

Case study: Offshore Europe

TRU-ARMS reservoir mapping services optimize well placement, improve reserves estimation for long-term production gains

The operator required an effective geomapping and geosteering solution that would help optimize well placement for long-term drainage, accurately measure reservoir thickness, and extend the production plateau.

The specific geosteering objectives included drilling a production interval, optimally placed 0-2 m (6.6 ft) below the reservoir roof. This placement would maximize the well's production life by minimizing attic oil.

The operator also wanted to drill an extended section into the underburden below the oil-water contact (OWC) for future water monitoring.

A novel geomapping solution

As part of its existing field drilling services contract with the operator, Baker Hughes developed TRU-ARMS™ advanced reservoir mapping services for improved geosteering- and geomapping-while-drilling.

TRU-ARMS services use ultra-deep azimuthal resistivity measurements and inversions to provide sharper insights into reservoir distribution and quality. The services provide greater flexibility in BHA design and a larger depth of detection capability to map lithological and fluid boundaries. The improved measurement sensitivity of TRU-ARMS services mapped remote boundaries at +32m (+105ft) TVD with increased confidence.

The resulting map of the remote reservoir base is then incorporated into a geo model to improve reservoir knowledge for future development.

Collaborating on the optimal design

Baker Hughes Reservoir Technical Services and Drilling Services team members collaborated with the operator to develop TRU-ARMS services for the field.

In monthly progress meetings, the operator's Science and Assets teams offered feedback and direction to ensure that the technology and service would accurately map remote boundaries while keeping the wellbore 2 m (or less) beneath the roof.

Open access to the TRU-ARMS services technology development gave the operator's Science team greater confidence in the offering and helped them champion the services for greater acceptance by the Asset teams.

Delivering an optimally placed well

The TRU-ARMS advanced reservoir mapping services helped the operator meet its well placement and reservoir evaluation goals.

The drilling team drilled a total of 691 m (2,267 ft) MD in one run and at an average rate of penetration (ROP) of 17 m/hr (56 ft/hr) during 67 circulation hours. The wellbore maintained a standoff of between 0 and 1.6 m (5.2 ft) below the reservoir roof, well within the operator's objective of 2 m or less. TRU-ARMS services mapped the reservoir thickness and geometry. Confident mapping of reservoir thickness provided by TRU-ARMS services improved the operator's reserves estimation.

Challenges

- Optimal well placement was essential to increasing the production lifetime of the well and ensuring long-term drainage of the reservoir
- Accurate measurements of reservoir thickness and geometry away from the wellbore were necessary to estimating reserves and maximizing stand-off to water

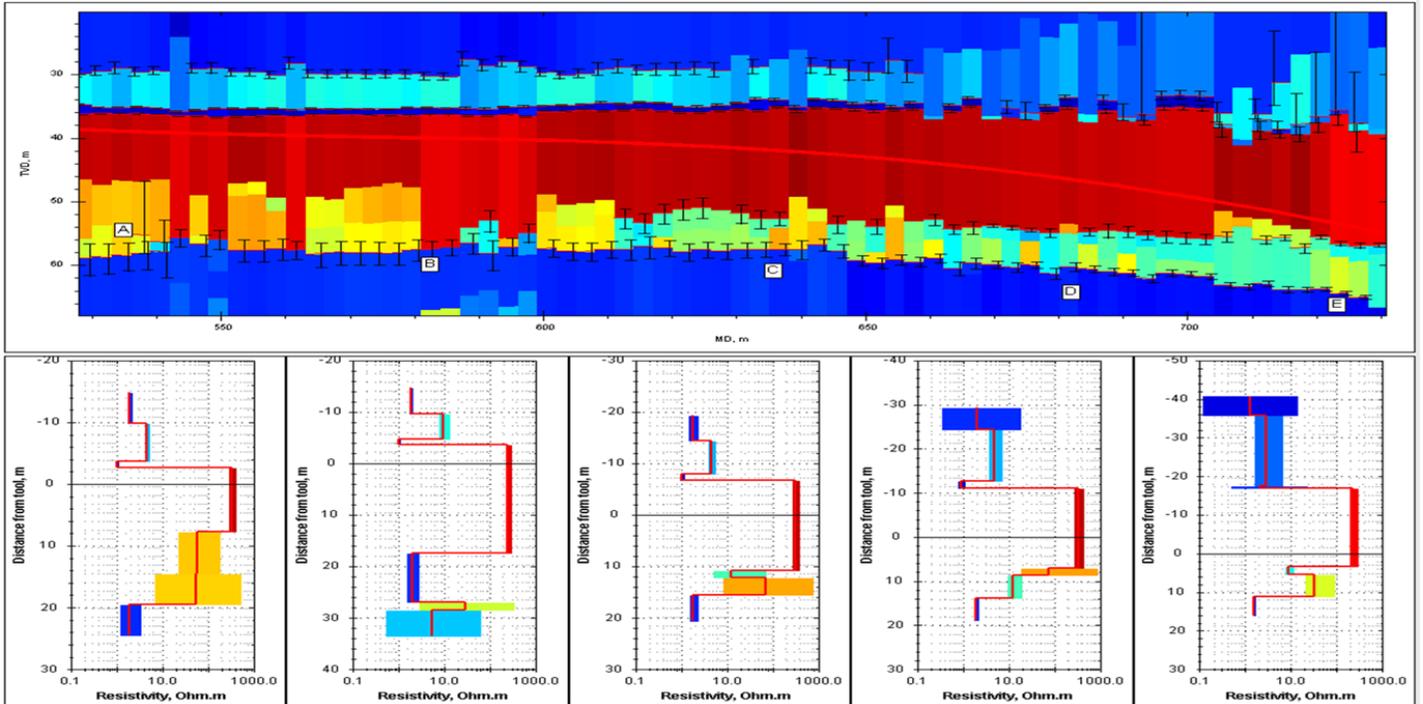
Results

- Drilled a total of 691 m (2,267 ft) MD in one run and with average ROP of 17 m/hr (56 ft/hr)
- Accurately placed well between 0 and 1.6 m (0 and 5.2 ft) below reservoir roof, within the operator's objective of 0-2 m
- Resolved base and mapped reservoir thickness from 22 to 32 m (72 to 105 ft) TVD for improved oil reserves estimation
- Delivered best-placed producing well for the field

The successful implementation of the TRU-ARMS services helped optimize well placement and deliver the best-placed producer in the operator's field thus far. The operator attributed this success to close team collaboration and clear communication with the Baker Hughes teams.

oil reserves and increased the well's production lifetime prior to water breakthrough. Optimized well placement ultimately results in improved reservoir performance to bring the operator closer to its goal of leaving no oil behind.

Thanks to the precise well placement provided by TRU-ARMS services, the operator added to its producible



TRU-ARMS advanced reservoir mapping services used ultra-deep azimuthal resistivity measurements to develop clear, multidimensional maps of reservoir distribution, quality, and boundaries, which helped the drilling team keep the well in the most productive zone.