The Role of Seismic Coherence Attributes in Mapping the Fracture Network and Improving the Productivity from Thin, Tight and Fractured Reservoir

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This paper describes a case study of utilizing 3D seismic coherency data to define and mapping fracture network pattern which was integrated with well testing to improve the productivity from thin, tight and fractured reservoir in the Bahrain field. The middle Cretaceous Ab zone is a thin, tight ,highly faulted and irregularly fractured limestone reservoir. The difficulty with this 15 ft, 1 md reservoir has prevented an efficient recovery. The average production of wells is 15 bopd. This has prompted a detailed integrated study plan to increase the wells' productivity. It is well known that seismic coherence data is a key to define and map the fracture network also well testing is a key to understand the reservoir dynamics. However the new approach that links transient well testing and production data with fracture network indications derived from seismic interpretations has resulted in improving the productivity considerably.

This was accomplished through re-entering old wells and designing special trajectories to intersect productive open fractures. The productivity was significantly increased to 60 bopd with sustained performance. The paper describes in detail our approach and methodology to understand the reservoir and its drive mechanism and to increase productivity and recovery starting from analyzing core data up to designing special configuration wells. The paper further highlights the pitfalls of the conventional workflow approach in modeling such difficult reservoirs