

Case study: Sichuan Province, China

# Well Construction Solutions drills exploration wells in fewer days, maximizes pay zone exposure

The operator planned several exploration wells to assess the production potential of a new block in an existing deep shale gas field. But with limited reference data from offset wells to characterize the complex reservoir, drillers could not effectively navigate wells through the formation to maximize pay zone exposure.

## Delivering a proven, integrated drilling solution

The operator asked Baker Hughes for help developing a low-risk, high-efficiency drilling program for the exploration wells. The proven expertise of the Well Construction Solutions team offered an answer. Incorporating technology innovations from the Baker Hughes Drilling Services (DS), Drill Bits (DB), and Drilling and Completion Fluids (DCF) product lines, Well

Construction Solutions has successfully drilled more than 500 shale gas wells in fields across southwest China.

This impressive track record includes 22 wells drilled in the Shale Gas Block in Southwest of China over two years, using only DS and DB technologies. The strong working relationship with the DS and DB product lines, coupled with the success of these earlier wells, was enough to convince the operator to integrate DCF into the Well Construction Solutions team. Meanwhile, the local Well Construction Solutions team adopted a risk-sharing model into its existing long-term strategic agreement.

## Collaborating on the optimal operation

The product lines collaborated following the principles of the Solutions Mindset, a Baker Hughes project management

## Challenges

- Drill exploration wells with maximum pay zone exposure in complex formation
- Develop drilling plan in new block with limited offset well data
- Experiment with new Well Construction Solutions

## Results

- Successfully drilled two wells below operator's allocated drilling days for exploration wells
- Minimized torque and drag and avoided sag events to deliver a stable borehole
- Achieved 100% and 97.5% pay zone exposure
- Saved \$250,000 USD and 17.4 days of rig time in first well





culture that creates customer-specific solutions to drilling challenges. The Solutions Mindset requires synergy between multiple well construction product lines to engineer seamless solutions for optimal outcomes.

The local Well Construction Solutions team played an integral role in each stage of the well construction process—from pre-well planning to drilling to post-drilling reviews.

Drawing on the application knowledge of the global Well Construction Solutions group, the local team developed and deployed a full technology and service package to improve drilling efficiency and wellbore placement in the exploration wells:

- AutoTrak™ Curve Pro / 6¾-in. Lucida RSS + Navi-Drill™ Ultra Motor
- Outstanding reservoir navigation from the Reservoir Navigation Services (RNS) team
- Dynamus™ DD505VS and DD505VSX drill bits

- CARBO-DRILL™ oil-based drilling fluid
- NANOSHIELD™ wellbore sealing polymer
- LC-LUBE™ sized, synthetic graphite

At each stage, the integrated team received real-time support from Reservoir Technical Services, Beacon Remote Support Center, and team members from the Assembly Maintenance Overhaul, Remote Operations Services, Application Engineers, and Sales and Commercial groups.

### **Efficiently drilling stable wellbores in target zone**

The integrated Well Construction Solutions team successfully drilled two 8½-in. exploration wells under the average 45 drilling days for offset wells as calculated by the operator. The first well was drilled to a target depth of 5,670 m (18,504 ft) in 28.57 days (41% faster than the 45-day average)—saving \$109,000 USD in rig time. The second well was drilled to

5,540 m (18,176 ft) in 34.32 days (29% faster than the average), saving \$174,000 USD in rig time.

DCF's high-density, oil-based fluid (with specific gravity of 2.10–2.30 [17.52–19.19ppg]) successfully delivered stable wellbores with no sag events and minimal torque and drag during drilling, tripping, running casing, and other downhole operations.

The two wells achieved 100% and 97.5% pay zone exposure, respectively. Pleased with these results, the operator awarded Baker Hughes a milestone bonus based on performance. Both companies are exploring other drilling opportunities for the Well Construction Solutions team in future wells.

**Baker Hughes** 