



## Shale Hydrocarbon Prospecting in the Central Part of the Volga-Ural Oil and Gas Province

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Until now nobody has prospected or estimated the oil shale resources in Tatarstan, although the high-carbon rocks of Domanikoid type often became an object of studies dedicated to assessment of the generation potential of liquid and gaseous hydrocarbons.

The evaluation of oil-shale deposits in Tatarstan should base on the well-known geological, geochemical and technological criteria. The main, determining conditions for shale oil and gas deposit formation are the following: high content of organic matter (OM) in the rock, and its certain catagenetic maturity; special features of the mineral composition of rocks that contribute to the formation of fractures; and the presence of overlying and underlying impermeable dense strata that ensure the safety of hydrocarbons in the shale series.

In Tatarstan, the development prospects of shale oil fields should be associated primarily with the rocks of Domanikoid formations of Upper Devonian – such as Semiluksky (Domanik) horizon, as well as Rechitsky (Mendymysky) horizon and Domanikoid formations of central and side areas of the Kama-Kinel trough system.

Studies on Domanik were started in the middle of the last century, when the Ural-Volga region experienced active interest for oil exploration. Then the research of Domanikoid series was carried out at the Department of Oil and Gas Geology, Kazan State University. But back then the prospecting was not clearly associated with an estimate of shale oil resources. As revealed during rock geochemical studies of the rock, the average content of organic matter in deposits of Semiluksky and Mendymysky horizons is 8.35 and 2.56 % respectively, which is enough to take these horizons as the main object of research and resource assessment. The presence of silica rocks and dense limestone in such a large proportion is a favorable factor in terms of assessing the effectiveness of fracturing. So we have a quite clear understanding of how to explore Domanik. In fact, the geological structure of our territories resemble a lot that of the territories of shale development in the USA. But we have to carry out a large complex of analytical studies in order to explore the geology and geochemistry of our shale series and then compare them to those already productive rocks from already developed productive shale plays.

In Tatarstan, oil seepage, as well as industrial oil accumulation in Semiluksky and Rechitsky horizons were previously identified in the central part of South-Tatar arch and on its western, northeastern and northern slopes, as well as on the southeastern slope of the North-Tatar arch. In particular, oil-bearing capacity of Semiluksky and Rechitsky horizons was identified on some areas of Romashkinskoye deposit and within Ersubaykinskoye, Berezovskoye and some other fields. These deposits are confined to linear zones of increased fracturing and associated with complex collector constructions that have a system of cavities, pores and fractures, and they are likely to represent industrial clusters formed as a result of migration of moveable oil from the lower horizons.

Shale oil is mainly light oil enclosed in rocks with very low porosity and permeability, which can be extracted with the help of a multistage water-fracturing technology. The term “shale oil” can also refer to lighter hydrocarbon fractions that can be obtained as a result of thermal effects produced on solid combustible shales with a high content (50-70 %) of dispersed organic substance - kerogen.