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Geological structure and hydrocarbon potential of Late Jurassic sedimentary deposits in the West Siberian Province

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West Siberian petroleum province is one of the largest in the world and covers an area of 2.2 million km^2. There are more than 600 hydrocarbon deposits on its territory producing about 330 million tons of oil per year.

The Bazhenov formation of Late Jurassic age (J_3) has expanded over the territory of West Siberian basin. Bazhenov formation consists of siliceous-argillaceous-carbonaceous rock mass. It is highly bituminous, and its total organic carbon reaches 20-25%. Bazhenov suite is widespread regional marker horizon. On the margins of the West Siberian province Bazhenov suite diminish its bituminosity and grades laterally to analogical suites: mulyminskaya, tutleimskaya, etc.

Bazhenov suite is the main source rock in West Siberia. Hydrocarbons generation volumes depends on the catagenesis stage which ranges from $МК_1$ to $МК_4$. The maturity of organic matter of great extent depends on the temperatures during basin evolution. Catagenesis of organic matter in Bazhenov suite rocks is typical for a second stage of the main oil generation zone – end of $МК_1^1$, $МК_2$ [1]. The temperature is often used as indicator of oil accumulation existence in the Bazhenov suite during petroleum exploration. Experience has shown that oil productive zones where Bazhenov suite is spreaded have more high present-day rock temperatures.

First discoveries of oil presence in the Bazhenov suite were made in the early 1970s. Some wells produced oil at the rate of 100 m^3/day and more. But on the average, well stock flow rates are low and correspond to 5-10 m^3/day at average for the wells developed by depletion. Abnormally high pressure frequently occurred in the reservoirs of Bazhenov suite influence over the flow rates.

Proved oil reserves of Bazhenov suite are about 200 million tons. In the last year the oil production from 7 pools of Bazhenov suite has amounted to 746 thousand tones. Today, there are different technologies of multifracturing used in horizontal wellbores in Bazhenov formation.

Specialists distinguish 5 or 6 lythotypes in the Bazhenov formation rocks. Bazhenov formation benches have thickness of 5-7 m and less, there are also some thin interlayers (a few cm) of permeable carbonate and terrigenous rocks. Lithotypes differ mainly in mineralogy. Ammonites, the remains of fish, onychites, buchias are widely presented in the Bazhenov formation. Pyrite occurs in the Bazhenov rocks in different amounts and conditions [2].

The distinctive feature of the Bazhenov formation is fracturing that creates additional capacitive space. Fracturing is particularly typical for carbonate and siliceous interlayers that thickness is up to 4-5 m. These interlayers are occurred in a many parts of the territory of the Bazhenov formation distribution.

It is planned to bring the oil production volumes from the Bazhenov formation deposits to 30-50 million tons per year.

References:

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