

## 2014 ITRC Project Proposal

### Environmental Molecular Diagnostics (EMD) –Modular Internet-based Training

**Proposal Date:** June 2013

**Proposal Contact:**

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**Proposal Topical Area:**

Site Characterization – new analytical techniques to support understanding of sites in all project life cycle stages – including remediation performance assessment, and long term monitoring.

**Proposal Summary**

EMD methods represent great potential to collect important data at sites during characterization, remediation, monitoring and closure. There is a broad range of EMD methods described in the ITRC Tech Reg. These EMDs are applicable to different site conditions, questions and contaminants. Because of the required familiarity and expertise needed to properly apply EMDs, we propose a new and unique method of training that uses advancements in software and research into learning strategies.

ITRC is well known for its very successful training programs, both “classroom” and internet based training (IBT). On occasion, teams expand their IBT and present four or eight hour training sessions at conferences. Recent feedback from technology transfer exercises has begun to stress the learners’ desire for small, self-contained and readily accessed modules of training. In addition an increasingly higher majority of environmental professionals require training that can provide CEUs.

The ITRC Environmental Molecular Diagnostics (EMD) team has completed an on-line technical and regulatory guidance document <http://www.itrcweb.org/EMD-2/#Welcome.htm>. It is an excellent resource, but to fully address the current knowledge gap in the environmental remediation community, cover related issues and adequately discuss each of these promising technologies would have required the document be overly long and dense. The IBT prepared by the EMD team is also an excellent resource. As with all ITRC IBT courses it provides an overview of the Tech Reg document. Unfortunately, complex ITRC projects like EMD highlight a gap in the training program. We simply cannot cover all of the information in the Tech Reg. More importantly, if we tried, we would inundate the learner with too much information.

In the past, a proposed solution has been classroom training. Classroom training is an excellent resource. It is however very expensive to develop and deliver. Successful deployment depends on marketing and an interest in taking the course. As with the IBT, even classroom training would be broad and just too much information for some learners. Educational research continues to document that individuals have different learning styles. The fixed syllabus of classroom training cannot accommodate

the learners who are only interested in some of the EMD tools. Even the most successful ITRC classroom training courses may only reach 2,000 learners. By the time each class has covered the cost of instructor travel, facility rental, course material prep, refreshments, regulator and stakeholder scholarships and other expenses it is difficult to break even. Also, it can be a problem for participants to gain approval to travel, sometimes out-of-state, for 2-3 days out of the office.

ITRC training needs to adapt. Small training modules need to be developed that present less intense and more digestible information. We need to take advantage of new software developments that allow interactive learning, allow the learner to pick and choose topics on demand, and document that the learner has taken the course by monitoring time spent and by testing to demonstrate comprehension. This type of platform would allow ITRC to easily offer CEUs and recover the cost of course development. Uniquely for EMD, it would support the progressive learning that is needed as environmental professionals begin to learn about and use EMDs at sites. Expanding ITRC's capabilities to include this type of course would greatly improve technology transfer for EMD, and also for other complex topics.

### **Proposed Scope to Address Problem**

The hard work and innovative spirit of the EMD team resulted in the "Team of the Year" award in 2012. Many of the EMD team members are experts in technology transfer. Academic members of the team use new interactive software to enhance their own teaching. With that background and ingenuity the team has constructed a pathway to an "e-learning" platform that is designed to present EMD tools in accessible modules of training. This proposed pathway develops a series of "nuggets" that are accessed on-line and seamlessly present small and concise lessons through a multitude of media types that can involve video, graphs and "drill down" style diagrams. In addition, optional quiz questions are presented that the learner can use to test their own mastery of the material, explore through the interaction with the material, or (through "hints") do both.

The curriculum for these nuggets will be more extensive than just a single IBT session. Since it is self-directed, by using hyperlinks the student can cover material in any order. The syllabus followed by each student is designed by that individual, with the option to skip some topics while going into depth on others. There will be a recommended and comprehensive syllabus that the trainers use in preparing the course, but it is by no means required or expected that each learner follow that syllabus. As stated earlier, EMD methods represent great potential for useful data to be collected at sites during all project phases. There is a broad range of EMD methods described in the ITRC Tech Reg. These are applicable to different site conditions, questions and contaminants. This unique method of training will allow the student to tailor the training to their personal needs.

