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Sequence Stratigraphy of the Nazareth Association, Offshore Guajira, Colombia

The Nazareth Association, Offshore Guajira comprises an area of exploration potential of nearly 7 million acres. A complex stratigraphic and structural history have produced a myriad of play opportunities within a region with over 25 years of prolific biogenic gas production from the Ballena, Chuchupa and Riohacha fields (over 7 Tcfg identified).

The seismic sequence stratigraphy provided a framework for evaluation of reservoir potential. Seven Super Sequences were identified; the oldest VII is equivalent to conglomerates in the north; V and VI in the south are equivalent to carbonate facies in the north; IV (Mid- Miocene) and I (Pliocene) prograde from south to north, while II and III (Mid-Upper Miocene) prograde from north to south.

Sequences with reservoir potential have been identified in basin floor fans in Mid-Miocene Super Sequence IV. Carbonates of reservoir quality (grainstone banks & reefs) are confined to the region adjacent to the present-day coastline. Other sequences (Upper Miocene- Pliocene) have lower slope fans with sands of variable thickness and reservoir quality. Some structural highs have fan development on their flanks.

Four main play concepts were identified. Those with greatest potential are slope and basin floor fans, some comprising stratigraphic traps. Structural highs with slope and basin floor fan reservoirs have good potential. Carbonates (grainstone banks & reefs) form a less extensive facies. Pre-Tertiary sediments with variable lithologies and possible fracture porosity pose a greater risk.