



CRM of Ukraine Database Supplements

Mineral target:	Ratnivske deposit
Commodity:	Phosphate rock

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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: located in the northern part of the Volyn region, on the territory of the Ratniv district, to 0.3 km east of the Postupel village.

Research. Exploration and geological and economic assessment of the deposit was carried out from 1991 to 2008, according to the results of which the reserves of nodular phosphorites were approved by the DKZ of Ukraine (protocol No. 1693 dated 01.20.2009).

Geological characteristics. The Late Cretaceous marl-chalk sequence, terrigenous glauconite-phosphorite-quartz sediments of the Paleogene and glacial formations of the Anthropocene take part in the geological structure of the deposit.

The Postupelska site is located in the extreme southwestern part of the Ratnivske deposit. Its geological structure includes sediments of the Cretaceous (100-200 m), Paleogene (up to 14.0 m) and Quaternary (up to 20.0 m) systems. The site consists of two deposits (northern and southern), which are located close to 400 m each other and are planned for development by two separate quarries. Their total area is 735.4 m² (73.5 ha).

The geological column of the site from bottom to top looks as follows. The sediments of the Zdolbunivska Suite of the Cretaceous system, which are represented by a layer of chalk-like marls and writing chalk, are widespread here and lie at depths of up to 25.0 m. In the upper part of the column, the rocks are weathered and are represented by viscous plastic chalk with admixtures of sandy and clay material ("clogging zone").

Above are the sediments of the Obukhivska Suite of the Paleogene system, which were preserved from the next erosion in the form of two separate islands to the east (Northern deposit) and south (Southern deposit) of the Postupel village.

At the bottom of the Paleogene sediments, mainly in the depressions of the pre-Paleogene relief, there are breccia-like carbonaceous clays of black color with gravel and pebbles (35%) of phosphate sandstones, quartz, black chert. The content of P₂O₅ in clays reaches 10%, in the fraction + 1 mm - 14.5%. The thickness of clays is 1.4 m, but mostly does not exceed 30.0 cm.

On carbonaceous clays, and in their absence on Late Cretaceous rocks, there are sediments of the Obukhivska Suite (nodular phosphorite bodies), in the bottom of which there is usually a layer of sand-gravel mixture, the psephyte component of which is dominated by phosphate sandstones (nodules), the rest - chert, quartz. The filler comprises quartz-glauconite sand, often micaceous, fine-grained, greenish-gray and bright green in color. The thickness of the layer is 6.3 m.

The upper part of the section of the Obukhivska Suite is represented by glauconite-quartz fine-grained to siltstone sands, micaceous with admixtures of gravel and pebbles of phosphate sandstones.

Phosphorite-bearing rocks are associated with Paleogene sand-gravel-pebble sediments, in small quantities with Quaternary fluvioglacial sand-gravel-pebble sediments, rarely with breccia-like carbonaceous clays containing gravel and pebbles of Paleogene phosphate-bearing sandstones.

The main reserves of phosphorites are limited to the bodies of greenish-gray and dark green sand-gravel-pebble hydrous rocks of the Paleogene.

The psephytic component of these rocks is represented by phosphate-containing sandstone grains (85-98%), black chert and quartz gravel (2-10%). The content of gravel-pebble material (class +1 mm) is 5-75%, on average - 45-52%. The bulk of the gravel-pebble material is represented by agglomerations of glauconite-quartz sandstones (nodules) from dark gray to black, sometimes with a brownish shade, on phosphate cement (20-25% of the volume of the rock). The content of P₂O₅ in the ore varies from 3.53 to 11.53%. The filler comprises glauconite-quartz sand.

Higher in the column there are the glauconite-quartz sands of the Obukhivska Suite with a thickness of 0.4-8.2 m, which are overlain by fluvioglacial mid-Quaternary sediments of the Dnipro Glaciation, represented by water-saturated quartz sands with interlayers and lenses of gravel-pebble rocks with a psephytic component of 81-84% (average 59 %) with a thickness of 0.1-3.2 m. The fraction +1 mm (40-

90%) is dominated by gravel and sandstone pebbles (nodules) on phosphate cement. The average content of P₂O₅ in ores is 9.44%, in ore - 4.23%.

The bodies of Quaternary phosphorite nodules have a local distribution, are small in size, and therefore do not have economic significance.

According to the results of laboratory studies, it was established that the useful mineral of the Postupel site is sandstone pebbles (nodules) of glauconite-quartz composition on phosphate cement. Phosphates in ores make up to 30.0%, and mainly 8-20%, represented by collophane in sandstone cement, rarely in the form of phosphorite nodules, and in small fractions in the form of separate grains and aggregates. Nodular phosphorite cement is a homogeneous microcrystalline, hidden crystalline to amorphous mass of brownish-gray to dark-gray color.

Phosphates are represented by minerals of the fluorapatite-francolite group, the P₂O₅ content of which is up to 36%, and mostly 30-32%.

The content of P₂O₅ in phosphate sandstones varies from 10 to 18%.

According to chemical analysis, the content of P₂O₅ in the ore is 1.89-12.85%. According to the results of technological tests, a phosphorite concentrate with a P₂O₅ content of 20.4% was obtained by the nodules screening and grinding, and by screening and grinding to a size 95% of class -0.09 mm with subsequent flotation 2.7 kg of phosphorite concentrate with a P₂O₅ content of 26.75% was obtained.

Thus, according to the results of research, the possibility of obtaining a concentrate with a P₂O₅ content of 8.6 to 26% from nodular phosphorite ore, suitable for the production of nitrogen-phosphorus and nitrogen-phosphorus-potassium mineral fertilizers of the NP, NPK type without the formation of phosphogypsum wastes, has been proven.

The hydrogeological and mining-geological conditions of the Postupel site are favorable for its development in the open-cast method.

Estimate of resources/reserves: as of 01.01.2024, phosphorite reserves are classified as B+C1, thousand tons: ore – 4,190.38, including P₂O₅ – 391.02.

Degree of development: not being developed.