The value for a user of a tailored syllabus for on-line learning will be maximized for EMDs because each user can select the modules that are most applicable to their particular site. The same user may return to the ITRC training and access different modules when working on a different site. EMDs are applicable to some of the most difficult contamination problems the remediation community faces. EMDs can provide unique and valuable information for dense non-aqueous phase liquid (DNAPL), such as chlorinated solvents, perchlorate, metals and other challenging contaminants. Currently, there are few

training resources available for environmental site management applications of the EMD methods, so ITRC has an opportunity to provide practical and in-depth continuing education training for environmental professionals.

### **Targeted Users**

As with other methods of ITRC training, the targeted users for the EMD training will be the entire membership. It is anticipated that this new method of delivering information will be very popular. Any ITRC member who, because of their license or professional credentials, needs CEUs will find these nuggets very useful and particularly effective.

As with all ITRC trainings, we anticipate that non-members will also participate. Hopefully other teams will follow our lead and this new method of information delivery will add to the ITRC training toolbox.

### **Summary of Deliverables and Schedule**

The focus of the project is to design and produce an EMD training program that:

- Is self-paced
- Is self-directed
- Contains components not found in other ITRC trainings
  - Video
  - Progress monitoring
  - Self-testing and potential for CEUs
- Recommends a comprehensive course syllabus that presents the material as a series of hyperlinks.
- Contains on-line “examples” that the user can either solve for them self or see worked out.
- Contains contact information for trainers so that learners can follow-up if necessary.
- Uniquely provides for the potential to develop a forum for learners to continue to interact.

Rather than prepare training on each of the EMD tools, we anticipate a different approach. We propose develop the following nuggets:

- One on ‘Why should we use EMD tools?’
- One each on the main EMD tools
  - Compound Specific Isotope Analysis
  - Qualitative Polymerase Chain Reaction
  - Stable Isotope Probing
- One each on using tools for three main contaminant types
  - Chlorinated Organics
  - MTBE
  - Perchlorate
- One each on three main environmental areas

- DNAPL
- Vapor Intrusion
- Monitored Natural Attenuation

It is also recognized that as a “first of its kind” project for ITRC, this innovative training style will become a model for future ITRC training efforts. This proposal could be implemented in one of two different alternative approaches. The first alternative would be to develop the above list of nuggets as one group of training modules. The second alternative would be to develop 3 or 4 of the nuggets as a pilot project to learn the best approach and then commit to developing more nuggets. Either of the approaches may suit the 2014 budget and so the two alternatives are being presented here. The team feels that once the mechanism to produce these nuggets is developed, turnaround on each one will be shorter and shorter. The first alternative should be able to be implemented as a one-year project. The second alternative should be able to be implemented in a two-year project.

### **Impact**

The EMD team does not intend for this new method of information delivery to replace the highly successful IBT or Classroom Training that has been the foundation of the ITRC training program. However, we do realize that for a complex and broad subject matter like these EMD tools we need to develop customized methods to deliver information.

We believe that by using an interactive training platform ITRC can allow learners to move at their own pace, pick and choose their own syllabus, engage in the training without travel, and deliver CEUs. By adding these training options ITRC will greatly expand the value of their training program.

We simply seek to leverage the tremendous amount of information we have developed in our fact sheets, web-based Tech Reg document and IBT into a valuable learning tool.

### **Proposed Personnel**

The EMD team is composed of a diverse group of experts, including federal personnel, academic members, industry experts, consulting and laboratory experts and state members from New Jersey, Pennsylvania, Georgia, Alaska, and California. The EMD team represents some of the leading experts in the fields of molecular biological tools and compound specific isotope analyses. The EMD team members are enthusiastic about pursuing the development of this modular Internet-based training.