# On The Results of Investigation of the Causes of Anomaly High Formation Pressure at the Fields of the South-Eastern Part of the Bukharo-Khiva Region

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Abstract
According to the studies of A.Kh. Nugmanov, the migration of oil along the bedding of sediments continued until the Amudarya sedimentary basin subsided - until the end of the Paleogene. During this time, gaseous hydrocarbons emigrated into the water reservoir and dissolved in the formation waters, tending to completely saturate them. The degree of saturation of waters with gases by the end of the Paleogene in the focus of subsidence could reach the limit value, when the reservoir pressure (Ppl) and the saturation pressure (Psat) of dissolved gases became equal. When equal Rpl and Rus. Dissolved gases are released into the free state. At the same time, the regional uplift of the Turonian plate that occurred at the end of the Paleogene caused the regression of the sea and erosion of sediments, which led to a decrease in Psh in aquifers and its alignment with Psa. For this reason, in a short geological time, almost the entire area of the Amu Darya sedimentary basin began to release gaseous hydrocarbons from formation waters and their migration. As a result, the previously formed oil deposits were at the margins of the basin and beyond - the Jurassic carbonate stratum became predominantly gas-bearing. Gas migration continued while erosion proceeded. Simultaneously with the regional uplift of the sedimentary basin at the end of the Oligocene, the emigration of hydrocarbons from oil and gas source rocks is interrupted. Regional uplift, which changed to subsidence at the beginning of the Middle Miocene, was accompanied by the accumulation of sediments. This led to an increase in Pm and a breakthrough in the release of water-dissolved gases [5: 14].

## 1. Introduction

According to the studies of A.Kh. Nugmanov, the migration of oil along the bedding of sediments continued until the Amudarya sedimentary basin subsided - until the end of the Paleogene. During this time, gaseous hydrocarbons emigrated into the water reservoir and dissolved in the formation waters, tending to completely saturate them. The degree of saturation of waters with gases by the end of the Paleogene in the focus of subsidence could reach the limit value, when the reservoir pressure (Ppl) and the saturation pressure (Psat) of dissolved gases became equal. When equal Rpl and Rus. Dissolved gases are released into the free state. At the same time, the regional uplift of the Turonian plate that occurred at the end of the Paleogene caused the regression of the sea and erosion of sediments, which led to a decrease in Psh in aquifers and its alignment with Psa. For this reason, in a short geological time, almost the entire area of the Amu Darya sedimentary basin began to release gaseous hydrocarbons from formation waters and their migration. As a result, the previously formed oil deposits were

at the margins of the basin and beyond - the Jurassic carbonate stratum became predominantly gas-bearing. Gas migration continued while erosion proceeded. Simultaneously with the regional uplift of the sedimentary basin at the end of the Oligocene, the emigration of hydrocarbons from oil and gas source rocks is interrupted. Regional uplift, which changed to subsidence at the beginning of the Middle Miocene, was accompanied by the accumulation of sediments. This led to an increase in Pm and a breakthrough in the release of water-dissolved gases [5: 14].

M Khamidov M.R. Based on the study of the patterns of formation of AHRP in the zones of gas accumulation in Western Uzbekistan, he showed that drilling of wells is most often complicated and even becomes impossible mainly due to gas and gas manifestations (high-pressure overflows of intra-salt brines). It has been established that the main causes of accidents in case of fire gas manifestations are the sudden opening by a well of local areas of crushing of salt strata, which contain an aqueous solution of calcium and magnesium salts, enriched with gas, which has increased fluidity and high pressure [3:19].

Fields with abnormally high formation pressures and formation temperatures over 100 0 C are characterized by under-gas deposits of oil of significant height (more than 20-40 m) and increased condensate content - from 100 to 670 g/m 3 (Kokdumalak, Kruk. Western Kruk. Sardob, Northern Shurtan and others). Fields with normal reservoir pressure have lower heights (up to 20 m) of under-gas oil deposits and largely depend on the depth of the trap. Urtabulak, Umid, Zekry, South Kemachi, Jarchy, Markovskoye, North Maimanak with a productive formation depth of 2100 to 2500 m, normal hydrostatic pressure and close formation temperatures are characterized by a lower condensate content, varying within 11-75 g/m3. Oil with different contents of asphaltenes, silica gel resins, and paraffins appears under the gas condensate accumulation starting from a depth of 2100 m (Karim) and further, accompanying deeper and deeper traps, constantly increasing in volume. In other oil and gas regions, this limit may be different depending on the thermobaric gradient and the electromagnetic activity of the region [2: 17]. In the eastern part of the Beshkent trough, according to the results of the above studies, three types of faults are distinguished.

