Heavy Oil Resource Catalyst For Innovation
In Eastern Kansas

One of my many annual conference and workshop stops is the Eastern Kansas Oil & Gas Association annual meeting. I am continually struck by eastern Kansas operators’ ingenuity and approach to challenges in developing oil and gas.

It is no secret that eastern Kansas and western Missouri face unique challenges. With shallow zones often producing heavy oil, operators must address unique situations each day. EKOGA’s 58th annual meeting in Mayetta, Ks., this month was to showcase some of the region’s latest innovations.

In a 2002 paper, "Recovery Methods for Heavy Oil in Ultraschallow Reservoirs," (SPE 76710), Shari Dunn-Norman and co-authors A. Gupta, D.A. Summers, L.F. Koederitz and D.T. Numbre discussed the process operators have used to drill and complete wells in this area. Dunn-Norman highlights a 250-mile swath along the Kansas/Missouri border covering 8,000 square miles. On the Missouri side alone, she notes, there could be 2 billion barrels of oil in place. However, this oil typically is around 18 degrees gravity, making recovery difficult. While oil does flow in natural conditions, the rate is slow, and combined with low reservoir pressure, makes production difficult at best.

Over the years, operators and service companies have tried several development technologies with a mixed success. Steam injection, carbon dioxide flooding, in-situ combustion, direct electrical heating, and stimulation with borehole explosives are a few of the techniques attempted. In many cases, a steam flood is the “go to” technology. Steam is injected either intermittently or continuously into a single well to improve viscosity and assist with production. This technique has been proven a technical success, however, often the economics of steam are such that it is cost prohibitive for many operators to effectively utilize this technology.

Dunn-Norman also highlights the use of solvents combined with downhole explosives used on the outside wells of a five-spot pattern. Additionally, she mentions CO2 flooding, applying direct electrical heat, and even directly mining as some of the many unique approaches to working this area. However, each time, economics seem to outweigh the technology.

Solutions that have more favorable economics include using microbial enhanced oil recovery, in which naturally occurring microbes are used to improve viscosity in the reservoir. In addition, horizontal fracturing in ultraschallow reservoirs can prove promising because of the ability to fracture past wellbore damage and create more surface area for oil to flow naturally. Coincidentally, this process combined with using microbes effectively can provide more area for the microbes to work within.

In another innovative approach, Darrell Husted from DrillRight Technology has several case studies showcasing the results of a unique drilling process using a slanted rig he developed as a solution to drilling in ultraschallow zones. Husted says the technology began as a challenge by a client who was trying to drill the curve section of a lateral well in fewer than 900 feet. The drillers made the turn, but were having a hard time getting enough weight on the drill string to drill laterally for more than a few hundred feet. Husted, who had spent some time in the river crossing industry, had an idea that he thought might work.

By modifying a river auger, which drills at an angle, Husted essentially could slant the derrick as much as 70 degrees to spud at near lateral position. The rig uses giant, hydraulically driven cog gears that can generate more than 400,000 pounds of weight on the drill string, and can push or pull at the same rate. This power behind the bit allows Husted to drill a lateral as long as two miles in a zone as shallow as 150 feet. Most exciting in this presentation is that this process has been so effective, it has allowed Husted to drill a lateral well in a shallow zone for around $400,000—compared with upward of $3 million a well—in a near record time of fewer than 14 days.

Finally, in what has been the talk of the region over the past couple years, is another interesting innovation and unique approach to producing the shallow heavy oil. In Fredonia, Ks., Stranded Oil Company of Austin, Tx., actually has created a 16-foot diameter shaft several hundred feet below the surface, leading to what it calls a “drilling gallery.” This large, circular room was created to allow drillers to drill laterally from the gallery with a goal of directly accessing stranded oil and gas.

The oil patch along the border of Kansas and Missouri is overlooked sometimes as a “player” in comparison with larger plays across the Mid-Continent. However, this region’s unique approach to challenges and difficult situations, developing and embracing new ideas, and oftentimes just plain “true grit,” have made the folks working here leaders in innovation.

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