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Exploring "Sweet Spots" in the Deep Shelf, Gulf of Mexico

The expression "sweet spots" refers to the optimum trend or fairway where sealed reservoir quality facies are capable of trapping commercial hydrocarbon columns. The new concept of integrating sequence stratigraphy and geopressure compartmentalization is a comprehensive risk assessment method.

Building sedimentary models using well logs, paleoenvironment data, sand maps, and seismic sequence stratigraphy, helps project the pattern of the sediment influx from the outer shelf to the slope and bathyal environments. Basin floor fans and ponded sand sheets represent the reservoir facies in the slope and bathyal environment. Deep water environments in these zones promote the forming of the condensed maximum flooding seals. The paleoenvironmental spatial distributions in relation to the structural setting of the sequence stratigraphic units, such as progradational and retrogradational depositional of sequences are responsible for the architectural development of the different compartments on a lateral scale. On the other hand, maximum flooding surfaces form effective seals and have great impact on the vertical partitioning. These deep compartments are usually geopressured (abnormally pressured). The hydrocarbon entrapments capability in this deeply buried section is a function of the ratio between the pore vs. the fracture pressures.

Reservoir quality and the shale cap sealing capacity of the structural closure are derived by the inter-relationship of the sediment paleoenvironment and the subsurface pore pressure development. Several case histories in the deep Miocene promote some new exploration approaches and enhance old play concepts.