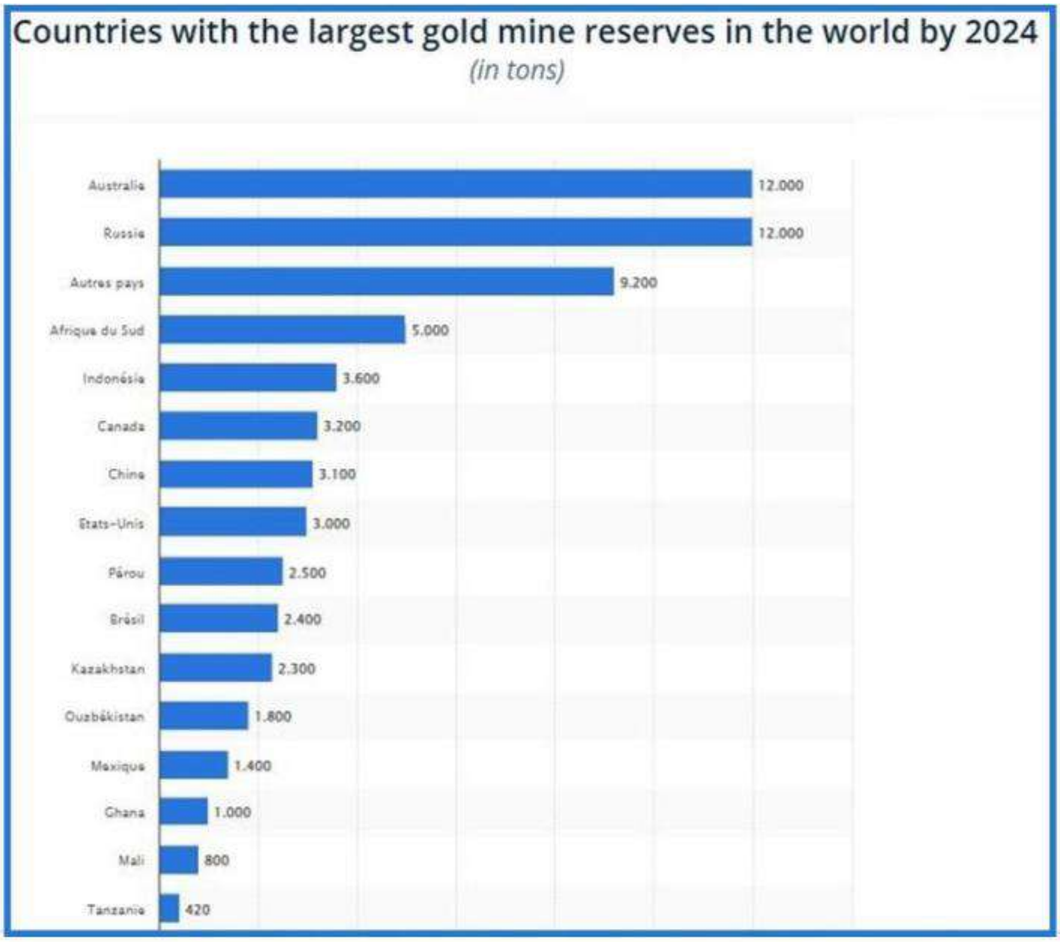
RSS-NMR IN GOLD MINING



NOM PRENOM	DATE	ACTION
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Introducción to the RSS-NMR Projects

The advantages of our RSS-NMR technology

- We carry out this entire exploration phase without sending an engineer into the field
- Discrete because no exploration permit required from government authorities
- We can study a competitor who wants to sell or simply understand their true potential
- No one on the ground means no expectations or attempts to increase social pressure
- In the event of auctions, we study the block being sold before participating and making a bid

Technological advance and unique tool for refurbish of old assets

- This methodology is very useful for older projects (mining or oil) to simply preserve for a re-use of the old assets during the exploitation of the new phase or the new development of the project
- Discoveries of new deposits or new reservoirs that are now visible thanks to this new technology
- We carry out all operations without stopping the mine or the producing well for a single minute

Our time limits or deadline for execution

With RSS-NMR we are able to explore 10000 km^2 per month, we need after exploration and delimitation of areas between 45 to 75 days for send the final to the Client, we consider 90 days like a normal duration of the work

The advantages of our technology

- We carry out this entire exploration phase without sending an engineer into the field
- no exploration permit required from government authorities
- We can study a competitor who wants to sell or simply understand their true potential
- No one on the ground means no expectations or attempts to increase social pressure
- In the event of auctions, we study the block being sold before participating and making a bid

- Very useful methodology for old projects (mining or oil) to simply preserve old assets in the exploitation of the new phase or the new development of the project
- Discoveries of new deposits or new reservoirs that are now visible thanks to this new technology
- We can conduct exploration in parks or protected areas because we are not working on the ground of the protected area park
We carry out all operations without stopping the mine or the producing well for a single minute
- Very low cost Low compared to traditional exploration
- Large areas can be screened, and in offshore exploration, we can go as deep as -6,000 meters from the surface.

Unique tools

- Polymetallic nodule fields can be identified up to 7,000 meters from the surface because they are located on the seabed. They are easily located since these nodules are composed mainly of manganese and iron. They also contain other elements such as silicon and aluminum, but their interest also stems from their richness in certain strategic metals, such as cobalt, nickel, and copper.
- Sunken ships with precious metals or archaeological wrecks
- Ammunition from the First or Second World Wars
- Uncontrolled dumps of buried or hidden chemicals
- Lost aircraft or boats
- The sole method for searching for oil fields or mine seams when magnetic disturbances distort exploration.
- Our basic method: we look directly for the product (metal, oil, etc.) and not for an anomaly to analyze

More technical Information's with results are available in 109 languages

https://rss-nmr.info

Preliminary geological study before RSS-NMR

Remote sensing survey (RSS) in mineral exploration

Poisk Group's nuclear-magnetic resonance (NMR) remote sensing technology in mineral exploration can help miners find and evaluate deposits without having to undertake massive exploration operations.

Exploring for minerals is a challenge that miners need to approach with as much information as possible. Rare metals and minerals can easily be missed, and the process of searching for them is an expensive risk.

That is why remote sensing and remote sensing data in mineral exploration is so important. Remote sensing involves gathering information about the physical world by measuring the electromagnetic radiation, particle and field signals that emanate from objects.

Remote sensing data occurs when information about an object is gathered without making physical contact with said object, especially the Earth, which is in contrast to the common on-site observation.

These sensing systems or tools are then used to gather valuable visual and spectral data. That data can then be analyzed to create insights throughout the mineral exploration process.

Remote sensing is a valuable tool in mineral exploration, thanks to its ability to save time and money while providing helpful information. It is best used for the discovery of high-value commodities such as gold, which are becoming more difficult to locate. While it may not show exactly where major deposits are, data gathered through sensors can be used to narrow field surveys to smaller areas.

Applications of remote sensing can also provide value by reducing the risk of a project and helping prioritize which sites to explore first. Expensive operations like drilling and field work can come after information is gathered.

The greatest advancement in mineral exploration is the ability to synthesize various forms of data. Known drill results can be integrated with topographic maps, air / satellite photos, structural maps and ore grade data. Data synthesis can greatly increase the accuracy and effectiveness of an exploration program.

Geological overview

The area of interest (AOI) is sitting in the tectonic fold belt where the Eurasian plate and the coastal Pacific plate interact, i.e. in the Central Asian orogenic belt comprising many provinces (Fig.1).

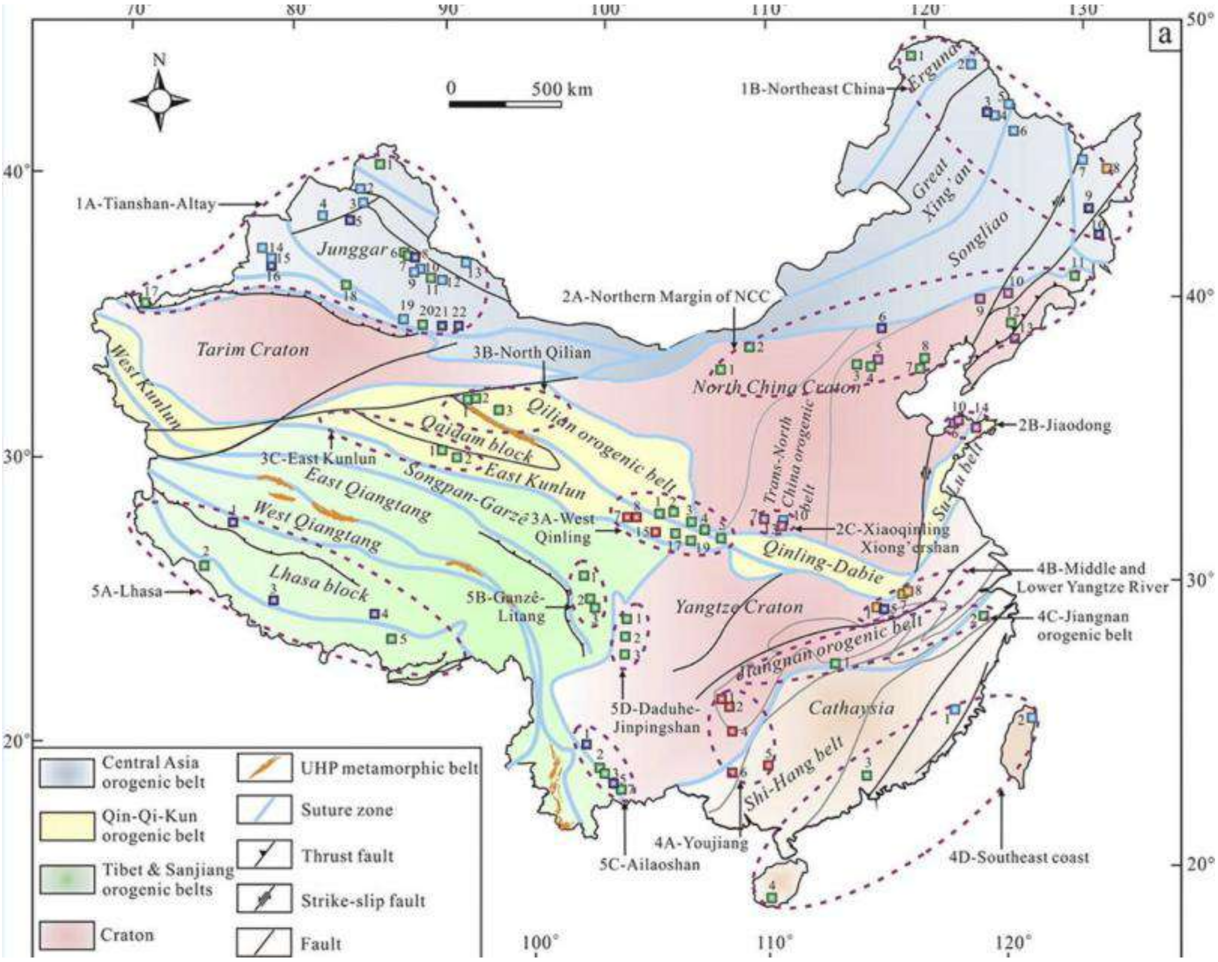

Fig.1. Main tectonic units

The gold metallogeny in China was initiated in Cambrian and lasted until Cenozoic, and is mainly concentrated in four main periods. The first is Carboniferous when the Central Asian orogenic belt formed by welding of micro-continental blocks and arcs in Tianshan-Altay, generating a series of porphyry–epithermal–orogenic deposits. The second period is from Triassic to Early Jurassic when the current tectonic mainframe of China started to take shape. In central and southern China, the North China Craton, South China Block and Simao block were amalgamated after the closure of Paleo-Tethys Ocean in Triassic, forming orogenic and Carlin-like gold deposits. The third period is Early Cretaceous when the subduction of the Pacific oceanic plate to the east and that of Neo-Tethyan oceanic plate to the west were taking place. The subduction in eastern China produced the Jiaodong-type deposits in the North China Craton, the skarn-type deposits in the northern margin (Middle to lower reaches of Yangtze River) and the epithermal-type deposits in the southeastern margin in the South China Block. The subduction in western China produced the Carlin-like gold deposits in the Youjiang basin and orogenic ones in the Garzê-Litang orogenic belt. The Cenozoic is the last major phase, during which southwestern China experienced continental collision, generating orogenic and porphyry–skarn gold deposits in the Tibetan and Sanjiang orogenic belts. Due to the spatial overlap of the second and third periods in a single gold province, the Xiaoqinling, West Qinling, and northern margin of the North China Craton have two or more episodes of gold metallogeny.

Irtysh – Great Hingganling mega province (IGH)

This giant province ("mega province") covers parts of Russia, Kazakhstan, China and Mongolia. It comprises three metallogenic provinces: Irtysh-Zaisan, South Mongolian, and Greater Hinggan (Fig.2)

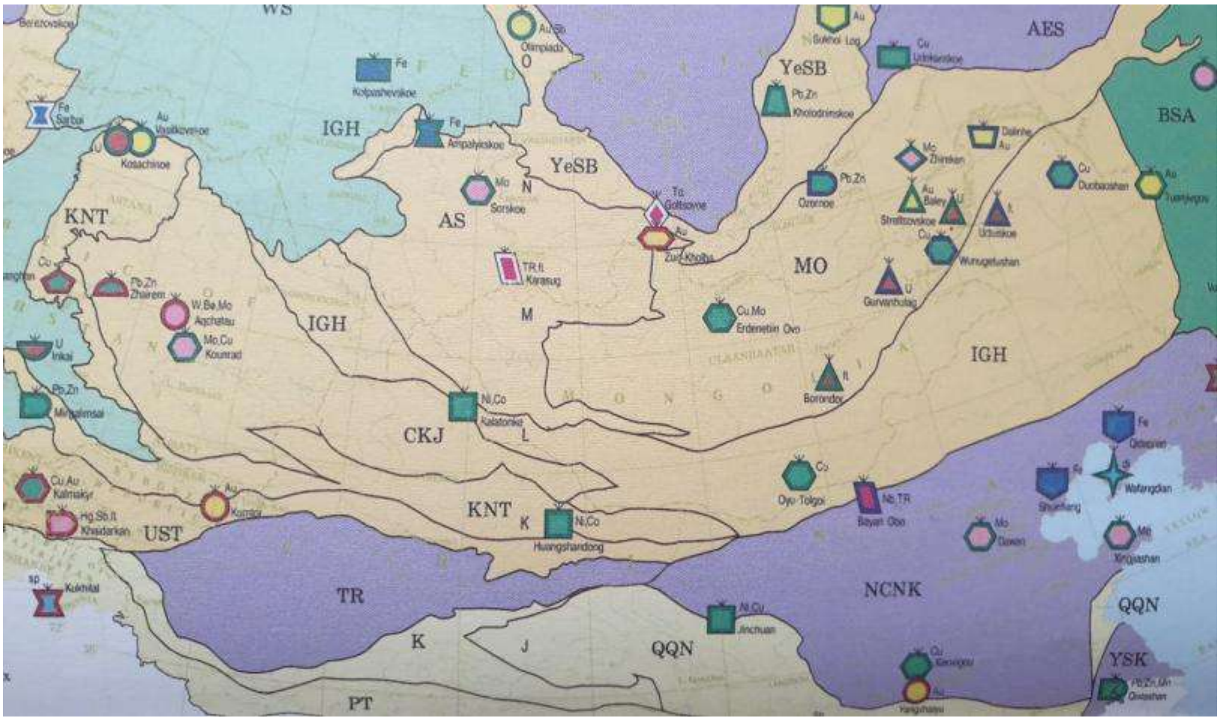

Fig.2. IGH province location

The provinces host several orogenic gold and porphyry copper deposits of various sizes (Fig.3). Many of the South Gobi porphyry deposits are found in the Devonian formation. The terrane is composed of lower to Mid-Paleozoic sediments and Lower Devonian tholeiitic basalts. The structure of the terrane is complex and is dominated by imbricate thrust sheets, dismembered blocks and mélange's. Numerous Devonians to Carboniferous diorite and monzodiorite complexes appear to be spatially (and genetically?) associated with a major northeast trending suture zone termed the East Mongolian Fault Zone. The suture, thought to be active from Mid Paleozoic to Mesozoic times, forms the southern boundary of the Gurvansayhan terrane and may also be the eastern most part of a mega-structure stretching thousands of kilometers westwards across northern China into Uzbekistan.

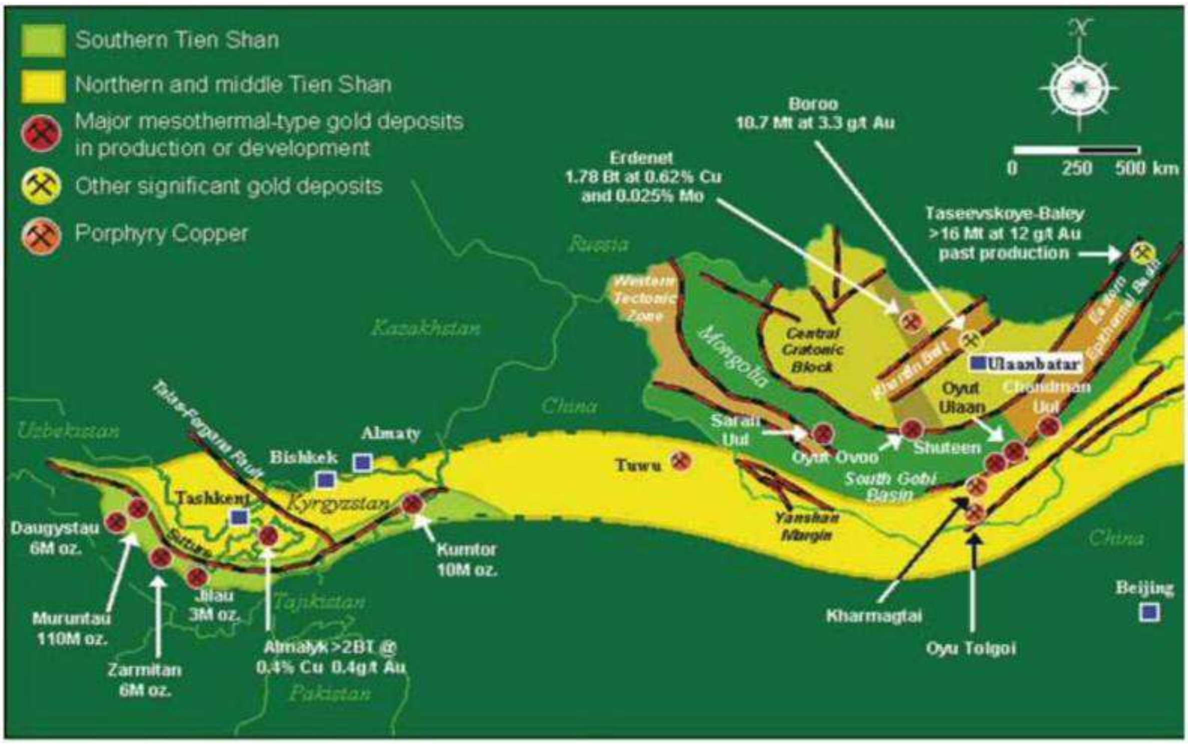

Fig.3. Large deposits

Paleo continental formations located within the IGH play the important role. In the Late Devonian, porphyry Cu-Au and Cu-Mo deposit types were formed. A large collision took place at the end of Carboniferous age , with which quartz-carbonate veined (lode) gold occurrences are associated. During the rifting period of the Permian-Early Triassic ages bimodal volcanism and alkali granite intrusions occurred. Rare metal and rare earth differentiation is associated with the latter deposits. The Late Paleozoic and Mesozoic formations overlay Proterozoic metamorphic complexes, as well as Riphean metamorphosed calcareous sandstones and Vendian-Cambrian terrigenous-carbonate complexes.

Metallogenic specialization of the IGH includes Au-Cu-porphyry deposits with Mo and Ag. There are also such deposits as Cu VMS (pyrite), volcanogenic-sedimentary Fe- Mn, Cr in ultramafic pyroxenite massifs and porphyry Cu-Au, Cu-Mo-Au, veined-greisen W- Mo-Be-Sn and Au deposits and occurrences.

The area of interest is believed to be located in the Ondor-Sum metallogenic province (OS, Fig.4). Main minerals of the province are Fe, fl, Pb, Zn, Cu. There are several deposits, including such medium-sized ones as Ondor-Sum (Fe), Boin Sum (Cu). The province extends along the northern border of the North China platform (North China Craton). The Early Caledonian fold belt was extensively transformed due to the Variscan orogeny process.

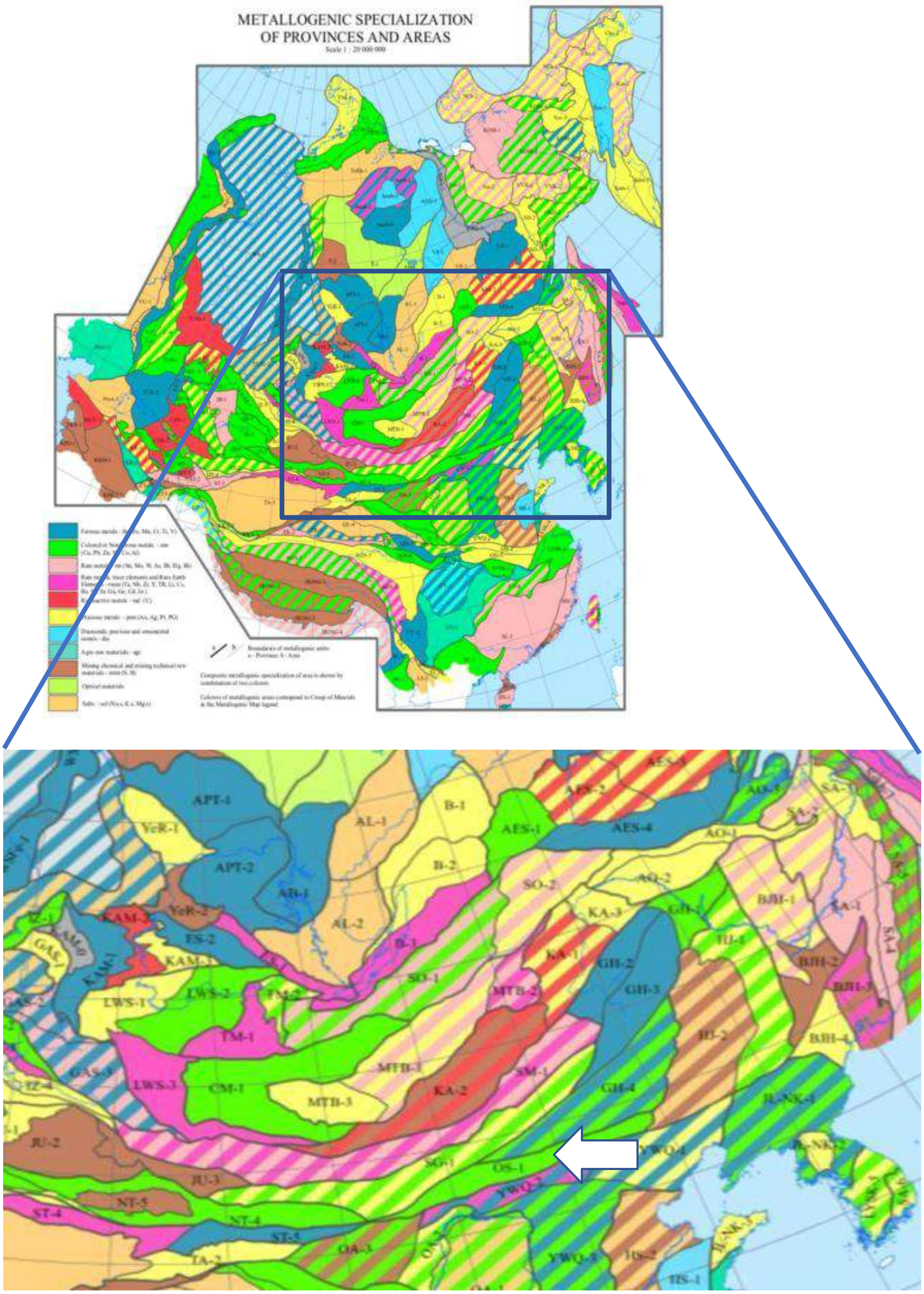

Fig.4. Ondor-Sum metallogenic province (OS-1)

The main minerals are lead, zinc, copper, iron, fluorite. Porphyry deposits dominate and are associated with the Caledonian magmatism. Mineralization occurred in Cambrian, Early Paleozoic and Mesozoic. The province includes the Ongnuid Qi ore zone, the Boin Sum-Beluutu copper ore zone, Sulinheer (Solonker) ore zone etc.

Ongnuid Qi lead-zinc ore zone. The zone is located in the east of this metallogenic province. During the Mesozoic, it was an intensely activated inter-continental zone. There are 5 small Pb-Zn deposits and dozens of mineral occurrences. Some deposits of this zone are enriched in Cu and Ag. The ore zone is composed of Proterozoic metamorphic mafic volcanic rocks with lead, zinc, silver and copper. Early Paleozoic carbonate rock is rich of Pb-Zn deposits.

