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HYDROCARBON EXPLORATION AND RESOURCE BASE DEVELOPMENT IN THE REPUBLIC OF UZBEKISTAN: HISTORICAL TRENDS AND FUTURE PERSPECTIVE

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Summary. The paper presents the results of a comprehensive analysis of oil and gas prospecting and exploration activities in the Republic of Uzbekistan from the late 19th century to 2025. The study aims to identify the main patterns in the development of the geological exploration sector, assess the efficiency of hydrocarbon resource base replenishment, and determine the prospects for further reserve growth. The research is based on official statistical data, archival materials and results of geological exploration activities conducted during different periods. The dynamics of key production and geological indicators were analysed, including exploration drilling volumes, preparation of structures for deep drilling, oil and gas reserve growth, and the efficiency of exploration activities at various stages of industry development. The study identifies periods of intensive subsurface development associated with the discovery and commercial deve-lopment of major oil and gas fields, as well as stages of declining exploration activity accompanied by reductions in drilling volumes and reserve growth. Particular attention is paid to the analysis of conversion coefficients of forecast resources into commercial reserves, which show considerable variability over different time periods. The results demonstrate that actual reserve growth in several cases significantly exceeded initial forecast estimates, indicating the need to improve methodological approaches to resource assessment and update the forecast resource base. The study confirms the high potential for further development of Uzbekistan's oil and gas sector through intensified exploration activities and the implementation of modern resource modeling and assessment technologies.

Introduction

A significant part of the territory of the Republic of Uzbekistan (more than 60%) is promising for oil and gas. The history of oil and gas industry of the country dates back more than 100 years. It originated in the Fergana Valley in the second half of the 19th century, initially with the development of oil sources using artisanal methods, and then with the establishment of the first oil field in Turkestan, Chimion (Bogdanov, Khmyrov, 2025). The annual growth in oil production necessitated the construction of refining facilities. Therefore, in 1906, the Vannovsky oil refinery was put into operation, later renamed the Altyaryk oil refinery, which is currently a branch of the Fergana oil refinery (Bogdanov et.al., 2024).

The development of the oil refining industry in the Republic of Uzbekistan was largely ensured by the activities of the geological exploration service, which, through the discovery of new hydrocarbon deposits and the expansion of the mineral resource base, formed the fuel and energy foundation for sustainable economic growth.

Thus, during the first 50 years of the 20th century, seven oil and gas fields were discovered in the Fergana region, three of which were medium-sized in terms of hydrocarbon reserves and four were small. It is noteworthy that all of these fields, with the exception of one (Chongara-Galcha), are still in operation today with Chimion-Yarkutan-Chaur having been in operation for over 120 years.

Chronologically, the next region was the Surkhandarya in which industrial oil and gas potential of the Republic was established, where in 1934, a powerful oil fountain with a flow rate of 400 tons per day struck from the deposits of the Bukhara Paleogene layers at the Haudag field (Bogdanov et.al., 2024). By 1950, three more fields had been discovered in the Surkhandarya region, all of them small in terms of hydrocarbon reserves, but oil production continues there to this day (Bogdanov, Khmyrov, 2025).

These 11 fields located in the Fergana and Surkhandarya regions were the only ones producing hydrocarbons in the republic until 1953, when the discovery of the Tashkuduk and Setalantepe fields

proved the industrial productivity of the Bukhara-Khiva region, which has been the flagship of oil and gas industry of Uzbekistan for over 70 years (Bogdanov et al., 2023; Bogdanov, Khmirov, 2024).

With the discovery of the Adamtash field in 1962 and the Shahpakhty field in 1963, two more oil and gas regions were identified: South-West Gissar and Ustyurt, respectively (Bogdanov et.al., 2024).

The involvement in the geological exploration process, primarily of the Bukhara-Khiva, as well as the Ustyurt and South-West Gissar regions, made it possible to identify a large number of hydrocarbon deposits, mainly gas accumulations. This made it possible to consider the territory of the Republic of Uzbekistan for the presence of deposits with reserves of mainly free gas. Currently, natural gas ranks third in terms of its share of fossil fuels in the global balance of primary energy resources, and for many years the world has been discussing the possibility that natural gas will play a decisive role in building a more sustainable energy future (World Energy Council, 2016). The subsoil of the Republic contains natural resources, including hydrocarbon raw materials, the conversion of which into land-based assets — human and physical capital — is seen as a strategic direction that ensures sustainable employment for the population and stimulates economic growth (Venables, 2016; Tatar et.al., 2024).

Overall, the discovery of a significant number of hydrocarbon deposits has contributed to the systematic and sustainable development of the republic's economy for many decades (van Krevel, Peters, 2024; Henstridge, Roe, 2018).

Materials and methods

The study is based on a comprehensive analysis of the history of geological explorations aimed at identifying oil and gas deposits in the Republic of Uzbekistan. Due to the lack of reliable data available to the authors on the types, volumes, and results of geological exploration activities conducted prior to 1962, the analytical coverage is limited to the period from 1962 to 2024. Data on the volumes of geophysical explorations using the MOGT-2D method are taken into account since 1970.

The database is based on materials from state statistical reports, including the State Balances of Mineral Resources of the Republic of Uzbekistan (forms 06-Gr, 07-Gr), annual reports of geological exploration organisations, reports on the state of the fund of structures promising for oil and gas exploration (form 03-Gr), as well as data on the volumes of liquid and gaseous hydrocarbon extraction (form 3).

The comparison made it possible to determine the contribution of each of five oil and gas regions of the country, as well as to analyse the state, dynamics, and growth of industrial-grade hydrocarbon reserves, annual and cumulative oil and gas production.

Results of geological exploration works

As noted above, the Fergana region was a pioneer in the discovery of oil and gas deposits among oil and gas-bearing territories of Uzbekistan. This region has the widest stratigraphic range of hydrocarbon deposits, from the Paleozoic rock complex to the Neogene inclusive. Within the Fergana region, mainly oil accumulations have been identified, i.e., the region belongs to the oil and gas category. As a result of geological exploration only three (Northern Hankyz, Chakar, and Yangi Avval) of the 34 hydrocarbon deposits identified in the region have no oil deposits. On January 1, 2025 if we convert the initial reserves of industrial categories into tons of fuel equivalent, the share of oil, free gas, and condensate looks like this: oil accounts for 81.8%, free gas for 17.6%, and recoverable condensate for 0.6% (Fig. 1).

As we can see, oil reserves are of paramount importance. During the entire period of geological explorations in the Fergana region, 189 hydrocarbon deposits have been identified in 34 fields, including 125 oil fields, 24 gas condensate fields, 21 gas fields, 18 oil and gas fields, and 1 oil and gas condensate field (Fig. 2).

The discovery of large oil deposits in the Fergana region against the backdrop of a lack of discoveries in the rest of Uzbekistan in the early stages (before 1934), led to the extraction of oil in the first place. In 1962, annual oil production in the Fergana region amounted to 1.522 million tons, which accounted for 88.3% of the annual oil production in the Republic of Uzbekistan. Currently, the volume of annual oil production in the region has significantly decreased due to the heavy depletion of deposits (some deposits have been in operation for over 100 years) and in 2024 amounted to 121 thousand tons, or 17% of the annual oil production in the republic. Developing production strategies for the most efficient exploitation of oil deposits requires optimizing processes that reflect the nature of operational decisions and the associated geological uncertainties. For the Fergana region, as for the republic as a whole, the oil recovery factor is quite low (0.1-0.3), which is a consequence of the use of oil reservoir flooding techniques and the lack of application of modern secondary and tertiary methods of reservoir stimulation. In this context, there is a potential opportunity to increase production from even depleted hydrocarbon deposits in the republic provided that innovative exploitation methods are used (Barros et al., 2020).

