EXPLORATION

Lots In Space

A new exploration tool is using satellite data to find oil

VANCOUVER-BASED PETROSTAR Petroleum Corporation owns and operates the 30-year-old Maidstone heavy oil field located near Lloydminster, Saskatchewan. Over the last several years, the company conducted a workover program to boost output from the producing McLaren formation to 125 barrels per day. It also shot seismic that showed a further prospective target structure in the Waseca formation. "We drilled a well into the Waseca zone, and it was 100% water," says Wade Tokarek, the area production superintendent for Petrostar. "Then we moved 50 metres to the east and encountered oil in the same zone and height." Petrostar was puzzled; seismic alone could not determine where to drill. The company needed another exploration tool to refine its search.

That extra tool turned out to be resonance coupling, a new exploration technology that relies on satellite sensing. "We identify an oil pool as if you are sitting on a giant crane and looking down," says Robert Fisher, CEO of Saskatoon, Saskatchewan-based Leaf and Stone Resonance Services Ltd. "We can say where the oil is, but not how deep."

According to Leaf and Stone, resonance coupling is a naturally occurring phenomenon whereby a substance creates a sympathetic response in an identical substance that is nearby. Although the phenomenon of resonance coupling has been known and studied, no one had thought to apply it to resource exploration until Fisher teamed up with David Carr.

Fisher, a CMA based in Saskatchewan, majored in math and quantitative analysis research at university. Carr, a 60-year-old Texan, is a dentist by training but has a fascination with space surveillance. "I've had two professional lives; one in the health field and one in space technology," says Carr. "I grew up in the aerospace field. My dad knew many scientists associated with NASA. I served on the Texas Aerospace Commission for 10 years, including a stint as chairman."

Friends for over 20 years, Fisher and Carr would often discuss arcane scientific matters, including the similarities between medical sensing of humans and satellite sensing of the Earth. "In the health field, there is a large amount of remote sensing," says Carr. "It's all the concept of measuring things based upon molecular frequencies. Likewise, we have been remote-sensing the Earth with satellites for several decades. There is a huge amount of spectrographic data."

Carr thought that satellite data could be used to scan for molecular signatures related to hydrocarbons and began investigating its potential in 2000. "We did beta testing for several years," he recalls. "A friend had a petroleum exploration company, and he was a bit dubious in the beginning, but we slowly worked his fields in Mississippi, Louisiana and Texas. We worked to see how the technology performed for existing fields. It was important for us to calibrate

EXPLORATION TOOL
Resonance coupling measurements are acquired on a lease using satellite, airplane or ground-based equipment.

what we were doing against known structures."

In 2007, Carr and Fisher set up Natural Resource Testing (NRT), LLC, in Texas to conduct further research into resonance coupling, and Leaf and Stone in Saskatchewan to market it. In Canada, Fisher worked with several mineral companies, successfully mapping out gold and kimberlite deposits (which can contain diamonds). They are working with three diamond companies on further surveys.

Their exploration tool is notably suited to aiding in the delineation of previously discovered oil deposits, however. "You can't use it as pure exploration for new fields," says Carr. "You need a sample from an existing well to match to a pattern." In a petroleum survey, NRT measures the resonance coupling properties of the client's target oil and then gathers data on the lease using satellite, airplane or ground-based equipment. NRT compares the gathered data to the target oil's measured response, creating a map showing where the same material is located geographically.

It takes about six weeks to run a survey. Clients can order two levels; a macro survey and a micro survey. A macro survey, which is used as an overview to high-grade targets, covers eight by 12 kilometres, or roughly 32,000 acres. A micro survey looks at a two-square-kilometre area. Costs range from $28-$30 per acre for a macro survey, to $100 per acre for a micro survey. "It's good for when someone has a lease with a thousand acres, and they need to figure out which 120 acres to concentrate their work in," says Fisher.

Resonance coupling came to the attention of Petrostar through a satisfied client who recommended the exploration tool to the company's president. "The president asked what I thought," recalls Tokarek. "I said if they can find oil, then it's important."

Leaf and Stone took an oil sample from the Maidstone field and ran a small, $15,000 survey. The result was a map showing where the oil was, and where the water was laterally. With the information, Petrostar was able to drill a $300,000 step-out located just 50 metres from a well that had encountered salt water. This time the company encountered a valuable column of oil. "We're happy with the results," says Tokarek. "It saved us a bunch of money."

The recent recession slowed Petrostar's Maidstone field expansion, but now that commodity prices and markets are recovering, the company has plans for another half-dozen wells based on the survey.

The future

In spite of initial success, Carr and Fisher are fully aware that the largely unknown technology — and their lack of geoscience background — makes the task of legitimizing the resonance coupling exploration tool an uphill struggle. "The biggest battle is to get geologists and geophysicists to believe we can do it," says Fisher.

"We are working unofficially with the Colorado School of Mines to test the technology and to educate young miners to understand the technology, how the patterns work," says Carr.

Still, the future looks bright; the duo hopes to double their client base, largely through word of mouth. "We have had 30 clients since 2007," says Fisher. "We hope to have 60 clients by June 30, 2010."

"It's new technology; people are reluctant to try new things," adds Tokarek. "Still, I have recommended it to two or three other companies." • **Gord Cope**

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