



# ITRC Guidance Information

## Product Announcement | April 2013

### *Environmental Molecular Diagnostics: New Tools for Better Decisions*

A new web-based document from ITRC describes how environmental molecular diagnostics (EMDs) can benefit environmental site management. This document provides objective guidance on the best practices for using EMDs, demonstrates appropriate uses of EMDs, and explains how to collect, evaluate, apply, and interpret results. Specific guidance for regulators, project managers, and public and tribal stakeholders is also provided. You can access this new guidance at <http://www.itrcweb.org/EMD-2/>.



## Background

Environmental molecular diagnostics (EMDs) is a collective term that describes a group of advanced and emerging techniques used to analyze the biological and chemical characteristics of environmental samples. Over the last decade, many advances have been made in adapting and applying EMDs for environmental site management. EMDs are becoming increasingly powerful, and standardized methods are being developed to guide their use. As a result, EMD use is increasing rapidly, and a growing need exists for technical information and training on EMDs. EMDs provide additional and often unique information that supplements conventional data.

EMDs can be classified into two major categories of analytical techniques: chemical techniques, specifically compound specific isotope analysis (CSIA), and a variety of molecular biological techniques (MBTs). CSIA measures the amount of stable isotopes (typically carbon, hydrogen, or chlorine) in contaminants to determine the extent of specific chemical and biochemical reactions impacting the contaminant. As a contaminant degrades through natural or engineered processes, the relative amount of each stable isotope in the contaminant can change. In contrast, the isotopic composition of contaminants is largely unaffected by processes that do not result in degradation of the contaminant (such as dilution). CSIA therefore can be useful for answering several important questions regarding a chemical's source, degradation mechanisms, and rate of degradation.

MBTs evaluate the types, abundance, and biochemical capabilities of microorganisms present in the environment. Often, the microorganisms responsible for the degradation of specific contaminants cannot be detected and quantified by conventional methods. Several types of available MBTs can overcome these limitations. Some MBTs can be used to detect known microorganisms, others are also useful for quantification, some can be used to determine whether microorganisms are actively degrading specific contaminants, and some can identify currently unknown microorganisms involved in degradation.

## How ITRC Guidance Can Help You

The EMD web-based guidance will help you to develop better site management decisions using these new diagnostic tools. The document provides detailed descriptions of each of the major EMDs, along with case studies and recommendations regarding the appropriate uses of these techniques. In addition, appendices are included to address the frequently asked questions regarding the underlying science (including stable isotope chemistry and fundamental molecular biology), so that interested project managers, stakeholders and regulators can easily find the information needed to understand the basis for each of the individual EMDs. The EMD web-based guidance and EMD fact sheets offer the following benefits to environmental professionals:



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

- ▶ An introduction to EMDs and information about their use in the management of contaminated sites
- ▶ Tables and decision framework diagrams to help you recognize how EMDs complement conventional data, identify benefits and limitations of EMDs, and determine if EMDs will be useful at a specific site
- ▶ Decision diagrams and data interpretation summaries so that you can consider which EMD is appropriate for your project lifecycle phase and site questions
- ▶ Case studies with examples of the application of EMDs in the field
- ▶ Basic overview information about isotopic chemistry and microbiology
- ▶ A web-based format for rapid navigation, simplified searching, portability, and easy sharing

If you are considering using EMDs at a cleanup site, you can achieve the maximum benefit from this guidance by taking the following actions:

- ▶ Share this guidance and FREE Internet-based training with your co-workers, site owners, consultants, and other audiences by providing a link from your website to: <http://www.itrcweb.org/EMD-2/>
- ▶ Use ITRC guidance as a tool to develop or update existing guidance.
- ▶ Report to ITRC any successes or concerns related to this guidance, training course, or the application of EMDs at sites at: <http://www.itrcweb.org/feedback.asp>.
- ▶ Promote the EMD web-based document use when speaking at conferences and meetings, or when developing curricula.
- ▶ If you are a regulator, provide your state's concurrence on the guidance document, which is coordinated by your ITRC State Point of Contact (POC), see <http://www.itrcweb.org/Team/Public?teamID=50>.

## Resources

For more information, please see the following ITRC documents and links:

- ▶ EMD Web-based Guidance (EMD-2), April 2013 (<http://www.itrcweb.org/EMD-2/>)
- ▶ EMD Fact Sheets (EMD-1), November 2011 (<http://www.itrcweb.org/Guidance/ListDocuments?topicID=33&subTopicID=14>)
- ▶ Additional information and useful links about EMDs (<http://www.itrcweb.org/Team/Public?teamID=3>)

## FREE Internet Training Course

ITRC has developed a FREE Internet-based training course for this product. This training will describe the utility of EMDs during site management, and provide an overview of the format and content of the web-based guidance, a technical overview of commonly used EMDs, and case study examples of application of EMDs in environmental site management.

You will also be provided with links to additional resources related to EMDs. Registration opens 4-6 weeks prior to the class date at: <http://www.itrcweb.org/Training?topicID=33>. You can take the training "live" from the comfort of your own office, or access archives of past classes at your convenience. If you have questions after completing the online registration, call (402) 201-2419, or send an e-mail to [training@itrcweb.org](mailto:training@itrcweb.org).

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