

## **A New Approach to Real Time Acoustic Measurements in North Kuwait Cretaceous Carbonate Formation Evaluation and Characterisation: Case Study**

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### **ABSTRACT**

Mauddud reservoir in Raudhatain field is a giant heterogeneous carbonate reservoir discovered in 1950s. The field is on production since 1957 with natural depletion since it has no surrounding aquifer. Overtime, with continuous production there has been a decline in reservoir pressure which affected the field productivity. Horizontal, deviated and highly deviated wells were drilled by Kuwait Oil Company (KOC) in this field and challenges to regulate oil production and early water cut in many horizontal and deviated wells. KOC has started an initiative of installing in-flow control devices (ICD) to optimize completion strategy in horizontal wells of Mauddud carbonate reservoirs. Formations intersected in such wells are heterogeneous in nature and have huge variation in petrophysical properties like porosity, permeability and facies/clast. It is well established that permeability estimation is a challenging problem due to its heterogeneous nature and success of ICD completion design depends upon accuracy of input data such as formation permeability/mobility, porosity, saturation and pressure. The need for such an accurate input data was recognized and subsequently answered by advance acoustic wave measurements. SonicScope is the latest acoustics Logging While Drilling (LWD) tool recently developed by Schlumberger to provide geomechanical properties and mobility. The main innovative features which are exclusive to the tool are real time acoustic slownesses, shear slowness in slow formations, stoneley slowness and mobility or permeability estimation. In addition, it provides source less porosity information along with in situ continuous permeability profile, which provides superior formation evaluation data. Real time sonic data was acquired for the first time in Raudhatain Mauddud horizontal well. The continuous permeability and porosity profile estimated from in situ acoustic measurements assisted in accurate well placement, detect fractures, pore pressure, geomechanical properties and most important for completion design. The real-time formation porosity can be used together with sonic derived porosity for more realistic porosity profile. This paper provides insight on successful application of innovative field development strategies to optimize production from Radhatain Mauddud reservoir. It also highlights the importance of realtime acoustic data in estimating mobility for optimum completion design, reservoir characterization and formation evaluation.