



## "GEOLOGICAL AND GEOPHYSICAL STUDIES CONDUCTED TO STUDY THE HYDROCARBON POTENTIAL OF THE WESTERN PART OF THE SURKHANDARYA REGION"

**Sariev Rustam Khushbakovich**

Chief Geologist of "Uzbekgeofizika" JSC ZHTUP,

[sariev\\_83@mail.ru](mailto:sariev_83@mail.ru)

**Annotation:** *The article discusses the features of geological and geophysical studies conducted to explore the oil and gas potential of the western part of Surkhandarya Region. Based on the analysis and synthesis of the obtained data, the article provides recommendations for further exploration efforts aimed at increasing the hydrocarbon resource base.*

**Key words:** *field, structure, oil, gas, hydrocarbon, anticline*

**Аннотация.** *В статье рассмотрены особенности геолого-геофизических исследований, проведённых с целью изучения перспектив нефтегазоносности западной части Сурхандарьинской области. На основании анализа и обобщения полученных данных представлены рекомендации по дальнейшему направлению поисково-разведочных работ, ориентированных на увеличение ресурсной базы углеводородов.*

The main directions of geological exploration in the Surkhandarya megasyncline are the Upper Jurassic carbonate formations - for gas and the Paleogene deposits - for oil.

The Paleogene deposits of the Baysun bend and the Kelif-Sarykamysh ridge are currently not considered as priority objects for the discovery of oil fields. The deep exploration drilling carried out here is aimed at developing the 25th Anniversary of Independence (Gadjak) field and finding new gas deposits in the Upper Jurassic and Lower Cretaceous deposits [2].

The initial data on the geological structure of the northern part of the Afghan-Tajik intermontane depression, the western part of which is occupied by the Surkhandarya megasyncline, were obtained by G.D. Romanovsky (1878-1890); I.V. Mushketov (1886); V.N. Weber (1913); S.N. It is cited in the works of Mikhailovsky (1914) [1].

Since 1931, oil exploration began in the Surkhandarya megasyncline, resulting in the discovery of the first Khaudag oil field in 1934, bordered by the limestones of the Bukhara Formation. The discovery of the Khaudag field began the intensification of geological surveying on a scale of 1:100,000, 1:50,000 and larger. Oil and gas exploration began in the Surkhandarya lowland (Boisun basin) in 1931. By 1960, the entire territory was covered by state geological surveys on a scale of 1:200,000 (V.G. Gorkovets, H.T. Tulyaganov).

Studies on scales of 1:100,000, 1:84,000 and larger covered the Kelif-Sarykamysh range, where the upper surface of the Meso-Cenozoic sedimentary cover complex is most widespread.

In 1949-1953, T.Ya. Bronstein and A.N. Naumov studied the Sherabod-Kelif anticline range, the Baysun basin and the Sarikamysh anticline. In 1949, E.A. Alamkina mapped the southwestern part of the Sherabod-Kelif range on a scale of 1:50,000. In 1952, G.M. Chistilin mapped the Aktau anticline, the southern lowland of Bobotag and the Tuyuntau mountains on a scale of 1:100,000. As a result of these works, the geological structure of the Kelif-Sariqamish ridge was studied, the extensive development of large continuous faults was noted, Akkapchigay, Boyangora, Kognisoy, Beshkhiz and other structures were identified from the Upper Cretaceous sediments (Fig. 1).

