

## **Comprehensive Wireline Formation Testing Enabled Optimized Well Testing Program, Saving Significant Cost and Time in an Exploratory Well**

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### **ABSTRACT**

Achieving reservoir parameters understanding at very low mobility through comprehensive wireline formation testing planning & execution. Then analyzing and utilizing these acquired data to optimize the subsequent well testing program. In this paper, Wireline formation testing was carried out at 4 different intervals across the lower cretaceous reservoirs with the aid of dual packer and the three dimensional (3D) probe. Matrix porosity was falling between 5 – 10 pu and no fractures were observed based on image logs. Reservoir formation tester with the state-of-art 3D probe confidently showed mobile oil at the first 3 stations overcoming the tightness of the formation mainly due its much larger surface flow area and superior pressure differential capability compared to other probes. Furthermore, oil quality was assessed real-time with the advanced downhole fluid analyzer showing the exact same medium to heavy oil at the first two depths. These first two depths showed similar reservoir thickness as well as rock and fluid properties. Hence, it was clear that performing the drill stem testing at one of them is sufficient and representing the other zone as well. Moving to the third sampling interval, light oil was identified showing a completely different oil quality than the previous two stations. Pressure build-ups analysis were conducted to better understand the permeability by removing the skin effect. This enabled more conscious decisions regarding the efficiency of performing fracturing job on those intervals. For example, the fracturing job was saved at station number 3 based on comprehensive evaluation and integration of the data. Finally, the dual packer was utilized to seal across the observed fractures in zone no. 4. The formation testing with dual packer showed very tight to dry behavior indicating that these fractures have no potential. This has been also confirmed later on by testing this zone with the drill stem test. Downhole fluid analysis and sampling were achieved from as low as 0.01md/cp mobility setting a record for the lowest mobility to be sampled in Kuwait! Pressure build-ups were conducted and later on analyzed for skin, permeability understanding. Based on the detailed real-time downhole fluid analysis – that was confirmed with lab results at a later stage – and the build-up analyses, the well testing program was optimized, saving a few millions of dollars and more than 14 days of rig time.