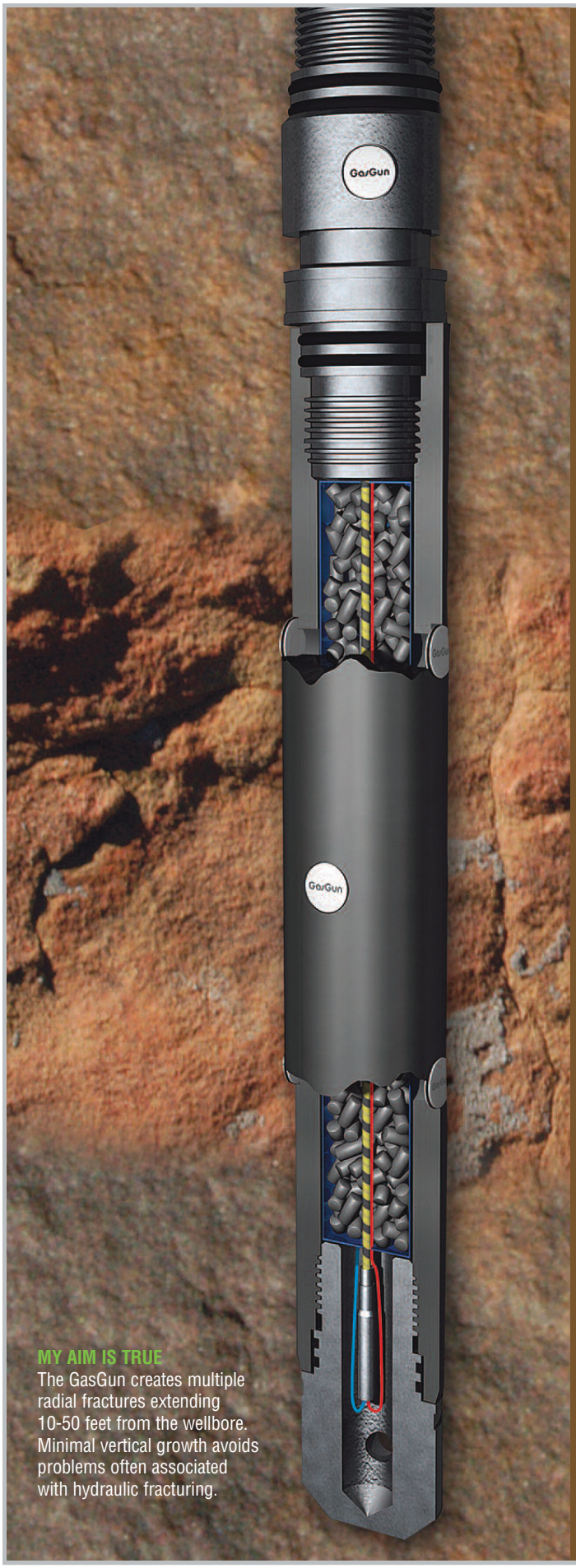


MY AIM IS TRUE
The GasGun creates multiple radial fractures extending 10-50 feet from the wellbore. Minimal vertical growth avoids problems often associated with hydraulic fracturing.

NEW TECH
TOOLS AND TECHNIQUES

PRODUCTION

Gun Control

MILITARY TECHNOLOGY AIDS PRODUCTION

BY LYNDA HARRISON

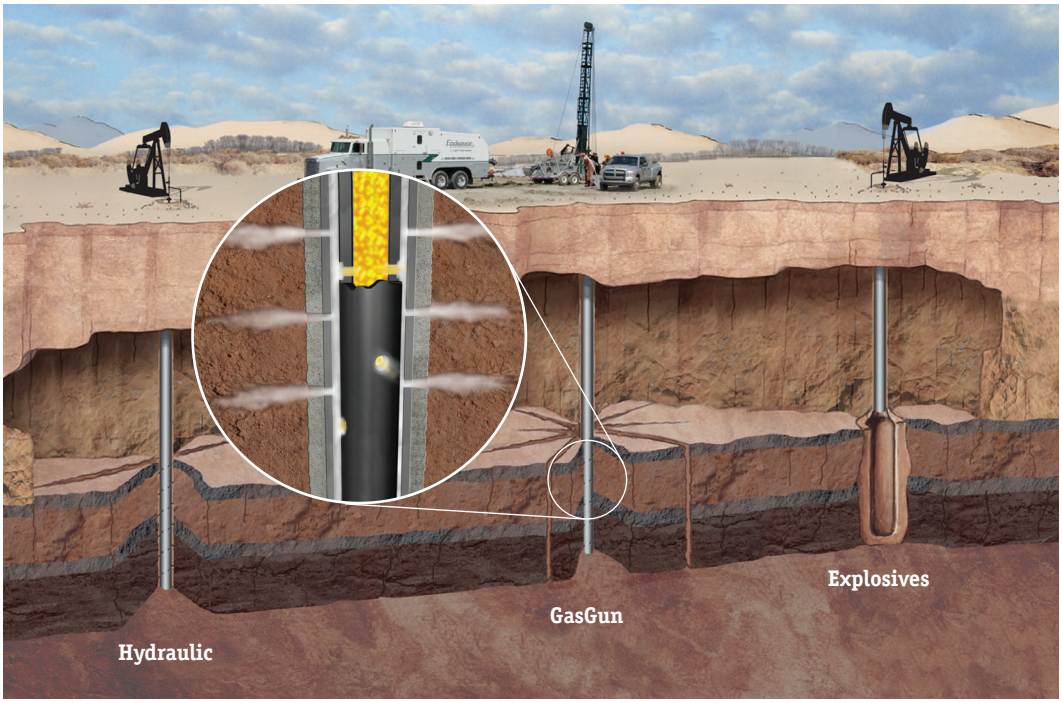
THE TECHNOLOGY BEHIND USING a gun to blast open a well has come a long way in the past hundred years or so.

