Utilizing High Resolution LWD Images to Improve the Well Productivity by Maximizing Reservoir Contact and Optimizing Completion Design in Carbonate Reservoirs

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1. **Objectives/Scope**

Developing thin fractured carbonate reservoirs became more challenging due to the associated geological complexity. While these reservoirs seem attractive to target, they represent many challenges in terms of drilling, well placement and production, in addition to understand the subsequent carbonate geological variation.

2. **Methods, Procedures, Process**

The main challenges attributed to the development phase are primarily drilling horizontal laterals steered in thin reservoirs and maximizing the reservoir contact; secondly, determining the zones with high intensity of extended natural fractures that would affect the well productivity by driving the water, and hence requiring zonal isolation. Both challenges are addressed through utilizing the Laterolog high resolution-imaging tool, and have multiple depth of investigation resistivity that are not affected by bed boundaries compared to electromagnetic wave resistivity, which enhances the petrophysical evaluation of such thin reservoirs. Beside that the uncompensated measurements facilitate better understanding of the variation in carbonate reservoirs

3. **Results, Observations, Conclusions**

This innovative workflow was implemented for achieving optimum reservoir contact by using the real-time image and at-bit resistivity. This enabled the geosteering engineer to make changes on time to keep well trajectory in the sweet-spot all the time. The paper provides examples of the integrated workflow from job planning to post-job analysis and interpretation of the high-resolution recorded image for reservoir characterization. This is used to identify the fracture framework and structural information to design intelligent completion stages by isolating the undesired zones for maximizing well productivity.

4. **Novelty/Significance/Additive Information**

Using new innovative technology firmware in real time enabled the navigation engineer to place the well in the most prolific zone by taking the quick action to make changes in the trajectory to avoid the reservoir top or bottom tight boundaries.