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On the Results of Research on the Causes of Abnormally High Reservoir Pressures in the Fields of the South-Eastern Part of the Bukhara-Khiva Region

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Abstract: *When conducting geological exploration, calculating hydrocarbon reserves, drawing up project documents for field development, planning measures to intensify production and increase the component recovery of productive formations, it is necessary to use the experience of working on similar fields. For productive deposits with different geological and physical conditions, the effectiveness of geological and technical measures varies, and this circumstance should be taken into account when conducting geological exploration and developing hydrocarbon deposits.*

Keywords: Oil, gas, deflection, tectonics, structure, fields, seismic exploration, location of wells, carbonate formation, reef, biogerm, swimming pool.

Introduction

Some reasons for the occurrence of avpd and anpd in the hydrocarbon deposits of the studied territory are considered by Nugmanov A. Kh. [1: 14], Abduazizov U. Jalalov M. S. Khodiev M. V. [2: 17], Khamidov M. R. [3: 8], Akramov B. sh., Khayitov O. G.[4: 113-118] , and others.

According to the research of A. H. Nugmanov, oil migration along the sediment layer continued until the Amu Darya sedimentary basin was submerged – until the end of the Paleogene [9]. During this time, gaseous hydrocarbons emigrated to the water reservoir and dissolved in the reservoir waters, striving to fully saturate them. The degree of water saturation with gases by the end of the Paleogene in the focus of deflection could reach the limit value when the reservoir pressure(RPL) and saturation pressure (RNAs) of dissolved gases became equal [10]. If the RPL and RNAs are equal. The dissolved gases pass into the free state. At the same time, the regional uplift of the Turonian plate that occurred at the end of the Paleogene caused sea regression and precipitation erosion, which led to a decrease in the RPL in aquifers and its alignment with the RNAs [11]. For this reason, in a short geological time, almost the entire area of the Amudarya sedimentary basin began to release gaseous hydrocarbons from reservoir waters and their migration. As a result, previously formed oil deposits were located on the outskirts of the basin and beyond it –the Jurassic carbonate layer became predominantly gas-bearing. Gas migration continued while erosion was occurring [12]. Simultaneously with the regional uplift of the sedimentary basin at the end of the Oligocene, the migration of hydrocarbons from oil and gas source rocks is interrupted. Regional uplift, which were replaced in the early middle Miocene the subsidence was accompanied by the accumulation of precipitation. This led to an increase in RPL and a breakthrough in the release of water-soluble gases [13].

Khamidov M. R. based on the study of the regularity of the formation of avpd in the zones of gas accumulation in Western Uzbekistan, showed that drilling wells is most often complicated and even becomes impossible mainly due to rapogazoproyavleniy (high-pressure overflows of intra-salt brines). It has been established that the main causes of accidents in rapogazoproyavlyannyh are sudden opening of the well local areas of crushing salt strata, which contain an aqueous solution of calcium and magnesium salts, enriched with gas, with high fluidity and high pressure [14].

Deposits with abnormally high reservoir pressures and reservoir temperatures of more than 1000C are characterized by sub - gas oil deposits of considerable height (more than 20-40 m) and an increased condensate content-from 100 to 670 g/m^3 (Kokdumalak, Kruk. West Crook. Sardob, Severny Shurtan, etc.). fields with normal reservoir pressure have lower heights (up to 20 m) of sub-gas oil deposits and largely depend on the depth of the trap **[15]**. Urtabulak, Umid, Zekry, southern Kemachi, Dzharchi, Markovskoe, and Northern Maimanak with a depth of 2100 to 2500 m, normal hydrostatic pressure, and close reservoir temperatures are characterized by a lower condensate content, varying within 11 - 75 g/m^3. Oil with different contents of asphaltenes, silica gels, and paraffins appears under the gas condensate accumulation starting from a depth of 2100 m (Karim) and further, accompanying deeper and deeper located traps, constantly increasing in volume. In other oil and gas bearing regions, this limit may be different depending on the thermobaric gradient and the electromagnetic activity of the region [16]. According to the results of the above studies, three types of faults are distinguished in the Eastern part of the Beshkent trough.

1. Faults that intersect the entire complex of rocks (from the basement of the doneogene - Quaternary deposits) are

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distributed mainly in the North-Eastern part of the study area. The westernmost of them stretches for more than 60 km and can be traced from the North Nishan structure (in the South), West of the North Shurtan field, through Kumchuk, South of the South Dzhanbulak structure[17]**.**

2. the Faults that fade in the upper salts are the most developed. Their isolation is complicated due to their small amplitude and weak expression on time sections. Most of them allocated after receipt of drilling results which revealed their wells (of Kumchuk, Congar, Germiston, etc.). They do not have a specific orientation, are located randomly and are like branches from the regional faults described above[18].

