

Boquillas (Eagle Ford) Upper Slope Sediments, West Texas: Outcrop Analogs for Potential Shale Reservoirs

Brian E. Lock and Lauren Peschier

Department of Geology, University of Louisiana at Lafayette, P.O. Box 44530, Lafayette, LA 70504

ABSTRACT

With the development of multilateral horizontal completion technology, fractured organic-rich shales have become popular exploration targets as reservoirs, as well as source rocks. The Bakken Shale and the Barnett Shale (Mississippian of Williston and Fort Worth basins, respectively) are two well known examples. In the Gulf Coast Basin, the Cenomanian-Turonian (Cretaceous) Eagle Ford Shale and its widespread equivalents (Tuscaloosa Shale, Boquillas Formation) have similar economic potential.

The Eagle Ford rocks were deposited during a time of exceptionally high sea levels, but can be divided in central Texas into several members representing successively transgressive, condensed and highstand conditions. The current study is concerned with outcrops in Val Verde and Terrell counties, Trans-Pecos Texas, where the Eagle Ford (going by the name Boquillas Formation) lies on the northern margin of the Maverick Basin. Attention is focused on the lowest member of the formation, which has characteristics of upper slope depositional conditions. Since earlier publications have interpreted the Boquillas in these counties to be tidal- flat or shallow shelf sediments, the evidence for the current re-interpretation needs to be presented. Sedimentary features of the basal member include slump folds, debris flows, probable turbidites, and possible contourites (previously interpreted as hummocky cross bedded grainstones). The strata consist of limestone and some dolomite beds (mainly the turbidites and contourites) interbedded with finely laminated, calcareous, black, organic-rich shales. Diagenetic re-partitioning of carbonate into the limestones has modified the geometry of the contourites, exaggerating their resemblance to hummocky cross-stratification. Benthonic fossils are largely confined to the redeposited limestone facies, with the exception of Inoceramid bivalves (known elsewhere from anaerobic to disaerobic Cretaceous sediments). Planktonic foraminifera and ammonites, together with abundant calcispheres, dominate the assemblage.

The middle portion of the Boquillas consists of planar-bedded limestones and shales lacking the distinctive features of the basal unit. These limestones may also be the products of turbid flow. Uppermost slope or outer shelf environments are suggested. The top unit contains abundant regular and irregular echinoids and oxygenated seafloor conditions appear to have returned. This unit can probably be correlated with the Eagle Ford highstand sediments of central Texas.