deposit is scheduled to be continued by M & Diamond Corp., and there is no other area left for further mineral occurrence, since the corporation owns the surrounding mineral occurrence areas.

3.2.7 Uubulan district

(1) Outline of survey results

The geology of this area comprises basic rock, granitic porphyry, dioritic porphyry, pegmatite, corresponding to the Upper Mesozoic, trachyte and andesite, corresponding to the Middle and Upper Mesozoic.

For the lineament, E-W trending lineament having a good continuity was extracted. For the alteration, the hydrothermally altered zone and the weak skarnization were confirmed, although no conspicuous sign of mineralization was observed.

3.2.8 South Camp District

(1) Outline of survey results

The surveyed area comprises sedimentary rocks corresponding to the Upper Proterozoic, ultrabasic rocks corresponding to the Upper Proterozoic to the Lower Paleozoic, the granitic rocks corresponding to the Proterozoic, intruding into aforesaid rocks and the sedimentary rocks corresponding to the Middle Mesozoic. The lineament corresponds to the extended portions of the E-W and NW-SE systems. For the alteration, a network type quartz vein accompanying a weak mineralization for gold was observed in the granite. It was reported that there were gold grains contained in an unsolidified gravel in Alluvium.

3.2.9 Khujirit district

(1) Outline of survey results

The surveyed area comprises andesites formed in the Upper Paleozoic and granites formed during the period ranging from the Upper Paleozoic to the Lower Mesozoic. Any outstanding lineament was not extracted. The hydrothermal alterations such as silicification, sericite and quartz vein in granite were observed. For mineral showing, copper oxide was observed along the cracks.

3.2.10 Khokho district

(1) Outline of survey results

The Khokho district comprises sedimentary rocks (metamorphic rocks) belonging to the Lower Paleozoic and granites belonging to the period ranging from the Proterozoic to the Lower Paleozoic. As lineament, E-W system and NE-SW system were sampled, and the mineral occurrence is located at the intersection of these lineaments. The hydrothermal alteration accompanying quartz vein was observed in granitic diorite body. The mineralization of galena, malachite, etc was observed in quartz vein. It is necessary, however, to confirm whether there is any potential of the skarn type mineralization around the ground in contact with the intrusion of granite and the like.

3.2.11 Altagan gol district

(1) Outline of survey results

The Altagan gol district comprises ultrabasic rocks and sedimentary rocks belonging to the Lower Paleozoic and the intrusions of granites and the like belonging to the Upper Paleozoic. For the lineament, the NW-SE system and NE-SW system were extracted, and the mineral occurrence is located at the intersection of these lineaments. As for the alteration, the formation of quartz vein was observed in granite. The presence of molybdenite in quartz vein was observed, although its grade was low, and there were no anomalous signs of the gold and silver mineralization. Further, there were no anomalous signs of the nickel and chromium deposits in the ultrabasic rock.

3.2.12 Altagan gol NW district

(1) Outline of survey results

This area comprises of carbonate rock and basic rock belonging to Lower Paleozoic and the intrusion of granite and the like belonging to the Middle Paleozoic. No outstanding lineament was extracted, however, according to the available data, the NW-SE and NE-SW trending faults are conspicuous. As for the alteration silicification and quartz vein were observed in green schist and limestone, which sometimes are signs of the metamorphic-type and Carlin-type mineralization, but no sign of the gold mineralization was observed.

3.2.13 Murun South district

(1) Outline of survey results

The surveyed area comprises of basalt, andesite, dacite, rhyolite, as well as acidic tuff, sandstone and conglomerate, which are belonging to the Upper Paleozoic, and the intrusions thereinto by monzonite, trachyte and granitic diorite belonging to Upper Paleozoic. As for the lineament, the E-W trending having a good continuity was extracted. As for the alteration, the silicification, sericitization and weak pyritization were observed, but unfortunately mineral showing was not observed.

3.2.14 Tariat district

(1) Outline of the district

(1-1) Location

This area is situated in the south of the surveyed area, ranging from 48° 00′ to 48 ° 30′ north latitude and from 98° 45′ to 100° 00′ east longitude covering an area of about 100 km from east to west and about 60 km from north to south (area: about 6,000 km^2). This area is away about 150 km in south-southwest from the city of Murun.

(1-2) Topography and vegetation

In the southern part of this area flows the Hayd terh River starting from the Hangay Mountain Range, and the Terhiyn tsagaan Lake lies in the central part of the area. In the central to northern part of the surveyed area, Tarvagatayn Mountain Ranges, with their peaks being about 2,500 m above sea level, runs continuously almost from east to west. The height of the area surrounding the Terhiyn tsagaan Lake is about 2,000 m above sea level.

The vegetation comprises thin coniferous forests covering the ranges of the mountains and the grasses growing on the lowlands.

(1-3) Infrastructure and access

There is the town of Tariat in this area. In this area, the supply of electricity is available, but other general infrastructures are not well established. The area surrounding the Terhiyn tsagaan Lake is a national park with scenic spots. In the surveyed area, a main road connecting the town of Tariat with the town of Tosontsengel runs along the south shore of the Terhiyan tsagaan Lake and the Hayd terh River, the main road not being paved but being wide and flat, thereby making the traffic easy.

(1-4) Features on SAR image

In the southern part of this district, E-W trending lineament is predominant. Further, in the part of this area ranging from the central part to the northern part, the N-S trending lineament, which is considered to have a good continuity and estimated to constitute a fault, while intermittent of NEE-SWW, NWW-SEE and N-S trending are distributed in granite in the northeastern part of this area.

Several circular lineaments, having radius of about 2km respectively, in the central and eastern parts of this district were extracted.

(1-5) Outlines of geology and deposit

Geology of this district is shown in Figure II-3-28. There are wide distributions of granodiorite, tonalite, granite, etc. of the Middle to the Lower Cambrian in the northern to central part of this area, while there are distributions of the sandstone, conglomerate, shale, limestone, gneiss, etc. of the Riphean to the Devonian in the southern part. These geologic formations are intruded by granites of the Devonian to the Carboniferous in the northeastern to southeastern part of this area. Further, there are intrusions of granites of the Permian in the western part of this area. Igneous activity of basaltic volcanic rock of the Quaternary was observed in the part along the east shore of the Lake Terhiyn tsagaan.

In the western part of this area, an NW-SE trending fault, 50 km long and having a good continuity, lies adjacent to the sedimentary rock of the Precambrian and granites of the Permian. In the central part, the NE-SW and the NWW-SEE trending faults are distributed, and the former offsets the latter. In the eastern part, an E-W trending fault lying adjacent to sedimentary rocks of the Precambrian to the Carboniferous and granites of the Cambrian to the Devonian was observed.

According to the list of the mineral occurrences, there are 3 mineral occurrences of gold, 6 mineral occurrences of copper and 1 mineral occurrence for the copper/gold. The type of mineral deposit comprises vein type and skarn type, although the records of the alteration zone and quartz vein are also included. The grades of the ores are low; for instance, 0.1g/t Au: and 0.1% Cu.

(1-6) Reason for selection

This area is selected for the reason that the mineral occurrences of the gold and copper are concentrated near the Terhiyn tsagaan Lake and the Hayd terh River, although the gold grades in these mineral occurrences are low as is represented by 0.1g/t of Au.

(1-7) Survey content

In this area, alteration and mineral showing in the vicinity of the latitude and longitudes

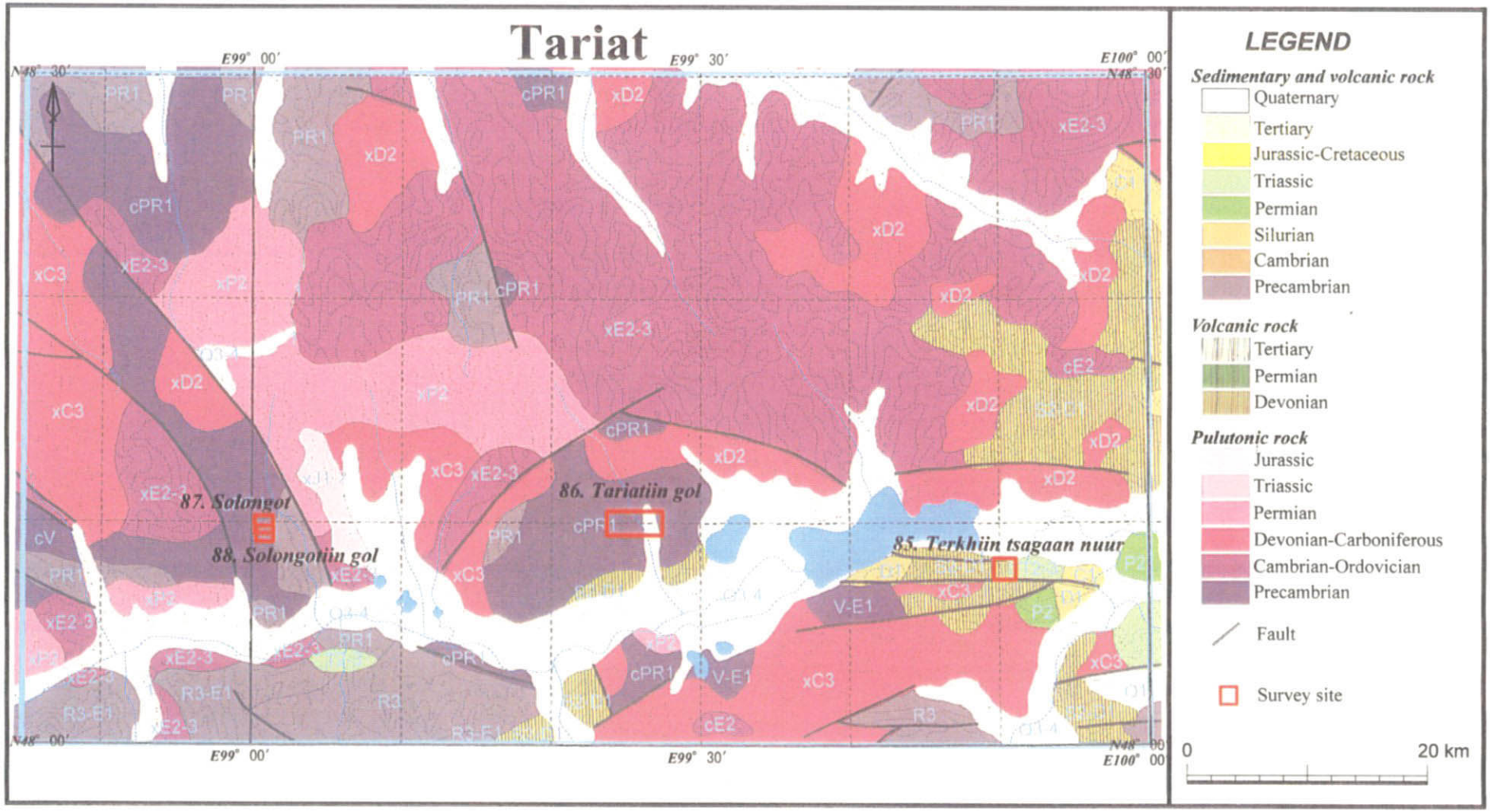


Fig. II-3-28 Geological map of the Tariat district

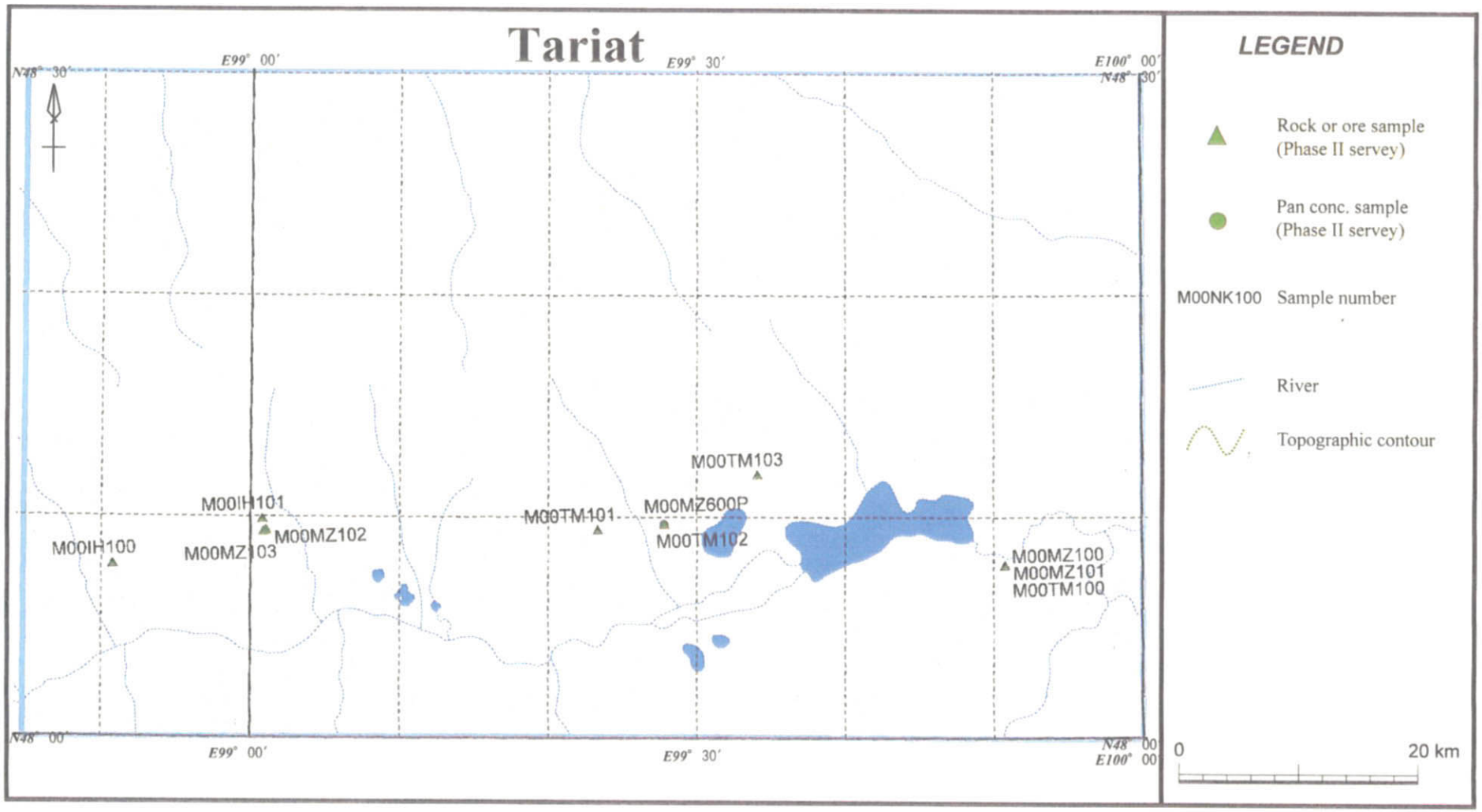


Fig. II-3-29 Sample locations of the Tariat district

given in the list of the mineral occurrences, including the mineral occurrences such as the Terkhiin tsagaan nuur mineral occurrence, Taiatiin gol mineral occurrence, Solongot mineral occurrence and Solongotiin gol mineral occurrence, were investigated. Figure II-3-29 shows the sampling locations of this district.