Boin Sum-Bieluwutu copper ore zone. This ore zone is located to the south of the Ondor Sum fault and is limited by the Early Paleozoic deep fault in the south. In the west of the ore zone, ore-bearing strata include a series of hypo metamorphic rocks of the Baiyinduxi group, and greenschist rocks of the Boin Sum group. In the north, it includes Lower Cambrian iron volcanic rocks of the Ondor Sum group. Jurassic volcanic rocks are common in the middle part of the ore zone. Main mineral is copper. Boin Sum copper deposit is enriched with Mo and Au. Bieluwutu copper deposit – with Pb and Zn. These deposits are of porphyry and SEDEX types, the host rock is carbonate. Boin Sum copper deposit is of Cambrian age.

The area of interest is confined to *the Sulinheer (Solonker)* ore zone (Fig.5) of Ondor-Sum metallogenic province. It is a part of ophiolite zone with chromite occurrences. The ophiolite is overlapped by tholeiitic pillow lavas and clastic volcanics of Upper Paleozoic age. The overlaying Mesozoic complex is presented by Early Cretaceous sedimentary and volcanic formations of basalt-rhyolite association with As-Sb- Au-Ag occurrences.

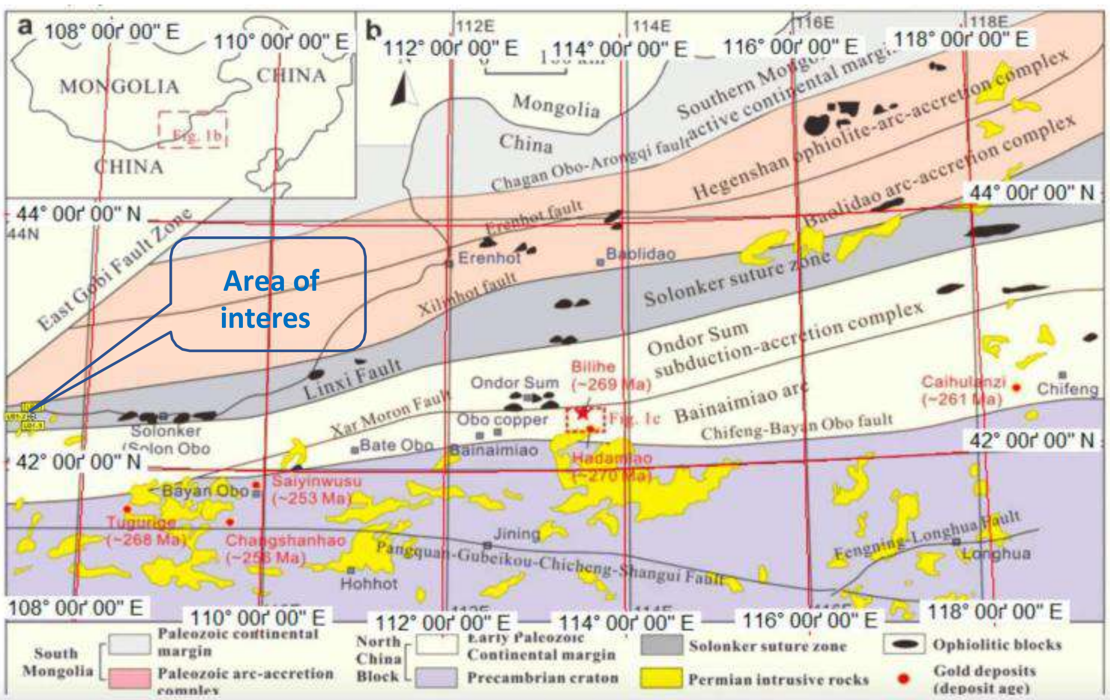

Fig. 5. The AOI location

Types of gold deposits

The gold deposits are classified as orogenic, Jiaodong, porphyry–skarn, Carlin-like, and epithermal-types, among which the first three types are dominant in the region.

The orogenic gold deposits formed in various tectonic settings related to oceanic subduction and subsequent crustal extension in the Qinling-Qilian-Kunlun, Tianshan- Altay, northern margin of North China Craton, and Xiaoqinling, and related to the Eocene– Miocene continental collision in the Tibet and Sanjiang orogenic belts. The tectonic periods such as from slab subduction to block amalgamation, from continental soft to hard collision, from intracontinental compression to shearing or extension, are important for the formation of the orogenic gold deposits. The orogenic gold deposits are the products of metamorphic fluids released during regional metamorphism associated with oceanic subduction or continental collision, or related to magma emplacement and associated hydrothermal activity during lithospheric extension after ocean closure.

The Jiaodong-type, clustered around Jiaodong, Xiaoqinling, and the northern margin of the North China Craton, is characterized by the involvement of mantle-derived fluids and a temporal link to the remote subduction of the Pacific oceanic plate concomitant with the episodic destruction of North China Craton.

The Carlin-like gold metallogenesis is related to the activity of connate fluid, metamorphic fluid, and meteoric water in different degrees in the Youjiang basin and West Qinling; the former Au province is temporally related to the remote subduction of the Tethyan oceanic plate and the later formed in a syn-collision setting. Porphyry–skarn Au deposits are distributed in the Tianshan-Altay, the Middle and Lower Yangtze River region, and Tibet and Sanjiang orogenic belts in both subduction and continental collision settings. The magma for the porphyry–skarn Au deposits commonly formed by melting of a thickened juvenile crust. The epithermal Au deposits, dominated by the low-sulfidation type, plus a few high-sulfidation ones, were produced during the Carboniferous oceanic plate subduction in Tianshan-Altay, during Early Cretaceous and Quaternary oceanic plate subduction in SEt coast of South China Block, and during the Pliocene continental collision in Tibet. The available data of different isotopic systems, especially fluid D–O isotopes and carbonate C–O systems, reveal that the isotopic compositions are largely overlapping for different genetic types and different for the same genetic type in different Au belts. The isotopic compositions are thus not good indicators of various genetic types of gold deposit, perhaps due to overprinting of post-ore alteration or the complex evolution of the fluids.

Analysis of the available information on the area suggests the most probable type of the gold deposit in the area of interest is of orogenic type.

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REPORT

Remote detection of gold ore anomalies on a licensed area of 0.9 km2 (China)"

(Contract № 1-05/2022 «11» 05. 2022)

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Sevastopol 2022

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Summary

The report presents preliminary results of an operational geological study of the license area (S≈0.9 km2) for gold on the territory of the People's Republic of China (the boundaries of the site are indicated on the satellite image, photo. No. 1, Appendix-1), obtained using only remote means of remote survey. The coordinates of the site are provided by the Customer according to the Scope of work (Table 1, Appendix-3). Core samples with commercial gold content were not provided by the Customer. However, a sample of quarried ores with a gold content of 1 g/t (low) was presented.

Radiation-chemical technology and equipment of the stationary geophysical complex "Poisk", patented in the Russian Federation, Switzerland, Ukraine and Germany, were used to process the satellite photographs.

Geological and predictive studies for the presence of gold ore anomalies were carried out using the material and technical base of Sevastopol State University (Sev.GU) and research equipment that allows identifying various minerals by decoding digital and analog satellite images. Satellite photographs of detailed remote exploration and analog satellite images were purchased from specialized space centers in Russia, the USA and Ukraine.

The work was completed only in the scope of the Stage I. Detailed field survey with the use of field equipment (Stage II) was not carried out as per the Scope of work.

As a result of processing digital satellite images of the surveyed area, 3 anomalous areas with areas of gold mineralization were identified (Satellite photos. No. 2, Appendix-1), in which anomalies with gold concentrations at their boundaries with≈1 g/t are identified. Anomalies are located: anomaly No. 1 (U01) - in the southwestern part of the surveyed area, anomaly No. 2 (U02) in the central part, and anomaly No. 3 (U03) in the northwestern part. The highlighted zones of increased gold concentration in them (≥1 g/t) are shown in Satellite Image No. 4 (Appendix-2), which were clarified by special processing of the detailed analog satellite images. The boundaries of tectonic faults were determined by processing detailed satellite images made in the IR frequency band.

Atomic spectra of a gold ore sample with a concentration of gold (1 g/t), which was selected from the Contractor's archive file, were used to search for and delineate anomalies. Information and energy spectra were recorded from the available sample

at the Contractor on the atomic absorption spectrophotometer "Saturn-4EPM" using highly sensitive measuring units of the stationary complex "Poisk". These amplitude-frequency electromagnetic spectra of the gold ore sample were taken as recognition when searching for underground gold deposits in the study area, lying at depths up to 1000-1200 m (depths of 1200 m and deeper can be examined only by field equipment).

The boundaries of the contours of gold ore anomalies were identified by processing analog satellite images (the patented method) in the university's laboratories using radiation-chemical technology that allows identifying and visualizing a gold deposit. As a result of this work, anomalies No. 1 (U01), No. 2(U02) and No. 3(U03), which are shown on satellite image No. 4 (Appendix 2), as well as tectonic faults pattern, have been identified and contoured by visualization of "high brightness" zones (image No. 3 Appendix 2). The points on the borders of the contours of anomalies are shown in satellite images No. 5 and No. 6 (Appendix-2), and their coordinates are summarized in Table-2 (Appendix 3). Due to the low amplitudes of the recognition signals received over anomaly No. 3 (U03), it is classified as unpromising. No further investigation was carried out. Its boundaries are shown in satellite image No. 7 (Appendix 2).

The depths of the ore bodies are measured at three points in each of the 2 anomalies selected on the lines of geological profiles I–I and II–II (satellite images. No. 5 and No. 6, Appendix 2). According to these points, deep sections have been generated (Fig.5 and Fig.6, Appendix 4).
At these points, the depths of the occurrence were estimated:

a) Gold ore anomaly No. 1: (U01);
- point U01-1, H1=54÷58 m, (north), ΔHavrge=4 m;
- point U01-2, H1=360÷366 m, and H2= 662÷667 m (central), Δhavrg≈5.5 m;
- point U01-3, H1=686÷690 m, and H2=1120÷1122 m, (South), ΔHavrg≈3 m;

The length of the I–I profile is ~ 33 m, the width of the anomaly is 41.5 m, the length of the anomaly is 235 m.

The mineralization extends from the southwest to the northeast in the form of 2 quartered veins with an acute angle of incidence of each from depths of 40-45 m to depths of 1122 m of the first and second veins - from a depth of 30-32 m to depths of 690 m (from the ground surface). The average thickness of the mineralization in each vein is ~ 3.5–4.0 m (considering the abrupt decrease in mineralization - no more than 2.0-2.5 m). In addition, a signal of increased intensity is recorded inside the area of anomaly No. 1 (a section on the Space Photo is highlighted. No. 5, Appendix-2) with a size of 40 m × 80 m, where the presence of weak mineralization is recorded in the depth intervals of 4-16 m and 28-44 m, with gold concentrations (1 g/t);

b) Gold ore anomaly No. 2 (U02);

- point U02-1, H1= 38÷41 m, (north), ΔHavrg =3 m;
- point U02-2, H2= 409÷414 m, (central), ΔH=5 m;
- point U02-3, H3= 862÷864 m, (south), ΔH=2 m.

The length of profile II–II is ≈ 26 m, the width of the ore anomaly is ≈34 m, the length is 180 m. The mineralization extends from the southwest to the northeast in the form of a single quarried vein with an acute angle of incidence from the depth of occurrence (from the ground surface) - 30÷32 m to ~ 864 m. The average thickness of the mineralization is Δhav 2.5–3.0 m (considering the angle of incidence - no more than 1.0-1.5 m). In addition, there is a signal of increased activity almost over the entire area of the anomaly, where mineralization is recorded in depth intervals from 3 to 5 m and from 10 to 15 m with a low gold content (1 g/t).
Coordinate points on the borders of the contours of all anomalies are shown in the satellite image No. 5, No. 6 and No. 7 (Appendix 2).

The reliability of the results can be improved only after field surveys (stage II), however, it is difficult to obtain high reliability due to the lack of samples of ore cores with different gold content from similar ore gold deposits located nearby.
To verify the results of the work, 2-3 control exploratory wells can be drilled to the required depth with the study of cores. After obtaining the gold content and related rare metals in cores taken from various depths, it is possible to assess the prospects of anomalies for their further commercial development.

Since the formation of these gold ore bodies is associated with the volcanic activity of the region, therefore, the presence of accompanying rare metals in mineralization should be expected. Presumably, gold ore anomalies are formed in vein-encrusted rocks in the form of fine gold and are confined to deep tectonic faults. The identification of gold ore anomalies was based on the anomalous values of gold (>1 g/t) in terms of the intensity of the recorded signals. Non-intense signals (below the average level <1 g/t) were not considered as ore anomalies. If the capacities of the quartered veins were replenished only at 3 points, then extensions of gold ore rocks near each vein are possible.

Over the entire area of the site, and especially around the boundaries of the identified anomalies, weak "point" manifestations of gold (below background concentrations) are recorded, which are assessed as not promising for examination and were not distinguished on satellite images (due to their small size and low concentrations of metal in them), including on the area of the entire anomaly no.3 (U03).

Based on the results obtained, it can be stated that the two gold ore anomalies No. 1 and No. 2 were found and contoured in the surveyed area, formed in quarried veins with thickness of 1.5 m to 2.0 m, with length of 180 to 235 m. The veins extend in the direction from southwest to northeast. The mineralization has abrupt angles of incidence (7-12°), with a slight inclination to the southeast at depths ranging from 30-40 m to 700-1120 m.

The identified vein gold ore anomalies, presumably, are not of commercial interest due to the small quantity of ores they may contain and the deep occurrence of gold deposits. More detailed surveys of the identified gold ore anomalies No. 1 and No. 2 can be performed using the set of field geophysical equipment (NMR- geo tomographic), as well as by sampling cores at points on geological profiles I-I and II-II with the determination of the actual concentrations of gold and rare elements by the depth of the strike of the mineralization (700 m).

The reliability (accuracy) of the results obtained is estimated at 55-60%, the results are underestimated due to the absence of core samples with commercial gold content.

Chapter I. Goals and objectives of the work

1.1. A brief geological overview of the site location area.

The site is located on the territory of the People's Republic of China in the border region (in the south-east of Mongolia), in the Central Asian orogenic belt of the North China Craton.

Orogenic gold deposits are products of metamorphic fluids released during regional metamorphism associated with various volcanic and hydrothermal activity during the expansion of the lithosphere.

There are about a dozen different deposits of copper, zinc, etc. near the studied area, including gold inclusions in some of them.

The nearest large deposit is Oyu-Tolgoi (Cu+Au), located to the north at a distance of the first tens of kilometers (the territory of southern Mongolia). Many deposits of Cu+Au and rare elements are associated with large tectonic faults. The area under study is located directly within the boundaries of the large Zun-Bayan tectonic fault (Fig - 1).

Карта -схема-1. Район расположения исследуемого участка, находящийся в границах Зун-Баянского разлома

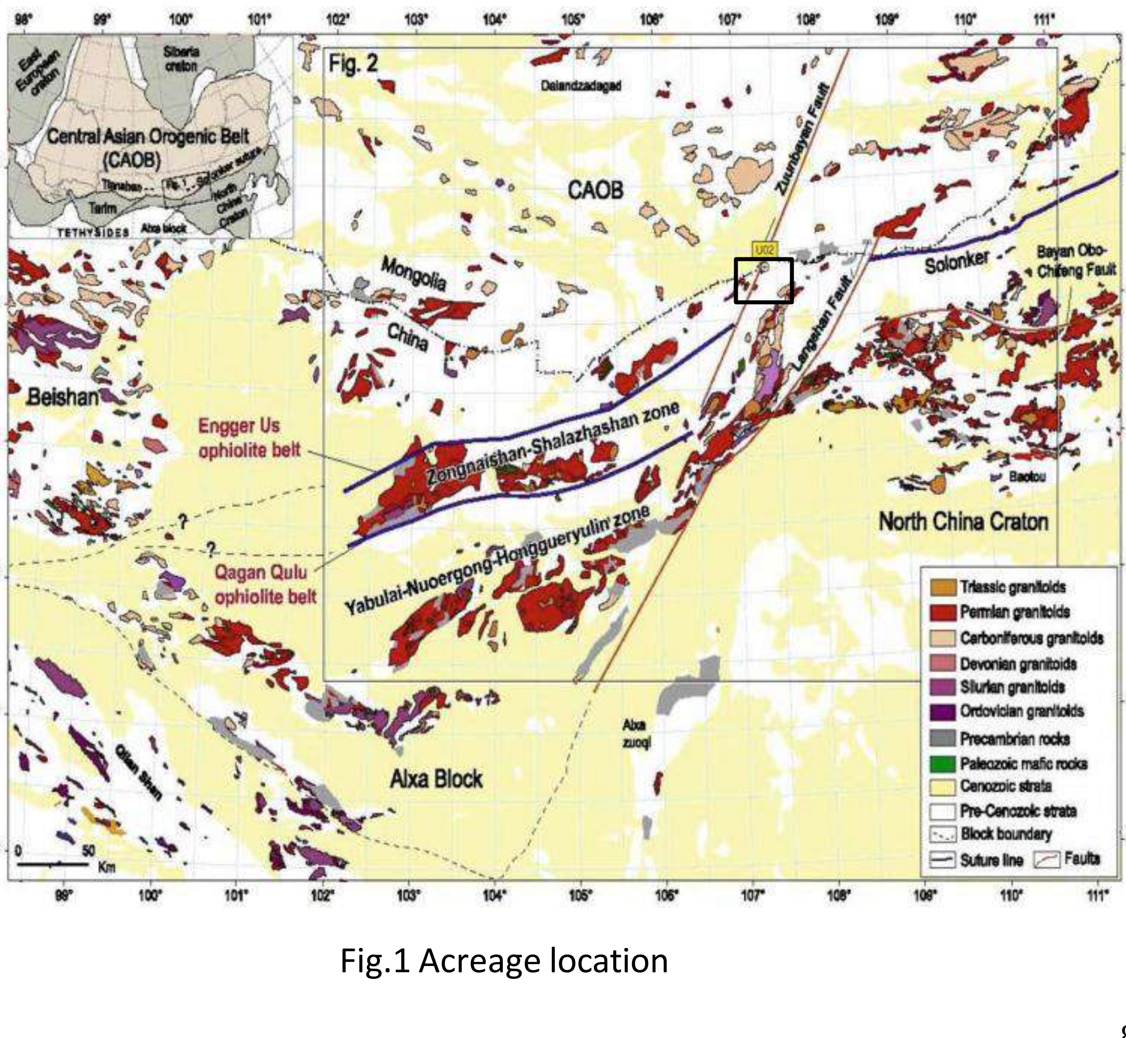

Fig.1 Acreage location

As a rule, deposits of various metals are confined to the outer boundaries of tectonic faults, less often – inside faults.
Based on this, the is located in a zone sufficiently promising for the possible formation of deposits of rare elements with gold inclusions.

1.2. Purpose and objectives of the work.

The purpose of the work is to carry out remote geological and predictive studies to identify deep-lying gold deposits in a licensed area of ~ 0.9 km2, with the determination of the depths of the occurrence of mineralization in the identified anomalies.
The tasks of geological and predictive research are

- determine the boundaries of the areas of dispersion of gold mineralization using remote geo-cosmic technology for decoding digital satellite images;
- outline the boundaries of ore anomalies (with a gold content of 1 g/t) identified in the scattering areas using the equipment of the geophysical complex "Poisk" to decipher a series of detailed analog satellite images;
- estimate the depth of the strike of the tools at individual measurement points on gold ore anomalies;
- select the 2 to 3 points for drilling wells on each anomaly;
- outline tectonic faults pattern in the area under study;
- assess the feasibility of carrying out detailed geological prospecting and drilling operations in specific gold ore anomalies suitable for development.

Due to lack of gold ore samples with a certain content of gold (commercial, cut-off) from the site-under-study (ore samples from a nearby deposit with a gold content in the ore - 1 g/t have been provided), the work was carried out on ore samples with background concentrations of gold and with a content of ≥ 1 g/t.
To process the satellite images, the spectra recorded from the samples of ore samples with background content of gold (1 g/t) and with content more than 1 g/t have been used. The amplitude-frequency spectra of electromagnetic radiation recorded on satellite images were used as tests for remote measurement of background gold content in gold ore anomalies with a high gold content (≥ 1 g/t).

The work is carried out using the remote stationary geophysical complex "Poisk" to survey depths of at least 1200 m. The depth of occurrence of the mineralization is determined at points (2-3 pcs.) selected on the geological profile crossing the anomaly. The calculation of the depths of mineralization is carried out according to the Method specified in Chapter III.

The applied remote technology of search, identification and volumetric underground delineation of minerals is patented by the author's team of the Sevastopol unversity: Patents of Ukraine: No.13408A dated 12/16/1996 MKI G01V9/12; Patent "Method of searching for mineral deposits" No. 35122 dated 08/26/2008; Patent No. 55916 dated 12/27/2010, "Method of searching for natural resources"; Russian patent "Method of mineral exploration", No. 227-2305 dated 20.03.06. Ru.; [25; 35]; International patent "Method of searching for natural resources" European Patent No. 2007A000247 dated 28.05.2008 (Switzerland); International patent "Method of searching for natural resources and equipment for its implementation", No. 601V 3/14 dated 03.02.2015 (Germany).
The use of remote technologies and equipment of the "Poisk" complex makes it possible to speed up the exploration by 2-4 times and obtain financial savings by 8-10 times compared to traditional methods of searching for deep-lying ore bodies.

The setup and testing of the "Poisk" complex were previously performed on samples of gold ore samples with a low gold content (~ 1 g/t) in the deposits of Mongolia and Peru.

The work is done in one step (in-house satellite data processing). Field survey, i.e. detailed examination of anomalies by mobile field equipment (stage II), according to the scope of work, is not carried out.

The reliability of the results of remote search, delineation and determination of the depths of ore bodies in anomalies can be no higher than 60%-65%. Errors in calculations for estimating the depths of mineralization may be at depths of 500-1000 m to ± 5-110 m. More precise depths of ore bodies can be determined only by field equipment (stage II stage).

The accuracy of the results can be assessed by the Customer by comparing them with the available data obtained by other methods of geological exploration at this site.

Chapter II. Technology of remote search for ore anomalies (deposits) of various metals using satellite and geophysical methods of deep sensing of the Earth's environment.

The technology of remote search for deep-lying ore anomalies of various metals is based on a consistent combination of traditional methods for registering the areas of scattering of metal atoms on the ground surface by processing digital satellite photographs, as well as the author's (patented) method of visualizing electromagnetic fields in the form of "high brightness zones" on analog satellite images. Zones of increased brightness in satellite images are formed over a "deposit" of specific ores, which are recorded by stationary or field spectral equipment with electromagnetic radiation frequency spectra characteristic of specific ores. Highly sensitive NMR equipment (NMR geo tomographic) and point electromagnetic exploration installations designed to determine the depths of ore bodies or metal-containing layers of alluvial soils are used as field equipment.

The technology is carried out in 2 stages:

Stage I: Predictive and evaluation work, including remote identification and delineation of areas of scattering of metals over ore anomalies by decoding (processing) digital and analog satellite images, pretreated with phosphors, sensitizers and sustained in radiation fields. According to the results of decoding analog satellite images, the areas of sites (contours of ore anomalies) and gold-bearing alluvial soils are visualized on them in the form of "zones of increased brightness", which are transferred by a video camera combined with a PC to a Google satellite image with a coordinate grid by the method of information overlay. According to the magnitude of the "shift" of the boundaries of the contours of each anomaly, determined by two satellite images taken over the anomaly from 2 aircrafts with different orbital inclinations, the (approximate) depths of the ore body or layers of alluvial metal-containing soil are calculated at one or two or three measurement points on this anomaly.

Stage II: Detailed examination of the detected anomaly using a complex of geophysical equipment installed on vehicles. The NMR geo-tomography verifies the boundaries of the identified "deposit", the continuity of its strike, the boundaries of the "deposit" are linked to the terrain (topo) map and its area is determined. Then, at the points selected on the lines of geological profiles, the depths of the ore-containing rocks (ore bodies) and the thickness of alluvial metal-containing soils (layers) or the thickness of ore bodies are measured (specified). Vehicle routes and coordinates of measurement points are recorded automatically using a PC. The depth measurement of the "deposit" is carried out using NMR geo tomography to depths of 500 m, and by point electromagnetic reconnaissance installations to depths of 500-2000 m. With the help of resonance testing equipment, the intervals of ores with different concentrations of metal along the depth of strike are determined.

According to the measurement points made by field equipment, deep sections of "deposits" (ore bodies) are constructed. Decoding of amplitude-frequency spectrograms at the measurement points is carried out on the stationary equipment of the geophysical complex "Poisk" (in-house work). Processing of spectrograms on the stationary equipment of the geophysical complex "Poisk" allows to determine the intervals of mineralization by the depth of their thickness and the concentration of metals in the ore by the depth of the strike of ore bodies. This makes it possible to calculate the forecast metal resources in each identified anomaly of the "deposit" type.

The technological scheme of the step-by-step remote search technology is shown in Fig.-1 (Appendix 4), functional schemes for delineating and determining the depths of ore deposits are shown in Fig. -2, 3, 4 (Appendix 4).

