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INVESTIGATING THE IMPACT OF THERMOBARIC CONDITIONS ON HYDROCARBON PRODUCTION IN THE SOUTHERN CASPIAN BASIN REGION

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One of the determinants of hydrocarbon potential in the Southern Caspian Basin, is the thermobaric conditions of the area. By thermobaric conditions we mean high pressure and temperature conditions that affect hydrocarbon production. In general, these conditions play an important role in achieving high hydrocarbon production and assessing the future of the region. As we know, geological and geophysical aspects are evaluated primarily in structural exploration. It is possible to state that the pressure and temperature changes in the South Caspian Basin during this period, i.e. the thermobaric regime, influenced the formation of hydrocarbon deposits in the field and their location conditions.

Oil and gas in the study area is directly linked to gas formation in deep layers under the influence of high thermobaric conditions. The fact that the study area has a complex geological structure as well as rich hydrocarbon reserves is considered as one of the main factors in the study of the area. Thermobaric conditions directly affect the gathering and processing process in hydrocarbon production and also determine the location of the field. Therefore, a change in thermobaric conditions in the Southern Caspian Basin region, i.e. an increase in factors such as temperature and pressure, may increase the migration of hydrocarbons and this process may affect hydrocarbon production. In other words, as we explore deeper layers, it is possible to observe the impact of this process on the discovery of new structures.

***Keywords**: South Caspian Basin, hydrocarbon production, thermobaric conditions, pressure and temperature*

INTRODUCTION

Studies have shown that the geological structure of the study area has undergone various deformations as a result of changing thermobaric conditions in the deep layers. As high temperature and pressure move deeper into the earth, the geological structure is reshaped under these effects. These changes are believed to be one of the factors that play an important role in the formation and location of hydrocarbon deposits. The high pressure and temperature conditions, the accumulation of hydrogen and the subsequent gradual change play a key role in the formation of oil and gas reserves in this region. Changing thermobaric conditions determine the formation and location of hydrocarbon reserves, as well as complicate the region with specific geological and geophysical changes.

The impact of thermobaric conditions on hydrocarbon resources in the South Caspian basin is of great importance not only in deepening oil and gas exploration in this region, but also in the processes of exploration and exploitation of these resources. Changes in high pressure and temperature conditions change the physical and chemical properties of oil and gas, as well as the storage conditions of deposits [1, 5, 6].

As a result of the research, it was found that thermobaric conditions change as they penetrate deeper layers and this change has a direct impact on the change of the internal structure of the region. By internal structure we mean geological variability; changes in the physical and chemical parameters of the rocks. Taking all this into account, it should be noted that as a result of the change in the thermobaric regime, a number of changes in the formation and production of hydrocarbon resources have been observed. Therefore, high temperature and pressure conditions directly affect

hydrocarbon accumulation in the South Caspian Basin. Thermobaric conditions lead to the complexity of the internal structure of the region.

The study determined the relationship between thermobaric conditions and oil and gas production. In general, thermobaric conditions affect not only hydrocarbon production but also other geological and geophysical issues. However, high thermobaric conditions affect both the physical and chemical properties of oil and gas. It has also been observed to have an impact on the location of hydrocarbon reserves in the region. Therefore, high thermobaric conditions play an important role in the exploration process of oil and gas structures. This is considered one of the main factors of strategic importance for foreign as well as domestic companies engaged in oil and gas production.

The research work will discuss the study and research of the thermobaric regime in the South Caspian Basin, as well as the determination of the relationship between oil and gas. This will lead to new ideas on the creation, formation, production and other issues of hydrocarbon reserves. In addition, on the basis of the discussions, issues of more efficient production and operation of oil and gas fields will be reflected. Therefore, the issue of thermobaric conditions, which play an important role in the development of hydrocarbon production in the future, will be explored.

MATERİAL AND METHODS

Maps based on actual measurements at the Bulla seafloor in the Southern Caspian Basin show that the temperature at -2000 m depth is 95-158oC (Fig.1), at -4000 m depth the temperature is 94-170oC (Fig.2), and at -6000 m depth the temperature ranges from 97- 175oC (Fig.3). Based on the above data, it is possible to observe how the thermobaric conditions change as we penetrate deeper.

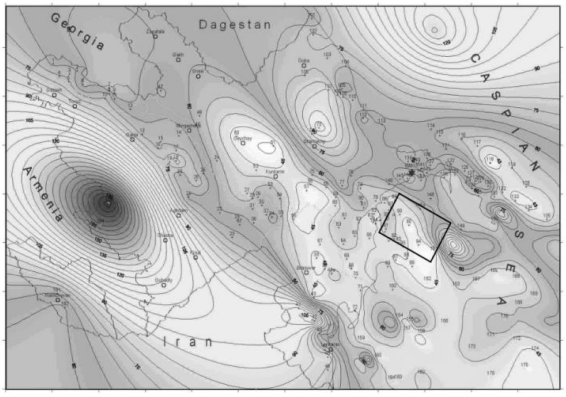

Fig. 1. Map of temperature variations in the territory of Azerbaijan at a depth of -2000 m. Compiled by: Mukhtarov A.Sh., Valiyev H.O. 1999.

