

# Sedimentology of the Lower Vivian Formation: A Widespread Lowstand Fluvial System?, Marañon Basin, Peru

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## Summary

The Marañon Basin of northern Peru is one of the sub-Andean foreland basins of South America. It is at the southern extent of a much larger structural basin that includes the Putumayo Basin of southern Colombia and the prolific hydrocarbon-bearing Oriente Basin of Ecuador. Hydrocarbon production in the Marañon Basin has historically been concentrated in the shallow northeast portion of the basin from Cretaceous aged marginal-marine to fluvial deposits in fields formed by gentle Neogene inversion of Paleozoic normal faults. Talisman Energy and partners are actively exploring the much deeper northwestern part of the basin: the Situche structural complex in Block 64. Oil was tested from the Lower Vivian Formation in well 64-15-2X ("Situche Central-2X") in January 2006 and a subsequent well, 64-15-3X ("Situche Central-3X"), also proved oil from the Lower Vivian Formation in mid-2009.

The main target within Block 64 is the Late Cretaceous Lower Vivian Formation. A regional study of cored Lower Vivian Formation intervals across the northern Marañon Basin determined that it is an extensive deposit primarily of fluvial origin. The Lower Vivian Formation is interpreted to represent the deposits of a widespread lowstand and transgressive system tract within a basin that was heavily influenced by cyclic eustasy and tectonics throughout the Middle and Late Cretaceous. Although hindered by sparse well control, the apparent lateral and down-dip extensiveness of the Lower Vivian Formation in core suggests a high sediment load system deposited upon a low-accommodation and low-gradient slope, possibly within a series of low-gradient, amalgamated valleys. The Lower Vivian Formation is hypothesized to be similar in depositional scope to the Mesa Rica Sandstone of the Middle Cretaceous Dakota Group in southern Colorado and northeastern New Mexico, where fluvial channel deposits are observed in outcrop to be continuous up-dip from the marine system for distances greater than 160 km.

The Lower Vivian Formation in the Situche Central-3X well was cored in July of 2009. Sedimentological observations from this core include an abundance of coarse-grained, poorly-sorted, trough cross-bedded sandstone, organic laminae and thin coal beds, rip-up clasts, rhizoliths (rootlets), calcrete horizons, and a general lack of observable trace fossils within the interpreted fluvial interval. This fluvial interval overlies an interpreted marginal-marine succession of tidal flat origin; and underlies marginal marine to open marine deposits of the Cachiycu Formation, indicating a landward shift of facies representing the subsequent late transgressive and high stand system tracts.

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