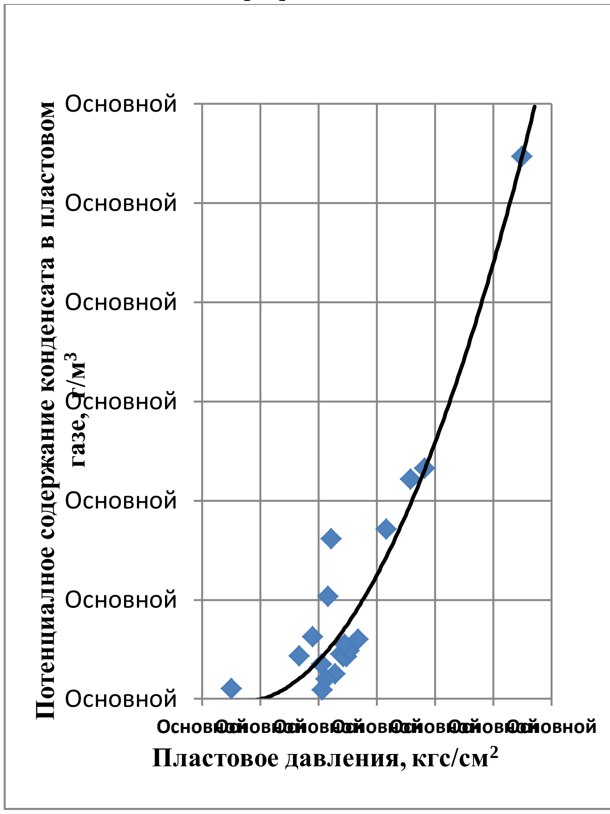

Fig.1. relationship between potential content in gas and condensate reservoir pressure.

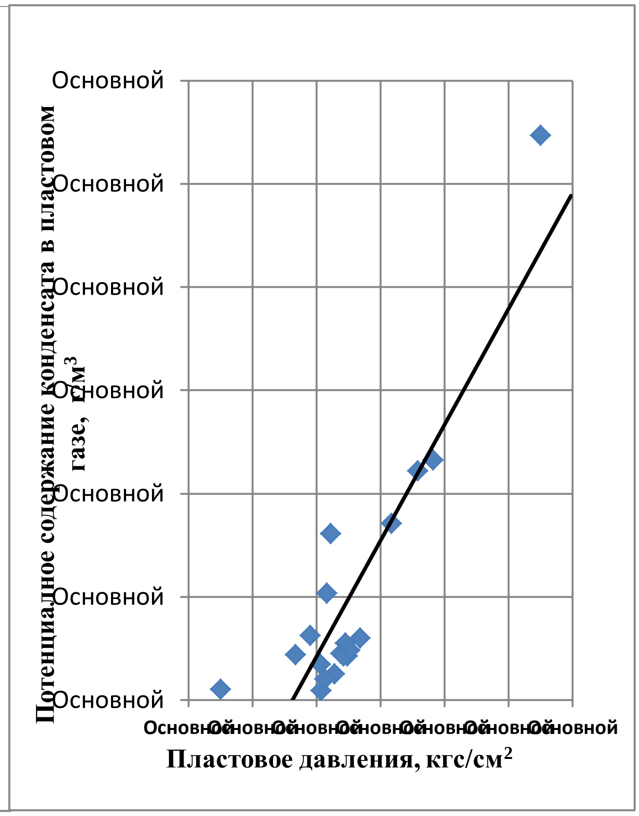

Figure 2.relationship between potential condensate content in gas From reservoir pressure.

Based on the above facts by the authors of the works [4: 141-158], [8: . 82-86], [19] it is concluded that tectonic movements of the earth's crust played a major role in the hydrocarbon deposits of the South-Eastern part of the BHR.

In order to determine the influence of the depth of productive horizons and reservoir temperature on the values of reservoir pressure and anomalies of reservoir pressure, the author constructed maps of the distribution of the depth of fluid divides (SNC, VNC, GWC) (Fig.3), reservoir temperature (Fig.4) and reservoir pressure (Fig.5) in the South-Eastern part of the BHR [20] .
As seen in Fig.3 in the South-Eastern part PHR there is an abnormal areas of the depth of fluidisation (CSC, KSS, HVA)released from the General pattern: a relatively higher level in the area of Shurtan gas condensate fields and Ilim; relatively low marks in the area of the deposits of the Northern Guzar and Germiston, oil and gas condensate field Shakarbulak and Koshkuduk, as well as the Northern Nishan gas condensate[21].

