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ОСОБЕННОСТИ РАСПРЕДЕЛЕНИЯ ЗАПАСОВ УГЛЕВОДОРОДОВ В ПРЕДЕЛАХ КИРМАКИНСКОЙ СВИТЫ

PECULIARITIES OF HYDROCARBON RESERVES DISTRIBUTION WITHIN THE KIRMAKINSKAYA FORMATION

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Аннотация. На основе полученных в ходе исследований данных можно было составить представление о термобарических условиях района, а также оценить перспективы нефтегазоносности пластов. Это, в свою очередь, позволило организовать мониторинг как на локальном, так и на региональном уровнях. Обобщая результаты исследований, можно выделить следующие ключевые моменты по отдельным участкам: Коммерчески значимые притоки газа и конденсата были получены из горизонтов GaLD, которые считаются основными перспективными интервалами в районе Апшеронского бассейна. В формации Кирмаки, расположенной на северо-восточном фланге, выявлены залежи нефти. В ее пяточной части, согласно диаграмме электрического каротажа, отмечается плотная песчаная пачка. Анализ продуктивных горизонтов показал, что толщина интервала QALD в Апшеронской впадине колеблется в пределах 114–162 м, среднее содержание карбонатов составляет около 3 %.

Ключевые слова: Апшеронский архипелаг, разработка, скважина, структура, Апшерон-Купеси.

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Annotation. Based on the data obtained in the course of the studies, it was possible to form an idea of the thermobaric conditions of the area, as well as to assess the prospects for oil and gas bearing formations. This in turn, allowed us to organise monitoring at both local and regional levels. Summarising the results of the studies, the following key points can be highlighted in the individual areas: Commercially significant gas and condensate flows were obtained from GaLD horizons, which are considered to be the main prospective intervals in the Absheron Basin area. Oil deposits have been identified in the Kirmaki formation located on the north-eastern flank. In its heel part, according to the electric logging diagram, a thick sand pack is recorded. The analysis of productive horizons showed that the thickness of the QALD interval in the Absheron depression varies within 114–162 m, with an average carbonate content of about 3 %.

Keywords: Absheron archipelag, development, well, structure, Absheron-Kupesi.

The Absheron-Kupesi areal is located in the north-western part of the Absheron Archipelago fold. Natural oil and gas outcrops in this region have long attracted the attention of researchers. In the area where the field is located, the seabed is covered with thin sands and ‘fish ears’, and under them lie Pliocene clay-sand deposits. The geological structure of the Absheron Archipelago has been studied using a variety of geophysical exploration methods in marine conditions, including pulse deep exploration and structural exploration drilling. From 1950 to 1952, geological and geophysical surveys were conducted in the Apsheron Basin, including seismic surveys, gravimetry, aerial photography, as well as mapping, structural prospecting and deep excavations. As a result of seismic studies, it was confirmed that the Apsheron Bankas is a large anticlinal fold. However, due to complex seismological conditions, its geological structure has not yet been fully studied. Several positive local anomalies were detected by detailed gravimetric method. One of them is the Apsheron Archipelago uplift, which is also known for the accumulation of denser Mesozoic sediments in its upper part.

In addition to geophysical studies, the tectonics and sediments that make up the Apsheronskaya Depression section were refined using dug wells. Exploration drilling was carried out in the area of the Apsheronskaya Depression, mainly in the north-western wing of the fold. As a result of these explorations, oil and gas deposits were discovered in the Kirmakinsk Formation. Between 1952 and 1990, 11 structural research wells were drilled in the Apsheron Basin, and 38 exploration wells were drilled between 1951 and 1989. Almost all wells penetrated fractured reservoir deposits. The lithological composition of the section is characterised by alternation of sandstone, fine sand and clay. The upper part of the section consists of clay, while the lower part consists of fine-grained light grey sand. In addition, fine-grained and carbonate sandstones and pyrite minerals occur in the composition. The clays are grey, medium dense, sandy and carbonate. The average thickness of the section is 90 metres. The logging diagrams of the KT deposit show varying resistivity. The resistivity in wells № 5, 6 and 7 is 6 ohm-m, in some sections of wells № 11 and 17 – 10 ohm-m, and in wells № 21, 24, 25 and others – 40–50 ohm-m. The thickness of the CT varies between 200–280 m, with an average thickness of 250 m (fig. 2).