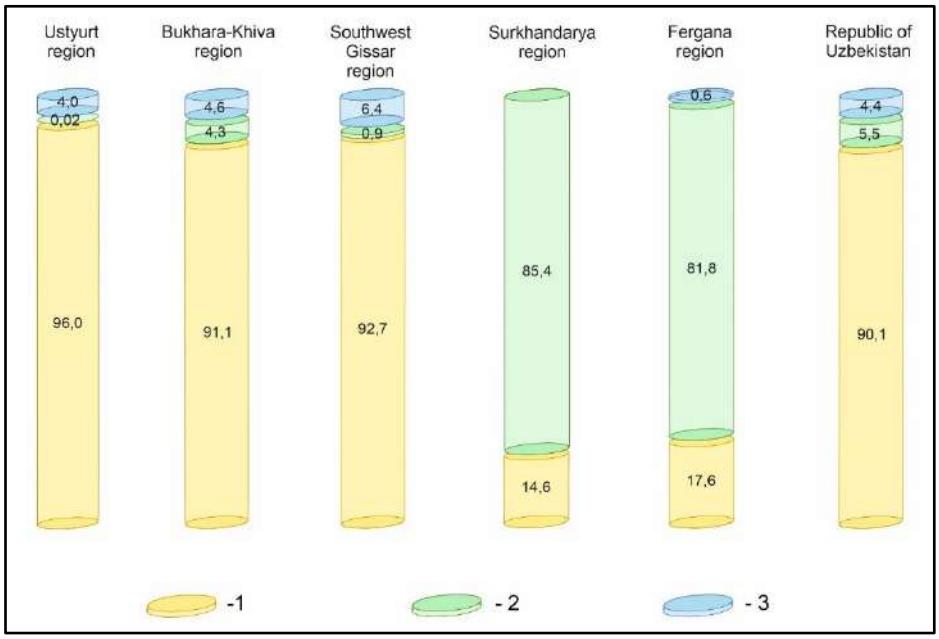

Fig. 1. Structure of initial total resources. Legend: 1 – gas, 2 – oil, 3 – condensate

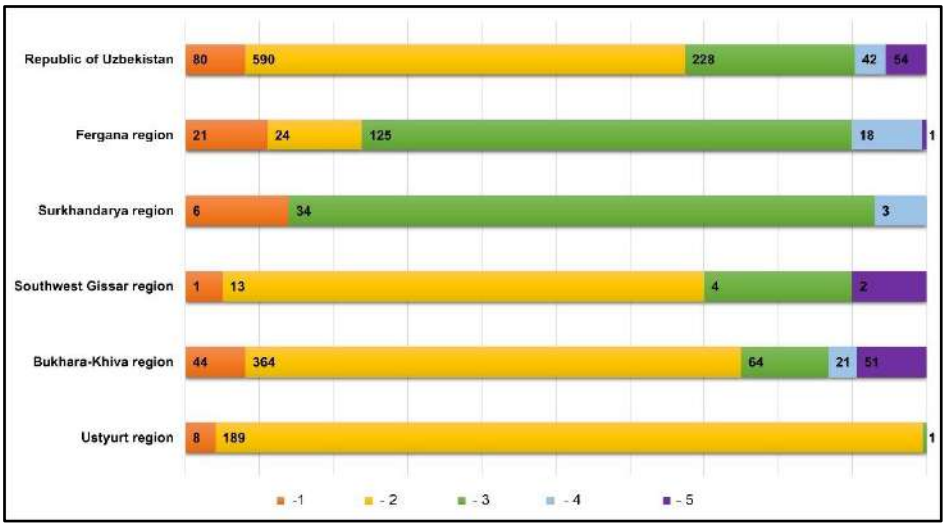

Fig. 2. Distribution of deposits by oil and gas bearing regions of the Republic of Uzbekistan. Legend: 1 – gas fields, 2 – gas condensate fields, 3 – oil fields, 4 – oil gas fields, 5 – oil and gas condensate fields

The analysis and summary of the source materials show that until the end of the 1930s, oil deposits were mainly found in the Paleogene sediments, then the stratigraphic range of productivity expanded due to the Neogene deposits, from the mid-1950s due to the Cretaceous deposits, and from the mid-1960s due to the Jurassic deposits. In addition, gas deposits were discovered in the Paleozoic sediments at two fields (Garbi Polvontosh and Southern Alamyishik), from which gas was extracted for a short time, but the deposits were not geometrised and reserves were not calculated.

Currently, despite high depletion rates, oil fields of the Fergana region rank second (26.2%) in the Republic after the Bukhara-Khiva region in terms of current reserves of commercial oil. In terms of current reserves of free gas, the region ranks last, in fifth place.

Further prospects for increasing the hydrocarbon resource base in the Fergana region are primarily associated with the exploration of traditional Paleogene-Neogene deposits and underlying the Cretaceous and Jurassic deposits, in the latter of which mainly gas deposits are expected to be discovered. Certain prospects are also associated with the refinement of the geological structure of previously discovered hydrocarbon deposits based on the results of exploitation, in which the recovery of extractable reserves exceeded 100% (layers I and KKS of the Andijan field; layers I, III, VIII of the Sharikhan-Khojaabad field; layer IV of the Vorukh

field, etc.). In general, it can be stated that the process of searching of oil and gas deposits within the Fergana region looks promising in the future, but its geological and economic efficiency is questionable due to the high degree of exploration of the territory and the complexity of its geological structure.

As of January 1, 2025, the initial total hydrocarbon resources of the Fergana region amounted to 835.6 million tons of oil equivalent, of which 4.4% were current reserves of industrial categories (ABC_1), accumulated production for the entire period of operation – 9.1%, preliminary estimated reserves (C_2) – 14.5%, prospective resources (C3) – 21.5%, and forecast resources (D1+D2) – 50.5% (Bogdanov, Khmyrov, 2025).

In 1934, based on the results of geological explorations, the Surkhandarya region was transferred from the oil and gas prospective category to the oil and gas bearing category following the discovery of the Haudag oil field. The stratigraphic range of oil and gas deposits covers rocks from the Jurassic to the Paleogene age inclusive. At the same time, the main stratigraphic complex of rocks containing the overwhelming majority of deposits (86.7%) are the Paleogene deposits. In addition, two fields (Lyalmiqar and Kuyi Haudag) have deposits in the Upper Cretaceous sediments, and one field (Mustaqillikning 25 Yilligi) has deposits in the Lower Cretaceous and the Middle-Upper Jurassic rocks.

Only two sites of 15 hydrocarbon deposits identified within the studied region as a result of geological explorations – Mustakillikning 25 Yilligi and Kuii Haudag – have been found to contain oil deposits and only gas deposits in the Cretaceous and the Jurassic sediments. At the same time, the Kuyi Haudag field, according to its geological and structural characteristics, is in fact a lower productive horizon of the Haudag field, which allows being considered not as an independent oil and gas structure, but as a part of a previously discovered field. Thus, it can be stated that there is only one new object where no oil deposits have been recorded – Mustakillikning 25 Yilligi. It should be noted that in the current practice of recording the results of geological exploration in the republic, the focus remains not only on the increase in recoverable hydrocarbon reserves, but also on the quantitative indicators of the discovered fields. In the absence of uniform criteria for differentiating between independent deposits and productive horizons within a single oil and gas bearing object, this approach can lead to a statistical increase in the number of new deposits.

Within the Surkhandarya oil and gas region, oil deposits have been the main focus of development, which allows being classified as a gas-oil-bearing territory with a predominance of oil-type fluids. As of January 1, 2025, the structure of initial total hydrocarbon reserves is characterised by a significant predominance of liquid hydrocarbons: oil accounts for 85.4% of total resources, while free gas accounts for only 14.6% (Fig. 1). Condensate has not been identified in the region, which reflects the specific thermobaric conditions and fluid composition characteristic of the sedimentary cover of this section of the South Tajik oil and gas province.

Thus, the oil component forms the basis of the resource potential of the region. During geological explorations in the region, 43 hydrocarbon deposits were identified associated with 15 fields of various sizes. 34 of them are oil fields, 6 are gas fields, and 3 are oil and gas fields (Fig. 2). This ratio indicates the pronounced specialisation of the region in oil production with limited gas reserves, reflecting the characteristic features of the formation and spatial distribution of hydrocarbon accumulations in the southern part of the Republic of Uzbekistan.

In 1962, annual oil production in the Surkhandarya region amounted to 201,600 tons, which accounted for 11.7% of the annual oil production in the Republic of Uzbekistan. Currently, the volume of annual oil production in the region has decreased due to the depletion of fields (some fields have been in operation for 90 years) and in 2024 amounted to 71,000 tons, or 10% of the annual oil production in Republic.

Currently, based on current reserves of commercial oil, the fields in the Surkhandarya region rank third (3.5%) in the republic. The region also ranks third in terms of current reserves of free gas (6.0%).

