Depositional Systems, Lithofacies, and Reservoir Characterization of the Upper Cretaceous Austin Chalk, Brookeland and Burr Ferry Fields in East Texas and Western Louisiana

Robert G. Loucks[1], Sheng Peng[1], Kelly E. Hattori[1], Priyanka Periwal[1], Josh R. Lambert[1], Christopher K. Zahm[1], and Lucy T. Ko[1]

[1]Bureau of Economic Geology, Austin, Texas

Abstract

The Upper Cretaceous Austin Chalk reservoirs produce from argillaceous marly chalks and chalky marls along a broad play trend from the Texas-Mexico border into Louisiana. A series of cores from the Brookeland, Burr Ferry, Burr Ferry North, and Burr Ferry South field areas in East Texas and western Louisiana allow for the characterization of these argillaceous Austin Chalk reservoirs in those areas and the chance to develop a reservoir analog with associated reservoir-characterization concepts for other Austin Chalk fields. The chalks in the study area were deposited on a deeper-water shelf behind the relict Lower Cretaceous Stuart City Reef trend and on the upper-slope area in front of the paleo-reef margin. A variety of lithofacies were deposited in the Austin Chalk, where the two main groups are wellbioturbated, organic-matter-poor to -fair, marly chalks to chalky marls and well-laminated, organic-matter-rich, marly chalks to chalky marls. The stacking patterns of the interbedded lithofacies with variable argillaceous content and fabrics creates vertical heterogeneity relative to mechanical strength and other reservoir properties. The pore network is predominantly interparticle nano- and micropores between coccolith fragments; however, these nano- and micropores are segmented by clay-mineral platelets that reduce pore-throat sizes and thus permeability. Overall, reservoir quality is low with mean porosity at 5.8% and geometric mean permeability at 285 nd. Major observations include: (1) Austin Chalk argillaceous chalks produce from a range of lithofacies with variable reservoir properties; (2) reservoir quality is low with pore sizes mainly in the nanometer range; (3) sourcerock quality in the laminated lithofacies is good and can contribute to self-sourcing; and (4) vertical heterogeneity can be high, while subregional lateral heterogeneity is low.

Ed. Note: This abstract was extracted from a full paper published in the 2022 volume of the *GCAGS Journal*. The *Journal* papers are currently available in open-access format online at www.gcags.org.