The step-by-step technology of remote search, delineation and determination of the depths of ore (placer) "deposits" consists of the following sequence of activities of 2 stages:

1. Purchase of necessary consumables, auxiliary technical means, adjustment and state verification of the equipment of the geophysical complex before the start of work. Getting maps of the search area.
2. Delivery from the nearest deposits of rock samples containing ores or samples of folded soil from cores characteristic of the survey area, recording from them information and energy electromagnetic spectra and NMR spectra of atomic elements (metals) included in ore samples characteristic of a specific type of "deposit".
3. Production of materials for the carriers of "test" matrices, recording resonant information and energy electromagnetic spectra from ore samples on them and activating the matrices using radiation and chemical technologies at a research nuclear reactor (IR-100) or at a gamma installation of higher power (GU-1000).
4. Conducting aerospace photography of the surveyed area (aircraft, drone, spacecraft) or purchase of digital detailed and analog satellite images.

5. Radiation treatment of photographs after their chemical treatment (application of phosphors and sensitizers), followed by their decoding using stationary equipment of the geophysical complex "Poisk". Visualization and contouring on satellite images of the boundaries of sites (ore anomalies) in the form of "zones of increased brightness" (glow).
6. Transfer of visualized contours of sites with ore anomalies from a satellite photograph to a map of the search area using a video complex combined with a PC (by superimposing information).
7. Determination of the primary depths of the ore "deposit" (ore bodies) by the magnitude of the shift of the anomaly boundaries on satellite images taken from 2 aircraft with different orbital inclinations.
8. Determination of deep tectonic faults from satellite images made in the infrared frequency range.
9. Assessment of preliminary results of detection, identification and delineation of the boundaries of ore sites with anomalies, assessment of preliminary depths of the strike of the tools. Design of a map-scheme of the survey area indicating the boundaries of the discovered sites with ore and placer anomalies of a particular metal. Preparation of an annotation report for the first stage of work.

Stage II

1. Preparation of equipment for field surveys in selected promising areas with ore and placer anomalies (testing equipment on existing ore cores and on known wells drilled in known "deposits" of this type).
2. Probing of ore anomalies detected at the Stage I using NMR equipment of a mobile geophysical complex installed on vehicles (NMR geo-tomography), to verify the boundaries of the anomaly, their identification and continuity of strike.
3. Registration of the amplitude-frequency characteristics of the emerging electromagnetic field at the measurement points over areas with ore anomalies (ore bodies) arising from the resonant "impact" on ores by radiation from a long-wave generator, NMR geo tomography, on the carrier frequency of which the frequency of the NMR spectrum of the atom of a particular metal in the ore is modulated. Recording by highly sensitive receiver devices of resonant (characteristic for a particular type of ore) amplitude-frequency spectra of electromagnetic radiation at measurement points on anomalies (above ore bodies) and transmitting them to a flash drive (in automatic mode).
4. Clarification of the boundaries of the contours of anomalies (ore bodies) with their binding to the map of the area by GPS receivers. Determination at the

measurement points of the depth of the cap and sole of ore bodies by electromagnetic parameters of the medium, using point electromagnetic exploration installations (up to depths of 2000 m).

5. Construction of deep sections of ore bodies according to selected measurement points on geological profiles with a step of thickening of measurement points – 50-100 m (up to depths of 500 m - 2000 m or more).
6. Processing (interpretation) of the received amplitude-frequency spectrograms on spectral stationary equipment, construction of deep columns at individual points selected for drilling wells for sampling ores (cores). Construction of a project of an ore body model on a PC with an indication of the averaged metal concentrations (content) and calculation of the volumes of forecast ore resources in each anomaly of the "deposit" type.
7. Clarification of the qualitative characteristics of the "deposit" by selecting points for drilling 2 to 3 wells to penetrate ore anomalies (ore bodies), if necessary, drilling 2 to 3 wells with core sampling (performed by the Customer).
8. Estimation of the forecast metal resources in the "deposit" (ore body).
9. Preparation of the final report, the necessary cartographic material and estimation of the forecast resources of ore deposits.

The equipment of the "Poisk" complex and fragments of the technology are presented in photographs No. 1-4 (Appendix 4).

Advantages and benefits of the technology:

- Versatility and ability to remotely search for any types of minerals (oil, gas, gas condensate, gold-bearing and uranium ores, diamonds, ores of various metals, as well as deep-lying underground geothermal and drinking water);
- High success of detection (hydrocarbons – more than 90%, metal ores - 80-85%), the possibility of delineation, determination of the depths of deposits and other deposits (before drilling) and estimation of the resources of deposits. (note: success rate of detection of underground deposits by existing geophysical methods is 30-35%, with the integration of exploration methods – up to 50-60%);
- Possibility to remotely determine the types of anomalies and their primary delineation on a satellite photograph, which ensures the vast area of the search operations (covering large search areas of up to 60 × 60 km), and also reduces the time for searching and determining the preliminary volumes of forecast resources of deposits of deposits to 5-6 months (standard methods – up to 2 years);

- Low cost of work on the detection and identification of anomalies (deposits of ore bodies) due to less quantities of seismic and exploratory drilling;
- No need to carry out a the whole set of geological studies of the area of accumulations (deposits) by many traditional methods of exploration (magnetic exploration, seismic, radiation and geochemical exploration, electrical exploration), since this technology determines the type and profile of the actual "deposit" (ore body), not just the geophysical features which traditionally imply where to drill and core the identified geological bodies that might not contain hydrocarbon or metals of commercial values;
- Ability to remotely determine approximate quantitative indicators and the quality of minerals before drilling (volumes, the presence of pollutants (gases), the depth of occurrence of all horizons and ore bodies, gas pressure in the hydrocarbon horizons, the average content of metal in the ore body), which eliminates the financial risks of drilling /mining unpromising "deposits" or empty "hydrocarbons- traps";
- High efficiency of work (Stage I) on the primary search and identification of sites with a "deposit" on large areas,
- Success rate of identification of ore bodies is 65-70%, and according to the results of the I and II stages (field) success rate reaches more than 80-90%.

The technology has been successfully used for many years to search for various minerals in many countries (Mongolia, UAE, Australia, USA, Ukraine, Russia, Indonesia, DR Congo, Kazakhstan, Peru, etc.).

Chapter III. Methods of performing work on the search, delineation of ore anomalies, determination of the depths of their occurrence using methods of remote geo-cosmic sensing of the Earth's environment and field equipment of the geophysical complex "Poisk"

The work is carried out according to the general technology of remote search for ore anomalies, shown in Fig. 1-4, (Appendix 4). The methodology provides for the integration of remote traditional and author's (patented) methods of geo-cosmic sensing of the Earth's environment using aircraft and space means of searching for ore anomalies, as well as field measurements of the depths of the "deposits" using NMR equipment of the geophysical complex "Search" (up to 500 m) and small-sized installations of point electromagnetic sensing of the environment "Cycle-Micro-05" or "Phoenix" (up to depths of 2000 m).

When performing the work, previously developed regulatory and operational documents for remote sensing of the Earth's environment using the equipment of the geophysical complex "Search" are used:

- "Operating instructions for the complex "Search" for deep sounding of rocks in the terrestrial environment for the search for minerals", SNUEIP, NPC "Nuclear Chemical Technologies", city of Zheltiye-Vody, GP "Vostok", 1998, 21 pages;
- "Methods of remote search, delineation of sites of hydrocarbon deposits, polymetallic ore bodies, underground and geothermal water flows using the equipment of the geophysical complex "Search"", SNUEIP, Ministry of Ecology and Resources of Ukraine, Kiev, 2007, 30 p.

Identification and delineation of the boundaries of ore anomalies of various metals (copper, gold, molybdenum, uranium, etc.) are performed using the author's and traditional geo-cosmic (satellite) methods of probing the Earth's environment by decoding / processing satellite images. Technologies allow within a short time to obtain at the first stage of work the necessary primary information about the presence of the scattering areas (halo) of the desired metals and their contour boundaries on the surveyed area, and then to identify the contours of promising deposits in them.

The following sequence of work is provided for when searching, identifying and delineating the boundaries of various ore anomalies or placer gold and diamonds in alluvial soils:

a. photographing the surveyed area in the ultraviolet spectral range from spacecraft or aircraft (aircraft, helicopter, drone) to detect (visualize) primary areas of scattering of background concentrations of metals on the ground surface (by specific visible signs);

b. taking photographs (or receiving data from satellites of the USA, EU and the Russian Federation) in the visible range of the spectrum to identify (clarify) signs of specific ore anomalies within the boundaries of areas based on the results of processing of the photographs (in automatic mode using GIS programs);

c. conducting (obtaining data of) radar survey of the territory (if necessary) using Terra SAR-X, RADARSAT-2, Envisat, etc. satellites to identify signs of tectonic faults and reduce the masking effect of vegetation cover on a clearer visualization of signs of ore anomalies;

d. obtaining detailed hyperspectral images from the EO-1 satellite (Hyperion), etc. to identify changes in the background characteristics of vegetation cover (change in leaf color – "blue shift") directly above ore anomalies, allowing to outline the primary boundaries of promising ore anomalies, as well as placer gold in alluvial soils;

e. obtaining and decoding of local and regional photographs in the IR range (IR shooting) to determine discontinuous faults or tectonic faults through tracing deep (hot) water discharge zones, drawing their boundaries on the area map;

f. obtaining and decoding analog photographs according to the author's method for identifying and outlining specific metal-containing ore bodies (deposits), as well as placer gold (diamonds) in alluvial soils by highlighting "zones of increased brightness" formed above anomalies;

g. remote determination of the approximate depths of the occurrence of deposits on the identified anomalies, based on detailed (analog) photographs taken from 2 satellites and having different orbital inclinations, by calculating them by the "magnitude of the shift" of the boundaries of the contours of the anomalies.

According to the results of the Stage I, the types of ore anomalies are identified, their delineation is performed, the primary areas of ore and alluvial anomalies, their depths of occurrence are determined, and tectonic faults are applied on the surveyed area of the territory.

To clarify the results of the primary analysis, the depths of the mineralization and their thickness are measured at the measurement points on each anomaly, using small–sized field installations of point electromagnetic sensing - "Phoenix" (Canada), "Cycle-Micro-05" or NMR equipment (NMR geo-tomography), which are part of the geophysical complex "Poisk" (Stage II). Measurements are carried out in accordance with the requirements of the operating instructions for electrical exploration installations and NMR equipment of the Poisk complex.

When measuring the depths of occurrence of specific types of tools and their capacities (at points selected on the geological profiles of the anomaly) using the field geophysical complex "Poisk", its adaptation and adjustment is carried out beforehand, which consists in the following:

- study of the chemical composition of samples of specific ores with different concentrations of metals in them (background value, minimum, average and maximum) and samples of ore-containing rocks of alluvial soils in order to establish "reference" (distinctive) metal atoms included in their compositions (Ti, V, C, S, N2, U, Cu, Ag, Mo, Au, etc.);
- recording on "test" carriers of NMR spectra (creation of a data bank for field equipment) reference metal atoms, as well as sulfur, carbon, nitrogen, etc., which are part of samples of various ores and soils (i.e. creation of a bank of test "matrices");
- recording of integral (information-energy amplitude-frequency electromagnetic) spectra from ore samples with different concentrations of the desired metal on "working" spectrum carriers (creation of a bank of "working matrices");
- recording of integral spectra (information and energy spectra) from samples of ore-bearing rocks and alluvial soils on "working" spectrum carriers ("working matrices");
- transfer of spectral characteristics of reference metal atoms (NMR spectra), as well as information and energy spectra (integral spectra) of ore samples with different concentrations of metals and rock samples to magnetic organometallic carriers – "matrices" (test and working);
- testing on bench equipment of modulation of spectral frequency characteristics from carriers ("matrices") to the operating frequency of the master long-wave generator;
- setting up the master generator and measuring NMR equipment for remote detection (identification) of specific ores (setting frequencies, amplitudes, polarization of the exciting signal, etc.), i.e. ensuring high penetration of the search signal and obtaining the measured parameters of the recognition spectrum of the signal;

- testing in laboratory and field conditions of resonant excitation of samples of various ores (and rocks) when they are exposed to the modulated frequency of a long-wave generator, by registering the characteristic recognition electromagnetic field they generate. Test samples are placed at various distances from the generator antenna: (in laboratory conditions – 25 m, in the field conditions – near operating wells with rock depths up to 100 m).

The resonant spectral characteristics of reference metal atoms (NMR spectra) selected as recognition ones for selective identification of specific metal concentrations in ore and in ore-containing rocks (soils) are recorded in the data bank of the stationary complex "Poisk" using blocks of stationary spectrometric equipment included in the stationary geophysical complex "Poisk". Reference metals or nonmetals are selected for each type of mineralization (and host rocks), based on the significant difference in their concentrations of elements or their characteristic integral spectra. Signal amplitudes are also taken into account when recording information and energy spectra from each ore sample (rocks, soils). Information and energy spectra of the desired substances are recorded using an atomic absorption spectrophotometer S-115-4EPM and transferred to working magnetic media ("matrices") using highly sensitive recording units. These "matrices" are used for resonant excitation of the desired ores in the terrestrial environment by exposing them to the polarization signal of the master generator modulated by the frequencies of the NMR spectra of specific metals [5, 7, 10] and with simultaneous exposure to the terrestrial environment (at the measurement point) of a pulse generator of a small-sized installation of point electromagnetic exploration "Cycle-Micro-05" or "Phoenix" installations (creation of an "ionization" channel in the environment).

To study the elemental composition of ores and rocks (soils), neutron activation or X-ray fluorescence methods are used to determine the concentrations of nonmetals and metals in them [31, 79, 80, 81, 83, 84, 85, 86].

The elemental composition of ore samples of various metals and their integral spectral characteristics (information and measurement spectra) are entered into the data bank of the stationary complex "Search". At the same time, all NMR spectra of reference metals in ores and rocks are recorded on "test" matrices and serve as additional recognition parameters for identifying specific concentrations of metals in ores when processing the results of field measurements at the stationary complex "Poisk" during in-house work.

The preparation of the matrix material and the production of "working" and "test" matrices is carried out in a radiochemical laboratory and consists in mixing organic substances (sucrose, polyvinyl alcohol, lactose and ceramic flour) with a small number of rare elements with increased magnetic properties.

Rare elements are "crosslinked" with organic substances in a thin layer using radiation-chemical technologies (under the influence of high-power gamma radiation) using the gamma installation GU-1000. The remainder of the "unstitched" molecules of rare elements is washed out with acid solutions. The activated matrix material is then cut into 40 × 60 mm plates. With the help of highly sensitive equipment of the "Search" complex, resonance spectra of reference chemical elements (metals) and information-energy spectra (integral spectra) are recorded from ore (rock) samples onto manufactured plates of "working" matrices (two sets per 1 spectrum) and "test" matrices.

Sets of "working" and "test" matrices are used to modulate the resonant frequencies of the atomic spectra and information-energy spectra of the desired substances to the carrier frequency of the long-wave electromagnetic polarization radiation generator when conducting remote excitation of these substances in the Earth's environment with the natural magnetic field of the Earth [107, 108, 109, 110].

In the field survey (Stage II) the modulated polarization signal via the "ionization" channel (created by the "Cycle-Micro-05" installation and a rotational electromagnetic field) is directed deep into the Earth's environment using a narrowly directional antenna from the master generator for remote resonant perturbation of an atom of a reference element in ore or several elements in ore [22, 24, 107]. At the same time, a characteristic electromagnetic field appears above the ore anomaly (the anomaly of placer gold), which is recorded by a highly sensitive receiver device tuned to the recognition resonant frequency of a specific sample of samples (ore, rock or soil type). The high sensitivity of the receiver device is provided by the choice of an electronic circuit based on a modulation radiometer (patented), which allows measuring the value of the useful signal by an order of magnitude lower than the value of noise signals.

In laboratory conditions, specific samples of ore samples (placed in a rotational electromagnetic field), rocks (soils) are sequentially excited by a modulated test signal of the master generator and the selectivity of registration of "resonant fields" is checked by field measuring equipment and equipment of the stationary complex "Poisk" from distances up to 25 m.

Remote operational determination and delineation of the boundaries of ore anomalies on large survey areas is carried out using stationary equipment of the geophysical complex "Search" by decoding satellite and analog photographs using traditional and author's methods. Satellite images are taken from spacecraft or aircraft (drones). With the author's method of decoding, analog space photographs (before decoding) are transmitted to the radiochemical laboratory. Images and information from an analog photograph are transferred to a space (digital) photograph with a special paper coating. This photograph is processed with a gel solution containing photosensitive phosphors, photosensitizers and other additives (nanoparticles) of rare elements, depending on the substance being determined in the terrestrial environment (ore, rocks, alluvial soils) [107, 108].

The photos treated with the solution and dried are kept in radiation fields until the characteristic glow of the entire photograph appears. After the irradiation is stopped, their exposure is carried out for a certain time under the influence of a rotational electromagnetic field and a modulated signal of a master generator configured to identify a specific type of ore. After a certain time, the glow of the entire photograph stops and only those areas in the photograph (areas of increased brightness) in which the specific substances (ore) are located continue to glow.

On other processed photographs, the boundaries of "increased brightness" (glow) are determined, where there are areas with other desired substances (rocks, soils). In this case, the frequency of the master radiation generator is modulated by the corresponding frequency of the information and energy spectrum of the identified substance or the NMR spectrum of the atom of the reference element in the substance. The reliability of identification of ore anomalies in the surveyed area reaches 65-70%.

The boundaries of the "luminescent" anomalies in the photograph ("high brightness" zones) are outlined and transferred using a video camera combined with a PC to the map of the survey area (by the method of information overlay).
To remotely determine the approximate depths of the deposits on the identified anomalies, their areas are subjected to repeated detailed satellite photography from 2 spacecraft with different angles of inclination of the orbits. According to detailed (analog) photographs taken from 2 satellites and having different orbital inclinations, the depths of the deposits (primary, approximate) are determined by calculating

them by the "magnitude of the shift" of the boundaries of the contours of the anomaly. Analog photographs can be used repeatedly.

During field work, mobile equipment is used to remotely determine the depth of occurrence and the power of the tools (NMR geo-tomography, installations "Cycle-Micro-05" or "Phoenix").

When using the Phoenix and Cycle-Micro point electromagnetic sensing installations in the field, the determination of the depths of the deposits is carried out in accordance with the instructions for their operation. Before starting measurements, the installations are calibrated on known "deposits" and on sites without "deposits". The processing of the received field work data at the measurement points is carried out at the stationary complex "Poisk". By analyzing the frequencies and amplitudes of the recognition electromagnetic fields recorded with the help of mobile equipment over ore anomalies, the content of metals in ores is determined. On the surveyed area, field equipment usually performs at least 30 - 50 measurements of the depths of the deposits. Points are selected on geological profiles. These data are then used to construct deep sections of anomalies with different steps between the measurement points.

The altitude above sea level is estimated at the points of measurement of the depths of the deposits.

The distance between the measurement points of the depths of the mineralization may vary from 50 m to 250 m, depending on the required accuracy of calculating the forecast ore resources. The small-sized field equipment "Cycle-Micro-05" and the NMR geo-tomography allow measurements to be carried out continuously when placed on a car (at a low speed of movement). At the same time, the recognition spectra of the tool are recorded automatically on a external disc (hard disc). When measuring the depths of deposits from 500 m to 2000 m, the Phoenix installation is used.

Interpretation of the data obtained, if necessary, is carried out by the Contractor together with specialists of the mining and geological department of the Customer, by comparing the constructed geological sections and comparing them with the structural and tectonic map of the surveyed area, as well as with other data obtained when performing traditional methods of geological exploration, including electrical exploration (seismic, etc.) or exploratory drilling (if they are available from the

Customer). In the absence of data from the Customer, the reliability of the results is confirmed by drilling 2-3 wells (performed by the Customer).

The method used allows to significantly reduce the total exploration time up to 5-6 months. The methodology reflects the experience of conducting search operations using the equipment of the "Poisk" complex when performing contracts for governmental agencies in 2004-2008 (Ministry of Emergency Situations of Ukraine, the Ministry of Ecology and Resources of Ukraine, the Ministry of Energy of Ukraine, Mongol atom (search for uranium, gold ores, copper, molybdenum, diamond placers), as well as for commercial enterprises and companies from Russia, Ukraine, Mongolia, UAE, USA, Australia, DR Congo, Indonesia and Kazakhstan. After the completion of the field work of the II stage, the accuracy of the results increases to 85-90%

Chapter IV. Composition and technical characteristics of the remote geophysical complex "Poisk"

4.1. System characteristics of the remote geophysical complex "Poisk"

The geophysical complex "Poisk" has been developed by Sevastopol State University and includes a new generation of field and stationary equipment for remote sensing of the Earth's environment (up to depths of 6000 m), designed to search for various minerals, which has confirmed its intended purpose in practice. The complex is an organized system of NMR equipment (NMR geo-tomography), radiometric spectral equipment and point electromagnetic reconnaissance installations, combining the following interconnected functional sets:

- a set of field technical means of remote sensing of the Earth's environment for the identification of various minerals and objects underground (and underwater);
- a list of technical stationary means of measuring and processing electromagnetic field spectra and other information obtained from mobile field units of NMR equipment and small-sized installations of point electromagnetic exploration, as well as resonance test devices designed for remote identification of ores and ore-bearing rocks (alluvial soils);
- a list of technical, methodological and operational documentation on the use of equipment of the geophysical complex "Poisk" and small-sized installations of point electromagnetic exploration;
- a list of software products for automated processing of the results of the measurements performed, as well as displaying them in various forms and on a map-diagram of the terrain of the surveyed area.

4.2. The composition of the equipment of the complex

The complex consists of the following devices, nodes, units etc:

- a set of aerial photography instruments (if necessary, brands-M1, UMK, etc.) or detailed space, aviation and analog photographs of the survey area;
- nuclear magnetic resonance research facilities;
- atomic absorption spectrophotometers (S-115M, S-115-4- EPM "Saturn");
- MII-4 microscope with video console to PC;
- scanning microscope Phenom Pro (Holland);
- green LASER MODULE KLM-A532-5-5 (3000 MW);

- red laser (2000 MW);
- blue laser (1000 MW);
- BMI Incli Tronic Plus laser goniometer (measurement accuracy 0.01°);
- VM 601080 LASER LEVEL GAUGE;
- spectrometers of X-ray fluorescence radiation energy SER–01 ("Elvax Light", Kiev) - 2 sets;
- a set of spectral equipment based on MDR-41 monochromators with laser prefixes (OKB "Spectrum", St. Petersburg), laser power (≤3000 MW);
- magnetron sputtering installations IB–5 (ION COATOR, Japan);
- vacuum sputtering installations of metal nanoparticles on plates "MULTICOATER", model VX-10A (Eico Engineering Co);
- GPS navigator-Garmin;
- portable field radio station for 2 subscribers (range – 2 km);
- ACER laptop;
- CPU Desktop Pentium 4 – 2 pcs;
- MUTLI 6CN 66 batteries;
- generators of radiation of various wavelengths of electromagnetic waves;
- dosimeter DSK-04 (laser and gamma radiation dosimeter);
- a highly sensitive device for geophysical measurements of electromagnetic fields (BP-M No. 08-2001) and a magnetic field strength meter in three axes X, Y, Z ("Pulse", EU);
- PC with software;
- stationary gamma radiation installation with a dose rate of up to 1000 r/hour;
- Kanbera-Paekart equipment (USA) for neutral activation analysis of samples of minerals and various substances;
- chemical and radiochemical laboratories of class 2 for working with open isotopes;
- low-power laser installations (up to 3000 MW) combined with rotational electromagnetic field devices;
- EMI-PZ-3-41 energy flux density meter with AP-3 and AP-5 sensors;

- mobile transmitting resonant-test equipment of electromagnetic radiation and highly sensitive measuring equipment of electromagnetic field (G-microwave and BI-microwave units);
- small-sized electric field strength meter with IPM-101 M processor (sensor E-01M and H-01M);
- small-sized Accumeter Super PRO-VI electrical exploration units (USA) and electromagnetic reconnaissance of the Cycle-Micro–05 and Phoenix types (Canada);
- UNISCAN-24 geo-cosmic data reception units located in the university;
- a technological unit for the chemical processing of photographs with the installation of vacuum spraying of prepared solutions of reference metals, lactose, phosphors and sensitizers on them;
- electronic prefixes to the Saturn spectrophotometer for scanning from samples of samples (minerals of ores, host rocks, samples of samples of alluvial soils) of information and energy spectra and recording them on "test" and "working" matrices;
- "test" matrices with recorded NMR spectra of atoms of substances (metals) that are part of various types of minerals;
- high-traffic road transport (for field work) with the NMR equipment (NMR geo-tomography) and small-sized installations of point electromagnetic reconnaissance, mobile (satellite) communications and GPS receivers;
- laptop, with programs for automated recording and processing of geophysical measurements in the field ("Map Info") – international topocards and GIS, according to "Gredo Geo" for processing geophysical measurements;
- a PC software package for determining the coordinates of points and the route of the survey in the area and displaying them on a geographical map;
- stationary identification complex "Spectrum" for decoding the recorded resonant information and energy spectra of the desired substances and comparing them with "test" NMR spectra;
- a center for processing geophysical characteristics, interpreting field work materials and constructing deep sections of various anomalies and ore bodies with different metal concentrations based on them;
- editorial and publishing complex for the preparation of charts, accounting documents and materials for the estimation of forecast resources of "deposits".

Before the field survey starts, the measuring equipment of the mobile complex "Poisk" is configured at known sites of the deposit or near the control wells for remote determination of the depths of the ores of various minerals.

