

**Discovery of the First Oil Field in Eastern Siberia**

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In March 1962 during drilling of the Markov stratigraphic well in the Ust'-Kut area of the Irkutsk Region on the left bank of the Lena River, a strong gas-oil flow with a yield of more than 1000 tons per day including about 500 m$^3$ of gas was brought in from a depth of 2164 m. The specific gravity of the oil is 0.83, beginning of boiling–28°C, sulfur content–0.8%, paraffin–0.04%, and yield of light oil-products–up to 60%.

The well was drilled for the purpose of studying the stratigraphy and litho-facies characteristics of the section and for determining the oil and gas prospects of the Lower Cambrian. It occurs structurally in the central part of the large Markov anticlinal uplift, which is composed of Ordovician and Upper Cambrian sediments and has an amplitude of 475 m.

The groundwork for the stratigraphic sub-division of the sediments of this region was done by the traverse of V. A. Obruchev (1891) along the Lena River from Kachuga to Vitima. The stratigraphy proposed by Obruchev was subsequently revised by V. Yu. Cherkesov, who worked in the valley of the Lena from Kachuga to Kirenska.

The presence in this region of anticlines with angles of dip from 2° to 5° was determined in 1938 by workers of NIGRI.

In 1952 the Verkhne-Markov geological survey party of the Gostsibneftegeologiya Trust mapped the large Markov anticline, at the crest of which five brachy-anticlines with amplitudes up to 400 m were determined.

In 1956 a group of geologists of the Vostsibneftegeologiya and Vostsibneftegeofizika Trusts used geophysical and deep drilling data to compile a tectonic map which served as a basis for further planning of oil exploration in the Irkutsk amphitheater. According to this tectonic map the Markov area is located in the central part of the Baykal-Lena synclize. The Markov anticline proper extends for more than 25 km from Nazarovo on the southwest to the intersection of the structure by the Maloy Tiroy River on the northeast. The crest area of the anticline with a width from 3 to 5 km extends along the 500 m contour and is composed of rocks of the Ust'-Kut formation, being replaced toward the northwest by sediments of the Ordovician. Rocks of the Upper Cambrian crop out on the west flank of the structure. The crest of the structure is intersected by the Lena River. In the region of the well, in addition to the Ordovician and Upper Cambrian rocks, there are Quaternary sediments with a thickness of 26 m. The Upper Cambrian is represented by the Lower part of the Verkholen formation with a thickness of 98 m, which was penetrated by the well in the 26-118 m interval and is represented predominately by marls with inclusions of gypsum. In the 118-338 m interval a complex of rocks (gypsum, anhydrite, dolomite, bituminous shales, and gypsum-anhydrite breccia) was penetrated which is referred provisionally to the Litvintsev formation of the Middle Cambrian. Its thickness is 220 m. The Lower Cambrian was encountered at a depth of 338 m. The sediments penetrated by the well in the 338-1484 m interval are referred provisionally to the Angara formation of the Lower Cambrian and consist of dolomites, locally bituminous, anhydrites, gypsum, argillites, limestones, and rock salt. The section of the Angara formation encountered here differs somewhat from the analogous sediments of the Irkutsk amphitheater. The sediments of the 1484-1651 m interval are referred to the Bulay formation of the Lower Cambrian and consist largely of dolomites. The Belaya formation of the Lower Cambrian was encountered in the 1651-2100 m interval; it consists of limestones, bituminous dolomites, and rock salt.

Sediments of the Usol formation of the Lower Cambrian were encountered by the well probably at 2100 m. This formation consists here of dolomites, rock salt, and at the bottom of the well–sandstones.

Drilling has shown that among the horizontal rocks there are steep angles of dip from 15-45° (1484-1535 m) up to the vertical, standing “on their heads” (1119-1353 m interval).

Brecciated and intensively crumpled rocks are observed in the 261-338 m and 513-540 m intervals. The thickness of the Angara formation has proved to be much thicker than had been assumed in the projections. In the section of the Angara and Belaya formations were encountered thick (up to 40 m) strata of rock salt, which apparently had an influence on the structure of the sediments, particularly the carbonate rocks above the salt.

The Usol formation of the Lower Cambrian has been encountered by almost all prospecting wells in the Irkutsk amphitheater. Its thickness ranges from 270 to 1505 m. In the central part of the Irkutsk amphitheater the Usol formation is represented by alternating strata of rock salt and sulfate-carbonate rocks. Close to the folded frame of the platform the salt-bearing facies as a whole is replaced by sulfate-carbonate rocks. The sulfate-carbonate complex of rocks in the lower part of the Usol formation was