

ABNORMALLY LUMINESCENT LAYERS IN THE BAZHENOV FORMATION OF THE WEST SIBERIAN BASIN

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The study in core of wells drilled in the sediments of the Western Siberian basin and, in particular, the Bazhenov formation is accompanied by photography of the core under ultraviolet light to determine the presence of hydrocarbons (HC), which are known to luminesce when irradiated with UV light.

As a result, in the core of the Bazhenov formation abnormally luminescent layers (ALL), mostly of clay composition were discovered. Their thickness is from several mm to 1 cm (Fig. 1) (Deeva, 2017). Selected layers have been stated in many wells in Tomsk Oblast and Khanty-Mansiysk Region. Earlier established interlayers have not been examined, which conditions the relevance of this study.

The aim of the research is to study the composition of the abnormally luminescent clay layers.

The main objective of the research is to study comprehensively the composition of the clay fractions of luminescent layers and the nature of the luminescent. Samples from selected areas were investigated by X-ray diffraction and petrographic analysis.

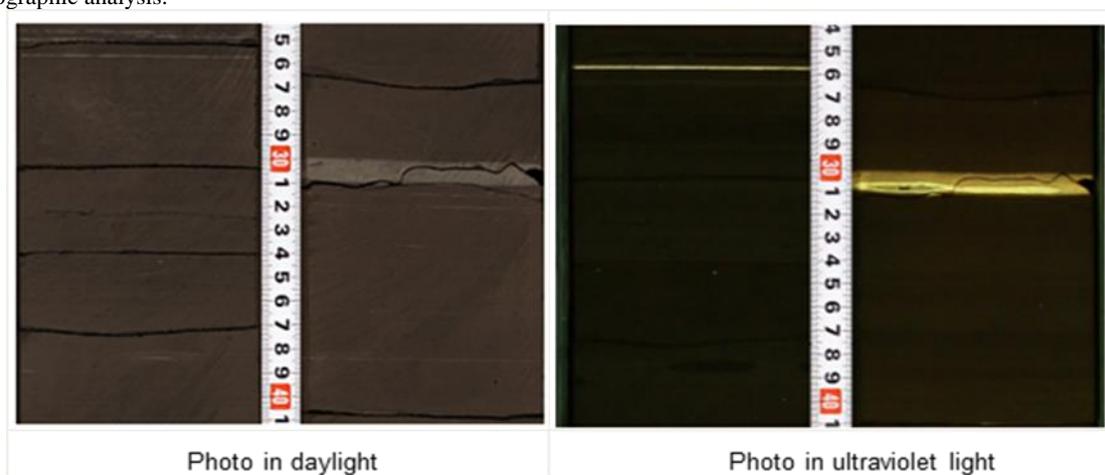


Fig. 1 Abnormally luminescent layers in the rocks of the Bazhenov formation.

At first, character and the nature of the luminescence were either associated with the oil-saturation or possible presence of the carbonates in the rocks. According to the results of x-ray analysis, content of carbonate minerals does not exceed the impurity content (no more than 5%) in the samples and cannot be a reason for the glow.

To determine the exact composition of rock clay fraction from the layers with abnormal luminescence we carried out x-ray analysis. The analysis of the clay from rocks has revealed the following composition: kaolinite and illite. We noticed a slight shift from the original location of illite on diffractogramme. According to reference data the first basal reflection at 9.98 Å is typical for illite, whereas that received by us is 11.3 Å, which suggests the alteration of the illite crystal lattice. A detailed study established the presence of the group of mixed-layer minerals illite–smectite. To examine the mineral framework of rocks from samples with anomalous luminescence under UV light, petrographic analysis of one of the samples was carried out. Microscopic description of the studied contact rocks showed the presence of typical Bazhenov Suite argillites and the ALL. It is also typical the absence of organic matter for the rocks of the studied ALL.

Thus, the layers with abnormally luminescent glow under ultraviolet light were detected in many wells in Tomsk region. The results of the research showed that layers are primarily composed of clay minerals, and contain no hydrocarbons. The nature of the luminescence is not associated with the presence of carbonate minerals or saturation of the rock, and presumably associated with mineral compounds in the composition of the mineral.

According to the preliminary data, the nature of the ALL formation is referred to volcanic.

References

1. Deeva E.S., 2017. Nature of abnormally luminescent layers in the the Bazhenov formation of the West Siberian basin //Proceeding of the 20 st Interntional Scientific symposium of students, postgraduates and young scientists of the name of academic Usov, Part 1, 860 p., (In Russian).