

Role of geothermal process in secondary screen formation and conservation of oil saturation of Bazhenov-Abalak complex

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Abstract

At the early stage of the stress-strain state in the Krasnoleninskij swell the character of hydrothermal transformation of the sedimentary strata in the Talinskoye field and Palyanovskaya area used to differ. In the former case, large-scale acid leaching of the Tyumen formation rocks has been recorded, with large amounts of dissolution products being carried outside the Talinskoye field. The early activation stage took place under sharp pulsating stress at elevated temperatures. That was conducive to intermittent release of interlayer water from smectites within the Upper Jurassic-Lower Cretaceous beds in the process of their illitization. Blocks of major accumulations of montmorillonite clays (the Early Cretaceous Frolovian series), that have been affected by convective heat and mass transfer during tectonic activation, acted as sources of avalanche inflow of petrogenic water into the general balance of the artesian system or into the Sherkalian formation rocks within the Tyumen formation. The water in question made the basis for the resulting hydrothermal solutions peculiar for high dissolving capacity. Eventually, the entire complex of unstable terrigenous minerals from the Sherkalian formation has been subjected to almost complete leaching. That has resulted in generation of numerous secondary cavities and expansion of macro and micro fractures. They are generally interconnected through a system of fractures. As a consequence, sandstones and gravelites in the Talinskoye field have acquired super-reservoir properties and reservoirs of the Tyumen formation in the Palyanovsky block have been converted to secondary screens. At the late activation stage, with noticeable relaxation of the stressdeformed state of the cover in the Talinskoye field, intense leaching was replaced by mineral formation and oil inflow into the hydrothermal system. Considering the hydrodynamic connection between the Bazhenov and the Tyumen formations in the zones of faults and branching fracturing, one may state that oil from the Bazhenov beds at that time has been totally or substantially redistributed by means of natural tectonic pumping; super-reservoirs of the Sherkalian formation were among the destination places. Thus, the Sherkalian formation makes the principal productive horizon within the Talinskoye field, while no oil occurs in the Bazhenov formation of the field, which is substantiated by the data acquired. In the adjacent Palyanovsky block, the bulk of the syngenetic oil remained in the rocks of the Bazhenov-Abalak complex.

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Keywords

A secondary supercollector, Bazhenov formation, Hydrocarbons, Hydrothermal solutions, Secondary fluid stop, Tyumen suite

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