SRNL's microbes useful for for environmental cleanup and oil recovery

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A unique, patent-pending collection of microbes that can be used both for cleaning up the environment and addressing our energy needs has earned the U.S. Department of Energy's Savannah River National Laboratory kudos from a newsletter covering the rapidly expanding field of nanotechnology.

Nanotech Briefs awarded SRNL's BioTiger™ a spot on its fourth annual Nano 50™ list, described as the top 50 technologies, innovators and products expected to revolutionize the industry. Nanotech Briefs will present the awards during the National Nano Engineering Conference, Nov. 12-13 in Boston. For more information, visit www.techbriefs.com/nano.

BioTiger™ resulted from over eight years of extensive work that began at a century-old Polish waste lagoon. "DOE had originally funded us to work with our Polish counterparts to develop a microbe-based method for cleaning up oil-contaminated soils," explains Dr. Robin Brigmon, SRNL Fellow Engineer. From that lagoon, they identified microbes that could break down the oil to carbon dioxide and other non-hazardous products. "The project was a great success," Dr. Brigmon says. "The lagoon now has been cleaned up, and deer now can be seen grazing on it."

Recent efforts have shown that BioTiger™ naturally produces chemicals that may have other industrial uses as well. For example, BioTiger™ can be applied directly for cleaning up oil residues on surfaces such as

concrete slabs and building foundations.

In addition to its original environmental cleanup uses, BioTiger™ has recently been shown to be highly effective for increasing oil recovery from oil sands without added chemicals. Oil sands (also referred to as tar sands) are a combination of clay, sand, water, and bitumen, a heavy black viscous material. Currently, oil sands represent about 40 percent of Canada's oil production. Approximately 20 percent of U.S. crude oil and refined products come from Canada, and a substantial portion of this amount comes from tar sands.

Oil sands are mined and processed to generate oil similar to that pumped from conventional oil wells, but extracting oil from these sands is more complex and requires more energy than standard oil recovery. Current methods require multiple steps including heating, mechanical mixing, and chemical additions to extract hydrocarbons from the oil sands.

There have been concerns about the environmental impact of these operations, including concerns about the amount of water used in the process, energy cost to operate the systems, runoff from the tailings ponds, wastewater from the facilities, and chemical residues in the water left over from the extraction process. Past efforts have generated large tailings ponds that still contain varying amounts of bitumen indicating that the process did not efficiently extract all of the available oil.

An enhanced oil recovery process using BioTiger™ could provide a means to maximize capacity and minimize environmental impact, while remaining cost effective. The BioTiger™ microbes attach themselves to the oil sands, separating the oil from the sand particles. The microbes make the separation step easier, resulting in more removed oil and, potentially, reduced energy costs.

In a test using oil sands from Ft. McMurray, Canada, BioTiger™

demonstrated a 50 percent improvement in separation over 4 hours, and a five-fold increase at 25 hours.

It may also have potential for other oil recovery initiatives, including oil shale and other underground areas with oil deposits.

Source: Savannah River National Laboratory