

**SEARCH AND SEARCH AND DETAILED SEISMIC EXPLORATION  
WORKS OF MOGT-2D IN THE SOUTH-EAST PART OF THE  
BASHKENT TROUGH, IN THE KASHKADARYA FOOTHILLA FOREFUL  
AND IN THE ZONE OF THEIR JOINT WITH THE SOUTH-WESTERN  
SPINS OF THE GISSAR RIDGE**

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**Рис.1.1**

Geophysical knowledge

The study of the geological structure of the Bukhoro-Khiva oil and gas region by geophysical methods begins in 1945. Since that time, the entire territory has been covered by aeromagnetic and gravimetric surveys, which, together with deep exploratory drilling, have given a general idea of the deep structure of the region.

The entire territory of the projected work is covered by aeromagnetic survey at a scale of 1:50000, carried out by Makarova Z.A., Vakhrushchev M.A. in 1964-1965. As a result of the generalization of aeromagnetic work, a summary map was compiled at a scale of 1:50000, on which a number of positive and negative anomalies were identified, stretching from the northwest to the southeast.

Gravimetric work on a scale of 1:200,000 was carried out on the territory of the planned work from 1951 to 1978 by Smolina T.V., Ivanova E.A., Orlovsky A.S. and others. As a result of the analysis of the obtained materials, it was established that in the Beshkent trough, tectonic elements of the Upper Jurassic post-salt plan are fixed as an anomaly, the structure of the Upper Jurassic sub-salt structural plan, the Shurtan field, is detailed. Currently, the interpretation and reinterpretation of high-precision gravity survey materials in order to detect GATZ associated with traps and hydrocarbon deposits is being carried out by employees of JSC "IGIRNIGM" (N.Yu.Bunyak, M.A.Dyrda), who gave recommendations for optimizing the directions for conducting search and detail seismic surveys within the Chanak-Dzhambulak area (the probability of detecting a deposit in the contours of the SATZ or is estimated at the level of 70- 80%).

Electrical exploration works (VES, DEZ, ZS) were carried out in 1958 on a scale of 1:200,000. The Shurtan, Guzar and other uplifts were identified (Gromyko N.A. et al., 1959). At the end of the 60s, as the depth of exploration increased, the reliability of structural constructions according to the SEM data fell sharply.

**Method.** Therefore, in order to study the wave field and the velocity features of the medium, analyze the dynamic and kinematic characteristics of the waves, determine the possibility of mapping Upper Jurassic carbonate deposits, a number of fundamentally new seismic survey methods are being introduced into the production regime of field parties: VSP (1967 A.A. Barkhudaryan, B.D. Ivliev), MOG, MOGT (1969 A.A. Barkhudaryan, B.D. Ivliev, S.Kh. Sitdikova, Yu.M. Yachmennikov).

In order to increase the possibilities of seismic exploration in tracking subsalt Jurassic horizons, since 1965, the introduction of vertical seismic profiling began, which makes it possible to study the wave field that occurs at internal points of the medium, carry out stratigraphic referencing of reflecting horizons, and determine the elastic properties of the sedimentary cover section.

Since 1970, the CDP method has occupied a leading position in the practice of seismic surveys, the use of which, in combination with deep drilling, VSP data, makes it possible to obtain a fairly complete picture of the relief structure of subsalt horizons with high capacitive properties.

Since 1974 and at the beginning of 1980, intensive introduction into production of gas-dynamic excitation sources GSK-10 and GSK-6 begins.

Since 1976, testing of vibroseismic installations of the SV-5-150 type has begun, which makes it possible to change the frequency range of the excitation signal within a fairly wide range, depending on specific tasks and the frequency spectrum of recorded reflected target waves.

The study of the geological structure of the SWOGKh by geophysical methods begins in 1956. Until 1965, aeromagnetic, gravimetric, electrical and seismic surveys were carried out in the regional plan, which made it possible to establish only general features of tectonics, to clarify the possibilities of various methods, and to draw a conclusion about the advisability of using seismic surveys of reflection waves in studying the structure of cover formations of the sedimentary cover, since in the first two geophysical fields there are separate objects are not selected. Electrical prospecting also turned out to be ineffective due to the distorting effect on the electric field of contacts of rocks of different ages emerging on the day surface.

