

Case study: Marcellus Shale, West Virginia

Lucida service delivered exact well placement and best-in-class slimhole daily footage

A customer tasked Baker Hughes to drill a challenging 6¼-in. curve and lateral section in the Marcellus shale in Tyler County, West Virginia. The curve section was planned with 8°/100 ft (30 m) buildup rate (BUR) and a lateral section length of more than 8,000 ft (2438 m). The Marcellus shale is typically drilled in an 8½-in. hole size and for this slimhole application it was critical to deliver first-rate drilling performance, maximize reservoir contact, and deliver excellent wellbore quality.

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.

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-DD505 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 Upper Marcellus shale 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 Lucida advanced rotary steerable service delivers new levels of drilling precision to maximize reservoir contact when using reservoir navigation. High-quality, 16-sector gamma-ray sensors, situated very close to the bit, provide real-time formation data that enable quick decisions to navigate the reservoir.

The planning and execution resulted in an exceptional drilling performance, drilling the curve and lateral sections at an overall average penetration rate of 190.8 ft/hr (58.2 m/hr).

Using a 4¼-in. **Navi-Drill™ Ultra™ XL/LS high performance drilling motor** in the lateral, the Lucida service's BHA drilled 236.7 ft/hr (72.1 m/hr) with a slimhole best-in-class 4,212 ft (1284 m) drilled in a 24-hour period.

The average dogleg severity (DLS) in the lateral section was just 0.83°/100 ft (30 m) and the average change in azimuth between the survey and the well plan was 0.50°. The automated wellpath trajectory control system significantly reduced wellbore tortuosity and provided superior wellbore quality.

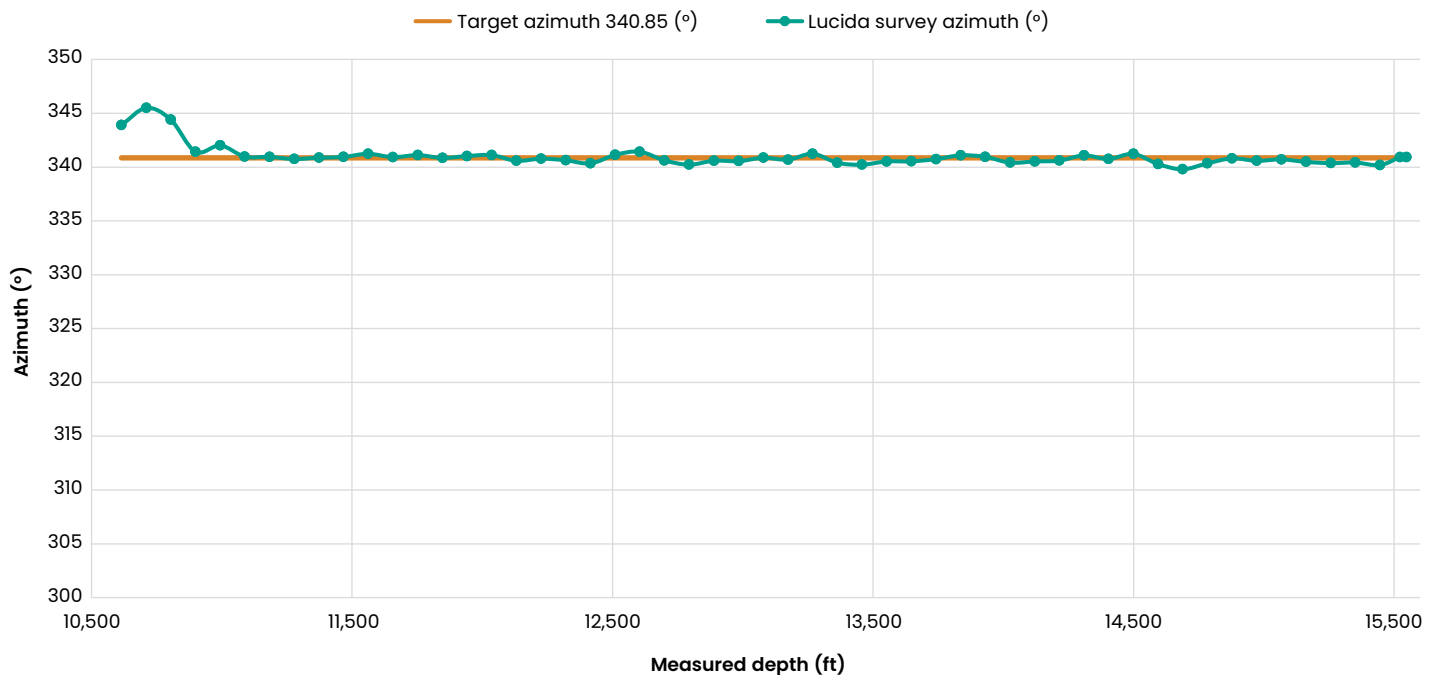
The multidisciplinary team planning, integrated BHA, and onsite execution delivered a best-in-class slimhole production section for the customer.

Challenges

- Drill a slimhole curve and lateral
- Extend drilling performance
- Maximize reservoir contact using geosteering
- Deliver excellent wellbore quality

Results

- Drilled slimhole curve and lateral at 190.8 ft/hr (58.2 m/hr)
- Achieved slimhole best-in-class 4,212 ft (1284 m) drilled in 24 hrs
- Maximized reservoir contact
- Delivered superior wellbore quality with 0.83°/100 ft (30 m) average DLS in the lateral



Exact well placement with tight azimuth control.