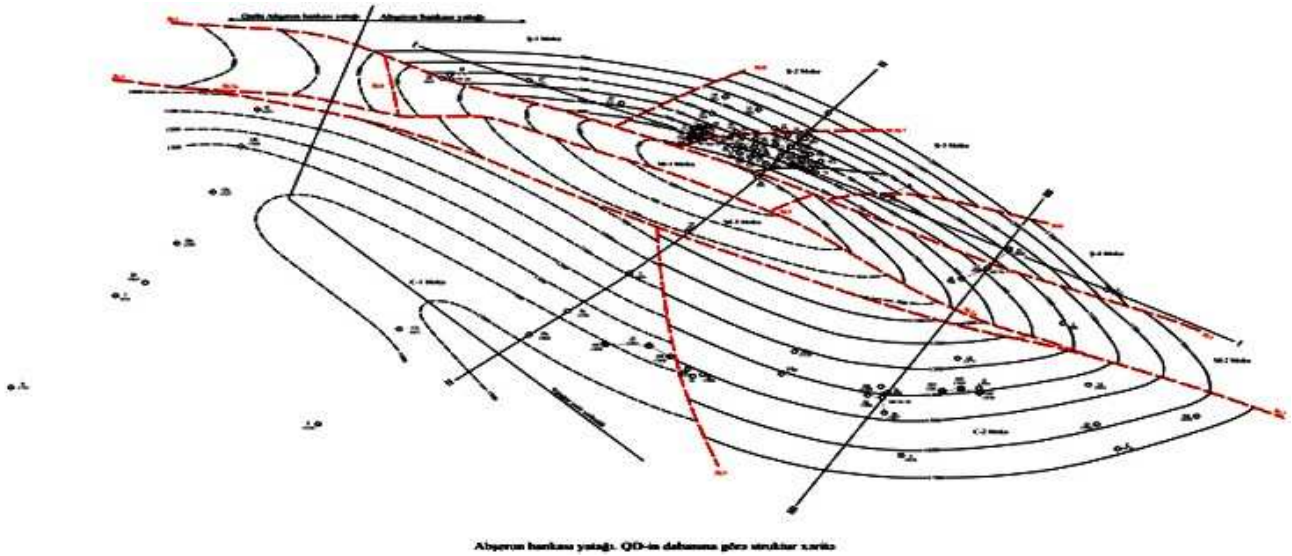

Figure 1 – Cross-section of the Kirmakinskaya Formation

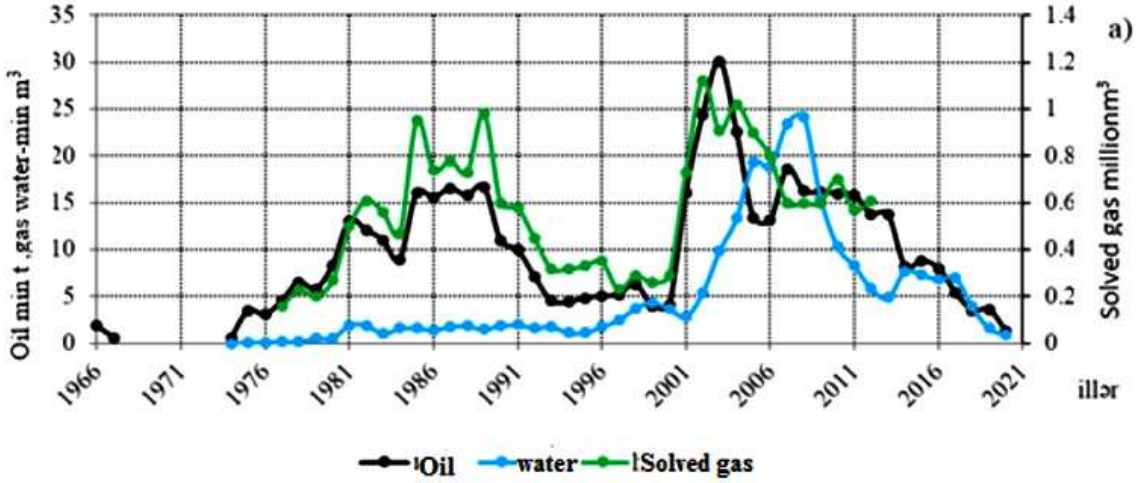

Figure 2 – Distribution of oil, water and gas in the diagram of the Kimmakinskaya Formation

In the Apsheron Archipelago section, MG fields are represented by all sediment strata.The Surakhanin Formation sediments have been washed into the vault part of the structure, but the wing is bifurcated in parts. Lithologically, it consists of alternating clay and sand. The clays are grey-brown in colour, hard and oily. The Sabunchu Formation sediments have been washed into the vault of the structure, but are distributed in parts of the wing. This layer consists of sand and clay in equal proportions. Deposits of the Balakhani Formation are distributed throughout the area, but the arch is partially and sometimes completely eroded. Lithologically, this layer includes thin and fine-grained light grey sands, predominantly quartz, partly calcareous (Fig. 3).

The interruption deposits were partially washed into the vaulted parts of the structure. Based on the results of analyses of rocks from wells 7 and 8, they were found to consist of thick sandy loam with interlayers of gravel and weak clays. Deposits of the Upper Cretaceous Clay Formation (ACF) are lithologically predominantly clayey lithofacies. The section is characterised by decreasing thicknesses of sandy layers. Fractured bed deposits were uncovered in most wells. The lithological composition of these deposits includes alternation of sandstone, fine and fine-grained sand with clay. The upper part of the section consists predominantly of clays. The total thickness of MG sediments of the Apsheronsky basin varies from 270 to 2030 metres. The structure of the Apsheron archipelago can be divided into three zones, each of which is bounded by transverse faults that form many tectonic blocks. The water depth in the central part of the Apsheron Rise, located to the north-east of Pirallakhi Island, reaches 2–3 m, while in its wings it reaches 20–25 m. The uplift is 10–12 km long and more than 3–3.5 km wide. The Apsheron depression is an anticlinal structure elongated in north-west and north-east directions. The northwestern wing has a steep inclination (45–50°), while the northeastern wing is more gentle (25–30°). The arch part of the structure is complicated by two longitudinal cracks, and the arch of the south-west wing by one. North-east.

