

Refilling of Oil Fields: Is Geochemistry the Key to Solve the Mystery?

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Oil and bitumoids from the sedimentary deposits of different age and basement rock in the zones of possible inflow of hydrocarbons of Romashkino, a giant oil field located in Tatarstan, Russia, are investigated. Results of the study show that the oil field is formed due to an inflow and mixing of hydrocarbon fluids from different sources and a refill of the oil field is possible at the present time.

Determination of the specific features of the formation of oil saturation in reservoir rock of different age in the Romashkino oil field and understanding of a possible refill of the oil field are of high economic significance and are also a key in understanding of what the source of oil had been. It is also of practical engineering importance as after understanding the process the industry may be able to exercise some control over the refilling process.

Geological, geophysical and geochemical studies allow fault-block structure of the basement and the sedimentary rock of the South-Tatar arch and adjacent area to be established. Thick fractured zones and geochemical abnormalities in the Domanic horizon and the Permian deposits provide evidence of an inflow of different species from the depth to the sedimentary basins. Analysis of bitumoids and pyrolysis data show that pre-Paleozoic basement rock of the South-Tatar arch and adjacent areas are enriched by migrated bitumoids.

Results of the study show that light oil fractions move from the deeper to more shallow horizons in the basement rock below two wells in sedimentary deposits of the Romashkino oil field. Analysis of the microelements in the oil composition, organic matter and basement rock show a very strong effect of the deep reduction systems bearing hydrocarbons on the formation of oil deposits in the sedimentary of the Romashkino oil field.