



North-Western Prospective Area (Residual Reserves) of Malyshevsky Placer Field of Titanium and Zirconium Ores

Minerals: the main minerals are titanium ores, zirconium ores; accompanying minerals are kyanite, sillimanite, and staurolite.

Type, period of subsoil use: 20-years licenses for exploration and production.

Location: Oleksandrivsky District of Kirovohrad Region and Pyatihatsky District of Dnipropetrovsk Region, 20.1 km north of Pyatihatky. The district is crossed by asphalt roads of the III class Vilnohirska-Lykhivka and Vilnohirska-Verkhnodniprovsk routes.

Land plot area: 3309.8 hectares

Geological characteristics. The exploitation region is located in the northern depression of the central part of the Ukrainian crystalline shield. The North-Western prospective area (residual reserves) is located in the north-western part of the Malyshevsky field and is a placer associated with coastal and marine sediments of quartz fine-grained sands of the Poltava series of veins and partially quartz fine-grained sands of the Sarmatian tier of the Miocene. The meaningful mineral comprises of the layer of industrial ore sands of the Poltava series of veins, which is attached to the upper part of the Poltava horizon and to the lower part of the sands of the Sarmatian tier in some places, at a cap of up to 5 m. The horizon of ores is represented by gray, yellow-gray, occasionally dark gray fine-grained quartz sands with high content of heavy minerals. In the sands of the Poltava series of veins there are 3 horizons with different degrees of mineralization. The upper horizon is enriched by minerals of heavy fraction. Ore sands consist of quartz, clay minerals and heavy minerals: zircon, rutile, ilmenite, leucocene, kyanite, sillimanite, staurolite, tourmaline, spinel, chromite, monazite. The main bulk of quartz grains belongs to the class $-0.28 + 0.1$ mm (89.84%). The most common titanium mineral is ilmenite with grains of high leucocene content. The average content of TiO_2 in ilmenite is 62.23%, TiO_2 in leucocene - 83.26%, TiO_2 in rutile - 90-98%. The main mineral containing zirconium is zircon. The ZnO_2 content varies from 63.1 to 63.9%. Technological properties studies of ore sands of the Poltava series of veins were conducted at the Motronivsko-Annivska prospective area of the Malyshevsky field. As a result the following concentrates were obtained: ilmenite - 62.23% TiO_2 ; rutile - 94.05% TiO_2 ; zirconium - 64.57% TiO_2 ; kyanite-sillimanite - 62.28% Al_2O_3 ; staurolite - 50.9% Al_2O_3 . Hydrogeological conditions of the Malyshevsky field are characterized by the presence of an aquifer complex in the Miocene sediments. Miocene aquifer complex is associated with fine-grained sands of the Sarmatian tier and fine-grained sands of the Poltava series of veins and is the only aquifer horizon that will affect the flooding of the quarry. According to the complexity of the geological structure of the North-Western prospective area (residual reserves) is classified as the one with a complex geological structure (Group 2).

Available geological information. Site exploration was carried out in 1955-1958 by the Ukrainian Geological Survey. For the first time the residual reserves of the North-West prospective area were approved by the protocol of the State Committee of the USSR from 20.01.1959 № 2553. In 2019, a detailed geological and economic assessment of reserves of zircon-rutile-ilmenite sands of Motronivsko-Annivska and North-Western prospective areas of the Malyshevskoye field was concluded (protocol of the State Committee of Ukraine dated 20.12.2019 № 5000-DSK).

Estimation of reserve/stock. The protocol of the State Commission of Ukraine on Mineral Resources dated 20.12.2019 No. 5000-DSK approved residual reserves of zircon-rutile-ilmenite-bearing sands, the industrial value of which is uncertain class code 332 (category of geological study C_2). According to the United Nations Framework Classification (UNSC-2009), reserves of zircon-rutile-ilmenite-bearing sands are according to non-commercial ones, the feasibility of the development of which cannot be assessed from the early stage of technological research, which does not allow determining economic efficiency. Information has limited access to the number of approved stocks. Reserves of associated minerals are approved under the C_2 category in the amount of: disten+sillimanite – 1407.8 thousand tons, staurolite – 567.9 thousand tons (class code 332). 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.

