

## New Chemistries Increase Production

By Colter Cookson

The right chemicals can work wonders at every stage of a well's life, from drilling and completion to enhanced oil recovery. With their ability to help drill pipe slide, reduce friction and drag on casing, deliver proppant to the reservoir, and keep scale and paraffin from plugging oil's path to the wellbore, effective chemicals are as essential to a well's health as water is to the human body.

As oil and gas producers continue to look for ways to reduce their cost per barrel of oil equivalent, chemistry may take an even greater role, argues James Silas, senior vice president of research and innovation at Flotek Industries Inc. He cites an analysis by Raymond James suggesting that oil productivity gains have slowed.

"A few years ago, the industry could increase initial 30-day production by 30 percent every year with longer laterals, higher stage counts, and greater proppant intensity," he says. "Today, those techniques are yielding diminishing returns. That, coupled with more frequent well interference and low-grading, has slowed annual productivity gains."

The Raymond James study estimated yearly productivity gains of 8 percent in 2018 and 5 percent in 2019, Silas says. "Chemistry may be the key to increasing that growth," he argues. "It is one of the few areas left that can be optimized to increase production at an acceptable cost."

### Reservoir-Centric Chemistry

To unlock its potential, the industry is

shifting toward a more holistic view of chemistry, says Jim Holmes, Flotek's senior vice president of global sales and business development.

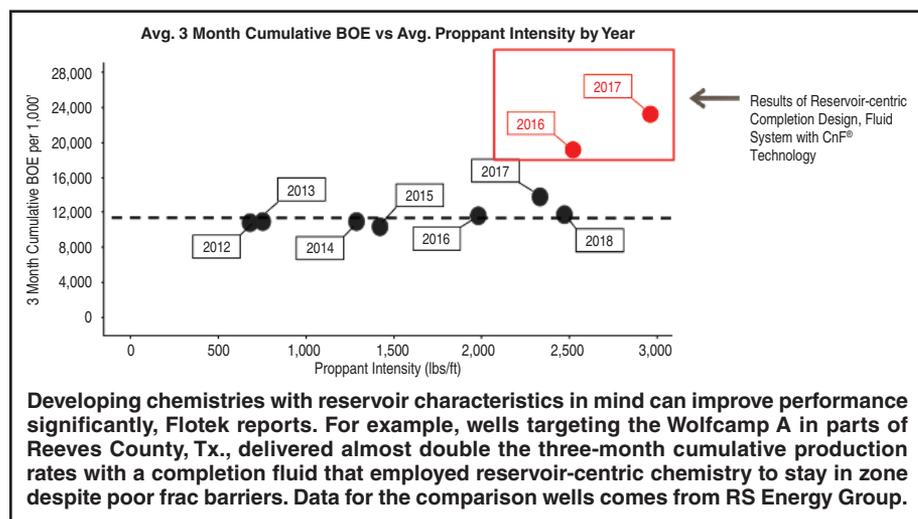
"In the past, the industry tended to select chemicals for individual wells based on laboratory work," he relates. "Testing additives in isolation can lead operators to ignore what the reservoir as a whole needs, given the other elements of the drilling and completion program."

Silas and Holmes recommend using a reservoir-centric approach to chemical selection that starts with fundamental geology. "The mineralogy of the rock, the oil chemistry, and the water chemistry all influence the fluid system's effectiveness," Silas emphasizes. "By looking at the reservoir as a whole, we can understand how these factors will change as development moves north or south or east or

west. This broad view lets us predict more accurately which chemistries will be most effective."

To show how much difference this approach can make, Silas recounts two case studies from the Delaware Basin in the West Texas counties of Winkler, Ward and Reeves. The studies focus on the Wolfcamp A and B benches. Despite increases in proppant intensity, Silas says production from wells targeting these formations has flattened over the past six years, with most wells' cumulative three-month production sitting around 12,000 boe for every 1,000 feet of lateral.

"In parts of Reeves County, the Wolfcamp A has such poor frac barriers that completions targeting it often frac into the Third Bone Spring, hurting production," he relates. "By studying the reservoir, we were able to design a completion





fluid that could stay in zone, but still deliver almost 2,900 pounds of proppant per foot. This increased the three-month cumulative production for every 1,000 feet of lateral to 24,000 boe.”

Wells targeting the Wolfcamp B faced a different problem: Low porosity made it difficult to extract liquids. To mobilize the oil, Silas says, Flotek tailored a proprietary, patented solvent and surfactant blend to the formation to reduce capillary pressures. From 2012 to 2018, he says, the chemistry upped three-month cumulative production

an average of 37 percent.

Holmes mentions that reservoir-centric chemistry can improve well economics beyond completions. “We are doing tremendous work in waterfloods, gas floods, and acidizing programs in all types of reservoirs, from high-temperature formations in East Texas to the cooler ones in the Permian,” he says.

“One of our most exciting applications is taking place in the Canadian portion of the Williston Basin,” he continues. “Many of the conventional reservoirs in

that area have heavy oils that are difficult to move with water alone. By optimizing chemistries for mobilizing the oil and cleaning injector and production wells, we are improving the economics of producing those reservoirs.”

As an example, Holmes points to a waterflood pilot targeting the Middle Bakken. Over the next five years, Flotek projects that the enhanced chemistry will increase production by 72,000 boe, 28,000 boe of which have been produced already. □