Real-Time LWD and Advanced Gas Analysis Data Improves Reservoir Characterization and Reduces Costs

Objectives

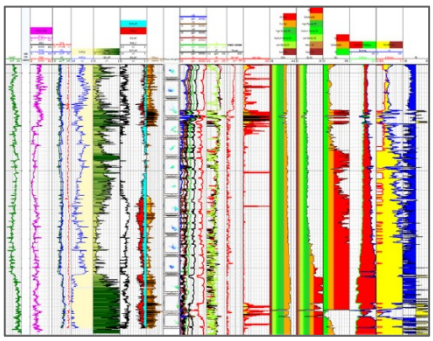
- Identify the optimal coring points in real time while drilling.
- Evaluate reservoir potential in real time while drilling.
- Characterize the stimulation potential by evaluating the mechanical rock properties and tectonic stress.
- Maximize the data acquisition method to optimize the formation evaluation budget.

Our Approach

- The Weatherford team deployed logging-while-drilling (LWD) tools including the CrossWave® sonic tool, HAGR™ high-temperature azimuthal gamma ray sensor, MFR™ multifrequency resistivity sensor, bore and annular pressure sensor, and TVM™ true-vibration monitor for real-time measurements when drilling. The team also deployed the GC-TRACER* system for advanced mud-gas extraction and analysis.
- The CrossWave tool and MFR sensor provided accurate, precise acoustic and resistivity data in real time. The data helped the operator to characterize the reservoir, make coring placement decisions while drilling, quantify the presence and porosity of organic matter, and evaluate stratigraphic variations.
- The GC-TRACER system analyzed mud gas components including C1 to C8, toluene, benzene, CO_2, and N_2.
- The team correlated the two data-acquisition methods. Then they used the resulting data in integrated petrophysical analysis to characterize the stratigraphic variations, water saturation, hydrocarbon migration, thermal maturity, formation fluid type—and ultimately identified the sweet spots.
- The analysis also incorporated slowness measurements from 16 oriented sectors of the CrossWave tool. The measurements enabled evaluation of stress-induced anisotropy and characterization of rock mechanics to determine fracability and to predict drilling efficiency.

Value to Client

- LWD technologies provided real-time reservoir characterization to select coring placement and to identify sweet spots.
- The real-time data and interpretation enabled the client to confidently identify two coring points and avoid coring an undesirable interval above the reservoir.
- Implementing LWD methods and advanced gas detection optimized logging costs and eliminated the need for wireline operations after drilling. Compared to a standard wireline logging run, these methods reduced costs by approximately US $120,000.



Weatherford integrated data from LWD and advanced gas technologies for real-time reservoir characterization and cost-effective formation evaluation.

LOCATION
Neuquen, Argentina

WELL TYPE
Onshore, oil, unconventional, exploration

FORMATION
Vaca Muerta

HOLE SIZE AND ANGLE
9.5 and 8.75 in., vertical

DEPTH
6,486 to 9,580 ft (1,977 to 2,920 m)

PRODUCTS/SERVICES
- CrossWave sonic tool
- HAGR sensor
- MFR sensor
- Bore and annular pressure sensor
- TVM sensor
- GC-TRACER system

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* CrossWave is a registered trademark of Weatherford in the US. GC-TRACER is a registered trademark of Weatherford in Canada.