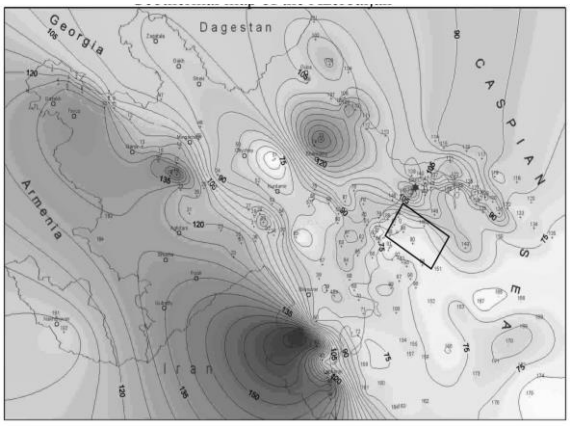

Fig. 2. Map of temperature variations in the territory of Azerbaijan at a depth of -4000 m. Compiled by: Mukhtarov A.Sh., Valiyev H.O. 1999.

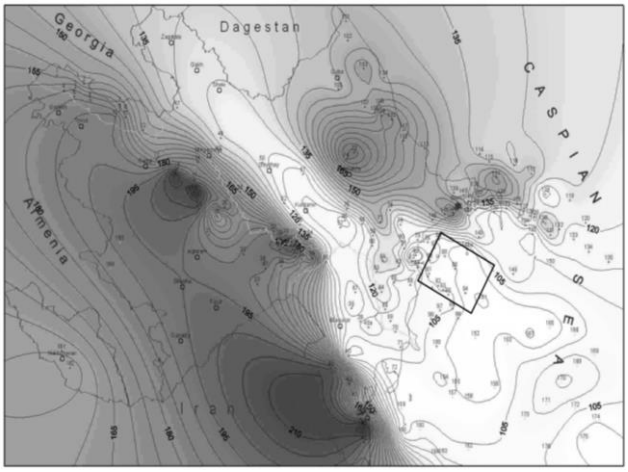

Fig. 3. Map of temperature variations in the territory of Azerbaijan at a depth of -6000 m. Compiled by: Mukhtarov A.Sh., Valiyev H.O. 1999.

First of all, thermobaric conditions were analyzed based on the study of the geological and geophysical structure of the region. For the analysis of thermobaric conditions, first of all, the study of the geological and geophysical characteristics of the research area, the analysis of geological and geophysical maps based on this, as well as the analysis and study of the structures in which the layers are formed, is a priority. In addition, the regularity of pressure and temperature changes according to the characteristics of the rock masses was also studied. This is done through geothermal gradient measurements. In addition, 2D and 3D seismic data were analyzed to study the high pressure and temperature conditions. All this information helped to gain a deeper understanding of the geology of the region and to investigate the impact of thermobaric conditions [2, 4, 10].

As for the physical properties of rocks, fluid storage properties play an important role in the formation and accumulation of hydrocarbon reserves. Different methods are used to study the processes of deposition and accumulation of hydrocarbons. These models include the study of changes in kerogens rich in carbon, hydrogen, nitrogen and sulfur elements as a result of high temperature, the formation of hydrocarbon resources in accordance with the geological structure of the region, the physical and chemical composition of hydrocarbons formed and produced in the region. As a result, the relationship between high thermobaric conditions and hydrocarbons was analyzed [3, 7, 9].

The study investigated the impact of hydrocarbon reserves on high thermobaric conditions. For this purpose, the type of structure determination, the conditions of formation of hydrocarbons in the deposits, their location and extraction processes were taken into account.

Based on all these, statistical and analytical comparisons were made and the effect of high pressure and temperature conditions during the formation and placement of hydrocarbon reserves was evaluated. As a result of the research, it was determined that high thermobaric conditions have an impact on oil and gas production [8, 9].

Thus, it was observed that high thermobaric conditions play an important role in the formation of hydrocarbon reserves in the study area. It was also observed that kerogen and other materials formed in the region were transformed into hydrocarbon resources as a result of high thermobaric conditions. It was observed that high thermobaric conditions create favorable conditions for the formation of hydrocarbon resources by penetrating deep layers. It should be noted that the pressure and temperature conditions observed in the deep subsoil and in the layer near the top of the Earth differ greatly. This creates favorable conditions for the formation of hydrocarbon resources. Therefore, before the discovery of oil and gas structures, the region is studied from a geological and geophysical point of view, thermobaric conditions are analyzed and modern methods are applied.

RESULTS AND DISCUSSION

Based on the results obtained, discussions were made and it was concluded that the temperature and pressure conditions in the study area play an important role in the formation of oil and gas deposits. Therefore, in the future, the study of high temperature and pressure, i.e. thermobaric conditions during the operation of oil and gas fields, as well as during the exploration of structures, will help to further optimize the production process. The presence of high thermobaric conditions creates the idea that there are high hydrocarbon reserves occurring in the region. Moreover, thermobaric conditions play an important role in the production and depletion of hydrocarbon resources.

