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THE SCIENTIFIC BASIS OF THE EMERGENCE OF GEOTECTONIC FACTORS AND INFLUENCE OF SALT TECTOGENESIS IN ANOMALOUS HIGH PRESSURE LAYER

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Аннотация

Тектогенез жараёнида қатламларда юқори аномал босимларни шаклланиши, қатламларда тузларнинг жойлашиш ҳолатлари ва майдонларда бурғилаш ишларини олиб боришда қатламнинг геологик шароитига боғлиқ ҳолда мураккабликларнинг пайдо бўлиши сабаблари таҳлил қилинган.

Аннотация

Сделан анализ образования аномольно высоких давлений на пластах в процесс тектогенеза, расположение солей на пластах и возникновение осложнений в процессе бурения в зависимости от условий промысл.

Annotation

The analysis of abnormally high pressure in the reservoirs in the process of orogeny, the location of the salts on the formation and vozneknovenie complications during drilling, depending on fishing conditions.

Таянч сўзлар

аномал босим, тектоник, флюид, геотектоник, тузли тектогениз, тузли шток, оқувчан тузлар, галоген, гидротермал, рапалар, гравитацион ҳаракат, геостатик, буртмалар, ангидритлар, тоғ босими.

Ключевые слова

аномальные давления, тектоника, флюид, геотектоника, солевый тектогенез, солевый шток, текующие соли, галоген, гидротермал, рапы, гравитационные движение, геостатика, складчатые, ангидриды, горные давления.

Key words

anomalous pressure, tectonics, fluid, geotectonics, salt tectogenesis, salt stock, liquid salt, halogen, hydrothermal, rapy, gravitational movement, geostatics, storage, anhydride, top pressure.

Methodology. The article presents a statistical analysis of the results of drilling operations in oil and gas fields based on practical data, studies tectogenetic factors

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and the causes of the formation of salt layers, and shows the need for in-depth study of the geological location of the layer.

Introduction. During the drilling process in oil and gas fields, geotectonic factors cause complications and unexpected accidents, which can delay the commissioning of wells. Such complications occurred in our Republic in the Amudarya rise and in the Bukhara-Khiva regions in Zevarda, Alan, Pamuq, Cholkuvar and other areas and the causes of the accidents are analytically analyzed in the article.

Geothermal conditions in oil and gas fields are one of the main factors in the formation of abnormally high pressure (AHBP). The increase in temperature in the layer is associated with tectonic movements, and the temperature over large areas gradually penetrates from the deep oil layer to the deep layer, causing it to change dramatically. The formation of intrusive massifs, volcano-sedimentary complexes, fracture systems, salt deposits, and catagenetic processes of organic matter increase the temperature of the layer at the boundary of the clear zone and affect the formation of the KAZUB.

The increase in temperature causes the volume of rocks, fluids, oil, gas, and water to expand significantly [1,2]. According to the research data of Bradley D.S., the volumetric expansion of grains of spherically shaped uncemented minerals is approximately 5x10-6 vol. units/0C. The coefficient of volumetric expansion of fluids in the formation (vol. units/0C) is equal to (Table 1).

Table 1

Water	$200x10^{-6}$	Oil	$1000x10^{-6}$
Mineral water	$400x10^{-6}$	Gas (ideal)	$4000x10^{-6}$

Favorable geotectonic conditions play a leading role in the emergence of anomalous high-pressure zones. The most active tectonic conditions are characterized by the Alpine fold region, but they also correspond to very ancient fold regions.

The uneven distribution of sediments causes the formation of high and low pressure layers, which in turn leads to differentiation of processes, as a result of which the force of gravity and vertical pressure act on the plastic mass and direct it to move towards the low pressure zone.

Thostov B.A., studying the causes of the formation of the AYKB, explains that, in addition to mountain pressure, tectonic stress plays a major role in the formation

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of layer energy, and in the place where the greatest stress is concentrated, folds rapidly appear in the arch [3].

