

Case study: Eagle Ford Shale, United States

Versa-Drive service milled 40 plugs with no short trips, saved USD \$120,000

A customer working in the Eagle Ford shale in south Texas had performed a plug-and-perf completion in a 12,240-ft (3,730-m) lateral, and had concerns about reaching total depth (TD) during plug millout. The well had a measured depth of 22,240 ft (6,779 m), and 35 of the 40 frac plugs in the well were from a competitor, and were known to be aggressive to mill. The customer opted to install **SPECTRE™ disintegrating frac plugs** from Baker Hughes in the toe of the well as a backup plan to gain access to the lowermost zones if they could not mill to TD.

In addition to the troublesome composite plugs and challenging well depth, the larger, more common 2½-in size coiled tubing (CT) that the customer preferred was not available. They would have to use 2-in CT, which presented even greater risks to the millout operation. The customer contacted Baker Hughes for a solution that could get them to TD in a single trip and without issues.

Upon review of the completion design, the Baker Hughes team proposed a **Versa-Drive™ plug milling service** with a bottomhole assembly (BHA) consisting of a **Versa-Drive Ultra workover motor**, a **Versa-Drive plug mill** dressed with **Glyphaloy™ advanced milling technology carbide**, and a **HydroPull™ extended-reach tool***. Built on technologies and procedures honed in the shale formations of North America, the Versa-Drive service leverages

an arsenal of extended-reach technologies, advanced cutting structures, and optimized mill designs to remove plugs from long horizontal wellbores, efficiently and reliably.

Despite the challenges of this job, the Versa-Drive service delivered a single-trip millout of all 40 plugs with zero short trips. The Ultra workover motor enabled the Baker Hughes team to maintain a flow rate of 4.75 bbl/min throughout the job to improve debris removal, and the average millout time per plug was only 6.4 minutes. This included milling of the SPECTRE plugs, which had not yet disintegrated because the well was not flowed back before milling operations began. Although easily milled, the SPECTRE frac plugs do not require post-frac intervention when exposed to well fluid for the required amount of time.

With a total operational time of approximately 40 hours from start to finish, the Versa-Drive plug milling service saved the customer an estimated \$120,000 USD while delivering the full value of the extended-reach lateral.

Challenges

- Extended-reach lateral section measuring 12,240 ft
- Preferred larger 2½-in CT size was unavailable
- Shallow section of the well had been completed with a competitor's composite plugs that are known to be aggressive to mill
- Customer had concerns about reaching TD during post-frac millout

Results

- Ran the milling BHA to TD and milled all 40 plugs without issue
- Eliminated short trips and reduced time on location
- Completed entire millout operation in approximately 40 hours
- Saved an estimated \$120,000 USD

*The HydroPull extended-reach tool is a registered product of Tempres Technologies, Inc.