(2) Survey results

(2-1) Terkhiin tsagaan nuul(Mineral occurrence No. 85)

[Representative longitude and latitude]

48° 07′ 20″ north latitude, 99° 50′ 20″ east longitude

[Topography and vegetation]

The area covers a relatively steep mountain mass (with its highest peak measuring 2,800 m above sea level) lying in the E-W direction and a flatland lying eastward. Highlands and valleys are covered with coniferous forests, while the flat areas are grasslands, and the rocks are exposed in some of the peaks and steep areas.

[Access]

The area is located 4 km away southwestward from the town of Tariat, near the eastern end of the Horgo uul Lake and is adjacent to the main road bound west through the town of Tosontsengel, thereby making the access easy.

[Preceding survey]

Geological mapping in 1:200,000 scale was conducted in 1975, and the mineral occurrence was found through this survey. Further, in 1982, trenching (26.5 m^3), as a follow-up survey, was conducted. The mineral occurrence along River Summan gol is composed of quartz vein of 0.5 m wide and 10 m long, which was analyzed for Au, Ag, Cu, Cr and Zn and got result of 0.1g/t Au and 0.01% Cu, etc.

[Features on SAR image] (SAR image unit "Dzurh")

This mineral occurrence is located within a zone where the lineament characterized by a long fault measuring more than 10 km ranging from WNW-ESE direction to E-W direction is predominant. Another lineament lying north adjacently to and in the same direction as that of the above-mentioned lineament was also found, and this lineament continues to the mineral occurrence of Tariatiin gol located about 30 km west, which will be explained later. Further, another lineament of about 3 km long and in NNE-SSW direction was found about 1 km east. This direction is conforming to the direction of quartz vein, which will be explained later.

[Geology and geological structure]

According to the existing data (document No. 3684, geological map of 1:200,000 scale), this mineral occurrence and the surrounding area comprise the distribution of late Proterozoic

shale-gneiss series, Zag series of the Middle Riphean system, non-alkali leucocratic granite body intruded in the Middle Riphean, Maikhan-uul layer of Vendian system and the Tariat formation of the lower Devonian. These rocks form the mountain mass, while the lava of the basalt erupted during the Pliocene to the lower Pleistocene is widely distributed along the River filling the valley.

[Mineral showing and alteration]

According to the existing geologic map (Figure II-3-30), there are two mineral occurrence of Au in the Maikhan-uul formation of the Vendian system lying along the Suman gol River. Other mineral occurrences of Au are all lying in the Quaternary sediment. Also, there is the possibility that these mineral occurrences being of the placer gold, though the details have not been disclosed yet.

In the field survey, the mineral occurrence along the Suman gol River, for which the trenching survey was conducted before, were investigated.

There is a shallow-excavation trench in a relatively steep east-side slope extending northward from the relatively steep mountain mass continuing E-W direction, and a quartz vein (as several parallel and diagonal streaks) lies in the south side of the extending range. The main vein is confirmed to lie on the top of the quartz vein running in N-S direction with inclination of 35 ° W, width of about 35 cm and length of about 32 m. For the main vein, channel samplings were conducted at 3 points 10 m apart from each other. The main quarts vein comprises mainly white but locally light purple crystalline quartz, locally accompanying a dark brown plate-like crystalline mineral (wolframite) present along the top edge of the quartz vein. In order to confirm the range of the inclination of the vein, the west-side slop of the extending range of the mountain mass was investigated, but no outcrops were found.

[Laboratory test]

According to the result of the chemical analyses of the channel samples taken at the three points (M00IH100, M00MZ100, M00TM100), 0.24g/t Au was obtained at the central point (M00MZ100), but Au of less than detection limit (0.005g/t) was detected at both the end points; about 0.002% W at a maximum.

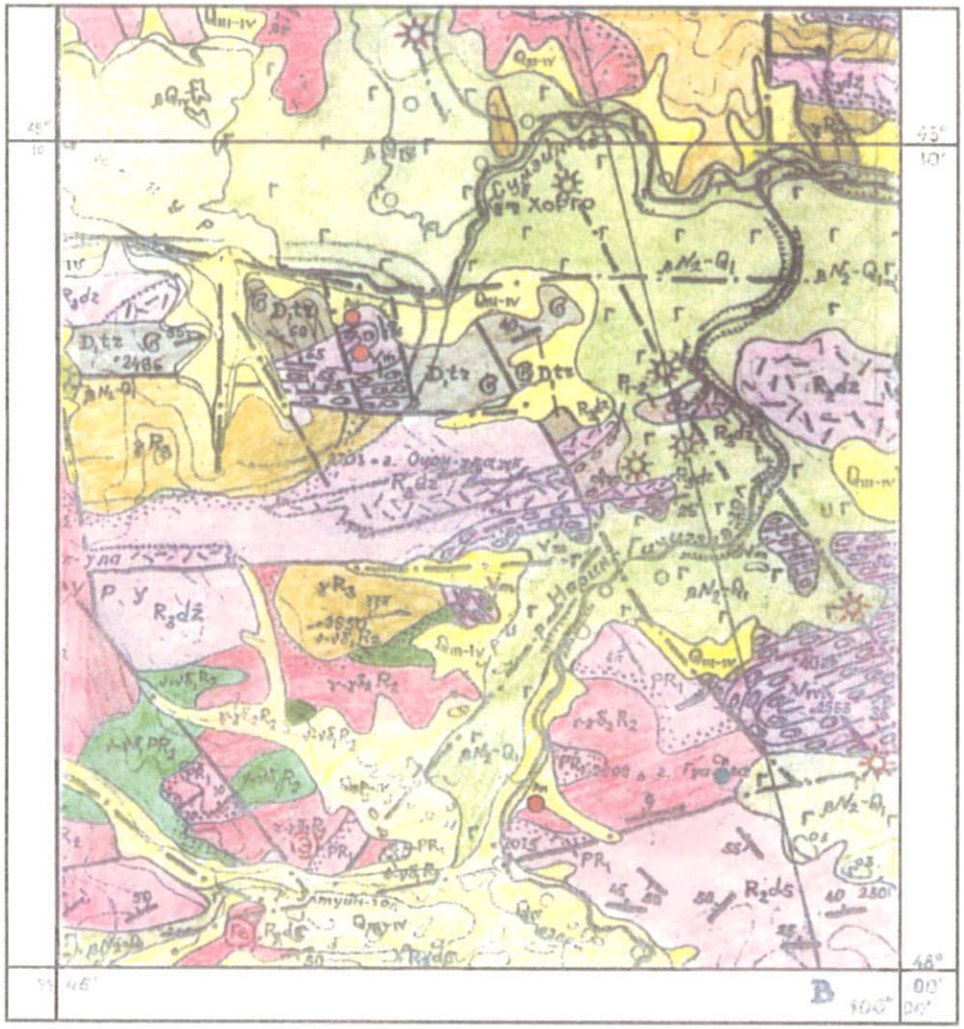
According to the result of the chemical analysis of the vein quartz (M00MZ101) including a dark brown plate-like crystalline mineral expected to be wolframite, Mn and W showed high values, i.e., 2530 ppm and 540 ppm, but, according to the result of X-ray diffraction, the minerals other than quartz were not detected.

[Evaluation]

The value of Au was as equally low as the past result of analysis (Au: 0.1g/t), and the possibility of the presence of high-grade Au ore seem to be low, judging from the vein quality. Further, since the presence of W is so small, although its presence is detectable, the potentiality of existing deposits having economical value is considered to be low.

GEOLOGICAL MAP OF THE
TSAGAAN-NUUR (Au) OCCURRENCE

Scale 1:100,000



LEGEND

- Recent deposit
- Recent deposit, Basalt
- Pliocene-Pleistocene, Basalt
- Lower Devonian, Tariat suite
- Upper Proterozoic - Vendian, Maikhan-uul suite
- Upper Riphean, Zavkhan series
- Middle Riphean, Zag series
- Lower Proterozoic, shale-gneiss series
- Upper Riphean, intrusion complex
- Middle Riphean, intrusion complex's second phase
- Dyke & vein
- Contact's hornfels
- Volcanite
- Epidotization, Limonitization
- Gold occurrence

0 5km

The map extracted from the geological map sheet of 1:200,000 scale was prepared for the project by Mongolian GIC.

Fig. II-3-30 Geological map of the Terkhiin tsagaan nuur

(2-2) Tariatiin gol (Mineral occurrence No. 86)

[Representative latitude and longitude]

48° 12′ 50″ north latitude, Long. 99° 26′ 35″ east longitude

[Topography and vegetation]

The area comprises a flatland and gently-sloping hilly districts lying on both sides of the flatland with short grasses covering 50% or less of the area.

[Access]

The mineral occurrence is situated about 35 km west of the town of Tariat and surrounded by gently sloping valley on the west side of the Horgo uul Lake. The area can be reached by a car by using the main road bound for the town of Tosontsengel passing the previously-mentioned mineral occurrence of Terkhiin tsagaan nuul and continuing the travel for about 40 km until reaching the point of departure from the main road and continuing the travel for about 10 km on the unpaved road in the grassland.

[Preceding survey]

In 1982, geological mapping in scale of 1/200,000 was conducted, at that time 4 mineral occurrence of gold and 1 mineral occurrence of copper were discovered, followed by trenching (213 m^3) and the like. Of the 4 mineral occurrences, 2 in the south are mineral occurrences of gold within the recent fluvial sediment distribution area, one of the two in the north is a gold mineral occurrence within composite rocks (amphibolite-gabbro-diorite) distribution area in the Middle Riphean, while the other is a copper mineral occurrence in composite rock (granite-grnitic prophyry, granitic syenite and syenite) in the Upper Riphean. The ore body is reported to be rubbles spreading throughout a range of 10 km x 8 km, which sometimes includes greisenized quartz vein and rock (stock), accompanying mineralization for Au and Ag. For instance, according to the result of chemical analysis, the gold content is on the order of 0.1g/t at a maximum, while the silver content is on the order of 0.7g/t at a maximum. Besides, it was also reported that a grain of gold had been found in a heavy mineral obtained from the sediments of the Quaternary.

[Features on SAR image] (SAR image unit "Dzurh")

The Tariatiin gol mineral occurrence and the surrounding area corresponds to a low lineament-density area, and no lineament other than one, 25 km long, lying in the WNW-ESE direction continuing from the vicinity of the previously-mentioned Terkhiin tsagaan nuul mineral occurrence was observed.

[Geology and geological structure]

According to the existing data (geologic map for mineral occurrences of 1:100,000 scale (Figure II-3-31)), the hills within the area comprise a shale-gneiss series of the Lower Proterozoic, intrusive complex of the Lower Proterozoic, the composite rocks of the Middle Riphean, the early-stage gabbros, the second-period non-alkali leucocratic granite, the Zavkhan

formation of Upper Riphean system and the intrusive complex of the Upper Riphean, while the valleys thereof are covered with sediments of the Quaternary.

[Mineral showing and alteration]

The locations of the mineral occurrences are not known definitely because of the non-existence of the detailed geologic map. According to the existing geological map (Figure II-3-31), 2 mineral occurrences are located along the boundary between the flatland consisting of sediments of the Quaternary and the hills. An outcrop of large crystalline gabbro was found in the vicinity of the west-side mineral occurrence shown in the geologic map, but the mineral showing suggesting mineralization was not observed. Similarly, there was an exposure of the leucocratic coarse- grained anorthosite, but alteration for mineralization was not observed. Though there are no past survey data, there was observed the presence of white crystalline sheet-form quartz blocks widely covering the southern slope of a relatively high hill of syenitic granite lying about 5 km east of the mineral occurrence.

[Laboratory test]

According to the result of the microscopic observation of the coarse grained anorthosite (M00TM101), the major portion thereof consists of extremely coarse grains with major axes of 20-0.3 mm forming coarse grained and hypidiomorphic-ingranular in texture. The coarse-grained anorthosite, including a small amount of quartz and augite is called quartz bearing augite/anorthosite and it was also found to have been suffered by a weak alteration to form small amounts of sericite, chlorite and quarts. By X-ray diffraction of coarse grain anorthosite represents quartz, plagioclase and sericite were detected.

The results of the chemical analyses of the coarse-grained anorthosite (M00TM102) and the quartz block (M00TM103) showed no anomalous values to be noted.

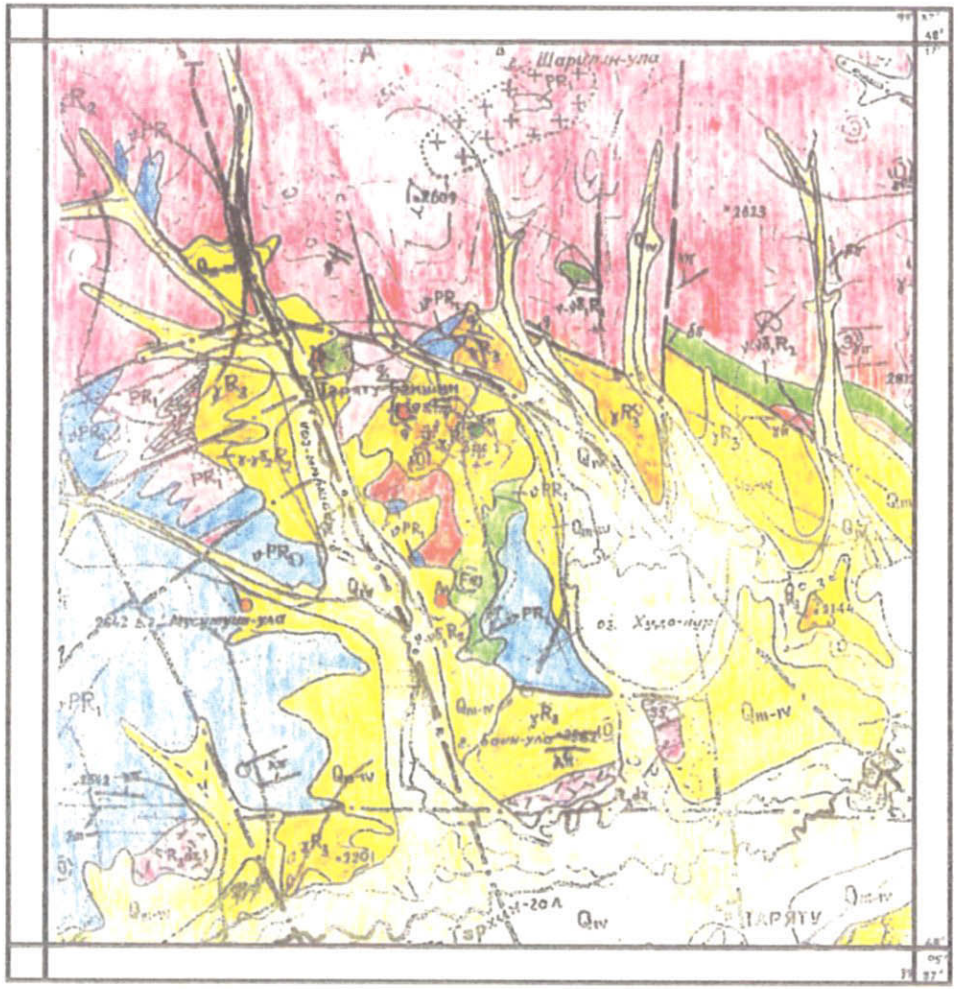
The results of the analyses (M00MZ600P) of the heavy minerals collected by panning in a River (5 m wide), flowing down through the valley between the east-side and west-side mineral occurrences, have shown a high content of Th of 13ppm, compared with other mineral occurrences, but no anomalous values were observed with respect to the useful elements such as Au and Pt.

