Microbes may control gas spills

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AMHERST - Iron-breathing microbes considered to be among the oldest life forms on earth could be the newest weapon against gasoline spills.

Researchers at the University of Massachusetts are looking into ways to use the tiny organisms found deep in the earth to control underground spills of the gasoline additive MTBE.

First added to gasoline to enhance octane, and later in much larger amounts to reduce air pollution, methyl tertiary butyl ether seeps quickly into the soil and has turned up in drinking water wells and groundwater supplies throughout the nation.

A recent study by the federal Environmental Protection Agency found that even if use of MTBE was immediately curtailed, it would take decades to remove the contamination. MTBE's effect on humans is still being studied, but it is suspected of causing cancer in animals.

"By encouraging these microorganisms deep in the soil we can get them to do the remediation for us," said Richard Lovley, a microbiologist who heads the UMass research project.

It's been known for some time that some bacteria can break down petrochemicals, he said, but most of the microorganisms that have been used are oxygen breathers.

Microbes whose life processes are based on iron and not oxygen have the advantage of naturally occurring deep in the earth where there is no oxygen, he said.

Because of the extreme conditions in which they can survive, the iron breathers, discovered about a decade ago, are believed to be among the earliest kind of organisms to appear on the earth and have intrigued scientists looking for clues to where life may be found on other planets.

"They are not harmful. They are natural components of the environment, so we wouldn't be adding something that could cause problems," he said. The waste product that is formed when they consume MTBE is carbon dioxide, he said.

The key to their effectiveness as pollution fighters is the ability of scientists to stimulate their growth and activity, to speed up what would otherwise be a slow process of breaking down MTBE. They are naturally present in all sediment, but in low numbers, LovLey said.

In lab tests using sediments from a variety of MTBE-contaminated sites from around the country, the bacteria, encouraged by the addition of iron-rich humus-like materials, have been able to remove about 3 percent of the MTBE a week. At that rate of removal, the sediment would be cleaned in less than a year, he said.

The researchers expect to begin field tests this fall he said.

Using similar techniques to encourage microbes whose life processes are based on sulfur, the UMass team has been able to remove benzene a carcinogenic component of gasoline and other fuels, from an underground site in Oklahoma, aceordin to LovleY.

"We found it actually worked better in the field than it had in the laboratory," LovleY said of the tests near Ponca City, Okla., financed with grants from the American Petroleum Institute and Conoco.