4.3 Technical characteristics of the "Poisk" complex

The probability (accuracy) of selective remote identification of types of minerals (ores, hydrocarbons, placer gold, groundwater) at depths up to 2000 m (ore) and up to 5000 m (hydrocarbons, groundwater) during the I and II stages of work:

- oil – > 95 %;
- gas – 94-95 %;
- water – > 95 %;
- polymetallic ores – 85-90 %;
- metal materials – 95-98%.

1. The error (based on the results of remote measurements) in calculating the projected volume resources of hydrocarbons, ores, drinking and geothermal waters is ± 25-30%.
2. The permissible deviation of the results of remote determination of the boundaries of the contours of anomalous areas, ore "deposits", ore bodies is:
   - when deciphered by the stationary complex "Poisk" of high–resolution aerospace photographs - ± 6-15 m (depending on the accuracy of tcorrelation with sayellite images of the area);
   - when directly examining the boundaries of the deposit using mobile equipment (field) complex "Search" – ± 3-4.5 m (depending on the accuracy of GPS receivers).
3. Permissible error in determining the depths of ore bodies, hydrocarbon reservoirs and water-saturated soils:
   - at a depth of 1000 m - ± 0.2% of the depth;
   - at a depth of 5000 m - ± 0.25-0.3% of the depth;
4. Weight of the equipment of the field mobile complex "Poisk" is up to 60 kg.
5. Weight of the equipment of the stationary geophysical complex "Poisk" is more than 1200 kg.
6. Sensitivity of the complex for remote identification of various organic (inorganic) substances and deposits of various metals ≥ 1 g/t underground.

4.4. Technical characteristics of modified electromagnetic reconnaissance units

a. Phoenix 10-07 (Canada)

- The dynamic range of the measured electrical signal is at least 100 dB.
- The maximum measured voltage of the transient signal is at least 4 V.
- Transient measurement time range from 100 ns to 30 ms.
- The RMS value of the channel's own noise with a shorted input, determined with the number of accumulations N = 64 and the initial measurement time of 1 microsecond, does not exceed 0.5 mv.
- Power is not more than 2.5 W, power supply is 12 V.
- The output voltage of the meter is from 4 to 10 V.
- Duration of the measured current pulses is from 100 to 1000 microseconds.
- The equipment ensures operation when synchronized from the high-precision time scale of the satellite system receiver (GPS).
- The equipment provides data exchange with the computer via a USB port.
- Overall dimensions of the Phoenix equipment are 440×380×180mm.
- The weight of the Phoenix equipment is 6 kg (without batteries).

b. Cycle-Micro-05 (Ukraine)

- Dynamic range of transient EMF measurement, not less than 140 dB;
- Intrinsic noise of the measuring channel when the input is shorted

  -in the 500 kHz band - 50 mv;

  -in the 1 kHz band - 0.5 mv;
- Maximum measured voltage - 3 V;
- Transient measurement time range - 400 ns – 56 s;
- 50 Hz interference suppression - at least 60 dB;
- Powered by a DC voltage source - 12V;
- Power consumption - 3W;
- Weight - 3 kg;
- Dimensions - 295×195×90 mm;

Chapter V. Work sequence and the main results

The work was carried out in accordance with the scope of work in the sequence specified in chapters I, II and III of the report (Stage I). The boundary of the total area of the survey is shown in satellite photograph No. 1, (Appendix-1). The area of the acreage is 0.9 km2.

The work of the Stage I was carried out using the equipment of the stationary geophysical complex "Poisk" and satellite means of photo-exploration in accordance with the "Methodology" specified in Chapter III.

The following activities were carried out:

1. Working" and "test" matrices are made of special metal-ceramic and polyvinyl materials (for recording on them NMR spectra of gold atoms and information-measuring electromagnetic spectra of gold ore samples and quartz vein samples;
2. A set of ore spectra was recorded on the manufactured matrices using the recording blocks included in the "Poisk" complex;
3. Test samples of ores (rock) were determined and NMR spectra of gold atoms in them were recorded to identify gold ore anomalies and areas of gold scattering (halo) on the ground surface (CAu <<1 g/t);
4. Yhe recording of amplitude-frequency electromagnetic spectra (information and energy) from gold ore samples and from samples of pure gold was carried out using the atomic absorption spectrophotometer Saturn-4EPM and a highly sensitive prefix (block) of the complex "Poisk" (excitation of ore metal atoms in the flame of a gas burner, t=+2500 ° C);
5. The recorded amplitude-frequency electromagnetic spectra of atoms of various gold ore samples were transferred to "test" and "working" matrices (CAu<<1g/t and CAu=1g/t);
6. The equipment of the "Poisk" complex has been configured for selective registration of resonant electromagnetic spectra of test samples of gold ore samples, as well as spectra of pure gold atoms (99%) in laboratory conditions;
7. Satellite image survey of the area of the acreage has been performed (a set of digital satellite photographs and detailed analog satellite images for conducting research have been obtained);
8. Processing of digital satellite photographs of the visible spectrum in radiation fields was performed, the boundaries of 3 detected areas of scattering of gold-ore anomalies (with a background content of Au<<1g/t) were visualized,

Satellite photo No. 2 (Appendix-1);

9. Digital satellite images were processed in the IR frequency range, a pattern of tectonic faults was mapped (Space photos. No. 3, Appendix-2);
10. Detailed analog satellite images were processed, the boundaries of contours ("zones of increased brightness") were identified – 3 gold ore anomalies No. 1 (U01), No.2 (U02) and No. 3 (U03) with a concentration of gold CAu = 1g/t (Satellite image No. 4, Appendix-2).

The technology and methodology of the work are described in more detail in chapter II and III of the report.

The decoding / processing of satellite digital photographs covering the survey area (4th photograph) was carried out using traditional GIS programs to visualize the areas of scattering of gold mineralization on the ground surface [108, 111, 112]. This information did not allow us to identify more precise boundaries of the contours of gold ore anomalies due to significant man-made "contamination" of the soil with background concentrations of gold, in most of the area of the site.

The decoding of analog satellite photographs was carried out using the author's method of visualization of ore anomalies in the form of "zones of increased brightness" [23, 33, 34, 36]. At the same time, analog photographs were treated with organic salts, phosphors and sensitizers, and then placed in radiation fields for a period of 1-5 days (before irradiation with doses > 5 · 10^5 Коentgen). After "radiation cooling" of the photographs for 1-2 hours, they were placed in a rotational electromagnetic field and read by the stationary equipment of the "Poisk" complex the necessary information on the intensity of the glow of the areas ("zones of increased brightness"), allowing to identify the boundaries of abnormal areas with a gold content of 1 g/t. The boundaries of the contours of gold-ore anomalies were automatically transferred using a camera combined with a PC to a satellite photo. No. 4, (Appendix 2) having a coordinate grid. As a result of processing a series of detailed analog satellite photographs, the boundaries of 3 gold ore anomalies were clarified - No. 1 (U01), No. 2 (U02) and No. 3 (U03) (Satellite Photographs No. 5, 6, and 7, Appendix 2). On the gold ore anomaly No. 3 (U03), the intensity of the registered recognition signal turned out to be very low, so this anomaly is classified as not promising. Detailed studies have not been carried out on it. Coordinate points at the boundaries of the contours of anomalies are shown in Table-2 (Appendix 3).

In order to measure the depth of the deposits in anomalies No. 1 (U01), No. 2 (U02), 12 detailed analog satellite photographs covering the boundaries of these anomalies were processed. Then, at the selected 3 points on the lines of 2 geological profiles I-I and II-II intersecting the 2nd perspective anomalies (No. 1 and No. 2), estimation of the depths of the deposits in them were performed. The depths of the mineralization were determined by calculating them by the magnitude of the amplitude of the resonant signals and by the magnitude of the "shift" of the boundaries of the contours of anomalies measured simultaneously from two satellites (images) having different angles of inclination of the axes of the orbits [99, 102, 103]. The measurement data points and geological profiles are shown in satellite images No. 5 and No. 6 (Appendix 4), and the coordinates of the points and the depth of the mineralization at the measurement points are indicated in Table-2 (Appendix 3).

The depths of occurrence of gold deposits measured at three points in each anomaly and selected on the lines of geological profiles I–I and II–II were from the ground surface:

a) Gold ore anomaly No. 1 (U01):

- point U01-1, H1= 54 ÷ 58 m, (north); ΔHavrg = 4 m;
- point U01-2, H1= 360 ÷ 366 m, and H2 = 662 ÷ 667 m (central); ΔHavrg1= 6 m; ΔHavrg2= 5 m;
- point U01-3, H1= 686 ÷ 690 m, and H2= 1120 ÷ 1122 m, (south); ΔHavrg1= 4 m; ΔHavrg2= 2 m.

The length of the I–I profile is 33 m, the width of the anomaly is 41.5 m, the length of the anomaly is 235 m.
The direction of the horizontal extension of the mineralization is from the southwest to the northeast. The extension of the mineralization in the form of 2 quartered veins in depth occurs at an acute angle of incidence (5-7°) to the southeast.

b) Gold ore anomaly No. 2 (U02):

- point U02-1, H1= 38 ÷ 41 m, (north); ΔHavrg= 3 m;
- point U02-2, H1= 409 ÷ 414 m, (central); ΔHavrg= 5 m;
- U02-3, h1= 862 ÷ 864 m, (south), ΔHavrg = 2 m.

The length of the profile II–II is 26 m, the width of the anomaly is 34 m, the length is 180 m.
The direction of the horizontal extension of the mineralization in the form of a single quarried vein is from the southwest to the northeast. The fall of the mineralization occurs at an acute angle (7-12 °) to the southeast.
The depths of the strike of the mineralization were determined from the ground surface and are shown in Fig.5 and Fig.6 (Appendix 4). Taking into account the abrupt angles of incidence, the actual thicknesses of the quartered cores were ~1.5-2.0 m.

According to the intensity of the "background" signals in the "high brightness zones", it can be additionally noted that in the area of anomaly No. 1 (U01) there is a small area (40 m × 60 m) in its central part, where the continuity of the gold ore anomaly is recorded in the depth intervals from the ground surface of 4-16 m and 28 ÷44 m (Fig.5, Appendix 4) with gold content in the ore of 1 g/t. Similarly, in the area of almost the entire gold ore anomaly No. 2 (U02), the continuity of the gold ore anomaly is recorded in the depth intervals of 3-5 m and 6-15 m with gold content in the ore of 1 g/t. These "background" values of gold content (1 g/t) in the upper horizons of ore bodies and an abrupt drop in the depth of the ore deposits do not allow us to assess the continuity of ore occurrences throughout the depth of their strike. This can be done only with the use of mobile field equipment (NMR geo-tomography) and in the presence of ore samples with commercial concentrations of metal in them. Therefore, it can be assumed that at other depths it is also possible to increase the thicknesses of the ore bodies.

It is advisable to drill 2-3 exploratory wells in these anomalies to clarify the continuity of mineralization, to determine the content of gold and related metals in the ore by the depth of the strike of the mineralization (up to 700 m). After that, it is possible to finally assess the prospects for the development of these anomalies and their further detailed examination with search and evaluation drilling operations and evaluation of the forecast resources of metals in anomalies (gold and rare elements).

Based on the preliminary results of the study, it is not possible to classify the site (with an area of 0.9 km2) as promising, since the identified two ore anomalies No. 1 (U01) and No. 2 (U02) are quartz-vein geological bodies of low thickness (ΔHavrg = 1.5-2.0 m), small in size (their length is 180m and 230 m) with an abrupt drop of veins at an angle (7-12 °) and extending to a great depth (700-1200 m). During their mining, it will be necessary to extract a large volume of soil and rocks (overburden).

The amount of work performed meets the requirements of the scope of work for the Stage I. The reliability (accuracy) of the results obtained is estimated at 55-60% and is significantly underestimated due to the lack of a set of gold ore core samples with commercial gold content (CAu ≥ 2÷3 g/t).

Conclusion

Fast-track remote evaluation of the acreage (area – 0.9 km2) resulted in the following:

1. By special processing of satellite photographs, with the use of stationary equipment of the geophysical complex "Poisk", the boundaries of three gold ore areas of gold mineralization on the ground surface were identified and contoured (satellite image No. 2, Appendix 1 and satellite image No. 4, Appendix2).
2. Processing detailed analog satellite images (using the author's /patented technology) enabled to identify boundaries of the anomalies associated with the mineralization of gold (zones of "increased brightness") with gold content of ≥1 g/t in each anomaly (satellite image No. 4, Appendix2):
   - anomaly No. 1 (U01), located in the south-western part of the site;
   - anomaly No. 2 (U02), located in the central part of the site;
   - anomaly No. 3 (U03), located in the western part of the site (with a low content of Au, classified as unpromising).
3. Estimation of the approximate depths of the occurrence of mineralization in anomalies were made by the values of the displacement of the boundaries of the contours of the visualized anomalies recorded on 2 satellite images, from aircraft with different angles of inclination of the axes of the orbits. The estimated depths of 2 gold deposits were carried out at three points on each anomaly selected on the lines of geological profiles I–I and II–II, and were (Table 2, Appendix 3):

a) Gold ore anomaly No. 1 (U01):

- point U01-1, H1= 54 ÷ 58 m, (north); ΔHavrg = 4 m;
- point U01-2, H1= 360 ÷ 366 m, and H2 = 662 ÷ 667 m (central); ΔHavrge1= 6 m; ΔHavrg2= 5 m;
- point U01-3, H1= 686 ÷ 690 m, and H2= 1120 ÷ 1122 m, (south); ΔHavrg1= 4 m; ΔHavrg2= 2 m.

The length of the I–I profile is up to 33.5 m, the width of the anomaly is 41.5 m.

The maximum depth of the extension of the mineralization in the form of 2 quartered veins is from 40 m to 1122 m from the ground surface (satellite image. No. 5, Appendix 2; Fig. 5, Appendix 4).

4. Ore bodies have sharp angles of incidence (7-12 °) with a slight slope to the southeast. The length of the stretch of each anomaly in the horizontal plane is 235 m and 180 m, respectively (Fig.5 and Fig.6, Appendix 4).

The coordinates of the points on the boundaries of the 3 identified anomalies are summarized in Table -2, (Appendix3).

5. Based on the obtained results of the study of 2 anomalies (No. 1 and No. 2) with gold content in ores ≥ 1 g / t, it can be assumed that the mineralization is of the quartz-vein type, steeply dipping to depths of 700÷1200 m with an insignificant thickness (taking into account the angle of incidence the average thickness is 1,01.0-1.5 m) and a horizontal length from 180 m (No. 2) to 235 m (No. 1). Commercial mining of gold in these anomalies is deemed not feasible.
6. To evaluate how promising are the deep-lying ore bodies in 2 anomalies, it is advisable to drill wells at 2 to 3 points with core sampling and determination of gold content and that of other rare elements in the ores of anomalies No. 1 (U01) and No. 2 (U02) at depths from 30 m to 700 m.
7. Accuracy of the results obtained on the delineation of gold ore anomalies and the determination of the depths of the strike of mineralization is estimated at no more than 60-62%.

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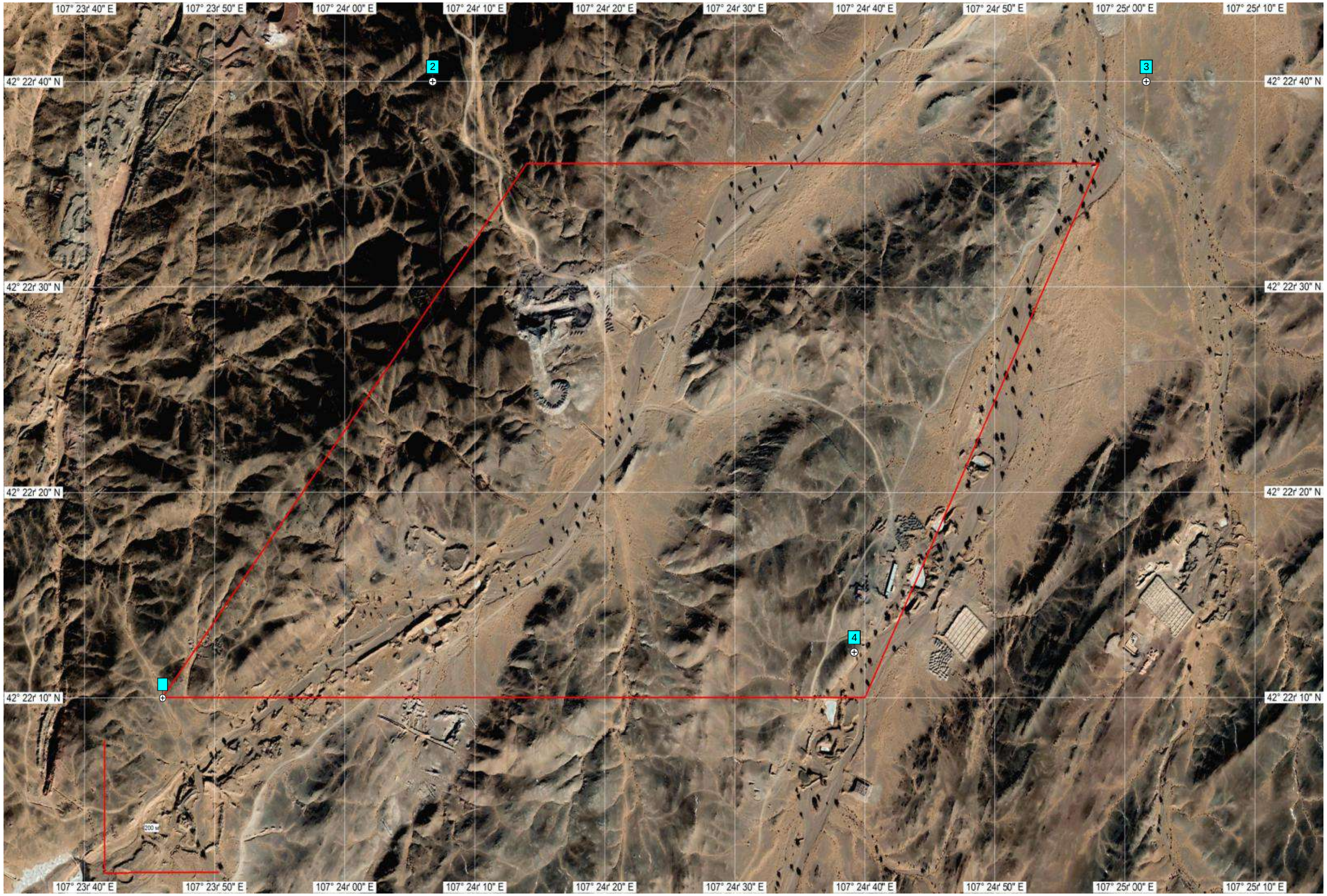
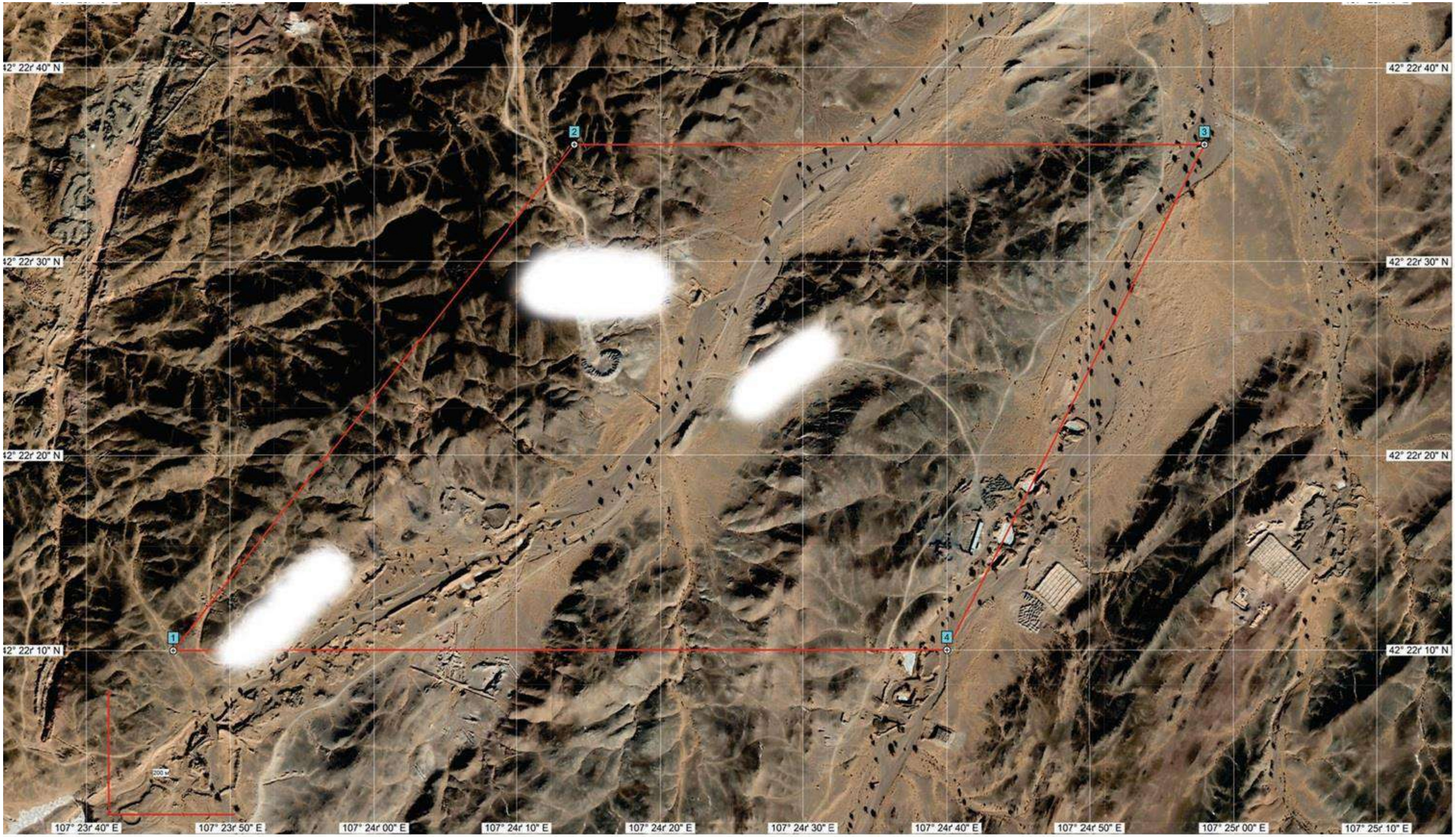
China Road map. in WGS 84 .Position of Au China section 0.9km2 near of the border with Mongolia

Space photograph #1.
Boundaries of the surveyed area (S = 0.9 sq. km)

