

# ALBERTA OIL

*The Business of Energy*

## How hungry microbes could revive old oilfields

Researchers in Saskatchewan hope tiny critters can boost recovery rates

BY DARREN CAMPBELL

April 23, 2012



*Illustration Anthony Tremmaglia*

**Malcolm Wilson** rattles off a jarring statistic. In Saskatchewan, operators typically produce only about eight per cent of the oil in a reservoir. “The more disturbing number is we’re leaving 92 per cent down there,” says the CEO of the Regina-based Petroleum Technology Resource Centre (PTRC).

In a world where US\$90-\$100 oil seems to be the new normal, that’s a lot of profit being left in the ground for companies active in Saskatchewan. That is also a lot of royalties – which governments use to build schools and hospitals and pay for programs and services – that are lost as well.

However, the PTRC, a non-profit research and development organization, is embarking on a research project that it hopes will improve the recovery ratio in Saskatchewan’s reservoirs. It’s yet another twist in the emerging field of enhanced oil recovery (EOR).

When petroleum experts think of EOR – the industry term for methods developed to squeeze more oil out of mature pools – they have visions of other, less obscure techniques. These would include injecting steam to loosen the heavy oil that allows it to flow more easily or using gases like carbon dioxide to enhance reservoir pressure and act as a solvent to free up the oil.

But what the PTRC is researching is not your typical EOR method. The center, which focuses on EOR research and also manages the world's largest carbon dioxide storage project – the Weyburn-Midale CO2 project – just received \$88,000 in funding to conduct research on what is known as microbial EOR (MEOR).

In essence, MEOR involves stimulating the growth of bacteria and allowing the tiny microbes to change the chemical composition of oil in the ground. They do this by secreting byproducts such as gas, polymers, acids and surfactants that improve the viscosity of the oil and allow it to flow to production wells more easily. What PTRC will be working on is identifying nutrients in Saskatchewan that could best “feed” these microbes that aid in oil recovery.

“If this process works, there are literally thousands of wells in which this system could be utilized with significant advantages to Saskatchewan and Alberta,” Wilson says.

The prize the PTRC is after could be huge for the oil and gas industry. Fully 20 per cent of global oil reserves are heavy and 1.1 trillion barrels of it is considered technically recoverable. Much of this oil is discovered, but industry hasn't figured out an economic way to produce it.

Closer to home, Lloydminster – the city that straddles the Saskatchewan-Alberta border – illustrates the potential that lies trapped underground in impermeable rock. Oil was first discovered there by a farmer in 1926. Today, the resource around Lloydminster is estimated to number 50 billion barrels. But the earth doesn't give up its black gold easily here. The oil is so heavy that as much sand is produced as oil. Calgary-based Husky Energy Inc. has land in the area that contains 10 billion barrels of oil. But in more than half a century of operating in Lloydminster, it's produced just 800 million barrels.

Wilson notes that throughout Saskatchewan the “thousands of wells” that are suspended or nearing that point could enjoy a rebirth if the MEOR work is successful. “We think with the situation we've got with a lot of wells potentially going to be abandoned that this will be successful and we'll be able to get another four, five or six years out of those wells,” he says. “And it would give us more time to develop the next generation technology beyond that.”

There are plenty of uncertainties that come with MEOR, however. While it's been touted as an extraction method for decades, it has also been plagued by poor performance and unreliable production. Yet some companies have stuck with it. Statoil is using MEOR at its Norne offshore field located in the Norwegian Sea. Then there is California-based Titan Oil Recovery Inc., which has turned it into a business, peddling its patented MEOR process to explorers and producers. Titan says it's had an average 127-per-cent increase in production in 55 wells where its MEOR process was used in 15 oilfields located in California, Alberta and Saskatchewan.

Wilson hopes the PTRC research will yield equally promising gains. But success is not guaranteed. “These are inevitably high-risk avenues, but high-reward if they work,” Wilson says. “So it's a good place for groups like PTRC to be involved.”

What the PTRC is focused on now is completing a nutrient scan in the province, identifying what organic nutrients are out there and what their properties are. Wilson says the researchers also have to understand what microbes there are and where you get the food for them so they can secrete the byproducts that free up the oil.

Between 2005 and 2011, heavy oil production in Saskatchewan declined by 36,000 barrels per day, according to the Canadian Association of Petroleum Producers. If MEOR applications are successful in the province, it is estimated that these non-producing wells could bring in an additional \$1.7 to \$3.4 million per well over five years.

The task at hand now is to get a sense of what nutrients are available and marry that with the microbial work, test it in the field and see if it works. It's a tall order and the odds are against it succeeding, but Wilson looks forward to the challenge. “It's kind of fun, actually,” he says. “I like getting out there and seeing what, at first glance, seems a bit offbeat.”

\*\*\*\*\*