

Case study: North Africa

RNS delivered 100% net-to-gross in thin horizontal reservoir section

A customer in North Africa was planning to drill a horizontal well with a target formation consisting of intercalations of clay and sandstone as thin as 0.5m (1.6ft), deposited in an estuarine environment. The drilling plan was further complicated by the uncertainty of formation dip, so the well couldn't be drilled geometrically.

The Baker Hughes **Reservoir Navigation Services (RNS)** team recommended that proactive navigation would be the key to successfully hitting, and staying within, the thin target zone. The RNS team proposed using a bottomhole assembly consisting of the **AutoTrak™ G3 integrated rotary steerable drilling system** combined with the **AziTrak™ deep azimuthal resistivity measurement service** with level 3 geosteering and the **OnTrak™ integrated measure-while-drilling and logging-while-drilling service**.

The combination of azimuthal resistivity, gamma ray imaging, and real-time dip picking was crucial to understanding reservoir structure. The AutoTrak G3 continuous proportional steering system enabled fine control and precise geosteering of the well.

The AziTrak service provides real-time, directional, azimuthal gamma ray, deep-reading azimuthal

multiple-propagation resistivity, and downhole pressure and vibration measurements from a single sub. These measurements enable optimal wellbore placement and improved reservoir contact in the reservoir sweet spot.

By interpreting the sensor responses, changes in geology could be predicted and the well path could be adjusted before the reservoir was exited. In this case, the reservoir was sand, with shale above and below. The RNS visualization software's distance-to-bed displays gave a clear understanding of wellbore location with respect to stratigraphic boundaries.

The RNS team successfully delivered the 535m (1,755 ft) horizontal wellpath 100% within the target zone—a first in this oil field.

The AutoTrak rotary steerable system reduced circulating hours by approximately 20% and also saved a trip that would have taken approximately 50 hours, providing a significant reduction drilling cost for the well.

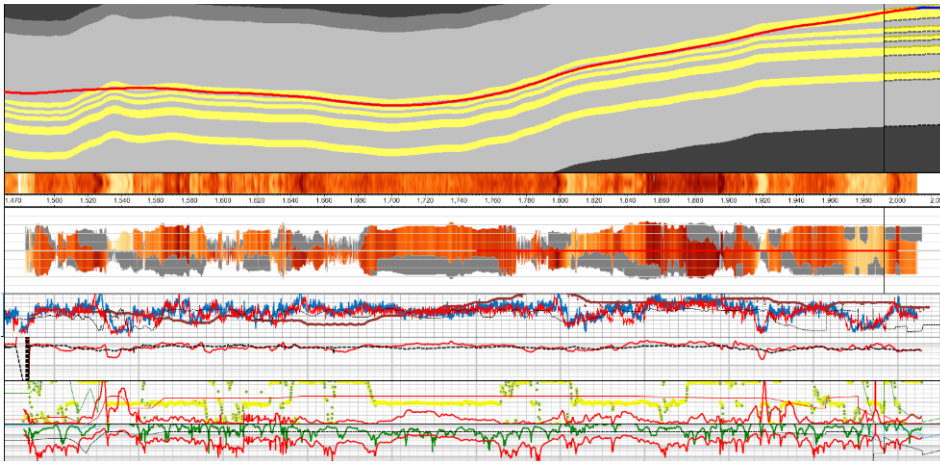
Because of this optimal well placement and drilling performance, the customer assigned Baker Hughes to geosteer another well in this field.

Challenges

- Maximize production by optimal well placement in horizontal target section
- Intercalations of clay and sandstone
- Reservoir thickness 0.5m - 2m (1.6ft - 6.6ft)
- Uncertain formation dip

Results

- Achieved 100% net-to-gross in thin target zone
- Drilled horizontal section in one run
- Reduced circulation hours by 20%
- Saved a 50 hour trip



The Baker Hughes Reservoir Navigation Services team provided clear and accurate real-time measurements through less-than-expected resistivity contrast between sand and shale, and a steepening structure in the second half of the 535m horizontal drain.