



News from the Savannah River National Laboratory

November 16, 2004 For immediate release
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Researchers Study How the Earth Heals Itself

AIKEN, S.C. – Nature has many ways of cleansing itself of the contamination that resulted from human activity. Sometimes the best method of environmental cleanup is just to let nature do its work, or to provide a little “boost” for the earth’s own tools.

The Savannah River National Laboratory is coordinating a project for the U.S. Department of Energy that looks at nature’s own ability to clean chlorinated solvents from the groundwater, and how to apply the new science to help understand that process. Results of this three-year project are expected to accelerate cleanup by a minimum of 10 years for DOE sites that have groundwater plumes contaminated with chlorinated solvents. At SRS, the project is expected to make it possible to accelerate chlorinated solvent cleanup by at least 20 years. “We have at our disposal a vast toolbox of methods for cleaning up contaminated groundwater,” Dr. Brian Looney, chairperson of the project’s technical team says. “Some contamination calls for very aggressive treatment using large amounts of energy and chemicals. At the other end of the spectrum, there are situations where the best approach is to stand back and allow natural mechanisms, like naturally occurring microbes, to break down or isolate the contaminants. In those cases, the human’s only role is to monitor the process, to make sure that nothing is interfering with nature’s ability to work,” Dr. Looney continues. “That approach is called monitored natural attenuation.

“Then there’s another type of situation, when all nature needs is a little assistance, such as the addition of nutrients to stimulate microbes to do their work,” Dr. Looney adds. This is known as “enhanced attenuation.” “The trick,” Dr. Looney explains, “is first to know which situation calls for which approach, and then to assure that any enhancements are sustainable.”

Last year, DOE launched the Monitored Natural Attenuation (MNA)/Enhanced Attenuation (EA) Project to facilitate the implementation of appropriate natural and enhanced strategies for the cleanup of solvent-contaminated groundwater at DOE sites. A technical working group of nationally recognized scientists, coordinated by SRNL’s Dr. Brian Looney, is guiding the project’s scientific and technical direction, working with researchers across the United States. The product of the project will be a technical guidance document that is suitable for use across the DOE complex in evaluating MNA and EA as potential tools in remediating solvent-contaminated groundwater sites.

“We’re building on the very good science that already exists in this field,” Karen Vangelas, this project’s technical coordinator for SRNL, says. “We looked at the existing processes and technologies and determined where further advancements in research and development might be useful.” The technical working group identified several key concepts and technical areas to be explored and developed. They then sought out research projects

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that would help them meet their goals: advancement in the understanding of the natural processes that contribute to natural attenuation of chlorinated solvents; identification of new tools for measuring these processes in a direct manner, for evaluating the data and making decisions; and assistance in designing long-term monitoring programs.

They solicited ideas for research projects from scientists, engineers and technology developers from across the nation. From the research ideas submitted by representatives of industry, universities, national laboratories and federal agencies, the group selected 14 research projects to be performed. Field test sites at the Savannah River Site were identified for those projects that required such a site. All of the research projects are now under way and are to be completed within 22 months.

Members of the technical working group are also working to develop three key topics: characterization and monitoring needed to support MNA and EA, the EA concept, and the mass balance concept. A mass balance approach could be a tool for evaluating when natural attenuation is a good choice for the remediation of a contaminated site. This approach balances the contaminants going into a system with the site's natural attenuation capacity. The site's capacity would include all of the natural mechanisms that the location has available to remedy the contamination, either by dispersing it, biodegrading it, chemically transforming it, sequestering it or immobilizing it.

A key element of the project is to develop a relationship with regulators, stakeholders and the companies and organizations that will implement these cleanup strategies. The idea is to coordinate with regulatory agencies while the research is being conducted, to ensure that the data and the resulting technologies meet their needs. To meet that aim, the MNA/EA Project is working closely with the Interstate Technology and Regulatory Council, a coalition that brings together regulatory agencies from 40 states, along with multiple federal partners, industry participants and other stakeholders to make it easier to implement new technologies for cost-effective environmental compliance. Collaboration between the project and ITRC will assist the technical working group to develop technical areas that will address issues the regulators are faced with in regulating remediation efforts. SRNL is the applied research and development laboratory at the Savannah River Site. Washington Savannah River Company operates the laboratory for the U.S. Department of Energy.

WSRC-04-37

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