

Attenuation-Based Remedies for Metals and Radionuclides in Groundwater

How and When Will We Impact Site Milestones?

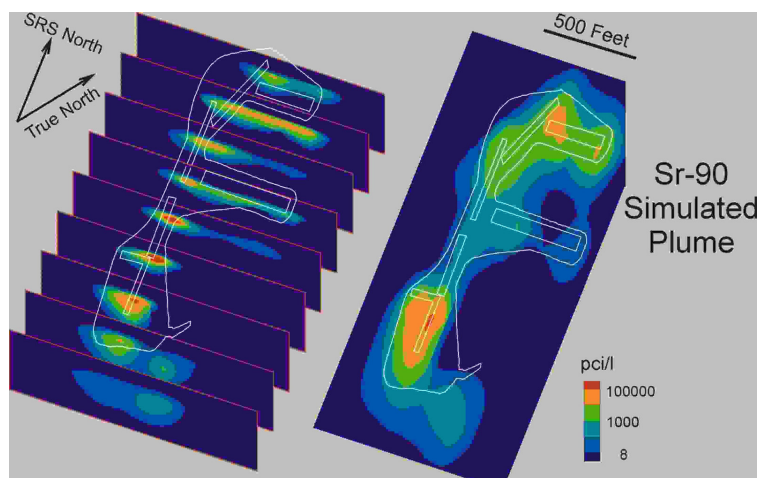
- ▶ FY11: Develop a framework, based on geochemical gradients, as the technical foundation to support innovative site remedial decisions.
- ▶ FY11: Demonstrate remediation technologies to transition from source treatments to monitored natural attenuation (MNA).
- ▶ FY12: Provide tools for measuring geochemical gradients and effectiveness of attenuation-based remedies.
- ▶ FY12: Demonstrate transition technologies to enable sites to discontinue use of energy intensive technologies and shorten time-frames to reaching remedial goals.

Milestone

Savannah River—Requirements of the F-Area Seepage Basins Resource Conservation and Recovery Act Corrective Action (RCRA) Plan Phase II Part A—“Develop and test practicable technologies to meet the groundwater protection standards” (submission no later than 7/31/2015)

How Is Metal and Radionuclide Contamination Impeding Site Closure?

Metals and radionuclides are not destroyed by remediation technologies. Currently, the only treatment methods are costly excavation or inefficient pump-and-treat. Unless maintenance is performed in perpetuity, all in situ remedies eventually rely on stabilization mechanisms to reduce environmental and human health risks. Attenuation-based remedies are the only paths to long-term stewardship of sites with metal and radionuclide contamination.



Environmental Management

safety ♦ performance ♦ cleanup ♦ closure

For more information:
[www.em.doe.gov/
Pages/GroundwaterSoilCleanup.aspx](http://www.em.doe.gov/Pages/GroundwaterSoilCleanup.aspx)



What Are The Transformational Concepts Advancing This Effort Over Others?

Geochemical Gradients-Based Technical Framework

Provide practical approaches and methods site owners can employ to understand the role of geochemical gradients in controlling the migration of contaminants. These approaches and methods support current, as well as long-term, actions as the geochemical gradients evolve in time and space.

Tools and Methods to Measure Geochemical Gradients and Attenuation Mechanisms

Provide practical means for site owners to measure field conditions, currently and in the long-term. These data support site conceptual model development and form the basis for remedial decisions.

Enhanced Attenuation Treatment Technologies

Develop and demonstrate engineered technologies that manipulate geochemical gradients such that the resulting attenuation mechanisms are sustainable. Technology implementation will enable remediation goals to be met and facilitate site closure.

What Did the National Academy of Sciences Identify as the Key Technical Challenges?

- ▶ *Complex interactions between hydrologic and biogeochemical processes need to be understood and incorporated into site models and remediation strategies (National Academy of Science, NAS)*
- ▶ *Site needs and contaminant sources are poorly addressed by baseline remediation approaches (NAS)*
- ▶ *Framework to gain regulatory approval for transitioning from active to passive (MNA) remediation is lacking*

Why Attenuation-Based Remedies?

All baseline plans for waste units with metal and radionuclide contamination in the groundwater include MNA in the remedy. The existing technical basis and tools do not support successfully reaching remediation goals as the focus has been short-term stabilization, rather than long-term stabilization that works in concert with natural waste site evolution. Attenuation-based remedies based on a geochemically-controlled technical framework will provide the only feasible, cost-effective paths to long-term stewardship of sites.

INITIATIVE IMPACT TO SITE MILESTONES

- Provides a means to effectively remediate metals and radionuclides without removal, excavation, transport, and disposal.
- Removes regulatory barriers to and enhances stakeholder acceptance for attenuation of metals and radionuclides.

For more information contact:

Miles Dehnam, (803) 725-5521;
miles.denham@srnl.doe.gov