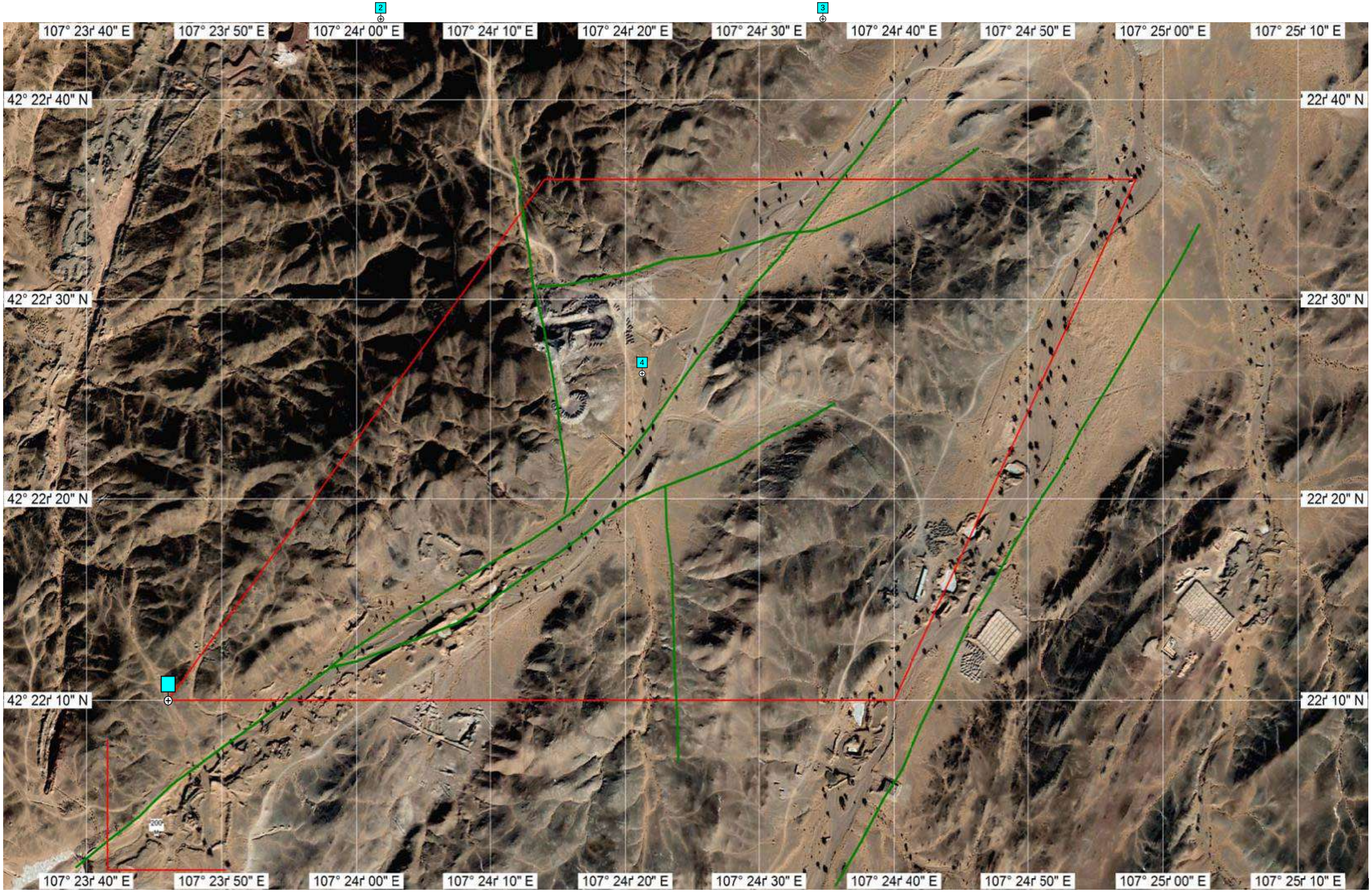


1

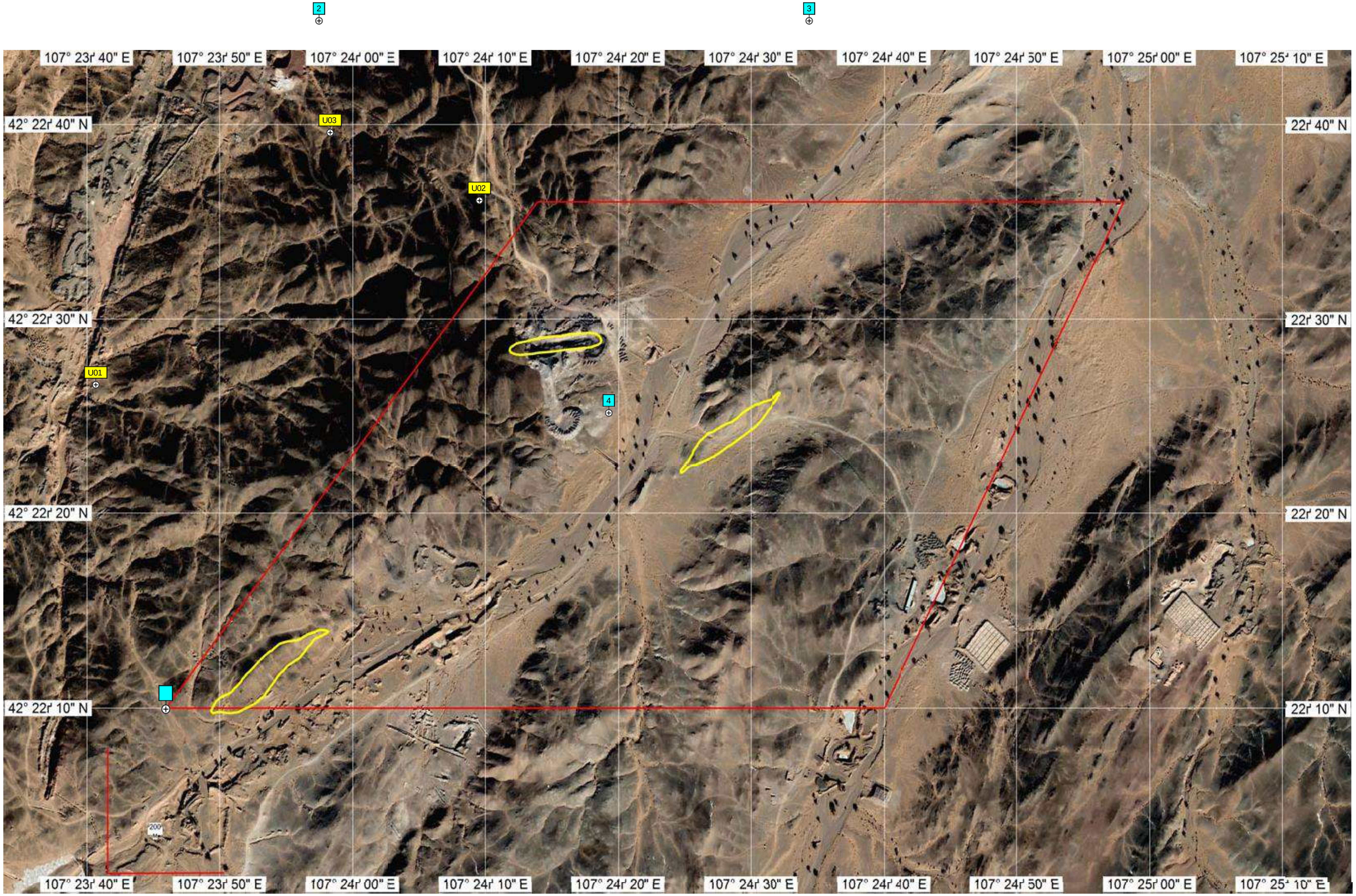
Satellite image #2. Three identified areas with areas of gold ore mineralization in the surveyed area.



Satellite image #3. Visualized boundaries of the deep tectonic fault network in the surveyed area

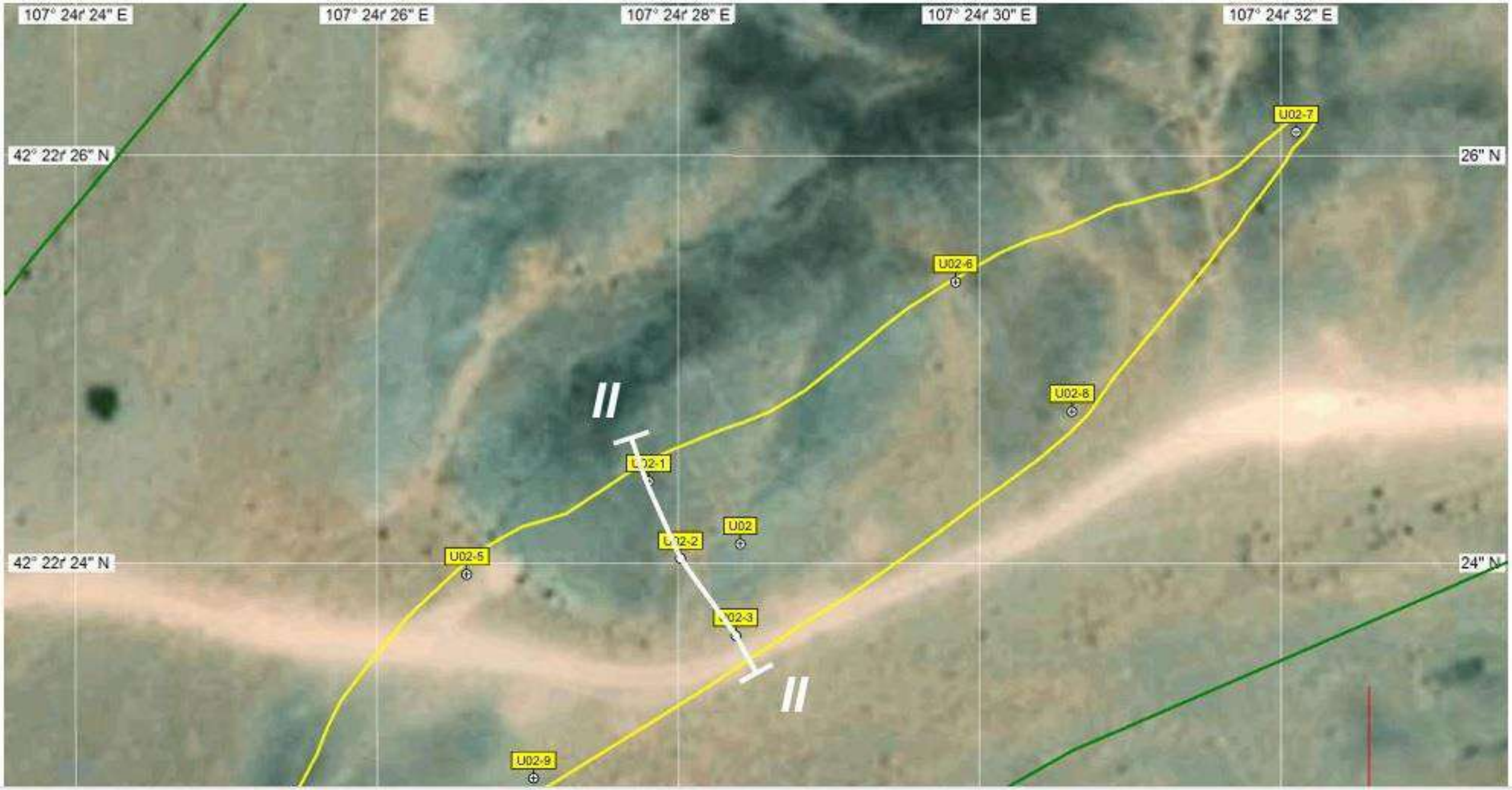


Satellite image #4. Results of delineation of gold ore anomalies boundaries in the surveyed area of the test site



Satellite image #5. Clarified boundaries of gold anomaly #1 with geological profile I-I on it

Satellite image #6. Clarified boundaries of gold anomaly #2 with geological profile II-II on it



Space photo #7. Clarified boundaries of gold anomaly #3

Рис. №5. Глубинный разрез орудинений в аномалии №1 (UO1) по геологическому профилю I-I

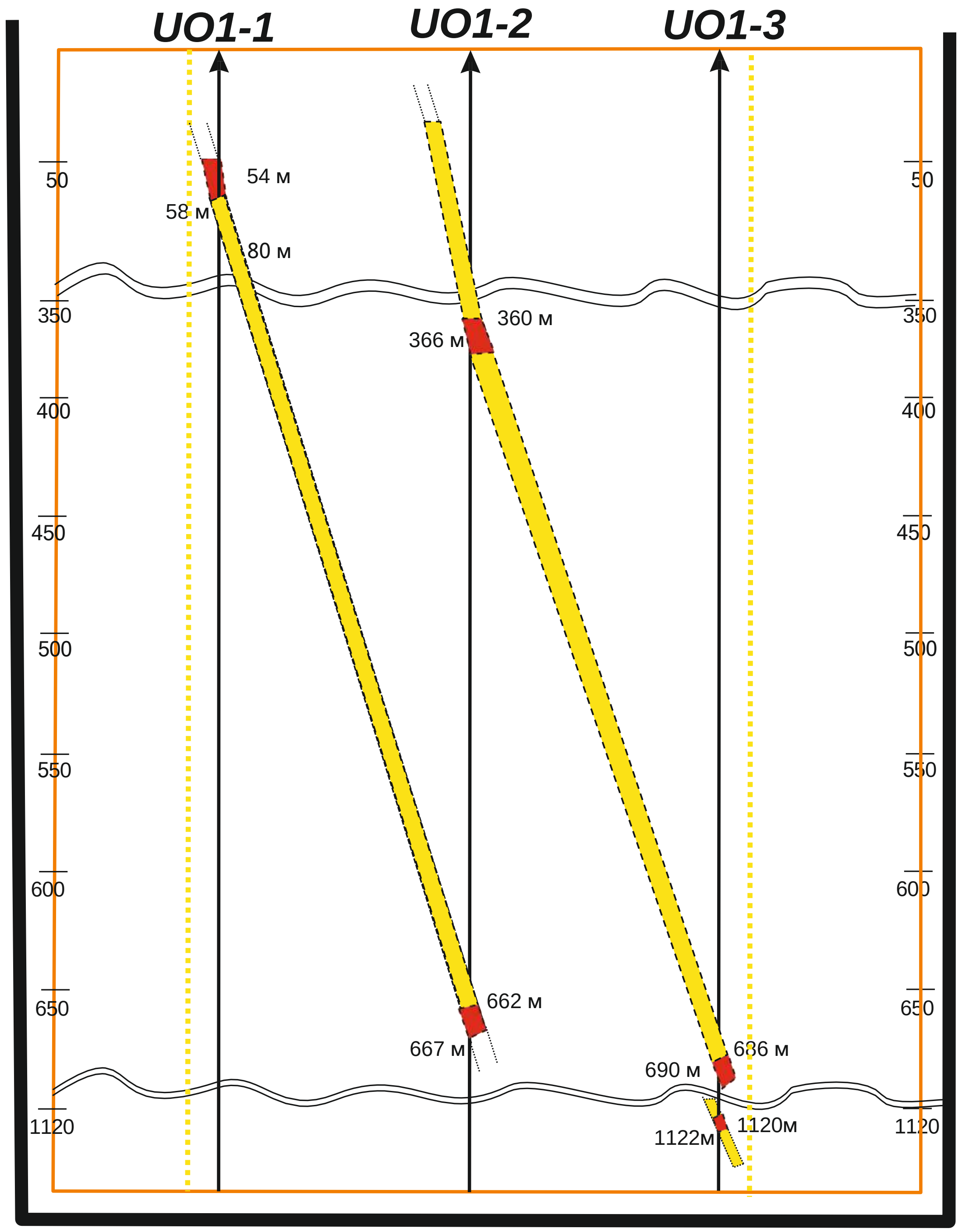


Рис. №6. Глубинный разрез орудинений в аномалии №2 (UO2) по геологическому профилю II-II

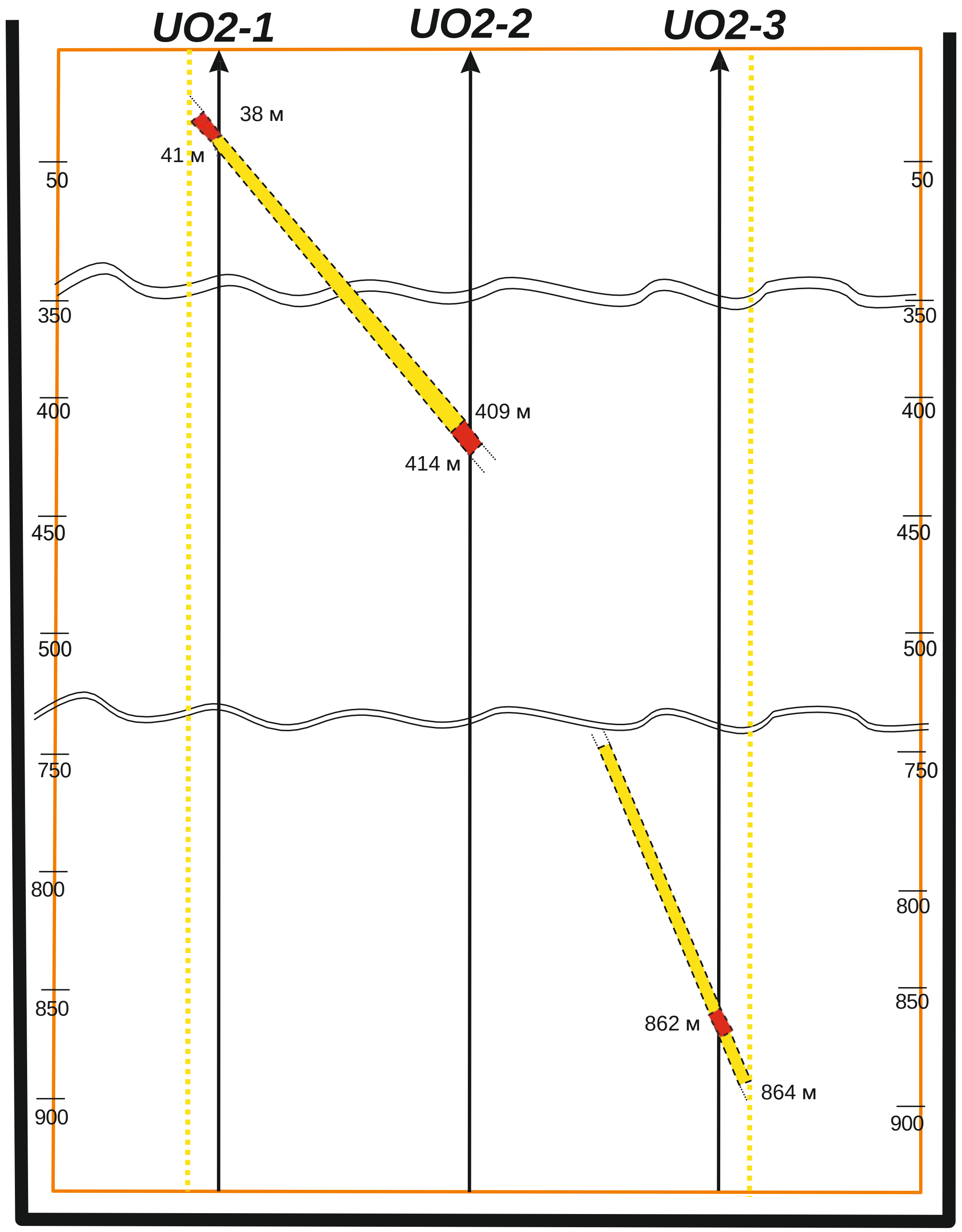


Table 2

Occurrence depth estimation. Anomalies #1 и #2
Gold content Au 1 g/t.

Points	Coordinates N, grad., min., sec. / E, grad., min., sec.	Occurrence depth h (м)	Average thickness Δh_{cp} (м)	Note
	Anomaly №1 (UO1), points on profile I-I			
1	*2*	*3*	*4*	*5*
U01-1	42° 22′ 12,2″ / 107° 24′ 28,4″	54÷58	4	The mineralization extension of two karst veins at an acute angle of incidence in the direction of the southeast
U01-2	42° 22′ 11,8″ / 107° 23′ 53,6″	360÷366 662÷667	6 5	
U01-3	42° 22′ 11,5″ / 107° 23′ 54,1″	686÷690 1120÷1122	4 2	
	Аномалия №1 (UO1), boundaries' points			
U01-4	42° 22′ 9,8″ / 107° 23′ 49,5″	Anomaly width 41,5 м	Anomaly length 235 м	The area of projection of the anomaly on the ground surface S_1=9500 м^2 Satellite image №5 (Appendix2)
U01-5	42° 22′ 11,4″ / 107° 23′ 51,8″			
U01-6	42° 22′ 13,2″ / 107° 23′ 54,7″			
U01-7	42° 22′ 13,9″ / 107° 23′ 57,9″			
U01-8	42° 22′ 12,5″ / 107° 23′ 55,8″			
U01-9	42° 22′ 10,2″ / 107° 23′ 52,5″			
	Аномалия №2 (UO2), points on profile II-II			
U02-1	42° 22′ 24,4″ / 107° 24′ 27,8″	38÷41	3	The mineralization extension of one karst veins at an acute angle of incidence in the direction of the southeast
U02-2	42° 22′ 24,0″ / 107° 24′ 28,0″	409÷414	5	
U02-3	42° 22′ 23,6″ / 107° 24′ 28,4″	862÷864	2	
	Аномалия №2 (UO2), boundaries' points			
U02-4	42° 22′ 22,2″ / 107° 24′ 24,8″	Anomaly width 34 м	Anomaly length 180 м	The area of projection of the anomaly on the ground surface S_2=6000 м^2 Satellite image №6 (Appendix 2)
U02-5	42° 22′ 23,9″ / 107° 24′ 26,6″			
U02-6	42° 22′ 25,4″ / 107° 24′ 29,8″			
U02-7	42° 22′ 26,1″ / 107° 24′ 32,1″			
U02-8	42° 22′ 24,7″ / 107° 24′ 30,6″			
U02-9	42° 22′ 22,9″ / 107° 24′ 27″			

1	2	3	4	5
	Anomaly №3 (UO3), boundaries' points			
U03-2	$\frac{42^{\circ}\,22'\,28{,}4''}{107^{\circ}\,24'\,11{,}9''}$	Anomaly width 22,0 м	Anomaly length 155 м	Anomaly is NOT promising. No detailed evaluation performed S_3=3400 м^2, Satellite image №7 (Appendix 2)
U03-3	$\frac{42^{\circ}22'\,29{,}0''}{107^{\circ}\,24'\,14{,}0''}$			
U03-4	$\frac{42^{\circ}\,22'\,29{,}2''}{107^{\circ}\,24'\,16{,}7''}$			
U03-5	$\frac{42^{\circ}\,22'\,28{,}9''}{107^{\circ}\,24'\,18{,}6''}$			
U03-6	$\frac{42^{\circ}\,22'\,28{,}5''}{107^{\circ}\,24'\,16{,}6''}$			
U03-7	$\frac{42^{\circ}\,22'\,28{,}2''}{107^{\circ}\,24'\,13{,}4''}$			

Remote Sensing Survey (RSS) with Nuclear Magnetic Resonance (NMR)

for

Hydrocarbons, Minerals, Gems, Water and polymetallic nodules

2004-2004

More of 350 Resources Exploration Projects worldwide with positive results

Introduction

- POISK Group offering a time & cost effective solution to remodel the ways and means of petroleum exploration. Fands-LLC with 30 years in Exploration worldwide gives the support and knowledge of countries to Sebastopol
- By ingenious remote sensing expertise plus corroborating field works derived from the Nuclear Magnetic Resonance (NMR) theory, commercially relevant anomalies are identified, delineated and geologically substantiated.
- Pre-knowledge on economic feasibility of acreage is provided; recommendation on best area for targeted seismic (if so pursued); the identification and geological validation of best spot for appraisal act is provided as a result of RS-NMR studies.
- The application of three integrated disciplines of patented remote sensing acumen, scientifically vindicated NMR field works and the ultimate G&G authentication of the findings, exercises a strong and innovative toolkit that is as disruptive as it is efficient.
- The world specialist in Geo Holography for exploration is Poisk Group

Overview of the Technology

- The innovative technology of remote search for hidden minerals is based on traditional and proprietary methods of **remote sensing of the Earth and special NMR equipment of POISK Group in Fands-llc in south america and Africa**
- A key feature of NMR is that the resonance frequency of a particular substance is directly proportional to the strength of the applied magnetic field. It is exploited in imaging techniques; if a sample is placed in a magnetic field then the resonance frequencies of the sample‘s nuclei depend on where in the field they are located.
- Radio-frequency magnetic fields penetrate both soft and hard rock allowing higher resolution anomalies mapping and can easily be used with a boat, plane, helicopter or truck for exploration.
- Remote geoholographic is created from instrumental set (stationary and field equipment) for remote search and contour plots of hidden mineral resources (oil, gas, gas condensate, and ore deposits), and accumulations of drinking water, and geothermal, as well as remote determination of important geological characteristics of their bedding to a depth of 6000m.

How it works

STEP-1 Sampling + Data Base	STEP-2 Remote Sensing + Data Processing	STEP-3 Field Survey
Analysing the Oil/Gas samples from the nearby field (same play type).	Satellite survey of the interest area and imaging of the analogue photographs	Additional examination of the identified anomalies using field equipment
Recording the frequency spectrum of the reference elements present in the sample	Processing images with ingenious nanogels and enhancement in a small-size Nuclear reactor	Field survey using special NMR equipment of the POISK group
Lab testing of samples using special POISK equipment	Identify boundaries of hydrocarbon accumulation by processing digital and analog satellite images taken in various frequency ranges of the visible ultraviolet and IR spectra.	Plotting the contours of anomalies associated with petroleum accumulations on maps of the survey area. Generating geological sections with depths of hydrocarbon accumulations

Step I – Sampling + Data base

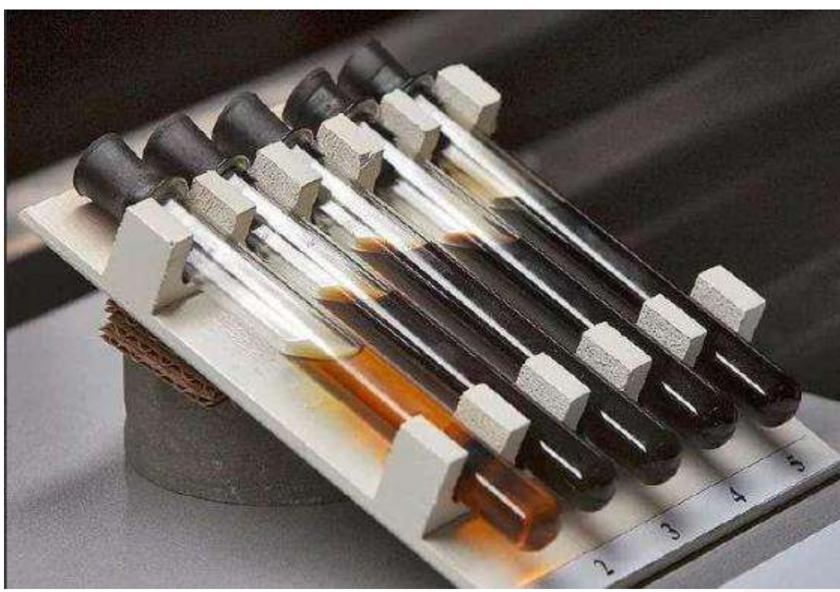
1.Collect and analyze oil samples from nearby fields (same play),

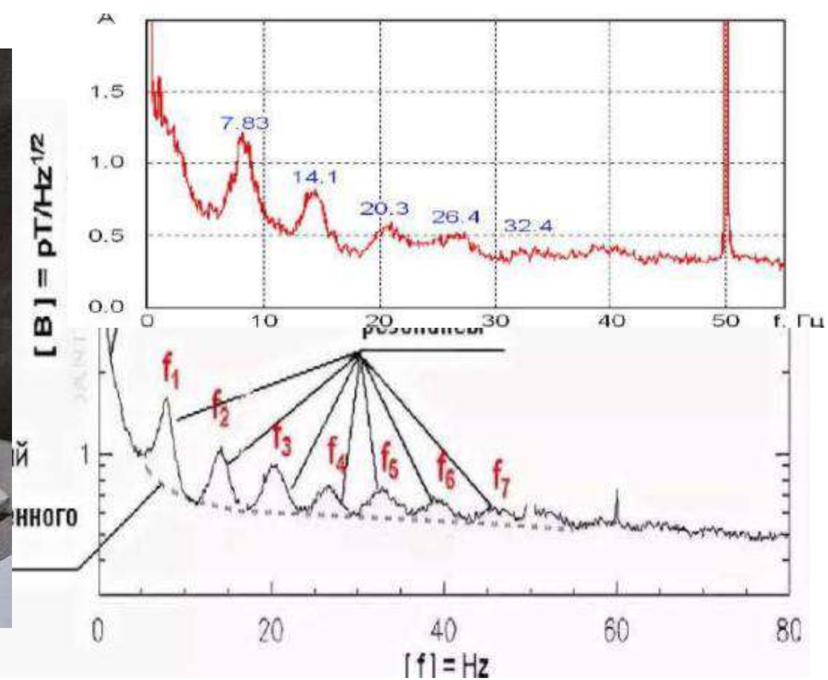
2.Identify reference elements in the samples,

3.Record frequency spectrum of the reference elements,

4.Save the reference element's data base for further hydrocarbon studies

Certain elements (e.g. V, Ni, Cu, Fe, Mn, Mo, Cr etc) are distinguished in oil composition, which are the main markers ("reference elements") in the identification of oil. Each element has its own (inherent) nuclei oscillation frequency.



