

Reliable Dissolution Improves Fracturing Efficiencies

Quick and smooth transition to production enabled by superior frac plug performance

Background

A Permian Basin customer wanted to perform a dissolvable frac plug field trial in several wells to determine if dissolvable frac plugs could be used throughout the wellbore, essentially eliminating the need for a coiled tubing cleanout.

Initially, the cleanouts were done to remove the composite plug debris and residual frac sand present after the completion operation. With an innovative frac design that allowed the customer to limit the amount of sand produced, the only purpose of the cleanout was to drill out the frac plugs themselves. Moving to a reliable dissolvable plug would be key in eliminating the cost of a cleanout post-stimulation.

Solution

The VapR™ dissolvable frac plug was chosen for this trial due to the extensive performance and dissolution testing history of the frac plug itself, along with the larger ID. The combination of these features allows for reliable stimulation and faster online well delivery time.

The selection of the VapR material most appropriate to the application required consultation and fluid analysis. Utilizing our in-house laboratory testing capabilities and personnel expertise, our team tested the fluid compatibility and exacted the dissolution times required.

For the trial, a cleanout trip was performed to assess the efficacy of using dissolvable plugs to deliver wells without future cleanouts.

Case study facts

Location: Permian Basin

Product specifications

- Product: VapR
- Size: 5.5-in. 23#
- Type: Dissolvable frac plug
- Max OD: 4.390 in.
- Min ID: 1.975 in.
- Max length: 8.975 in.

General well information

- Casing size: 5½-in. 23#
- Bottom hole temperature: 160° F
- Maximum setting depth: 17,850 ft

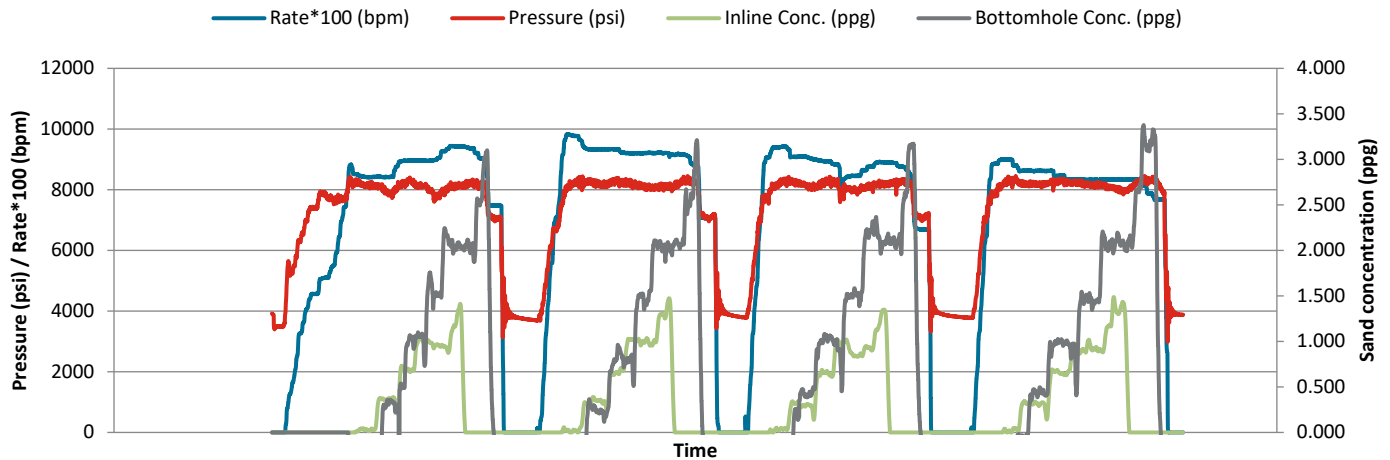


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Results

The VapR frac plug trial included 126 stages over three wells. Through a thorough investigation and post-job analysis of the stimulation charts, it was determined that all 126 stages were completed successfully and with no suspected plug slips or loss of isolation. Furthermore, the treatment design required that the VapR maintain integrity through the various stimulation cycles performed.

The reliable performance of the plug was a key metric for the project's success and was made possible by the unique and robust design of the VapR frac plug. Once set, the slips and dissolvable element remained engaged throughout the treatment and maintained the zonal isolation through the 466 cycles performed on this project.



A cleanout run was performed to confirm the well was ready for flowback. Below mill data shows that the trip to total depth (TD) was reduced by 30% since minimal downhole tags were observed at the VapR plugs setting depths. About 200 lb of frac plug material was set in each of the three wells, and less than 20 lb was recovered in small bits while circulating to clean the well out for production.

The customer noted that many of the frac plugs had already fully dissolved during the milling operations. Out of an abundance of caution, the mill was activated at each set depth to ensure any residual plug was circulated or drilled out at that time. The plugs that were encountered were drilled out in under one minute.

Two types of bits were used to drill the VapR on this trial. The tri-cone bit performed the best on two of the wells, and the reverse-clutch mill maintained good performance but was slightly slower on drillout times.