On the map of reservoir temperature distribution in the South-Eastern part of the bhrv, several zones are distinguished, both with relatively lower values of reservoir temperature in the area of the Namozboy, oidin, and North Nishon fields, and with higher values in the area of the Sherkent, Zafar, Tavakkal, Karatepe, and Garmiston wells (Fig.4).
Comparison of maps of distribution of deep fluid divisions (Fig.3) and reservoir temperature with maps of reservoir pressure distribution (Fig.4) show that there are no visible links between the factors considered. therefore, it can be concluded that the occurrence of avpd deposits in the South-Eastern part of the BHR is not related to the depth of productive horizons and reservoir temperature[22].

As a result, it was found that the occurrence of WPA in the hydrocarbon fields of the South-Eastern part of the BHR is most affected by the magnitude of vertical movements of the earth's surface, and the difference in the water and oil payloads and open porosity also significantly affects the condensate content in gas[23-26].

In this regard, when drilling prospecting and exploration wells in new areas of the South-Eastern part of the BHR, the expected value of reservoir pressure should be justified taking into account the above factors that are the main causes of AVPD.

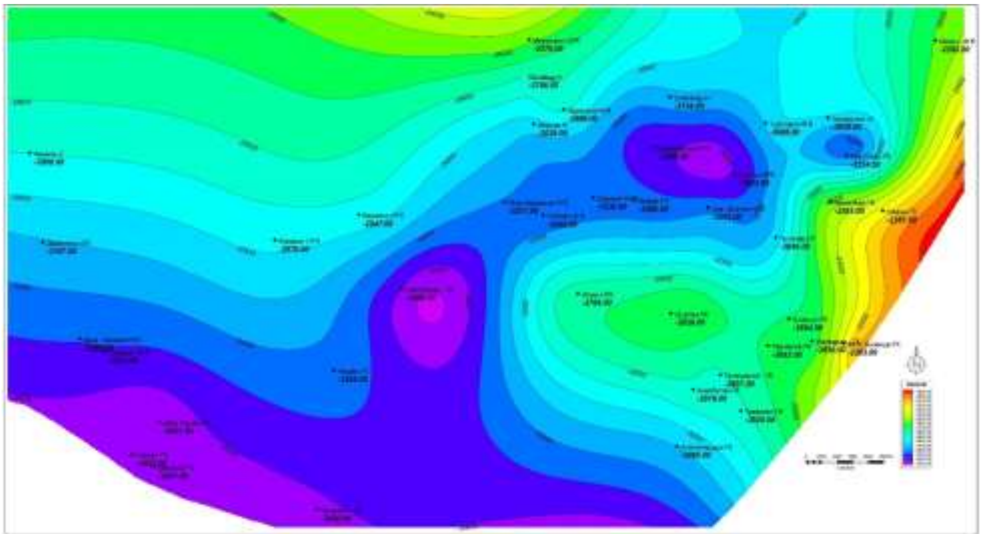

Fig. 3. map of the distribution of the depth of fluid divisions (SNC, VNC, GVC) in the South-Eastern part of the BHR. (made up:Khayitov O. G., 2020g.).

