



CRM of Ukraine Database Supplements

Mineral target:	Viazovatiy Yar deposit
Commodity:	Phosphate rock

Version: 17 April 2024

Project	101075609 — GSEU — HORIZON-CL5-2021-D3-02
Supplement Data	
Supplement number:	MO.400043
Dissemination level:	Public
Supplement type:	Description
Work package:	WP2: Critical Raw Materials, the International Centre of Excellence and United Nations Framework Classification (CRM-ICE-UNFC)
Lead WP/ Supplement beneficiary:	[EGS]

Supplement status	
Endorsed (WP leader):	Guillaume Bertrand, BRGM
Supervised	Boris Malyuk, BRGM/GIU
Approved (Metadata Coordinator):	Oleksiy Likhosherstov, GIU
Author(s):	Affiliation:
Nataliya Kovalenko	GIU
Stella Shekhunova	IGS
Vitaliy Sukach	IGMOF
Maria Kurylo	UAG

Location: The Viazovaty Yar chalk and phosphorite deposit is located 200 m northwest of the Mala Komyshevakh village of the Izyum district of the Kharkiv region, on the left slope of the Viazovaty Yar stream and 12 km southwest of the district center of the city of Izyum and the railway station of the same name.

Research: The study of phosphorites in the area of the deposit has been carried out since the 1930s. In 1933, the Institute of Applied Physico-Chemistry explored areas of phosphorites near the village of Zavody and the Viazovaty Yar stream, which are located on the northeastern flank of the Malokomyshuvakhska dimple. In 1950, the Donetsk Party carried out reconnaissance work in the areas of Viazovaty Yar and Peremoga of the Malokomyshuvakhske phosphorite deposit. In 1960, the Artemivska Expedition carried out work on the Viazovaty Yar site with the aim of identifying phosphorite reserves with a shallow deposit (up to 7 m). In 1998-2003, the Kharkivska KGP conducted prospecting and evaluation works on the Malokomyshuvakhska phosphorite site, during which the Viazovaty Yar deposit was estimated to have 71,000 tons of C2 phosphorous ore reserves and 437,000 tons of estimated P1 resources. In 2003, a preliminary survey was carried out at the deposit, based on the results of which the balance reserves of chalk suitable for the production of building lime were calculated in the amount of 549.2 thousand tons under the C1 category, as well as reserves of phosphorites (ore) in the amount of 63.8 thousand tons, including category C1 – 40.6 thousand tons (being recalculated to P₂O₅ – 3.66 thousand tons) and category C2 – 23.2 thousand tons (being recalculated to P₂O₅ - 2.32 thousand tons).

Currently, "Ednist-Resurs" LLC is developing the chalk of the Viazovaty Yar deposit, in accordance with the granted special permit for the extraction of minerals dated 12.30.2010 No. 5275. Phosphorite reserves are not included in the special permit.

Geological characteristics. From a geostructural point of view, the deposit area is confined to the transition zone from the Dniprovsko-Donetska depression to the Donbas. Two northern anticlinal zones pass through the working area. One of them (in the southern part of the area) includes the Svyatogorsk-Sukhokamyanske and Kamyanske uplifts. From the south, this zone is bounded by the Komyshevakh-Lymanska syncline. The second anticlinal zone includes Ternivske, Karpivske, and Chervonooskilske uplifts. Viazovaty Yar is located on the northeastern limb of the Komyshevakh-Lymanska syncline.

A complex of sediments from Devonian to Quaternary takes part in the geological structure of the works area. Phosphorites and chalk in the deposit belong to the Cenomanian Upper Cretaceous stage.

The main mineral in the Viazovaty Yar deposit is represented by the chalk of the Coniacian stage of the Upper Cretaceous system. The layer of phosphorites of the Cenomanian layer, which lies under the layer of marl-chalk deposits, is considered as a co-occurring mineral.

The chalk is underlain by glauconite-quartz sand with thin layers of silicified sandstone. Co-occurring mineral - the phosphorite layer lies in the bottom of the marl-chalk pile. The size of the nodules varies from a few millimeters to ten or more centimeters. The thickness of the phosphorite layer varies from 0.2 to 0.8 m and is on average 0.5 m on the area of reserve estimation of category C1 and 0.4 m on the area of reserve estimation of category C2.

Overburden is represented by a soil-vegetable layer, eolian deluvial yellow-brown and brown loams with the inclusion of calcareous loams, and a layer of pebbly formations with fragments of chert in light gray clay. The total thickness of overburden varies from 0 m to 9.7 m, with an average of 2.0 m.

There are 3 types of phosphorite layer found in the deposit:

1) Phosphorite plate, which is represented by thick dark gray phosphorites of various shapes and sizes, cemented with sand-marl cement. In places, it is very strong, found in isolated productions.

2) Phosphorite grains, mostly of irregular and rounded shape, ranging in size from a few mm to 3-5 cm in sandy chalk.

3) Fossils of phosphorites of various sizes (mostly irregular), less often - rounded in marl glauconite sand.

Phosphorite ore is characterized by the following composition: the grade larger than 2 mm in the ore is 27.1-38.7%. The main amount of phosphate material (69.1-77%) is concentrated here, and 5-20 mm phosphorites dominate. In addition, there are chert and quartz pebbles and gravel.

The granular fraction ($-2 +0.04$ mm) is 26.2-37.1%. It is mainly represented by quartz, feldspar, glauconite, phosphates.

Clay fraction (less than 0.04 mm) makes up a significant part of the ore, 6.1-35.1%.

The natural moisture content of the ore varies from 3 to 7%, the productivity is 615-699 kg/m², the average is 651 kg/m².

The content of P₂O₅ in phosphate ore varies from 4.8 to 12.5% with a weighted average value of 9.47%.

Phosphorus enrichment of the Viazovaty Yar deposit was studied for 1 sample. In the sample before enrichment, the mass fraction of P₂O₅ in the ore was 9.33%, 78.3% of the sample's phosphorus oxide was concentrated in the $+0.315$ mm class, the mass fraction of P₂O₅ in the fraction larger than 0.315 mm was 13.02%. After enrichment and removal of the 0.04 mm class from it, the mass fraction of P₂O₅ in the fraction larger than 0.315 mm increases to 18.34% when 90.5% is extracted from the operation. Thus, the extraction of phosphorus oxide into a product with a mass fraction of 18.34% from the original ore will be 70.9%, which is a good indicator. The yield of such a product from the original ore will be 37.7%.

To assess the agrochemical efficiency of phosphorite from the Viazovaty Yar deposit, an experimental batch of phosphorite flour weighing 400 kg with a P₂O₅ content of 15% was produced from a bulk sample taken from the Yaremivskiy quarry, which was tested on the plots for growing agricultural crops. Tests have proven that phosphoflour from the deposit is an effective phosphorus fertilizer. The total effect of applying phosphoflour over 4 years of experiments was 92.4% of the effectiveness of superphosphate.

Among the disadvantages of the study of phosphorites of the deposit is the fact that the content of all harmful elements in them is not determined.

Information on reserves. The deposit is recorded by the State Inventory of Minerals of Ukraine and as of January 1, 2024, the reserves are divided into categories, thousand tons: phosphorite (ores) - C1 - 40.6, including P₂O₅ – 3.66; C2 – 23.2, including P₂O₅ – 2.32; off-balance - 43.4, including P₂O₅ – 3.75; chalks: C1 – 549.0; C2 – 1201.0.