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Eni Receives Industry-First While-Drilling Analysis of Hydrocarbon Composition, Gulf of Mexico

PVT lab testing validates results of fluid-profiling method

CHALLENGE

Determine capability of new formation testing method to optimize formation pressure testing and sampling processes.

SOLUTION

Use SpectraSphere* fluid mapping-while-drilling service to obtain reservoir-representative downhole samples in a wildcat exploration well and provide in situ fluid properties in real time.

RESULTS

- Transmitted fluid compositions for C_1, C_2, C_3, C_4, C_5, C_{6+}, and CO_2 in real time for first time while drilling.
- Delivered lab-quality, in situ fluid property analysis, which would save an estimated 10 weeks of lab time in future sampling operations.

"The SpectraSphere service will soon give us the possibility to perform a complete formation evaluation in a single run while also reducing acquisition time and rig cost."

Gian Luca Atzeni
Operations Geology Manager, Eni

Identify new sampling method to save time and money in future operations

Eni US Operating Co. wanted to optimize formation testing processes to save time and money in future wells. The operator conducted a field test while drilling an exploratory well in the Mississippi Canyon area of the Gulf of Mexico in Miocene turbiditic sands. The target zone was located at a water depth of about 5,800 ft with uncertain reservoir characteristics and fluid properties. A new reservoir fluid mapping method would need to be capable of acquiring pretests, capturing clean downhole samples, and fully describing reservoir fluids at a cost and time savings.

Acquire individual fluid composition analysis up to C_5 with SpectraSphere service

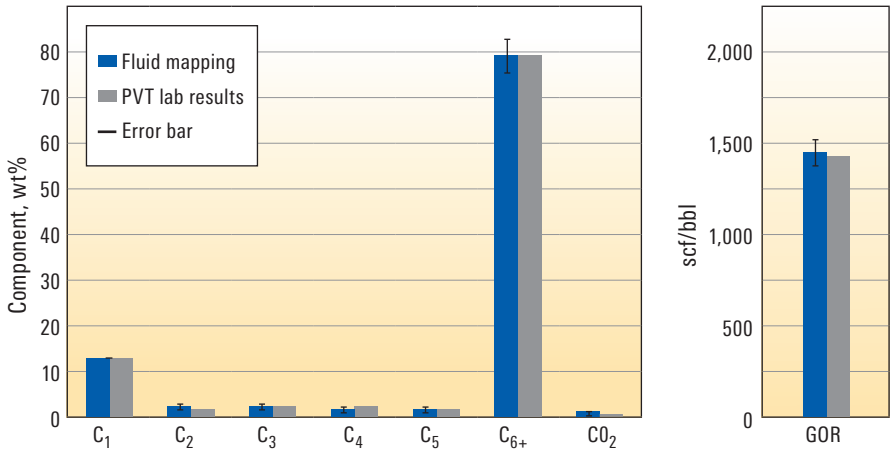
Schlumberger recommended using the SpectraSphere service to measure formation pressures, acquire samples, and analyze the fluid characteristics in real time from the exploratory Mississippi Canyon well. This service is added to the downhole drilling assembly and collects reservoir-representative samples while performing accurate fluid analysis before sampling while drilling. Traditionally, sampling happens about a day after drilling, which often results in deeper invasion of the reservoir by the drilling fluid filtrate. The SpectraSphere service accurately delivers the following in situ hydrocarbons properties: individual compositions from C_1 to C_5, C_{6+}, GOR, fluid color, hydrocarbons and water fractions, flowline fluid resistivity, temperature and pressure, and CO_2.

Transmitted individual hydrocarbon analysis in situ, delivered lab-quality fluid profiling

