

Recent Oil and Gas Discoveries in the Jurassic and Lower Cretaceous of Northwestern Egypt (Western Desert) and Implications for Future Prospectivity

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Apache-operated concessions in northwestern Egypt have experienced a fourfold increase in hydrocarbon production to over 220,000 BOEPD since 2001, driven largely by new field discoveries in the Jurassic Khatatba and Lower Cretaceous Alam El Bueib Formations. The largest of these is Qasr Field, discovered in 2003, with reserves of 2.2 TCF and 70 MMBC. Since that time, gas-condensate discoveries in the Matruh area to the east and recent oil discoveries in the Faghur-Shushan basins to the southwest have been keys to continued production and reserve growth.

The bulk of hydrocarbons found to date occur in largely extensional fault-dependent structures that originated during Jurassic rifting and have been reactivated to various degrees by later tectonic activity, including Late Cretaceous and Tertiary inversion. Jurassic reservoirs are fluvial to proximal marine sandstones, ranging from amalgamated fluvial sands as much as 1000 ft thick at Qasr Field to single-story channel sands a few tens of feet thick to the north and east. Overall the succession is transgressive, capped by mudstone, marl and thin-bedded sands of the Zahra Member of the Khatatba Formation. The main source rocks appear to be Jurassic carbonaceous mudstone and coals that occur within the underlying Safa Member. Prediction of hydrocarbon phase remains a challenge, with low GOR oil, high GOR oil, and gas-condensate sometimes found in close proximity in the same reservoir units. Key risk factors in exploration are typically reservoir presence and quality, along with trap integrity associated with fault seal.

Currently available 3D seismic data are not able to resolve individual reservoirs or reservoir properties; nevertheless, wildcat success in the Jurassic has remained at around 50%. Recently acquired 3D data, with adjustments in acquisition parameters and technological innovations, have the potential to improve this situation. We expect a new generation of play types to evolve from better seismic resolution, and for strong growth in reserve additions to continue well into the next decade.