

## **ABSTRACT**

# **TECTONOSTRATIGRAPHIC INTERPRETATION OF UPPER CRETACEOUS TO LOWER TERTIARY LIMESTONE LENTILS WITHIN THE POTRERILLOS FORMATION SURROUNDING EL PAPALOTE DIAPIR, LA POPA BASIN, NUEVO LEON, MEXICO**

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El Papalote evaporite diapir controlled the distribution of sedimentary facies in the southeastern part of La Popa basin during latest Cretaceous through Early Tertiary time. El Papalote diapir is flanked by a series of six discontinuous carbonate masses referred to as lentils. The six lentils formed in a complex mixed siliciclastic/carbonate marine environment. Petrographic analysis of the six limestone lentils resulted in the determination of 12 distinct lithofacies, which indicate that the basin was locally characterized by deep, normal marine to stressed marine conditions during lentil deposition. The lentils are Upper Cretaceous (Maastrichtian) to Lower Tertiary (Paleocene) in age based on benthic and rare planktic foraminifera.

Horizontal and vertical sedimentation patterns encircling the diapir illustrate facies changes from east to west around El Papalote diapir. On the far eastern and western sides of the diapir siliciclastic sediments and stressed carbonate facies are dominant, controlled by the presence of the diapir as a topographic high. Evidence that the diapir was a topographic high during the time of sedimentation include: 1) discontinuous limestone in a

siliciclastic dominated basin; 2) bio-nutrient phosphate, which may have been derived from the diapir, within the lentils; 3) calcite precipitation from the high concentrations of calcium ions as a result of the dissolution of gypsum; 4) igneous clasts within the diapir and the lentils; 5) the "shadow effect" (Kneller and McCaffrey, 1995) observed in the siliciclastic sedimentation patterns surrounding the diapir; 6) the facies distribution; 7) bedded gypsum and halokinetic breccia at the base of lentil 1. In the central and eastern parts of the limestone surrounding the northern margin of the diapir, normal marine bryozoan-rich facies are dominant. This is interpreted as a result of the "shadow effect" caused by the diapir blocking and redirecting siliciclastic sediment around the diapir, leaving a protected area where normal marine carbonates could develop.

The vertical facies trends are divided into 4 types of cycles: upward-shallowing carbonate cycles, upward-shallowing stressed carbonate to siliciclastic cycles, stressed carbonate to normal marine carbonate cycles, and saline to carbonate cycles. Cycles range from a few meters to over a hundred meters thick. Lentil 1 is characterized by upward-shallowing cycles dominated by coralline red algae. The other three cycle types are present in lentils 2-6. Stressed carbonate to siliciclastic cycles are present in the far eastern and western section of the sediments surrounding the diapir. Stressed carbonate to normal marine carbonate cycles and saline to carbonate cycles are present in the central and eastern sections. The cycles are controlled by El Papalote diapir, with minor influences by regional controls including tectonics (rise of the Sierra Madre Oriental), eustasy, and climate.