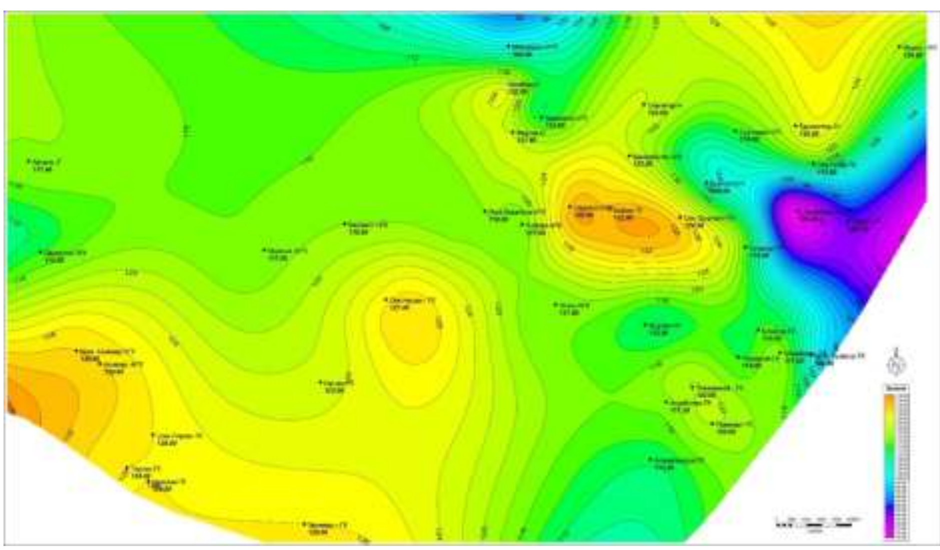

Fig. 4. map of the reservoir temperature depth distribution in the South-Eastern part of the BHR(Russia:Khayitov O. G., 2020g.).

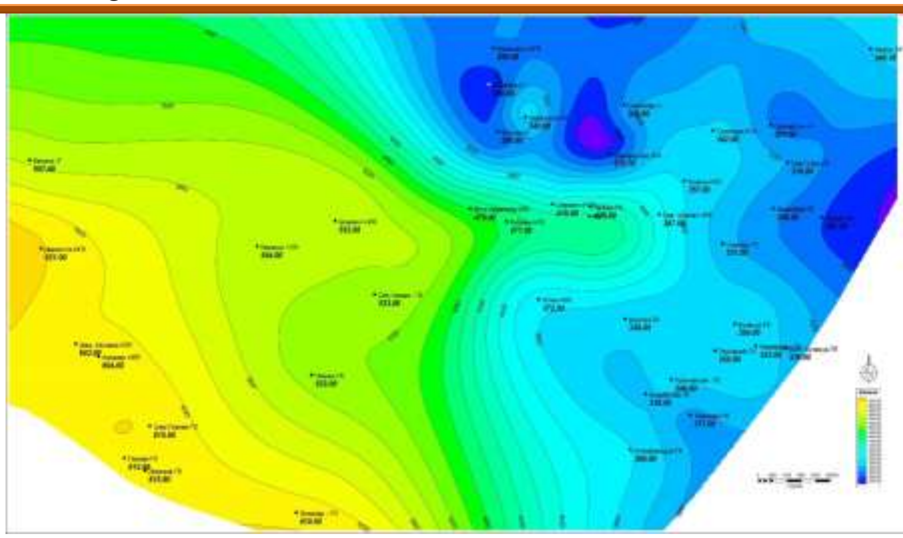

Fig. 6. Map of reservoir pressure distribution in the South-Eastern part of the BHR (Russia:Khayitov O. G., 2020g.)

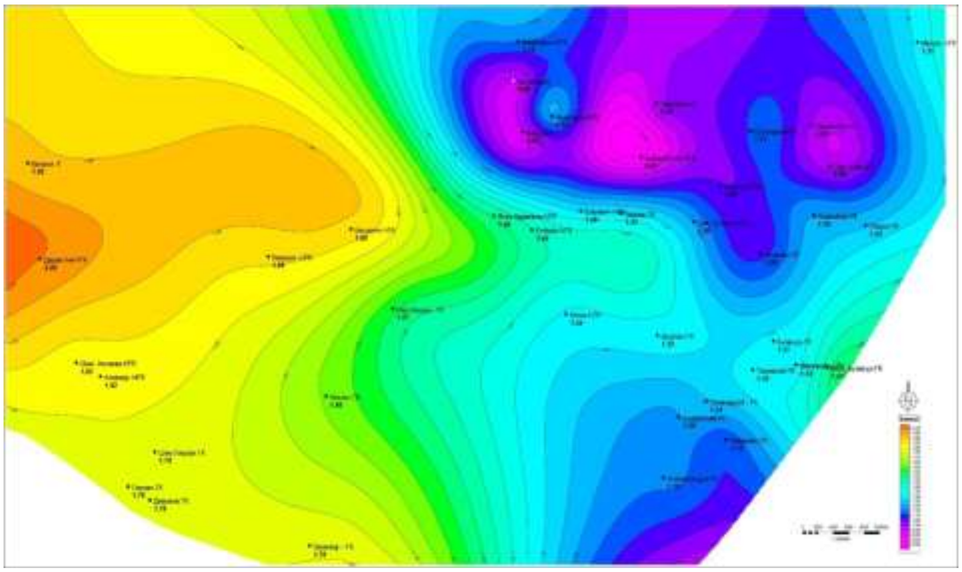

Fig. 7. map of the distribution of reservoir pressure anomalies in the South-Eastern part of the BHR (made up:Khayitov O. G., 2020g.).

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