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Stratigraphic Architecture Demarcation of Middle Minagish Reservoir in Western Part of Kuwait

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ABSTRACT

The Lower Cretaceous Minagish Formation is classified into three Units/Members known as Lower, Middle, and Upper. The Middle Minagish unit, known also as Minagish Oolite, comprised predominantly of limestone that consists of grainstone/packstone lithology deposited within inner to a middle ramp setting. The oolitic units considered as the main reservoir interval in the whole western part of Kuwait as in Minagish and Umm Gudair producing fields. Because of the paleotopographic variations of Jurassic units and sea level fluctuation over a wide range of carbonate platform setting, it is stratigraphically challenging to map the Minagish Oolitic units across Kuwait. In addition, both vertical and lateral changes of the oolites played an important role controlling the reservoir quality. The prospect evaluation team of the KOC have targeted the untapped areas for further exploration such as the western part of the country known as West Kuwait Sub-region (WKSR) which covers an area of more than 3600 km2. During the 1960's, the area has been drilled with five wells targeting various successions and have revealed a promising chance of commercial hydrocarbon accumulations. Therefore, a comprehensive G&G re-evaluation has been performed on the available dataset represented by 2D seismic data, basic open hole logs from five wells and core analysis over the Minagish Oolite unit. Demarcation of the stratigraphic architecture of the Minagish Oolitic units was achieved by an integrated approach of the interpreted and evaluated available data. Borehole to seismic scale data has been integrated to construct both vertically and laterally the stratigraphic geometries of the main reservoir units in the area. The integration of analyzed dataset revealed that the Minagish successions were deposited under the influence of transgressive and highstand systems tracts which have developed distinctive stratigraphic geometries represented by progradation and back-stepping respectively. Where the area has no major structure, it is crucial to identify the potential stratigraphic entrapments for exploration. Understanding the stratigraphic architecture, geometries, and quality of Minagish Oolite in this area has a significant impact on further exploration planning and execution to firm up wildcat drilling.