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Real Time Seismic Measurements Whilst Drilling - A Drilling Optimization Measurement for Subsalt Wells

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SUMMARY

Drilling through and under salt can introduce some severe technical challenges. These are caused primarily by the uncertainty in the interpretation of the initial surface seismic. These are primarily associated with the quality of the initial seismic and the problems associated with the image and the correct velocities to use in the vicinity of salt.

Historically sub salt exploration and development wells would be drilled from the pre drill interpreted velocities. Problems occurred when the uncertainty of this interpretation resulted in large depth discrepancies in formation targets and extremely narrow drilling “mud weight” windows derived from pre drill casing and mud programs. These translated into severe Non productive drilling time in the early sub salt drilling programs, in many circumstances leading projects to be abandoned without achieving their original objectives.

This paper will describe a Logging While Drilling tool that takes seismic measurements during pauses in the drilling process. In this respect the seismic data can be acquired entirely transparent to normal drilling operations. This data can then be used to prove, or disprove the original velocity interpretation. Advances in communication technology now allow real time data to be streamed to multi disciplinary teams wherever it is appropriate for them to be based. This reduces the need for extra personnel on the rigsite and allows for better informed decisions to be made by the correct decision makers. This data used correctly, within these multi disciplinary teams, allows real time decisions to be taken that can impact the drilling of the well by reducing the uncertainty, and therefore reducing the drilling risk in these complex environments. This therefore takes the seismic measurements on which the well is originally planned from the static pre or post drill environment directly into the real time drilling environment.

Whilst allowing for the fact that this will not resolve all associated risk from the drilling of these wells it can in certain circumstances have a hugely beneficial input into the successful completion of sub salt wells.

Case histories will demonstrate the use of the tool for optimal casing positioning to maximize drilling windows for subsequent hole sections, correct picking of the base of salt, mapping inclusions within the salt and its use in conjunction with wireline walkaway surveys at the base of salt to improve sub salt pore pressure prediction.

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