Genetic Pore Typing as a Means of Characterizing Reservoir Flow Units: San Andres, Sunflower Field, Terry County, Texas

Aubrey N. Humbolt and Wayne Ahr

Department of Geology and Geophysics, Texas A&M University,
College Station, Texas 77843-3115

ABSTRACT

Carbonate reservoirs are characteristically heterogeneous in reservoir quality and performance owing to the variety of processes that influence pore formation. Additionally, porosity and permeability do not conform to depositional facies boundaries in carbonate reservoirs affected by diagenesis or fracturing; consequently, conventional methods of petrophysical characterization of flow units based on depositional facies are unreliable as predictors of reservoir behavior.

We provide an integrated stratigraphic, petrographic, and petrophysical study of the San Andres reservoir at Sunflower Field, Terry County, Texas, that identifies and quality-ranks flow units on the basis of genetic pore types. A total of 12 full-diameter cores were analyzed revealing three primary depositional facies and cyclical patterns of deposition identified as parasequences. From the cores, 73 samples were chosen for thin sections. Through petrographic analysis, pores were classified and four distinct, genetic pore types were identified. Petrophysical rock types were established by identifying which genetic pore types correspond to high poroperm values, and where they occur within the stratigraphic framework of the reservoir.

Sixteen coherent plugs were also subjected to mercury injection capillary pressure analysis in order to quantify pore / pore-throat relationships. The data were then evaluated by facies, porosity type, and cycle position using graphical methods, such as k/phi, Winland R35, and Lorenz plots. The results of this study reveal that the most effective way of characterizing petrophysical flow units is the combination of k/phi ratio analyses and genetic pore typing.

Humbolt, A. N., and W. Ahr, 2008, Genetic pore typing as a means of characterizing reservoir flow units: San Andres, Sunflower Field, Terry County, Texas: Gulf Coast Association of Geological Societies Transactions, v. 58, p. 431.