Further prospects for increasing the hydrocarbon resource base in the Surkhandarya region are linked along with the Paleogene deposits, primarily to the exploration of deep Cretaceous and Jurassic deposits, in the latter of which mainly gas deposits are expected to be discovered. In general, the search for oil and gas deposits in the Surkhandarya region will directly depend on the technical capabilities of drilling equipment capable of drilling to depths of more than 6-8 km in order to study the Jurassic carbonate deposits under salt, which are associated with the main prospects for hydrocarbon growth in the Surkhandarya region (more than 80% of the region's forecast resources (D1+D2)) and the republic (more than 11% of the republic's forecast resources) (Shuster, 2022).

As of January 1, 2025, the total initial hydrocarbon resources of the Surkhandarya region are estimated at 1,762.2 million tons of fuel equivalent. The structure of resource distribution by category shows the dominance of the forecast component, which indicates an insufficient level of geological exploration and a limited degree of industrial development of the territory. Thus, current reserves of industrial categories (ABC_1) account for only 7.4% of total

resources, while cumulative production for the entire period of operation accounts for 1.1%. Preliminarily estimated reserves of category C_2 account for 4.0%, prospective resources (C3) — 10.9%, while the bulk is accounted for by projected resources of categories D1+D2, which make up 76.6% of the total volume (Bogdanov, Khmyrov, 2025).

This ratio of categories indicates the high potential for further expansion of the resource base through the identification and preparation of new hydrocarbon traps, as well as the need to intensify exploration and prospecting activities in order to transfer projected resources to higher categories of accounting.

The next region to receive oil and gas bearing status was Bukhara-Khiva, where the first exploratory reconnaissance work dates back to the 1920s, and with the discovery of the Tashkuduk and Setalantepe fields in 1953, the identification of oil and gas fields in this territory began.

The stratigraphic range of oil and gas deposits covers rocks from the Lower Jurassic to the Upper Cretaceous age inclusive. The main stratigraphic complex of rocks containing the vast majority of deposits (90.3%) is the carbonate formation of the Jurassic age (Bogdanov, Khmirov, 2024). In addition, four fields (Gazli, Tashkuuk, Akdzhar, and Kaltakyr) also have deposits in the Upper Cretaceous sediments, 32 fields have deposits in the Lower Cretaceous sediments, and 28 fields have deposits in the Middle Jurassic rocks.

In 216 hydrocarbon deposits identified within the Bukhara-Khiva region as a result of geological explorations, oil deposits were found in 95 deposits and gas deposits were found in 159 deposits.

Within the Bukhara-Khiva oil and gas region, gas deposits have been the main focus of development, which allows being classified as an oil and gas region with a pronounced predominance of gas-type fluids. On January 1, 2025, the structure of initial total hydrocarbon reserves is characterised by the dominance of free gas, which accounts for 91.1% of total resources. The share of recoverable oil is 4.3%, and condensate is 4.6% (Fig. 1). Thus, gas components form the bulk of the region's resource potential, determining its strategic specialisation in natural gas production.

Over the entire period of geological exploration in the region, 544 hydrocarbon deposits have been identified, located within 216 fields of various sizes. Among them, gas condensate deposits predominate — 364 deposits, which is more than two-thirds of the total number. In addition, 44 gas, 21 oil and gas, 51 oil and gas condensate, and 64 oil deposits have been identified (Fig. 2) (Bogdanov, Khmirov, 2024). This ratio of deposit types reflects the complex structure of the region's fluid system, in which gas condensate and gas formations have become widespread, forming the basis of the modern industrial potential of the Bukhara-Khiva oil and gas province.

Analysis of the spatial distribution of deposits shows that gas and gas condensate fields are concentrated mainly in the Mesozoic and Cenozoic sediments controlled by large anticline structures and regional fault zones. The predominance of gas in the resource structure is due to a combination of factors: the considerable depth of productive horizons, high thermobaric gradient, and the specific facies composition of the sedimentary cover, which is conducive to the generation and preservation of gas systems. Together, these features form a stable trend of gas specialisation in the region, which is consistent with its location in the southwestern part of the Amudarya oil and gas province and the overall evolution of its oil and gas-forming systems.

In 1962, annual free gas production in the Bukhara-Khiva region amounted to 9.6 billion cubic meters, or 96.9% of the annual gas production in the Republic of Uzbekistan. Oil and condensate production in the Bukhara-Khiva region had not yet begun in 1962. The first oil production in the region was recorded in 1963 at the Karaulbazar-Sarytash field (3,000 tons) (Bogdanov, Khmirov, 2024).

Here it is necessary to explain this situation. The fact is that oil and gas reserves in the region were discovered relatively recently (1953), and despite the fact that the first unique gas field in the Soviet Union, Gazli (1956) with reserves of more than 500 billion m^3 (Bogdanov et al., 2024), the fields of the region were still in the early stages of development and production volumes were low. In addition, during this period, the discovered oil and gas fields in the region were located only in the Bukhara step (with the exception of the Uchkyr field, discovered in 1960 and put into operation in 1968), where hydrocarbon deposits were associated with structural traps.

However, with the start of exploration of the Chargos stage deposits, the detailed study of core material from the Urtabulak field wells allowed a number of researchers concluding that the productive horizons of the carbonate Jurassic of this field are reef-based and, possibly, that the productive horizons of other fields in the region are also reef-based. As a result of the studies, significant variations in the thickness of the carbonate formation were established, associated with the presence of reef-type traps. At that time, this was of great importance for the oil and gas geology of Uzbekistan, as it opened up a new direction of work in the search for reef massifs with high concentrations of hydrocarbon reserves per unit volume. Subsequent discoveries of fields with hydrocarbon deposits in reef traps (Zevardy, Alan, Southern Pamuk, Kokdumalak, etc.) made it possible not only to significant-

ly increase the hydrocarbon resource base, but also to significantly increase hydrocarbon production, primarily free gas, thereby making the Bukhara-Khiva region a leader in terms of hydrocarbon reserve growth and production (Punanova, 2022).

Currently (2024), the annual production of free gas in the region amounted to 32.6 billion cubic meters, or 74.2% of the annual gas production of the Republic. This is not the highest development indicator for the region over the entire period of operation, as in 2010 gas production reached 53.0 billion m^3, but due to the high depletion of unique and large hydrocarbon deposits, this indicator is gradually declining. A similar situation is observed with oil and condensate production volumes.

In 2024, oil and condensate production volumes in the region will be 495,000 tons (69.5% of the republic's annual production) and 517,000 tons (52.9% of the republic's annual production), respectively. In 1998, these figures were 4.508 million tons and 4.402 million tons, respectively, or a total of 8.910 million tons of liquid hydrocarbons (oil + condensate). In 1998, this accounted for 96.4% of the total annual republican production. These figures in 1998 were mainly influenced by the Kokdumalak oil and gas condensate field, which was discovered in 1985 and put into production in 1989. To date, the depletion of this field has led to a significant decline in oil and condensate production.

Currently, in terms of current reserves of hydrocarbon raw materials (free gas, recoverable oil, and condensate) of industrial categories, the fields of the Bukhara-Khiva region rank first (65.9%, 69.1%, and 74.0%, respectively) in the republic.

As of January 1, 2025, the total initial hydrocarbon resources of the Bukhara-Khiva region are estimated at 8,933.3 million tons of oil equivalent. The distribution of resources by reserve category shows a fairly balanced ratio between the developed and projected parts of the resource base. Thus, current reserves of industrial categories (ABC_1) account for 17.4%, which reflects the high level of exploration and involvement of resources in industrial development. The share of cumulative production for the entire period of operation is 34.5%, which indicates intensive and continuous industrial development of the region.

At the same time, preliminary estimated reserves (C_2) account for 2.9% of total resources, and prospective resources (C_3) account for 7.5%, confirming the potential for expanding the mineral resource base through further exploration of identified structures. The largest share, 37.7%, is accounted for by projected resources (D_1+D_2), reflecting the region's significant prospects for discovering new deposits, primarily in poorly explored areas with deep productive horizons.

Thus, the current ratio of reserve categories characterises the Bukhara-Khiva region as a highly developed oil and gas bearing territory that still has potential for development, where further resource growth can be achieved by intensifying exploration and prospecting in deep and poorly studied stratigraphic complexes.

The next oil and gas region in chronological order was South-West Gissar, where the Adamtash gas condensate field was discovered in 1962.