In 1966, systematic seismic surveys began. Over the next five years, a large amount of experimental-methodical, pilot-production and search-detailed studies of DOM were carried out in the areas of Belesyaynak, Karabay, Dzharkuduk, Gumbulak, Adamtash, Kizilbayrak, etc., which made it possible to determine the optimality of technical and methodological methods of conducting field work, to significantly expand the existing ideas about the deep structure of the territory, to transfer a number of structures for deep exploration drilling.

Based on the analysis of the extensive geological and geophysical information accumulated at the end of 1971, it was established that, based on the materials of the resurfacing, it is only possible to reliably trace the horizons associated with post-salt deposits. As for sunburn.

## GEOLOGICAL AND GEOPHYSICAL STUDIES

### 1.2.1. Geological knowledge

To date, the entire territory of the Bukhara-Khiva oil and gas region, which includes the areas of projected work, is covered by a comprehensive geological and hydrogeological survey at a scale of 1: 200,000, according to which there is a wide development of modern Neogene-Quaternary deposits on the surface. Geomorphological studies have also been carried out everywhere, but the main features of the deep structure of the region are still not fully understood.

The first geological studies within the areas of projected work were started in 1936. During this period, N.P. Zubov, S.P. Suvorov started geological surveying, scale 1:84000. The result of the survey was the selection of a number of anticlinal structures, which were reflected in the terrain.

By 1949, geological work had been carried out on the vast territory of the region; Yu.K.Mironov, V.I.Chernov conducted geological surveys, which made it possible to compile summary sections of Tertiary and Quaternary deposits, as well as to compile geological maps at a scale of 1:50000.

Since 1950, within the territory of the Beshkent trough, a systematic study of the deep structure of the geological section has begun using deep and structural drilling in combination with geophysical methods.

Since 1956, the main emphasis of geological surveys has been directed to the search and exploration of objects that are promising for oil and gas. Since that time, the volumes of structural, prospecting and exploratory drilling have been steadily increasing.

Exploration of structures by deep exploratory drilling directly in the area of the projected work began in 1959.

In the immediate vicinity of the project area, drilling of prospecting and exploration wells began in 1971 with the laying of the Dzhambulak-1 well. To date, geological information has been obtained on the section on the pl. Guzar, Buzakhur, Zafar, Ilim, Shurtan, Garmiston, Kumchuk, Hamal, etc.

As a result of the work performed, large gas condensate fields Shurtan, Zafar, Buzakhur, Chunagar, Mezon, etc. were discovered; oil and gas condensate fields Sev.Shurtan, Garmistan, Kumchuk, Turtsari, etc.

All of the above wells uncovered the Callovian and Oxfordian-Kimmeridgian stages of the Upper Jurassic.

As a result of exploration work in the project and adjacent areas, the deep geological structure, the structural plan of the pre-salt and post-salt complexes of Upper Jurassic rocks were studied, and the regional productivity of the Callovian-Kimmeridgian carbonate sequence associated with organogenic reef facies was established.

The main types and methods of geological surveys in the area of design work with a brief description of the results achieved are given in Table No. 1.

The first studies of the Kashkadarya depression date back to the second half of the nineteenth century, when in 1877 V.A. Obruchev carried out geological studies in the area of the oil outlet near the village of Shurasan.

In 1887, N.V. Weber faunistically characterized the Jurassic, Cretaceous and Tertiary deposits within the Yakkabag Range, N.A. Oleinik studied the structure of the Shurasan area and adjacent areas, establishing the prospects of these areas for oil and gas.

In 1929, I.A. Kudryatsev conducted a geological survey of the Shurasan area, described oil seeps in Shurasan. In 1947, F.P. Korsakov built a geological map, which shows a group of folds in the Yakkabag region. In 1947, V.G. Mashadova carried out a geological survey, which made it possible to largely detail the occurrence of tertiary rocks throughout the studied area, and gave a more detailed description of the Shurasan, Tashbulak and other folds.

In the period from 1949 to 1952, a geological survey at a scale of 1:25,000 was carried out in the Yakkabag region under the leadership of F.P. Korsakov together with S.V. Ekshibarov and V.P. Shevchenko. As a result of the research in 1955, F.P. Korsakov compiled summary geological structural maps and profile

sections, summarized the factual material on lithology and stratigraphy of molasses, describing the tectonics of the area of work.

Since 1950, a systematic study of the territory began with structural drilling as the main method of geological research, as well as deep exploratory drilling in combination with geophysical methods.

