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Distribution and State of Operation of Reserves of Oil Deposits of Productive Sediments of The Fergana oil and Gas-Bearing Region

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ABSTRACT: The information on the geological structure of oil and gas and oil fields of the Fergana oil and gas region is given. The features of the distribution of geological and recoverable oil reserves by productive deposits are established. It is shown that the implemented field development systems are not sufficiently effective. To stabilize the decline in oil production in the long-developed fields of the region, the most promising are the physicochemical methods of increasing the oil recovery coefficient.

KEY WORDS: field, horizon, sediments, depth, porosity, permeability, model, reservoir, sandstone, water flooding, pressure, dependence, rate, intensity, carbonate, terrigen.

I.INTRODUCTION

In Uzbekistan, hydrocarbon raw materials are extracted in five oil and gas regions, one of the oldest of which is the Ferghana Valley. Industrial oil in the Ferghana intermountain trench was discovered in the Chimion region as far back as 1900, and commercial development of fields began in 1904. By early 2019, 30 oil and gas fields were discovered in the Ferghana Oil and Gas Bearing Region (FNGO), mainly in the instrumental parts of the depression (fig. 1).

The Cainazoic, Mesozoic, and Paleozoic sediments are involved in the structure of the VNGO. The total thickness of the sedimentary cover in the central part of the depression is 10–12 km, in the instrument one –2.4–4.0 km or more [1,2].

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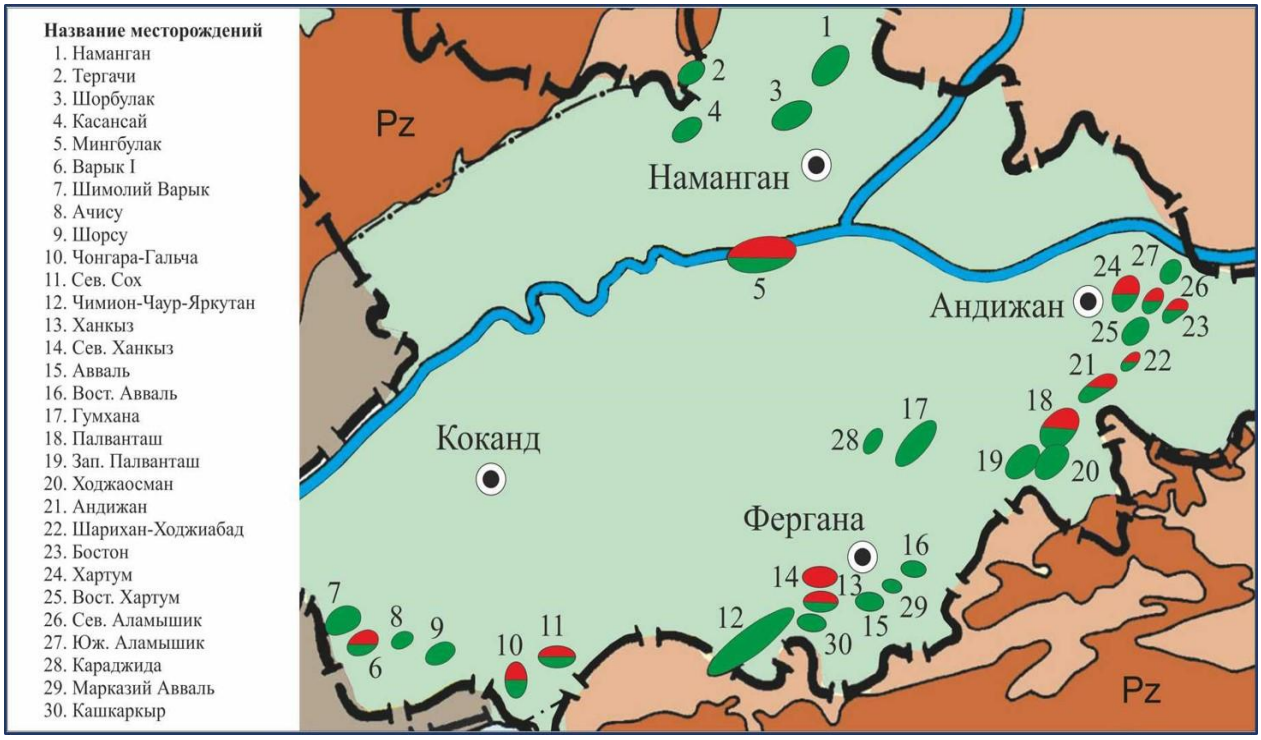

