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FOR IMMEDIATE RELEASE

Vegetable Oil Used to Treat Groundwater Contamination

AIKEN, S.C. (July 16, 2013) – A common household product is being used at the Savannah River Site (SRS) to treat groundwater contamination, saving an estimated $27 million and significantly reducing cleanup time. Vegetable oil is being used to treat hazardous chlorinated solvents in groundwater beneath T Area, a former laboratory and production facility at SRS. Switching to this biodegradable treatment approach is expected to meet environmental cleanup objectives in one-third the time of traditional techniques, saving millions of dollars of Federal cleanup funds.

T Area, located in the southwest portion of the site, was one of the first operational facilities at SRS and continued in operation until the end of the Cold War. In collaboration with Savannah River Nuclear Solutions (SRNS) Environmental Compliance and Area Completion Projects, researchers at the Savannah River National Laboratory (SRNL) have been working toward improving the efficiency of the cleanup of this facility. In this cleanup technique, soybean oil is injected into wells to treat the groundwater. The oil is able to capture the hazardous solvents by immobilizing it from the groundwater. It then acts to stimulate the growth and activity of microbes. These microbes are able to consume solvents and break them down into harmless byproducts.

Jay Noonkester and Keith Hyde sample groundwater in T Area to evaluate remediation progress.

This is the first time SRS has used vegetable oil as part of an active remediation effort.
"Biodegradable oils, like vegetable or other edible oils, have emerged as an effective treatment at environmental waste sites. Edible oils work in two ways: they contain the contaminants from spreading, and they accelerate natural processes that decompose chlorinated solvents into harmless components, thereby removing the risk to the

environment," said lead researcher Brian Riha. "Traditional active remedial techniques are aimed at physically removing the contaminants from the soil. They are extremely expensive and frankly, not always effective."

The groundwater beneath T Area is contaminated by chlorinated solvents that are common degreasing agents. Since the contamination was detected in the 1980s, the area has been treated by a combination of soil vapor extraction and groundwater pump-and-treat systems. Soil vapor extraction removes volatile contaminants by inducing air flow through the contaminated area. The groundwater pump and treat method pumps water to the surface, removes the hazardous chemicals and then discharges the treated water. Both systems are active treatment remedies and are expensive to operate.

SRS received approval to temporarily discontinue the active groundwater treatment and implement an innovative strategy developed by a team of researchers led by SRNL. This strategy is called "enhanced attenuation." Enhanced attenuation investigates how nature could rid itself of contamination, and then uses engineering principles to encourage and foster this process, allowing the contamination to be passively stabilized and reduced.

Studies on the use of vegetable oil in T Area began in 2006. By using the biodegradable oil, zones are created that serve to decrease chemical concentrations. This is done by physically isolating the contaminants in the oil, reducing groundwater mobility. The vegetable oil also encourages microbes to grow and more efficiently aid in the breakdown of chemicals. In-place degradation is typically more efficient and cost effective than physically removing the contamination through pump-and-treat methods.

"The purpose of these studies was to determine the feasibility of using edible oils for remediation of the low, but persistent, chlorinated solvent groundwater contamination. Pure soybean oil spreads laterally, forming a thin layer on the water table to intercept and reduce future chlorinated solvents by partitioning, and reduces oxygen inputs by bio-stimulation," Riha said. "We also used emulsified oil to form active zones within the contaminated area to degrade existing groundwater contamination. Due to the success of the treatability study, SRS was able to transition from active treatment to the innovative low-cost and low-energy passive treatment using the existing groundwater well network and vegetable oil treatment."

Since these biodegradable oils are injected approximately 60 feet below ground surface, there is no negative impact to plants or wildlife in the area. The series of wells where the oil is injected is approximately 1600 feet from the Savannah River, allowing the oil to completely degrade before reaching the river.

"Through innovative research such as this, the Savannah River National Laboratory is able to make a direct impact on improving our environment, while at the same time finding more efficient and cost effective ways to do business," said SRNL Laboratory Director Dr. Terry Michalske. "The environmental cleanup mission is critical to our nation, and the creative scientists and engineers at SRNL are key to its success."

"The edible oil process provides the Savannah River Site with significant cost and schedule savings. It is also a highly innovative method for treating the groundwater pollution that remains in T-Area," Karen Guevara, Savannah River Operations Office Assistant Manager for Infrastructure and Environmental Stewardship.

"The ability to put this process into use was an excellent collaboration between our contractor Savannah River Nuclear Solutions working closely with the Savannah River National Laboratory to develop , test and deploy the edible oil treatment systems. Additionally, gaining the approval to deploy this system from our regulators, the U.S. Environmental Protection Agency – Region 4, and South Carolina Department of Health and Environmental Control was key to this upgrade," Guevara said. Also contributing to this research were Brian Looney, Miles Denham, and Kitt Bagwell.

The Savannah River National Laboratory (SRNL) is a multi-program applied research and development laboratory for the U.S. Department of Energy. SRNL applies state-of-the-art science and engineering to provide practical, high-value, cost-effective solutions for our nation's environmental cleanup, nuclear security and clean energy challenges.

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