

WELL-TEST LOGGING TO ENDEAVOR MAPPING THE CARBONATES PERMEABILITY, OFFSHORE ABU DHABI

Paper Ref : SPWLA-2021-0053

Author : Antoine Jacques and Vincent Jaffrezic (TOTAL SE); Benoit Brouard (BROUARD Consulting);
Shafiq Ahmed, Amr Mohamed Serry, Raymond Nguyen, and Yann Bigno (ADNOC off Shore)

Speaker : Antoine Jacques

Abstract:

In current economic and environmental contexts, the optimization of long, horizontal well completion and the maximization of individual well performance are becoming increasingly important. The challenge is to be able to start improving the production efficiency while designing an adapted completion for each well without compromising the project economy. The cost-effective formation evaluation technique described in this paper allows rapid identification of dynamic heterogeneities along the reservoir after the drilling of a horizontal well. This key information then can be used to optimize well completion and treatment.

This new approach, called WTLog, combines well testing and logging techniques and was introduced initially for the optimization of unconventional well completion (Jacques et al., 2019 and Manivannan et al. 2019). The log begins by circulating a low-viscosity liquid that can be injected in the formation through the mud cake. The brine circulation operation is run at the end of the drilling phase, after reaching TD of the drain while maintaining a constant wellhead pressure at the wellhead. The constant pressure control can be applied without a specific additional choke device when Managed Pressure Drilling (MPD) is used to drill the formation section.

The inlet and outlet flowrates are measured accurately, and their difference corresponds to the apparent formation-injection rate. The depth of the interface between the two liquids inside the borehole is estimated from the flowrates and pressure measured at the wellhead. Combining these data allows derivation of the low-viscosity/liquid-injection profile along the open hole. A permeability log then can be derived by inversion.

Well Test Logging has been applied successfully for the first time on two horizontal wells in a conventional carbonate reservoir. The interpretation results were benchmarked to static conventional openhole logs and validated against the data log obtained by the dynamic production log tool (PLT) performed after well start-up. This technique opens new perspectives for optimizing well completion in these carbonate-fractured formations for which porosity logs might not be a good permeability indicator and where conductive fractures seen on image logs are not always indicative of future production.

Bio:



Antoine Jacques has more than 25 years of experience as a reservoir engineer at Total and its subsidiaries. His research interest includes innovative well testing, electrical fracturing, remote sensing using radar technology, and other low-cost techniques for optimizing unconventional plays. He has authored or coauthored more than 15 technical papers and holds 3 patents. He holds an M.S. degree in Reservoir Engineering from IFP School, France, and Paris VI University, France.