Fig. 1. Overview map of Ferghana oil and gas region

II. MAIN BODY.

In the Neogene section, oil deposits were established in 1,1a, 1b, BRS and KKS strata, in the Paleogene section - in II-IX strata (II, III, IV are represented by fine-grained sandstones and siltstones, V, VI, VII, VIII, IX-carbonate rocks: limestones and dolomites). In the section of Cretaceous deposits, the XVIII, XIX, XX, XXI strata, Jurassic-XXIII, XXIV, XXVIII, Paleozoic-XXX stratum are distinguished [4,5].

The collectors of productive Mesozoic strata are, as a rule, sandstones with intercalations of siltstones. Only some horizons of the Upper and Lower Cretaceous are represented by limestones. The oil content of the Mesozoic and Paleozoic sediments is limited. Known small oil deposits are of non-industrial importance, oil inflows from them are short-term and unstable.

The oil deposits are confined to narrow asymmetric folds, the length of which is 10-15 km, the width does not increase 2-3 km, the angles of incidence are 20-30 ° or more. Known oil deposits relate mainly to the stratum-vault type.
Almost all deposits are multilayer. The largest number of deposits is discovered in the context of the North Sokhskoye, Yuzhno-Alamyshinsky, Andijan, Sharikhan-Khojabad, West Palvantash and Palvantash deposits. Oil deposits are characterized by a small thickness, a small difference between the initial reservoir pressure and the gas saturation pressure of oil [1,2].B Due to the almost end of the fund of anticlinal objects in instrumentation zones, the main reserve for increasing oil production in the Federal State Educational Institution is deep-seated prospective structures located in the Northern and Central parts of the valley.

The problem itself is not new to develop deeply submerged (5,000 m or more) hydrocarbon deposits, but its solution has been delayed for a long time due to the lack of technical capabilities of drilling organizations and the high capital intensity of work in the absence of sufficient guarantees to obtain a positive result. The first practical steps in this direction were taken only a few decades ago.

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At the beginning of the 60s of the last century, at the Namangan field on the northern side of the Fergana Depression (average depth of about 3000 m), the initial production rates of the first exploratory wells reached 400-500 tons / day, significantly exceeding this parameter for all the objects of the region known at that time [3].

Exploration wells at the Gymkhana field with a depth of about 5000 m (in the southern part of the Central Ferghana mega synclinal), conducted since 1968, made it possible to obtain powerful (in terms of up to 200 tons / day and much more), but short-term oil inflows in 10 of them [3].

III. RESULTS AND DISCUSSION.

The oil production rate of well No. 5 of the Mingbulak field (northern part of the megasyncline) from a depth of about 5.5 thousand m over 2 months of 1983 steadily exceeded 5,000 tons / day, significantly increasing by the end of this period.

Of the productive sediments of the Karazhida field (the central part of the depression), when they were discovered in 2011, powerful oil manifestations were noted at a depth exceeding 6000 m.

The indicated impressive results during the opening of oil-bearing rocks served as the basis for organizing exploration work on a large scale.

To increase the efficiency of prospecting and exploration work, there is a need to assess the prospects of the oil potential of the section of the deeply submerged part of the low-grade oil and gas sector.

