

Brine-based fluid sees wide application in Permian

Replacing oil-based muds with a reusable brine-based system results in reduced torque and drag, increased ROP, and gauge wellbores.

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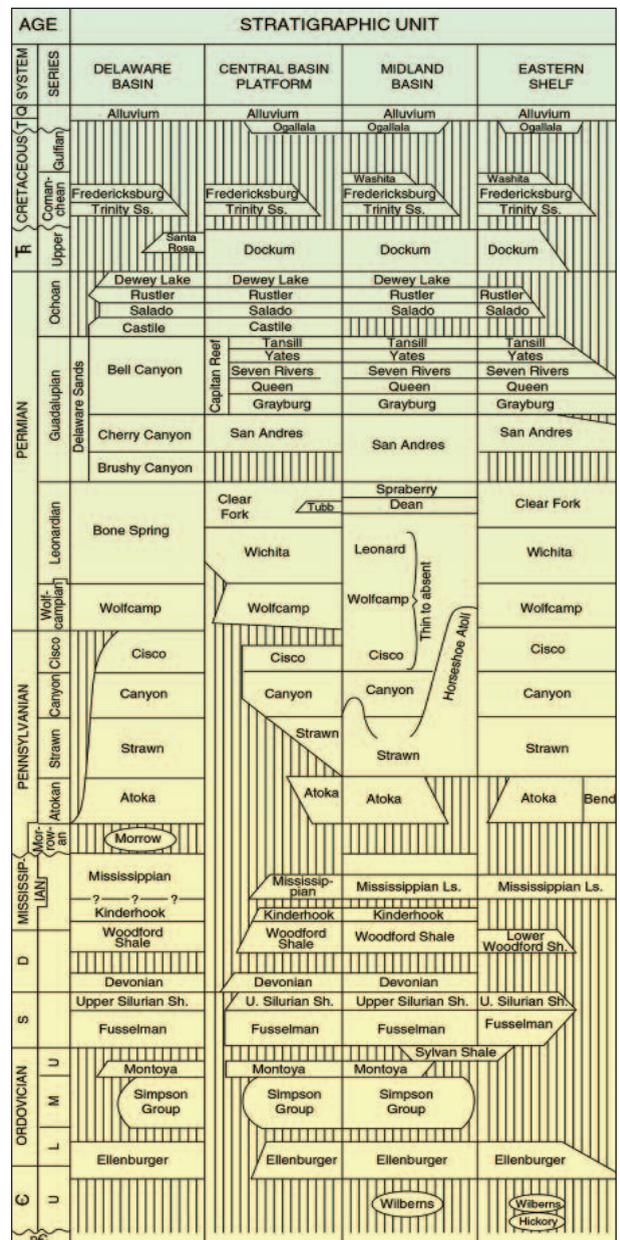
Since the launch of Newpark Drilling Fluids' Evolution water-based drilling fluid system in the Permian basin, hundreds of successful wells have been drilled in various formations for a variety of operators. From shallow San Andres (sandstone) and Tubb (carbonate) wells to deep Spraberry (limestone/shale/sandstone), Bone Spring (sandstone), and Wolfcamp (shale/detrital/limestone/sandstone) wells, the system has proved both economical and effective. Lithology columns for the Permian basin show the geologic sequence for the potential producing zones and illustrate the broad scope of application of the system in West Texas.

Developed as an alternative to oil-based mud for drilling wells in horizontal unconventional resources, the system was used to drill Bone Spring wells for an operator in Ward and Winkler counties. By increasing drilling rates in the lateral by 100%, the number of days in the lateral section was reduced from 14 days to seven days. The same results were replicated in the Bone Spring for another operator in Ward County. From these initial applications in 2010, wells using these products and techniques have spread across the entire West Texas/New Mexico region.

Adapting the system

As the focus on different producing horizons has shifted, the system has adapted to changing drilling conditions. Wolfcamp shale wells have been drilled in all areas of the Permian basin using the system, including the Eastern Shelf in Scurry, Borden, Mitchell, Garza, and Lynn counties. In the Midland basin, the system has been applied in Howard, Midland, Glasscock, and Reagan counties. It also has been successful in the Central basin platform in Winkler and Ward counties and in the Delaware basin, specifically Reeves and Loving counties in Texas and Lea and Eddy counties in New Mexico.

The system reduces drilling costs by replacing oil-based mud in the Lower Wolfcamp play. The same



The West Texas stratigraphic column offers bountiful opportunities for E&P. (Image courtesy of Newpark Drilling Fluids)



The Evolution fluid system has helped operators avoid unplanned events like stuck pipe and drillstring twist-offs.

increase in penetration rates seen in the Bone Spring have been experienced when drilling Wolfcamp horizontal wells. With a lower fluid cost and equivalent or better lubricity, the system readily replaces oil mud. Since it is formulated with a low-viscosity produced brine and premium products, it enables rates of penetration that exceed other systems' performance. Additional benefits seen include the elimination of HSE concerns associated with diesel oil and mud formulated using it.

Case study

An example of success is occurring in northwest Crockett County. The operator is drilling 2,400-m (8,000-ft) laterals targeting the Middle and Lower Wolfcamp. Before using this high-performance drilling fluid, the operator's drilling days were averaging 18 to 20 days from spud to total depth, with 35% of the wells having to be plugged and abandoned due to unplanned events

like stuck pipe and drillstring twist-offs. The drilling fluid in use was a generic brine water/gel mud using low-cost commodity products. Other operators have used traditional oil-based muds in the same area with similar results.

In June 2013 Newpark began working with the operator. The application has helped the operator drill 29 successful Wolfcamp wells. Drilling days have been reduced to an average of 10 days, and zero wells have had to be plugged and abandoned. Cost savings for this operator since the utilization of Evolution are estimated at US \$500,000 per well. The success obtained to this point is now reinforcing additional cost-reducing measures from familiarity with the drilling conditions and the ability to save and reuse the fluid from well to well.

In October 2013 a second operator in Crockett County began using the system, enjoying similar results. It has drilled two Wolfcamp lateral wells to date and plans to drill 16 more this year.

In Midland County another operator has used the fluid in three Wolfcamp wells. Reduced torque and drag, increased ROP, and nearly perfectly gauged wellbores were three areas in which the operator's expectations were exceeded. The fluid cost on the third well drilled was one-third the cost of the first well due to proper storage, conditioning, and reuse of the fluid. This operator has moved to northern Reeves County near Pecos, Texas, where it is continuing to have success drilling Middle Wolfcamp laterals using the high-performance drilling fluid. Offset wells drilled in this area have traditionally used oil-based mud. The system's performance has resulted in the same benefits seen in Crockett and Midland counties.

Beneficial merger

While this technology provides a basis for the results obtained, a high-performance organization is required to fully exploit its benefits. In January 2013 the Permian Basin Division of Newpark Drilling Fluids acquired and combined with Alliance Drilling Fluids. This merger brought two of the largest drilling fluids companies in West Texas together. The combination of the two companies added to the capability to service operators by doubling the amount of well-trained and experienced field technicians. The merger also brought many of the best problem-solving minds in the region together, thereby increasing the ability to provide excellent well-planning and pre-spud services. The results have allowed Newpark Drilling Fluids to grow into one of the largest drilling fluid providers in the Permian basin and New Mexico. **ESP**