[Evaluation]

Two of the four already known mineral occurrences have no definite evidence of mineral showing, such as being located within the distribution area of the Quaternary. Although the detailed data of the mineral occurrences are not available due to the lack of detailed geological map, the possibility of existing deposits having economical value is considered to be low, judging from that no outcrop indicating mineralization was observed through the geological survey and that the results of the past analyses are not mineral occurrence.

GEOLOGICAL MAP OF THE
TARIATIIN GOL OCCURRENCE

Scale 1:100 000



LEGEND

- Qtv — Recent deposit
- Qm-tv — Upper Quaternary - Recent deposit
- R_3dz — Upper Riphean, Zavkhan suite
- PR_1 — Lower Proterozoic, shale-gneiss series
- γR_3 — Upper Riphean, intrusion complex
- γ-$\gamma\delta_2R_2$ — Middle Riphean, intrusion complex's second phase
- ν-$\nu\delta_2R_2$ — Middle Riphean, intrusive complex's primary phase
- νPR_1 — Lower Proterozoic, intrusive complex
- Q, Fe — Quartzization, Ferruginisation
- Greisenization
- Border of facies and lithological subdivision of same age
- Acidic effusion
- Granite with corneous and biotite-corneous
- Dyke and vein
- Au — Gold occurrence

0 — 5km

The map extracted from the geological map sheet of 1:200,000 scale was prepared for the project by Mongolian GIC.

Fig. II-3-31 Geological map of the Tariatiin gol

(2-3) Solongot (Mineral occurrence No.87)

[Representative latitude and longitude]

48° 09′ 51″ north latitude, Long. 99° 00′ 50″ east longitude

[Topography and vegetation]

The mineral occurrence is located in the southern foot of the Tarvagaitay mountainous area. The north slopes are very gentle and covered with short grasses, while its east sides of the mountains form relatively steep inclines with sporadic exposures of granite and sporadic growths of short grasses.

[Access]

The mineral occurrence is located about 70 km west of the town of Tariat and the southern foot of Tarvagaitay mountainous area. The access to the mineral occurrence requires traveling by car on the main road bound for the town of Tosontsengel, departing from the main road at the point about 30 km from the bridge crossing the Hoyd Terh River and continuing the travel about 2 km on the gently sloping grassland in northwestern direction until reaching the northeastern foot of the mountainous area where the mineral occurrence is located.

[Preceding survey]

In 1981, geological mapping in scale of 1:200,000 was conducted, at that time two Cu mineral occurrences were discovered, followed by trenching (295.7 m^3). According to the results of the analyses of the Au, Ag, Ni, Cu, Pb and Zn ores in the mineral occurrence of the copper ore, their contents were 0.1g/t, 4.0g/t, 0.003%, 0.0015%, 0.01% and 0.01% respectively at a maximum.

[Features on SAR image](SAR image unit "Dzurh")

In the northern part of the mineral occurrence, dislocation-like lineament (about 7 km wide) was observed at the extension of west side of the mineral occurrence.

[Geology and geological structure]

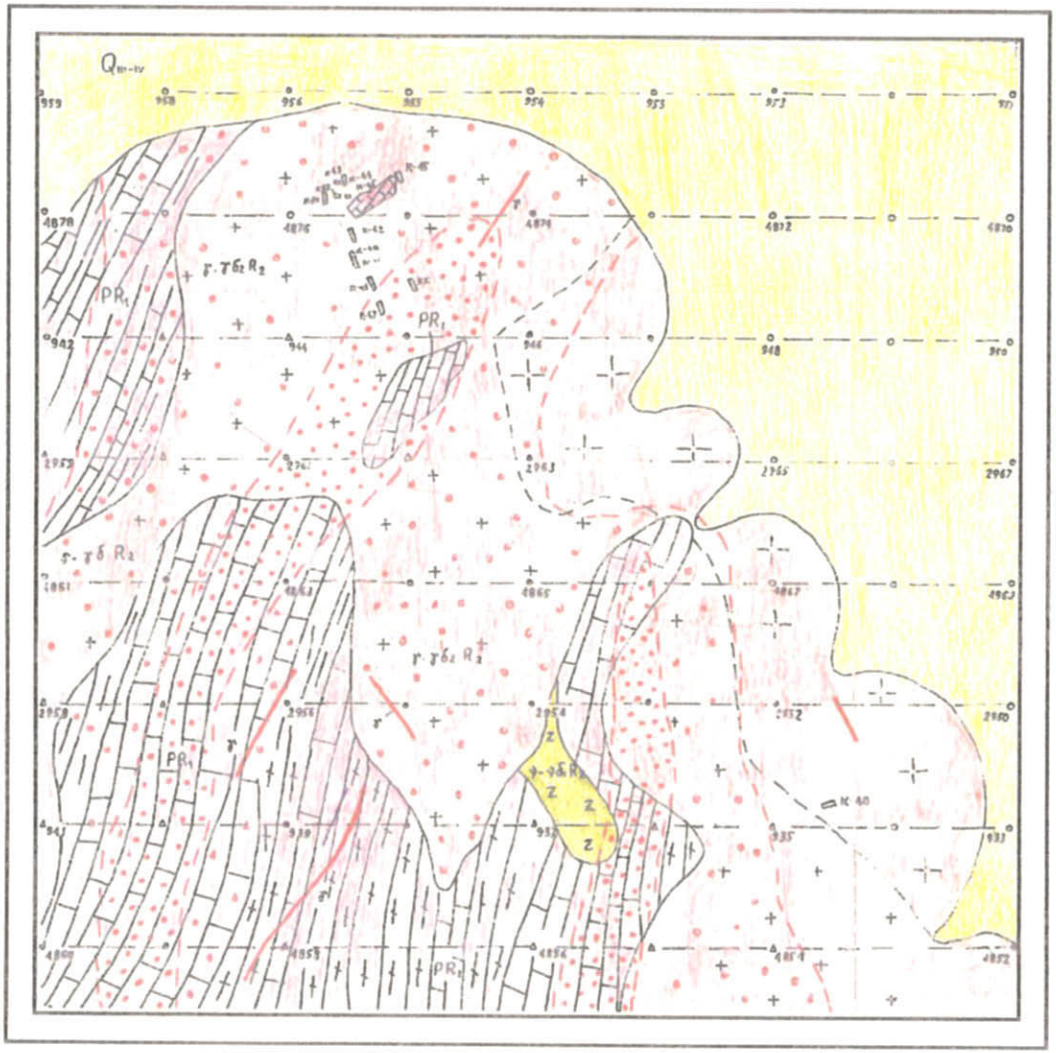
According to the existing data (document No. 3684, geological map of 1:200,000 scale), the two copper mineral occurrences are located in the boundary between limestone of the shale-gneiss series in the Lower Proterozoic and non-alkali leucocratic granite of intrusive complex of the second period of the Middle Riphean. The mountain mass, where the mineral occurrences are located, consists of above-mentioned granite, with limestone in the form of roof pendent.

[Mineral showing and alteration]

According to the existing geological map in scale of 1:10,000 (Figure II-3-32), a group of short trenches are located in strongly altered zone (skarnization, silicification and iron ore) or weakly altered zone (skarnization, silicification and iron ore) in the northern foot of the mountain.

The trench group is located in the gently sloping northern foot of the mountain, and crystallne limestone is partially exposed at small rises on the gentle slope, but the trenches

Geological map of the Solongot.
1:10 000 scale.



LEGEND

- Q_{III-IV} Upper Quaternary - Recent deposit
- PR_1 Lower Proterozoic shale-gneiss, marbled limestone
- $\gamma-\gamma\delta_2R_2$ Middle Riphean intrusive complex's second phase
- $\nu-\nu\delta_1R_2$ Middle Riphean intrusive complex's first phase
- Marbled limestone
- Biotite-gneiss

INTRUSIVE ROCKS

- Porphyritic, fine-grained, gabbroic
- dyke and vein

ALTERATION ZONE

- Intensive alteration zone skarnization, quartization, ironization
- Weak alteration zone skarnization, quartization, ironization
- The previous work area
- Trench
- Prospecting tour line and observation point

0 500m

The map was offered and the legend was translated in English by Mongolian GIC.

Fig. II-3-32 Geological map of the Solongot

themselves were substantially buried, and the details thereof were not known. There are exposures of the granite, skarn and crystallne limestone on the relatively steep eastern slope and the minor ridges, 1 km south-eastward from this trenches. The granite partially includes large phenocrist of potassic feldspar, but the granite in the vicinity of skarn zone is medium grained presenting weak banding. The skarn has strike shift of N 25° W, idip of 90° with the width of 40m, while crystaline limestone is about 30 m wide. No metallic minerals were observed with these outcrops nor observed floats of the gossan in the vicinity.

[Laboratory test]

According to the result of microscopic observation, granite (M00HH101) was found to be fresh hornblende biotite granite, which normally is medium grained with major axis of 3 mm or smaller and hypidiomorphic, ingranular in texture. The constituent minerals are, in decreasing order of the contents, potassic feldspar, quartz, plagioclase, biotite andhornblende, while small and extremely small amounts of iron oxide, sphene, apatite and zircon are included as accessory mineral. The presence of hypidiomorphic large-grainded potassic feldspar is characteristic.

According to the result of the microscopic observation, skarn (M00IH102) was found mainly comprising salite-hedenbergite, muscovite, calcite, unidentified colorless mineral, sphene and epidote. Of these minerals, pyroxene with major axis of 2mm-0.1mm is 70% of all, so skarn is pyroxene skarn.

Through X-ray diffraction, calcite (quartz index: 50.0), chlorite (5.0) and sericite (1.8) were detected from the skarn (M00HH101) on the side of crystalline limestone. According to the result of the chemical analysis of skarn, the contents of Ca and Mg have shown high values such as 17.05% and 10.75%, and no other abnormalous values were detected.

[Evaluation]

It is hard to make a general evaluation only from the result of ashort-term field survey, but, since no high values were detected by the survey of the copper occurrence in Solongot and no definite mineralization was observed despite the presence of skarn by the field survey, the possibility of existing deposts having economical value is considered to be low.

(2-4) Solongotiin gol (Mineral occurrence No. 88)

[Representative latitude and longitude]

48° 09′ 23.5″ north latitude, 99° 01′ 00.7″ east longitude, 2,430 m above sea level (pit site)

[Topography and vegetation]

The mineral occurrence is located in a hilly area having rather steep inclines. The vegetation is grasses that short grasses are predominant and forests.

[Access]

An unpaved road running between the town of Tariat and the town of Tosontsengel is used to reach around the site of the mineral occurrence by car. It takes about 3 hours by car for one-way trip from the town of Tariat. The mineral occurrence is situated on a hill lying west of the road running in north-north west direction and it takes about 30 minutes on foot to reach the site of the mineral occurrence.

[Preceding survey]

In 1981, geological survey in scale of 1:200,000 was conducted, and a gold occurrence was found at that time. A quartz vein and an aplite have shown Au content of 0.1g/t and Ag content of 4.0g/t. The scales of the quartz vein zone were reported to be 80 m x 1.5 m and 10 m x 5 m.

[Features on SAR image] (SAR image unit "Dzurh")

The SAR image showed a dark gray to gray tone with relatively flat up and down, showing the presence of unclear but a readable lineament in NNW direction. The drainage systems exist in lattice form, but the developments thereof were poor. The resistivity of the rocks was relatively low, and bedding plane was not observed.

[Geology and geological structure]

According to the existing data (document No. 3684), the mineral occurrence belongs to the Khangai structure belt of the North Mongolian Fold system and has the distributions of gneiss of the Lower Proterozoic and granites of the Middle Riphean. In the site of the mineral occurrence, the distributions of the white crystalline limestone and gabbro and syenite, which seem intruding into the formers, were observed. Locally gneissose structures were observed in gabbro and syenite. Further, the distribution of biotite epidote skarn with host rock of white crystalline limestone was observed.

[Mineral showing and alteration]

There were two pits, each having diameter of 2m, in the site corresponding to the representative latitude and longitude, where the presence of pyrite dissemination accompanying biotite epidote skarn was observed. Further, dissemination of magnetite accompanying biotite skarn was observed near the pits. Further, the presence of the float from quartz vein accompanying tourmaline was observed, but the presence of the outcrop thereof was not confirmed.

[Laboratory test]

According to the result of microscopic observation of dark gray rock (M00MZ103) in which the dissemination of magnetite, the presence of the alteration minerals of chlorite, sericite and epidote were observed and considered to have been affected by the hydrothermal alteration. According to the result of the chemical analysis of skarnized rock (M00MZ102) with pyrite dissemination, the content of Au is below the detection limit and the content of Cu was 114 ppm

and the content of Ag was 0.2 g/t.

[Evaluation]

Because the skarn type mineralization observed at the site of the mineral occurrence was extremely weak and the grades of the Au and Cu ores analyzed by laboratory test were low, the possibility of existing deposts having economical value is considered to be low.

3.2.15 Murun West district

(1) Outline of the district

(1-1) Location

This area is located in the central part of the surveyed area, ranging 49 ° 30′ - 50° 00′ north latitude, 99° 15′ - 99° 55′ east longitude, covering the area ranging about 50 km in east to west and about 60 km in north to south (area: about 3,000 km^2). This area is about 50 km away in a straight line from the city of Murun.

(1-2) Topography and vegetation

The area includes relatively steep mountain ranges and valleys and lies at 1,700 m to 2,400 m above sea level. In the central part of this area, the Delger murun River, a branch of the Selenge River, flows eastward, while the mountain ranges and the valleys extend ranging from E-W direction to NW-SE direction. As for the vegetation, short grasses grow densely in the valleys and lowlands, while thin coniferous forests grow on the mountain ranges.

(1-3) Infrastructure and access

The nearest city to this area is Murun city, the next in scale to Erdenet city and Bulgan city. In Murun city, regular airline service to and from Ulaanbaatarr and the relatively well-furnished tourist hotels are available. It takes by car about 2-3 hours to this area from the city of Murun.

There is a road in the grassland leading to Murun, although it is not paved, and so this area can be accessed easily. There are the towns of Arbulag and Burentogtoh in this area.

(1-4) Features on SAR image

In the eastern part to the central part and the southern part of this area, many short lineaments of the WNW-ESE system, about 5 km long, are observed, and these lineaments are offset by the NE-SW , NNE-SSW and NNW-SSE trending lineaments. In the northern part of this area, an E-W system lineament, which is considered to be a fault of about 40 km long, was extracted. In the northern marginal part of this area, a circular lineament, with a radius of 5 km,

was observed.

(1-5) Outline of geology and deposit

Geology around this district is shown in Figure II-3-33. The geology of this district comprises sedimentary rocks such as sandstone, conglomerate, shale, limestone, gneiss, etc. of the Riphean to the Cambrian and the granites of the Middle Devonian intruding into the formers. Especially, in the central, eastern and northern parts of this area, the distribution of sedimentary rocks of the Riphean to the Cambrian was observed. Further, sedimentary rocks and granites are bounded by the NW-SE or E-W trending fault.

According to the list of the mineral occurrences, except sedimentary type deposit, there are 1 mineral occurrence of copper/gold , 7 mineral occurrences of copper, 1 mineral occurrence of lead/zinc, and 5 mineral occurrences of tungsten and etc. The types of the deposit are considered to be vein type and skarn type, although there records of the alteration zone and quarts vein affected by the hydrothermal solution in the list of the mineral occurrences. The grades of the ores are low; for instance, 0.25g/t Au (Arshaan mineral occurrence) and 0.1% Cu.

(1-6) Reason for selection

According to the list of the mineral occurrences, mainly the mineral occurrences of the copper are concentrated in this area, and this area was selected for this reason.

