## INVESTIGATION OF COMPLEX GEOLOGICAL STRUCTURE FEATURES OF CARBONATE RESERVOIR AND ITS TYPING ON THE OILFIELD EXAMPLES

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The aim of the work is to consider and typify the carbonate reservoirs of the Volga-Ural oil and gas province of the Orenburg region using the example of Ananyevskoye and Baklanovskoye fields.

The object of the research is the productive interval of the tourney-timan.

Paleogeography

The Volga-Ural oil and gas province occupies the eastern part of the Russian platform, stretching from the Baltic Sea in the West to the Ural Mountains in the east. In the north, the boundary is the Timan uplift, in the south - a sharp scarp, common with the northern edge of the Caspian basin. [one]

Geology

In the section of the Paleozoic productive complex on the territory of The Volga-Ural oil and gas province, a large number of productive strata are established, composed of terrigenous and carbonate rocks. The study of the reservoirs was carried out on the basis of core data and geophysical data (GIS). The lithological features and reservoir properties of the Upper Devonian and Tournaisian deposits are associated with the development at this time of the troughs of the Kama-Kinel system and adjacent parts of the Zhigulevsky and Tatar arches that were not compensated by sediments. [2] An important role in the formation of reservoir properties due to permeability and secondary porosity was played by repeated breaks, accompanied by erosion of carbonate rocks.

According to the core and logging in the Upper Devonian strata, layers are identified, composed mainly of limestones, less often of limestone dolomites. Limestones of pelitomorphic, crystalline and organogenic structures, sometimes fractured with secondary calcite along fractures. The reservoir properties of these deposits are low.

Reservoir typification based on field examples.

1. Ananievskoe.

The productive strata of the Tournaisian stage are associated with undivided carbonate deposits, represented by gray, dark gray limestones, recrystallized to varying degrees, clay interlayers, organogenic detrital, dense. Formations T2 '+ T2 and T1 are distinguished. Layer T1 is composed of cavernous, porous, fractured limestones. Formations T2 '+ T2 are represented by porous and cavernous limestones.

The sediments cover the relief of the Fansko-Famennian period like a cloak. The accumulation of sediments took place on a shallow shelf. The sediments formed under these conditions are distinguished by the uniformity of lithology, the consistency of the total thickness of the reservoir, and the correlability of the reservoirs.

Sediments of the Upper Devonian are represented by mudstones, siltstones, gray, dark gray, micro-fine crystalline limestones. The dependences of permeability on porosity were plotted for the Tournaisian carbonate reservoir (Fig. 1).

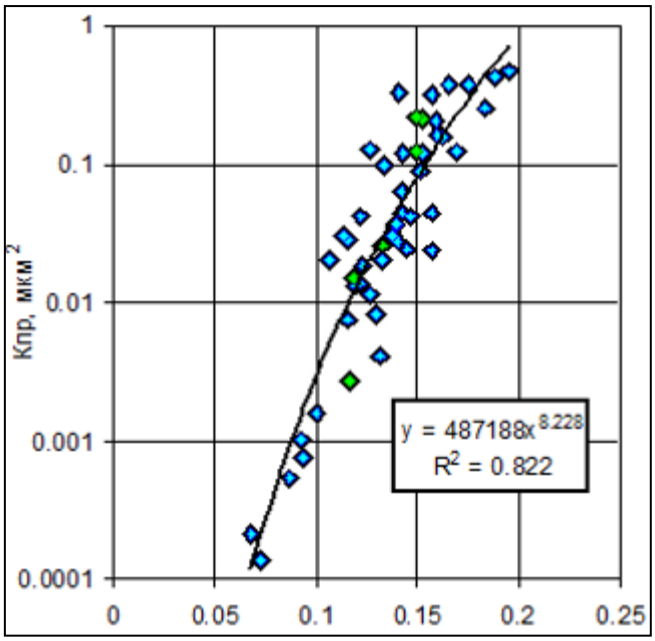


***Fig.1 Dependence of porosity on permeability for the Tournaisian strata of the Ananievskoye field***

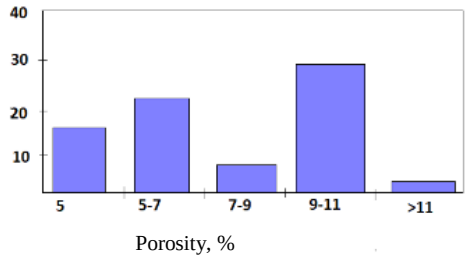


***Fig.2 Distribution of porosity in the productive interval***

Porosity and permeability of carbonate deposits vary from 5.0% to 11.2% and from 0.01mD to 96mD.

2. Baklanovskoe

The Tournaisian stage is represented by limestones and dolomites, irregularly sulfated. Productive strata T1 and T2 are identified in the limestone strata. Seams T1 and T2 are represented by alternating dolomites and limestones of varying degrees of dolomitization, sometimes clayey, of small thickness and separated from each other by a pack of compacted, low-permeable rocks. The beds are composed of cavernous-porous limestones, dolomitized to varying degrees, alternating with compacted varieties. The deposits of the Upper Devonian are represented by limestone dark gray and gray with a brown tint, dense, strong, with comminuted fracture. The dependences of permeability on porosity were plotted for the Tournaisian carbonate reservoir (Fig. 3).

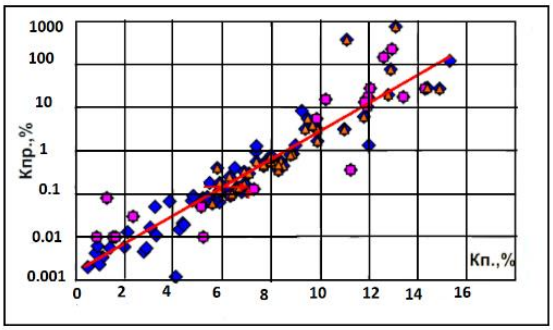


***Fig.3 Dependence of porosity on permeability for the formations of the Tournaisian age of the Baklanovskoye field***

Capacitive properties vary in a wide range (from 0.7% to 7.0% according to core study data). The uneven vugs and fractures of the carbonate reservoir in the Tournaisian-Timan interval were highlighted in the core description. Thirty-six core samples were examined. In general, the porosity and permeability of carbonate deposits in the samples representing the effective reservoir capacity T1 + T2 vary from 7.0% to 15.3% and from 0.03 mD to 122.31 mD. The weighted average values of the porosity coefficient over the effective thickness - 10.5%, permeability - 11.8 mD. Figure 4 shows the distribution of porosity.

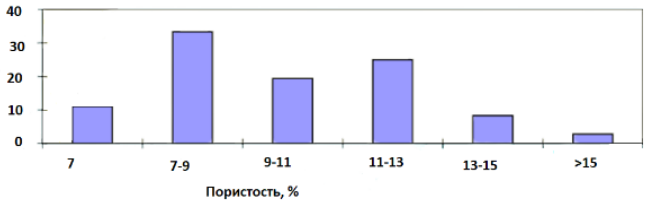


***Fig.4 Distribution of porosity in the productive interval***

References

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