

Customized Drilling System Saves 5 Days in North Kazakhstan

BHA with push-the-bit rotary steerable system reenters and deepens well in one record-setting run with no NPT

CHALLENGE

Drill 5 $\frac{7}{8}$ -in section through a depleted reservoir in one run and minimize NPT.

SOLUTION

Design a BHA that incorporates a PowerDrive X6* rotary steerable system (RSS), Hydra-Jar AP* double-acting hydraulic drilling jar and Accelerator AP* impact tool, and WELL COMMANDER† circulating tool.

RESULTS

- Drilled the 5 $\frac{7}{8}$ -in section 5 days ahead of plan in one run with no NPT.
- Set a Schlumberger record for the most drilling hours in a single run.



Reenter and deepen North Kazakhstan wells

An operator using a workover rig to reenter and deepen wells in North Kazakhstan wanted to improve the performance of the 5 $\frac{7}{8}$ -in BHAs. Because trajectory control for the BHAs was provided by positive displacement motors, approximately 80% of drilling time was spent sliding the BHA. In addition to increasing the risk of differential sticking in the depleted reservoir, sliding reduced ROP more than 40%. Motors also provided less directional control and increased tortuosity. In addition, the use of motors made it difficult to kick off from vertical with a PDC bit and required one or more trips to change BHAs.

Combine drilling technologies in custom BHA

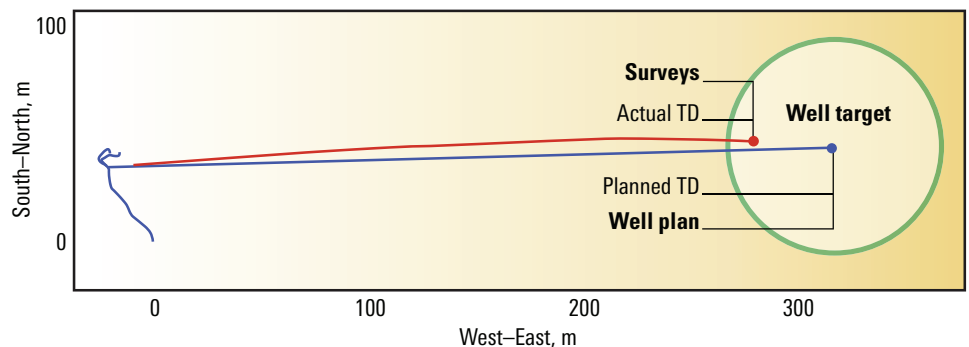
Schlumberger designed an application-specific BHA that increased ROP, reduced the risk of differential sticking, and enabled the operator to drill the section in one run. A 4.75-in OD PowerDrive X6 RSS—equipped with a special low-flow impeller that allowed precise steering control despite the workover rig's limited pump capacity—provided push-the-bit trajectory control with no sliding. The RSS kicked off from vertical with the PDC bit, built angle from 0° to 31° at an average dogleg severity of 3°/30 m, and then maintained the tangent for more than 400 m to TD.

Because wellbore instability had caused a stuck pipe incident in a previous well, Schlumberger performed an impact analysis to position the Hydra-Jar AP drilling jar and Accelerator AP impact tool on the BHA. The jar and impact tool worked without applied torque so that the directional drilling tools maintained orientation throughout the jarring operation. To mitigate the risk of mud losses in the upper depleted section of the well, the BHA included a multicycle WELL COMMANDER circulating tool from M-I SWACO, a Schlumberger company.

Drill to TD in one run with no NPT

The application-specific BHA drilled the 5 $\frac{7}{8}$ -in section to TD in one 762-m run with no NPT and in 5 days less time than planned. During the run, the BHA was below the rotary table for 405 hours and drilled for 285 hours, setting a Schlumberger world record for the most drilling hours in a single run in a 5 $\frac{7}{8}$ -in well section.

Planned Trajectory Versus Actual Trajectory



Push-the-bit trajectory control enabled drilling to section TD 5 days ahead of plan.

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