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The Effect of Oil Composition on Field Development Plan: A Study From Two Infracambrian Reservoirs

Rachid Sablit[1]

[1]Kuwait Oil Company

ABSTRACT

In a field of Infracambrian age two major oil-bearing reservoirs occur. The former is fractured Dolomite Z, the latter underneath, Lower Sand Y reservoir. The oil accumulation in these reservoirs is a product of a unique pulse of generation from an Infracambrian marine carbonate source rock deposited during anoxic conditions as suggested by biomarkers. Petroleum generation occurred at the beginning of an oil window peak (vitrinite reflectance approx. 0.65%). The carbonate Dolomite Z has a thickness of about 300m while the Lower Sand Y has a thickness of 20m. All the reservoirs in the area have favorable stratigraphic framework to make them potential producers. Lower Sand Y is an estuarine chanel facies system influenced by tidal effects while Dolomite Z is of supratidal and intertidal origin with subaerial exposure, intense dolomitization developing a secondary porosity system. The mechanism of creation of accommodation for the Infracambrian sediments is one of thermal subsidence due to cessation of ancient volcanic activity in the area. The oil in all formations is black, viscous and heavy with an overall decreasing quality from base to top. In addition, the oil went through biodegradation of light components. The internal structure of Dolomite Z reservoir, although apparently homogeneous, has different compartments with different values of porosity, permeability and oil quality. The use of biomarkers is a powerful tool to characterize the crude oil and determine the hydraulic compartments.