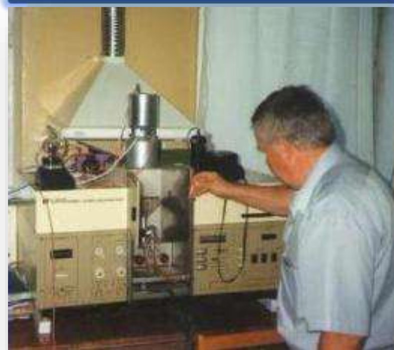


Step I – Sampling + Data base

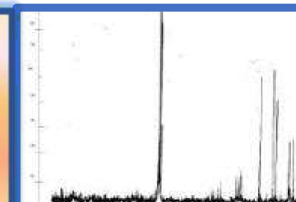
1 Samples of samples: hydrocarbons, ores, rocks - the water

2 **The study sample :**
1) Neutron activation method
2) Atomic - absorption (spectrophotometer "Saturn")
3) RENGO-fluorescent methods

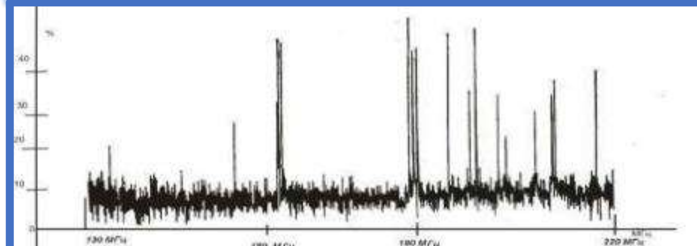
3 The choice of reference element



4 Spectra were recorded on the reference elements "test matrix“



spectrum of Oil



spectrum of Coal

5 Laboratory testing of samples with identification of specimens using equipment complex «Search»

6 **Result**
Data bank of recognition spectra for remote identification of deposit types

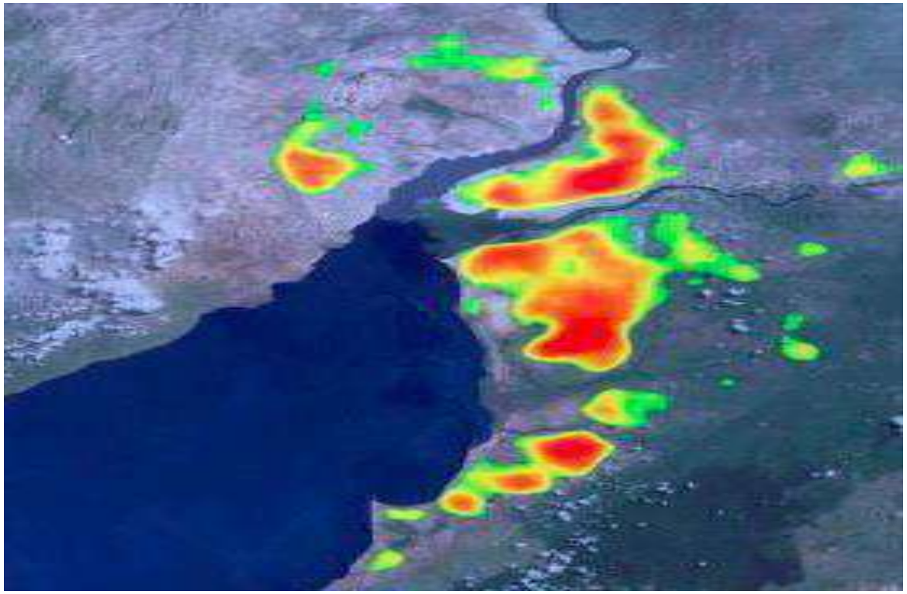
Step I – Sampling + Data base

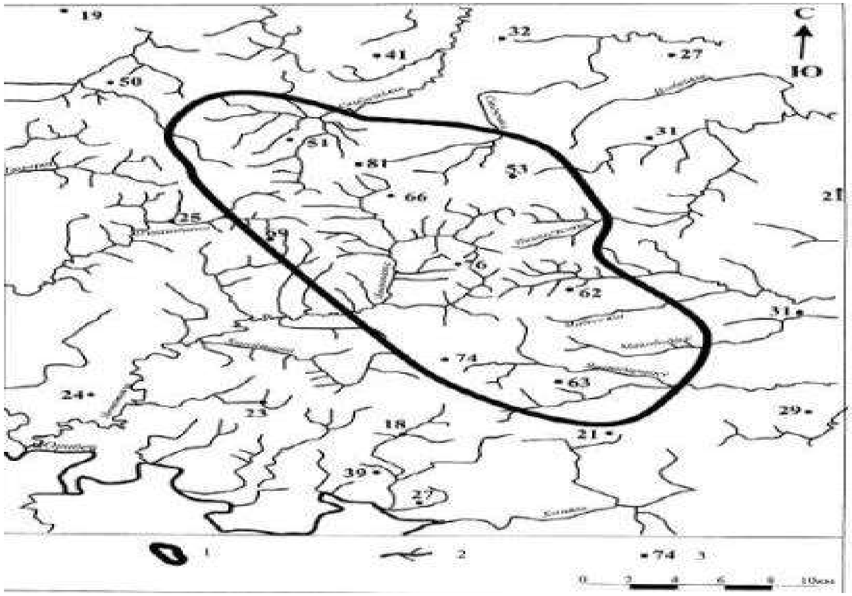
Sample Analysis Process

- The presence of rare earth metals, especially tungsten and titanium (in micro-quantity) are determined in the oil sample. According to their ratio, oil origin can be determined, that is, one may find out, for example, oil is from which country. Same approach is implemented in the NMR survey, i.e. NMR spectra of these elements are recognizable when we search for oil accumulations.
- In oil samples, the composition of other metals is analyzed, the content of which differs significantly from the rest of the NMR spectra. They can also be used as additional diagnostic factors of oil in a particular region, i.e. they are the so-called "test" search matrices.
- Integral electromagnetic spectra (information and measurement spectra) are recorded from oil samples by exciting metal atoms when oil samples are introduced into the "atomization furnace" (temperature = 2500 °C) using special spectral equipment which is part of the "Poisk" facilities complex. Thus, we record the so-called working search diagnostic matrices.

Step II – RS + Data processing

1. Perform satellite survey and imaging of the Area of Interest (AOI).
2. Process the image material with ingenious nanogels and solutions to amplify and highlight spectral anomalies associated with petroleum accumulations.
3. Enhance processing of the image in a small-size nuclear reactor,
4. Plot preliminary boundaries of hydrocarbon accumulation on the AOI map.





Step II – RS + Data processing

Interpretation of space **analog** photographs, identification and delineation of areas with anomalies

1

Photo reconnaissance of search areas

2

Processing satellite analogue data images with nanogel solutions

3

Exposure of the image in the IR-100 reactor

4

Transferring the boundaries of the light area from the photograph to the map of the search area

5

Work results

Step II – RS + Data processing

What we record and process in Analog Photographs?

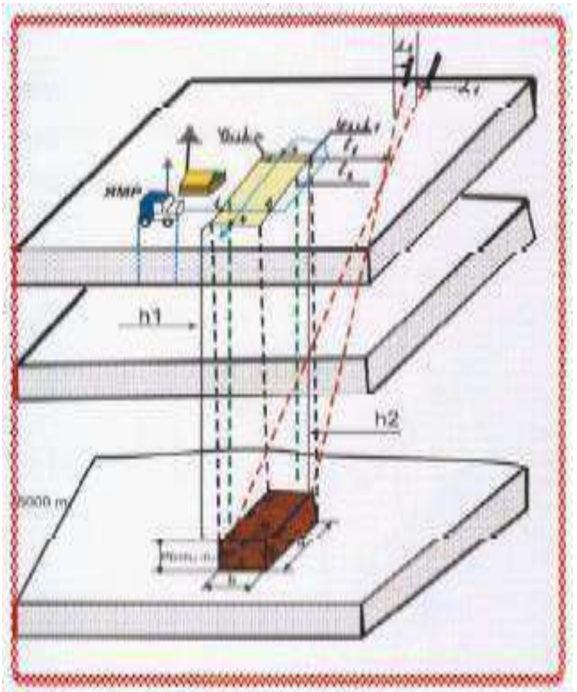
- On analog satellite images, characteristic electromagnetic fields (spectra) that exist over each type of "deposits" (oil, water, ore, etc.) are recorded. Characteristic electromagnetic fields (of a specific frequency) are formed over the deposit (anomaly), i.e. on the ground surface due to various chemical, thermal and electrochemical processes in rocks with prolonged migration of oil, gases (other metals in ores) from great depths to the ground surface.
- Poisk technology enables to "visualize" on analog satellite images the characteristic electromagnetic fields in the form of "high brightness zones", after special processing of photo paper using chemical reagents (nanogels), phosphors, sensitizers (layers of mixtures), which are selected for each type of deposits (oil, gas, ore, salt water, fresh water, etc).
- Processing of digital satellite images in the visible spectrum provides only the "primary" visible signs (images) of various anomalies or areas of scattering of mineralization of various metals (copper, gold, molybdenum, etc.).
- Accuracy of identification and delineation of anomalies of various minerals by processing of analog images (Poisk's patented technology) is significantly higher than traditional methods and approaches of geological exploration.

Step III – Field survey + Theory

1. The resonant frequencies of the reference molecule's atoms are imposed/modulated on the carrier frequency by a high-frequency generator.

2. High-frequency electromagnetic fields, characteristic of the reference sample's elements, are induced above an oil accumulation by its resonating frequencies.

3. Each characteristic electromagnetic field is sequentially recorded by a sensitive receiving device tuned to register resonant frequencies of the reference sample's atoms, ensuring a plausible identification of petroleum accumulations.

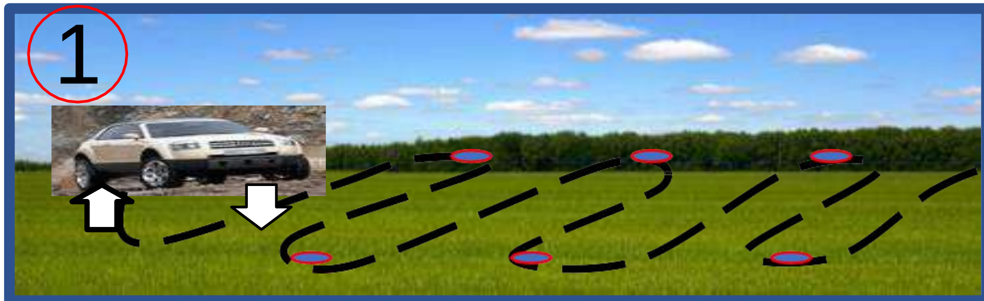


Precise boundaries of petroleum accumulations are plotted on the area-of-interest.

Step III – Field survey + Theory

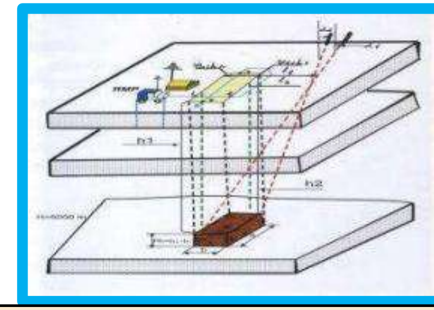
Inspection of the anomalous areas with field equipment, selection of a point for drilling and calculation of reserves

1



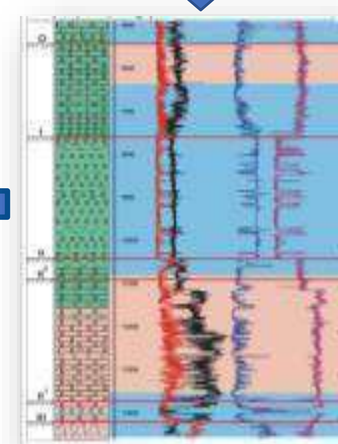
Refinement of areas and boundaries of the site

2



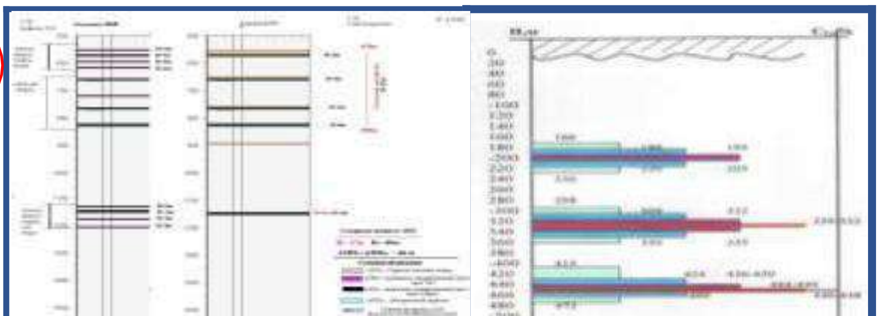
Determining the depths of horizons at measurement points with field equipment

3



Building depth slices by measurement points

4



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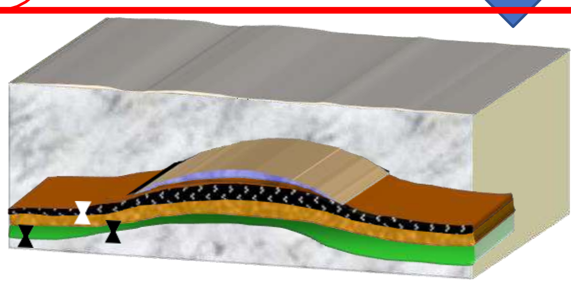


Construction of a volumetric profile of the deposit collector, ore body

Deliverables

After Step-1 & 2

Accuracy - 60% to 80%

1. **Maps with identified anomalies associated with petroleum accumulations**
2. **Cross sections with depth of occurrence**
3. **Recommendations where to drill and core**

After Step-3

Accuracy is about 90%.

1. **Maps with precisely delineated areas of anomalies**
2. **Cross sections with more precise depths of occurrence**
3. **Thickness of potential reservoirs**
4. **Volumes estimation**

Final Report might provide the geological substantiation (optional) including:

a - Geological setting analysis,

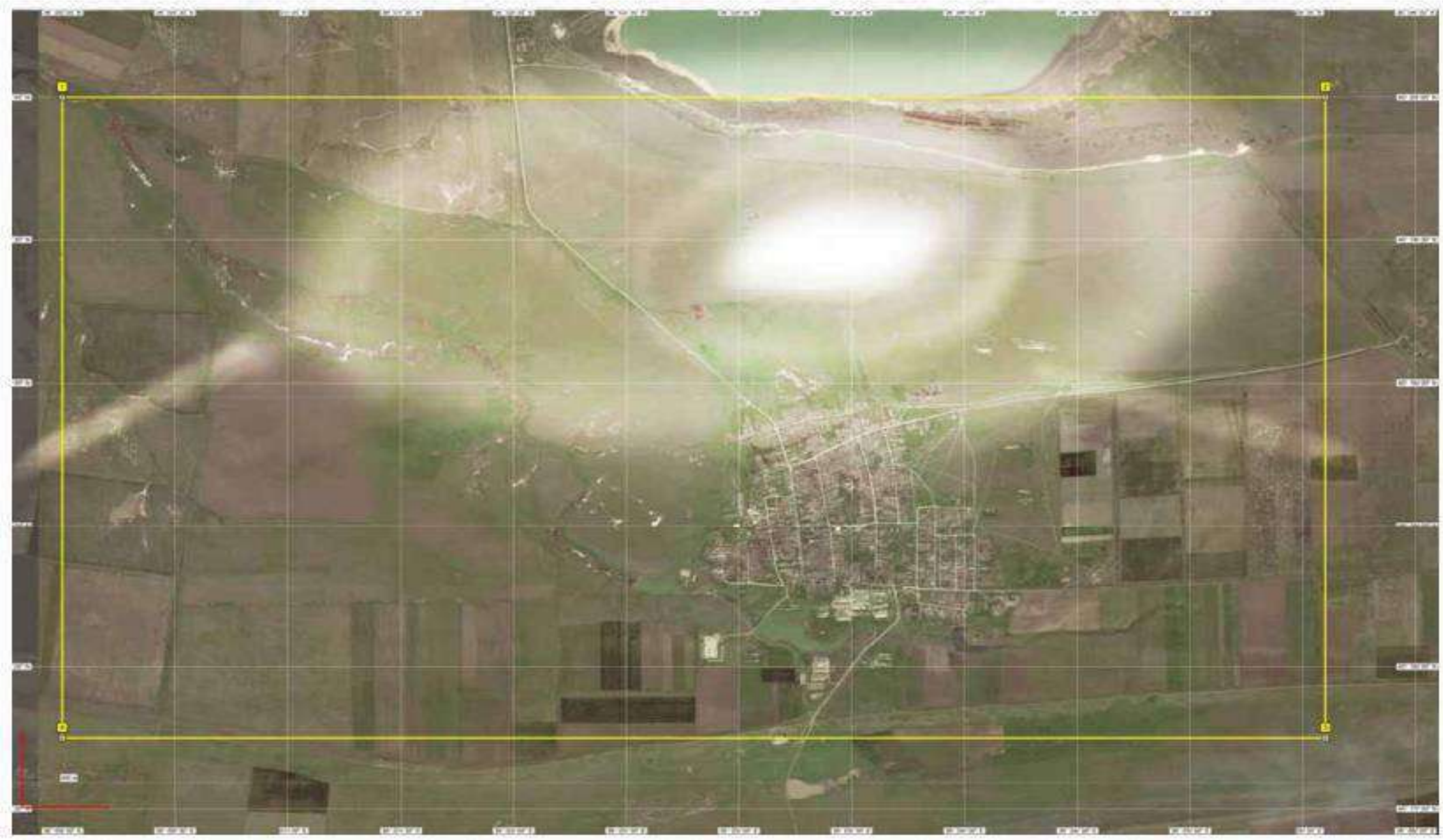
b- Resources Evaluation

Deliverables
Sample 1: step-1

Космический фотоснимок №1. Границы исследуемой площади (Новониколаевка, Крым) S=32 км²

