

Lithofacies, Cyclicity, and Reservoir Heterogeneity of Peritidal Carbonates, Clear Fork Formation, in the Northern Eastern Shelf of the Permian Basin, Texas

Qilong Fu¹

¹Bureau of Economic Geology, Austin, Texas

Abstract

The Clear Fork carbonate reservoirs at Iatan East Howard Field are highly heterogeneous. In the downdip areas, the Clear Fork consists of dominant subtidal deposits and minor tidal-flat facies. Towards the updip direction, peritidal facies become more abundant. About 70 meter scale upward-shallowing cycles (averaging ~12.8 ft or ~4.0 m in thickness) were defined in a long core (~900 ft), and most of them have bioclast wackestone and packstone in the lower part and are capped by fenestral peloid packstone, silty to sandy dolostone, or dark mudrocks. Six cycle sets were distinguished, and two depositional sequences were recognized. Sequences are correlatable, but it is challenging to correlate meter-scale cycles. Stratigraphic cyclicity is considered to record the relative sea level (accommodation) changes. Reservoir pores (porosity >4%) commonly occur in the transgressive systems tracts (TST) and lower highstand systems tracts (HST); the upper HSTs consist of amalgamated tidal-flat deposits and are generally tight because vugs and fenestral pores were occluded by anhydrite and carbonate cements. Reservoirs are areally discontinuous and vertically compartmented by numerous nonporous zones. Reservoir characterization is critical to improve recovery efficiency.