
Temperature and Preservation Rates in the Deep Tuscaloosa Formation, Judge Digby Field, Louisiana

Lauri Burke

U.S. Geological Survey, MS 939, Box 25046, DFC, Denver, Colorado 80225-0046

ABSTRACT

Judge Digby Field in Pointe Coupe Parish, Louisiana, exhibits some of the highest cumulative natural gas production from the lower Tuscaloosa Formation (Upper Cretaceous) in the Gulf Coast. The average production depth in Judge Digby Field is approximately 22,000 ft. The 400°F temperatures typically encountered at depth in Judge Digby Field are anomalously low when compared to temperature trends extrapolated to similar depths regionally. At this depth, the minimum and maximum temperatures for all reservoirs in Gulf Coast producing gas fields are 330 and 550°F, respectively; the average temperature is 430°F. The relatively depressed geothermal gradients in Judge Digby Field may be due to high sediment preservation rates, which may have delayed the thermal equilibration of the sediment package with respect to the surrounding rock. Analyzing burial history and thermal maturation indicates that the deep Tuscaloosa trend in Judge Digby Field is currently in the gas generation window. Using temperature trends as an exploration tool may have important implications for undiscovered hydrocarbons at greater depths in currently producing reservoirs, and for settings that are geologically analogous to Judge Digby Field.