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Petrophysical Features of The Rocks of The Pliocene Deposits of The Oil and Gas Bearing Region of The Nizhnekurinskaya Depression

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Abstract

In the article was showed complexes results of petro physical testing sample of rocks from taken digging prospecting-development wells from areas of the Lower Kura Trouth which are widen productive unit sediments. Defined the collectors characteristics of rocks.

Shows the results of generalization, the analysis and the interpretation of collectors researches more than a thousand samples of sedimentary and magmatic rocks from taken deep exploration wells in the Lower Kura Trouth under high atmospheric pressures and temperatures.

For restoration the physical properties as a result of elastic deformations have been investigated the lithological difference of rock samples from the area of Lower Kura Trouth. Researches have shown that the physical properties of single-nominal and single-old rocks are changed and have different values in the result of geological-physical processes.

Keywords: Petrophysics, Density, Propagation of Ultrasonic Wave, Porosity, Wells, Deep, Oil, Collector, Pressure, Deformation.

The paper presents the results of complex petrophysical studies of rock samples, Meso-Cenozoic sediments taken from drilled prospecting wells and geological material from the areas of the Nizhnekura depression in the oil and gas region, where deposits of the productive strata are widespread (PT-Lower Pliocene) and their reservoir properties are determined. The studies were carried out under atmospheric and thermodynamic conditions.

In recent years, when repeated treatments are carried out, taking into account such qualities as anisotropy of rocks, degree of mineralization, the influence of geodynamic processes occurring in the region, formations estimated as aquifers during primary treatment were predicted as oil-bearing, and perforation and sampling works confirmed the conclusions obtained in reprocessing.

The study of the material composition, structure and physical properties of rocks at different depths of the earth's crust using superdeep drilling opens up great prospects for the development of methods for reliable geological interpretation of the results of seismic and other methods of geological and geophysical research.

The article presents the results of complex petrophysical studies of rock samples taken from exploration wells drilled in the areas of the Nizhnekurinskaya depression, where deposits of the productive strata are widespread and their reservoir properties have been determined.

It is known that rocks in natural conditions of occurrence at great depths are subjected to the action of forces caused by various physical and chemical phenomena. The main ones are: pressure in the pore space of rocks; temperature that increases with increasing depth of rocks.

The results of generalization, analysis and interpretation of reservoir studies of more than thousand samples of sedimentary and igneous rocks from deep exploration wells in the Nizhnekurinskaya depression at atmospheric and high pressures and temperatures are presented [1,2].

In rocks during epigenesis, under the influence of pressure and temperature, mineral substances dissolve and during their rejuvenation in the pore space, which causes an increase in density and a decrease in porosity. These changes in physical properties are associated with irreversible epigenetic transformations in the pore space of the reservoirs during the formation of rocks. Thus, by studying certain physical properties of rocks after their remov-

al to the surface, we observe the results of irreversible epigenetic changes.

During drilling, reversible (elastic) deformations occur in rocks while carrying core samples to the surface.

Studying the physical properties of cemented rocks under relatively short-term comprehensive compression (if the stress does not exceed the elastic limit), we can judge about changes in the properties of rocks that occur mainly as a result of elastic deformations, which in this case is of subordinate importance, although in the study of some highly clayey and carbonate reservoirs, they have to be taken into account. Elastic deformation studies help to get a better understanding of the physical properties of rocks at the depth from which they are extracted to the surface, compared to the determination of properties on cores in atmospheric conditions.

In addition, the results of these studies are of great importance for determining elastic changes in reservoir properties of formations in the process of field development. To restore the physical properties of rocks in relation to the natural conditions of bedding, or, in other words, to study changes in physical properties due to elastic deformations, we studied various lithological differences in rock samples from the areas of the Nizhnekurinskaya depression (Kyursanga, Garabagly, Pirsagat, Kyurovdag). The names of the samples, coring wells, intervals of occurrence, as well as some physical parameters are given in the table [3-5].

In the Kursanga area, as well as in other areas, studies were carried out from the PT to the ancient Caspian sediments, inclusive. It is noted that the PT carbonate clay rocks underwent strong equidistant variability, which significantly influenced their physical properties.

Studies of the porosity and density of sedimentary rocks under conditions of all-round pressure showed a rather noticeable change in these parameters, which must be taken into account when interpreting the geological and geophysical.

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Studies of the porosity and density of sedimentary rocks under conditions of all-round pressure showed a rather noticeable change in these parameters, which must be taken into account when interpreting geological and geophysical materials.

In the pressure range up to 60 MPa, corresponding to a depth of 5-6 km, elastic changes in the pore volume reach 30-50%.

With an increase in the total pressure to 60 MPa, a change in the absolute values of the porosity of sandstones and siltstones is observed. A characteristic feature of the change in porosity from pressure is the maximum gradient in the pressure range up to 20 - 30 MPa, followed by its decrease to almost zero at high pressures above 60 MPa. The minimum relative change in the porosity coefficient is typical for weakly clayey varieties of sandstones and siltstones with high initial porosity. The maximum relative change is characteristic of strongly clayey rocks with low initial porosity [6,7].

Samples of the productive strata of different areas are represented by fine, medium-grained sandstones containing fragments of quartz, feldspars, microquartzites and micaceous chlorite rocks. The fragments are cemented with carbonate and chlorite cement of the porous-basal type.

Paired relationships were established between physical parameters for individual varieties of rocks, relationships between physical properties and material composition, showing their closeness to a linear relationship with a high tightness of connection [8]. The studies were carried out in atmospheric and thermodynamic conditions.

Studies show that the physical characteristics of rocks of the same age and of the same name change as a result of geological and physical processes, leading to different results. The reservoir properties of the PT rocks were studied. A table has been created that reflects their physical properties of a given area in time and space, as well as various types of geological features of reservoir rocks and the pattern of their distribution.

As a result of the analysis and interpretation of geological-geophysical and petrophysical materials, it was found that oil and gas reservoirs are mainly sandy-clayey, fractured volcanic-sedimentary and carbonate rocks. The results of studying many thousands of core samples from various deep wells, correlated with the data of production geophysics, have been described in detail earlier.

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