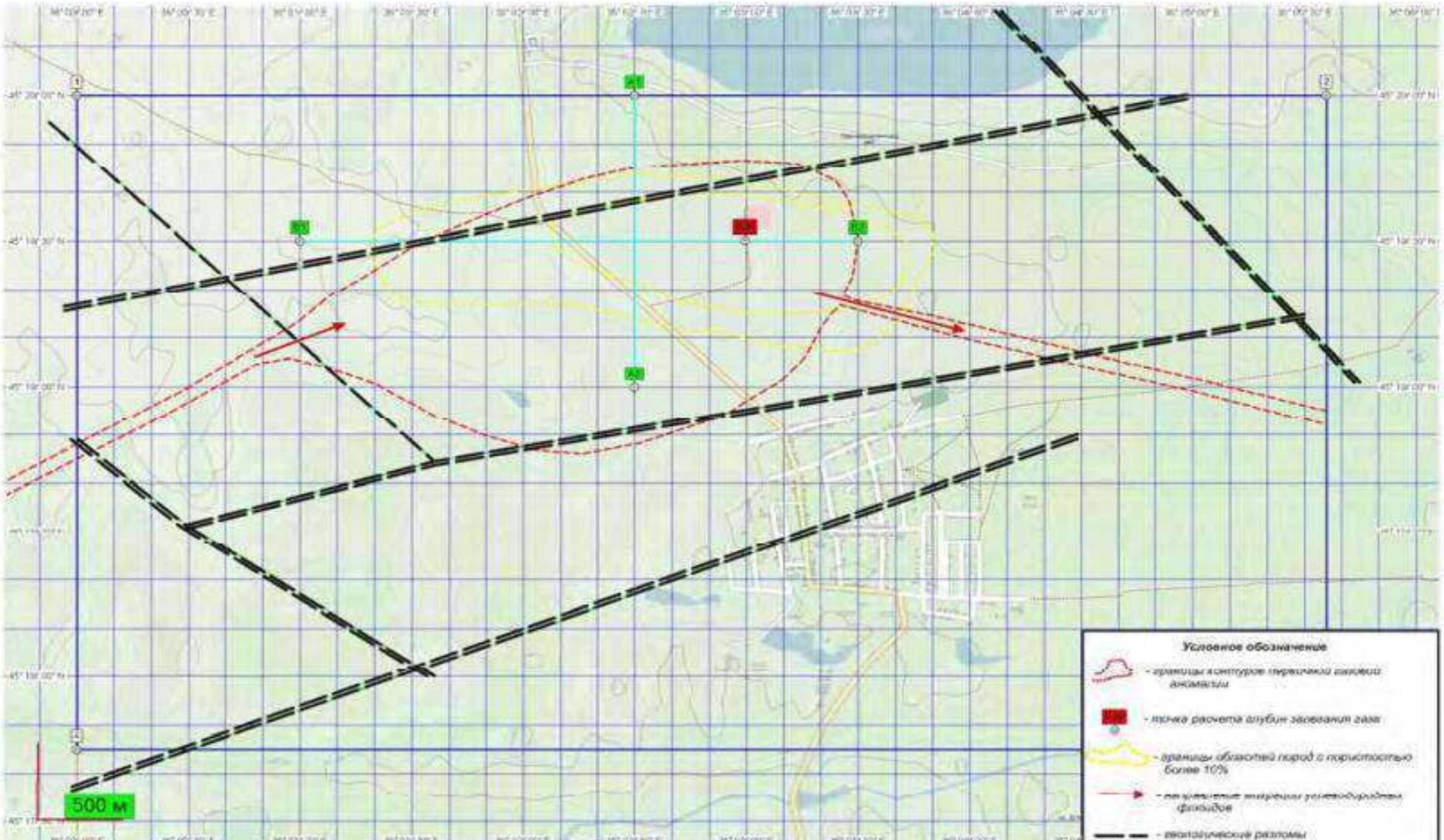
Deliverables

Sample 1: step-2



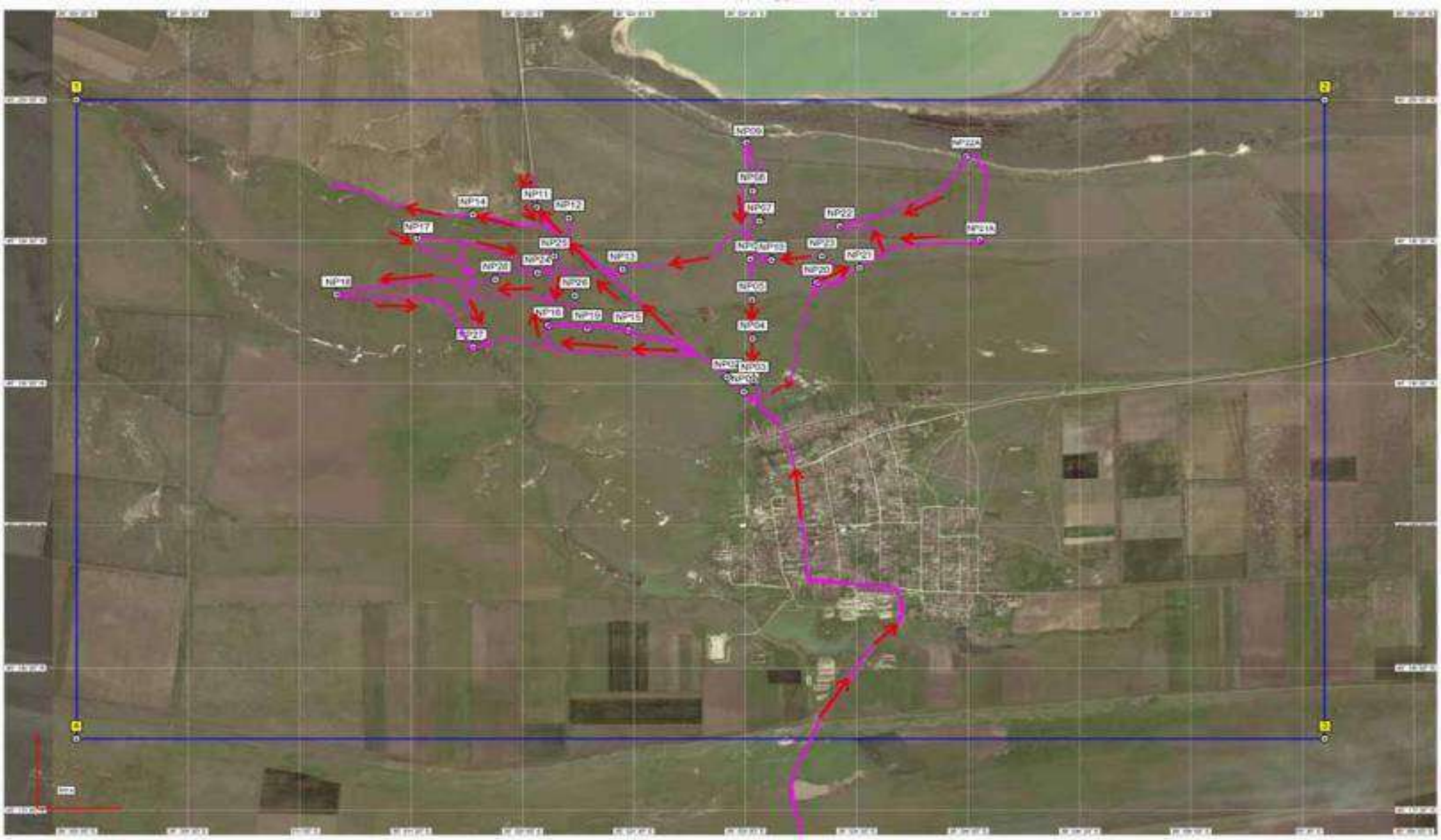
Deliverables

Sample 1: step-2



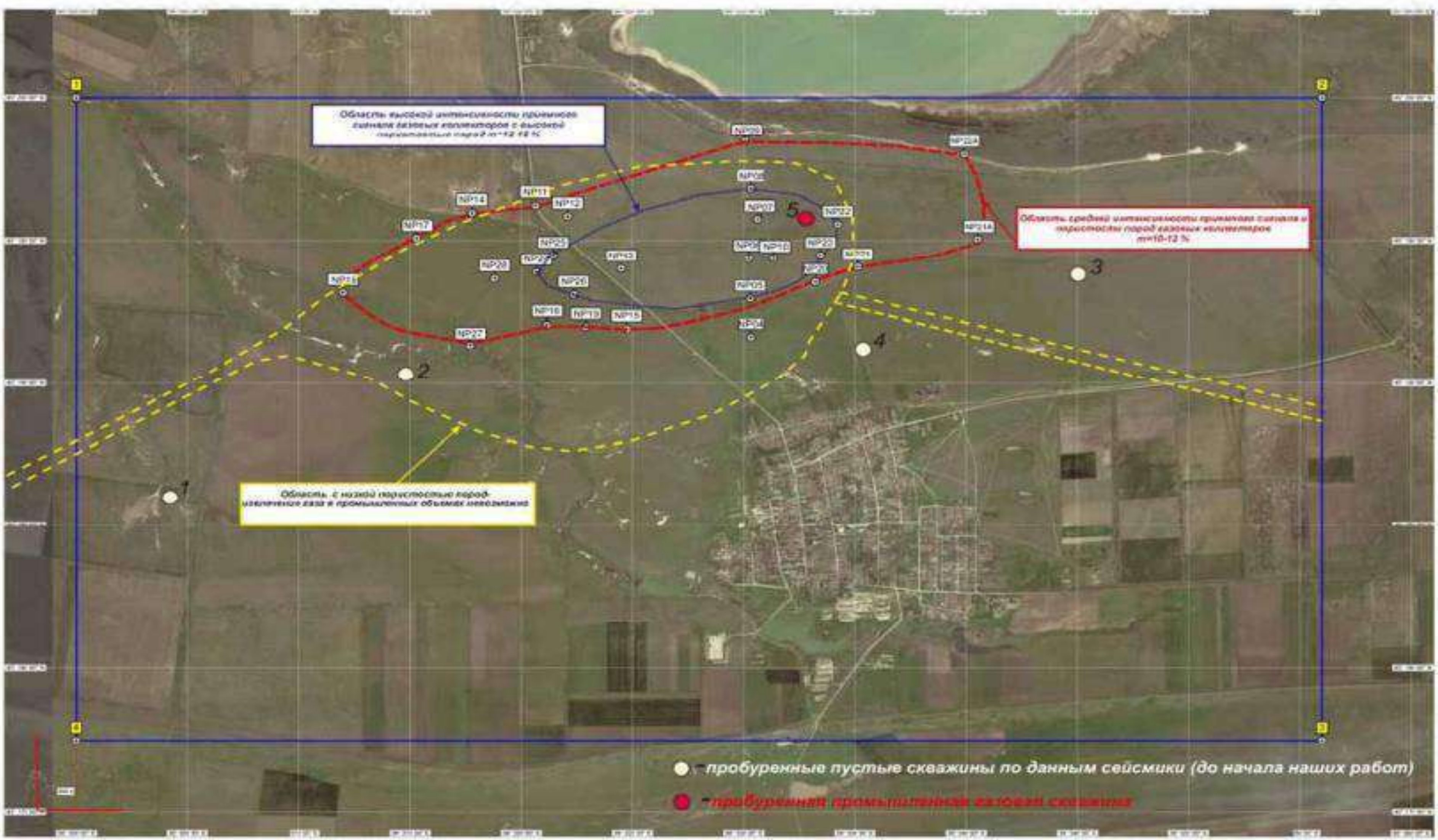
Deliverables

Sample 1: step-2



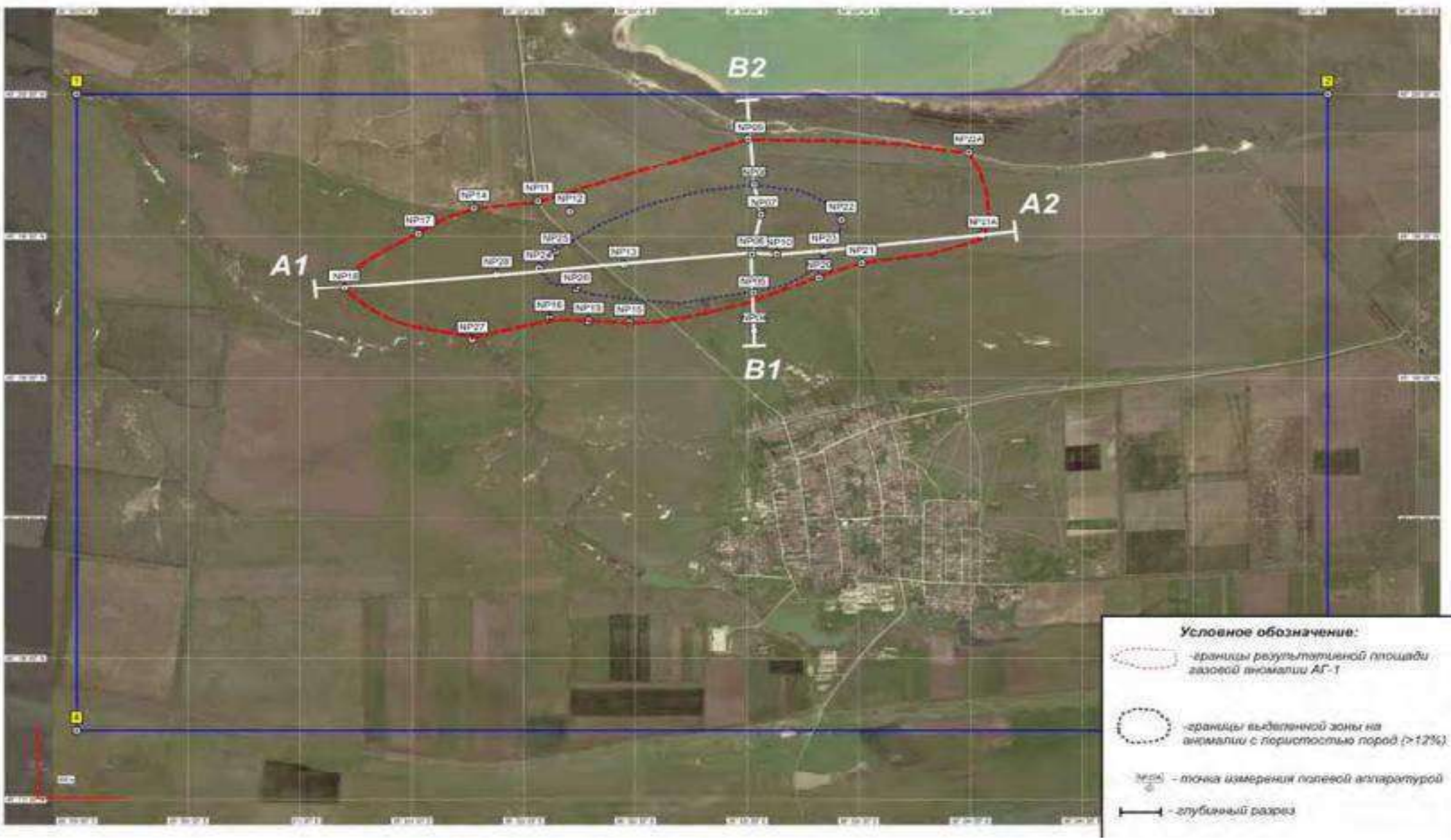
Deliverables

Sample 1: step-2



Deliverables

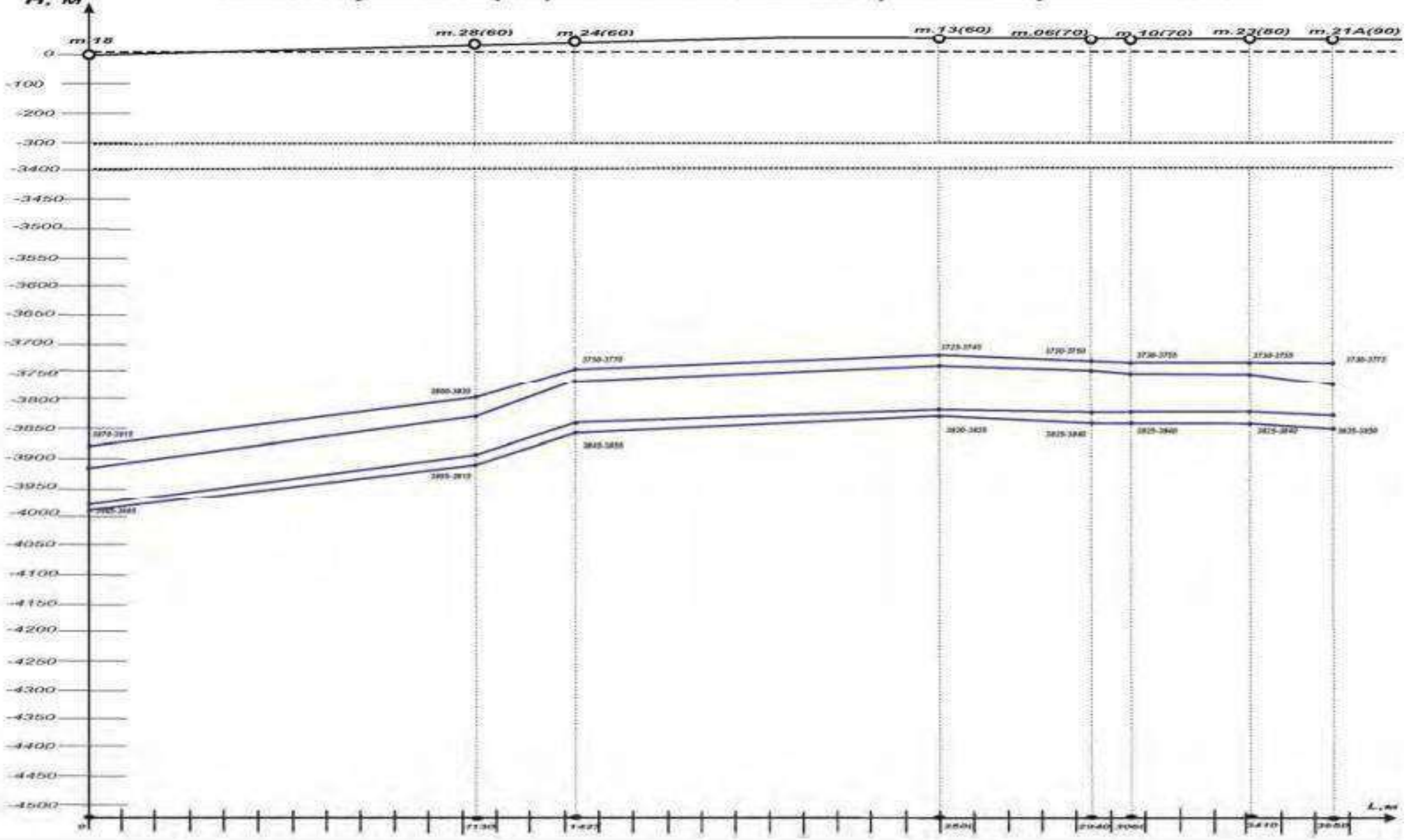
Sample 1: step-2



Deliverables

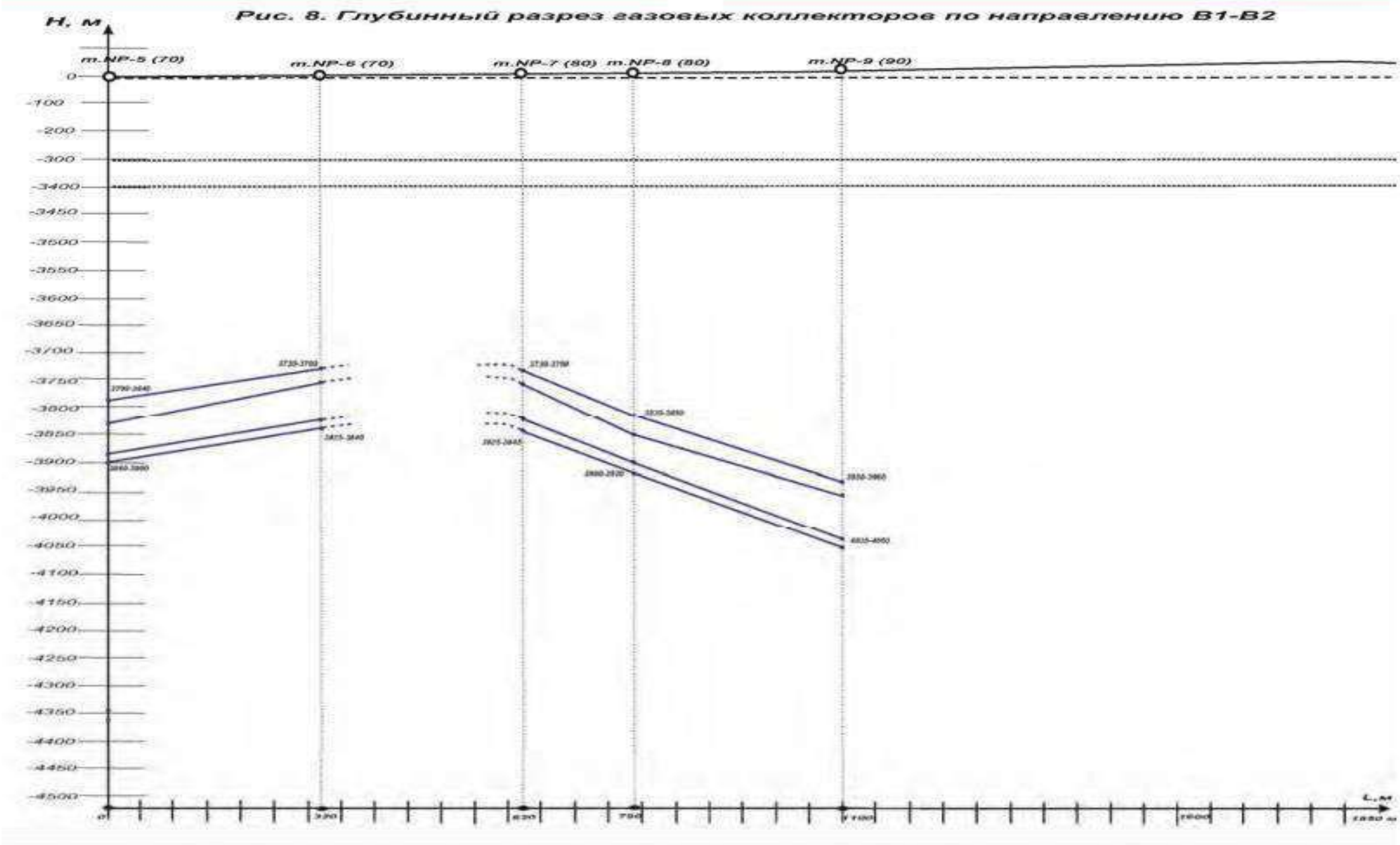
Sample 1: step-2

Рис. 7. Глубинный разрез газовых коллекторов по направлению А-А2



Deliverables

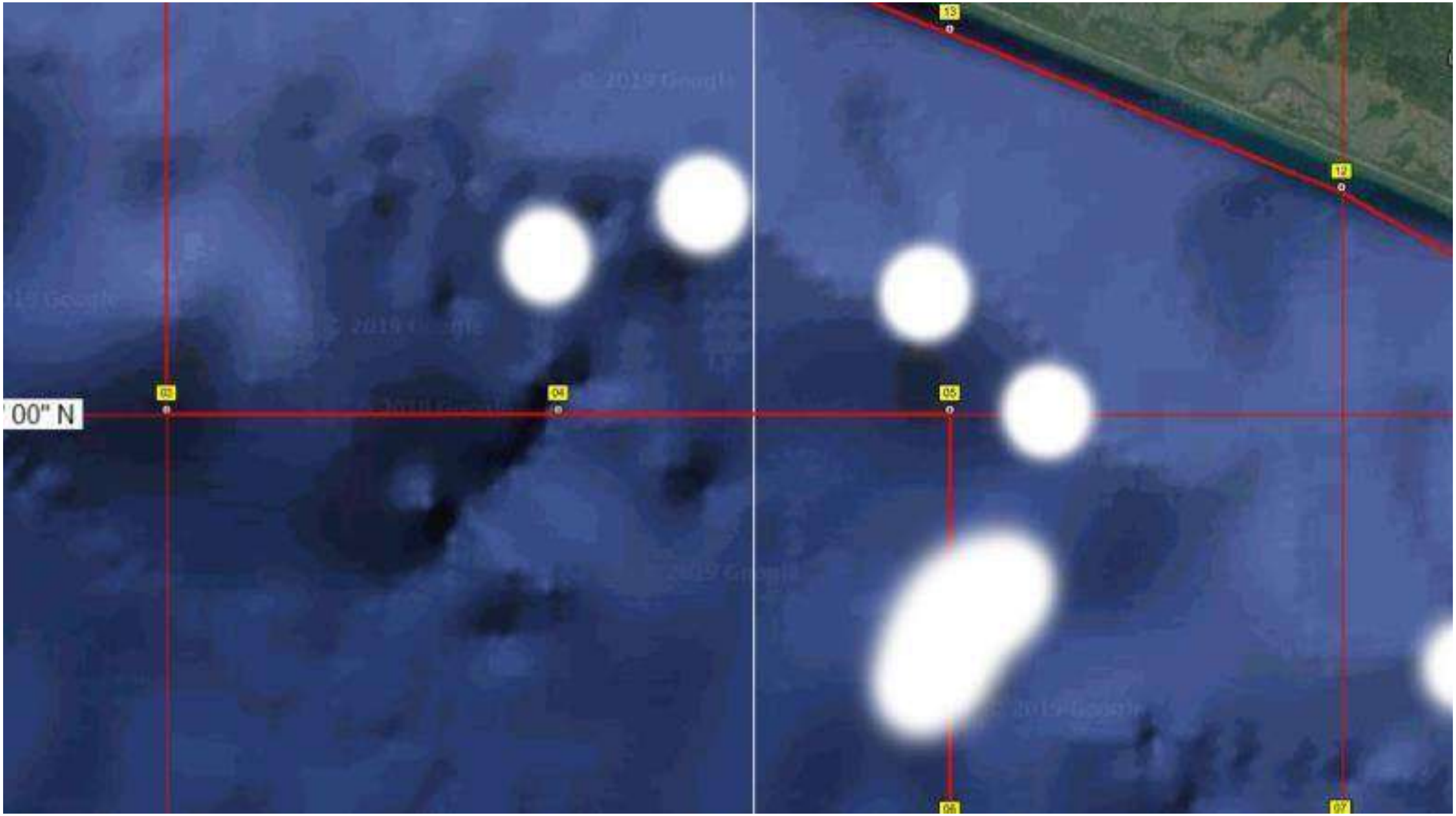
Sample 1: step-2



Deliverables

Sample 2: step-2

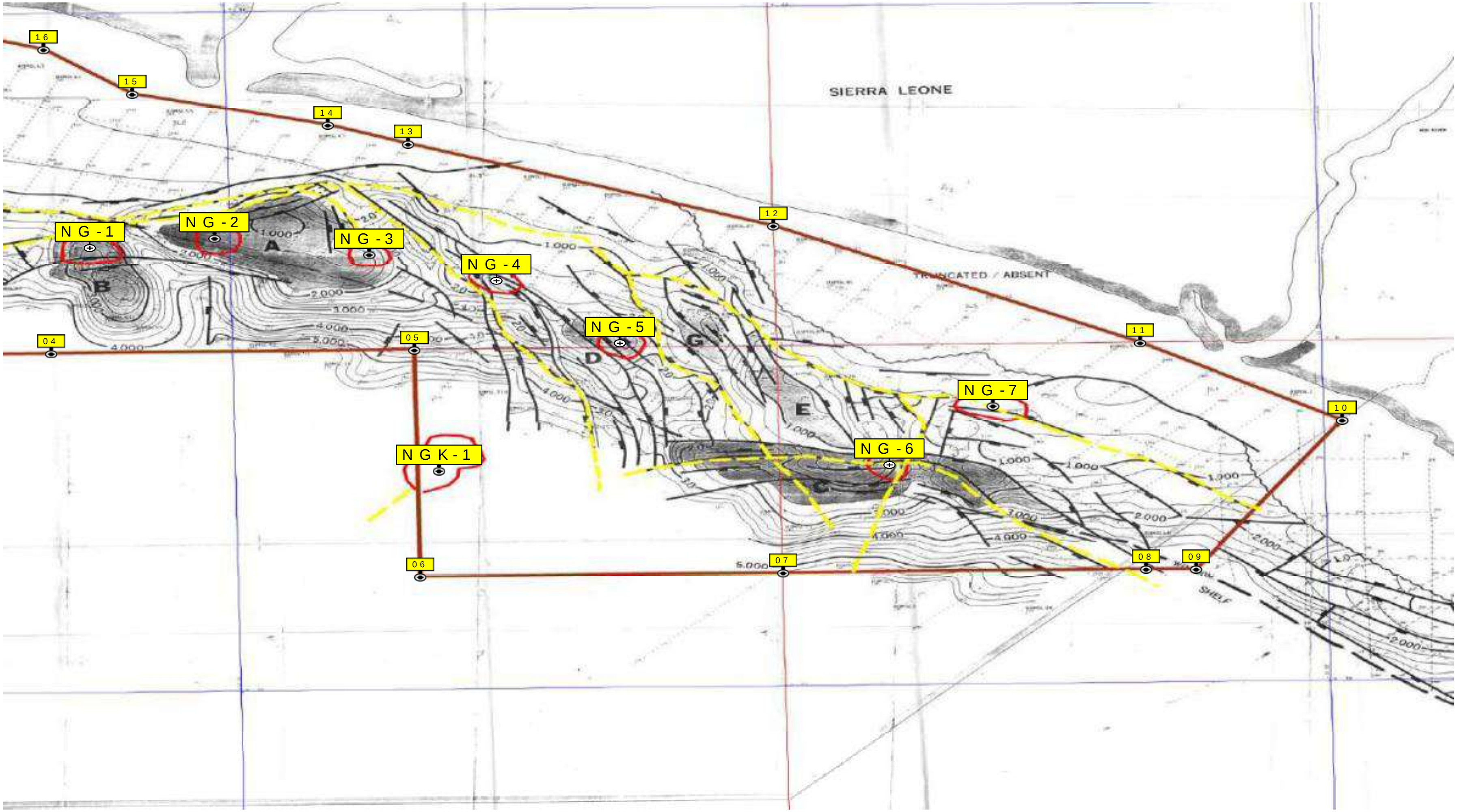
Topographic map with anomalies associated with petroleum accumulations



Deliverables

Sample 2: step-2

Structure map with anomalies associated with petroleum accumulations



Deliverables

Sample 2: step-2

Resources evaluation (optional) provided reservoir properties are known from the nearby oil fields in the same play

Simulation Settings

Mode: EXPLORATION PROSPECT

Notes

	Original In Place		Prospective Undiscovered Recoverable Reserves						
			Liquids		Sales Gas		Total Geologic Pre-Drill	Above Commercial Threshold (Option is OFF)	Above Economic Threshold (Option is OFF)
	Oil	Gas	Oil	Total Cond	Non-Assoc	Soln			
	MMMT	MMCM	MMMT	MMMT	MMCM	MMCM	MMMTE	MMMTE	MMMTE
P99	12,45	0,00	2,06	0,00	0,00	0,00	2,06	NA	NA
P90	24,76	0,00	4,20	0,00	0,00	0,00	4,20	NA	NA
Mode	39,15	0,00	7,21	0,00	0,00	0,00	7,21	NA	NA
P50	57,77	0,00	10,33	0,00	0,00	0,00	10,33	NA	NA
Mean (P99->P1)	72,15	0,00	13,00	0,00	0,00	0,00	13,00	NA	NA
P10	142,53	0,00	26,25	0,00	0,00	0,00	26,25	NA	NA
P1	291,68	0,00	54,45	0,00	0,00	0,00	54,45	NA	NA

	Pg- Chance of Geologic Success (>=Ab Min reserve)	Pc- Chance of Commercial Success (>=MCFS) (Option is OFF)	Pe- Chance of Economic Success (>=MEFS) (Option is OFF)
Chance of Success >>	11,3%	NA	NA

Current settings...
Estimating method:
VOLUMETRIC (Area X Net Pay X HC Yield)
Intermediate Simulation: 5000 Iterations
Resources Simulation: 5000 Iterations
Truncations:
Input= 0,00/1,00
Output= 0,00/1,00
Complex Trap option OFF
Area-Pay correlation= 0
Raw Gas Surface Loss: NONE
Percentile Sorting: HC Equiv only

In this product, the term 'reserves' denotes PROSPECTIVE RESOURCES, or the ultimate recoverable resources that will be produced should this prospect become a field. It does not conform to the definition of 'proven reserves' provided by the U.S. Security and Exchange Commission.

