

ABSTRACT

**SEDIMENTOLOGY, STRATIGRAPHY, AND PETROLOGY OF
THE PALEOCENE UPPER SANDSTONE MEMBER OF THE
POTRERILLOS FORMATION, LA POPA BASIN, MEXICO**

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The Paleocene upper sandstone member of the Potrerillos Formation is a regressive succession of marginal marine strata in the La Popa foreland basin of northeast Mexico. Deposition of the upper sandstone member was influenced by the simultaneous development of halokinetic and tectonic structures in addition to eustatic influences. The La Popa syncline, a tectonically-modified salt-withdrawal structure, formed a minibasin, the Potrerillos minibasin. The minibasin was flanked to the north by a salt wall that formerly occupied the La Popa salt weld, and to the south by the El Gordo anticline, an intrabasinal detachment fold. Within the minibasin, deposition was locally affected by the El Papalote salt diapir.

Lithofacies analysis indicates that the upper sandstone member was deposited by three depositional systems: a wave-dominated marine shoreface, a tidal embayment, and a lower delta plain. Low-energy tidal systems adjacent to the diapir are correlative with

high-energy tidal environments at greater distance from the diapir. Far from the diapir, paleocurrents were oriented southeast, sub-parallel to intrabasinal fold trends; adjacent to the diapir, paleocurrents were deflected to the northeast and east. Growth strata indicate syndepositional uplift of the diapir and the anticline. Sequence stratigraphic analysis indicates three sequences characterized by 3rd and 4th order cycles. Stratigraphic geometries demonstrate that deposition and preservation of strata were significantly influenced by both the diapir and the anticline.

The sandstone composition ranges from arkose to lithic arkose. Framework grains indicate volcanic, metamorphic, and sedimentary sources. The majority of the detritus was derived from eroding volcanic terranes to the west, and transported through the Parras basin. Minor amounts of detritus were delivered by structure parallel fluvial systems from the northwest.

Development of the Potrerillos minibasin was controlled by several controls that formed a feed back loop. Salt flowed from under the La Popa syncline and into the flanking structures. Subsidence created a depositional low that controlled dispersal paths and increased sediment accumulation in the syncline, further amplifying salt withdrawal. Axial, southeastward progradation of sediments through the minibasin drove uplift of the diapir. During sea-level low stands, the minibasin became expressed as a tidal embayment, the Altos Blancos embayment.