(1-7) Survey content

In this area, the condition of the alteration and the presence of mineral showing in the vicinity of the latitudes and longitudes given in the list of the mineral occurrences were surveyed in the Tsagaan tolgoi mineral occurrence and Ulaan nuur mineral occurrence. Figure II-3-34 shows the locations of sampling within this area.

(2) Survey Results

(2-1) Tsagaan tolgoi (Mineral occurrence No. 89)

[Representative Latitude and Longitude]

49° 39′ 00″ north latitude, 99° 40′ 00″ east longitude.

[Topography and vegetation]

The mineral occurrence is situated near a gently sloping hill about 10m from the level of the flatland. The Delger murun River flows east at about 5 km away south from the mineral occurrence, while rocky mountains having peculiar shapes lie in the north of the mineral occurrence. The flatland is covered with short grasses, but there are exposures of white rocks in

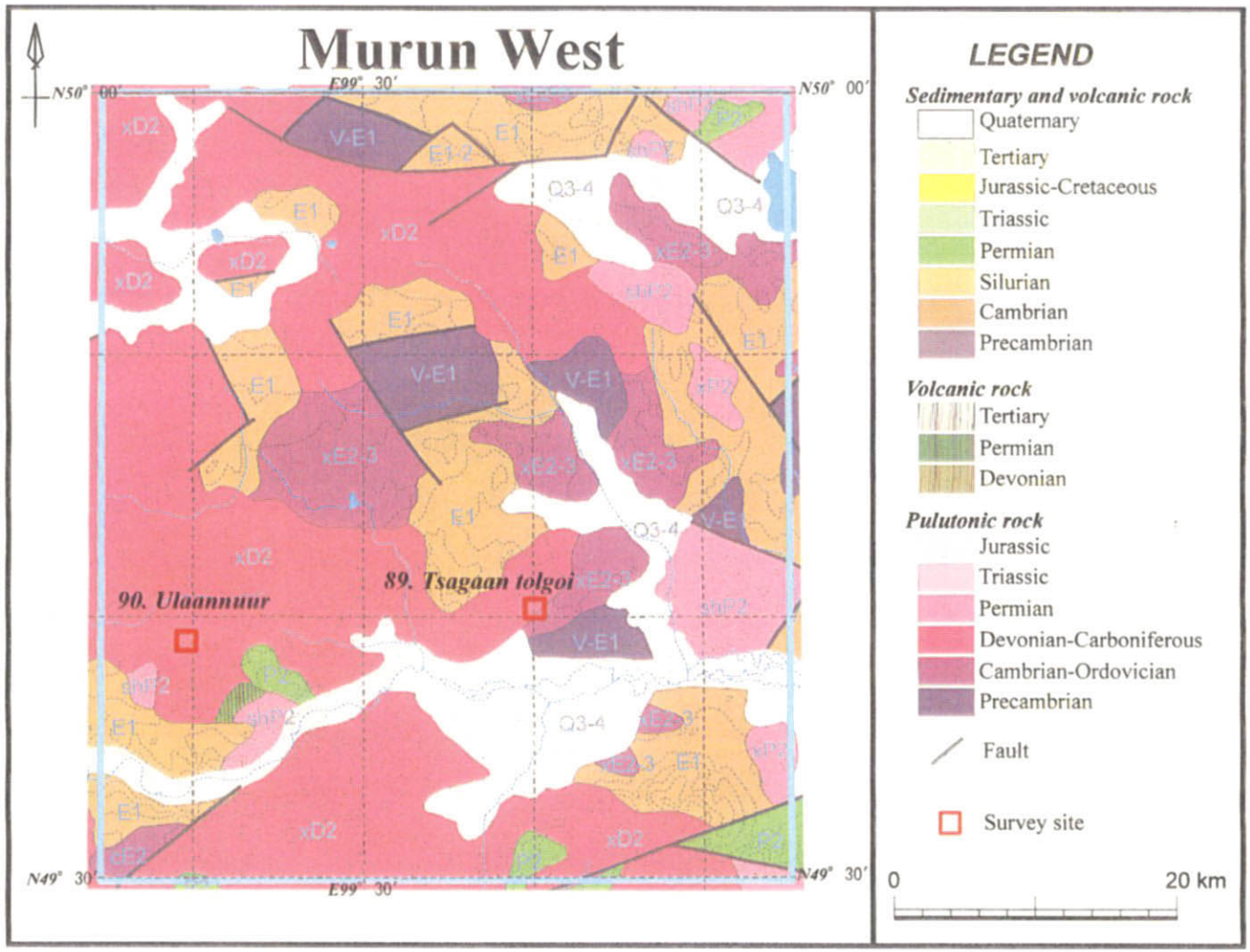


Fig. II-3-33 Geological map of the Murun West district

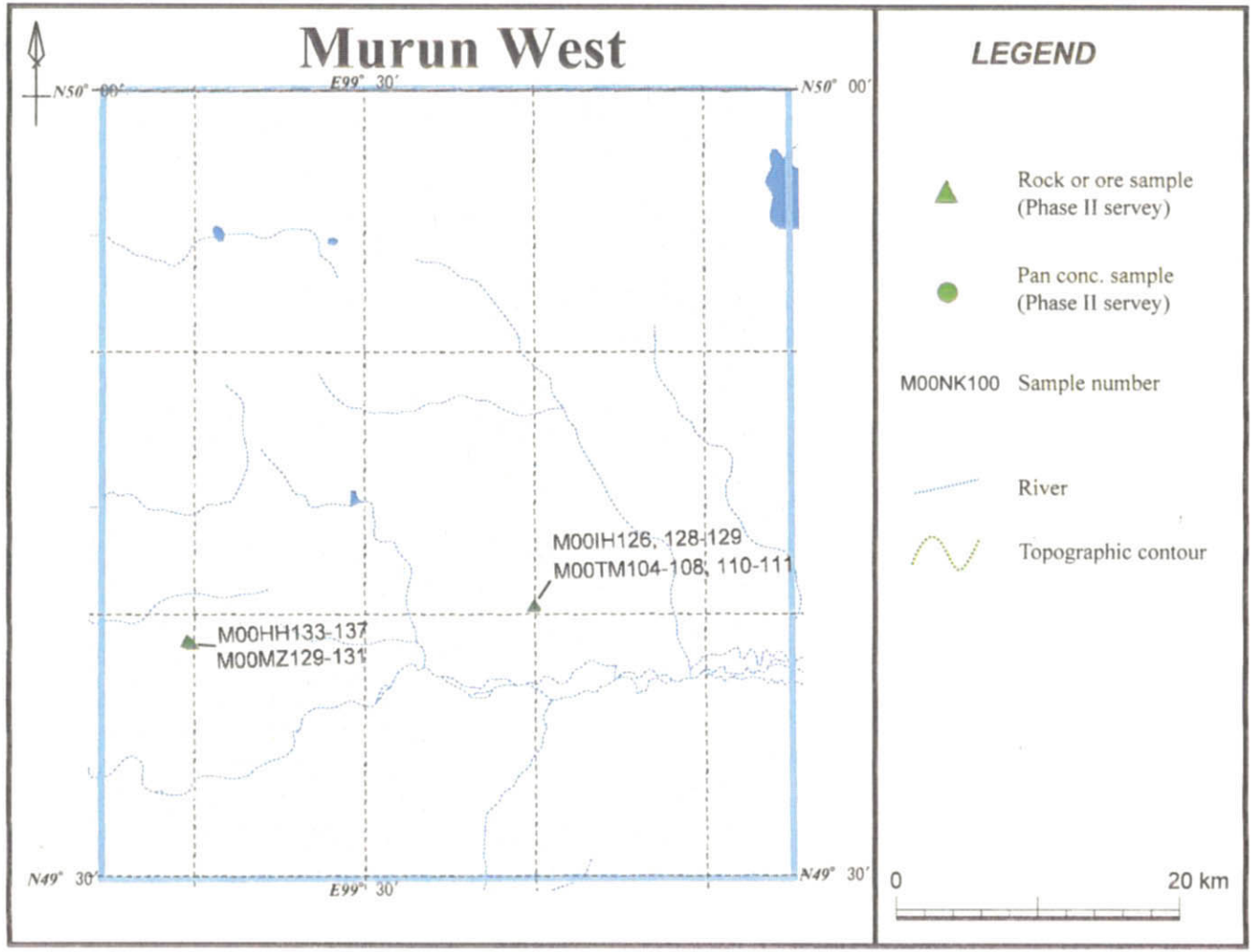


Fig. II-3-34 Sample locations of the Murun West district

the east-side slope of the hill especially.

[Access]

The mineral occurrence is located 40 km west from the town of Murun. Traveling by a car about 10 km west using a main road and turning to the left from there to proceed westward about 30 km on a road running along the Delger murun River brings one to the small hill where the mineral occurrence is located.

[Preceding survey]

In 1973, a survey based in a scale of 1:200,000 geological map was conducted, at this time the mineral occurrence was discovered. This follow-up survey was conducted by pitting (18.6 m), trenching (170.5 m^3) and a drilling (1,021 m)).

[Features on SAR image] (SAR image unit "Murun")

On both the east side and west side fault-like lineaments in the E-W direction almost parallel to the Delger murun River were detected, one on the west side reaching to the west, or near Ulaan nuur mineral occurrence is more definitely recognizable than the other. Besides, a short lineament running in the NE-SW direction was detected in the north.

[Geology and geological structure]

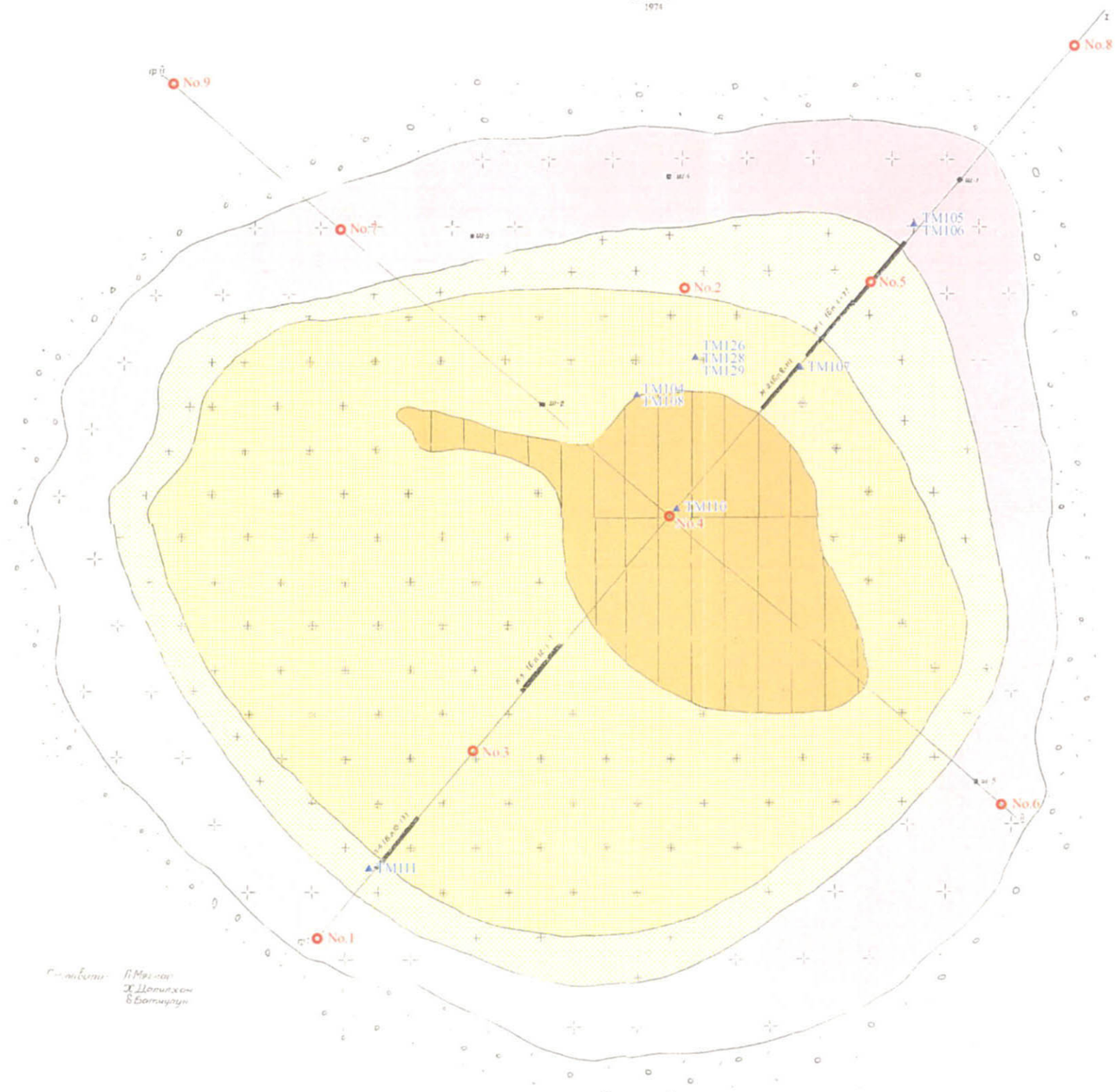
According to the existing data (document No. 2256, geological map in 1:200,000 scale), there are the distribution of sedimentary rocks of the Riphean and granites of early to middle Devonian intruding into the former, forming the mountain mass, while there is the distribution of the Quaternary in the flatland. According to the geological map in scale of 1:500 (Figure II-3-35), there are the distribution of quartz in the central part and the surrounding distributions of greisen, greisenized granite and unaltered biotite granite, forming zonal distribution.

[Mineral showing and alteration]

According to the existing data, the ore body is greisenized ore body, which scarcely accompanies metallic minerals and was greisenization during the Upper Jurassic in granites of the Numrug complex. The alteration are greisenization, quartzization and limonization. Also, the main minerals are molybdenite, wolframite, chalcopyrite, sphalerite, galena and pyrite. The analyses are 0.06% Ba, 0.001% Be, 0.001-0.02% Cu, 0.001-0.2% Mo, 0.006-0.06% Pb, 0.001-0.006% Zr and 0.004-0.006% Cu.