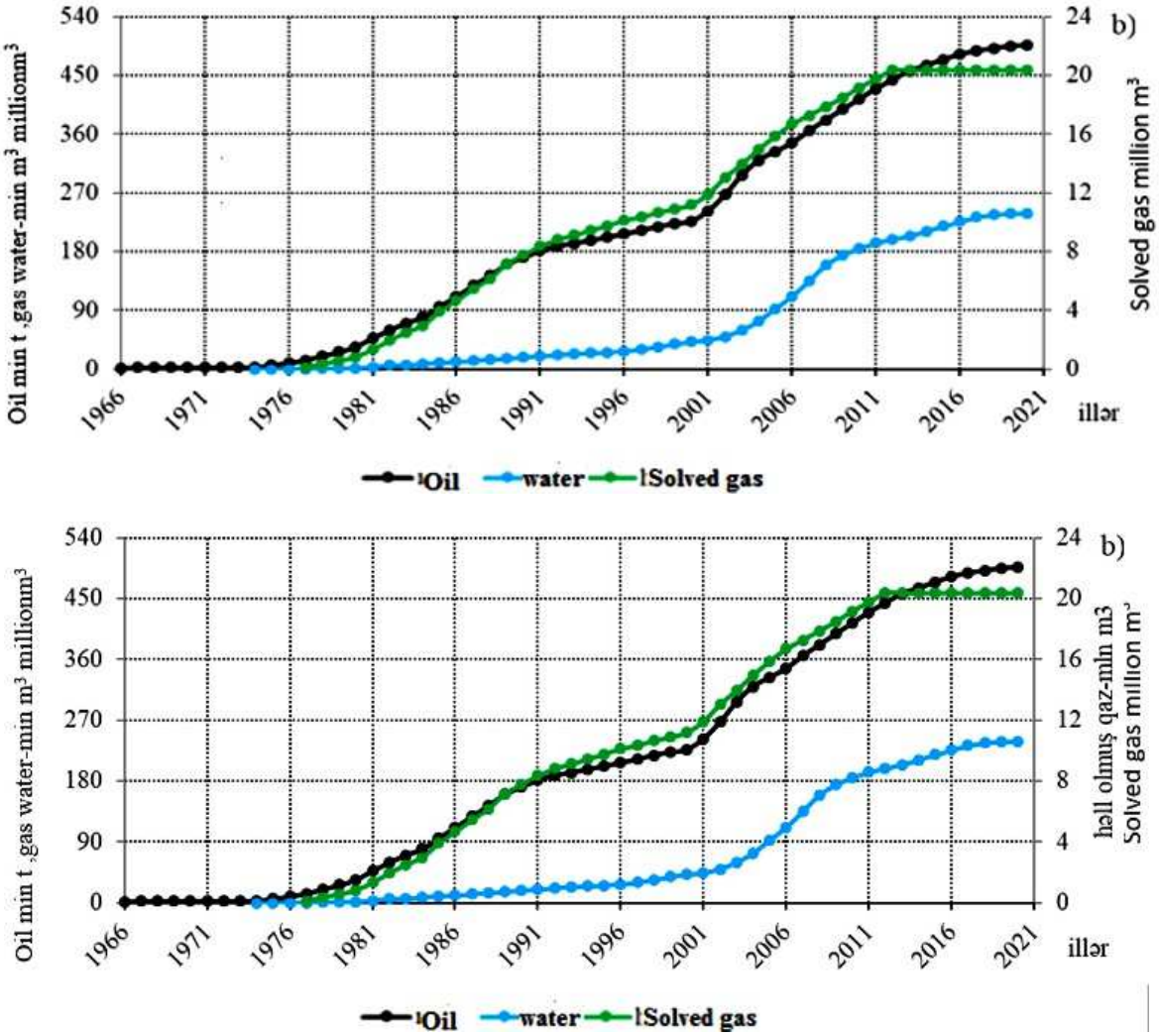

Figure 3 – Distribution of oil, water and gas in the diagram of the Balakhani Formation

Conclusions

1. Geological, geophysical and mining data (including drilling and well test data) obtained from structural exploration and prospecting wells drilled in the Absheron Basin uplift have been collected, systematised and analysed.
2. The lower structural layer comprises rocks of Cretaceous-Miocene age, while the upper layer covers a fertile layer of Quaternary age. The substructural floor is mainly composed of clay layers.
3. Considering that oil and gas content in the Absheron Basin uplift zone is mainly associated with the lower branch of the MC, as well as gas manifestations recorded during drilling from Miocene-Paleogene and Mesozoic sediments, it will be more appropriate to use seismic data instead of 3D seismic surveys to fully assess the oil and gas content of the structure.

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