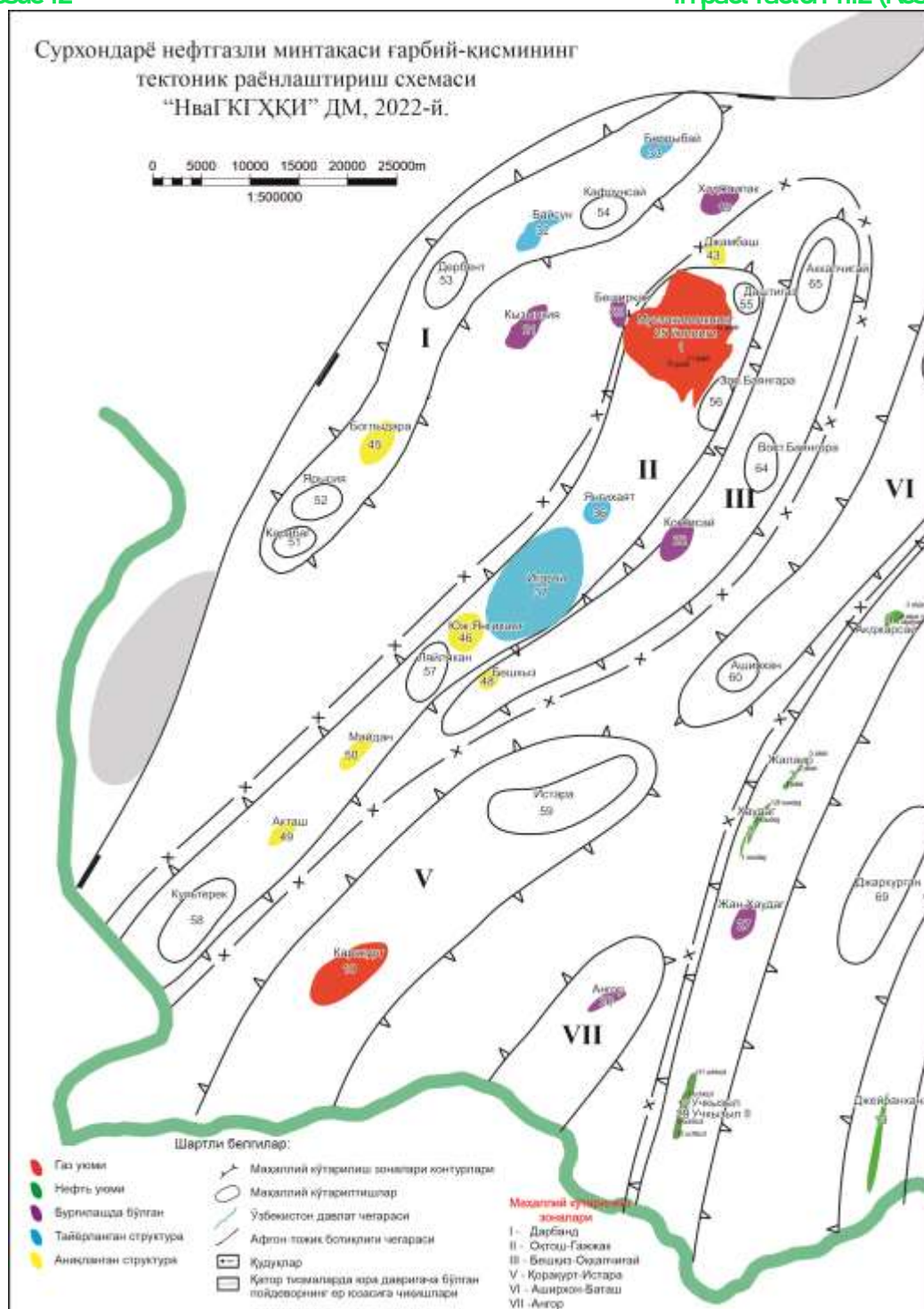


Figure 1. Tectonic zoning scheme of the research area  
(According to DM "NvaGKGHQT").

Based on the data of geological surveys of 1950-53, deep exploration work was started in the Aktash region to open Jurassic deposits and assess their oil and

gas prospects (K.V. Bekov, 1953). According to the results of drilling by the Termezneft trust, extensive development of large-scale fault breaks of the thrust type was noted, and in the center of the structures the thickness of the Lower Cretaceous deposits sharply increases.

In 1961, the Boyangora structure was prepared for deep exploration drilling by the Karshineftegazrazvedka trust using structural drilling. In 1963, the appearance of oil in the Upper Cretaceous deposits (senon) was noted by the Boyangora well No. 1.

In 1966-1969, the Samarkandgeology Trust conducted geological surveys on a scale of 1:50,000 on the eastern slopes of the Kugitangtau Mountains (Y.N. Krasko). The structure of the area adjacent to the southwestern side of the Baysun basin was studied in detail.

In 1966-1980, the Tashkentgeology Trust conducted geological surveys on a scale of 1:25,000 (I.S. Rapota, D.R. Rasulov, L.I. Bunyak), as a result of which a conditional geological map of the Kelif-Sarykamysch ridge on a scale of 1:25,000 was compiled.

In 1969, P.K. Azimov and others conducted a comparative analysis of the effectiveness of geological surveys of various scales from 1:200,000 to 1:25,000 in oil exploration. The authors conclude that the most effective geological survey for the preparation of structures is a scale of 1:25,000. Studies of this scale served as the basis for determining the location of wells in the Amu Darya (1964), Kashtar (1966), 25th Anniversary of Independence (Gadjak) (1975), Mirshodi (1985) fields. Since 1969, the Uzbekneft Association has been conducting systematic exploration work in Maidana, Zarabog, Boyangora, Khojaipak, Beshkiz, Darband, Kognisoy and others.

In the Boyangora area, the presence of large shallow thrusts in the Lower Cretaceous deposits (wells 1, 2) and intensive gas production from valine deposits (K1) in well 5 of Boyangora were noted.