A field survey has shown that the "secondary quartz" described on geological map covers the northeastern slope of the hill having characteristics of a massive and crystalline. "secondary quartz" was partly brecciated and space of intra-clast were filled with filled with limonite (pyrite). Further, it has been found that the outcrops were scarcely observed in the distribution area of greisen, greisenized granite and unaltered granite as shown on the geological map, although there are sporadic occurrences of floats. The mineralized granites were observed in the drill core scattering on the top of the hill. They were mainly epidote quartz veinlets accompanying molybdenite and pyrite dissemination in the coarse-grained granite and also

THE GEOLOGIGAL PLAN OF TSAGAAN TOLGOI MOLYBDENUM OCCURRENCE
Scale 1:500
1974



LEGEND

- Quartz
- Greisen
- Altered granite(greisenization)
- Not altered,pink colored and irregular grained biotitic granite
- Quaternary loose deposits
- No.5 The holes and its number
- Trench and its number
- The location of channel sampling and its number
- Pit and it's number
- ▲ Sample No. collected

Fig. II-3-35 Geological map of the Tsagaan tolgoi

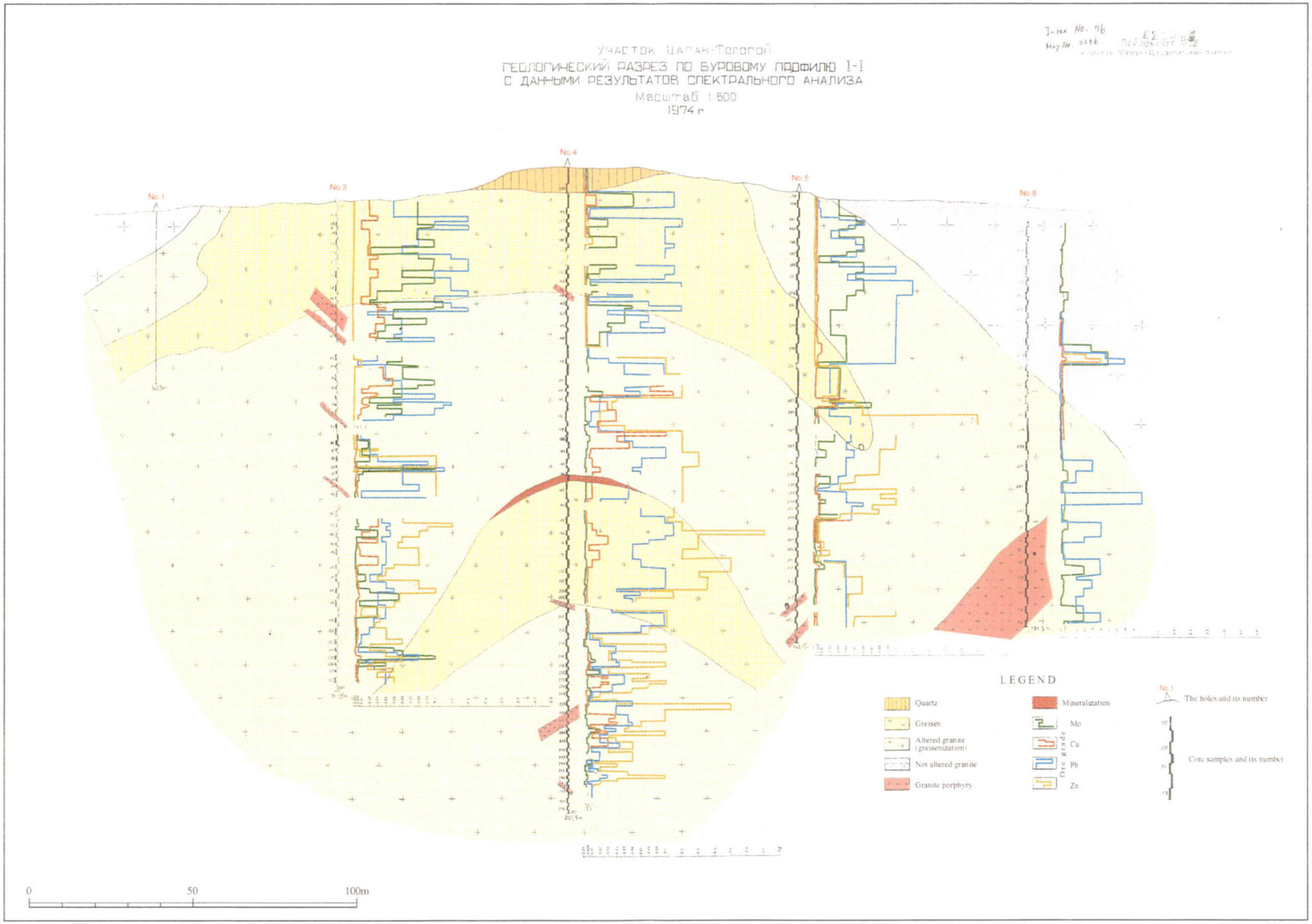


Fig. II-3-36 Geological cross section of the Tsagaan tolgoi (1)

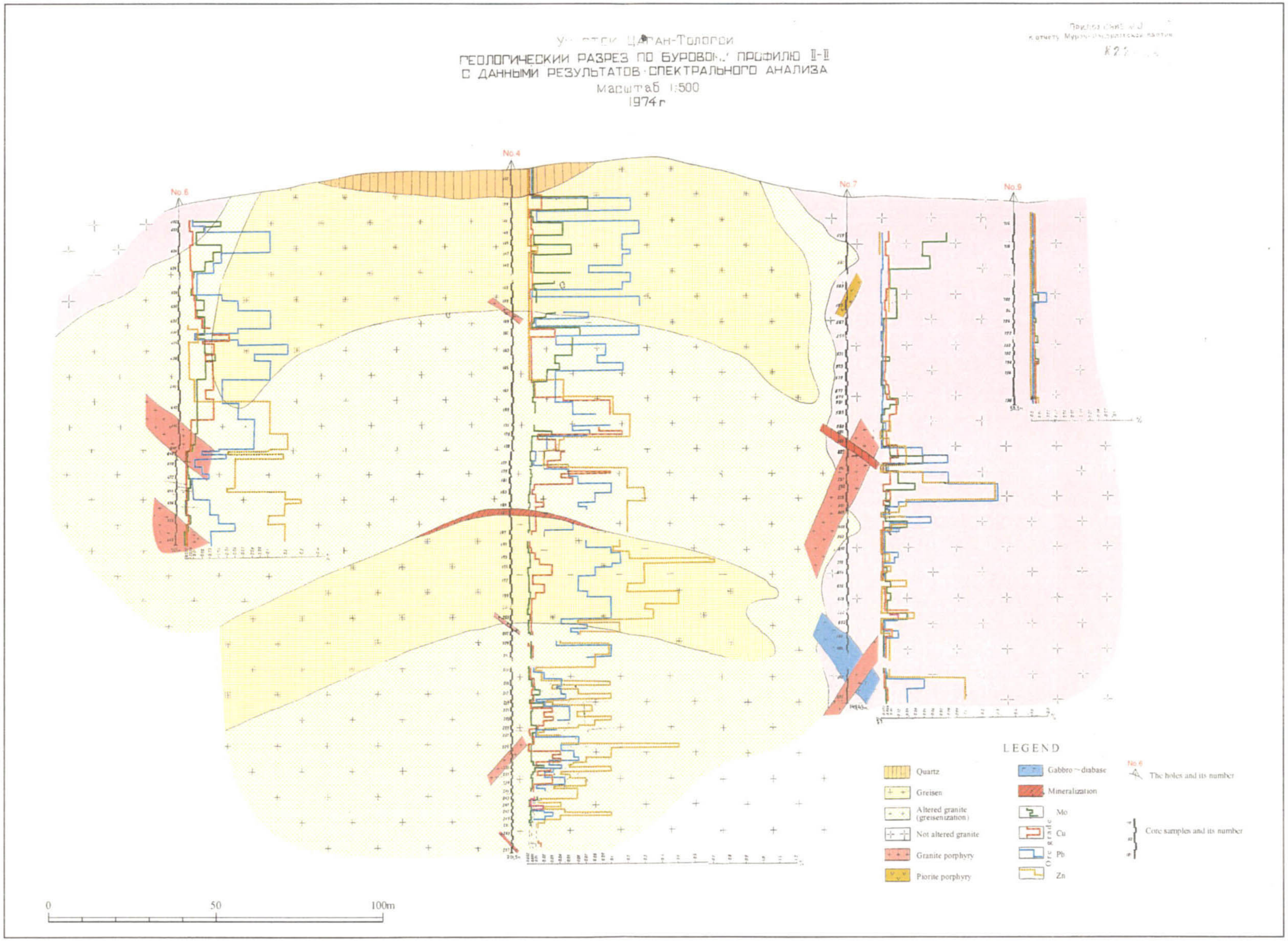


Fig. II-3-37 Geological cross section of the Tsagaan tolgoi (2)

muscovite-quartz veinlets accompanying tourmaline was observed.

According to the 1:500 scale geological cross section (Figure II-3-36, 37), the analyses of drill core sample obtained from the drill hole at the top of the hill have shown higher grade Cu, Pb, Zn and Mo than those obtained from drill hole around, while the grades of samples obtained from within the unaltered granite haves shown low grades. Relatively speaking, however, Mo ore obtained at relatively shallow levels such as at the depths of 100 m or less has shown high grades, while Cu obtained at the depth of 100 m around, Zn obtained at the depth of 100 m or deeper has shown high grades, although all of then have shown low grades near the bottom of No. 4 drill holes.

[Laboratory test]

The result of the microscopic observation block of quartz (M00TM108) has shown the presence of limonite and the trace amount of pyrite, while X-ray diffraction has shown only the presence of the quartz. The result of the chemical analysis of another similar quartz block (M00TTM104) has not shown any high values with respect to the metallic element such as Au, Ag, etc.

In the case of the granite (M00TM106) collected in a unaltered granite area in northwestern direction, the result of the microscopic observation has shown that the sample is biotite granite comprising potassic feldspar, quartz, plagioclase, biotite and iron oxide and having a medium-grained, hypautomorphic or unequigranular texture. Sericite, chlorite and iron ore are formed as the secondary minerals, but the degrees of their alterations are not so strong. Similar granite (M00TM105) was analyzed by X-ray diffraction and potassic feldspar, quartz and sericite were detected. According to the results of the chemical analyses of these granites (M00TM105 and TM106), any high-grade contents were not detected except the case of the M00TM105 in which 1325ppm (≒0.1%) of Mo was detected.

Of the drill cores scattering on the top of the hill, unaltered granite (M00IH128), which was considered not have been mineralized, and one (M00IH129) in which the inclusion of the visually recognized fine particles of the metallic minerals were chemically analyzed, and the results were as shown below.

M00IH128:	110ppm Cu	18ppm Pb	138ppm Zn
M00IH129:	1ppm Cu	152ppm Pb	1275ppm Zn

According to the above analyses, the metallic mineral which could be recognized by naked eyes was spharelite, and that even the unaltered granite, which appears as if it were not mineralized, includes relatively high contents of Cu and Zn.

According to the result of the test of the greisenized quartz porphyry (M00TM107), collected in the greisen (in the west of the surveyed area), by X-ray diffraction, quartz, sericite and a small amount of calcite were detected, while the result of the chemical analysis showed the Pb content of 692ppm (0.07%), Mo content of 384ppm (0.004%) and no other high contents.

The result of K-Ar dating of muscovite in the greisenized quartz prophyry (N00TM110) sampled in the southern greisen indicated that the greisenization was 518 ± 26Ma. Further, only quartz and sericite were detected X-ray diffraction from quartz vein of float (M00TM111) sampled in the southern flatland.

[Evaluation]

Sufficient drilling tests were conducted for its evaluation. Judging from the geological cross section, the area of the mineralization was estimated to be about 15 million tons covering the area within radius of 100m and the depth of 200 m below the surface, centering around the No. 4 drill holes located on the hill. It is hard to calculate the average grade of this mineral occurrence by this cross section, but the potentiality of existing deposits having economical value is considered to be low since grade is 1/10 lower than that of crude ore (Cu: 0.69%) of the Erdenet Mine.

(2-2) Ulaannuur (Mineral occurrence No. 90)

[Representative latitude and longitude]

49° 38′ 45.3″ north latitude, 99° 19′ 50.5″ east longitude (vicinity of the center of the mineral occurrence)

[Topography and vegetation]

The mineral occurrence is situated in a gently sloping hill, with vegetation comprising sporadic growth of short grasses of about 10cm high. The exposures are not so good.

[Access]

It takes about 2 hours by car to reach the mineral occurrence located about 60 km west of the Murun city. It is possible to access the mineral occurrence by car.

[Preceding survey]

In 1972, geological mapping in scale of 1:200,000 was conducted and this mineral occurrence was discovered. In parallel with this survey, drilling (2 drill holes, 140 m in total length) and trenching (475 m^3) were conducted. In 1988, the follow-up surveys, such as drilling (5 drill holes, 1,119.4m), trenching (4,515.1m^3), magnetic explotation (0.61km^2), electric exploration (0.51km^2) and geochemical exploration (209 samples) were conducted.

[Features on SAR image] (SAR image unit "Murun")

The image has dark-grayish tone. A weak resistance was observed, and the most of the drainage systems were not distinguished. Further, no development of characteristic lineament was observed.

[Geology and geological structure]

According to the existing data (document No. 4715), the mineral occurrence comprises the Tess complex granites corresponding to the Middle Devonian and aplitic granites and granodiorite dike corresponding to the upper Jurassic (?), which intruded into the former. The

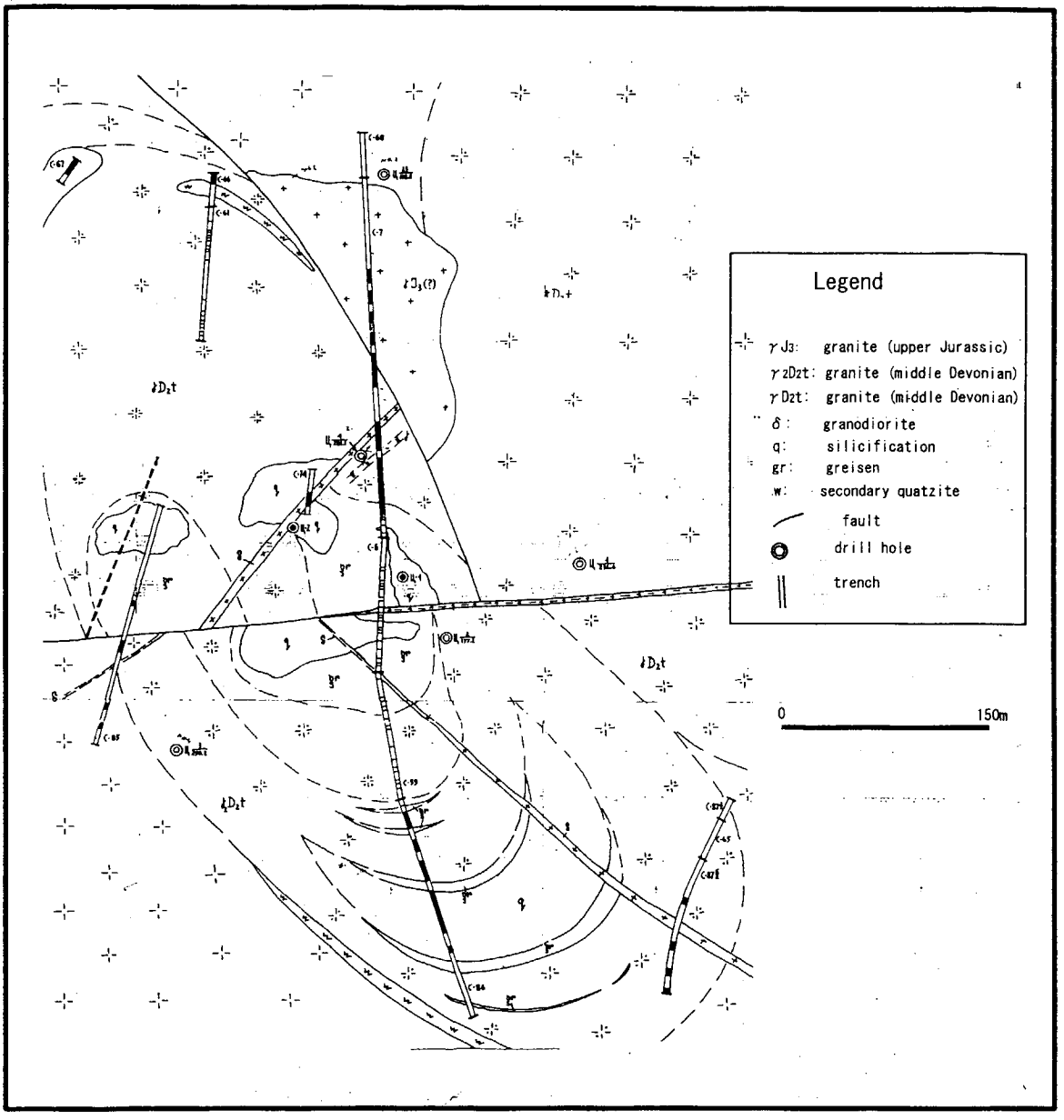


Fig. II-3-38 Geological map of the Ulaannuur

development of E-W and t NNW-SSE trending fault offset thereby were observed.