Oil and gas wells have been stimulated using high-energy explosives since the late 1800s, while well shooting is believed to have been done long before that, back when water wells were sometimes brought back to life by firing a rifle down the well.

The technology has been evolving ever since. Part of that evolution is the GasGun, a radial fracturing tool that users say can be an effective and economical method of fracturing formations. Its roots can be traced back to the Second World War in that the propellant it shoots out is similar to what was used in large-bore guns like howitzers.

The propellant itself is top-secret because it, along with the carrier design, is patented. All Adam Schmidt, chief operating officer of GasGun Inc., will reveal is that it's military-grade, large-bore gun ammunition.

Compatible with both open and cased hole completions, the propellant consists of perforated grains that are progressive-burn-



ing. Call it a low explosive. It generates high-pressure gas at a rapid rate that is tailored to the formation's characteristics. The rate is fast enough to create multiple fractures radiating 10 to 50 feet from the wellbore, but not so rapid as to pulverize and compact the rock — which is the danger of using classic high explosives such as nitroglycerine.

Usually fielded by wireline using a casing collar locator, the GasGun is ignited while suspended. The propellant is conveyed to the formation in a high-strength, hollow steel carrier under a fluid column of 300 to 8,000 feet, which tamps the charge to ensure the energy is restricted to the pay zone.

"The tool is either wireline-conveyed or tubing-conveyed into position just the same as a perforating gun," explains Colin Haynes, technical sales manager for Endeavor E-line Services Inc., the exclusive supplier of GasGun in Canada. "However, it does not create holes in the casing, therefore it is run in the well after the well is perforated and placed on depth, exactly where the perforations exist."

A minimum 100-metre cushion of any fluid is then placed above the GasGun, keeping the gas generated directly at the perforated zone. The tool is then detonated and gas is generated inside the carrier at an extremely high rate.

The gas exits the carrier and goes into the wellbore where it enters all the perforating tunnels and creates the radial fractures. The spent carrier is returned to surface where it can be reused.

The star-shaped pattern of multiple fractures removes wellbore damage or blockage and increases the formation permeability near the wellbore.

Hydraulic fracturing, on the other hand, creates a single fracture which, unfortunately, can propagate vertically as well as laterally, seeking the path of least resistance. Many hydraulic fractures have been known to break out of the producing formation and into aquifers and thief zones.

While the fractures produced by the GasGun are more limited in length, gas pressures overpower the in-situ state of stress, creating fractures with minimal vertical growth. As a result, GasGun fractures are much less likely to wander out of the producing zone.

John van Schyndel, operations manager for Sebring Energy Inc., says he's used the tool twice, the first application being four or five years ago on a relatively shallow well of about 600 metres at Wandering River near Lac La Biche in northeast Alberta, when he was with BXL Energy Ltd.

The GasGun was called in to service after the well didn't live up to its potential based on a drillstem test, producing only 350 to 400 thousand cubic feet (mcf) of gas per day after the test said it should have output of 900 mcf per day.

Van Schyndel was reluctant to frac it, though, because of underlying water in the reservoir that was fairly close to the intended zone. "We felt if we got really aggressive we could frac into that water," he says.

GasGun stimulation brought production to 700 mcf per day. "We were quite happy with the outcome of that," he says.

Van Schyndel says the GasGun was very easy to use and provided significant cost savings compared to traditional hydraulic fracturing. He estimated the GasGun treatment cost $6,000 to $8,000 whereas even a small hydraulic fracture would run about $20,000 to $35,000.

Subsequent use of it a few years later, for Espoir Exploration Ltd., wasn't successful in changing the character of the well at all, he says. He allowed that may have been because of the well's greater depth — 1 200 to 1 300 metres — or due to the fact there was in-situ bitumen in the reservoir.

But he says he'd definitely use it again. "For this type of technology one out of two's probably not bad odds." He suggested it might be useful as a pre-fracture treatment before committing to the much greater expense of a hydraulic fracture.

That's exactly why Geoff Ready tried it out in central Alberta, when he was working for Morpheus Energy Corporation. The chemical engineer, who's now vice-president of Tandem Energy Corporation, applied the GasGun on a tight formation that had a history of not responding to conventional fracing.

It worked well, he says, estimating it saved the company $15,000 to $20,000 on horsepower costs that would have been spent on a hydraulic frac. "It's money well spent."

Six months later he used it on another well after a conventional frac left some tools downhole, forcing Morpheus to kill the well by pumping water down the hole. The tools were retrieved but the water damaged the well so that it wouldn't flow.

"After we GasGunned it the well was back to what it was before we had the problems," says Ready. "It basically got us past the damage we had artificially created in the hole. It was a cheap try at recovering the well and it worked out extremely well."

He says the GasGun doesn't replace a hydraulic fracture but it comes in handy when you're using it as a pre-frac tool and he sees no reason why it wouldn't work on oil wells, too. ntm

CONTACT FOR MORE INFORMATION

The GasGun, Inc.
165 SW TUALATIN LOOP
WEST LINN, OR 97068
PHONE: (503) 557-1370
WEB: WWW.THEGASGUN.COM