Strong industrial gas flows were obtained in wells No. 6 and 8 of Gadzhak (Jurassic limestones). No disruption was detected in the areas of the 1P Kognisoy well, which was completed by drilling to a depth of 4286 m (apt). In well 2, a powerful gas fountain was obtained from the XIV horizon (K1) in 1990 from a depth of 3624 m; in well 3, according to geophysical survey data in the wells, the XIV horizon is saturated with gas, although it is located 200 m lower than in well 2.

The largest number of wells was drilled in the Gadzhak area - only 15 wells. Only the 6th, 14th, 15th, and 18th wells of them exposed the faulted limestones of the Upper Jurassic period. Their depth is 3162 m in well 14, in wells 15-3615 m, 18-3424 m 8-, 17-kimmeridgian-titan deposits were found, in wells No. 11, 16, 24, 25 - Lower Cretaceous terrigenous deposits (valangin). The rest of the wells did not reach the target horizons.

Thus, out of the total number of drilled wells, only 12 reached the target Lower Cretaceous (Karabil Formation) layers and 6 reached the Upper Jurassic limestones. Drilling efficiency was 12% for Upper Jurassic carbonate layers and 24% for Lower Cretaceous terrigenous deposits.

Structural drilling gave the most effective results at the stage of studying and analyzing the geological features of the Gajak, Boyangor, Uchkyzyl, Khaudag, Aktau, Lalmikor, Mirshadi, Kushchek, Koshtar and other formations. During 1952–1970, I.M. Podolskaya, E.A. Goltman, M.M. Mirasrorov, S.I. Musaev, Kim Ben-Chan, T.K. Ruziev and others prepared more than 30 areas for deep drilling. Later, in 1987–1990, along with seismic surveys, the results of constructive drilling were used to study the articulation features of the Koshtar and North Aktau anticlines (E.I. Ivanov, Y.M. Yachmennikov, A.P. Yugai).

Deep exploration work was carried out in 43 areas, including Boyangara, Gadzhak, Okkapchigay, Kognisoy, Beshkiz, Aktash, Kulterek, Zarabog, Lailakan, Maidan, Darband, Karakurt, Kattakum, Angor, Ashirkhan, Shorchi, Sangardak, Batash, Mirshadi, Sev. Akzhar, Akzhar, Khaudag, Uchkyzyl, Zhaironkhona,

Kokaiti, Lalmikor, Shim. Lalmikor, Sharq. Lalmikor, Kushcheka, Pakhtaobod, Kurgancha, Kattabosh, Kashtar, South Kashtar, Shorbulak, Aktau, Ajoyib, Pogranichnaya, Amudarya, Karsogli, Dasmanaga (P.K. Azimov, Z.Z. Nasreddinov, Sh. Sharatov, M.M. Mirasrorov, A.S. Mitin, C.K. Sherov, A.N. Levin).

Deep drilling revealed a complex depth structure of the depression, which is due to the presence of shear faults in the Cretaceous and Jurassic beds [3].

Currently, 365 deep wells have been drilled in 45 areas in the Surkhandarya megasyncline. Exploration and parametric drilling wells have discovered deposits of Mesozoic-Cenozoic age, up to Upper Jurassic carbonates. At the same time, Paleogene-Neogene deposits have been mainly discovered, and only in separate areas (Aktau, Dasmanaga, Lyalmikar, Kokaiti, Amu Darya, Kattabash) are found in the upper silt. Cretaceous deposits and Upper Jurassic carbonates have been discovered in the areas of the Baisun basin and the Kelif-Sarykamys ridge.

In general, deep drilling has established the complex geological structure of the Surkhandarya megasyncline, which is expressed in the presence of movement faults in the Cretaceous and Jurassic sediments, as well as inconsistencies in the structural plans of the salt and subsalt complexes of rocks [1].

It should be emphasized that in such complex conditions, the full study of the deep drilling area is still at a low level, and without full integration with seismic surveys it is difficult to obtain reliable and complete information about the geological structure of the area.

Modern ideas about the geological structure of the Surkhandarya megasyncline are based on extensive and accurate research materials. At the same time, some of its structural elements have not been sufficiently studied geologically and geophysically. This is mainly due to the complexity of the geological structure and the level of confidence in the effective development of deep-lying, promising oil and gas stratigraphic complexes.

The main goal of these studies is to study the hydrocarbon productivity of the region and the structures associated with them.

Currently, the primary task in the region is to search for areas of accumulation of hydrocarbon deposits in the strata, in which the following cases are distinguished:

1. Identification of objects considered promising in the relatively shallow Lower Cretaceous and Jurassic strata during the period of exploratory drilling in the Boysun slope.

2. Study of the geological structure of previously identified Yangihayot, Igarchi and a number of other objects considered promising, located in the vicinity of the 25th Anniversary of Independence (Gadjak) field, and analysis of the results.

3. Search for hydrocarbon deposits with various geological processes, including structural and non-structural features.

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