[Mineral showing and alteration]

According to the existing data (document No. 4715), the mineralization took place in this mineral occurrence was copper/molybdenum accompanying greisenization. Greisenization formed a zonal structure, and a strong silicification and greisenization take place near the central portion, while the greisen developed outside thereof. The scale of which is about 800m x 350m. Silicification/greisenization were divided into a south and a north portions by the E-W trending fault (Figure II-3-38). The analyses of the samples were 0.2% Mo, 0.01-0.3% W, 0.01-0.15% Cu, 0.01-0.2% Pb and 0.02-0.2% Zn. It was confirmed, through Phase-II survey, that the pegmatite, greisen and quartz vein develop accompanying aplitic granite, which is considered corresponding to the Upper Jurassic (?). The presence of the pyrite in the drill cores (Tess complex granites) was detected, but the presences of the copper and molybdenum were not detected.

[Laboratory test]

The result of the microscopic observation indicates that biotite granite comprises potassic feldspar, quartz, plagioclase and biotite representing coarse-grained, hypautomorphic uneguigranular texture. The opaque minerals, though the degrees of alternation were not so strong, were formed with chlorite and sericite. The granite (M00MZ131), comprising quartz, potassic feldspar and plagioclase, representing coarse-grained hypautomorphic-uneguigranular texture. The sample also showed generally intense alteration consisting saussurite, calicite and iron ore. The results of the chemical analyses of pyrite disseminated granodiorite with pyrite dissemination (M00HH136), silicifiedd rock (M00HH137) and greisen accompanying limonite (M00MZ129) have shown any anomalous values except that M00MZ129 has shown an high value of molybdenum (42ppm).

[Evaluation]

The mineralization of copper/molybdenum is considered being accompanied by greisenization, but according to the result of the Phase-2 survey, the ore minerals on the surface and in the drill core were not observed since greisenization is small. Accordingly the potentiality of existing deposits having economical value is considered to be low.

3.2.16 Tsagaan uul district

(1) Outline of the district

(1-1) Location

This district is located in the western part of the surveyed area ranging from 49° 25' to

50° 20' north latitude and from 98° 15' to 98° 55' east longitude, whose total area is approximately 5,000 km^2 (approx. 60 km in the E-W direction x approx. 100 km in the S-N direction). The center of this district is approximately 150 km in rectilinear distance westward from Murun city.

(1-2) Topography and vegetation

This district is around 2,000 m above the sea level, and its topography consists of low mountains and highlands. The Delege murun River as the major River in this district runs from the north to the eastern end of this district flowing to the southeast and then turning its course southward. Its branch River flows in the northeast direction into the Delege murun River. A string of low mountains continues almost in parallel with the extension of this branch. Most of the southern part of this district consists of hills, and Lake Tunamai is situated in its southern end.

(1-3) Infrastructure and access

Tsagaan uul town is located in the south of this district. Since no other towns exist there, the general infrastructure level is low. With a street running through the south of this district toward Sogoo and Tsetserleg towns via Tsagaan uul town, it is easy to have an access to the periphery of the street. However, it is rather difficult to access to the mountainous zone in the northern part where Rivers are well developed.

(1-4) Features on SAR image

Lineaments are extracted from the central part of this district which are presumed to be faults in the E-W and ENE-WSW trends intermittently extending for approximately 50 km or more. In the northern part of this district, a lot of intermittent lineaments in the NW-SE and NE-SW trends are extracted. Lineaments in the E-W to ENE-WSW system, presumably faults with good continuity, are identified. Further, in the central and northern parts of this district, lineaments in unclear forms like rings are extracted.

(1-5) Outline of geology and deposit

Geologaical map of this distric is shown in Figure II-3-39. Geology of this district consists of sedimentary and metamorphic rocks such as sandstone, conglomerate, shale, limestone and gneiss of the Riphean to the Lower Cambrian as well as granitic rocks consisting of granodiorite, tonalite and granite of the Devonian. From the central to southern parts of this district, faults in the NE-SW and E-W trends with good continuity are identified at the boundary between sedimentary rocks and granitic rocks, whereas from the central to northern parts, intermittent faults in the NE-SW and NW-SE trends are identified on the border of sedimentary and granitic

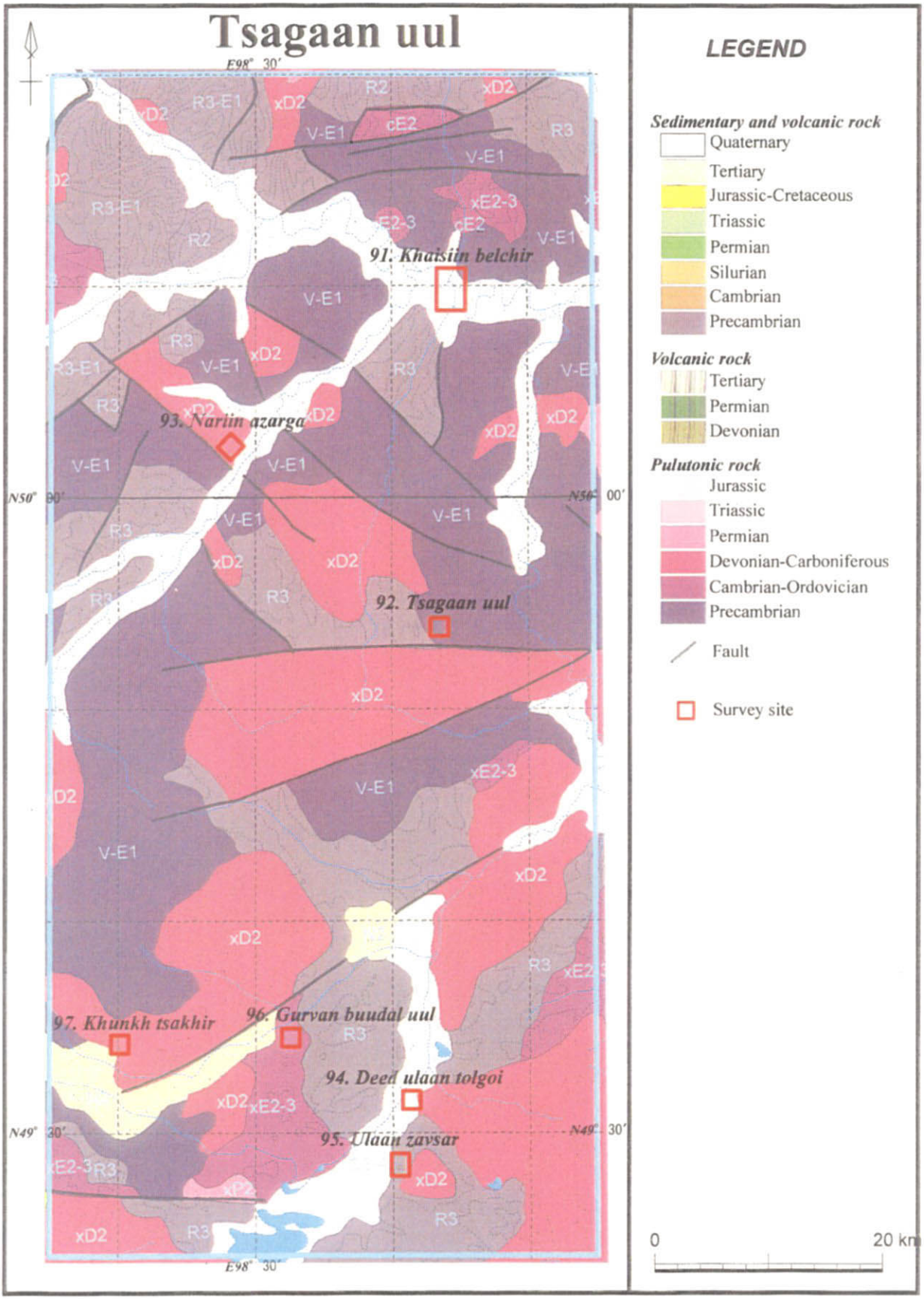


Fig. II-3-39 Geological map of the Tsagaan uul district

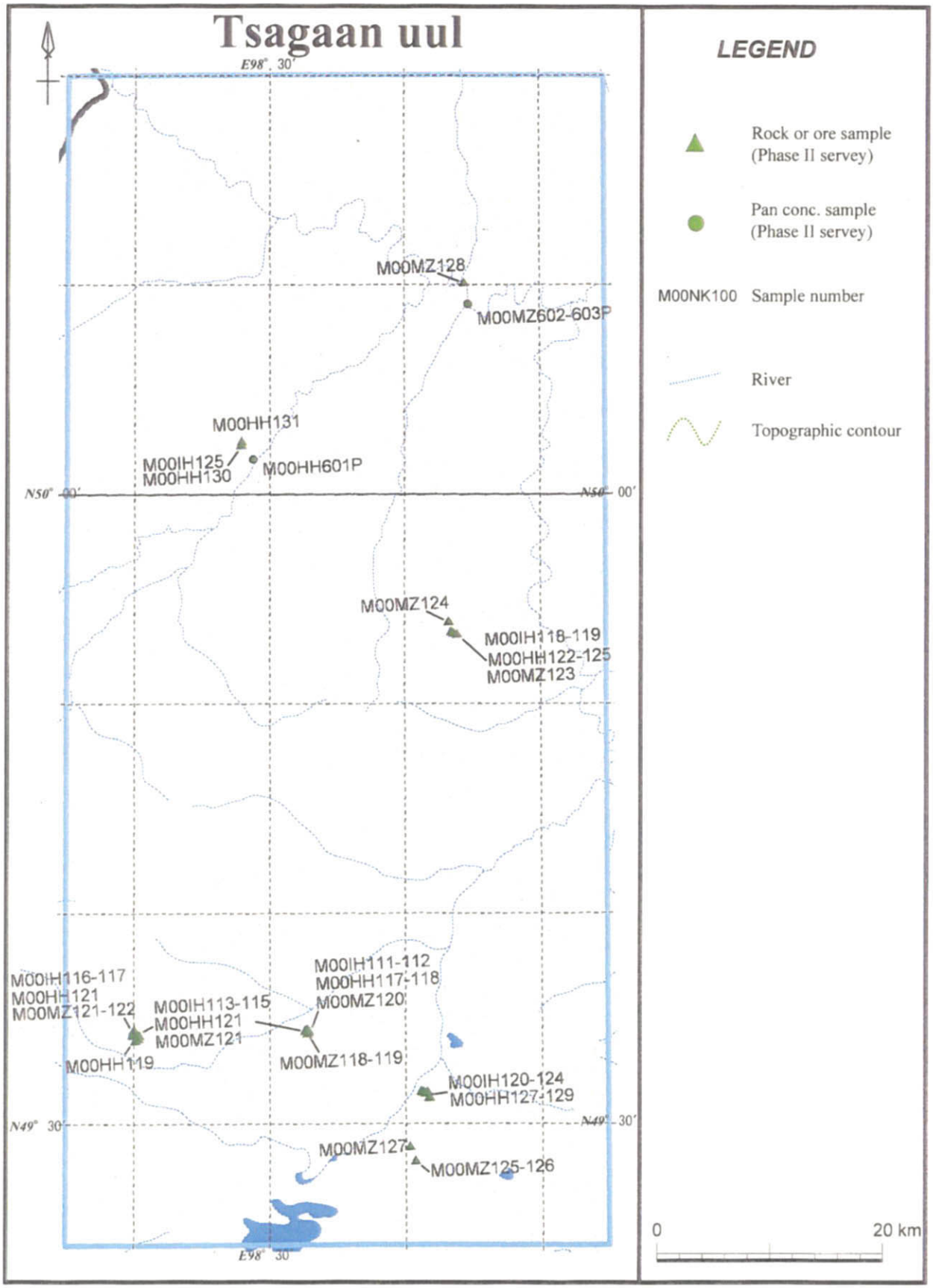


Fig. II-3-40 Sample locations of the Tsagaan uul district

rocks, and the former is offset by the latter. Moreover, a fault in the E-W trend is identified near the northern end of this district.

According to the list of mineral occurrences, four gold mineral occurrences, five copper mineral occurrences and two copper/gold mineral occurrences are indicated this district, excluding those of sedimentary feature. Types of deposits are referred to as vein and skarn type. Their host rocks are granites and crystalline shale. Alteration zones and quartz veins are also included. Their grades are low with the results of 0.005-1.2 g/t Au and around 0.02% Cu.

(1-6) Reason for selection

According to the list of mineral occurrences, gold mineral occurrences exist in the southern, central and northern parts. Alluvial gold mineral occurrences are also distributed in the periphery of the northern part. In addition, copper/gold mineral occurrences and tungsten/molybdenum mineral occurrences are referred to exist in the southern, central and northern parts. Although their grades are low with analysis results of 1.2 g/t Au at maximum (Gurvan buudal uul mineral occurrences and 0.02% Cu at maximum (Khunkh tsakhir), gold and gold/copper mineral occurrences are concentrated in this mineral occurrence. Therefore, this district was selected.

(1-7) Survey content

Our survey of this district was enforced on the state of alteration and whether or not mineral showing occurred near the latitudes and longitudes referred to in the list of mineral occurrences on Khaisiin belchir mineral occurrence, Tsagaan uul mineral occurrence, Nariin azarga and Deed ulaan tolgoi mineral occurrences, Deed ulaan tolgoi mineral occurrence, Ulaan zavsar mineral occurrence, Gurvan buudal uul mineral occurrence and Khunkh tsakhir mineral occurrence. Figure II-3-40 shows sampling location in this district.

(2) Survey result

(2-1) Khaisiin belchir (Mineral occurrence No. 91)

[Typical latitude and longitude]

50° 10' 35.0" north latitude, 98° 44' 58.0" east longitude (the latitude and longitude of this mineral occurrence according to the existing data)

This mineral occurrence is located to the north of the Delege Murun River which runs in the east-southeast direction. However, since it was impossible to cross the River, we conducted our survey on the southern side of the River covering outcrops and floats. The latitude and longitude of the River shores where the survey was conducted were 50° 10' 07.2" north

latitude and 98° 44' 22.3" east longitude, and the height above the sea level was 1,655 m.

[Topography and vegetation]

Observing this mineral occurrence from the far distance, we found that the topography of this mineral occurrence constitutes a steep mountainous zone. Vegetation consists of steppe and forests. The highland is covered by out crop of rock. The Delege Murun River is a wide flowing fast.

[Access]

It takes about 3 hours for a one-way drive to get to the shore of the Delege River on a bad road along the valley for a distance of approximately 60 km northeast from Tsagaan uul town. To cross the River safely, it is recommended to use a bridge established in Murun city in the far lower reaches of the River.

[Preceding survey]

This mineral occurrence was discovered in 1992 as a result of a geological survey conducted in a scale of 1:50000. Trenching (235 km^3) and geochemical analysis (40 samples) were enforced simultaneously, and the values of 0.07 g/t Au, 0.003% Cu and 0.008% Zn were reported. It is reported that the gold grade in black schist is relatively high.