Explaining the mechanism of transmission of rock pressure to formation fluid and gas is a complex process, and under normal conditions, rock pressure is absorbed by the formation rock and not transmitted to the fluids. The study of the AQP in oil fields depends on the nature of the geological cut and represents the natural state. Typically, fractured limestones are cut by oil and gas deposits and are covered by silt and other types of plastic deposits.

Salt tectogenesis is widespread in the Amu Darya uplift of the Chorju Plateau and in the Bukhara-Khiva oil belt, as well as in other regions. Salt domes and rock salts play a major role in the formation of oil and gas reservoirs. Such formations are observed in a number of deposits in the pre-Hisar oil and gas zones, in the geological location of the Zevarda, Alan, Pamuq and Cholquvar fields. These deposits are characterized by deformation of sedimentary beds, shearing of salt stocks, active salt intrusion, and simultaneous uplift of layers. The specificity of salt diapirism is that salt deposits are uplifted through the gaps of the sediments above them. Leverson scientifically substantiates his theory of salt plastic flow [6] by stating that the salt itself is deposited in a layer as a highly viscous liquid or plastic substance, which has a fluidity characteristic. This is the case when oil was extracted together with the extracted products during drilling and exploitation at the Kokdumalak field. If we observe the accidents that occurred during the drilling of wells in the Cholkuvar field (in 3 wells), it is observed that in the initial period of the eruption, the gas appears at high pressure, and then the salt mixture comes out.

Result. According to the data of many investigators, there are cases of re-stratification of salt layers in the Upper Jurassic thickness in Surkhandarya and other deposits of Central Asia. The origin of halogen formation under the influence of metamorphic groundwater and deep emplacement has been poorly studied in individual deposits, cuttings, or local areas. The formation of halogen rocks as a result of hydrothermal processes attracts the attention of geologists. In the Almaliq region, under hydrothermal conditions, sulfate and saline rocks form hydrothermal anhydrites in their upper and inner thicknesses [4].

The salt in natural salt deposits is composed of chloride. They are formed by two main processes - evaporation, leaching under surface conditions, and mixing with saline rocks. This mixing also occurs in the sedimentary layer above the surface. The presence of salt water in salt basins causes them to be buried together or to precipitate under the influence of gravity, i.e., salt crystals form layered between the layers (raps). It should also be noted that the rocks quickly become compacted and become impermeable, and compression occurs not only in the

lower layer, but also in the upper layer. If we analyze this idea on the basis of practical data, the mass of rapa penetrates into the bottom part of the layers as a result of the densification of salt layers.

Here, the downward movement of heavy saline waters under the influence of gravitational force is observed. It begins as a result of the formation of a basin and flows rapidly at the stage of salt deposit basins, and the mineralization of saline waters reaches its maximum value. Due to the paucity of investigational data on gravity motion, it is practically ignored. Systematic study of these problems was started in 1938 by Moscow State University (MGU). The research data shows that the highly mineralized waters are located on top of the less mineralized waters and their redistribution according to their specific gravity occurs. The heavy liquid flows down and the light liquid flows upwards. Such displacement is called gravitational flow movement. It was found that the redistribution of water of different specific gravity occurs isochorically, which does not change in volume. It occurs both vertically and obliquely in the impermeable surface layer. Flow-gravitational movement occurs in a water system of static and gravitational pressure due to a pressure difference, which causes a downward movement due to a difference in specific gravity. As a result of the redistribution of water, the solutions mix, and the salt water that flows down is more salty than the previous one. As the difference in specific gravity increases, as the permeability and slope of the rock increase, and as the viscosity of the solution decreases, the rate of gravitational descent increases.

Under the influence of gravity, a heavy stream forms a conical flow as it descends. The salt water flows over the surface, if it is flat or sloping, it flows through it, and if it is sloping, it collects on it.