An analysis of the distribution of geological and recoverable reserves of the A + B + C1 category of discovered deposits in the Fergana Depression shows that it is distributed almost identically in carbonate and terrigenous reservoirs (Fig.2).

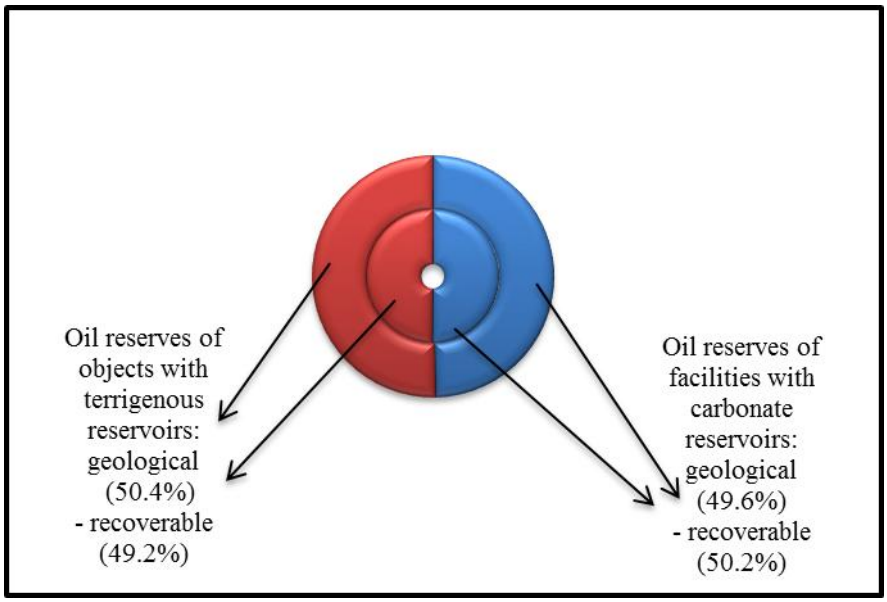

Fig. 2. Distribution of oil reserves of category A + B + C, developed fields of NGF by type of reservoir

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IV. CONCLUSIONS

However, geological and recoverable oil reserves of discovered fields are extremely unevenly distributed over productive deposits (Fig. 3.4). The bulk of geological and recoverable oil reserves are concentrated in oilfield deposits (75.0%). About 25% of oil reserves are concentrated in Neogene deposits, and 3.9 and 0.9% respectively in Cretaceous and Jurassic deposits. From the given values of oil reserves by deposits, it follows that in the promising areas of the Northern and Central parts of the Fergana Depression, Paleogene and Neogene deposits will be industrially productive.

