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Media Contacts

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DOE TESTING VEGETABLE OIL AS POSSIBLE TREATMENT FOR GROUNDWATER CONTAMINATION AT HANFORD

The U.S. Department of Energy, contractor Fluor Hanford, and Pacific Northwest National Laboratory (PNNL) are testing a common household item – vegetable oil – to see how effective it can be in cleaning up contaminated groundwater at DOE's Hanford Site in southeast Washington State.

Today, a crew began injecting 1,500 gallons of emulsified vegetable oil mixed with 55,000 gallons of water into a well near the 100-D nuclear reactor that once produced plutonium for nuclear weapons during the Cold War.

This is the second phase of testing a method called biostimulation, a method that stimulates microbes in the soil to treat contaminants. During the first phase of testing in September 2007, a crew injected 5,500 gallons of molasses mixed with water in a separate test well. The vegetable oil will grow microbes that should change chromium contamination in the groundwater into a non-toxic and less mobile form. The technology

is also designed to improve the performance of an existing treatment system in the ground between the contaminated groundwater and the nearby Columbia River.

“The molasses and vegetable oil are food sources for microbes,” said PNNL scientist Mike Truex. “We expect that microbes already in the groundwater will feed on the material and reproduce. The ‘bloom’ of microbes should change the water chemistry to the point that the toxic chromium will be reduced to a non-toxic state. In its new form, the chromium will also be non-soluble, so it won’t move with the groundwater.”

Hanford groundwater is not a source of drinking water and does not affect offsite drinking water sources, but there are possible impacts where Hanford groundwater flows into the Columbia River. DOE and Fluor Hanford have been operating a system since the 1990s to pump out and treat contaminated groundwater. They also injected a reactive chemical barrier next to the river. The barrier changes chromium to its non-toxic form as groundwater passes through. The biostimulation technology is intended to enhance the performance and extend the life of this reactive barrier.

During Hanford’s production years, the 1940s to the 1980s, a chemical called sodium dichromate was mixed with water that cooled Hanford’s nuclear reactors. After passing through the reactors, millions of gallons of cooling water were sent to liquid waste disposal facilities near the reactors, resulting in chromium contamination of the ground and groundwater.

“Going after the chromium in this area of Hanford is especially important,” said Mike Thompson, a hydrogeologist with the U.S. Department of Energy. “Levels of chromium contamination near the 100-D Reactor are among the highest on the site, and the area is next to the Columbia River. We need to protect the river and its ecosystem.”

“We need additional methods for treating contaminated groundwater near the D Reactor,” said Ann Shattuck, Fluor Hanford’s Groundwater Remediation Manager for the 100 Area. “Will these injections of molasses or vegetable oil be a recipe for success? We don’t know yet. Biostimulation is one potential method we’re testing. We’ll evaluate it along with other technologies we’re testing and apply the ones that work well.”

The molasses and vegetable oil are being tested in separate wells and will not be mixed. The molasses contains sugars that break down readily and are easily consumed by microbes in the groundwater. Scientists expect the molasses treatment to last about two years. The vegetable oil may last up to five years because its organic compounds are more concentrated and release slowly into the groundwater. Scientists will evaluate how well each of the materials works.

“Ecology approves of this test of a promising technology,” said John Price, Environmental Restoration Project Manager, Washington State Department of Ecology. “Ecology expects that multi-year tests should not delay early installation of full-scale systems.”

Biostimulation has been researched extensively over the past 20 years. Molasses and vegetable oil are commercially applied at locations off the Hanford Site, and in 2004, PNNL conducted limited testing of biostimulation using another material at Hanford.

The molasses has been treating the contaminants since it was injected last year. Monitoring of the molasses test will continue for at least another year while the vegetable oil is tested in an adjacent area. Following the demonstration, evaluation and results will be provided to the Department of Energy. DOE will identify a preferred cleanup method to the Washington State Department of Ecology.

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