

8.5-in Section Drilled in Single Run, Saving CCLS USD 400,000 in South China Sea

PowerDrive Archer system 675 successfully achieves high DLS in soft deepwater formation

CHALLENGE

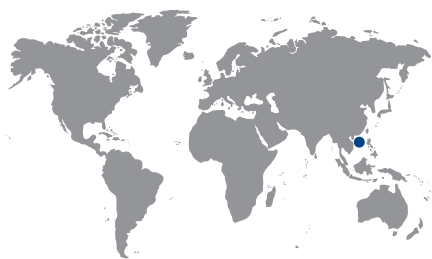
Drill the landing and the lateral of a well in soft formation on target in one run, despite high dogleg severity (DLS) requirements, potential hole enlargement, and rapid steering response to stay within 1 m from top of reservoir.

SOLUTION

Use PowerDrive Archer* 675 high build rate rotary steerable system (RSS) to drill the 8½-in section in one run with a PDC bit from Smith Bits, a Schlumberger company.

RESULTS

- Set 8½-in target depth section per plan and drilled in a single run, saving approximately 1 trip and more than USD 400,000.
- Achieved high DLS for landing and rapid steering response in lateral.

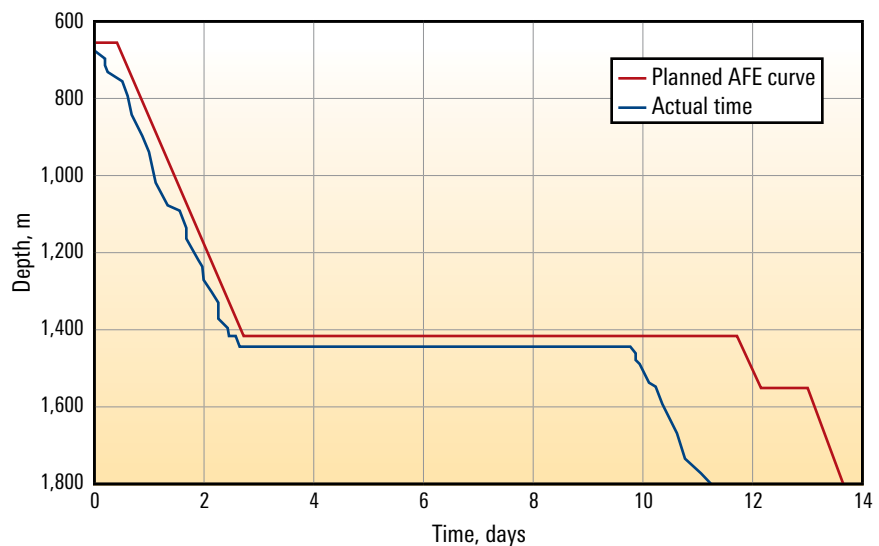


Accommodate soft formation drilling environment

CCLS (CNOOC China, Ltd. – Shenzhen) planned to drill a well in the LiuHua 11-1 field located in the Pearl River Mouth basin of the South China Sea. The heavy oil field, which was discovered in 1987, has only been in production since 1996. The main zone of this new field is a heterogeneous reservoir with soft formation and many faults and fractures. The drilling conditions have presented continuous dogleg assurance challenges for the field and have often required running motors to achieve necessary steering. CNOOC needed a reliable drilling system that would avoid the use of motors, achieve high DLS, and accommodate for potential hole enlargement of up to two inches while drilling in the soft formation.

