



Some Aspects of Formation of the Domanik Shale Deposits in the Volga-Ural Region

Irina Plotnikova (1), Sergey Ostroukhov (2), and Nikita Pronin (3)

(1) Institute of Advanced Studies of the Academy of Sciences of the Republic of Tatarstan, Department of Natural Sciences, Kazan, Russian Federation (irena-2005@rambler.ru), (2) VolgogradNIPImorneft Branch of LUKOIL-Engineering LLC, Volgograd, Russia, (3) Kazan (Volga region) Federal University, Kazan, Russia

The object of research is the shale rocks of the Dominican formation (Sargaevskian- Semilukskian –Mendymkian horizons). The analysis of results of geochemical studies of various trace elements has shown that during the moments of accumulation of Domanic shale rocks the role of a volcanic source repeatedly increased. Oceanic anoxic events have caused the formation of horizons of carboniferous metalliferous sediments (Dominican formation) on the continental margins of the ancient continent. Oceanic anoxic phenomena were associated with the periodic activation of deep processes - the development of rift systems, magmatism, plumes that were active in the Middle-Upper Devonian time on the continent-ocean border.

Based on the study of the molecular mass distribution in n-alkanes of bitumen of the Semilukskian horizon, the presence of migrational hydrocarbons was revealed in them with a different generation source. The results obtained on the basis of the molecular mass distribution are in good agreement with the group composition of bitumen, as well as with the results of gas liquid chromatography (bitumen and oil) and pyrolytic studies. The high convergence of the results obtained by different methods confirms the expediency of using the molecular mass distribution method for estimating the migration component in rocks of different productive horizons and in shale strata. The dominant process in the formation of initial organic matter of the Semilukskian horizon was the active bacterial environment, caused by anoxic conditions with hydrogen sulfide contamination of the sedimentation basin. The occurrence of anoxic environments with hydrogen sulphide contamination was most likely due to the periodic activation of volcanic activity and other endogenous processes that were regional in nature and took place on a significant area of the continental slope of the ancient platform. The existence of anoxic environments in different parts of the sedimentation basin varied in intensity, duration, and periodicity of occurrence. The area of their distribution in the Sargaevskian-Mendymkian time was more regional in nature. Then, due to changes in the intensity of endogenous processes, it narrowed. The continued periodic occurrence of anoxic events along deep faults led to the formation of intra-formation deflections of the Kama-Kinel system. Geochemical studies (R.P. Gottikh, B.I. Pisotsky, 2007) have shown that in the geological section some horizons of elevated radioactivity are characterized by high concentrations of As, Te, Hg, Au, Ag, Re, Pd and Pt known to correlate with main volcanism events. The metal-enriched solutions entering the sedimentation basin ensured formation of geochemical anomalies.

The analysis of various trace elements information content in the study of oil formation processes is represented, substantiation for the deep nature of trace elements in oils is given, and the mechanism of geochemical anomalies formation in the Domanik rocks of the VolgaUral region is revealed.