The stratigraphic range of oil and gas deposits covers rocks of the Middle-Upper Jurassic age (carbonate formation).

Within the South-West Gissar oil and gas region, many years of geological explorations have revealed 19 hydrocarbon deposits, of which 16 contain free gas and 5 contain oil accumulations. Thus, the region belongs to the category of oil and gas bearing territories with a pronounced predominance of gas in the structure of resources.

As of January 1, 2025, the structure of the initial total hydrocarbon reserves is characterised by the dominance of free gas, which accounts for 92.7%. The share of recoverable oil is only 0.9%, and gas condensate – 6.4% (Fig. 1). This ratio of fluid components indicates gas condensate specialisation of the region, where the bulk of hydrocarbons is concentrated in gas and gas condensate deposits of the Mesozoic complex.

During geological explorations within the region, 20 hydrocarbon deposits were identified, associated with 19 fields. Among them, gas condensate deposits predominate – 13 deposits, with an additional 1 gas, 2 oil and gas condensate, and 4 oil deposits (Fig. 2). This distribution of deposit types reflects the structural and facies heterogeneity of the section, where gas and gas condensate formations are mainly confined to tectonically complex anticline uplifts and zones of tectonic disturbances, which form favorable traps for gas accumulation.

The predominant gas orientation of the hydrocarbon system in the South-West Gissar region is due to the deep occurrence of source rocks, the high level of catagenesis of organic matter, and the predominantly thermogenic type of fluid generation. Together, these factors determine the high degree of maturity of the oil and gas source rocks and the formation of regional-scale gas condensate systems, ensuring its key role in the modern gas production structure of the Republic of Uzbekistan.

The first oil production in the region dates back to 1991 (Okul), which amounted to 7,000 tons or 0.5% of the republic's annual oil production. In 2001, free gas production began in the region (Southern Tandyrcha) – 533 million cubic meters, or 0.4% of the republic's annual gas production. The launch of the Southern Tandyrcha field was prompt-

ed by the need to supply the Shurtan gas chemical complex with hydrocarbon raw materials and was associated with the beginning of a decline in production at the Shurtan field due to its gradual depletion.

At the end of 2024, the South-West Gissar region demonstrated stable production activity with a clear predominance of gas. The annual volume of free gas production amounted to 6.125 billion m³, which is equivalent to 13.9% of the total production of this type of raw material in the Republic of Uzbekistan. At the same time, oil production is estimated at 25 thousand tons (3.5%), and gas condensate production at 358 thousand tons (36.6%) of the republic's total figures.

Currently, in terms of current reserves of free gas and extracted oil of industrial categories, the fields of the South-West Gissar region rank fourth (4.5% and 1.0%, respectively), and in terms of current reserves of extracted condensate, they rank third (4.4%) in the Republic.

Further prospects for increasing the hydrocarbon resource base in the South-West Gissar region are associated with Jurassic carbonate deposits.

As of January 1, 2025, the total initial hydrocarbon resources of the South-West Gissar region are estimated at 810.3 million tons of oil equivalent. A structural analysis of their distribution by category shows that the region is characterised by a moderate degree of geological exploration with significant potential for further reserve growth. Current reserves of industrial categories (ABC_1) account for only 12.7%, which indicates limited involvement of explored structures in active development. At the same time, the share of accumulated production is 16.7%, reflecting a relatively high level of industrial use of open deposits.

The share of preliminary estimated (C_2) and prospective resources (C_3) remains relatively low – 2.7% and 3.4%, respectively. This indicates an insufficient level of detail in the geological data on a number of local structures, which opens up opportunities for in-depth study of the section and refinement of resource parameters. The most significant part of the region's potential is formed by the projected resources of categories D_1+D_2, which account for 64.5%. Their predominance indicates the presence of significant but poorly studied areas that are promising for the discovery of new hydrocarbon deposits.

Thus, the South-West Gissar region can be characterised as a territory with a developed industrial base for gas and oil production, while a significant share of projected resources determines the need to intensify geological exploration and appraisal activities. In the long term, this will ensure the reproduction of the mineral resource base and strengthen the role of the region in the country's hydrocarbon potential.

The last region to receive oil and gas bearing status was Ustyurt, within which the first gas field, Shakhpakhta, was discovered in 1963.

The stratigraphic range of oil and gas deposits covers rocks from the Paleozoic to the Upper Jurassic age inclusive. At the same time, the main stratigraphic complex of rocks containing the overwhelming majority of deposits (71.4%) is the Middle Jurassic deposits. In addition, nine fields also have deposits in the Upper Jurassic sediments, 17 fields have deposits in the Lower Jurassic sediments, and two fields have deposits in the Paleozoic rocks.

As a result of many years of geological explorations in the Ustyurt oil and gas region, 28 hydrocarbon deposits have been identified, all of which contain gas reserves, with only one containing oil reserves (the West Aral field). Thus, in terms of fluid type, the region is classified as oil and gas bearing, but its resource base is clearly gas-specialised.

As of January 1, 2025, the structure of the initial total hydrocarbon reserves shows a significant predominance of free gas, which accounts for 95.99% of the total volume. Meanwhile, the share of recoverable oil is only 0.02%, and gas condensate is 3.99% (Fig. 1). This imbalance indicates the sustained dominance of gas, which determines the region's strategic role in shaping the gas production potential of the Republic of Uzbekistan.

198 hydrocarbon deposits have been identified within the region, located in 28 fields up to now. Among them, 189 deposits are gas condensate, 8 are gas, and only one is oil (Fig. 2).

The productivity of the Ustyurt region is largely determined by the specifics of its tectonic and stratigraphic structure—the presence of a thick sedimentary cover with a developed the Mesozoic-Paleozoic complex and deep structural traps associated with regional platform-type dislocations. Together, these factors have ensured a high level of maturity of oil and gas source rocks and the formation of significant gas condensate systems, which determine the industrial significance of the region in the modern structure of the country's fuel and energy balance.

The first production of free gas in the Ustyurt region took place in 1971 at the Shakhpakhta field, which amounted to 404 million m^3, or 1.2% of the annual gas production in the Republic of Uzbekistan. Oil production in the Ustyurt region has never been carried out and is still not being carried out. The first production of condensate in the region, amounting to 2,000 tons, was recorded in 1995 at the Urga field.

It should be noted that between 1963 and 1999, only eight hydrocarbon deposits were discovered in the Ustyurt region as a result of geological exploration work. The turning point came in 1998, when, in accordance with the Protocol of Instructions of the

President of the Republic of Uzbekistan, I.A.Karimov dated February 11, 1998, on intensifying oil and gas explorations on the Ustyurt Plateau and in the Aral Sea basin, extremely important decisions were developed and adopted on a radical change in geophysical and drilling explorations in the region. The implementation of these measures ensured a sharp expansion in the volume of geological explorations, resulting in the discovery of 20 new gas condensate fields to date (Berdakh, East Berdakh, Shagyrlyk, Surgil, North Aral, Uchsay, Shege, Aral, Dali, Northern Berdakh, etc.). Subsequently, a number of fields were combined into a single entity based on the results of hydrocarbon reserve calculations: Surgil and Northern Aral into Surgil; Berdakh and Northern Berdakh into Berdak-Shimoliy Berdak; Eastern Berdakh and Uchsay into Sharkiy Berdak.

The significant shallowing of the Aral Sea over the past decades has opened up opportunities for geological exploration in the area that was previously the Aral Sea basin (Fig. 3).

As a result of the discovery of new deposits, the hydrocarbon resource base has been significantly expanded, as individual deposits have been reclassified as large in terms of hydrocarbon reserves: Surgil, Sharkiy Berdak, Berdak-Shimoliy Berdak.

Currently, only four fields with unique hydrocarbon reserves (> 300 million tons of oil equivalent) have been discovered within the Republic of Uzbekistan (Gazli, Shurtan, Dengizkul-Khuzak-Shady-Northern Dengizkul-Khodjasayat, Zevardy), which are located in the Bukhara-Khiva region and have been the foundation of production, primarily gas, in the republic for many decades. No other regions with unique hydrocarbon reserves have been identified yet.

