

Modeling Tectonic Stress Rotation in Real Time Projects and Its Application on the Brazilian Post- and Pre- Salt Rocks

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ABSTRACT

Drilling highly deviated and horizontal wells is a common practice in Kuwait. While previously all wells in the study fields in Kuwait were cased and perforated during the planning stage for increasing production, the question raised is about the feasibility of a horizontal open hole during the reservoir lifetime and the associated challenges with drilling. These challenges include preventing wellbore collapse, taking near-wellbore drawdown, and far field production-induced reservoir depletion. Several drilling issues were commonly reported during real time, issues that are associated with stress field predictions in a tectonic zone created by the presence of salt rocks or active faults/fractures zones. Identifying breakout rotations can be the key for understanding the stress regime in near areas. An accurate pre-drill model, together with well instability real time monitoring using LWD image technologies can help operators avoid well instabilities and lost circulations problems. This can serve as a tool to define the strategy for choosing the correct drilling fluid or to define the well attack angle.

A case study will be presented that shows the influence of using LWD image technologies for an early identification of a breakout rotation due to an active fault zone. Usually, for regions with no active tectonic fractures or faults, wellbore breakouts will form axially in the borehole where the circumferential stresses are higher and have exceeded the strength of the rock. Localized slip on fractures intersected by the wellbore will generate a localized stress perturbation (stress drop), and breakouts will either decrease to form or rotate at their intersection with the active fault. The image interpretation during drilling could assist with a more accurate tectonic stress state model to keep the borehole in good shape.