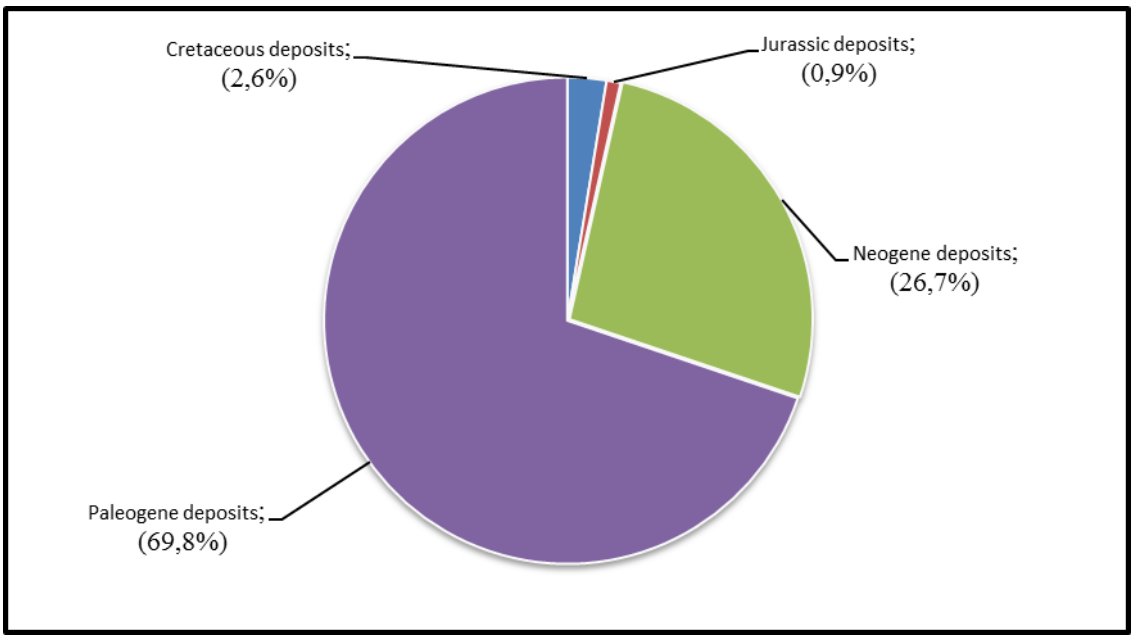

Fig. 3. Distribution of geological oil reserves of category A + B + C1, developed deposits of NGF deposits

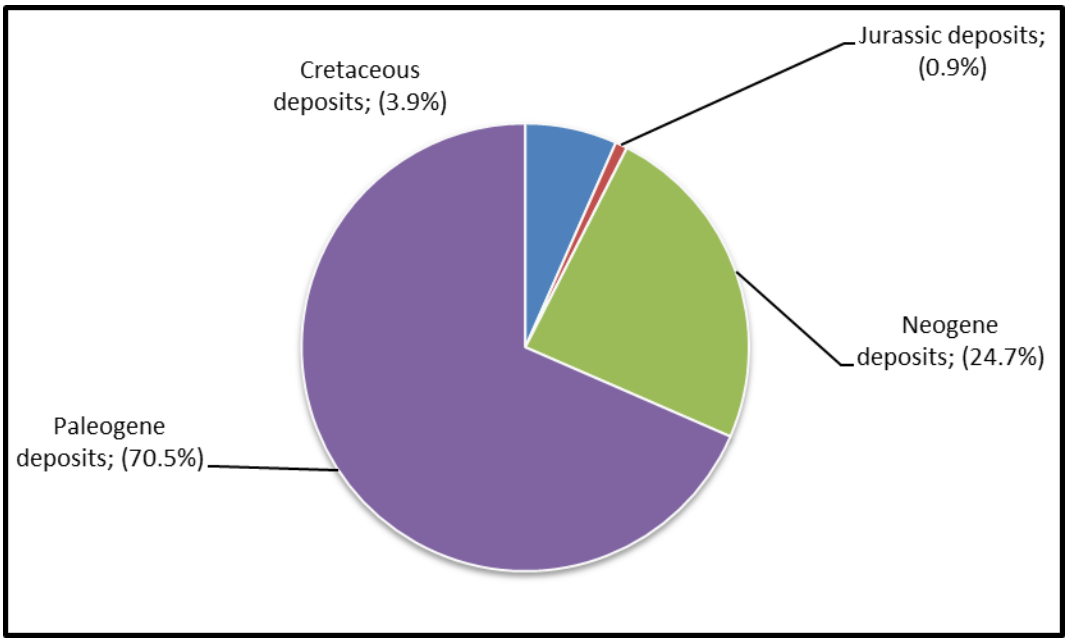

Fig. 4. Distribution of recoverable oil reserves of category A + B + C1, developed deposits of NGF deposits

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In addition to geological and physical conditions, the developed fields of NGNFs are also characterized by some technological features.

All objects were drilled according to a creeping system, wells were placed on a triangular grid, with a density of 1 to 20 ha. The drilling time was mainly 5-7 years. In reservoirs, methods of maintaining reservoir pressure were applied after their preliminary development on a natural regime (after significant depletion of reservoir energy). Due to the close values of the initial reservoir pressure and the pressure of oil saturation with gas, as well as the late application of water flooding, low activity of contour water, the vast majority of oil deposits worked in the initial stage of development in the dissolved gas mode [1,2].

