

Visualization and the Use of Real Time Data While Geosteering, Onshore Algeria

Taylor, Mark S.¹ (1) In Salah Gas, BP, Statoil, Sonatrach, Sunbury on Thames, United Kingdom.

Good communication and understanding between all parties involved with geosteering decisions is seen as one of the key factors to a successful operation. The use of rigsite 3D visualization was used in a recent onshore Algeria well. The geosteered well remained 100% within a thin reservoir and proved up future development.

Generally during the planning phase of a well to be geosteered 3D models are built and pseudo log responses along the proposed trajectory are then computed. While drilling if the modelled and actual log responses match everything is going to plan. The challenge comes when these responses start to diverge, the reason for this divergence needs to be understood and, if necessary, an updated forward plan generated. There are three distinct phases in this process, the first is updating the model to account for the divergence, the second generating and communicating a new forward plan and third ensuring that the updated plan is correct. Depending on the ROP, tool response and consequence of diverging from the plan it might not be possible to complete phase one before making a decision.

Phase One: One way to update a 3D model is to generate additional top and base reservoir control points. The additional control points are generated through matching modelled and actual log responses through changing the distance the modelled boundaries seen by the logs. A series of top and base reservoir control points can now be generated and the model updated, for further control additional points can be generated by projecting ahead the modelled dip at the well.

Phase Two: The updated 3D model can now be used to plan a new look ahead trajectory by extending the existing well. The use of 3D rigsite visualization facilitates this process through using an application that accesses the same data that is being used in the office. The rigsite can monitor changes in the model and can comment on the validity of the model. Once the rigsite and office agree a forward plan can be generated.

Phase Three: On implementation progress is then monitored. If the expected log response starts to differ from the actual response then the cycle is repeated.

Case Study: This process was successfully implemented on a recent well on the Teg field (In Salah Gas, Algeria). This well was the first geosteered multi-lateral in Algeria. The well successfully demonstrated that it was possible to drill a horizontal well in a 2-3m sweetspot in a 6m reservoir.