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ILMENITE PLACERS IN MODERN ALLUVIAL DEPOSITS OF THE VELYKA VYS RIVER (SOUTHERN PART OF THE KORSUN-NOVOMYRHOROD PLUTON)

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The best-known placers in the modern alluvium of the Velyka Vys River within the southern part of Korsun-Novomyrhorod pluton are briefly characterized. More detailed attention is paid to the least researched of them – the Vytiazivskyi placer. The results of the lateral distribution of the average contents of ilmenite, zircon, rutile and the thickness of ore-bearing sands are presented. The vertical distribution of the content of loose minerals in the vertical section of the productive deposits was studied. Information on the direction and strength of correlations between minerals is given.
Keywords: Korsun-Novomyrhorod pluton, Quaternary placers, ilmenite.

РОЗСИПИ ІЛЬМЕНІТУ В СУЧАСНИХ АЛЮВІАЛЬНИХ ВІДКЛАДАХ РІЧКИ ВЕЛИКА ВИСЬ (ПІВДЕННА ЧАСТИНА КОРСУНЬ-НОВОМИРГОРОДСЬКОГО ПЛУТОНУ)

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Коротко охарактеризовано найбільш відомі розсипи в сучасному алювії річки Велика Вись у межах південної частини Корсунь-Новомиргородського плутону. Більш детальна увага приділена найменш дослідженому з них – Витязівському розсипу. Представлено результати латерального поширення середніх вмістів ільменіту, циркону, рутилу та товщини рудовмісних пісків. Досліджено вертикальний розподіл вмісту розсипних мінералів у вертикальному перетині продуктивних відкладів. Подано відомості про напрямок і силу кореляційних зв'язків між мінералами.
Ключові слова: Корсунь-Новомиргородський плутон, четвертинні розсипи, ільменіт.

Introduction. Within the boundaries of the Korsun-Novomyrhorod pluton, the ilmenite content is established in the rocks of the crystalline basement, their weathering crust, in Aptian-Albian continental deposits, in Upper Albian coastal-marine deposits, in Middle Eocene continental deposits, and alluvial deposits of the Quaternary system [2]. The authors believe that the Korsun-Novomyrhorod pluton is a polygenic-polychronic paragenetic-spatial zircon-ilmenite ore-bearing system. This ore-bearing system collectively has a significant resource potential, which is investment-attractive in the case of complex development of different-age and heterogeneous ore-bearing formations. The greatest resource potential of the sedimentary cover is weathering crusts of crystalline basement rocks, continental deposits of the Aptian-Lower Albian, which were formed due to erosion and redeposition of eluvium, coastal marine deposits of the Upper Albian, which were formed due to erosion of weathering crusts and continental deposits of the Aptian-Lower Albian and to a lesser extent – continental deposits of the Middle Eocene and alluvial deposits of the Quaternary system. Investigating the ore-bearing of deposits with a more significant resource potential, Quaternary alluvial deposits were overlooked, the ore-bearing of which indicates the presence of intermediate reservoirs within the river valley and catchment areas. With this publication, the authors draw the attention of scientists to the need for a more detailed study of modern Quaternary alluvial deposits, which contain information about the minerageny of the rocks they erode.

Analysis of previous records. The first specialized work on titanium, zirconium, rare earth elements and other metals within the research area was carried out in 1948-1954. The ore-bearing capacity of the crystalline basement rocks, their weathering crust and Mesozoic-Cenozoic sedimentary formations within the Korsun-Novomyrhorod pluton was established by production geologists. In this regard, it is necessary to single out the works on the search for zircon-ilmenite placers, which are associated with such geologists as M.T. Vadimov, V.I. Skorobach, V.S. Tarasenko, I.E. Shkurenko, M.M. Levchenko, I.F. Zlobenko, V.G. Zlobenko, M.K. Babenko, V.S. Yarova, V.D. Yarovyi, L.F. Babenko, Z.M. Lebedev, V.M. Safonov, Yu.V. Kononov, K.M. Zarutskyi, V.G. Karmazenko, L.I. Korenev et al. [2]. Modern Quaternary alluvial placers were studied by N.M.