However, there is currently a real possibility of identifying a unique hydrocarbon deposit within the Ustyurt region. The fact is that between 1999 and 2021, seven deposits were discovered in the southern part of the former Aral Sea basin, some of which (Surgil, Berdak-Shimoli Berdak) are currently under development, one field (Arslan) is ready for industrial development, and four (Inam, Kyzyl-Shaly, Kuyi Surgil, and Western Kuyi Surgil) are under exploration. According to final and operational estimates of hydrocarbon reserves carried out in various years, the productivity contours of these fields for various productive formations are located within a single gas-bearing contour, i.e., they are in fact a single field (Fig. 4).

Already today, by combining these fields and, accordingly, hydrocarbon reserves into a single entity, it is possible to obtain a field with initial reserves of industrial-grade hydrocarbons of approximately 346 million tons of oil equivalent, which means that this combined field can already be classified as unique in terms of hydrocarbon reserves. In addition, as noted above, four fields are under exploration and an increase in hydrocarbon reserves is seen in the future. Furthermore, these seven fields have preliminary estimated reserves of 74.6 million tons of oil equivalent in the C_2 category. In the Republic of Uzbekistan, the average conversion factor for preliminary estimated C_2 reserves to industrial ABC_1 reserves is more than one. However, exercising a degree of caution and assuming this factor to be 0.9, an increase in hydrocarbon reserves of 67.2 million tons of oil equivalent can be expected. The prospects of this approach are quite attractive, and given the development of a unified project, we can hope for high operational efficiency.

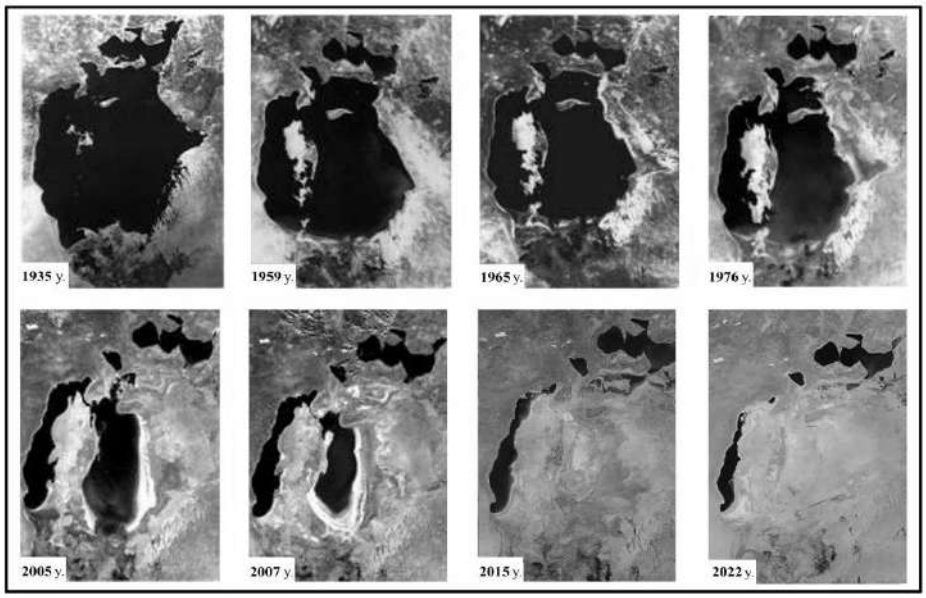

Fig. 3. Dynamics of the decline in the level of the Aral Sea

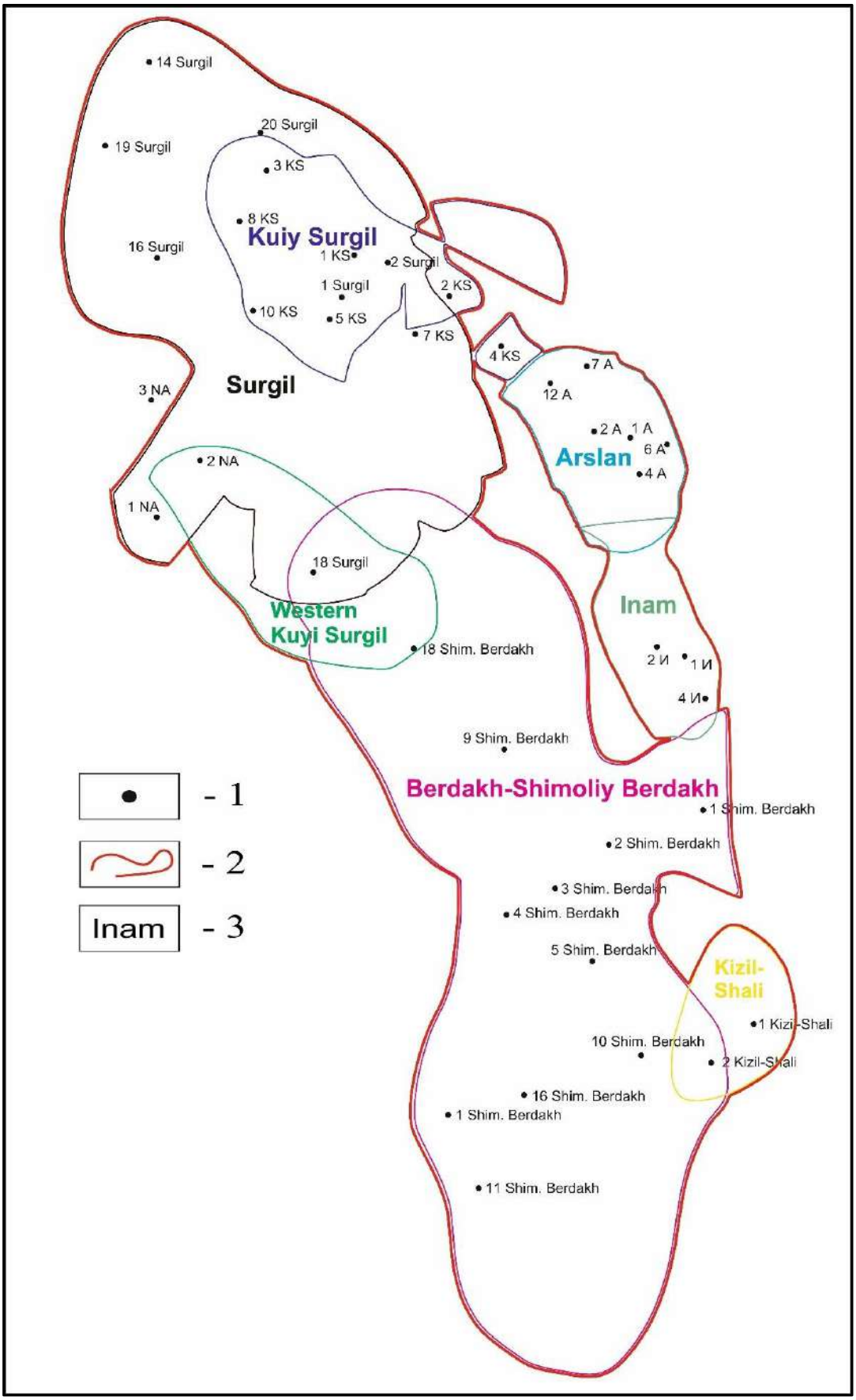

Fig. 4. Approved productivity contours of fields in the Ustyurt region, united by a common gas-water contact. Legend: 1 – exploration and appraisal wells (KS – Kuyi Surgil, NA – Nothern Aral, A – Arslan, И – Inam), 2 – approved productivity contours by fields, 3 – name of deposits

As of 2024, the annual production of free gas within the Ustyurt region amounted to 5.2 billion m³, which is equivalent to 11.7% of the total annual production in the Republic of Uzbekistan. Gas condensate production for the same period reached 100,000 tons, or 10.2% of the republican level. These proportions indicate the significant contribution of the Ustyurt region to the national gas production balance, despite the relatively low degree of involvement of reserves in industrial development.

Today, in terms of current reserves of industrial-grade hydrocarbon raw materials (free gas and recoverable condensate), the fields in the Ustyurt region rank second (23.2% and 21.0%, respectively) in the republic. In terms of current recoverable oil reserves, the region ranks fifth (0.1%).

Further prospects for increasing the hydrocarbon raw material base in the Ustyurt region are primarily associated with the Jurassic deposits, as well as the Paleozoic formations.

As of January 1, 2025, the total initial hydrocarbon resources of the Ustyurt region are estimated at 3,007.8 million tons of oil equivalent. Analysis of the distribution of resources by reserve category indicates an uneven degree of geological exploration and industrial development. Current reserves of industrial categories (ABC_1) account for only 10.8%, which indicates limited involvement of identified structures in exploitation. At the same time, cumulative production for the entire development period is 3.2%, reflecting the relatively short history of industrial development in the region compared to more mature oil and gas provinces in the country.

