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Comparative characteristics of the mineralogical composition of Ti-Zr potential placer district

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Russia has a great off-balance reserves of TiO_2 and it is ranked fourth in the world after Ukraine, China and Australia. Inferred resources are also very significant. But today Russia produces titanium products only from imported raw materials. Exploration of Ti-raw material is carried out in Russia only as passing on comprehensive deposits.
As a result of work conducted in 1959, Stavropolsky elevation was discovered Stavropolsky Ti-Zr alluvial basin. The same mineralogical composition has Ti-Zr Ergeninsky potential alluvial district, which is located north-eastern of Stavropolsky littoral basin.
Administratively, Ergeninsky area, basically, covers territory of Kalmikia, and partially Rostovsky and Volgogradsky area. In terms of tectonics, it occupies an area of the junction of the East European platform and Karpinsky Ridge. Alluvial basin holds really magnificent range.
There are two hypotheses as to where was the demolition of ore sand. According to the first demolition of the original ore material was from crumbling crystalline rocks southern East European platform. The second hypothesis links the formation of these placers due to the erosion of crystalline basement rocks of the Greater Caucasus, which is explained by the fact of the existence of the Sarmatian paleo sea.
There are two productive horizons on the territory of Ergeninsky potential placer district.
First - the lower productive horizon it has a capacity of 1.5 to 6.3 m and the total content of titanium and zirconium minerals 12 to 66 kg \ m^3.
Second – upper productive horizon. 1.5 to 4.3 m and the total content of titanium and zirconium minerals from 21 to 50 kg \ m^3.
Earlier in the study of the area, only samples from the upper productive horizon were considered.
At the beginning petrophysical analysis of all available samples, was conducted. Before you choose a basic test, each of the 26 studied several petrophysical properties:
1. Magnetic susceptibility (κ, 10-5 units. C)
2. The density (d, g / cm3)
3. The dielectric constant (ε)
4. The electrical resistivity (, Mom * cm)
We composed a system of five equations, which helped us to determine the content of the basic minerals placers: leucoxene rutile, ilmenite, magnetite and zircon. The calculations were performed on the system, of the following equations:
d (sample) = d1 * V1 + d2 * V2 + d3 * V3 + d4 *V4 + d5 * V5 ;
κ (sample) = κ 1 * V1 + ... + κ 5 * V5;
ε (sample) = ε 1 * V1 + ...+ ε 5 * V5;
(sample) = 1 * V1 + ...+ 5 * V5 ;
1 = V1 +V2 + V3 + V4 +V5
Then, with these results collected, we substitute them into the system and calculates the average content of essential minerals in the samples.
Summarizing the research, a table showing the relationship between the weight fractions and mineral contents is prepared. In the future, we need to examine more closely the nature of the formation deposits, to define all the details of the formation of placers.