

VapR Frac Plug Appalachian Success

Successful frac plug run proves superior performance of our dissolvable and composite frac plug offerings

Background

In plug-and-perf completion operations, customers want to maximize their efficiency by deploying dissolvable frac plug technology. The challenge has always been getting the right design and dissolvable technology to provide full zonal isolation throughout the stimulation and reliably dissolve in a timely manner. The available options are currently limited in application due to the fluid/plug interactions downhole, which is highly dependent on variant temperatures and chloride content. Eventually, customers want to eliminate millout confirmation runs, but this will require confidence in the plugs they use.

Solution

A customer in the Utica shale play of the Appalachian basin chose NOV's VapR™ dissolvable frac plug based on its minimalistic design, superior downhole performance during frac treatment, and customizable material based on the variant fluid environment.

This plug is fully dissolvable and designed to provide a dependable method for temporary zonal isolation during frac operations in vertical and horizontal completions. The compact design eliminates milling and post-frac cleanout leaving no debris to remove from the well. The minimalistic design has 60% fewer parts than competitive products, thus leaving less material in the well to be dissolved.

The rigorous testing protocol was completed in different fluid environments, including Hydrochloric acid, and extended duration testing up to 11 hours to ensure frac plug integrity during frac operations.

This plug has once again proven to be a market leader with our latest success in the Appalachian region where it was installed in combination with our Setter™ composite frac plugs.

Case study facts

Location: Utica shale play of the Appalachian basin

Products

- 5.5-in. 23# VapR dissolvable frac plug with 4.390-in. maximum OD, 1.975-in. minimum ID, and 8.975-in. length
- Setter composite frac plug

General well information

- Casing size: 5½-in. 23#
- Bottom hole temperature: 160° F
- Maximum pump down rate: 19 bbl/min
- Maximum line speed: 550 ft/min
- Maximum surface treating pressure: 11,400 psi
- Maximum VapR plug setting depth: 16,247 ft



Results

Multiple 5.5-in. 23# VapR dissolvable frac plugs were deployed with the deepest plug being installed at 16,247 ft. The robust design of the VapR also allowed the operator to maximize efficiency in reducing water consumption and operation time during pump-down operations with rates up to 19 bpm and 550-ft/min line speed. During frac operations, 100% of the ball seat signatures were identified, no slipping of the frac plugs was observed, and the maximum frac rate achieved was 90 bpm at 11,400-psi surface treating pressure. In one of the stages, treatment was shut down due to an issue with surface pumping equipment that left the VapR exposed to corrosive downhole fluids for a few hours. Upon maintenance of the surface equipment, the VapR continued to hold treatment pressure, maintaining zonal isolation and maximizing performance.

A cleanout run was done to mill-out the Setter composite plugs in the upper stages. No downhole tags were observed for the VapR plugs, confirming they had dissolved. The operator was extremely pleased with the millout of the Setter composite plug and the dissolution of the VapR frac plugs.

The operational results of this run exceeded our customer's expectations. Through the simple, unique, and minimalist design, we were able to perform the high-pressure frac stimulation and dissolve the plug well within the customer's expected time window. Using the VapR plugs allowed our customer to begin producing the well much faster than expected.

