

Flexible 4 3/4 Inch LWD System Enhances Short Radius Horizontal Drilling Applications in Ghawar Field, Saudi Arabia

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The benefit of acquiring valid formation evaluation data while drilling is becoming a very important factor in deciding the value of any reservoir characterization program. Providing this data in real time with LWD tools allows for real time data evaluation and decision-making. In addition, the ability to measure accurate LWD formation data in wells featuring a variety of high dogleg represents a significant opportunity for safe and cost-efficient well-bore construction.

The development of the 4.3/4.Inch LWD system including directional, gamma ray, density, neutron and resistivity enabled Logging While Drilling and the acquisition of Triple Combo data in high dogleg (up to 68°/100ft) short radius wells without having to do multiple logging runs after landing the well.

Historically the buildup sections of these wells had to be logged after the well was landed due to the inability to run LWD tools while drilling the curve section. Implementation of short radius horizontal drilling in the Ghawar field has revitalized this field and created additional recoverable reserve.

Selection of this strategy above 60°/100ft is based on cost, drilling time and minimizes drilling through tough formations such as the anhydrite above the Arab-D reservoir, as this technique provides a shorter curve section.

This paper describes the results of these case studies. The knowledge, experience and lessons learned that lead to overcoming the limitations faced in the drilling of ultra-short radius wells will also be addressed and discussed.