

Case study: Delaware Basin, New Mexico

Lucida service drilled best-in-class slimhole production section, reduced drilling time by 35%

A customer tasked Baker Hughes to drill a 6 $\frac{1}{8}$ -in. diameter hole in the Wolfcamp A production section in the Delaware Basin in Eddy County, New Mexico, with a target to drill the section in 6.54 days. Carbonate stringers in the lateral section presented significant challenges to maintain directional control which, in turn, limits drilling performance if corrections need to be made to stay on target.

Baker Hughes proposed the **Lucida™ advanced rotary steerable service** for this challenging application and engaged a multidisciplinary team to configure the bottomhole assembly (BHA) and provide drilling parameter optimization and road mapping.

The Lucida advanced rotary steerable service has a robust integrated BHA with a fully customized drill bit and multi-chip module electronics to deliver exceptional drilling performance. The **Dynamus™ XG-D405T extended-life drill bit** was specifically designed for this application with advanced drill bit directional control features, premium cutters, and a proprietary connection to handle the rigors of the challenging lateral section in the Wolfcamp A formation.

The Lucida service's automated wellpath trajectory control system integrates both azimuthal and inclination hold modes with continuous proportional steering to automatically correct wellbore trajectory for any formation trends. The automated wellpath trajectory control system, enabled by near-bit directional sensors, checks azimuth and inclination every

millisecond. The integrated system automatically adjusts steer forces second-by-second for precise control, even at very high penetration rates.

The planning and execution resulted in exceptional drilling performance, drilling the production section in 4.26 days, a 35% reduction in drilling time, versus the Q1 target delivering a best-in-class well for the customer. This was also a 33% improvement versus the fastest prior production section of 6.32 days. The Lucida service's BHA drilled the 10,330-ft (3149-m) lateral section in 68.9 hours, resulting in an overall average penetration rate of 150 ft/hr (46 m/hr). The average on-bottom penetration rate was 249 ft/hr (76 m/hr), the highest achieved in the state. This run also produced a customer state record of 4,355 ft (1327 m) in a 24-hour period.

The average dogleg severity in the lateral section was just 1.10°/100 ft (30 m), providing reduced wellbore tortuosity for exact well placement and superior wellbore quality. This reduction of wellbore tortuosity also resulted in less torque and drag and contributed to the high penetration rate.

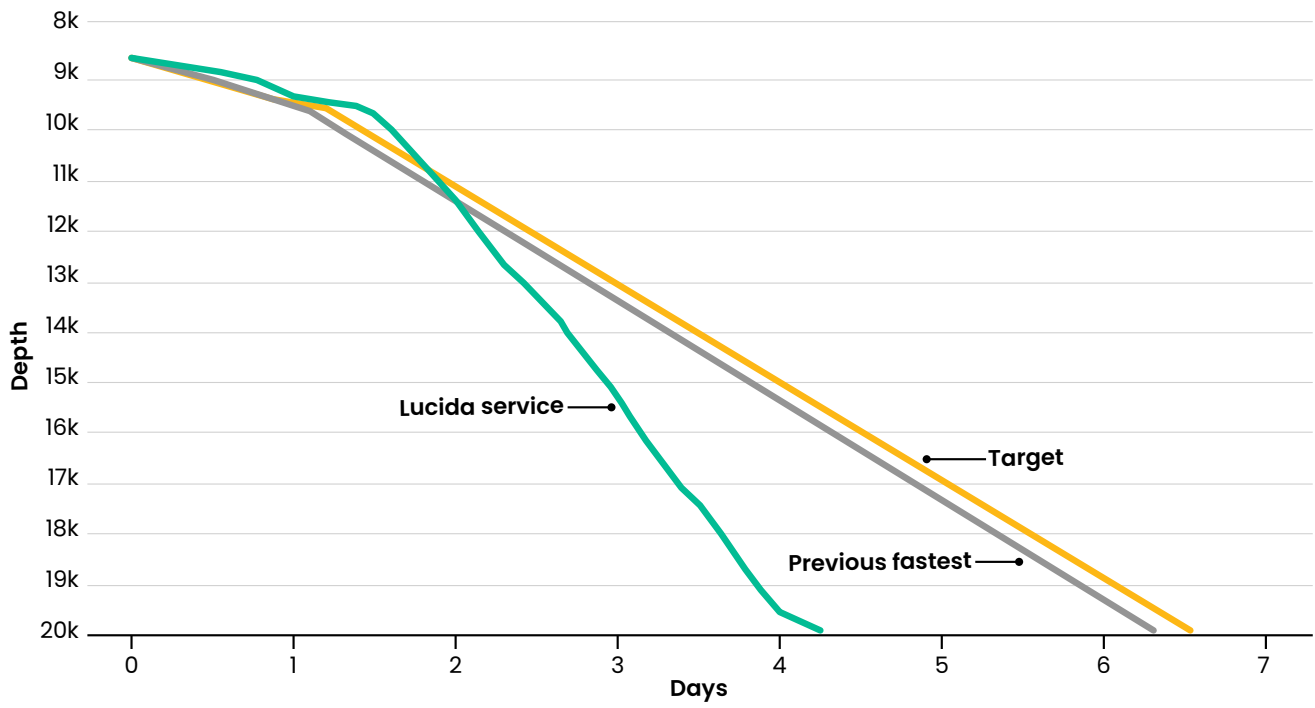
The multidisciplinary team planning, integrated BHA, and onsite execution pushed the operational envelope and delivered a best-in-class slimhole production section in the state for the customer.

Challenges

- Drill the slimhole production section in 6.54 days
- Improve penetration rate
- Deliver accurate well placement with low tortuosity
- Drill 10,000-ft (3048-m) lateral

Results

- Completed the slimhole production section in a best-in-class 4.26 days
- Reduced drilling time by 35%
- Beat the fastest prior production section by 33%
- Achieved average on-bottom penetration rate of 249 ft/hr (76 m/hr)
- Delivered exact well placement and low tortuosity with an average dog leg severity of 1.1°/100 ft (30 m)
- Drilled 10,330-ft (3148-m) lateral



Exceptional drilling performance with the Lucida advanced rotary steerable service