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Pitfalls of Fluid Property Prediction in a Deep Offshore Prolific Basin

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Selecting the right prospect to drill in deep offshore environment could be strongly dependent on our ability to predict the fluid properties. This is even more important when productivity and surface processing are keys to the economic of a project. One can assume that in a mature basin where several fields have been discovered, some producing for many years, it is conceivable to achieve a reasonably good prediction of the key fluid properties, i.e. in situ viscosity, GOR, API, acidity.

In this paper we present a case study where fluid specialists were asked to predict fluid properties for an exploration/appraisal target in deep offshore block in West Africa. No 'killing' factor having been anticipated, a well was drilled and the results showed unexpected fluid quality, especially the in situ viscosity. Although the find was still considered as economically viable, the tools we used for the prediction were initially particularly challenged. Subsequent analyses and interpretations showed that the input parameters we were given at the early stage of the prospect ranking evaluation were responsible for the inaccurate prediction. The tool that has been developed for the fluid property prediction in this biodegradation prone environment is based on statistical treatment of the multiple data collected from fields of this sedimentary basin and close analogues (Sermondadaz et al., 2008). As an example, a variation from 268 to 628m in the trap volume/oil-water contact surface ratio would induce an increase from 4cP to 14cP in the insitu viscosity of the fluid (Figure 1).

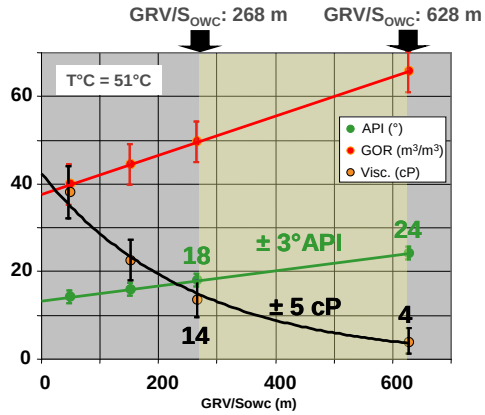

Figure 1: Impact of trap geometry on the fluid property prediction (at mid-column).

Three reservoir intervals were sampled with wireline downhole sampler and another sample was collected during a DST of the main sand. An integrated evaluation of the fluids using downhole fluid analyzer, pressures, mudgas data, PVT and geochemistry data was carried out. It revealed that many of the data, taken alone would have led to the wrong interpretation of the complex fluid distribution in these reservoirs.

Reference:

Sermondadaz et al., 2008, Oil Quality Prediction In Deep Waters: Gulf Of Guinea Applications. AAPG International Conference and Exhibition 26-29 October 2008, Cape Town, South Africa.