Various Techniques Help Offshore Operators With Sand Control

Independent oil producers account for 81 percent of offshore leases and 30 percent of oil production in the Gulf of Mexico. For them, technological advancements and best practices designed to handle common issues are key to continued success.

One issue many operators face during drilling and completion is sand control. The SPE Frac Packing Handbook, by Ali Ghalambor, Syed A. Ali and W. David Norman, describes how producing sand with gas and oil can create a number of potentially dangerous and costly problems. It is possible for sand to partially or even completely fill the wellbore, thus limiting and even sometimes shutting off production completely. For many years, selecting and implementing the appropriate sand control technique has been critical for operators working in these formations.

The Frac Packing Handbook authors reference multiple techniques that have been employed with varying degrees of success. Among techniques used to control sand in the wellbore has been production rate control. Like the name implies, keeping the rate of production below the critical sand-producing rate allows operators to control sand economically.

Additionally, mechanical sand control has been evolving for many years, and essentially involves using a screen prepacked with gravel or other porous media sized appropriately to prevent formation sand from entering the wellbore while allowing hydrocarbons to move through.

A gravel pack completion is identified as one of the more reliable sand control techniques, however, problems with wellbore damage and skin effect often limit production potential.

The frac-pack completion technique combines a fracture treatment with a gravel pack. The fracture provides a more productive path to the wellbore, getting past near-wellbore damage while changing the flow path into the well and reducing the chance of plugging perforations or the gravel pack. During this process, maximizing the amount of high-permeability sand placed into each perforation reduces the amount of formation sand able to make it into the wellbore.

These techniques have been used when completing wells for many years. However, the need to control sand can occur during the drilling phase as well. There have been research and innovations designed to address sand control during drilling in the offshore environment.

In an SPE publication titled, Drilling with Liner Technology Enables Successful Sidetrack through Depleted Sands in Shallow Water Gulf of Mexico (SPE/IADC-173046), the authors illustrate how many operators in the Gulf have to drill through depleted zones to hit their desired targets. This can cause problems, since heavy mud must be used to maintain overbalance. This risks differential sticking and lost circulation in the depleted zone.

“Drilling with liner” (DwL) technology was tested to address this issue. After producing a complete plan and workflow, the operator and service company decided to use the DwL method to drill through two depleted zones bound by overpressured shale zones. The team recorded no observable losses over the entire interval, and when the frac-pack completion was conducted, the team observed significantly lower wellbore damage than with previous wells in the area.

Key results included completing the well on time and under budget, fluid invasion was minimal because of the mechanical interaction of the liner with the wellbore and mud cake, and tripping across depleted zones was minimal. Overall, it appears DwL technology is a viable alternative when drilling into depleted zones.

In Chemical Sand Consolidation–Developing a Strategies Capability across a Wide Portfolio (SPE/IADC-173092-M S), the authors discuss how mechanical sand control methods typically are used to optimize production from weak formations. While this is common, the process sometimes doesn’t work effectively. While there can be a significant economic return on these wells, oftentimes controlling sand is too complex and costly. Recompletion represents one possible solution, but again many times is not economical.

The authors suggest chemical consolidation of the formation is one alternative to mechanical sand control. The process works by pumping specifically designed chemicals to the targeted zone that will strengthen the formation and stop sanding. This process is used on production intervals generally less than 100 meters long.

In this trial, researchers looked at proppant flowback remediation, production intervals less than 100 meters, and production intervals greater than 100 meters. They observed near 100 percent success rates in remediating proppant flowback, and the longer intervals were treated successfully over time. One key finding was a precise understanding that the location of the sand zone was key to the success of the operation, and that using computer-simulated models aided in this process. Once identified, placing the chemical was critical to the effectiveness of the process.

For many operators, sand control will remain a key issue in drilling, completing and producing wells. A good understanding of sand control fundamentals as well as innovations in process and technology will greatly improve an operator’s success in these situations.

**“Understanding sand control fundamentals and innovations will greatly improve an operator’s success.”**

**Jeremy Visconti** is director of technology transfer for the University of Kansas Tertiary Oil Recovery Program and is Mid-Continent regional director for PTTC. He has more than a decade of experience in developing and organizing technical conferences and special events.

Reproduced for the Petroleum Technology Transfer Council from the April 2015 issue of *The American Oil & Gas Reporter*