Key Features and Benefits

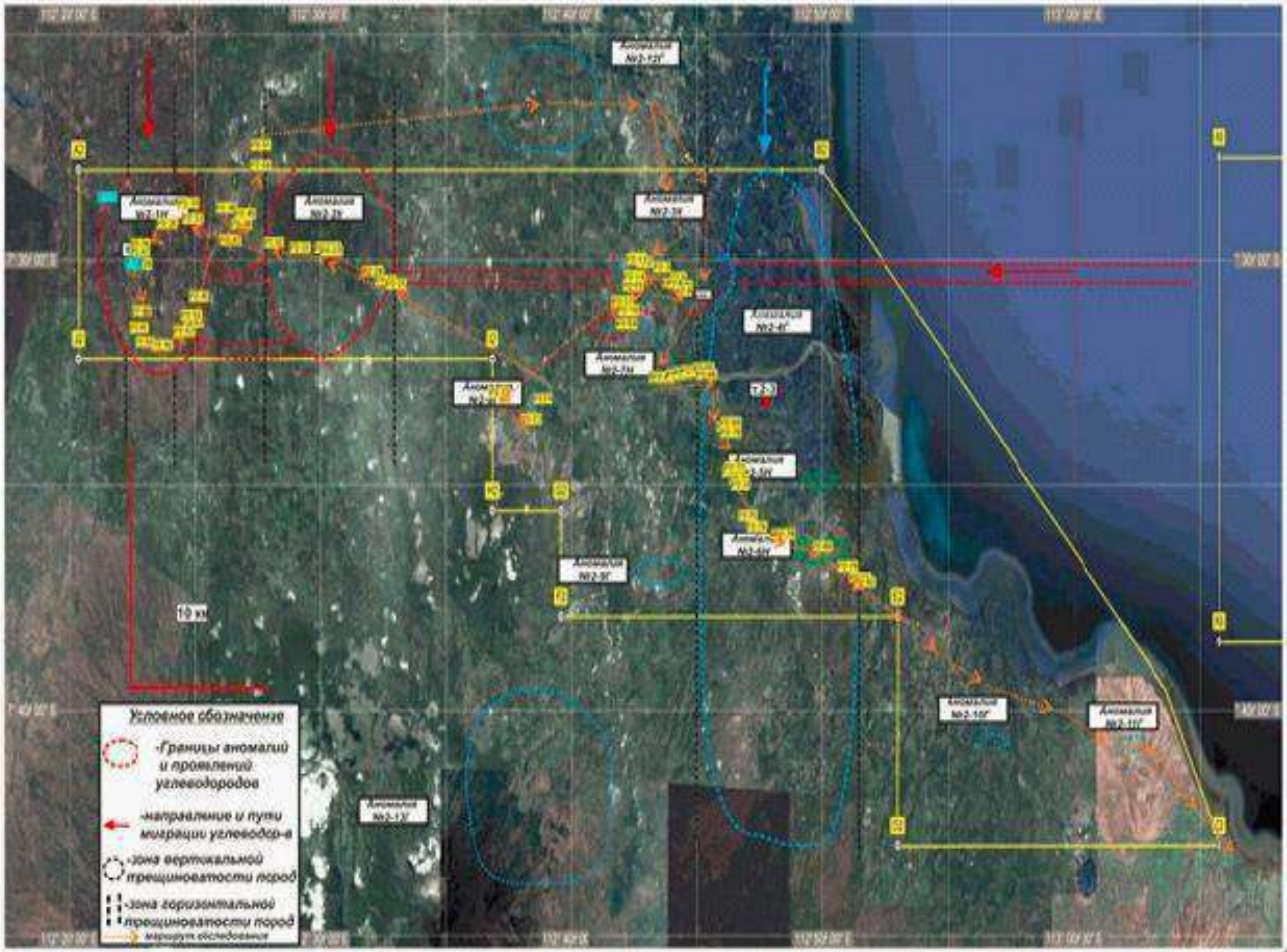
1. *Highly Cost-effective and Time-effective technology for identifying the focus area of hydrocarbons and other minerals.*
2. *This technology is unique with analogue image data processing.*
3. *The reliability of the obtained results based on NMR & remote sensing data after Stage-1 (Step-1&2) is 60%-80%, and after performing field work in Step-3 is about 90%.*
4. *3D Seismic data acquisition area could be finalized without investing time and money in 2D seismic and other geophysical surveys.*
5. *If seismic is already done in any area, this NMR-RS technology helps in identifying and validating the drilling locations. Also helps in the assessment of probable reserves of hydrocarbons, ores and groundwater prior to drilling.*
6. *This Technology is very useful in the remote and topographically challenging terrains like Manipur, Mizoram, Nagaland, J&K states of India.*
7. *Detection of hydrocarbon and geothermal waters up to depth of 5000 m, ore bodies up to 1500m, underground drinking water to depths of 1000 m.*
8. *Vertical resolution of the anomaly after Step-2 is 100m and after Step-3 is 30-50m.*
9. *The total time for the execution of NMR-RS exploration work on survey area of 1000 sq. km. is approximately 2 months for Step-1 & 2, and 5-6 months for Step-1,2 &3.*

Projects

- Oil, Gas and Gas condensate
- Coal
- Uranium
- Zinc, Lead
- Molybdenum
- Copper
- Polymetallic ore
- Diamond etc.

About 300 projects worldwide (Russia, Mongolia, Colombia, Ukraine, USA, Indonesia, Australia, Congo etc.)

Case Study I



License block in Indonesia

Productive wells are sitting within the areas outlined marked with red color

Testimonial

Russ Techno
Tel: +62 8170 228877 FAX: +62 21 84306196

CV RussTechno Indonesia

Ruko Permata Boulevard Blok BA, No.1
Jl Pos Pengumben Raya Jakarta Barat 11550 – INDONESIA

Date : 1 June, 2012 r.

Re: SBRDSS report reference

In accordance Contract No.1, 28.11.2011 between RussTechno Indonesia and Sevastopol State University, Sevastopol's specialists (head of team - Ph.D. Kovalev N.I.) were involved with a set of equipment "Poisk" for remote search for oil and gas with identification its depth and deposit on Brantas Block in Java, Indonesia total area 3050 km2. Off-shore – 2 blocks and On-shore – 3 blocks.

Previously, these areas were studied by traditional seismic methods and have more then 30 wells.

The study was performed in February 2012. Based on the results of study on Brantas Block by using remote method SBRDSS Sevastopol specialists discovered total 31 hydrocarbon anomalies.

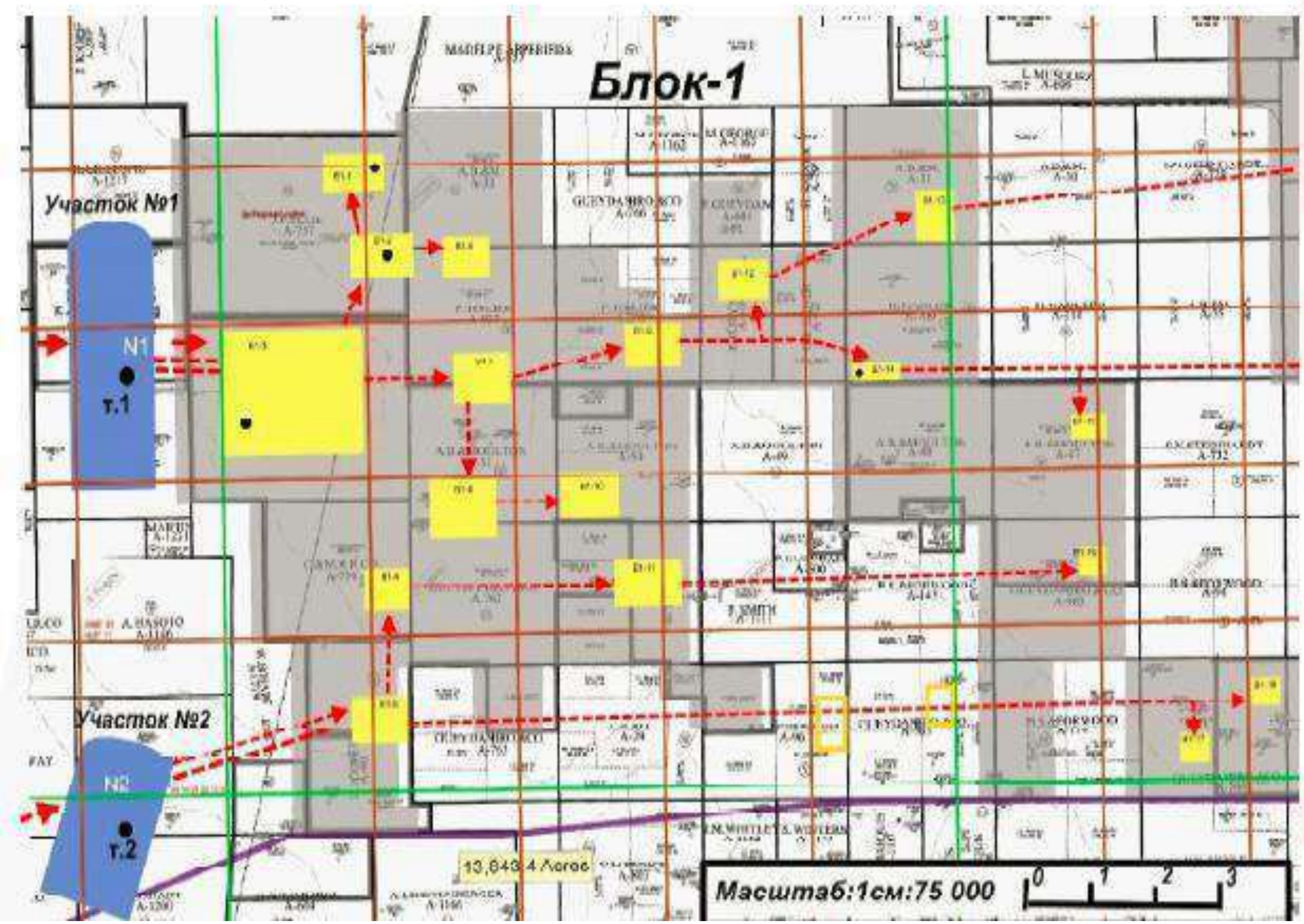
SBDRSS remote method was proven by compare with seismic date available in Lapindo Brantas company. This method is cost effective and very accurate in depth and deposit result.

Regards,

Thanigasalam
President Director

CV RUSSTECHNO INDONESIA
RTI

Case Study II



License block in Texas, USA

Well N-1 penetrated shale oil formation as indicated by the corresponding anomaly

Testimonial

«Інститут геофізики та проблем Землі»

Товариство з обмеженою відповідальністю

Україна, м. Київ, вул. К.Білокур 4, оф. 6
тел/факс: +38 044 285 0826, моб.: +38 068 100 5153

Founded in 2007

«Institute of Geophysics and Problems of the Earth»

Limited Liability Company

Ukraine, Kyiv, K. Bilokur 4, of. 6
tel/fax: +38 044 285 0826, mobile: +38 068 100 5153

Outgoing # 11/10-03

15.11. 2010

Conclusion

on the results of prospecting works performed by specialists of the «Sevastopol National University of Nuclear Energy and Industry» in the territory of Texas, USA

Commissioned by the Institute of Geophysics and Problems of the Earth (Kiev, Ukraine) in 2010 specialists (Ph.D. Goh V.A., Ph.D. Kovalev N.I., Doctor of Geological and Mineralogical Sciences Filippov E.M., etc.) performed a search and exploration of natural gas deposits on the territory of Texas, USA using the equipment of the remote complex "Search". At the same time, remote search facilities were used to study the territory in the south of Texas, with an area of about 500 km2.

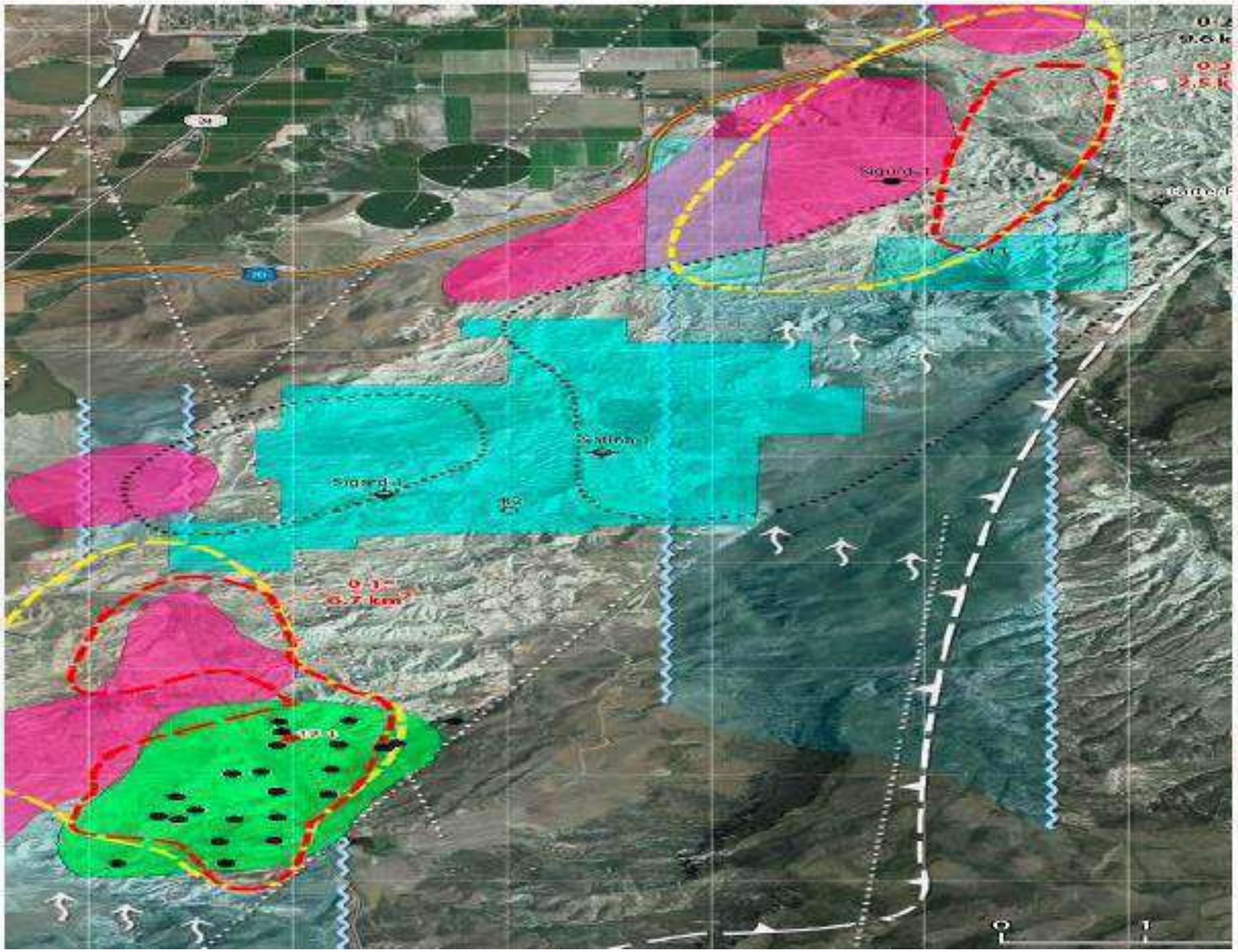
Based on the results of work on a given territory, underground natural gas accumulations were discovered having industrial significance, 3 points for drilling industrial wells were selected and surveyed.

The results of drilling a well at one of the proposed points confirmed the presence of a natural gas reservoir. The gas pressure in the deposit proved to be abnormally high, 620 atm., in accordance with the survey data.

Director of
Institute of Geophysics and
Problems of the Earth
Pavel Ivashchenko

«ІНСТИТУТ ГЕОФІЗИКИ ТА ПРОБЛЕМ ЗЕМЛІ»

Case Study III



License block in Utah, USA

The oil accumulations and wells locations have proved the delineated anomalies. Recommendations were made to drill new wells at the identified anomalies to the north-east.

Testimonial

"CARPATHIA", LLC
Limited Liability Company
470 E 3900 So Suite104, Salt Lake City, Utah 84107
Off.801-293-3314 Fax:801-303-0720
Cell:801-380-2087 ttvol333@gmail.com

CARPATHIA

"КАРПАТІЯ", ТОВ
Товариство з Обмеженою Відповідальністю
Cell:8063-740-4071 ttvol333@gmail.com

FINAL REPORT
On Presentation-Demonstration of "Deep Vision" Model

"CARPATHIA", LLC, represented by Vasyl Lyubarets, as a party representing "Deep Vision" Model of discovering natural resources that being tested, and Kelly Alvey, as a party participating in the test, have executed this Final Report concerning final results of testing unique Model "Deep Vision".

Results of inspection of objects, located on the territory of the state of Utah, USA — Dated 25 of February 2009

Object #	Kelly Alvey's data	"Deep Vision" data	Comparison %	CONCLUSION
"0"	Nothing	Nothing	100 %	matching results
1	Nothing	Nothing	100 %	Matching results
9/1	6280	6150-6450	100 %	Matching results
9/2	6380	6150-6420	100 %	Matching results
9/3	6500 ; 9500-10000	6040-6420 ; 9450-9750	98 %	Matching results

Director of "Institute of Geophysics and Problems of the Earth",
Technical Director of "Benif International" Corporation — Pavlo N. Ivashchenko

Inventor of "Deep Vision" Model
Professor — Vitaly A. Gokh

Inventor of "Deep Vision" Model
Professor — Mykola I. Kovalyov

Signatures of Witnesses

Vasyl O. Lyubarets, Leader-President of "CARPATHIA", LLC

Kelly Alvey

Rex W Hardy, Lawyer

Roy Moore, Wolverine Gas and Oil Company of Utah, LLC. Landman

Ray Beckham, BYU Professor

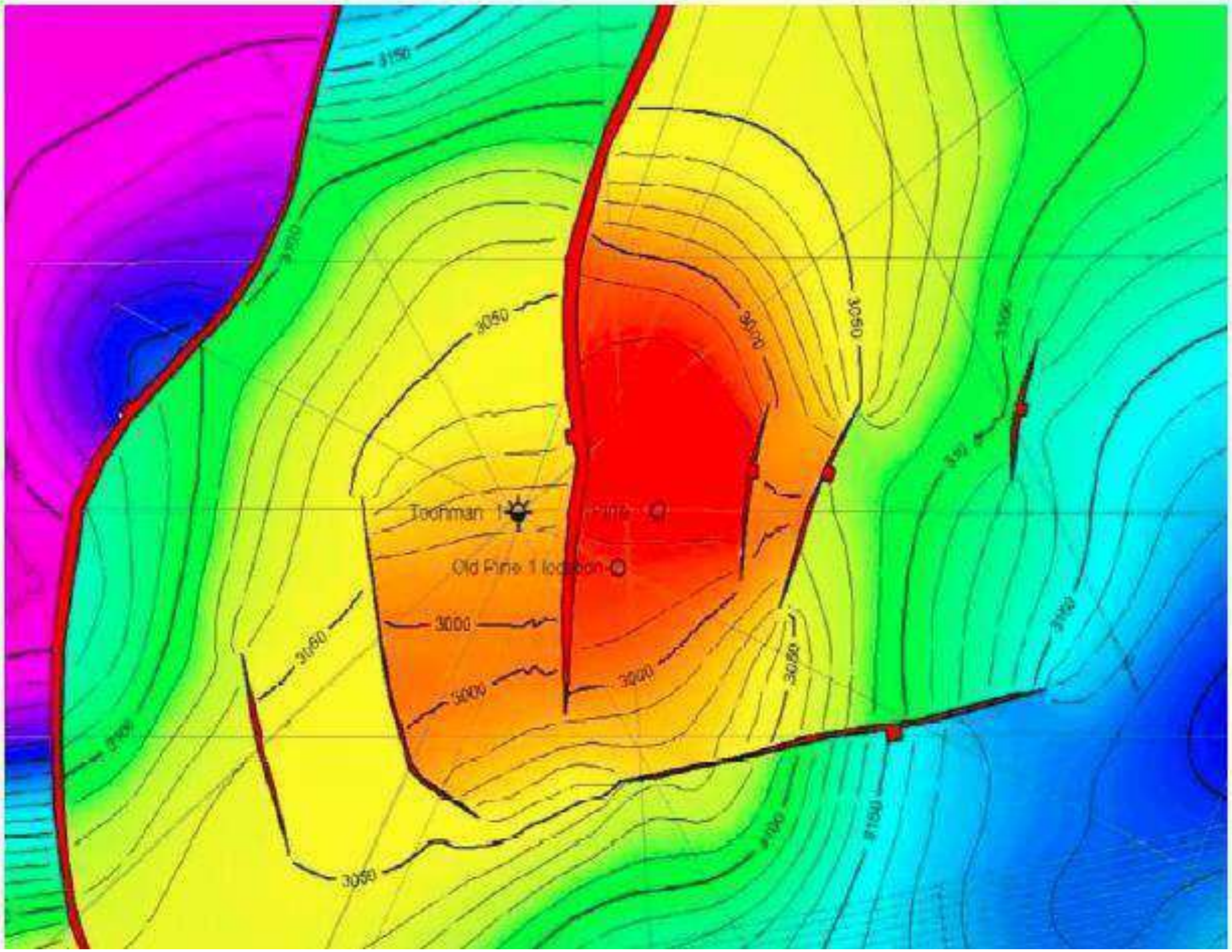
Jeffrey F. Chivers, "ENDEAVOR" Capital Group, LLC

Brad Whittaker, CEDO Executive Director

Edward W. Fall, P.G.UT Government Department of Natural Resources
Phillip Babcock

Arbitrator — Elizabeth Goryunova, Director of International Relations Salt Lake Chamber of Commerce

Case Study IV



License block Pel-105 in Australia

Well Pine-1 location was changed as suggested the identified anomaly. The well has been drilled and proved to be productive.

Points of Consideration

1. *Highly Cost-effective and Time-effective technology for identifying the focus area of hydrocarbons and other minerals IN South América.*
2. *This technology is unique. No analogue image processing available in the world.*
3. *The reliability of the obtained results based on NMR & remote sensing data after Step-1 & 2 is 60%-80%, and after performing field work in Step-3 is about 90%.*
4. *3D Seismic data acquisition area could be finalized without investing time and money in 2D seismic and other geophysical surveys.*
5. *If seismic is already done in any area, this NMR-RS technology helps in identifying and validating the drilling locations. Also helps in the assessment of probable reserves of hydrocarbons, ores and groundwater prior to drilling.Usefull for Re exploration in Brownfield (oil, gas, minery)*
6. *This Technology is very useful in the remote and topographically challenging terrains like Andes or Shale área in South of Continent (Vaca Muerta, los Monos..)*
7. *Detection of hydrocarbon and geothermal waters up to depth of 5000 m, ore bodies up to 1500m, underground drinking water to depths of 3000 m.*
8. *Vertical resolution of the anomaly after Step-2 is 100m and after Step-3 is 30-50m.*
9. *The total time for the execution of NMR-RSS exploration work on survey area of 10000 sq. km. is approximately 2 months for Step-1 & 2, and 5-6 months for Step-1,2 &3.*

RSS NMR
THE SIMPLE WAY OF EXPLORATION
By Fands-LLC

SEVASTOPOL STATE UNIVERSITY

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