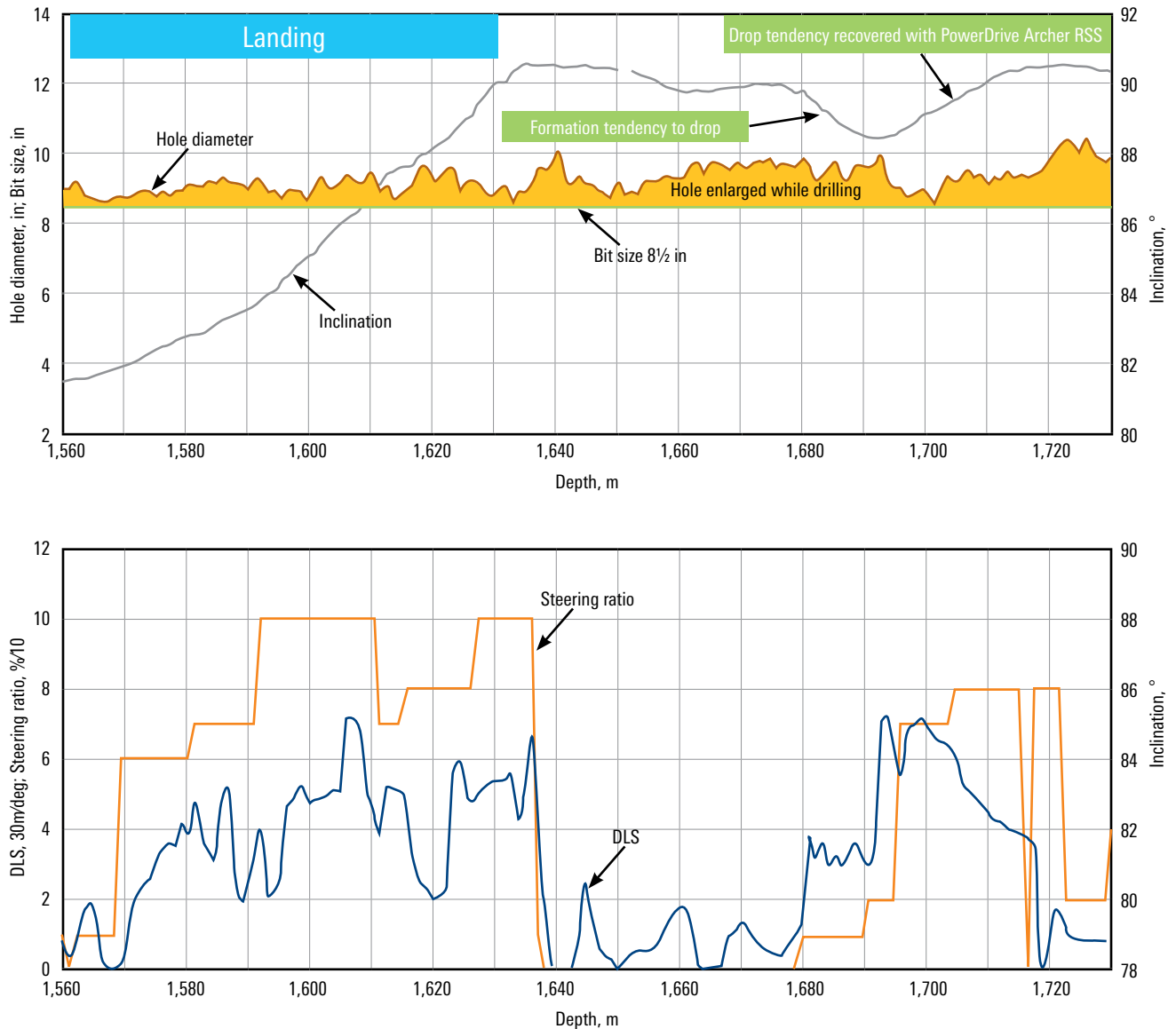
Achieve high dogleg severity with flexible RSS

The intended well was to be drilled in a shallow reservoir approximately 1,240-m deep and 900 m below the mudline. Parameters involved drilling a 3–3½°/100-ft curve in a 8½-in hole, but the faulted stratigraphy of the reservoir could easily increase the DLS to beyond 5°/100 ft with a hole enlargement up to 10½ in near the landing.



The PowerDrive Archer 675 RSS helped save 1 BHA run, performing with better results than projected.

CASE STUDY: PowerDrive Archer 675 system achieves high DLS and drills section of deepwater formation in single run



Data acquired shows successful dogleg severity achievement and hole enlargement fluctuations throughout drilling of the hole.

Drilled section successfully in single run

Using the PowerDrive Archer RSS, in collaboration with well placement services, the 8½-in section was successfully landed at target depth. The well was landed and the lateral was drilled in a single run. With a 0.8-degree bend, and the ability to quickly adjust to 1 degree, the system was used to drill the 8½-in hole and successfully respond to expected hole enlargement. Due to a change in the TVD, observed by real-time monitoring, the DLS reached a required build rate of higher than 4°–6°/100-ft toward the landing. The RSS BHA easily accommodated for the change in geosteering.

CCLS saved 1 BHA run and more than USD 400,000 by using a true-hybrid RSS, avoiding use of a motor and eliminating the need to change the casing design. CCLS plans to use PowerDrive Archer RSS for future wells for high DLS assurance.

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