[Features on SAR image] (SAR image unit "Altraga")

The image is in gray color. The texture caused by topographical undulation is of a medium grade and a lineament in the NNE-SSW direction is extracted. The drainage system is like a grid and the degree of its development is medium. Resistance of rocks is also in of a medium degree. No bedding plane is identified.

[Geology and geological structure]

According to the existing data (document No. 4863), the mineral occurrence belongs to Khuvsgul structure belt of North Mongolian folding system, where metamorphic rocks of Khug series of the central Ripheian are distributed. Also, porphyry, diorite and andesite are said to have intruded in the NE-SW direction.

Dark gray pelitic schist is distributed on the southern shore of the Delege Murun River where our survey was conducted. Its schistosity represent strike of N65° -70° E and dip of 45° - 80° SE. In the place where a lineament in the NNE-SSW direction is extracted in the SAR image, deformation of schistosity caused by fault movement is observed.

[Mineral showing and alteration]

Quartz veins hosted in pelitic schist are distributed. The quartz veins include those in width of approximately 30 cm and harmonic with schistosity and those in width of about 3 cm and crossing the schistosity. The structure of the latter includes: strike of N15° W, dip of vertical. In the floats on the River shore, existence of black pelitic schist disseminated with idiomorphic pyrite was identified.

[Laboratory test]

As a result of chemical analysis of pelitic schist accompanying dissemination of pyrite (M00MZ128), 0.02 g/t Au and 0.4 g/t Ag were obtained. Resulting from the analysis of panning samples (M00MZ602, MZ603), both of Au and Ag were found less than the detection limits.

[Evaluation]

No high value of gold was obtained from chemical analysis. We could not reach the mineral occurrence covered by this survey. Judging from the Au analysis value, however, the potentiality of existing deposits having economical value is considered to be low.

(2-2) Tsagaan uul (Mineral Occurrence No. 92)

[Representative latitude and longitude]

49° 53' 00.0" north latitude , 98° 43' 00.0" east longitude

[Topography and vegetation]

As a whole, old-aged slope is seen on the plateau of 2,000 m above the sea level, but a sharp cliff is formed along the River. Most of the plateau constitutes a wide steppe where short grasses grow, and conifers grow in a valley.

[Access]

The mineral occurrence is located about 32 km to the west of Tsaagan uul town and in the upper reaches of the Delger murun River, a branch of the Selenge River. The mineral occurrence is reached by driving approximately 25 km on an unpaved road northward from the town and then by driving approximately 10 km on a bad road in the northeast direction. Access condition is quite poor.

[Preceding survey]

According to the existing data (document No. 1966, 3045, and 4428), this mineral occurrence was discovered when geological survey taken place on a scale of 1/200,000 in 1978. Subsequently, a detailed survey, trenching (418.9m^3) and drilling (drilled length: 107m) were conducted. Afterwards, a further detailed survey was conducted accompanying trenching (5 trenches, 3,445,7 m^3) and drilling (6 drill holes, total drilled length: 786.9 m). Based on the results of these survey, 12 oxide zones showing W and Cu mineral occurrences were grasped.

[Features on SAR image] (SAR image unit "Sharga")

A clear lineament is detected nearby extending about 10 km in the NW-SE direction. Two more lineaments in the same direction are also detected extending westward in an interval of approximately 10 km. A clear lineament in a length of approximately 15 km extends in the E-W direction, which further extends westward, though intermittently, for approximately 50 km or more.

[Geology and geological structure]

In the entire vicinity are distributed metamorphic rocks originated from sedimentary rocks of the Vendian to the Cambrian, limestone of the Palaecozoic in the lower part of the Cambrian, as well as intrusive rocks mainly consisting of granites of the Middle Palaecozoic.

According to the existing geological map of the mineral occurrences (scale: 1:10000, Figure II-3-41), metamorphic rocks such as calcareous schist, green schist and siliceous schist mainly in Murun series of the lower Proterozoic, calcareous schist, meta-volcanic rocks, meta-sandstone in Darkhad series of the upper Proterozoic, and various types of breccia in Bayanzurkh series of the Vendian to the Cambrian are distributed in the mineral occurrence and its periphery. Individual series are bounded by faults in the NW-SE trend or flat-lying thrust fault.

[Mineral showing and alteration]

According to the existing geological map of the mineral occurrences, oxidized zones exist mainly in Murun series, and a large-scaled zone whose area is approximately 0.5 km^2 exists on a small ridge in the NW-SE direction. A quartz vein of the E-W strike exists in this oxidized zone. According to the map, five trenches whose maximum length is 500 m were excavated. However, only one trench was dug in the northwestern end of this oxidized zone. Similarly, out of six holes excavated, only one hole was drilled in this oxidized zone.

Existence of many trench traces was confirmed in this area where oxidized zones are distributed as shown in this map. However, no existence of oxidized zone was identified. Most of trenches are in short length with their total length being only a few meters, and since they are buried, their detailed conditions are unknown. From the rock block excavated at the time of trenching, ores to be probed may be wolframite – muscovite – quartz vein from host rocks of pelitic or psammitic schist and crystalline limestone. Further, from the maximum diameter of scattering quartz vein lumps, existence of s vein in a width of 20 cm or more is presumed. Since quartz vein lumps accompanying similar wolframite are identified also in other two trenches, their strikes are almost in the E-W direction and their total extension is presumed as at least 40 m. Further, dolomite disseminated with pyrrhotite was identified in core pieces scattering in the traces of the drill holes near the trench (No. 13 hole on the map).

On the other hand, limonitized hard mudstone in dark gray color was seen on the valley northeast to this oxidized zone and among them quartz vein with pores were identified, which are considered as cast-off skin of sulfide minerals.

[Laboratory test]

Under microscopic observation of wolframite – muscovite – quartz vein (M00IH118 and M00HH123) collected in the trench, a lot of quartz and hematite and small amounts of sericite were observed. As a result of x-ray diffraction of metamorphic rock, quartz and sericite were detected.

1 Upper Quaternary sediments

2 Late Paleozoic granite

3 Vendian - Cambrian
Bayanzurkh series

Vendian - Cambrian
Bayanzurkh series

Upper Proterozoic
Darkhad series

Lower Proterozoic
Murun series middle - upper series

Lower Proterozoic
Murun series lower series

Dykes
γ : fine-grained granite or aplite, ν : gabbro, β : basalt

Series border
a : concordant, b : discordant

Location elements
a : slope, b : steep, c : vertical

Fault :
a : vertical, b : horizontal

Oxided ore bodies

Oxided zone

Border of oxidation

Mineralization point of oxides

Silicified points or quartz veins

Mineralization point of ochre

Supposed border of coaly schist

Trench

Drill hole

The map was offered and the legend was translated in English by Mongolian GIC.

Fig. II-3-41 Geological map of the Tsagaan uul

Under microscopic observation of the core pieces (M00IH119) scattering in the trace of drill holes near the trench detected a medium amount of pyrite and a trace amount of pyrite and magnetite accompanying lots of calcite, quartz and a medium amount of muscovite. High values of 355 ppm As, 70 ppm Be, 4,020 ppm Mn, 231 ppm Ni, 1,780 ppm P, and 750 ppm W were obtained from chemical analysis of this core piece. Further, as a result of similar microscopic observation of the core piece (M00HH122), small quantities of pyrite and calcite as well as trace amount of chalcopyrite and mafic mineral were observed in addition to large quantities of quartz, epidote and calcite, moderate quantities of muscovite and sphene. X-ray diffraction of core pieces of silicified rocks (M00HH124) revealed quartz, sericite, kaolin and pyrite, while its chemical analysis did not reveal any high values of Au or Ag.

On the other hand, no notable anomalous values were obtained through chemical analysis of limonized hard mudstone in dark gray color (M00MZ123) and quartz vein from the above host rock (M00MZ124).

[Evaluation]

Without any detailed map of the mineral occurrence and under unfavorable outcrop conditions, no existence of oxidized zone was identified. In view of the unfavorable conditions of the trench and negative results of the laboratory test conducted during the survey of the Phase-2, the possibility of existing ore deposits having economical value is considered to be low.

(2-3) Nariin azarga (Mineral occurrence No. 93)

[Representative latitude and longitude]

50° 02' 24.7" north latitude, 98° 27' 51.6" east longitude

(outcrops of limestone with quartz along the bedding in the central part of the district surveyed)

[Topography and vegetation]

Hills on 1,800 – 2,000 m above the sea level. Although short grasses are dominant on the lowlands along the River, high trees also grow in some places.

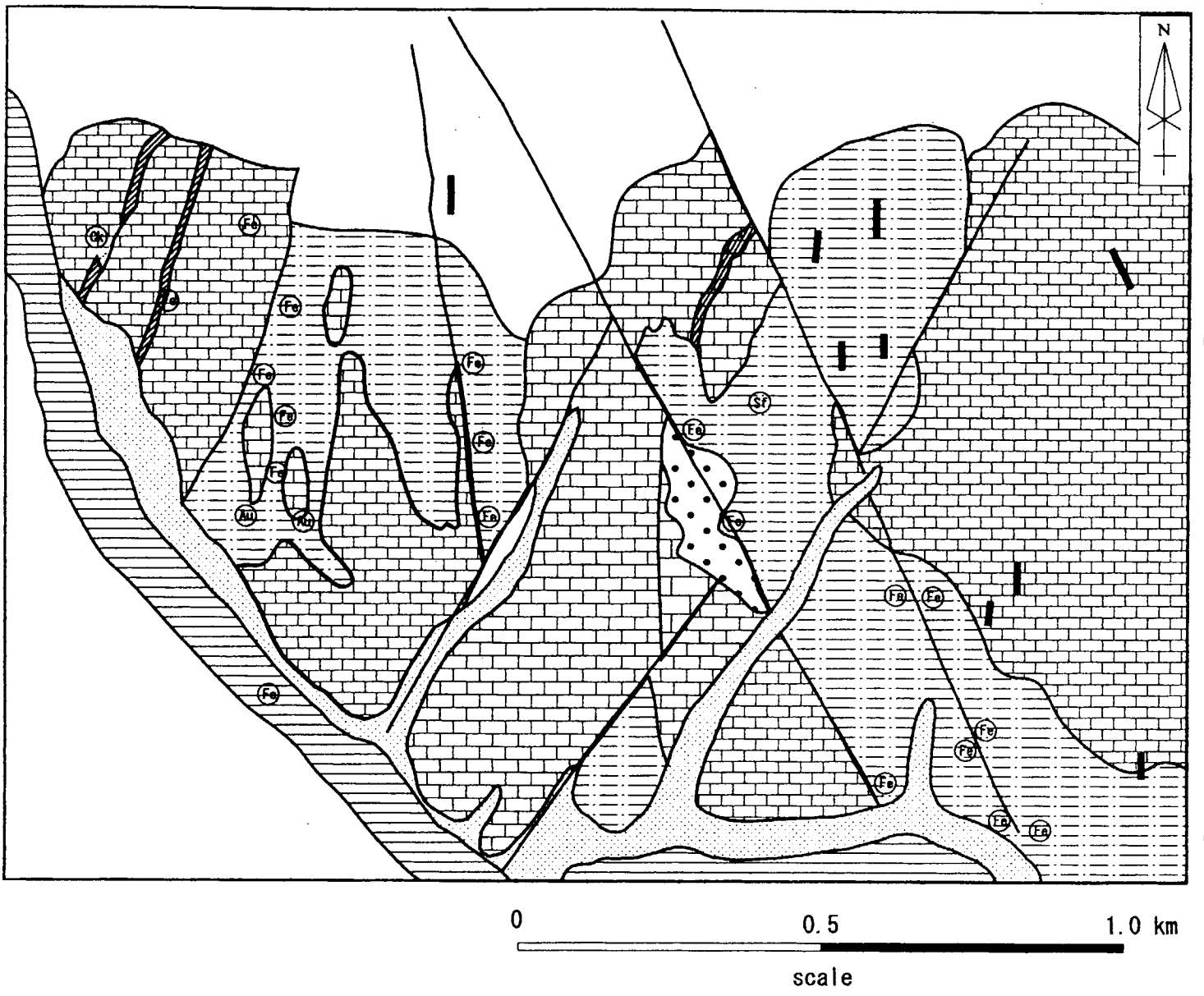
Most of the hills are also covered with short grasses. However, no vegetation is observed due to geological conditions in some areas.

[Access]

The mineral occurrence is located 51 km north-northwest to the town of Tsagaan uul. It takes two hours and a half by a vehicle to reach the surveyed mineral occurrence from the camping spot 14 km to the northeast of Tsagaan uul.

[Preceding survey]

During the geological survey conducted in 1992 with a scale of 1/50000, the mineral showing was discovered. Trenching (525.5 m^3), pitting (20 m), geochemical exploration (664 samples) and metallometric test (341 samples) were conducted simultaneously.



Legend

- Modern alluvial deposits: sand, gravel, and clay
- Talus-prolubial deposits: cobble, gravel and sand
- Middle-upper Cambrian intrusion: gabbro
- Lower-middle Riphean Khug series lower strata: Crystalline and plinty shale
- The Muren's lower sub strata: Marble and limestone.
- Quartzite beds
- Dykes
- (Sf) Sulfide
- (Fe) Limonitization
- (Ck) The malachite mineralization point
- Fracture
- (Au) Gold ore mineralization occur

Fig. II-3-42 Geological map of the Nariin azarga

[Features on SAR image] (SAR image unit ":Altraga")

Although the mineral occurrence is situated on the border of a dark-colored zone extending in the NNW-SSE direction and a light gray zone spreading on its northern and western sides, no conspicuous feature was noted.

[Geology and geological structure]

According to the existing data (document No. 4863), geology of this mineral occurrence consists of marble and limestone of Murun series in the lower slab of the Riphean, shale of Khug series of the Lower Riphean, Telmen complex (gabbro) and rock veins of the Middle to the Upper Cambrian. (Figure II-3-42)

[Mineral showing and alteration]

Although silicification, hematization and skarnization had been reported as a result of the preceding survey, no such features were observed during the site survey. Neither Telmen complex (gabbro) nor mineral showing presumably associated with it was identified.

[Laboratory test]

No notable anomaly was obtained from chemical analysis of sandstone (M00IH125) and pann concentrated sanple (M00HH601P).

[Evaluation]

Although "ore body" is referred to in the existing data, the possibility of survey. the possibility of existing deposits having economical value is considered to be low.

