



2014 ITRC PROJECT PROPOSAL

Remediation Projects Only

Remediation Management of Complex Sites: Case Studies and Guidance

Proposal Date

September 13, 2013

Proposal Contacts

- Hope Lee and Mike Truex, Pacific Northwest National Laboratory
- Paul Beam, DOE-EM
- Charles Newell, GSI Environmental
- DoD (TBD)
- State Team Leader (at least one from WA,SC,TN,KY)
- Other State Representatives

Proposals Topical Area

This proposal cross-cuts all of the topical areas identified in the RFP.

- Site characterization, sampling, and monitoring: Proposed products provide a structured approach and context for site characterization and monitoring, with incorporation of the resulting information into conceptual models that support remedy decisions.
- Soil, groundwater, and sediments contamination: Proposed products include integration of predictive analyses and assessment of risk with approaches for selecting and implementing remedy strategies that improve the integration between and iterative nature of remediation and monitoring. being employed.
- Long term stewardship and land use controls: Proposed products provide approaches for reducing future risk as an element of long-term management strategies to maintain protectiveness, and define and achieve restoration goals.

Proposal Summary

There are multiple sites where conventional remedies and approaches are difficult to successfully apply (National Research Council, 2012). Despite nearly 40 years of remediation efforts in the United States and other industrialized countries, remediation of groundwater to a condition allowing for unlimited use/unrestricted exposure (UU/UE) remains a significant challenge. While there are success stories, the majority of waste sites that have been closed were relatively simple compared with the remaining sites. Substantial portions of the remaining challenge are owned by the Department of Defense (DoD) and the Department of Energy (DOE) Office of Environmental Management (EM), representing two of the largest soil and groundwater cleanup programs in the world. The National Research Council recently examined DoD, DOE and other cleanup to identify the magnitude of the remaining challenge and trends. This study included a rough estimate of 126,000 remaining complex sites with a remediation cost of \$110 to \$127 billion (NRC 2012).



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Current regulations and existing guidance enable a variety of approaches that could be suitable to address challenging sites. However, specific examples followed by guidance describing the elements, tools, and options for these sites are needed. This is especially true where success may need to rely on risk management strategies coupled with long-term management using iterative applications of remediation and monitoring to (a) maintain protectiveness of human health and the environment and (b) make appropriate progress toward reducing future risk and defining and achieving restoration goals. Providing a structured approach to address complex sites will help regulators and site managers to develop protective approaches that have a strong scientific and technical foundation for selecting and implementing integrated remediation, monitoring and management solutions.

Within an ITRC Project, guidance could be developed to achieve the following:

- Define integrated characterization, monitoring, and conceptual model efforts that support predictive analyses before and during remediation, remedy decisions, and focus on information/data (scientific and technical) needed to support remediation approaches at complex sites; Examine and provide approaches for selection and implementation of multi-component remedies that incorporate the following:
 - Increased focus on mitigating future risks as an element of long-term management strategies
 - Iterative application of remediation and monitoring programs to maintain human health and environmental protectiveness and make progress toward reducing future risk; and
- Provide a technical foundation for progressive remedy implementation, where appropriate, and for defining and achieving a successful remediation strategy at complex sites.

The proposed approach for the ITRC project would be to compile and synthesize existing guidance and regulations along with case study examples to produce a more holistic technical regulatory guidance document relevant to managing challenging sites that may need to consider more nuanced or longer-term strategies to meet cleanup goals. These existing tools and strategies may need to be adapted to focus on providing the technical justification and implementation approaches for remedies at challenging sites. The effort would also compile and identify relevant tools to support this process with guidance on how these tools could be used to support specific aspects of the remedy selection and implementation process.

A useful element for structuring the guidance to address challenging sites is defining and managing aspects of the remedy selection and implementation process around remediation goals as described by the National Research Council (2012). The ITRC's Integrated DNAPL Site Strategy (IDSS) technical/regulatory guidance is another important document that provides strong concepts such as Functional Objectives for management of remediation that can serve as a building block for a broader complex site guidance document. Other relevant documents produced by ITRC's Remediation Risk Management and the Environmental Molecular Diagnostics teams, and by ESTCP (e.g., Diagnostic Tools for Performance Evaluation of Innovative In-Situ Remediation Technologies at Chlorinated Solvent-Contaminated Sites, 2011; and Assessing Alternative Endpoints for Groundwater Remediation at Contaminated Sites, 2011). Incorporating elements necessary to predict remediation performance based on appropriate conceptual model practices will be another component of the complex site guidance. The ITRC has another team, Risk Assessment, which is currently producing updated guidance that will be a key component of the complex site guidance as well. The National Research Council (2012) has recently advanced the need for developments that can aid in "transition from active remediation to



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more passive strategies and provide more cost-effective and protective long-term management of complex sites,” including conducting formal Transition Assessments. This concept also provides a material for consideration and incorporation into the complex site guidance that will be the goal of the ITRC team. A key part of the effort would be to use the ITRC forum to engage project participants in examining remediation strategies and the concepts, approaches, and tools, such as ASCEM, that can support remediation decisions at complex sites. In addition to the multiple resources described above, existing regulatory guidance will be revisited together with the recently released EPA groundwater restoration Road Map (2011). This summarizes existing guidance for restoring contaminated groundwater under CERCLA, and the Road Map includes major decision points.

The stages of the project would include a research element to compile information, a discussion and synthesis element to prepare case studies and to develop a framework for a guidance document, and then the document preparation, review, and release process. A three-year project period is anticipated to fully address these elements. Year 1 would include the research element with case studies and compiling a template for the technical regulatory document. Year 2 would focus on the preparation of the technical regulatory document, and Year 3 would involve the completion/publication of the document and related communication activities. A training course could be developed and implemented in Year 3.

Proposed Personnel

- State and federal (EPA) participation is needed to facilitate compilation of appropriate existing relevant guidance, regulations, and tools and to provide regulatory context for synthesizing and adapting this information into a useful complex site document. A strong engagement of states would be desired due to the wide distribution of DoD and DOE sites across the nation.
- This proposal addresses key concerns for DOE and DoD site managers and would therefore include participation of representatives from DOE and DoD.
- Technical representatives from national laboratories, academia, and industry familiar with appropriate tools and application of guidance documents will help support interpretation of the technical aspects of the guidance document.

Summary of Deliverables/Primary Project Product(s)

Deliverables will include the following:

- A mapping of current guidance and tools relevant to determination of remediation goals and the selection and implementation of related remedies.
- A case study summary with appropriate analyses of the compiled results.
- A technical and regulatory guidance document and related overview document(s), if any.
- Associated training course (internet and/or in-person).



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Targeted Users

As is typical with ITRC documents, the primary targets are state regulators and stakeholders. The project will target a broad range of other stakeholders (DOE, DoD, NRC, USEPA, tribal communities, and any commercial facilities that have contaminated sites with long-term remediation issues). In addition, team members from academia may have an interest in the educational aspects and development of technical tools for use at complex sites.