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Past and Future Gas Play Potential of the Neogene in the Veracruz Basin, Southern Mexico

An integrated BEG-PEMEX team completed a basin analysis and play characterization of the gas-prone Miocene-lower Pliocene section of the Veracruz Basin, which has produced nearly 200 Bcf mainly from three fields. The objective was to provide an up-to-date, basin-wide framework that strengthens the ranking, sizing, success probability, dependencies, and economic analysis of gas plays and their leads and prospects.

The basin was located along the tectonically active southwestern margin of the Gulf of Mexico Basin at the convergence of several plates, which created numerous post- and syn-depositional, transpressional and extensional structures. Each play element was systematically identified and mapped. Reservoirs comprise abundant, seismically mappable deepwater clastics ranging from low-quality conglomerates to high-quality sandstones in a broad spectrum of channel complexes and basin-floor fans.

Abundant traps include four-way (domal) closures, fault-dependent three-way closures, combined structural and stratigraphic traps, and purely stratigraphic traps. Seal adequacy is an important risk due to geopressure and complex, long-lived structural deformation. Source maturity, quantity, and quality for gas are considered adequate over most of the basin. Principal source rocks are Upper Jurassic/Cretaceous and lower Tertiary. Biogenic gas is prevalent in many upper Miocene and lower Pliocene reservoirs. Numerous deep-seated thrust faults and strike-slip faults serve as pathways for thermogenic gas. Surface seeps and abundant drilling gas shows indicate that hydrocarbons are being generated today.

High risk but high reward exists for deeply buried, lower Miocene fan complexes draped over large anticlines. These targets are likely to be geopressured and are at risk of seal failure. At least two gas chimneys occur in the basin. Shallow reservoir targets are lower risk but small. Channelized slope sandstones with biogenic gas and associated amplitude anomalies dominate. Sealing faults capable of sustaining significant gas column heights have yet to be found.