Directly in the area of work, drilling of exploratory deep wells began in 1974 on the square. Yakkasaray, where six exploratory wells were drilled. In well No. 3, a commercial oil inflow was obtained at a depth of -3244m (Lower Cretaceous deposits, XIII of the Neocom-Aptian horizon).

In 1988, the area was put into exploration drilling. Western Yakkasaray. 3 exploratory wells were drilled. As a result, the productivity of the XII horizon of the Neocom-Aptian was confirmed.

In addition, in the areas: Shurasan, Urtakishlak, Talli, Tankhaz, Badakhshan, Sev. Badakhshan, Shorbulak, Yakkabag, Chimkurgan the first exploratory wells were drilled, from which no product was obtained.

In 1951, S.V. Ekshibarov took a sample of oil from a pit drilled at the Shurasan spring.

Paleozoic rocks.

According to the composition, the sediments of the Jurassic terrigenous complex are divided into two main types. The first of them is represented by igneous and pyroclastic rocks. The second is sedimentary rocks (argillites, thin layers of siltstones, sandstones).

Carbonate deposits (J3 O+km)

On terrigenous deposits, without visible unconformity, there is a carbonate stratum, which has a widespread distribution in the described area. It is represented by a complex of facies-related carbonate rocks, the thickness of which varies over a fairly wide range from 200 m to 520 m. At the base of the carbonate formation lie aphanitic latently crystalline limestones of dark gray color.

Salt-bearing deposits of the Upper Jurassic are developed over a large area of the BHNGO. Within the Beshkent trough, these formations essentially control large oil and gas accumulations in the underlying Oxfordian-Kimmeridgian carbonate deposits. The salt-anhydrite complex during the transition from the Chardzhou to the Bukhara stage decreases in thickness and changes its structure from five-membered: lower anhydrites - lower salts - middle anhydrites - upper salts - upper anhydrites, to a three-membered one - without salt-bearing layers (V.V. Korsun, M.H. Alimukhamedov, 1971).

Cretaceous deposits (K)

Cretaceous rocks (800-1860m) overlie the Jurassic deposits. The structure and thickness of these deposits are consistent throughout the region. The deposits of the Upper Cretaceous are composed of a sandy-argillaceous stratum with interlayers of siltstone. The thickness of these deposits in the Zhilinskaya area is 875m (well No. 1-P).

Lower Cretaceous sediments are represented by greenish-gray fine-grained sandstones, a member of red-colored clays with thin interlayers of sandstones and siltstones. Thickness ranges from 700m (well No. 1 Zhilinskaya) to 800m (well No. 2 Yuzh. Dzhambulak).

#### Paleogene (P)

The Paleogene system consists of deposits of the Paleocene and Eocene. The Paleocene is composed of cavernous limestones with interlayers of marls and dolomites. The Eocene is represented by clays and interlayers of marls and siltstones. The total thickness of the Paleogene reaches 280 m.

Neogene-Quaternary deposits are represented by sandstones, clays, siltstones, proluvium, loams, sandy loam, etc. Their thickness reaches up to 600 meters.

#### Kashkadarya depression

#### Paleozoic deposits - Pz

Paleozoic deposits were discovered by deep drilling wells in the adjacent areas of Tashly (in well No. 2 at a depth of 1952m), Azlyartepe (in well No. 1 at a depth of 1752 m), Uvada (in well No. 1 at a depth of 1200 m), Gordan (in well No. 1 at a depth of 1434m), etc. The deposits are represented by metamorphic (shales, mudstones), igneous and effusive-sedimentary rocks.

#### Mesozoic - Mz

Paleozoic sediments unconformably overlie Jurassic terrigenous sediments.

#### Jurassic - J

Three different sedimentary complexes are distinguished in the Jurassic deposits:

- terrigenous - Lower (J 1) - Middle Jurassic (J 2)
- carbonate - Upper Jurassic (Lower Oxford-Kimmeridgian - J3 O + km)
- hydrochloric anhydrite - Upper Jurassic (Tithon - J3 t)

Terrigenous deposits of the Jurassic age unconformably lie on the eroded surface of metamorphic rocks of the Paleozoic (well No. 1 of the Raimsufi pool, wells No. 1.2 - Khodjakuduk, wells No. 1.2 - Zap. Maimanak, etc.)

#### Lower and Middle Jurassic (J1+2)

The Lower Jurassic rocks are represented by terrigenous deposits of marine and continental genesis (interbedding of sandstones, siltstones, mudstones, clays and clay-carbonate shales).

