Construction of a Core-based Sequence-Stratigraphic Facies Model for a Mixed Siliciclastic-Carbonate Grayburg Reservoir: Eastern Central Basin Platform, West Texas, U.S.A.

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The North Cowden Unit (NCU) is one of several mature waterfloods within Grayburg and lower Queen formation mixed siliciclastic and dolomitic reservoirs along the eastern margin of the Central Basin Platform. A study integrating over 10,000 feet of core description (24 wells) and 1600+ well logs was initiated to better understand field performance within NCU. A core-based sequence-stratigraphic framework divides the Grayburg reservoir volume into 3 high frequency sequences, which are further subdivided into 10 high frequency cycles on the basis of facies stacking patterns. Principal reservoir facies include 1) fine-grained silciclastic sandstone/siltstone, 2) Grain dominated dolopackstone, 3) fusulinid dolopackstone to dolowackestone and 4) supratidal, anhydrite cemented pisolite to dolomudstone. A facies model was constructed within a 4 square mile area of interest using normalized gamma ray and porosity logs which were classified through means of neural network model and trained using core descriptions. The resulting facies model better explains the distribution of original hydrocarbons within the reservoir and more importantly provides a predictive tool for determination of the distribution of remaining hydrocarbons in place.