

The Eagle Ford Formation in Outcrop, West Texas: Depositional and Diagenetic Trends in the Transgressive Systems Tract

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ABSTRACT

The principal productive interval in the Eagle Ford Formation is the transgressive systems tract (TST), known in the subsurface as the lower member, or in outcrop as the middle member (this author) and as “facies B” (BP publications). A basal unit seen in outcrop is largely missing in the subsurface. To avoid confusion, the TST is here referred to simply as the productive interval. Outcrops along U.S. Highway 90 in Val Verde County and around Lozier Canyon (Terrell County) provide excellent opportunities to examine these strata, and some distinctive vertical trends can be observed.

The Eagle Ford “shale” is predominantly limestone, with variable proportions of siliciclastic sediment, mainly clay minerals. Through the interval there are distinctive vertical trends consistent with the transgressive interpretation as the strata become increasingly distal in character upwards, culminating in a thin, chalky white limestone representing the maximum flooding surface (MFS). The upward trends include increase in carbonate content, increase in nannofossils, decrease in clay minerals, decrease in quartz and feldspar, decrease in total organic carbon (TOC), and change in kerogen type. These are interpreted to result from decreasing terrigenous input, resulting in an increased proportional importance of the carbonate component with a reduced average sedimentation rate approaching the MFS.

The carbonates show evidence of diagenetic modification, with nodule formation and further concentration of the carbonate in zones already relatively enriched in carbonate. Some carbonate nodule horizons have been misinterpreted as primary hummocky sedimentary structures, leading to the suggestion of shallower water than is indicated by the overall sedimentology. The main vertical variations described imply that the principal control is one of distal position relative to the terrigenous input rather than water depth, although depth likely increased upward through this member. Water depths remained well below even storm weather wave base throughout deposition of the TST interval.