1. Faults that cross the entire complex of rocks (from the basement of the pre-Neogene-Quaternary deposits) are distributed mainly in the northeastern part of the study area. The westernmost of them stretches for more than 60 km and can be traced from the Northern Nishan structure (in the south), west of the Northern Shurtan deposit, through Kumchuk, south of the Southern Dzhanbulak structure.

2. Faults damping in the upper salts are the most developed. Their identification is complicated due to the small amplitude and weak expression on time sections. Most of them were identified after receiving the results of drilling of wells that discovered them (Kumchuk, Chunagar, Garmiston, etc.). They do not have a specific direction, are located randomly and are, as it were, branches from the regional faults described above.

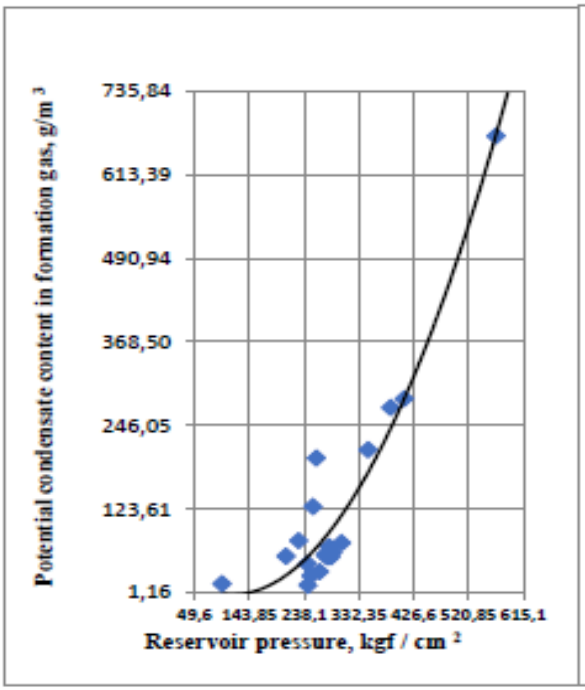



Fig.1. Relationship between potentials and condensate content in gas from reservoir pressure .

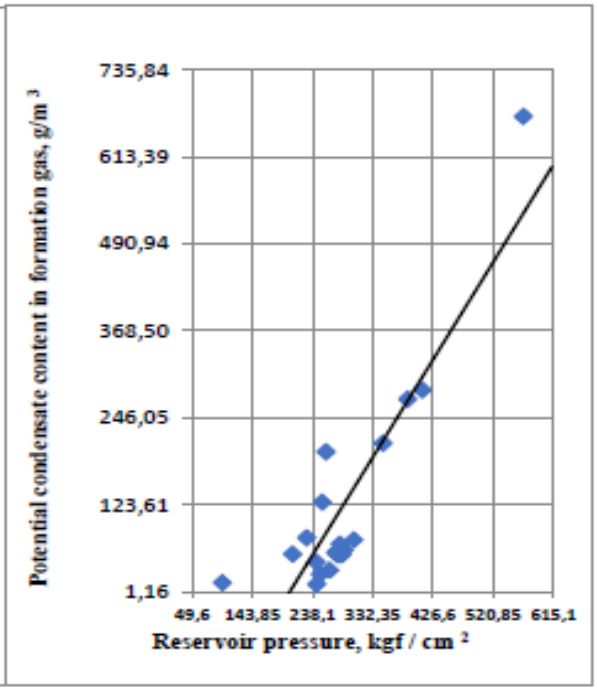
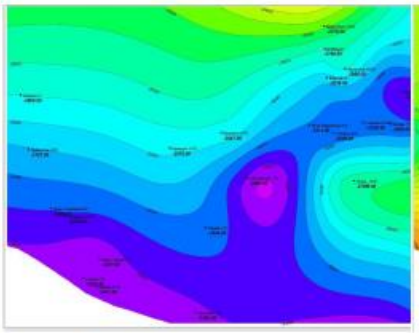
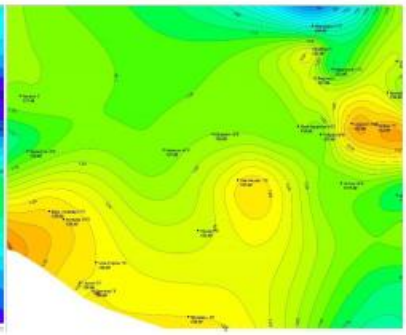


