

Polygonal Faults Implication on the Carbonate Reservoir Characterization. Case Study: Abu El-Gharadig Basin, Egypt

Munir El-Mahdy^{1,2}, Elhamy Tarabees², Ali Bakr³, and Ali Farag⁴

¹ Khalda Petroleum Company (KPC)

² Damanhur University

³ Exploration Consultant

⁴ British University in Egypt

ABSTRACT

Polygonal faults are unique, non-tectonic connected normal faults observed at many sedimentary basins worldwide. Although many scientists consider them as an important pathway for the fluid escaping, the impact of these faults on tight carbonate reservoirs still poorly defined. The data obtained from the 3D seismic attribute and interpretation in line with the wire line logging interpretation of the Abu El-Gharadig basin has revealed a network of extensional normal faults affect the Middle Eocene chalky of the Apollonia formation. This carbonate is considered as a viable gas bearing reservoir characterized by its high porosity and low permeability. The aim of this study is to characterize the development of these faults and define their effect on the drainage character of the reservoir. The structural analysis of these faults aids in the determination of the permeability and transmissibility of each fault zone. Based on the available data, the structural characterization of these faults are in accordance to the known structural feature “polygonal fault system”. Structural analysis elucidates low values of Shale Gouge ratio and high values of permeability for most of the fault zones. This could be applied to consider the polygonal faults in the Apollonia Formation as a permeable pathway for the fluid flow which improves the overall drainage character of the carbonate reservoir. This work illuminates the importance of the detailed structural analysis of faults to determine their impact on the reservoir characterization of tight, highly faulted, carbonate reservoirs.