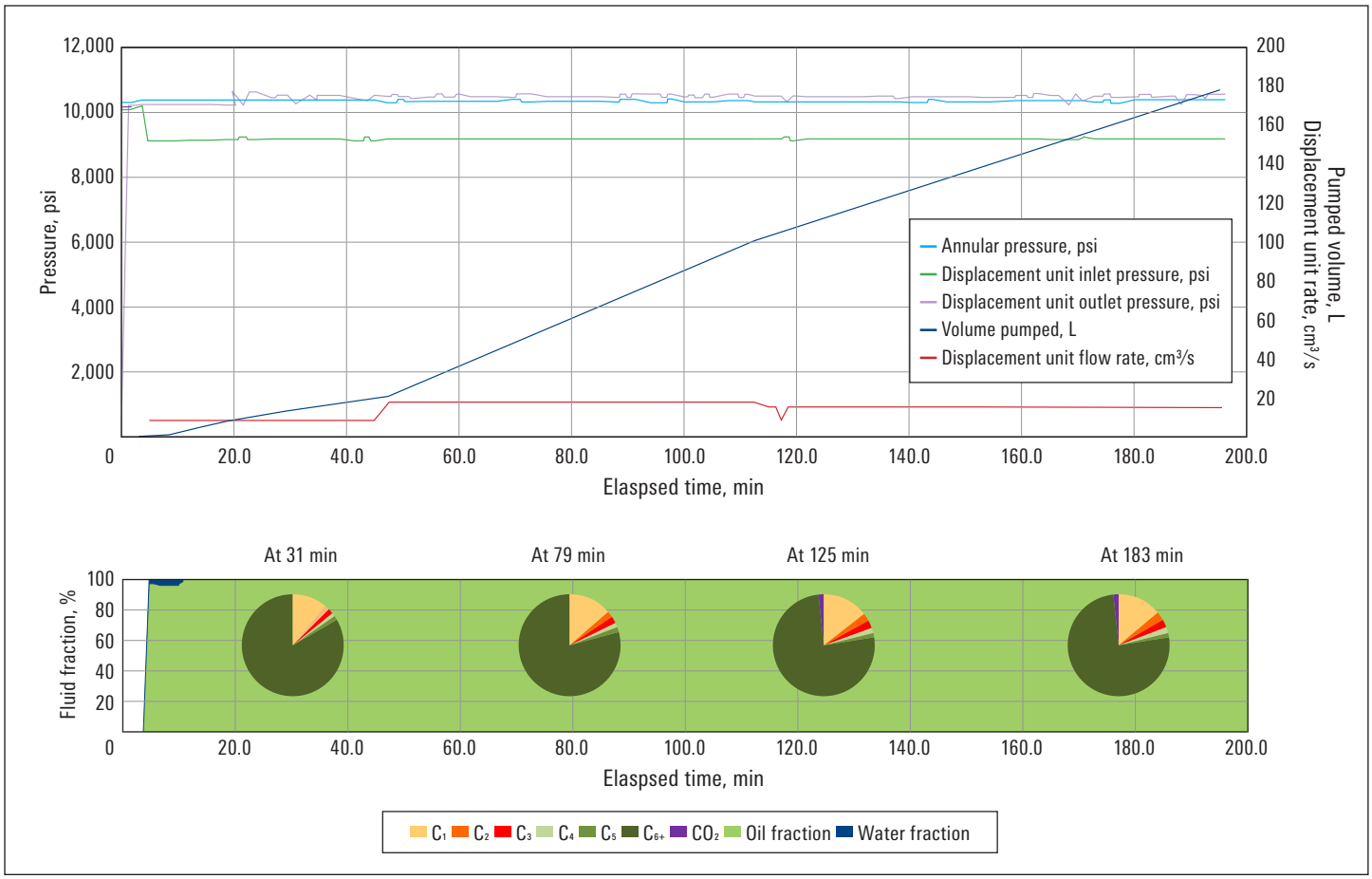
The SpectraSphere service analyzed and collected six samples downhole in real time, setting an industry first for the transmission of detailed in situ fluid properties. The SpectraSphere service estimated contamination and time to clean up, performed fluid identification and typing and measured GOR and fluid composition (C_1 to C_5, C_{6+}, and CO_2).

These results were verified 10 weeks later by lab results. Contamination was estimated in real time to within ±2% of the laboratory-determined values. Pressure measurements and fluid gradients were also successfully obtained during the operation. A total of 28 pretests were taken—17 while drilling and 11 while pulling out—that provided Eni a full description of the reservoir pressure and fluid gradients.

By delivering lab-quality results while drilling, SpectraSphere service proved its capability of gathering good measurements and clean samples, saving Eni about 10 weeks.



PVT lab analysis results show good agreement with real-time, in situ analysis of fluid properties.



Eni determined that the quality and amount of real-time data (shown above) from the SpectraSphere service would enable it to accurately determine pressures, fluid composition, and fluid fraction in future wells.

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