Nagornova, O.K. Timoshkin, M.F. Veklych, Yu.V. Kononov et al. [2].The priority in the study of zircon-ilmenite ore occurrences in the weathering crust and in continental and coastal marine deposits of different ages of the Korsun-Novomyrhorod pluton belongs to the employees of the lithology department of the Institute of Geological Sciences of the National Academy of Sciences of Ukraine. The results of these studies are highlighted in dissertations, numerous scientific publications and made public at scientific conferences of various ranks.

Actual material and research methodology. The methodological and methodological basis of the research was the work of the authors on the structural and lithological modeling of placers of heavy minerals. The actual material for the research was the production reports, based on which a database was created that contains the coordinates of the wells, their description, and test results. Cartographic constructions were carried out using the software Golden Software Strater, Golden Software Surfer. Correlations between mineral contents were investigated in Microsoft Excell.

Obtained results, their discussion. The ***Kamianskyi placer*** is located 5.5 km east of the city of Novomyrhorod, between the village of Kamianka and Martonosha. The geological structure of the site includes crystalline rocks of the main composition of the Novomyrhorod massif, the weathered crust of crystalline rocks, Quaternary alluvial deposits of the Velyka Vys river valley. The weathering crust is mainly represented by eluvial kaolins. Their thickness is up to 15 m. The content of ilmenite in the weathering crust is up to 83.2 kg/m^3. In the lower part of the valley there are sands of the Lower-Middle Eocene, in which the content of ilmenite reaches 120.1 kg/m^3 at a thickness of 3.0 m. The Velyka Vys River in this part of the river valley erodes the weathered crust of the main composition rocks, which contain an increased content of ilmenite. As a result of erosion of the weathering crust, ilmenite enriches the modern alluvium of the Velyka Vys River, forming a placer with a width of 0.3–1.0 km and a length of up to 4.0 km. The placer is localized in medium-grained, gray sands that lie at a depth of 2.0–3.0 m. The thickness of the productive horizon is 2.0–13.0 m (7.6 m on average). The content of ilmenite in the placer reaches 119 kg/m^3 (average content

44.1 kg/m^3). Kamianskyi placer meets the requirements of industry and is of practical interest.

The ***Andriivkska placer*** is located 7 km west of Novomyrhorod in the area of Andriivka and Likareve villages. Placer is confined to the valley of the Velyka Vys River, which erodes Upper Cretaceous (Upper Albian) coastal-marine and Lower Cretaceous (Aptian-Lower Albian) continental deposits in this area. Minor tributaries of the river erode the weathering crust of the crystalline rocks of the foundation. Placer is composed of medium-coarse-grained, gray alluvial sands. The width of the placer is 0.3–0.6 km, the length is up to 4.0 km [3]. The thickness of the productive layer is 2.7 m. The ilmenite content is 30–61 kg/m^3 (47 kg/m^3 on average).

The ***Novomyrhorod area*** is located in the valley of the Velyka Vys river on the northwestern outskirts of Novomyrhorod. The geological structure of the area is simple. The rocks of the sedimentary cover are practically washed away by the river. Only undissociated coal-bearing sand-clay sediments of the Middle Eocene, which fill the Novomyrhorod paleovalley, survived the Quaternary erosion. Quaternary alluvium lies in the top of the layer, in the bottom– weathered crust of rapakivi granites.The content of ilmenite in Quaternary alluvial sands rarely exceeds 15 kg/m^3, only in a single sample was found anomalous concentration of ilmenite – 430 kg/m^3 [1].

The Vytiazivskyiplacer is located in the area of the confluence of the Velyka and Mala Vys rivers. Here the river erodes the weathering crust of biotite gneisses of the Teteriv series [1]. The content of placer minerals in the placer is as follows (kg/m^3): ilmenite – 6.12–27.9 (average value – 9.75); zircon – 0.03–0.11 (average value – 0.05); rutile – 0.012–0.05 (average value –0.02). The thickness of the ore-bearing deposits is 1.8–17.2 m (the average value is 8.67 m).

