

Karst Reservoir Play, Cretaceous Shelf Margin Trend, Gulf of Mexico, U.S.A.

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The Karst Reservoir Play is one of eight clastic and carbonate plays associated with the Cretaceous Shelf-Margin Trend located in the Gulf of Mexico, U.S.A. study area. Analogs in the Permian Basin of west Texas show that karst reservoirs are developed in limestones during sea level low stands when ground water percolates through natural fractures and dissolves calcium carbonate. The presence of diagenetic anhydrite and the proximity to oil production suggests that hydrocarbons, which produce sulfuric acid during maturation are responsible for enhancing porosity and permeability. Surface mapping shows that the best karst reservoirs are associated with intersecting fractures. Reservoir porosity sizes range from vuggy to cavernous. Analogs show that hydrocarbons are trapped by a combination of structure and stratigraphy, and production rates of 1000 barrels of liquid per day are common.

The main risks associated with this play are reservoir, trap, hydrocarbon type, and vertical seal. Seismic attribute analysis shows that there is a low impedance and low fre-

quency signature associated with vuggy reservoirs. Ray trace modeling shows that cavernous porosity is difficult to image on seismic data that is acquired with the typical parameters of an offshore 3D survey. Petrophysical analysis of vuggy reservoir models using sonic and density logs consistently underestimate the porosity. The hydrocarbon type produced from discoveries in clastics and carbonates along the Cretaceous Shelf-Margin Trend in the Gulf of Mexico study area is dominantly gas. However, geochemical modeling shows that the target section may be more oil-prone farther to the south. The vertical seal carries a moderate to high risk, because the Gulf of Mexico received clastic influx from the Appalachians during the Jurassic and Cretaceous. An example of a Valanginian age shelf-margin incised valley and the sand-prone seismic facies signature of the valley fill illustrates this risk. Seismic examples of Karst Play prospects with cavernous and vuggy reservoirs are illustrated with high resolution 2D and 3D data in the Gulf of Mexico study area.

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