

Geochemical Characteristics of Tertiary, Cretaceous, and Jurassic Source Rocks, Gulf of Mexico

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Despite the abundance of oil and gas in the Gulf of Mexico (GOM), source rocks seldom have been encountered primarily due to depth of burial far below reservoir intervals. However, source rocks have been encountered in a deepwater well, the Norton prospect located in Garden Banks. This well penetrated both Cretaceous and Jurassic source rocks at relatively shallow depth (8000-9000 ft.). Samples include both sidewall core and cuttings. In addition Tertiary and Cretaceous source rocks were encountered in the Deep Sea Drilling Project (DSDP) leg 55 offshore of the southwestern Floridian coast and samples of the Tithonian from Mexico were analyzed. These samples provide a unique opportunity to characterize the generation and charge characteristics of GOM source rocks. These data aid prediction the timing of hydrocarbon generation and the quality of hydrocarbons in a particular charge.

Measurement of basic geochemical parameters indicates that these particular source rocks are organic rich (reaching approximately 10% total organic carbon) and primarily oil prone. Extract fingerprints and biomarker analyses indicate low pristane/phytane ratios (<1) and the presence of bisnorhopane, both indicators of anoxic depositional environments. For prediction of the timing of hydrocarbon generation, rates of decomposition (kinetic parameters) were measured on various samples from each horizon. These measurements include bulk and compositional kinetic parameters on source rocks and oil asphaltenes. In addition artificial maturation of these source rocks allowed determination and evaluation of the relative yields of oil and gas at various levels of conversion. These results are compared to produced oils.