In addition, the research region with high thermobaric conditions is characterized by high quality hydrocarbon reserves. All these studies will play an important role in decisions on the formation and production of hydrocarbon reserves in the region and will contribute to the further development of oil and gas production in the future. This will have an impact on the economic strengthening of the country and the strategic importance of the exploration area.

CONCLUSION

It has been shown that under the influence of geodynamic stress in the research area, the dynamics of thermal conditions in oil-gas horizons increases and these factors are likely to affect oil-gas production, which is important. The influence of geodynamic factors - earthquakes - should be taken into account in the study of the increase and decrease of production in oil wells in the earthquake time interval.

According to the hydrocarbon data obtained from the study area, the exploitation of quality oil and gas is directly related to high thermobaric conditions. However, it was determined that the location and formation of hydrocarbon reserves in the region, as well as high thermobaric conditions in the production process create a favorable environment. Thus, it was learned that high pressure and temperature directly affect the physical and chemical properties of hydrocarbons. Given the great importance of the Southern Caspian Basin for the country's economy, the results obtained will allow further development and effective utilization of oil and gas extraction in the future, as well as the discovery of new deposits and structures.

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TERMOBARİK ŞƏRAİTİN CƏNUBİ XƏZƏR HÖVZƏSİ ƏRAZİSİNDƏ KARBOHİDROGEN HASİLATINA TƏSİRİNİN ÖYRƏNİLMƏSİ

A.V. Səmədzadə

Cənubi Xəzər Hövzəsində karbohidrogen potensialına təsir edən amillərdən biri də ərazinin termobarik şəraiti hesab olunur. Termobarik şərait dedik də, karbohidrogen hasilatına təsir edən yüksək təzyiq və temperatur şəraiti nəzərdə tutulur. Ümumiyyətlə, bu şərait karbohidrogen hasilatında yüksək miqdarın əldə olunmasında eləcə də, ərazinin perspektivliliyinin qiymətləndirilməsində mühüm rol oynayır. Ərazinin malik olduğu mürəkkəb geoloji struktur analiz olunmuş və əldə olunmuş geoloji və geofiziki məlumatlar əsasında dərinliyə doğru getdikcə müxtəlif lay təbəqələrində yüksək təzyiq və temperatur şəraitinin yaranması müşahidə olunmuşdur. Tədqiqat sahəsindən əldə edilmiş karbohidrogenlərin hasilat məlumatlarına əsasən, keyfiyyətli neft və qazın istismar edilməsi bilavasitə yüksək termobarik şəraitlə əlaqələndirilmişdir. Bununla da, ərazidə yüksək termobarik şəraitin mövcudluğu karbohidrogen ehtiyyatlarının formalaşmasında, yerləşməsində, eləcə də, hasilat prosesində mühüm rol oynadığı müəyyən edilmişdir. Beləliklə, yüksək təzyiq və temperaturun karbohidrogenlərin fiziki və kimyəvi xüsusiyyətlərinə bilavasitə təsir etdiyi öyrənilmişdir. Cənubi Xəzər Hövzəsinin ölkə iqtisadiyyatı üçün böyük əhəmiyyət kəsb etdiyini nəzərə alaraq, alınmış nəticələr gələcəkdə neft qaz istismarının daha da yaxşılaşdırılmasına və effektiv istismar prosesinə eləcə də, yeni yataq və strukturların aşkar olunmasına imkan yaradacaqdır.

Açar sözlər: *Cənubi Xəzər Hövzəsi, karbohidrogen hasilatı, termobarik şərait, təzyiq və temperatur*

ИССЛЕДОВАНИЕ ВЛИЯНИЯ ТЕРМОБАРИЧЕСКИХ УСЛОВИЙ НА ДОБЫЧУ УГЛЕВОДОРОДОВ В ЮЖНО-КАСПИЙСКОМ БАССЕЙНЕ

А.В. Самедзаде

Одним из факторов, влияющих на углеводородный потенциал Южно-Каспийского бассейна, являются термобарические условия района. Когда мы говорим о термобарических условиях, мы имеем в виду условия высокого давления и температуры, влияющие на добычу углеводородов. В целом эти условия играют важную роль в получении высоких объемов добычи углеводородов, а также в оценке перспективности района. Проанализировано сложное геологическое строение территории и на основании полученных геологических и геофизических данных отмечено формирование высокого барического и температурного режима в более глубоких пластах. На основе данных о добыче углеводородов на исследуемой территории, добыча качественной нефти и газа напрямую связана с высокими термобарическими условиями. При этом установлено, что наличие высоких термобарических условий на территории играет большую роль в формировании, расположении и добыче углеводородов. Таким образом, выяснилось, что высокое давление и температура напрямую влияют на физические и химические свойства углеводородов. Учитывая большую важность Южно-Каспийского бассейна для экономики страны, полученные результаты дадут возможность усовершенствования добычи нефти и газа и увеличения эффективности процесса разработки, а также поможет в открытии новых месторождений и структур.

Ключевые слова: *Южно-Каспийский бассейн, добыча углеводородов, термобарические условия, давление и температура*