The connection between the streams is broken, the conical flow gradually flattens, the most concentrated waters accumulate at its base. As a result, saline waters occupy the lowest position in the system. When the heavy flow reaches the impermeable layer, the connection is broken, and saline water, in the form of an elongated drop with maximum internal mineralization, reaches the impermeable layer and again occupies the conical flow. Thus, depending on the source, the gravitational flow of saline water continues for a long time and its speed, the presence of impermeable layers, and the formation of a straight or reverse vertical hydrochemical zone. The depression in the upper part is filled with a mixture of $CaCl_2$ and a highly soluble solid salt is added to the bottom. A vertical flow of heavy water appears beneath the saltwater source. The layer covered by fresh water gradually bends under the influence of the heavy water flow, turning into a linear flow, and finally the water in this layer is compressed around and upwards

[5]. The conical fresh water flow rises upwards, and then the saltwater upwelling occurs.

The presence of silty layers reduces the rate of mixing. In this case, saltwater flows through the silty surface and quickly penetrates the silt. In this case, the flow penetrates into pores and cracks, and contact between saltwater and silt occurs. The Upper Jurassic salt layer is distributed over a large part of the territory of Central Asia. The Bukhara-Khiva-Murgab uplifts are characterized by glybo-block tectonics. The basement blocks are separated by ancient fracture zones, most of which are located far from the drilling zone.

The salt-bearing areas of the Mesozoic shear zones of Khiva-Bukhara-Murgab and Afghanistan, Tajikistan at low altitudes are similar to the lithological features of the South-West-Hissar. Platforms on the South-West-Hissar and Beshkent folds, conducted in recent years, show that in the middle part of the shear zone there are red anhydrites, interspersed with pear-shaped dolomites. This type of anhydrite occupies a very large area. The thickness of the salt dome varies from 10–30 m to 100–120 m. The rock salts are gray, with layers of anhydrite, mud, and in some places, potassium salts. This process is very interesting, since under normal conditions the density of rock salt is 2.2 g/cm^3, but it remains unchanged even when the pressure of the overlying rocks increases. In all cases, it is observed that the rock salt does not actively penetrate the sedimentary beds. The important point in establishing the order of occurrence of the AQQB is that rock salt and other salts are sheared by permeable fractured rocks located in the stratum. Due to its high plasticity, rock salt, due to its high plasticity, is partially or completely squeezed out of the zone of structural gaps under the influence of geostatic pressure and is directed to migrate to the uplift arch. Therefore, the thickness of rock salt is minimal in the interstices of the formations, and maximal in the vaults of the uplift. For example, if we consider the Zevarda, Pamuk and Chulkuvar gas condensate fields, the Jurassic fractured limestones are connected with reef massifs, covered with a large thickness of rock salt and anhydrites.

Such a thickness of the rock salt layer in the Zevarda mine is 2600 to 2950 m, and the angdrite layer is 2774 to 3000 m. In the Pamuk field, the rock salt layer is between 2400 and 2600 m, and the anhydrite layer varies along the elevation, sometimes starting from 2630 meters and continuing to 2700-2900 meters. In the Cholkuvar field, the rock salt layer of this thickness is from 2850 to 3375 meters, and the anhydrite continues to a depth of 3430 meters. Salt formations are in soft and hard states, and the formation pressure is expected to be 25.5 MPa. During the drilling of well No. 10, the density of the washing solution was 1.32-1.37 g/cm^3. Because the pressure in the tectonic zone of the layer was around 63.0 MPa, it

caused the accident. Such tectonic compression piles with high anomalous pressure also occurred during the drilling of the Zevarda mine. In such deposits, the shale gas was in contact with the rock, and its plasticity was due to contact with the salinity rock, its settlement under the influence of geostatic pressure, and the underlying gas deposits were covered with cracks, which directly transferred the rock pressure to the gas plume. During drilling, abnormally high pressure is directed towards the wellbore when a fracture is opened. This mechanism of rock pressure transmission and the occurrence of a BOP is one of the most common cases. The plasticity of the salinity in the formation, their fluidity complicates the process of drilling wells and requires the use of heavy washing solutions. It also creates counter pressure and prevents deformation of the salinity layer.

Conclusion. The effective conduct of drilling operations in oil and gas fields requires prior study of geotectonic factors and the causes of salt tectogenesis and optimal assessment of the drilling process and the basis of the composition of the solutions based on the geological conditions of the formation have been shown to prevent accidents, and the results of analytical information can be used in practice.

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