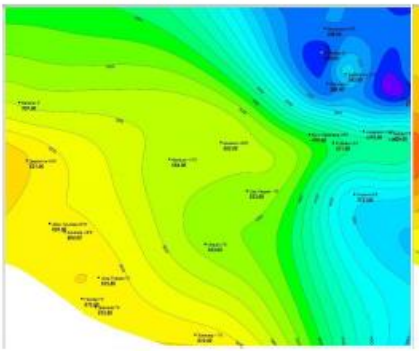

Fig.2. Relationship between potentials



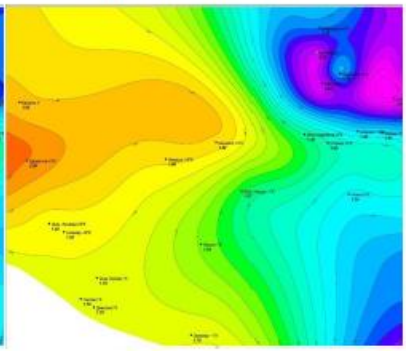
Rice. Fig. 3. Distribution map of the depth of fluid separations (GOC, VOC, GWC) in the southeastern part of the BCR. (compiled by: Hayitov O.G., 2020).



Rice. 4. Map of the distribution of the depth of reservoir temperature in the southeastern part of the BCR (compiled by: Khaitov O.G., 2020).



Rice. 6. Map of reservoir pressure distribution in the southeastern part of the BCR (compiled by: Khaitov O.G., 2020).



Rice. 7. Map of the distribution of formation pressure anomalies in the southeastern part of the BCR (compiled by: Khaitov O.G., 2020).

## 2. Methods

On the basis of the above facts, the authors of works [4: 141-158], [8: . 82-86], [6: 9-11] concluded that in the hydrocarbon deposits of the southeastern part of the BCR, the main role was played by tectonic movements of the earth's crust. To establish the influence of the depth of occurrence of productive horizons and reservoir temperature on the values of reservoir pressure and anomalies of reservoir pressure, maps of the distribution of the depth of fluid separations (GOC, WOC, GWC) (Fig. 3), reservoir temperature (Fig. 4) and reservoir pressure (Fig. 5) in the southeastern part of the BHR.

As can be seen from Fig.3, in the territory of the southeastern part of the BCR, there are anomalous sections of the depth of fluid separations (GOC, VNK, GVK) that stand out from the general pattern: relatively higher marks in the area of the Shurtan and Ilim gas condensate fields; relatively lower levels in the area of the Northern Guzar and Garmiston fields, the Shakarbulak and Koshkuduk oil and gas condensate fields, and the Northern Nishan gas condensate field.

On the reservoir temperature distribution map in the southeastern part of the BCR , several zones are distinguished, both with relatively lower reservoir temperature values in the area of the Namozboy, Oydin, and Northern Nishon fields, and with its higher values in the area of the wells Sherkent, Zafar, Tavakkal, Karatepe, Garmiston (Fig. 4).

Comparison of maps of distribution of deep fluid separations (Fig.3) and reservoir temperature with maps of reservoir pressure distribution (Fig. 4) show that there are no visible relationships between the factors considered, in this regard, we can conclude that in the southeastern part of the BCR, the occurrence of deposits AHRP are not related to the depth of productive horizons and reservoir temperature.

As a result, it has been established that the occurrence of AHRP in the hydrocarbon fields of the southeastern part of the BCR is most affected by the magnitude of the vertical movements of the earth's surface, and the influence of the condensate content in the gas, the difference in water and oil payability and open porosity is also significant.

## 3. Results

In this regard, when drilling prospecting and exploratory wells in new areas of the southeastern part of the BCR, the expected value of reservoir pressure should be justified taking into account the above factors that are the main causes of AHRP.

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