

Case study: Northeast United States

Remote operations team delivered record-setting single run of 20,463 ft

An operator in the unconventional Marcellus Basin needed to drill an extended-length, complex 3D wellpath. The well was being drilled from a congested pad with eight active wells which necessitated an immediate build-and-turn to avoid the adjacent wells and lease lines. The plan called for holding a 40°+ inclination tangent for 3,500 ft (1067 m) in order to achieve the necessary step out and land the well in the targeted lateral slot.

The planned lateral was designed to drill nearly 16,000 ft (4877 m) of pay and included a close approach to the lease boundary as the well approached total depth (TD). Additionally, some wells drilled previously on the pad experienced wellbore stability issues. The operator wanted to avoid these issues and operate as efficiently as possible with zero nonproductive time (NPT) or health, safety and environment (HSE) incidents.

The planned length of the 8 ½-in. curve and lateral sections represented 20,500 ft (6248 m). Drawing on past experience in the play and detailed pre-well modeling, Baker Hughes felt confident that it would be possible to drill both the curve and lateral in a single run. Based on the well design and the operator's objectives, Baker Hughes engineered a bottomhole assembly (BHA) design for this application featuring a 6 ¾-in. **AutoTrak™ Curve rotary steerable system (RSS)**, a 7-in. **Navi-Drill™ Ultra™ XL/RS motor**, and a **Dynamus™ ATD506x extended-life drill bit**.

The BHA was designed to ensure that the Baker Hughes team could precisely steer the long tangent, 3D curve, and extended lateral section. The bit and BHA also enabled the directional drillers to apply aggressive controlled parameters to achieve high rate of penetration (ROP) through the lateral while avoiding any high doglegs that could complicate or slow down casing runs.

To drive efficiencies and foster collaboration, previous wells for this company had been drilled and steered from the operator's in-house remote operations center. However, to further reduce onsite and travel-related HSE risks during the COVID-19 crisis, Baker Hughes and the operator agreed it would be best to execute the well's directional drilling and measurement-while-drilling (MWD) services from multiple remote locations.

This completely eliminated the need for field service engineers at the wellsite with the well managed by a **Remote Operations Services** team and the client team working from various locations. Because all of these individuals would be working together on a common set of real-time data, they would be able to collaborate effectively to quickly resolve any issue that might arise.

The well was executed according to plan with the team drilling the curve and lateral in a single, 20,463-ft (6237-m) run with minimal NPT and zero HSE incidents. The remote team monitored key drilling parameters in real time and made adjustments to

Challenges

- Drill complex 3D wellpath
- Minimize collision risks with adjacent wells
- Reduce DLS
- Execute curve and lateral in a single run
- Drive operational efficiencies
- Minimize HSE risks

Results

- Supported and managed directional activities remotely
 - Maximized operating efficiency
 - Reduced HSE risks
- Drilled 20,463 ft (6237 m) in a single, 162.9 hour run
- Delivered a smooth 15,890-ft (4843-m) lateral with minimal deviation from target (99.3% in zone)
- Recorded an on-bottom ROP of 165.1 ft/hr
- Drilled 6,194 ft in a single, 24-hr period
- Achieved superior HSE results

preserve bit life without negatively impacting ROP. As a result, the team avoided a time-consuming bit trip while achieving an average on bottom ROP of 165.1 ft/hr (50.3 m/hr) to drill more than a mile (6,194 ft) in a single, 24-hr period and 10,295 ft (3138 m) in a 48-hr period.

The team also delivered the desired dogleg severity (DLS) of 1.23°/100 ft and kept the well on the desired path—placing the lateral 99.3% in zone.

It is believed that this 20,463-ft run represents the most footage ever

drilled in a single trip using a fully remote drilling team—surpassing the previous 20,000+ footage single-run records of 20,332 ft, 20,302 ft, and 20,131 ft that Baker Hughes achieved for the same customer earlier this year as well as in 2018–19.

Baker Hughes is committed to delivering an ever-increasing number of its services remotely to ensure high-quality, efficient, and consistent performance everywhere it operates.

