TLC Could Be Just The Ticket

Tool's Gentle Stimulation Increases Heavy Oil Production

GENTLE STIMULATION Left: Petrostar's Down Hole Tool being installed in a heavy oil well. Right: Connected by an encased coil cable to an energy source at surface, the DHT provides heat to generate steam and pressure downhole.

J.A. (Sandy) Sprinkle has been in and around the oil and gas business for a lot of years, in many facets, and only now, after nearly four decades, has he found people who will listen to his ideas.

He started out as a production engineer for several oil and gas producers. Much later, he earned an education degree and taught petroleum and instrumentation at the Northern Alberta Institute of Technology and Lakeland College. He ran a chemical business, treating chemicals. He was a consultant in the petroleum and construction industries. He even tried retirement for a while. Most recently, he designed and sized production equipment.

Now, Vancouver-based Petrostar Petroleum Corporation has offered him the opportunity to put into practice what he's been saying all along: that the best way to stimulate heavy oil wells, and not wreck the reservoir, is to do it gently.

"These guys gave me the chance to consult because they're talking the same language I've been talking 30 years, and it's kind of interesting … they're doing just what I would have done a long time ago," he says.

With Sprinkle as its senior production engineer and senior research and development engineer, any day now Petrostar will take a second stab at testing a tool designed to reduce the viscosity of heavy oil so that the oil flows more easily through traditional and horizontal wells, and can then be pushed out using heat and gas.

Petrostar's patent-pending Down Hole Tool (DHT) is electrical and similar to a stove element, but is about three inches in diameter and about four feet long. It sits at the bottom of a hole, opposite perforations to the oil formation. Water trickles past it and is almost made into steam, and that's what pushes into the formation and warms everything up, he explains.

Current methods of using steam to help recover oil, steam-assisted gravity drainage (SAGD) and VAPEX (vapour extraction), are energy- and capital-intensive.

SAGD is an expensive, major undertaking that requires a tremendous amount of steam, a steam generator, steam engineers, a source of fresh water, a way to collect it and government approvals, says Sprinkle. The DHT needs none of those. Petrostar is simply heating water and keeping the downhole pressure high enough that it doesn't collect scale build-up and burn out, he says.

SAGD can be quite violent, says Sprinkle. On occasion the steam cavity bursts through the production zone blowing sand and oil and sometimes even shale all over the place, and operators have trouble with their pumps.

"This is gentle. We're looking at three, four, five times the production of a primary well, but steady. What we're looking at is profitable. The investment is small, relatively, and the returns could be enormous," he says.

Most wells in the test area of west-central Saskatchewan produce a maximum of seven per cent of the oil in the ground on primary production. "We're thinking this is going to push it to 30 to 40%, and then we'll wait for a couple of years and start again, because the oil's still there," says Sprinkle, adding the formation may need a year or two to recharge before oil comes back to the wells.

Instead of producing for the usual five to 10 years, wells might produce for 50 years using Petrostar's DHT, contends Sprinkle. "We're looking at a long period of time, not extreme production," he says.

The DHT uses mostly reservoir water so there are fewer water disposal issues. Any additional water that's needed will be trucked in and the company estimates between two and 20 barrels per day per well will be needed for what Sprinkle calls "a nice, closed process."

The first-generation DHT was tested on two wells that were thought to have no reserves. The first test took place last summer on a well near Maidstone, Saskatchewan, in the McLaren formation, which contains 12- to 15-degree API oil. The well was heated for about two weeks and its production doubled to 12 bbls per day from six bbls for a few weeks after the tool was removed.

The second well was heated for about six weeks and the nearby wells showed a response immediately. Production increased six-fold, to more than 17 bbls per day from almost three bbls per day, lasting for four to five weeks after the tool was removed.

Two second-generation (Gen-2) tools are being deployed on the company's Maidstone well in the Waseca formation. They're vastly different from the first, says Wade Tokarek, Petrostar's area production superintendent.

The first-generation tool allowed water to run through it, causing scale build-up, and was deployed via coiled tubing. Gen-2's elements don't touch the fluid at all, so there's no build-up, and the tool is run down the hole on its own cable. The new tool is the same size as the first, but uses about half the power to generate more heat, says Tokarek.

The second-generation tool is also less expensive to build and deploy. Furthermore, the 66-kilowatt generator to run the first prototype has been replaced with a 22-kilowatt one that uses power more efficiently.

Modifications made to the Gen-2 are designed to increase its heating capability to 250 C from the previous prototype's 190 C, for increased steam and pressure buildup in the reservoir.

"We can run it down ourselves; we don't need any other side operators. It's more powerful and the elements have changed," says Tokarek of the second tool.

There is another Gen-2 DHT that's ready for further testing, and if results of the first batch of second-generation tests are promising, another six DHTs will be built starting a month or two later for further testing or for sale. Interest in the tools has come from several North American companies and as far away as the Middle East.

While the DHT is designed primarily to recover heavy oil, it can also be used to produce light oil where heat is needed to keep wells warm to prevent the attendant paraffin from solidifying halfway up the well, says Sprinkle.

"It's parallel to some of my own ideas and that's one reason I'm quite excited about it," he says.

■ Lynda Harrison

CONTACT FOR MORE INFORMATION

Robert Sim, Petrostar Petroleum, Tel: (604) 662-3004 x 105, E-mail: rasim@petrostarpetroleum.ca