

## **Integrated Exploration Approach to Characterize Hartha Formation, an Emerging Exploration Play in Kuwait**

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### **ABSTRACT**

Kuwait is a prolific hydrocarbon producer from reservoirs ranging from Jurassic to Tertiary. However, there are many unexplored plays, one of which is the relatively shallow Upper Cretaceous Hartha formation. Exploration for Hydrocarbon accumulations in Hartha and Sadi formations has not been given serious attention even though oil has been reported from Hartha section in neighboring Iraq. The hydrocarbon shows encountered in Hartha section during the drilling of a Jurassic well in South Burgan area triggered the exploration interest and systematic efforts are made to explore the hydrocarbon potential of this new Hartha play in the area. However, identifying and characterizing of Hartha/Sadi reservoirs became highly challenging due to the absence of logs in this shallow zone of interest. To mitigate this challenge, few available mud logs are studied for the oil/gas shows and efforts were made to relate them with seismic character/expression. A detailed analysis of the hydrocarbon indications both on and off the structure from the mud logs clearly brought prospective corridors and show that the play appear to be primarily strati-structural in nature. Windowed amplitude attribute maps generated from Hartha Formation clearly brought predominately NE-SW trending linear anomalous amplitude bodies, which could be correlated to hydrocarbon indications. For further validation of these stratigraphic features in Hartha and to better understand reservoir facies distributions, an integrated approach had been adopted in relating the seismic data with hydrocarbon indications through a combination of seismic attributes like instantaneous frequency, phase, amplitude, sweetness, spectral decomposition as well as waveform classification coupled with impedance data. The geologic model postulated with seismic and hydrocarbon indications is calibrated with the log interpretation from a slim hole drilled in a deeper Jurassic well and the results have been validated by the good oil and gas shows in the two recently drilled wells in the area. The study has established that systematic workflow adopted through integrated analysis of seismic attributes is the key in defining reservoir geometry. This study has culminated in assessing a new stratigraphic play, Hartha, in rich petroliferous province like Kuwait.