An analysis of the design and achieved values of the average value of the oil recovery coefficient (ORF) for productive sediment deposits shows that the implemented development systems as a whole were not effective enough (Fig. 5).

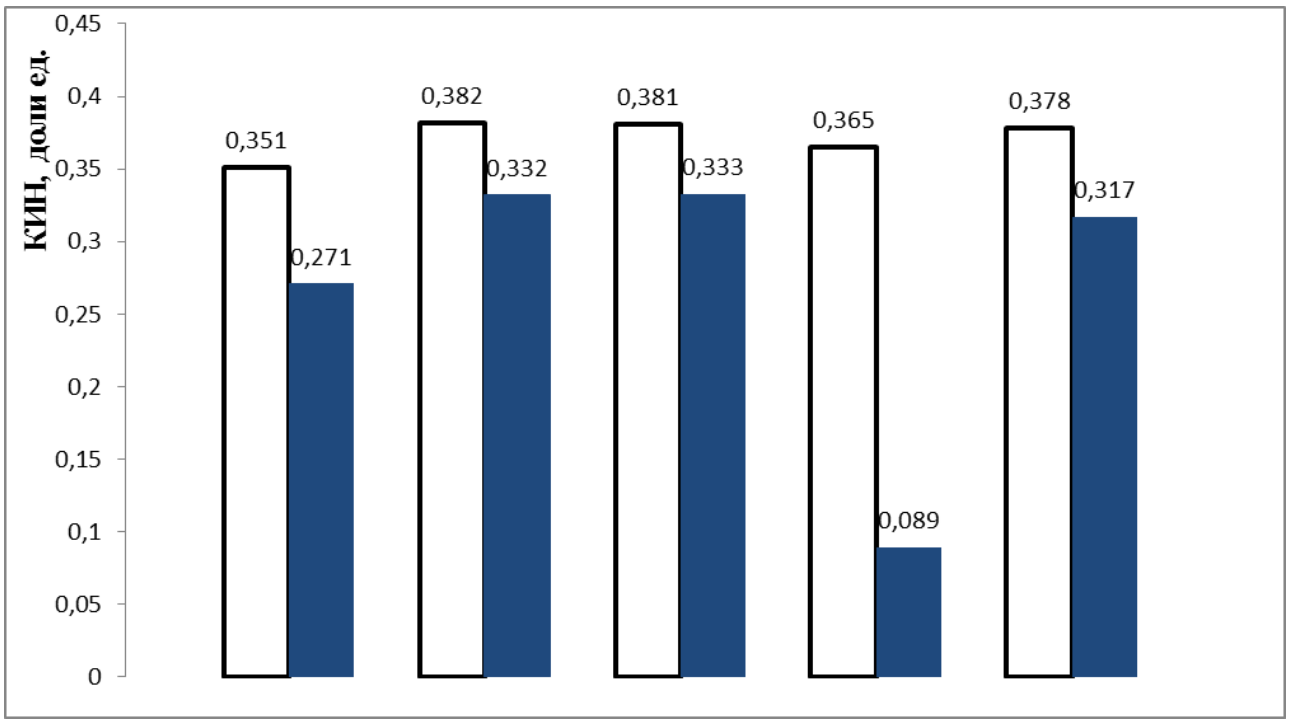

Fig. 5. Approved achieved average values of the oil recovery coefficient of the deposits of productive deposits of the Federal High-Level Scientific Production:
- approved when calculating recoverable oil reserves;
- current CIN value as of January 1, 2018

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Since most oil deposits are developed using water flooding, the most promising are the physicochemical methods [1]. This direction may be one of the main ways to stabilize and increase the oil production of the long-developed fields of the Federal State Institution of Natural Resources.

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