Available geological reports:

http://geoinf.kiev.ua/wp/geologichni-zviti.php?rep=fnd_shifr.rdf&schifr=19480

http://geoinf.kiev.ua/wp/geologichni-zviti.php?rep=fnd_shifr.rdf&schifr=60211

http://geoinf.kiev.ua/wp/geologichni-zviti.php?rep=fnd_shifr.rdf&schifr=64530

http://geoinf.kiev.ua/wp/geologichni-zviti.php?rep=fnd_shifr.rdf&schifr=66507

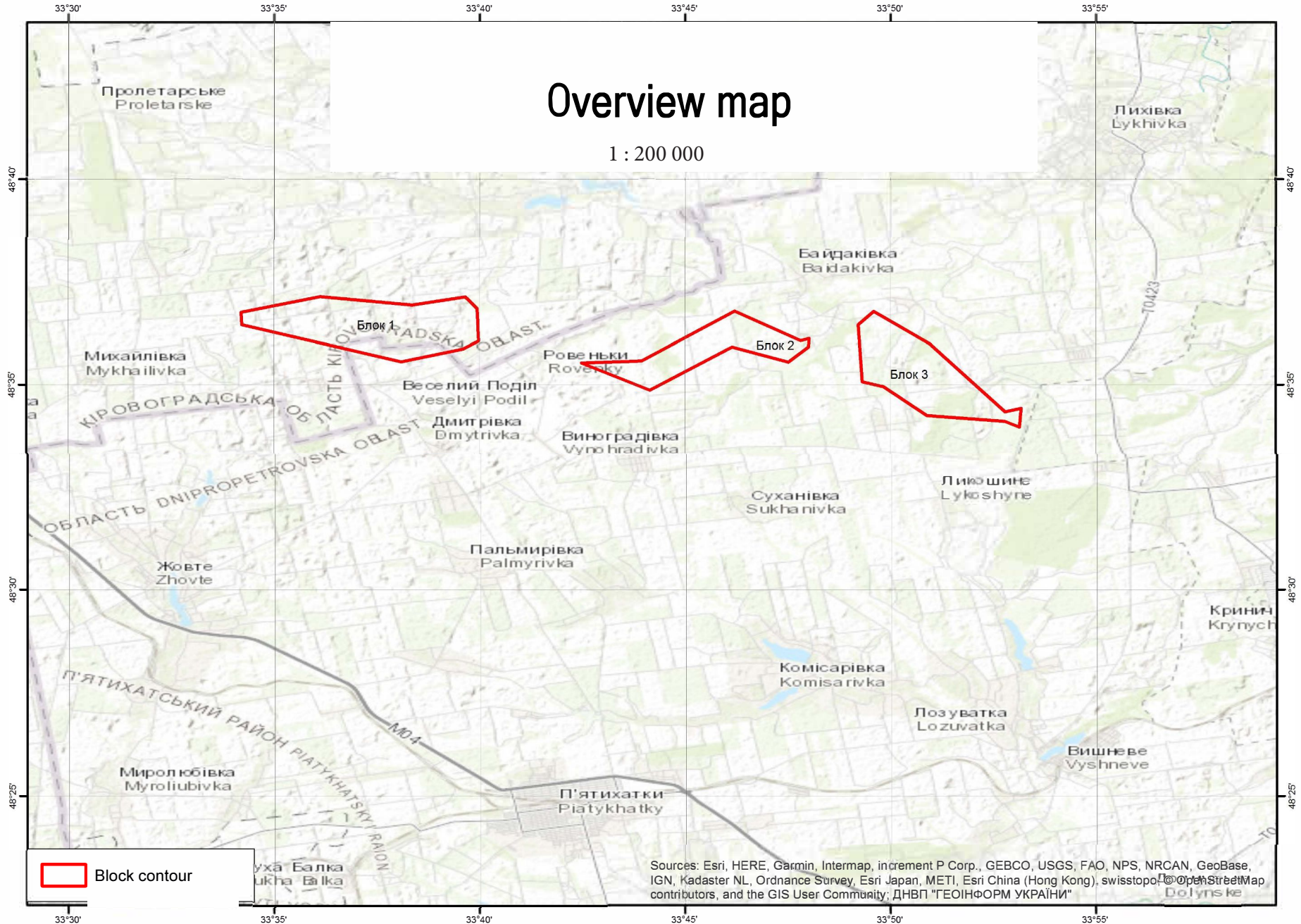
Minimum work program

Provided by Mining terms Model agreements and defined in "Work Program" annex.