Let's consider the ore bearing of the Vytiazivskyi placer in more detail.

The lateral distribution of thickness and average content of ilmenite in modern alluvial deposits is presented in Figure 1.Areas of increased average ilmenite content in alluvium do not coincide spatially.

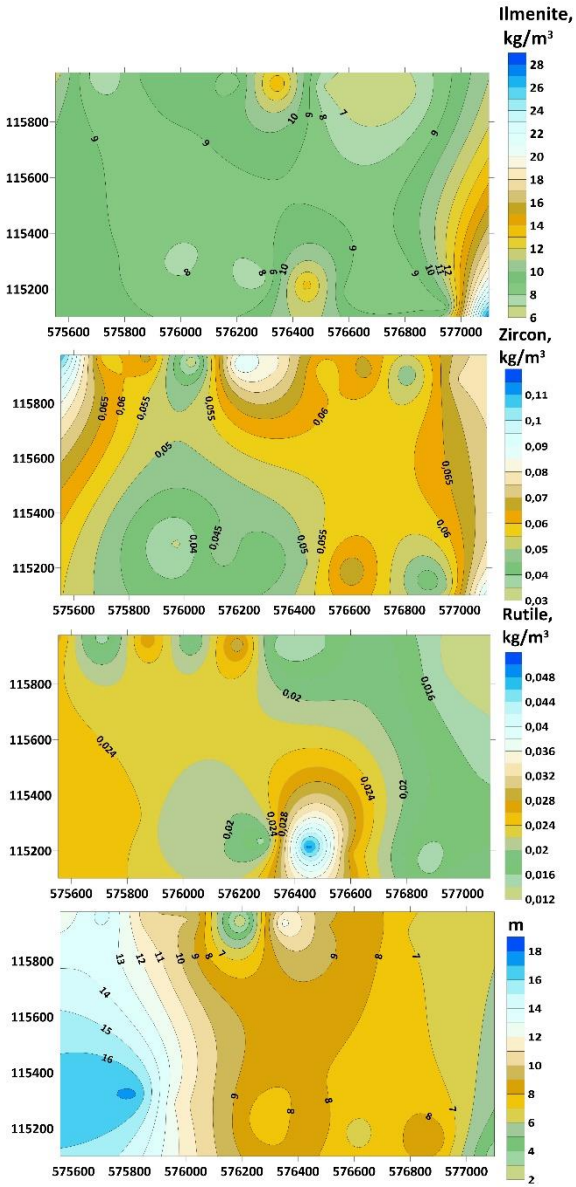

Fig. 1. Lateral distribution of the average content of ilmenite, zircon, rutile and the thickness of the productive layer of the Vytiazivskyi placer

Correlation analysis investigated the direction and strength of correlations between the average mineral contents along the lateral. It was established: a direct moderate correlation between the average content of ilmenite and zircon (+ 0,46), a direct weak correlation between the average content of ilmenite and rutile (+ 0,16) and zircon and rutile (+ 0,15).

The distribution of mineral content in the vertical section of the productive layer is complex (Fig. 2). Thus, between the content of ilmenite and zircon, there can be an inverse strong correlation (– 0.67, see Fig. 2*a*), inverse moderate (– 0.37, see Fig. 2*d*), inverse very weak (– 0.11, see Fig. 2*c*) and direct moderate (+ 0.35, see Fig. 2*b*). A direct strong (+ 0.79) correlation between the content of ilmenite and rutile was established in well 3610 (see Fig. 2*b*); reverse strong (– 0.67) – in well 3620 (see Fig. 2*d*); the reverse is weak – in wells 3608 (– 0.27) and 3612 (– 0.29) (see Fig. 2 *a*,*c*). There is a direct strong correlation between the zircon and rutile content in wells 3610 (+ 0.77) and 3620 (+ 0.68) (see Fig. 2 *b*,*d*); reverse strong (– 0.65) – in well 3608 (see Fig. 2*a*); direct weak (+ 0.29) – in well 3612 (see Fig. 2*c*).

