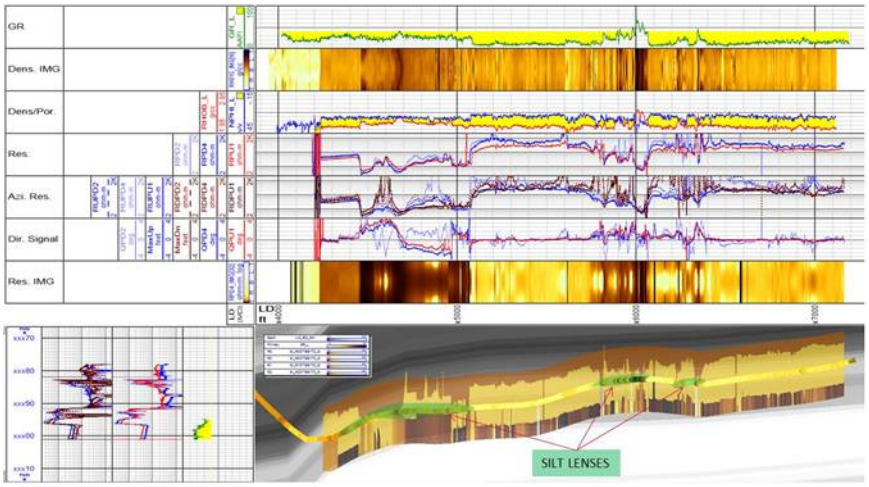
GuideWave® Azimuthal Resistivity Tool Enables Single-Trip Landing of Drillstring 100% Within Pay Zone in Challenging Clastic Formation



The Weatherford GuideWave azimuthal resistivity tool acquired formation data that identified key geological features in a clastic formation. This data enabled the client to successfully navigate a complex well path and land in the target zone.

Objectives

- Drill a 2,983-ft (909-m) lateral through a thin-sand, clastic formation to a planned depth of 8,972 ft (2,735 m). Adding to the complexity of the drilling operation was the poor lateral continuity of the reservoir, which was characterized by a fluvial meandering dispositional environment of sand bars with different thicknesses.
- Maximize target exposure by proactively geosteering away from interbedded shale and local dip changes with a maximum dogleg severity (DLS) of 2°.
- Land the well in the target zone, which was composed of sandstone and had optimal petrophysical properties for producing hydrocarbons.

Our Approach

- Upon receiving formation data from nearby offset wells in the same field, Weatherford conducted extensive pre-well modeling. The team found silty layers within the target zone that minimized resistivity contrast and made decision-making for proactive geosteering more difficult.
- As a result, Weatherford recommended incorporating the GuideWave azimuthal resistivity tool into the bottomhole assembly (BHA) of the drillstring, because this tool has radial, axial, and tilted antennae orientations that accurately determine formation resistivity in challenging environments.

LOCATION
Middle East

WELL TYPE
Offshore, horizontal, oil

FORMATION
Clastic

HOLE SIZE
6-1/8 in.

GEOSTEERING INCLINATION
89.5 to 91.5°

LATERAL LENGTH
2,983 ft (909 m)

LANDING DEPTH
8,972 ft (2,735 m)

TOTAL DEPTH
11,955 ft (3,656 m)

PRODUCTS/SERVICES

- 4 3/4-in. Revolution Core RSS
- GuideWave azimuthal resistivity tool
- Integrated directional sonde tool
- Neutron density tool
- Multi-frequency resistivity (MFR™) sensors
- Hostile-environment-logging (HEL) measurement-while-drilling (MWD) system

Weatherford®

GuideWave® Azimuthal Resistivity Tool Enables Single-Trip Landing of Drillstring 100% Within Pay Zone in Challenging Clastic Formation

Our Approach (continued)

- The team set the GuideWave tool just below the Revolution® Core rotary steerable system (RSS) and 36.9 ft (11.2 m) above the drillbit. This placement enhanced the ability of the team to make proactive drilling decisions.
- The team increased the pulse of the frequencies for the GuideWave tool to 2 MHz, 400 kHz, and 100 kHz. This maximized the amount of collected data and enabled mapping the different depths of investigation, all directional signals, top and bottom resistivities, and bed-boundary detection.
- The GuideWave tool gathered data that helped to identify the location of silty layers, interbedded shale, and local dip changes in the formation.
- Armed with this information and using the Revolution RSS, the team successfully geosteered the lateral around these obstacles—while maintaining DLS below the maximum allowable angle of 2°—and landed the well at the planned depth and 100% within the pay zone.

Value to Client

- The GuideWave tool gathered critical formation data and informed proactive decision-making. Without this data, the client would have had great difficulty in geosteering around geological complexities and landing the well in the pay zone.
- The single-trip operation minimized rig time and costs.
- Landing 100% within the pay zone broadened the clients' options for perforation points during the reservoir-stimulation phase. By avoiding interbedded shale, the team also eliminated the need to deploy blind screens to separate shale from the sand target. On average, these screens cost US $10,000 per joint. Therefore, landing entirely in the pay zone reduced costs significantly.
- Using the RSS resulted in a smooth borehole, which enabled the client to run the planned completion string downhole without any issues.

* GuideWave is a registered trademark of Weatherford in the US. Revolution is a registered trademark of Weatherford in the US and Canada.

Weatherford®