Model agreements are listed at the link: <https://www.geo.gov.ua/primirni-ugodi-pro-umovi-koristuvannya-nadrami/>

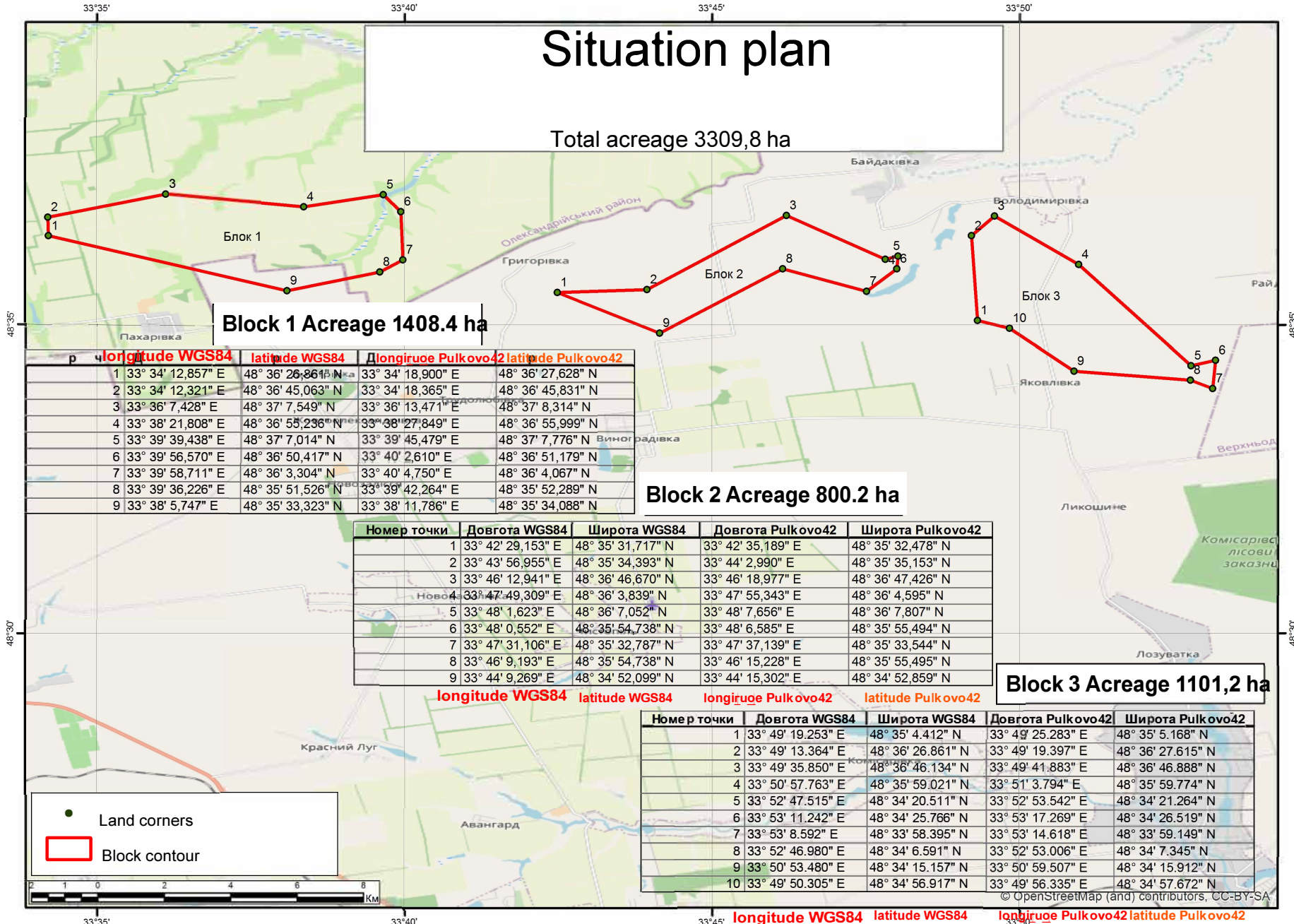
Overview map

1 : 200 000



Situation plan

Total acreage 3309,8 ha



Block 1 Acreage 1408.4 ha

п. ч.	longitude WGS84	latitude WGS84	longitude Pulkovo42	latitude Pulkovo42
1	33° 34' 12,857" E	48° 36' 26,861" N	33° 34' 18,900" E	48° 36' 27,628" N
2	33° 34' 12,321" E	48° 36' 45,063" N	33° 34' 18,365" E	48° 36' 45,831" N
3	33° 36' 7,428" E	48° 37' 7,549" N	33° 36' 13,471" E	48° 37' 8,314" N
4	33° 38' 21,808" E	48° 36' 55,236" N	33° 38' 27,849" E	48° 36' 55,999" N
5	33° 39' 39,438" E	48° 37' 7,014" N	33° 39' 45,479" E	48° 37' 7,776" N
6	33° 39' 56,570" E	48° 36' 50,417" N	33° 40' 2,610" E	48° 36' 51,179" N
7	33° 39' 58,711" E	48° 36' 3,304" N	33° 40' 4,750" E	48° 36' 4,067" N
8	33° 39' 36,226" E	48° 35' 51,526" N	33° 39' 42,264" E	48° 35' 52,289" N
9	33° 38' 5,747" E	48° 35' 33,323" N	33° 38' 11,786" E	48° 35' 34,088" N

Block 2 Acreage 800.2 ha

Номер точки	Довгота WGS84	Широта WGS84	Довгота Pulkovo42	Широта Pulkovo42
1	33° 42' 29,153" E	48° 35' 31,717" N	33° 42' 35,189" E	48° 35' 32,478" N
2	33° 43' 56,955" E	48° 35' 34,393" N	33° 44' 2,990" E	48° 35' 35,153" N
3	33° 46' 12,941" E	48° 36' 46,670" N	33° 46' 18,977" E	48° 36' 47,426" N