Conclusions. The modern sediments of watercourses in the southern part of the Kursun-Novomyrhorod pluton sometimes contain placers of titanium minerals. Zircon is often present in large quantities in placers of titanium minerals. The ore content of the Quaternary alluvial deposits is due to the ore-bearing crusts of the weathering of the rocks of the crystalline basement, continental, coastal-marine deposits of the Lower Cretaceous, continental deposits of the Lower-Middle Eocene, which modern rivers erode.

Thus, modern alluvial placers of ilmenite, zircon, rutile and other minerals are an information base about the mineragenic specialization of catchment areas and the rocks they erodeThe areal distribution of the ore-bearing stratum of modern alluvium and its content of placer minerals depends on the concentration of ilmenite in the weathered crust of gabbro-anorthosite rocks and in older sedimentary deposits of Lower Cretaceous and Middle Eocene age.

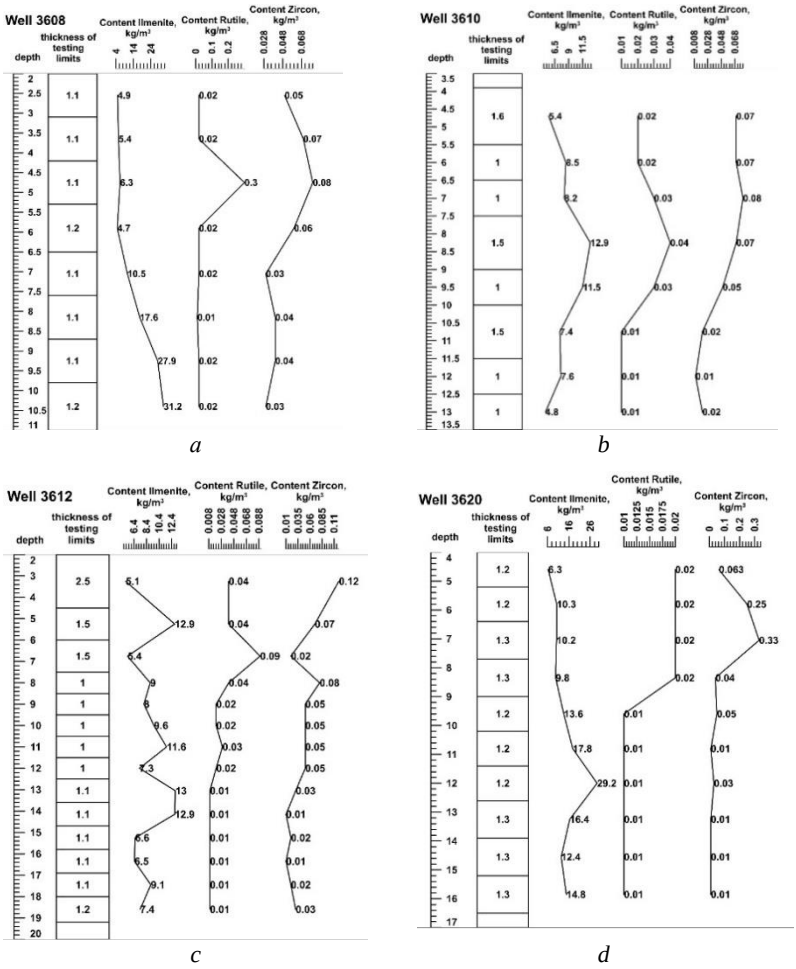

Fig. 2. Distribution of the content of ilmenite, zircon and rutile in the vertical section of the productive layer

Sometimes, modern placers are spatially and paragenetically connected with older placers, due to the erosion of which they were formed. Such a spatial and paragenetic arrangement increases the mineral and raw material potential of the areas. In general, the content of ilmenite, zircon, rutile in modern placers is not industrial. Only some modern placers, in the case of industrial development of older

placers or weathering crust, can be included in the composition of the productive layer.

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