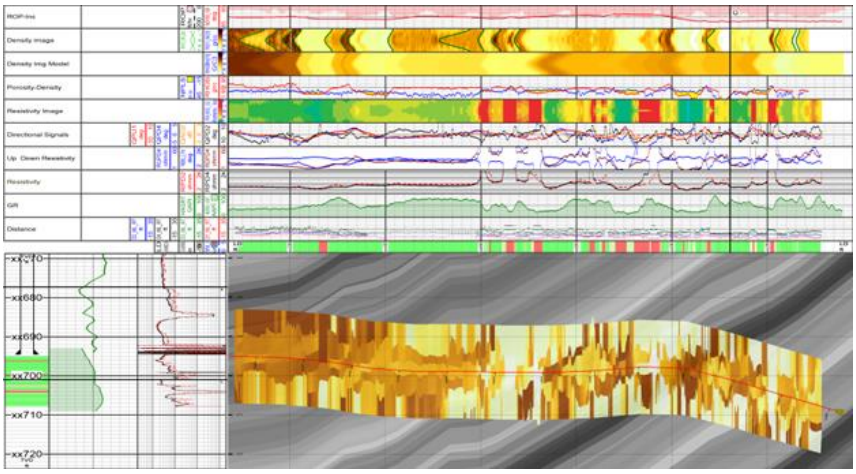
# **GuideWave® CLEAR Multilayer Mapping-While-Drilling Service** Improves Reservoir Modeling, Recovery Projections in Debut Deployment in Region



Geosteering model with the GuideWave CLEAR multilayer mapping-while-drilling service with log information obtained: ROP, gamma ray, resistivities, density-porosity, and imagen density.

## Objectives

- Characterize the reservoir in real time, identifying sweet spots, and fulfilling the operator's requirement for timely petrophysical evaluation to make informed decisions while drilling.
- Perform an advanced petrophysical evaluation by incorporating triple-combo measurements to assess porosity and permeability, capturing the dynamic relationship between various geological elements in such complex and multi-layered clastic oil reservoir formations.
- Improve future planning by incorporating density, image dip interpretation, and multilayer inversion models to enhance geological models to better understand the structural changes in the reservoirs.

## Our Approach

- Engineers from the operator and Weatherford knew the fluvial reservoirs offered unique depositional complexity—featuring non-continuous layers and structural uncertainties—and determined this was the ideal scenario for using a deep azimuthal multilayer inversion of data.
- The team designed a bottomhole assembly (BHA) to deliver precise formation evaluation essential for the effective reservoir assessment.

**LOCATION**
Middle East

**WELL TYPE**
Horizontal

**FORMATION**
Sand-shale

**HOLE SIZE AND ANGLE**
6-1/8 in., 91.5°

**TOTAL DEPTH**
6,630 ft (2,020 m)

**LOGGING INTERVAL**
5,298 to 6,630 ft (1,614 to 2,020 m)

**FOOTAGE DRILLED**
1,332 ft (405 m)

**PRODUCTS/SERVICES**
- GuideWave CLEAR service
- HAGR™ high-temperature azimuthal gamma ray tool
- NDT™ neutron density tool
- Magnus RSS

Weatherford®



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## Our Approach (continued)

- The BHA consisted of the following components: triple combo logging tools, the GuideWave CLEAR service, and the Magnus® rotary steerable system (RSS).
- A key factor in the success of this operation was the collaborative teamwork between the Interpretation and Evaluation Services and InZone Well Placement teams as well as the asset teams with different disciplines from engineering, operations experts, and field development across multiple layers.

## Value to Customer

- The Magnus RSS's ability to stay on course with superior reservoir features led to a remarkable ROP of 170 ft/hr (51.8 m/hr), facilitating the drilling and logging of 1,332 ft (405 m) in the formation in a single run while minimizing the downtime on the rig.
- The flexible BHA facilitated the trajectory change to make contact with two defined sand layers, providing immediate petrophysical data that helped identify nine zones of high porosity.
- The team successfully navigated through reservoir heterogeneity by accurately mapping sand layers (measuring only 2 to 4 ft (0.6 to 1.2 m) thick) and ensured successful completion, avoiding unnecessary exits.
- The use of the GuideWave CLEAR multilayer visualization within a challenging reservoir setting uncovered a discontinuous layer compartmentalization, resulting in a calculated net reservoir thickness of 30 ft (9.1 m) spread across 6 distinct zones, ultimately improving both reservoir modeling and recovery projections.
- Accurate wellbore positioning ensured successful penetration to a total of 343 ft (104.5 m) while encountering multiple sand layers.
- LWD logging used density images to estimate the formation dip changes from 1 to 3.5°.