Ultra-Deep Mesozoic Subsalt Exploration Targets: Dead Sea, Israel Implications from U.S. Successes

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Abstract

The continued economic success of Ultra-Deep Drilling has reduced the risk reward ratios thus creating economically drillable hydrocarbon prospects worldwide. An example of this is the recent discoveries of viable reservoirs in the U.S. Offshore Gulf Of Mexico salt controlled ultra-deep Norphlet sandstone reservoirs. All carbonate related ultra-deep reservoirs and near salt contend with thermochemical sulfate reduction, the simultaneously occurring dissolution of calcium carbonate and the precipitation of silica (quartz), Onset of mesogenetic dolomites are at vitrinite reflectance of .55 with TSR at 1.3.AT TSR we should see increase in dissolution of calcium carbonate. One such area that epigenetic diagenesis has destroyed original reservoir quality is onshore Israel. Thus viable potential reservoirs would be of mesogenetic in nature. The Dead Sea located in southern Israel has untested Mesozoic sub-salt petroleum system exploration targets (9 km). The carbonates and clastics of Tethian age equivalent chronostratigraphic units have thus far not yielded the exploration success as in Arabia and Iran. Under the Dead Sea the most recent drastic burial may have enabled the potential immature Cretaceous source rock to mature. Additional potential source rocks may exist of older ages. Drastic subsidence rates may cause a significant flaw in hydrocarbon thermal maturation simulations with respect to the disequilibrium of the organic and inorganic matter vs. a short geological time; resulting in a much deeper thermal maturity window for organic matter. A model of this suggests the window occurring deeper vs. time, (6-12 Km). Onset of mesodiagenesis for dolomites are at 6 Km, and H_2S onset at 8 Km based upon current

hydrocarbon generation model from the deepest drilled well, Sedom Deep 1(6.5 Km). Deep burial saddle dolomitization occurs in the upper Jurassic Zohar Formation offshore Israel and onshore in early Jurassic age rocks. The ultra-deep Deep Block has 3.5 km of Mesozoic and older untested overlain by 900 m of salt and the low porosity Hazeva Formation a non- marine clastic. Seismic resolution at 7 to 9 km sub-salt does not reflect structural deformation in the Deep Block. Regionally, Cretaceous age Syrian-Arc structural trends sub-parallel the eastern Mediterranean. Analogous structural clay and Californian geological models suggest recent structure forming events prior to hydrocarbon generation. An ultra-deep tests are merited when considering the probability of the combination of pre-basin structures pre Miocene, the age of Dead Sea paired with pull apart deformation between the master strike-slip faults.

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