4	33° 47' 49,309" E	48° 36' 3,839" N	33° 47' 55,343" E	48° 36' 4,595" N
5	33° 48' 1,623" E	48° 36' 7,052" N	33° 48' 7,656" E	48° 36' 7,807" N
6	33° 48' 0,552" E	48° 35' 54,738" N	33° 48' 6,585" E	48° 35' 55,494" N
7	33° 47' 31,106" E	48° 35' 32,787" N	33° 47' 37,139" E	48° 35' 33,544" N
8	33° 46' 9,193" E	48° 35' 54,738" N	33° 46' 15,228" E	48° 35' 55,495" N
9	33° 44' 9,269" E	48° 34' 52,099" N	33° 44' 15,302" E	48° 34' 52,859" N

Block 3 Acreage 1101,2 ha

Номер точки	Довгота WGS84	Широта WGS84	Довгота Pulkovo42	Широта Pulkovo42
1	33° 49' 19,253" E	48° 35' 4,412" N	33° 49' 25,283" E	48° 35' 5,168" N
2	33° 49' 13,364" E	48° 36' 26,861" N	33° 49' 19,397" E	48° 36' 27,615" N
3	33° 49' 35,850" E	48° 36' 46,134" N	33° 49' 41,883" E	48° 36' 46,888" N
4	33° 50' 57,763" E	48° 35' 59,021" N	33° 51' 3,794" E	48° 35' 59,774" N
5	33° 52' 47,515" E	48° 34' 20,511" N	33° 52' 53,542" E	48° 34' 21,264" N
6	33° 53' 11,242" E	48° 34' 25,766" N	33° 53' 17,269" E	48° 34' 26,519" N
7	33° 53' 8,592" E	48° 33' 58,395" N	33° 53' 14,618" E	48° 33' 59,149" N
8	33° 52' 46,980" E	48° 34' 6,591" N	33° 52' 53,006" E	48° 34' 7,345" N
9	33° 50' 53,480" E	48° 34' 15,157" N	33° 50' 59,507" E	48° 34' 15,912" N
10	33° 49' 50,305" E	48° 34' 56,917" N	33° 49' 56,335" E	48° 34' 57,672" N

Land corners
 Block contour



© OpenStreetMap (and) contributors, CC-BY-SA