Preliminary estimated reserves (C_2) account for 3.3%, and prospective resources (C_3) — 19.4%, which confirms the existence of significant potential for reserve growth through refinement of the structure of prospective areas and further exploration. The most significant share — 63.2% is made up of projected resources (D_1+D_2), concentrated mainly in poorly studied areas in the northern and central parts of the region, where the development of deep-lying Paleozoic and Mesozoic complexes creates the conditions for the formation of new hydrocarbon deposits.

Thus, the structure of the resource base of the Ustyurt region is characterised by a high proportion of prospective categories with a relatively low level of industrial development, reflecting the early stage of the geological-industrial cycle. With targeted development of exploration and prospecting, especially in the deep horizons of the Paleozoic basement, the region has the potential for significant growth in gas and condensate reserves, which could compensate for the decline in production in the more developed provinces of Uzbekistan.

Discussion of the results of geological explorations

Overall, in the 125 years since the first field was discovered in the Fergana region, a great deal of work has been done, including various regional and exploratory geophysical surveys and deep drilling, which has led to the discovery of 312 oil and gas fields.

The stratigraphic range of oil and gas deposits is quite wide, as hydrocarbon deposits are located in sediments from the Paleozoic to the Neogene age inclusive. The majority of deposits are located in carbonate sediments of the Middle-Upper Jurassic age (68.9%).

Analysis of the results of many years of geological explorations shows that 312 hydrocarbon deposits have been identified to date within the oil and gas bearing territories of the Republic of Uzbekistan, represented by various types of fluids and structural-lithological conditions of occurrence. Gas plays a dominant role: gas deposits have been identified at 258 fields, while oil deposits have been identified at 145 sites.

As of January 1, 2025, free gas resources predominate in the structure of the initial total hydrocarbon reserves of the Republic of Uzbekistan, accounting for 90.1%, while oil and gas condensate account for 5.5% and 4.4%, respectively (Fig. 1). This ratio reflects a steady trend towards a shift in the resource base towards gas specialisation, which is characteristic of large sedimentary basins in the Central Asia.

To date, 994 hydrocarbon deposits have been identified in the republic, confined to 312 fields, of which gas condensate facilities account for 59.4%, oil facilities for 22.9%, gas facilities for 8.0%, oil and gas condensate fields account for 5.4%, and oil and gas fields account for 4.3% (Fig. 2). This structural organisation of reserves indicates a complex relationship between fluid systems and traps of different ages, caused by both the evolution of the sedimentary cover and the heterogeneity of the thermobaric conditions of hydrocarbon generation.

In 2024, the total volume of hydrocarbon production in the Republic of Uzbekistan amounted to 43.9 billion m³ of natural gas, 712 thousand tons of oil, and 1,271 thousand tons of gas condensate. At the same time, the share of gas in the overall production balance reaches almost 94%, which underscores the gas-producing vector of development of the national fuel and energy industry.

A long-term (1962–2024) analysis of hydrocarbon reserves growth shows that this indicator depends on the volume of parametric, exploratory, and prospecting drilling (Fig. 5). However, as can be seen from the graph, the increase in deep drilling volumes in recent years has not had a significant impact on hydrocarbon reserve growth indicators. This situation is due to the fact that, as in previous

years, the main oil and gas-bearing region in terms of reserve growth and hydrocarbon production is the Bukhara-Khiva region, which has been extensively explored. As a result, increasingly smaller traps are being drilled, which, in the event of a discovery, will result in insignificant hydrocarbon reserves. The effectiveness of exploration and prospecting is also affected by the need to search for deeper horizons. Systematic explorations carried out between 1962 and 2024 has made it possible to identify characteristic patterns in changes in the annual growth of hydrocarbon reserves, which, following a downward trend, indicate a gradual but steady decline in the growth of hydrocarbon reserves (Sokolov, 2023).

Figure 6 shows the dynamics of hydrocarbon production in the Republic of Uzbekistan for the period of 1962-2024. This figure shows that hydrocarbon production in the Republic of Uzbekistan peaked between 1996 and 2020 (Delannoy et al., 2021). It also clearly shows that the basis of annual hydrocarbon production is unique and large oil and gas fields. The share of large and unique hydrocarbon deposits in total annual production varies from 37% (1963) to 95% (1992). In 2024, it was 72.2%. Given that as of 2024 there were 312 oil and gas fields in the republic, it turns out that 31 fields (4 unique and 27 large) or 9.9% of the total number account for 72.2% of the republic's annual hydrocarbon production (Nuriyev, McFerren, 2025). Analysis of the data in Figure 6 suggests that the downward trend in hydrocarbon production will continue in the future (Laherrere et al., 2022).

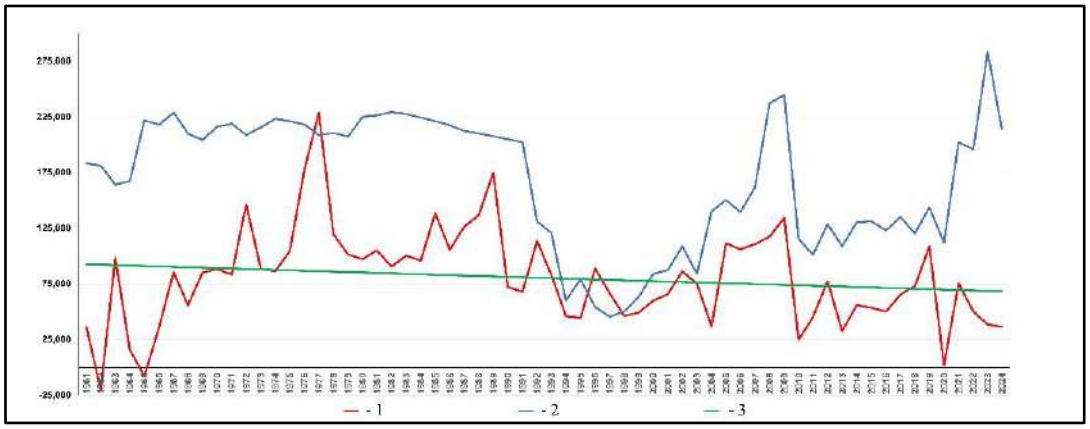

Fig. 5. Comparison of deep drilling indicators and hydrocarbon reserves growth. Legend: 1 – increase in oil reserves (million tons of oil equivalent), 2 – volumes of exploration and parametric drilling (thousand meters), 3 – trend line (million tons of oil equivalent)

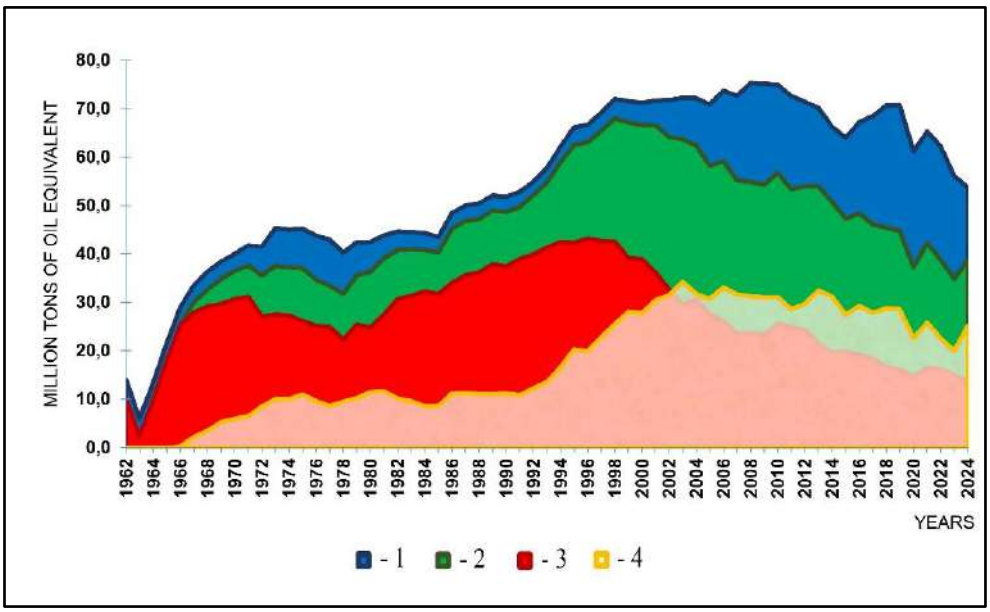

Fig. 6. Share of large and unique deposits in the production of the Republic of Uzbekistan. Legend: 1 – hydrocarbon production in the Republic of Uzbekistan, 2 – production of hydrocarbons from unique and large deposits, 3 – production of hydrocarbons from four unique deposits, 4 – hydrocarbon production from large deposit**s**

If we consider only the share of unique hydrocarbon reserves, this indicator ranges from 22.8% (2019) to 87.2% (1966). In 2024, it was 25.4%, meaning that four unique fields, or 1.3% of the total number, account for more than a quarter of the republic's annual hydrocarbon production.

