PETROPHYSICAL CHARACTERIZATION AND RESERVOIR MODELING OF GCA FIELDS

Aliyev Nusret Sh1 and Negahban Shahin2
1 BP Amoco, Azerbaijan BU, GCA Team
2 BP Amoco, Houston

The Gunashli, Chirag and Azeri (GCA) megastructure is located on the Apsheron ridge in the South Caspian Basin. Development of the GCA structure by the Azerbaijan International Oil Company (AIOC) has required extensive re-evaluation of the Miocene to Middle Pliocene depositional systems and reservoir rock types.

Efficient field development requires a full knowledge of reservoir rock, fluid properties and their interactions. A petrophysical study in combination with formation evaluation has been conducted to assess reservoir quality and characterize lithology, rock types and ultimately determine flow. Accurate reservoir characterization in combination with a flow simulation model is then used to predict reservoir performance and provide a realistic reserves forecast.

The first AIOC-drilled exploration well (GCA-1),has been a critical part of the GCA petrophysical program. A robust data set has been collected and analyzed here, including core studies, a full logging suite, formation pressure data and drill stern tests.

Rock type identification in this study was based on pore-throat radius distribution, capillary pressure data, mineralogy and core porosity-permeability relationships. A new statistical approach confirmed that the rock type classification, predicted from wireline, was in good agreement with the depositional lithofacies described from core. A probabilistic model of capillary pressure derived saturations and petrophysical rock types was performed that minimised uncertainty in determining water saturations and porosities from wireline.

The new empirical method of predicting water saturation from capillary pressure data and a non-Archie log derived solution gives more accurate saturations than those derived from wireline alone and match with the log derived water saturations.