AAPG Annual Meeting
March 10-13, 2002
Houston, Texas

Susan Longacre[1], G. Michael Grammer[1], Jean C. Hsieh[1], Denise Pfeffer[1], James Hendry[2], Deborah Bliefnick[3], Antonio Giovannelli[4], Maurizio Viaggi[4], Terry O'Hearn[5], Andrei Samsanov[5], Torichellij Yugai[6], Yuri Pisarenko[7] (1) Texaco Upstream Technology, Houston, TX (2) University of Portsmouth (formerly BG Technology, Loughborough, UK), Portsmouth, United Kingdom (3) Badley-Ashton and Associates (formerly BG Technology, Loughborough, UK)), Horncastle, United Kingdom (4) ENI - Agip, San Donato, Italy (5) Karachaganak Integrated Organisation (KIO), London, United Kingdom (6) NVNIIGG (retired), Saratov, Russia (7) NVNIIGG, Saratov, Russia

Evolution of the Geologic Model of the Karachaganak Field, Northwest Kazakhstan

Karachaganak is a giant retrograde gas-condensate-oil reservoir with a 1650m-thick hydrocarbon column and in-place hydrocarbons of 17.78 billion BOE. Heterogeneous biohermal and platform carbonates ranging in age from Late Devonian (Frasnian) through Early Permian (Artinskian) comprise the primary reservoir section. From Late Devonian to Early Carboniferous, the Karachaganak massif evolved from a ramp into an isolated platform along the northern margin of the Pre-Caspian basin. The Carboniferous platform features marginal bioherm and bioherm slope facies with a relatively small internal lagoon dominated by skeletal grain-dominated facies. Permian pinnacle-like bioherms and bioherm slope facies unconformably overlie the Carboniferous (Lower Bashkirian).

Geologic efforts focused on further developing preliminary interpretations of depositional environments. New sidewall cores and core collections, recently evaluated in Russian (NVNIIGG) and Kazakh (KazNIGRI) Institutes, greatly expanded the rock-base available for characterizing the facies and general stratal architecture, leading to an enhanced geological facies model. New facies are combined with stochastic modeling to better constrain the reservoir model. Although the current model predicts that porosity trends are intimately tied to facies tracks, relationships between reservoir quality and diagenesis have yet to be unequivocally established.

Details of the sequence stratigraphic framework are currently limited by the distribution of core data; this will be enhanced through the upcoming coring program and interpretation of 3-D seismic data. Incorporation of subsurface analogs, such as the Horseshoe Atoll of west Texas, provides guidance on the potential stratigraphic architecture and distribution of reservoir facies.