



CRM of Ukraine Database Supplements

Mineral target:	Verkhnyo-Irshynske deposit
Commodity:	Titanium

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Location: Zhytomyr region, Zhytomyr district, the nearest railway station is Nova Borova. The deposit is connected with the Irshynskiy GZK and the village of Irshansk by asphalt road.

Research: the Verkhnyo-Irshynske deposit was discovered in 1964 by the Zhytomyrska GRE of the "Kyivgeologiya" Trust during geological prospecting for titanium. The deposit was explored with shock-wire drilling wells along lines oriented across the extension of the ancient valley, on a grid of 200x40 m in the contour of reserves of category B, 150-300x40-80 m in the contour of reserves of category C1. The northwestern part of the placer was explored on a grid of 350-400x80-160 m in the outline of reserves of category C2. The southeastern flank of the placer, near the reservoir, was not explored due to flooding. The reserves of titanium ores are approved by the protocol of the GKZ of the USSR dated September 6, 1967 No. 5222.

In 1969-1972, the Zhytomyrska Expedition carried out a detailed exploration of placer titanium deposits, the reserves were approved by the protocol of the GKZ of the USSR No. 6903 dated 05/29/1973.

Geological characteristics: the Verkhnyo-Irshynske titanium ore deposit is located in the western part of the Volodarsko-Volynskiy gabbro-anorthosite massif, in the basin of the upper reaches of the Irsha River. The geological structure of the deposit includes the mafic rocks of the Proterozoic, the weathered kaolin crust of the Paleozoic-Mesozoic age, and the sedimentary formations of the Mesocene, which are represented by alluvial-deluvial deposits of the Lower Cretaceous, lower Quaternary alluvial, middle Quaternary hydro-glacial and glacial, upper Quaternary and modern alluvial deposits.

The placer deposit of ilmenite is associated with Mesozoic alluvial and alluvial-deluvial deposits, which lie in ancient overlain valleys (not coinciding with the modern hydro-network) on the kaolin crust of the weathering of the mafic rocks. The source of ilmenite feeding in placers is the mafic rocks of the Volodarsko-Volynskiy massif and their weathering crust. The Verkhnyo-Irshynskiy placer is located in the junction of the left tributaries of the Irsha River - the Radych and Stebnytsia streams. In the northwest, it is combined with the Katerynivskiy ilmenite placer, the reserves of which were approved by the GKZ in 1959 under the C2 category, in the southeast, it directly adjoins the shoreline of the reservoir on the Irsha River.

The explored length of the placer is 2,750 m, the width varies from 476 to 1,552 m. The productive layer consists mainly of Lower Quaternary, rarely Lower Cretaceous and Middle Quaternary sands of various grain sizes, sometimes with lenses of clay rocks. The thickness of the sand layer varies from 1 to 15 m, with an average of 5.3 m. The productive layer of peat is covered by sandy loam, clay, and sand with a total thickness of up to 18-20 m, with an average of 9.5 m.

The main titanium-bearing mineral is ilmenite, the content of which in the layers varies from 25 to 72%, with an average of 45%. The sizes of ilmenite grains are less than 2 mm, including the yield of fractions: 2+0.6 mm – 18.4%; 0.6+0.2 mm – 57%; less than 0.2 mm – 24.5%.

In the productive layer, the content of ilmenite varies in blocks from 52 to 84 kg/m³ (in individual samples up to 250 kg/m³) and on average in the placer is 57.8 kg/m³. Approximately 8% of the indicated amount of ilmenite is leucoxenized ilmenite. In addition to ilmenite, small amounts of leucoxene, rutile, zircon, apatite, titanomagnetite, staurolite, siderite, and pyrite are found in the placer.

According to the chemical analyzes of the samples, the total content of titanium dioxide in ilmenite and leucoxenized ilmenite is 53.5%, chromium dioxide - 0.027, phosphorus pentoxide - 0.037, manganese oxide - 0.48, vanadium pentoxide - 0.23, iron – 16.82, iron oxide – 27.96, silicic acid – 0.91, alumina – 0.42%.

The content of ilmenite in placer peats is on average 6.8 kg/m³ with a variation in blocks from 4.6 to 10.1 kg/m³, and in the contour of the calculation of off-balance sand reserves above the productive layer from 4.6 to 23.7 kg/m³ (with a reservoir thickness of 1.5 to 3.8 m). Placer bottom is composed of

weathered kaolin crust, mostly compacted primary kaolins, the upper part of which has been washed and redeposited. The content of ilmenite in the weathering crust varies from 1 to 200 kg/m³ and is 40-50 kg/m³ on average per block with a thickness of 2.2 to 7.0 m per block.

According to the complexity of the geological structure and the nature of the distribution of the useful component, the deposit belongs to the second group.

The hydrogeological conditions of the deposit are characterized by a highly watered productive sequence. One aquifer is developed in the deposit, confined to a complex pile of Quaternary sediments, with a thickness of 10 to 17 m, an average of 10.9 m. The depth of the groundwater level varies from 6.8 m in the northwestern part of the field to 0.5-1 m in the reservoir area. The minimum amount of groundwater that can flow into a pit 20 m deep is approximately 58 m³/hour, and taking into account the influence of the reservoir - about 115 m³/hour. The productive layer is below the water level in the reservoir, and when the spill is worked out with a dredge, the level in the pit will be regulated by pumping water from the reservoir into the dredged landfill. The chemical composition of groundwater is suitable for drinking water supply.

The mining and technical conditions for the development of the deposit are complex. Off-balance reserves include reserves of alluvial sands in the sides of the placer, in peats - above the industrial layer, as well as in kaolins of the weathering crust - in the roach of the placer. But off-balance placer reserves were excluded from the calculation due to difficult mining conditions. When working out the placer with a dredger, the calculated off-balance reserves of alluvial sands, which are located above the productive layer, will fall into the dump together with peats, and the off-balance reserves of primary kaolins will end up under the dredged dumps and are unlikely to be of industrial interest.

The lower part of the placer is under the building of the Kropyvenko village, therefore, the economic feasibility of developing this part of the placer requires special technical and economic calculations.

The Verkhno-Irshinskoe titanium ore deposit was exploited from 1974 to 2004. Ilmenite-bearing sands and ilmenite-bearing weathering crust were developed.

Information about mineral resources and reserves is confidential.