Figure 7 shows a graph of cumulative production from all oil and gas fields in the Republic of Uzbekistan for the period 1962-2024. This graph shows that more than half (50.3%) of the total cumulative hydrocarbon production in the republic comes from fields that are unique in terms of hydrocarbon reserves. This indicates that existing hydrocarbon reserves are unevenly involved in active production. A study of the distribution of cumulative production and current reserves of different groups of fields by reserve size shows significant heterogeneity in the distribution of these indicators (Sokolov, Shubina, 2023).

As of January 1, 2025, the total initial resources of hydrocarbon raw materials in the Republic of Uzbekistan are estimated at 18,141.1 million tons of fuel equivalent. This figure also includes the projected resources of categories D_1+D_2, determined for the Khorezm and Middle Syr Darya oil and gas prospective regions, where the total estimate is 1,041.4 million tons of fuel equivalent, and more detailed geological exploration data is not yet available.

An analysis of the resource base structure shows that the distribution of reserves by category varies significantly: current industrial reserves (ABC_1) account for 12.9%, which reflects the level of exploration and industrial development of deposits; cumulative production for the entire period of operation accounts for 19.1%, indicating the degree of involvement of resources in economic turnover. Preliminary estimated reserves (C_2) account for 3.5%, while prospective resources (C_3) account for 11.0%. The most significant part – projected resources of categories D_1+D_2, reaching 53.5% of the total volume — characterises the significant potential for further reserve growth with the intensification of exploration and prospecting activities.

This ratio of reserve categories shows that despite the high level of geological exploration of main oil and gas regions of the country, the potential for growth in hydrocarbon resources remains significant, especially in poorly studied areas with predominantly projected estimates.

The relevance of conducting geological exploration aimed at increasing oil and gas reserves in the Republic of Uzbekistan remains an indisputable and strategically important task. In this context, the volume of hydrocarbon resources, estimated at 9,706.5 million tons of oil equivalent, is traditionally considered as the initial resource base for planning and implementing exploration drilling with the aim of transferring hydrocarbon resources into the category of commercial reserves. However, quantitatively significant estimated resources do not in themselves guarantee the economic and technical feasibility of conducting the relevant exploration activities. When determining resource potential benchmarks, key questions inevitably arise: how much drilling is needed to confirm and transfer estimated resources to the category of proven reserves? What is the time frame for implementing such a volume of work? What is the expected efficiency of the geological explorations being carried out? The answers to these questions are critically important, as they allow us to assess the feasibility of drilling programs and determine the prospects for the commercial development of prospective resources (Sokolov, 2023).

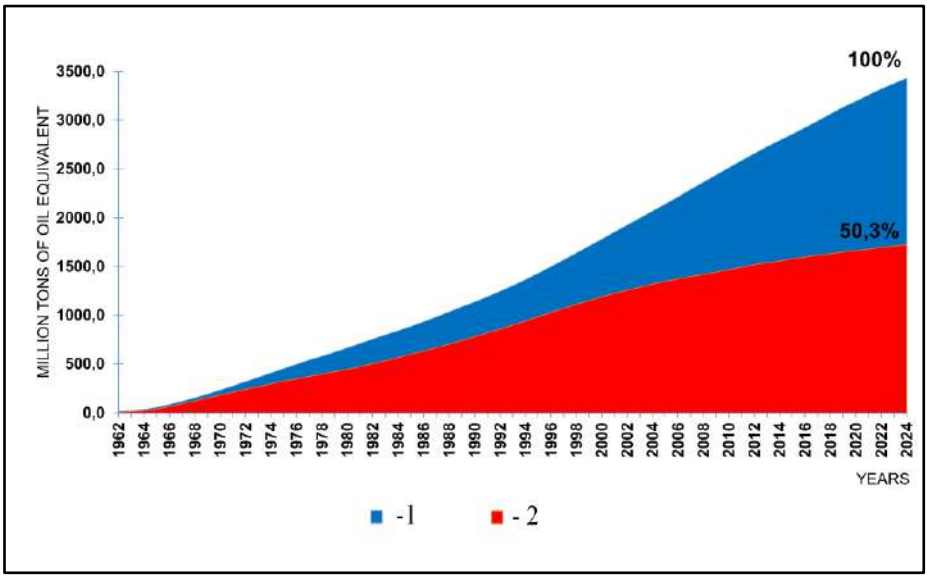

Fig. 7. The impact of unique deposits on cumulative production in the Republic of Uzbekistan. Legend: 1 – Accumulated hydrocarbon production in the Republic of Uzbekistan, 2 – Accumulated hydrocarbon production from four unique deposits

Based on the analysis of the conversion rates of forecast resources into industrial category reserves, it can be reasonably asserted that previous estimates of forecast hydrocarbon resources in categories D_1+D_2 (using the Bukhara-Khiva region as an example) are clearly underestimated. This is confirmed by actual data on the growth of industrial reserves of categories ABC_1 over the past decades, which indicate a high confirmation rate of forecast resources.

Thus, the increase in reserves for 1980-2022 significantly exceeded the estimated increase due to the total forecast resources previously included in the estimates. The coefficients for converting forecast resources into reserves, calculated based on actual data, range from 0.51 to 0.64, and in certain periods (e.g., 1999-2020), they reach values above 1, which indicates a very high coefficient of confirmation of forecast resources, especially against the backdrop of a lower coefficient of conversion of prospective resources into industrial reserves (0.4).

These data indicate that the previously adopted methodology for assessing forecast resources probably underestimated the actual potential of the region's subsoil, failing to take into account a number of deep-lying objects, as well as poorly studied areas with significant geological potential.

Thus, this analysis demonstrates that within the Republic of Uzbekistan (using the Bukhara-Khiva region as an example), the volume of hydrocarbon forecast resources may be significantly higher than previously stated figures and requires a corresponding upward adjustment.

Conclusion

As of January 1, 2025, 312 oil and gas fields have been identified in the Republic of Uzbekistan as a result of geological exploration work. These can be classified as follows:

– by oil and gas geological zoning – Ustyurt region (28 deposits), Bukhara-Khiva region (216), South-West Gissar (19), Surkhandarya (15), Fergana (34) (Bogdanov, Khmirov, 2023);

– by fluid type – gas (10), gas condensate (159), oil and gas condensate (59), oil and gas (29), and oil (55) (Bogdanov, Khmirov, 2023);

– by degree of development – under development (114), prepared for industrial development (93), explored (96) and mothballed (9) (Bogdanov, Khmirov, 2023);

– by size of hydrocarbon reserves – unique (4), large (27), medium (34), and small (247) (Bogdanov, Khmirov, 2023).

The main source of hydrocarbon reserves growth throughout the history of geological explorations in the Republic of Uzbekistan has been four unique hydrocarbon deposits (Gazli, Dengizkul-Khozak-Shady-Northern Dengizkul-Khojasayat, Shurtan, Zevardy), which account for 36% of the initial reserves of hydrocarbons of industrial categories (ABC_1) or an average of 9% of the republic's initial hydrocarbon reserves per unique deposit (Bogdanov et al., 2024). For comparison, the 247 small hydrocarbon deposits account for a total of 11.4% of the initial reserves of industrial categories (ABC_1). The 27 large hydrocarbon deposits account for 43.6% of the republic's initial reserves of industrial categories. Together, unique and large deposits account for 79.6% of the total balance of initial hydrocarbon reserves.

