

CRM of Ukraine Database Supplements

Mineral target:	Livoberezhne deposit
Commodity:	Titanium ores

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Location: Khoroshiv district, Zhytomyr region, at a distance 21 km to the northwest from the Irshanskiy GZK, in the basin of the middle course of the Irsha river (left tributary of the Teteriv river), which surrounds the western part of the Volodarsk-Volynskiy massif of ilmenite gabbroid rocks in this column. The deposit is adjacent to the Irshanske Water Reservoir.

Research: The Livoberezhne deposit was discovered in 1965, detailed exploration was carried out by the Zhytomyrska Expedition in 1969-72. As a result of the works, the reserves of raw materials, which were to be used for the production of titanium dioxide by industrial categories, were calculated and approved (protocol of the State Committee of the USSR dated 29.05.1973 No. 6903). In 1986-87, the Irshanskiy GZK carried out preliminary exploration of the Livoberezhne deposit in order to prepare it for development and complex use of enrichment products.

Geological characteristics. Geostrurally, the deposit is located in the northwestern part of the Ukrainian Shield, within the Volodarsk-Volynskiy massif of the mafic rocks of the Korosten pluton. Precambrian magmatic and metamorphic formations, weathered crust, and Mesozoic and Cenozoic sediments are involved in the geological structure. The Livoberezhne deposit is located in the immediate vicinity of the Katerynivskiy placers, the northeastern part of which adjoins the drainage landfills of the Verkhnyo-Irshynske deposit. Almost all crystalline rocks contain titanium minerals, the main one of which is ilmenite. There is a certain regularity in the distribution of ilmenite – the most ancient (Lower Proterozoic) rocks are enriched among the metamorphic complexes; in igneous rocks, the titanium content increases from ancient to younger - Upper Proterozoic (gabbro, gabbro-norites, diabases). However, ore inclusions in them do not form industrial concentrations; these rocks are the main feeding source for industrial placers. Two genetic types of placers have been established: eluvial and alluvial-deluvial. By the spatial location of their sources, both types belong to the group of local placers. Eluvial placers are associated with the ancient weathering crust of the mafic rocks. Industrial placers of ilmenite are confined to the crust of melanocratic varieties of gabbroids. The concentration of titanium-bearing minerals in some areas reaches 263.8 kg/m³. Among the alluvial-deluvial placers, two groups of different ages are distinguished: Mesozoic and Quaternary. The groups are associated with erosion relief forms (dismembered valleys, gullies), which were formed during the Meso-Cenozoic regressive cycles. Mesozoic placers are the richest in terms of ilmenite content (70-200 kg/m³) and the largest in reserves of ore sands. They are covered by a continuous cover (5-15 m) of younger sedimentary deposits and do not stand out in the modern terrain. Quaternary placers are much poorer (30-50 kg/m³), formed by erosion of ancient ilmenite deposits and weathering crust of rocks of the main series. The alluvial-deluvial part of the deposit is limited to a series of shallow depressions of a complex configuration, as a result of which the ilmenite-bearing deposit is represented by several separate areas - blocks. The thickness of the layer varies from 1 to 15 m, on average it is 4.6 m. The absolute marks of the bottom of the deposit fluctuate within 182.0-186.0 m. The productive layer of the deposit is mainly characterized by sands of different grain sizes (66%). Sandy loams and loams make up only 5.5%, sandy secondary kaolins make up 2.5%; the weathering crust occupies 26% of the total volume of the ore mass. The content of ilmenite in the ore sands ranges from 46 to 86 kg/m³ in the blocks, on average in the alluvial part of the deposit it is 61.0 kg/m³. In addition to ilmenite, accompanying minerals were also found in the sands of the Livoberezhne deposit, such as: leucoxene (2.77 kg/m³), rutile (0.18 kg/m³), zircon (0.29 kg/m³), apatite (0.74 kg/m³), titanomagnetite (0.06 kg/m³), staurolite, siderite, pyrite. The chemical composition of ilmenite by major elements is as follows: content of titanium dioxide - 54.0%; iron oxide (III) - 19.3%; iron oxide (II) - 19.9%. The ilmenite-enriched weathering crust occurs in the form of separate areas, in total it makes up 36% of the area of the alluvial part of the deposit. It is represented by kaolinized rock - gruss: the average yield of the granular fraction in the weathering crust is about 40%. The average thickness of the productive kaolins in the estimation blocks is equal to 4.5 m at 87.8 kg/m³ of ilmenite content. Ilmenite grain size is similar to ilmenite from sands, but at the same time, the

degree of leucoxenization is lower - the average content of titanium dioxide is 51.86%; iron oxide (III) - 11.17%; iron oxide (II) - 32.34%. The conducted technological tests established that the sands and the underlying ilmenite-bearing crust of weathering are enriched according to the gravity scheme with the finishing of the rough ilmenite concentrate by wet magnetic separation. Extraction of ilmenite in the concentrate is 82-89% from the original ore, while its content in the commercial product is 96-98%. As a result of the tests, the suitability of the ilmenite concentrate for the production of high-quality pigment titanium dioxide was established.

Hydrogeological conditions are characterized by the presence of two aquifers: Middle Quaternary hydroglacial sediments and Neogene-Lower Quaternary alluvial sediments, with a total average thickness of 9 m. The depth of the underground water level varies from 2.0 to 3.0 m. Filtration coefficients range from 0.08-0.22 to 11.1-38.2 m/day. The maximum water inflow into the pit is 390 m³/day.

Information about mineral resources and reserves is confidential.