



ENHANCED OIL RECOVERY

SHINING A LIGHT ON PLASMA PULSE

Joint venture takes Russian technology into Canadian oilfield

Plasma is the most common state of ordinary matter in the universe, observable in neon lamps, welding arcs, St. Elmo's fire and, perhaps most notably, the sun, which shines due to intense heat and pressure that ionizes gas to a point at which the energy frees electrons from hydrogen and helium atoms. Energizing gas into plasma is also part of a new and environmentally friendly technology used to obtain sustained higher productivity for oil and gas producers.

"It is a high-energy electrical discharge of capacitated, stored energy in the tool, in which the power is achieved from the surface into the tool through wireline or e-line delivery," says Ken Stankievich, president and chief executive officer at Technovita Technologies. "It does not require a lot of power on surface. In fact, while the energy delivered at the source of pulse creation is very high, it is only for a nanosecond."

Plasma pulse technology creates an electric arc between two electrodes, which very briefly discharges approximately 20,000 volts within the formation, emitting a high-speed hydraulic impulse wave strong enough to remove any clogged sedimentation from the perforation zone, and moving far into the formation without causing damage to downhole infrastructure.

The resonance vibrations can clean filtration channels and even create new ones within a 1,500-metre radius of the initial pulse, clearing away paraffins, asphaltene, scales and other materials. Placed opposite the perforated interval, crews initiate a metallic conductor discharge that forms the plasma pulse and accompanying compression wave. A well can be treated and put back into service within 24 hours.

Stankievich says: "If it is on surface, you can actually see a flash. But when done in the fluid of the >

▲ SHOCK TREATMENT

Novas Energy's plasma pulse technology uses a high-energy electrical discharge of capacitated, stored energy to emit a high-speed hydraulic impulse wave into the formation to increase oil recovery.

wellbore, then a gas bubble is created at a very intense pressure level—about 1.5 gigajoules for an instant—regulated at the absolute perfect location that we measure through logging to be in alignment with the perforation zone.”

As the plasma cools, the formation pressure forces sedimentation to flow into the well's sump, and the shockwave can be altered into flexible volume oscillations from the surface. With proper conveyance techniques, the technology is applicable to vertical, deviated and horizontal wells. “We have managed extensive laboratory testing to show that we are far below any threshold of destructive damage to any component of a well completion.”

In October, Propell Technologies Group, the U.S. provider of this Russian enhanced oil recovery method, launched its joint venture between wholly-owned subsidiary Novas Energy USA, along with Calgary-based Technovita, the Canadian provider, to form Novas Energy North America, for which Stankieveh serves as chief executive officer, and which has the exclusive rights to deliver well treatment for North America using the patented plasma pulse technology.

“We now have a large inventory of tools in Canada and the [U.S.]. Novas Energy already has customers under contract for Canada and the [U.S. and] we are very excited with our planned treatment programs throughout Alberta and Saskatchewan,” he says. “This next year, 2016, will be a very busy year for us.”

NOVAS TECHNOLOGY COMES TO CANADA

With over 35 years experience in materials engineering and testing in Calgary, Stankieveh spent about a decade in Russia working with Gazprom, where he was introduced to the plasma pulse technology via Skolkovo, a large research and development group focused on energy. In 2013, he invested in Novas Moscow to attain part ownership in its intellectual property.

“There are so many great areas of science which have been developed in Russia, but the problem is [the Russians] have struggled in the commercialization of their world-class technologies,” Stankieveh says, adding North America's oilpatch by contrast is very well equipped to manufacture and roll out new technologies domestically and abroad.

“My goal with my colleagues in Moscow is to use the Canadian [entity] as the springboard to take this technology

beyond the excellent early development that has been done in Russia, the Middle East, China and South America.”

The joint venture recently treated its first Canadian well with the proprietary plasma pulse technology—a Petromin production well in the Grand Rapids Formation near Cold Lake, Alta.

“We believe the technology has incredible potential, and we are now engaging Novas Energy in the treatment of additional Canadian assets,” says Ross Gorell, president and chief executive officer at Petromin. He adds the excellent results of this new technology demonstrate both its economics and the professional services provided by Novas.

Completed in 2005, the Petromin well's production levels initially averaged 11 cubic metres per day, but had fallen to less than half a cubic metre per day over the past decade. On October 29, after less than six hours of treatment, the well immediately increased its flow and bottomhole pressure levels and improved its production level to between 12 and 13 cubic metres per day.

On December 1, production levels stabilized to what they were at the time of initial completion 10 years prior. Stankieveh says: “A year ago, I would have said that we are not ready to provide our treatments with heavy oil in the unconsolidated sands.

“If we had a ‘sweet spot’ area it would have been in the tighter permeability geologies of the dolomite, carbonate and potentially the very tight shale formations. However, after our recent successes in the Cold Lake area we have now broadened that to include a big part of Alberta and Saskatchewan's oil assets. This pilot work was challenging for the company, but I felt it was worthy of risk.”

He adds: “If we are going to do work in western Canada, then we better be able to treat or have some sort of impact in the heavy oil and in the unconsolidated sands.”

While still fairly new to Canada, crews have thus far treated about 60 U.S. wells with plasma pulse, and the Society of Petroleum Engineers recently published a study demonstrating how the technology improved productivity on a Middle Eastern Kuwait Oil Company well.

“In some of our own experiments, through microseismic activity we have seen that we have actually had stimulation taking place in neighbouring wells 1.5 kilometres away from the well being treated,” Stankieveh says.

PLASMA PULSE NEEDS SOME PRESSURE

Plasma pulse technology “cannot resurrect the dead,” according to Stankieveh. For it to work there must be at least some bottomhole pressure in the reservoir.

“If there is no back pressure, then the well is not a candidate for treatment. We have had some results when we treated a well with low bottomhole pressure, because we opened up some new zones, but that is a rarity. Therefore, we look for minimum pressure levels in the well so that there is positive pressure to assist in the reduction of the skin factor and improvement in the overall stimulation of the selected pay zone.”

In Canada and the U.S. over the past 12 months, Novas Energy has trained over 20 geologists and petroleum engineers, along with data management experts, who can look at customers' assets and recommend which wells are optimal candidates for plasma pulse treatments. “In Canada, with the use of AccuMap and GeoSCOUT, we can zero in on the clients' assets that are best suited for our technology,” Stankieveh says.

The current generation of plasma pulse tools has treated over 400 wells, Stankieveh adds, but there are a number of features the company is developing in its next generation tools. Scientists and engineers are working on real-time feedback features that will provide Novas Energy valuable additional information downhole with the various impacts of the technology.

“We are adding intelligence into our tools specific to real-time feedback of the treatment area such as pressure, temperature and precise location, without having to rely on typical downhole logging tools today that need to be run prior to our treatments.”

Novas Energy recently opened a service centre in Calgary and is working with an Edmonton-area partner to roll out a plasma pulse manufacturing facility in 2016. According to Stankieveh, the joint venture is also finalizing its Canadian patents, which will accompany those already held in the U.S. and internationally, bringing to the world this Russian-designed technology and harnessing the power of plasma creation to enhance oil recovery.

■ Carter Haydu

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