Above the marine suite, there is a transitional suite (Upper Bathonian-Lower Callovian), composed of sandstones with interlayers of shale. The XVII and XVIII productive horizons are confined to the deposits of the terrigenous Jurassic sequence. Its power varies from 0 to 240 meters. The reduction in thickness occurs due to the loss of lower horizons from the section.

#### Upper Jurassic (J 3 )

Upper Jurassic deposits are represented by carbonate and hydrochloric anhydrite formations.

#### Carbonate deposits (J 3 O + km)

Within the area under consideration, Oxfordian-Kimmeridgian carbonates are represented by interbedded dense and porous limestones of various hardness and cavernousness. The limestones are light gray, predominantly algal and organogenic-detrital. The upper part of the formation is composed of argillaceous-carbonate shales with anhydrite interlayers. The total thickness of the Oxford-Kimmeridgian is 220 m. The XVI, XVa and XV horizons are confined to the deposits described above.

#### Salt-anhydrite deposits (J 3 t t)

Tithonian deposits are thin (Talli and Yakkabag fields), thickness in some places reaches 90-120 m (Shurasan well No. 4). They are composed of alternating white anhydrites with thin brownish clays (17 m of the Yakkasaray well, well No. 5) and coarse-grained salt of light gray color.

#### Cretaceous system (K)

The Cretaceous system is represented by the lower and upper sections, subdivided into the Neocomian, Aptian, Albian, Cenomanian, Turonian, and Senonian stages. Lithologically, the chalk deposits are represented by alternating clays, sandstones, and siltstones. The thickness of the chalk within the Kashkadarya depression reaches 1275 m (Shurasan area, well No. 4) and more, while on Yakkasaray it is 850 m.

#### Cenozoic formations (Kz)

In the Kashkadarya depression, Tertiary deposits are represented by Paleogene sediments and thick Neogene continental reds.

#### Paleogene system (P)

The Paleogene system is represented by cavernous limestones with interlayers of gypsum and dolomites, clays with interlayers of marls and siltstones. The thickness of these deposits ranges from 0 to 390 m.

#### Neogene system (N)

Neogene formations lie on the eroded surface of the Paleogene, Senonian and Turonian. They are represented by a sequence of red sandstones, siltstones, gravelstones, clays and conglomerates. The thickness of the Neogene ranges from 522 m on the square. Sarych up to 2150 m on the square. Yakkasaray.

#### Anthropogenic system (Q)

Anthropogenic (Quaternary) deposits are very insignificant, and sometimes absent. Only on the square Yakkasaray, they reach 200 m and are represented by light gray lumpy siltstones with a yellowish tinge. They often contain interlayers of sandstones and hard conglomerates.

#### Southwestern spurs of Hissar

#### Paleozoic (Pz)

Paleozoic formations were discovered only in Dzhilimchi by well No. 1 at a depth of 3400 m, where they are represented by very hard metamorphosed inequigranular brecciform rocks with inclusions of well-rounded pebbles.

#### Mesozoic (Mz)

### Triassic system (T)

The Triassic deposits have a local development, they lie unconformably on the Paleozoic. Their small scattered outcrops are observed in the northern and western frames of Kugintangtau, Baysuntau. The Lower Triassic deposits are conventionally identified by T.A.Sikstel as part of the Khonaklinskaya suite, represented by a sequence of limestones, conglomerates, gravelstones, sandstones and mudstones with interlayers of tuffs. Their thickness is about 800 m.

Upper Triassic deposits are transgressively overlain by Lower Jurassic large-pebble conglomerates, sandstones, and shales. Their power is 10-6th.

Jurassic system (J)According to the lithological composition and sedimentation conditions, the sediments of the Jurassic system are subdivided from bottom to top into three strata: terrigenous, carbonate, and hydrochloric anhydrite. Lower and Middle Jurassic (J1+2) Terrigenous deposits of the Jurassic were discovered by deep drilling wells at the Shurtan, Gumbulak, Adamtash deposits and in the Jilimchi area. Their power according to the well Shurtan-25 is 1043m. The terrigenous complex is represented by intercalation of sandstones, siltstones, argillites, marls and clays, it contains XVIII and XVII-permeable horizons.

Upper Jurassic deposits are represented by two formations: carbonate (Oxfordian-Kimmeridgian stage) and salt-anhydrite (Titonian stage).