An analysis of hydrocarbon production in the republic's main gas-producing regions – Bukhara-Khiva and Ustyurt – shows that despite the high depletion of industrial reserves in the Bukhara-Khiva region, it continues to be the leader in terms of annual production volumes compared to the Ustyurt region, despite the relatively low depletion of the latter's hydrocarbon reserves.

This is primarily due to the type of traps containing gas deposits. In the Bukhara-Khiva region, where the main gas volumes are associated with reef-type traps, the highest annual production reached 10-14% of current reserves, while in the Ustyurt region, where there are large quantities of hydrocarbon deposits concentrated in relatively low-capacity terrigenous reservoirs, the maximum annual production volume is within the range of 2-4% of current hydrocarbon reserves. Thus, the Bukhara-Khiva region continues to be the main center of gas production in Uzbekistan.

Hydrocarbon production figures, both cumulative and annual (2024) indicate that throughout the entire period of oil and gas field operation in the Republic of Uzbekistan, unique and large fields have been the basis for hydrocarbon production, accounting for 50.3% and 38.9% of cumulative hydrocarbon production, respectively, which together total 89.2%. Medium and small fields in terms of hydrocarbon reserves account for 5.1% and 5.7%, respectively. Approximately the same trend is observed today. Despite the high depletion of all four unique hydrocarbon deposits in terms of reserves, as well as some large ones, these two groups of deposits still account for the bulk of annual hydrocarbon production: 25.3% and 46.6%, respectively, which together account for 71.9% of the republic's total annual production. This is a very high figure. Medium and small hydrocarbon deposits account for 12% and 16.1%, respectively.

Analysing this situation, it can be predicted that, provided no new unique (primarily) or large deposits are discovered, there will be a further decline in hydrocarbon production volumes. Since traditional hydrocarbons are running out, one solution is to explore unconventional hydrocarbons, which are the main candidate for future hydrocarbon production (Muther et al., 2022).

There is cause for concern regarding the number of explored deposits, which has reached 96, or 30.8% of the total number of deposits in the republic. In 2000, the share of explored deposits in the republic was 20.3%. The reason lies in the fact that in recent decades, most of the newly discovered deposits have begun to be exploited at an accelerated rate, sometimes at industrial rates, in order to compensate for the decline in production, which does not allow proper completion of exploration, reliable assessment of hydrocarbon reserves, and the development of an up-to-date industrial development project aimed at ensuring the reliability of the exploited facility and increasing the efficiency of hydrocarbon field development (Suleymanov et al., 2022). As a result, not only the geological exploration process suffer, when fields are not completed by exploration and the fund of explored fields is artificially increased, in which the latter "hang" for decades, but also in the long term, damage is done to the operational process, when intensive hydrocarbon production reduces the potential for further development.

In conclusion, it can be stated that the oil and gas industry provides the republic's economy with energy resources, and despite some problems, the overall outlook for the continued effective conduct of oil and gas exploration activities appears quite optimistic (Masnadi, Brandt, 2017). The presence of significant volumes of projected resources (18,141.1 million tons of oil equivalent), with the prospect of their possible increase, gives hope for the discovery of new oil and gas fields, including those with large reserves of hydrocarbons (Bogdanov, Khmirov, 2025).

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РАЗВИТИЕ РЕСУРСНОЙ БАЗЫ УГЛЕВОДОРОДОВ И НЕФТЕГАЗОРАЗВЕДОЧНЫХ РАБОТ В РЕСПУБЛИКЕ УЗБЕКИСТАН: ИСТОРИЧЕСКИЕ ТЕНДЕНЦИИ И ПЕРСПЕКТИВЫ РАЗВИТИЯ

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Резюме. В статье представлены результаты комплексного анализа развития нефтегазопоисковых и разведочных работ на территории Республики Узбекистан в период от конца XIX века до 2025 года. Исследование направлено на выявление закономерностей развития геологоразведочной отрасли, оценку эффективности восполнения минерально-сырьевой базы углеводородов и определение перспектив дальнейшего прироста запасов нефти и газа. В качестве исходных материалов использованы официальные статистические данные, фондовые и архивные источники, результаты геологоразведочных работ, а также сведения о динамике добычи и освоения месторождений. Проведён анализ основных производственных и геологических показателей, включая объёмы поисково-разведочного бурения, показатели подготовки структур к глубокому бурению, прирост запасов нефти и газа, а также эффективность геологоразведочных работ на различных этапах развития отрасли. Выделены периоды наиболее интенсивного освоения недр, связанные с открытием и вводом в промышленную разработку крупных нефтяных и газовых месторождений, и этапы снижения геологоразведочной активности, сопровождавшиеся сокращением объёмов бурения и прироста запасов углеводородов. Особое внимание уделено анализу коэффициентов перевода прогнозных ресурсов в промышленные запасы, характеризующихся значительной изменчивостью в различные временные периоды. Установлено, что фактический прирост запасов в ряде случаев существенно превышал первоначальные прогнозные оценки, что свидетельствует о необходимости совершенствования методических подходов к оценке ресурсной базы и актуализации прогнозных ресурсов. Полученные результаты подтверждают высокие перспективы дальнейшего развития нефтегазового комплекса Узбекистана при условии активизации геологоразведочных работ, внедрения современных технологий моделирования и повышения эффективности оценки ресурсов.

Ключевые слова: *нефть, газ, углеводороды, геологоразведка, ресурсы, запасы*

ÖZBƏKİSTAN RESPUBLİKASINDA KARBOHİDROGEN EHTİYATLARININ KƏŞFİYYATI VƏ XAMMAL-RESURS BAZASININ İNKİŞAFI: TARİXİ İNKİŞAF MEYLLƏRİ VƏ GƏLƏCƏK PERSPEKTİVLƏR

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100164, Daşkənd, Mirzo-Uluqbek rayonu, Olimlar küç., 64
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Xülasə. Məqalə IX-cu əsrin sonlarından 2025-ci ilə qədər Özbəkistan Respublikasında neft və qaz axtarışı və kəşfiyyat fəaliyyətlərinin inkişafının əhatəli təhlilinin nəticələrini təqdim edir. Tədqiqatın məqsədi geoloji kəşfiyyat sektorunun inkişafındakı tendensiyaları müəyyən etmək, karbohidrogen mineral resurs bazasının bərpasının effektivliyini qiymətləndirmək və neft və qaz ehtiyatlarının daha da artması perspektivlərini müəyyən etməkdir. Rəsmi statistik məlumatlar, istinad və arxiv mənbələri, geoloji kəşfiyyat işlərinin nəticələri, eləcə də istehsal və sahə inkişafının dinamikası haqqında məlumatlar mənbə materialları kimi istifadə olunub. Əsas istehsal və geoloji göstəricilərin – kəşfiyyat qazma həcmi, dərin qazma üçün sahənin hazırlanması göstəriciləri, neft və qaz ehtiyatlarının artımı və sənayenin inkişafının müxtəlif mərhələlərində geoloji kəşfiyyat işlərinin effektivliyinin – təhlili aparılıb. Böyük neft və qaz yataqlarının kəşf edilməsi və istismara verilməsi ilə əlaqədar mineral ehtiyatların ən intensiv istismar dövrləri, eləcə də qazma həcmində və karbohidrogen ehtiyatlarının artımında azalma ilə müşayiət olunan kəşfiyyat fəaliyyətinin azalma mərhələləri müəyyən edilib. Təxmin edilən ehtiyatların kommersiya ehtiyatlarına çevrilmə nisbətlərinin təhlilinə xüsusi diqqət yetirilir; bu nisbətlər müxtəlif dövrlərdə əhəmiyyətli dəyişiklik göstərir. Məlum olub ki, bir sıra hallarda ehtiyatların faktiki artımı ilkin proqnozları əhəmiyyətli dərəcədə üstələyib, bu isə resurs bazasını qiymətləndirmək üçün metodoloji yanaşmaları təkmilləşdirməyə və resurs proqnozlarını yeniləməyə ehtiyac olduğunu göstərir. Əldə olunan nəticələr geoloji kəşfiyyat işləri gücləndirildikdə, müasir modelləşdirmə texnologiyaları tətbiq edildikdə və resursların qiymətləndirilməsinin səmərəliliyi artırıldıqda Özbəkistanın neft və qaz sektorunun daha da inkişafı üçün güclü perspektivlərin mövcudluğunu təsdiqləyir.

Açar sözlər: *neft, qaz, karbohidrogenlər, geoloji kəşfiyyat, resurslar, ehtiyatlar*