



CRM of Ukraine Database Supplements

Mineral target:	Malyshevske deposit
Commodity:	Titanium ores

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Location: within the borders of Verkhnyodniprovskiy, Pyatykhatskiy and Krynychanskiy districts of Dnipropetrovsk region.

Site area: The deposit occupies an area of 47 km².

Research: Prospecting work on the Malyshevske (until 1973, Samotkanskiy) zircon-rutile-ilmenite deposit was carried out in 1955-1958 by the Pravoberezhna GRE of the Ukrainian Geological Administration. Reserves of ore and useful components were approved by the decision of the State Committee of the USSR (No. 2553 dated 20.01.1959). Since 1964, the Vilnogirskiy GZK has been operating on the basis of the deposit. In 2004 reserves of sands of Sarmatian and Poltavskiy age in the Central and Eastern areas were reassessed (protocol of the DKZ of Ukraine No. 828 of February 25, 2004). In 2006, the reserves of the Motronivsko-Annivska section were calculated and approved by the DKZ of Ukraine (protocol of the DKZ of Ukraine No. 1090 dated 17.03.2006). In addition to reserves of titanium dioxide and zirconium, reserves of tantalum pentoxide, niobium, vanadium, hafnium dioxide, scandium trioxide, disthene and sillimanite, staurolite, foundry sands have been confirmed at the deposit. In 2009 a geological and economic assessment of ore sand reserves of the Sarmatian layer of the Eastern section of the Malyshevske placer deposit was carried out (protocol of the DKZ of Ukraine No. 1995-DSK dated 06.03.2010). In 2015, a geological and economic assessment of the Western, Central, Eastern, Motronivsko-Annivska and North-Western sections of the deposit sections was carried out with the approval of reserves of the DKZ of Ukraine (protocols dated 01.29.2015 No. 3306, No. 3307). In 2019, a detailed geological and economic assessment of reserves of zircon-rutile-ilmenite-bearing sands of the Motronivsko-Annivska and North-Western sections was carried out (protocol of the DKZ of Ukraine dated 12.20.2019 No. 5000-DSK). In 2020, a repeated detailed geological and economic assessment of the reserves of the Western, Central and Eastern sections was carried out with the approval of the reserves of the DKZ of Ukraine (protocol dated November 19, 2020 #5196). In 2021, a geological and economic assessment of the Western, Central and Eastern sections was carried out with the aim of increasing the volume of mineral extraction due to the expansion of the boundaries of the granted subsoil section as of 01.01.21 (protocol of the DKZ of Ukraine dated 08.30.2021 No. 5365).

Geological characteristics. The work area is located in the northern depression of the central part of the Ukrainian Shield.

Ore-bearing sands are confined to coastal-marine sandy deposits of the Sarmatian stage of the lower Neogene and sandy deposits of the Poltavska Series of the lower Neogene - upper Paleogene.

In terms of reserves of titanium dioxide and zirconium dioxide, this is the largest placer deposit in Ukraine, and it is unique in terms of the presence of useful components. The deposit has a length of about 18 km and it is divided by the branches of the Samotkan River into three separate sections: Eastern, Central and Western and, as a continuation, North-Western and Motronivsko-Annivska.

The productive layer is represented by fine-grained sands of the Sarmatian stage and fine-grained sands of the Neogene Poltavska Series. The average thickness of the industrial sands of the Sarmatian layer by deposit is 7.9 m, the average depth of the productive sequence is 24 m. The ore sands are homogeneous, the heavy fraction is represented mainly by ilmenite, rutile, zircon, leucoxene, in smaller quantities disthene is present in the sands, sillimanite, tourmaline and other minerals.

The lower part of the ore horizon with a thickness of 3-6 m contains 1-5% of heavy minerals, the middle part with a thickness of up to 5 m contains from 5 to 15 and more percent of heavy minerals (high-grade ores), the upper part with a thickness of 4-7 m contains 1-5% of heavy minerals.

Greenish-gray Sarmatian clays and Quaternary red-brown clays, red-brown and loess-like loams, soil-plant layer (overburden) lie on the productive sands.

Content of heavy metals in placers: ilmenite - 30-37%, rutile - 13-18%, zircon - 8-12%, disthene-sillimanite - 8-12%, staurolite - 6-16%, tourmaline - 3-4%, chromite and chrome spinel – 1%, monazite <

1%. In the heavy fraction of the Poltavskiy horizon, ilmenite makes up 40-45%, rutile - 15-20%, zircon - 4-5%.

The most common titanium mineral in the deposit sands is ilmenite. The TiO_2 content in ilmenite ranges from 59.87 to 67.95% (63.02% on average). Content in ilmenite: Fe_2O_3 – 26.82%, TiO_2 – 0.89%, Al_2O_3 – 3.5%, MnO – 0.91%, MgO – 0.83%, Ta_2O_5 – 0.02%, V_2O_5 – 0.13%, P_2O_5 – 0.18%, Cr_2O_3 – 0.28-3.36%.

The content of accompanying components in minerals: HfO_2 in zircon - 1.19%; Ta_2O_5 in rutile – 0.04%, Nb_2O_5 in rutile – 0.37%, in ilmenite – 0.10%; V_2O_5 in ilmenite – 0.13%; Sc_2O_3 in ilmenite is 0.021%.

The granulometric composition of ore sands is characterized by a strong predominance of two fractions: sandy and clayey. The sand fraction (+0.05 mm) is mainly represented by the 0.315+0.1 mm class; classes +0.315 and +0.560 mm are from 3 to 5%; class +1 mm – 0.5-1%. Heavy ore minerals are mainly concentrated in the 0.160-0.063 mm class.

Ore sands in their natural state have a moisture content of 4 to 7%, a specific gravity of 1.7 to 2.3, depending on the content of heavy and clay fractions.

The hydrogeological conditions of the deposit are characterized by the presence of three aquifers: in sandy-clay alluvial deposits; in Quaternary loams; in the sands of the Poltavska Series and the lower part of the Sarmatian stage. The Sarmatian sands, as well as a part of the Poltavski sands, lie above the water level of this horizon.

The hydrogeological and hydrotechnical conditions of the deposit are favorable for open pit mining. Exploitation of ore sands of the Poltava series lying below is associated with significant complications due to their water overloading.

According to the radiation-hygiene assessment, due to the increased content of the total specific activity of natural radionuclides in zircon concentrates, the Malyshevske deposit belongs to the II group. The deposit is classified as deposits of a complex geological structure (group 2) in accordance with the Classification of Mineral Reserves and Resources of the State Mineral Resources Fund.

Information about mineral resources and reserves is confidential.

During research and industrial development, it is recommended to investigate the possibility of extracting, first of all, titanium and zirconium, as well as other components that are present in titanium-zirconium ores.

The Western, Central and Eastern (Poltavska Series) sites of the Malyshevske deposit are being developed by the State Enterprise "United Mining and Chemical Company", the Matronivsko-Annivska and North-Western sections are being developed by the "Motronivskiy Mining and Processing Plant" LLC.