(2-4) Deed ulaan tolgoi (Mineral occurrence No. 94)

[Representative latitude and longitude]

49° 31' 28.2" north latitude, 98° 41' 25.1" east longitude

(The northwestern end of a huge trench in the central part of the surveyed area)

[Topography and vegetation]

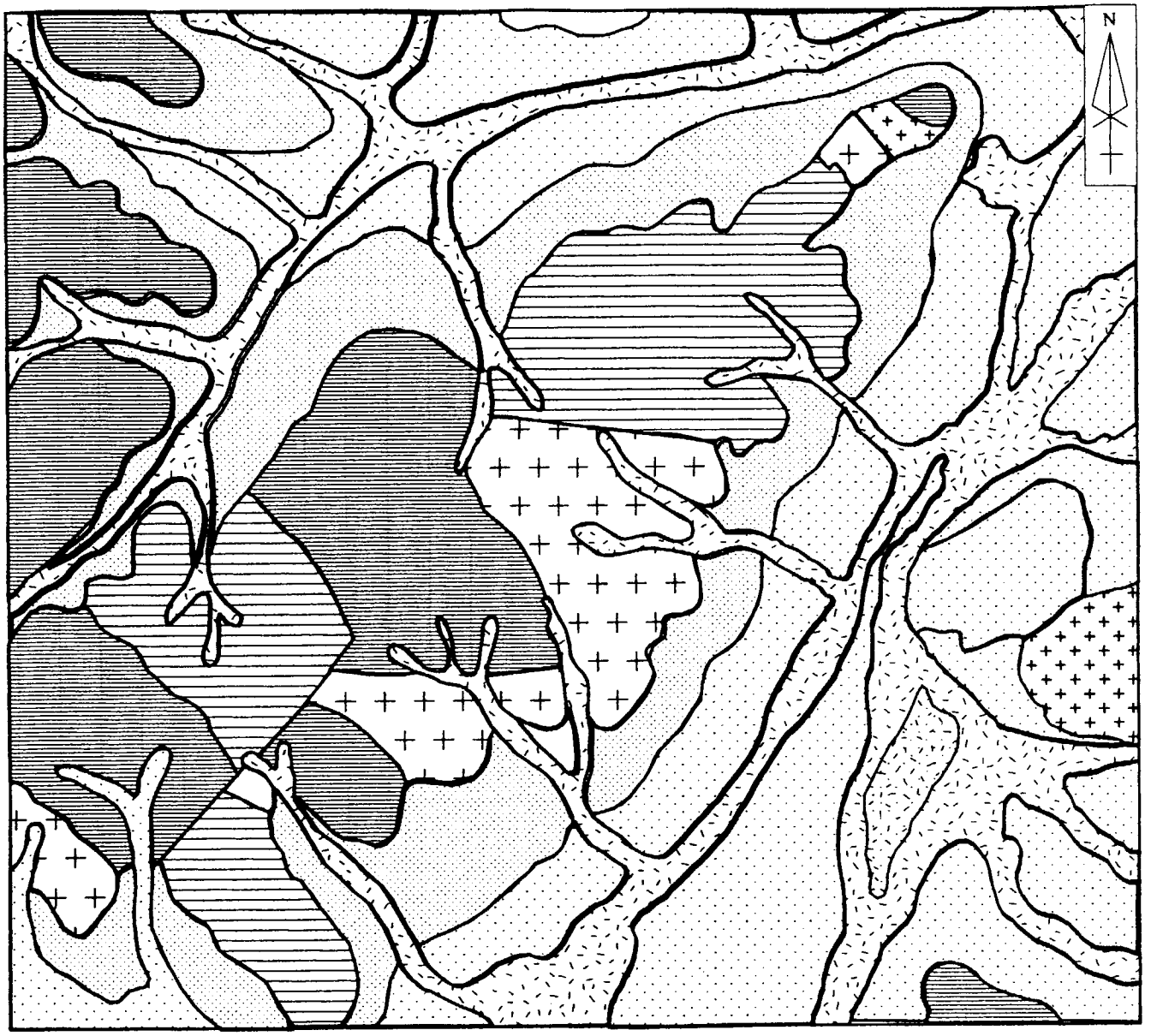
Around the mineral occurrence is a plain land, elevated 1,900 m above the sea level, and hills are observed here and there. The mineral occurrence covered by this survey was a gentle hill where short grasses are dominant.

[Access]

The mineral occurrence is located 9 km south to Tsagaan uul. It takes two hours and a half by car to reach the mineral occurrence from the camping spot, 14km northeast of Tsagaan uul,, and then two hours drive brings you to the mineral occurrence.

[Preceding survey]

The mineral showing was discovered during the geological survey conducted in 1987 with a scale of 1/50000. Trenching (1,192.4 m^3) and geochemical exploration (385 samples) were conducted simultaneously.



Legend

- Recent: alluvium, alluvium-proluvium lacustrine rounded rubble, sand, sandy clay
- Upper Quaternary: alluvium-proluvium, talus-proluvium, non-rounded rubble
- Upper Quaternary: talus, angular rubble, sandy clay, alluvial rounded rubble
- Late Carboniferous: fine to medium grained leucocratic granite, granitic porphyry
- Late Carboniferous: secondary phase; granite,
- Late Carboniferous: first phase; granodiorite
- Late Riphean: Upper Formation; schistocity sandstone, limestone
- Late Riphean: Middle Formation; schistocity sandstone
- Late Riphean: Lower Formation; schistocity sandstone, limestone

Fig. II-3-43 Geological map of the Deed ulaan tolgoi (1)

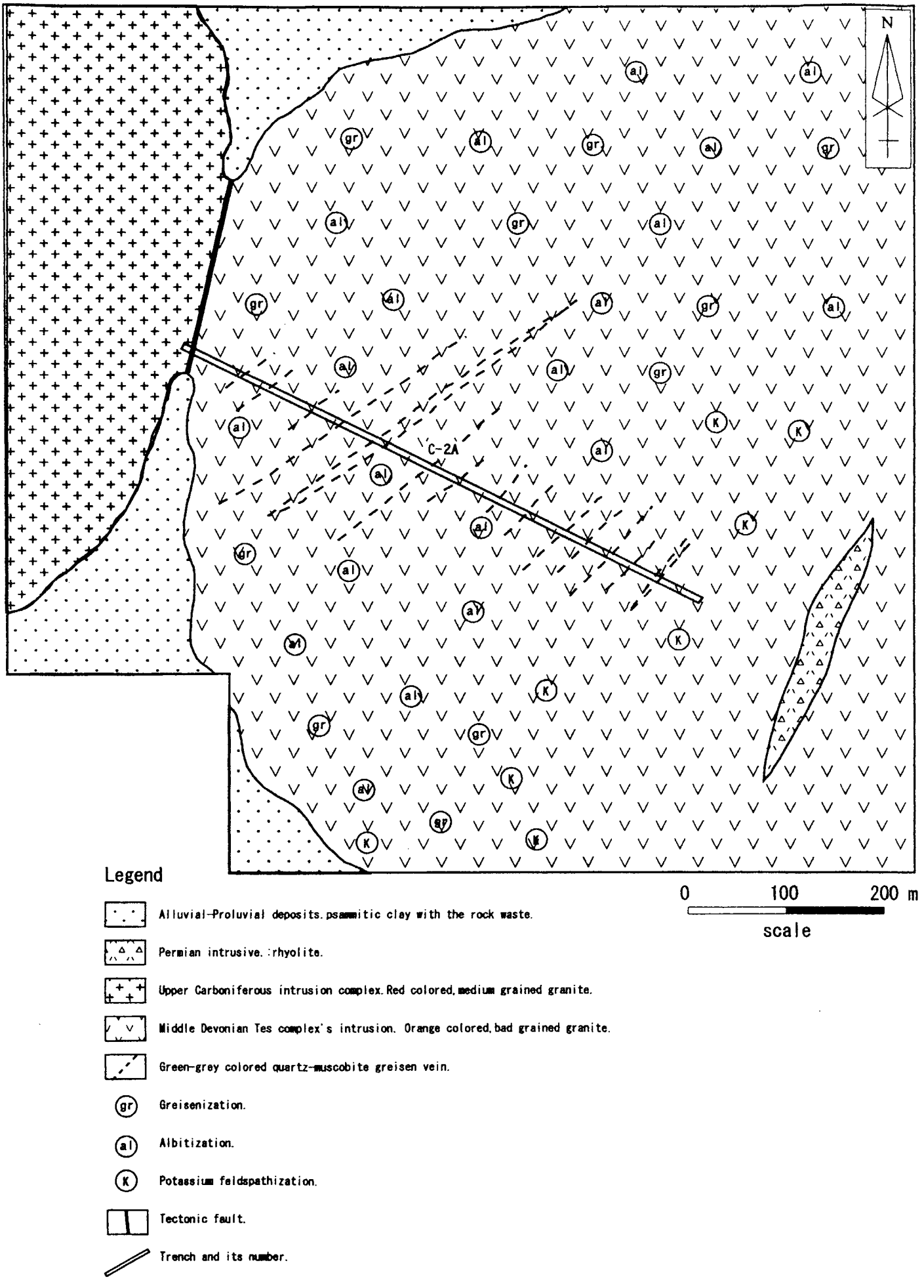


Fig. II-3-44 Geological map of the Deed ulaan tolgoi (2)

[Features on SAR image] (SAR image unit "Sharga")

The mineral occurrence is situated in a wide, dark-gray zone extending in the E-W direction from a wide area of view point. No conspicuous feature is noted in its vicinity.

[Geology and geological structure]

According to the existing data (document No. 4428), geology of this mineral occurrence consists of Tes Complex intrusive rock of the Middle Devonian, complex intrusive rock (leucocratic granite) of the Upper the Carboniferous, which is adjacent to the above in a ring fault, and rhyolite vein of the Permian which is intruded into Tes Complex intrusive rock (Figure II-3-43).

[Mineral showing and alteration]

The preceding survey revealed existence of alteration zone in the granitic rocks of Tes Complex intrusive rock accompanying quartz-muscovite greisen vein in width of 0.5 – 10 m and inclination of 85-90° . As alteration, albitization, orthoclatization and limonitization are identified. This survey included the survey of a huge trench (600 m long, 7m wide) extending in the NW-SE direction in Tes Complex intrusive rocks of Middle Devonian. Granite, syenite (coarse-grained, in pink color), felsite and breccia were observed in the trench. In some parts, limonitized quartz veinlets of druse quality, granitic rock lumps accompanying quartz in brecciated vein and felsite vein lump accompanying narrow quartz vein were identified. Also, quartz veins were identified in the complex intrusive rock of the Upper Carboniferous (coarse-grained, leucocratic granite) adjacent to Tes Complex intrusive rocks with a fault. Several quartz veins were found in the width of 20 m, and their average width was 2 – 4 cm (20 cm at the maximum). Strike and inclination were N-S and 90-80° E respectively. No conspicuous alteration was noted along the vein.

[Laboratory test]

As a result of microscopic observation, granites (M00IH120 and M00IH121) were identified as muscovite-biotite granite and biotite granite respectively. No notable anomaly was observed in geochemical analysis of quartz vein (M00IH122, M00IH123, M00HH127) felsite dyke (M00IH124) and breccia (M00HH129).

[Evaluation]

Since no mineral showing of gold or geochemical anomaly related to Au mineralization was identified, the possibility of existing deposits having economical value is thought to be low.

(2-5) Ulaan zavsar (Mineral occurrence No. 95)

[Representative latitude and longitude]

49° 28' 15.5" north latitude, 98° 40' 41.0" east longitude, 2,060 m above the sea level (the point where M00MZ125 was collected)

[Topography and vegetation]

The mineral occurrences constitute plains and gentle hills with vegetation in the steppe of dominant short grasses. Trees are sparsely distributed in local spots.

[Access]

The site is reached by driving on a vehicle for about thirty minutes southward from Tsagaan uul town on unpaved roads and steppe.

[Preceding survey]

The mineral occurrence was discovered during the geological survey enforced in 1987 with a scale of 1:50000. Trenching (215 m^3) and sampling of rocks (350 pieces) were conducted afterwards. Associated analysis results of 0.1 g/t Au and 2.0 g/t Ag are reported.

[Features on SAR image] (SAR image unit: "Sharga")

The image in dark-gray color shows a flat land with few undulations. and no lineament is extracted. Drainage systems were not identified because of its dark color tone. Also, because of low rock resistance, no bedding plane was identified.

[Geology and geological structure]

According to the existing data (document No. 4428), this mineral occurrence belongs to Tuva-Mongol structure belt of North Mongolian folding system. Metasedimentary rocks in Darkhand series of the Lower Riphean system are distributed, and intrusive rocks of the Middle Riphean and limestone of the Palaeozoic are said to be distributed.

pelitic schist is dominantly distributed in the site. In addition, distribution of psammitic schist, quartzite and limestone was identified. Schistosity of pelitic schist in black color has a structure of strike:N60° W and dip: 80° N.

[Mineral showing and alteration]

Although the existing data (document No. 4428) refers to the achievements of trench drilling, it was impossible to identify the existence of such trench. Probably, they were reclaimed.

On the outcrops, existence of quartz vein from the host rock of black pelitic schist was identified. The quartz veins were white, accompanying a small quantity of limonite. Its structure is harmonic with the schistosity with the strike of N60° W and dip of 80° N. The maximum width was approximately 30 cm, and the total length was several meters at maximum representing lens like form. Further, limonite dissemination in dots was identified in a light-gray hard rock which was considered as silicificated pelitic schist. Pyrite may have been disseminated in its primary state.

[Laboratory test]

As a result of X-ray diffraction of pelitic schist (M00MZ126), sericite and kaolin clay mineral were identified. Microchemical observation of gniessose pelitic rock (M00MZ127), the secondary quartz and sericite caused by strong silicification were observed. From these,

the quartz vein is considered to have been generated through hydrothermal activity after metamorphism.

Chemical analysis of quartz vein (M00MZ125) and its host rocks (M00MZ126, M00MZ127), revealed 0.005 g/t Au to less than detection limit and 0.2 g/t Ag: to less than detection limit

[Evaluation]

Mineral occurrence of gold was referred to in the existing data and existence of metamorphogenic type gold deposits. However, since the lpelitic schist as a host rock of quartz vein was suffered silicification, generation of quartz vein may have been caused through hydrothermal activity after metamorphisim. The results of geochemical analysis conducted in the preceding survey and this survey show low grades. The possibility of existing deposits having economical value is thought to be low.

(2-6) Gurvan buudal uul (Mineral Occurrence No. 96)

[Representative latitude and longitude]

49° 35' 00.0" north latitude, 98° 33' 00.0" east longitude

[Topography and vegetation]

The mineral occurrence constitutes gentle hills around 2,000 m above the sea level. On the northwest side of the mineral occurrence, a branch swamp exists to the Delger murun River which is a branch River of the Selenge River. Rocks are locally exposed near the hilltops. However, gentle sopes are covered with small rock fragments like talus. Although short grasses grow in a gentle valley among hills, only short grasses grow sparsely on most of the slopes of hills.

[Access]

The mineral occurrence is located 12 km to the southwest of Tsagaan uul town. It can be reached by driving approximately 10 km on unpaved roads westward from Tsagaan uul town to Khunkh tsakhir mineral occurrence and then by driving several kilometers southward.

[Preceding survey]

The mineral occurrence was discovered during the geological survey conducted in 1987 with a scale of 1:50000. Subsequently, pitting (80 m), etc. were conducted.

[Features on SAR image] (SAR image unit: "Sharga")

A lineament extending in the E-W direction from the north of Khunkh tsakhir mineral occurrence passes through the northern part of this Gurvan buudal uul mineral occurrence. No lineament was detected within the range southward from the mineral occurrence including the vicinity of Deed ulaan tolgoi and Ulaan zavsar mineral occurrences.

[Geology and geological structure]

According to the existing data (document No. 4428), metamorphosed shale of the

Ripheian accompanying fine sandstone and sediments of the Quaternary are distributed in this mineral occurrence. On the western side, medium grained leucocratic granite intruded into former rocks and distributed. The metamorphosed shale extending northward became hornfels (Figure II-3-45).

[Mineral showing and alteration]

According to the existing data (document No. 4428), alteration zones in the width of 0.4 to 1.0 km and in the total length of 5.2 km exist in the place where the contact place with metamorphosed shale and intrusive rocks and along the fault extending to the northwest. Alteration includes hematization, quartzitation and sulphidation. The main minerals are limonite and pyrite, and the results of 0.1 g/t Au and 1.2 g/t Ag were recorded with these ores..

The field survey revealed poor outcrop condition as a whole in the periphery of granite, and no outcrops were observed in the places other than mountaintops. Traces of pits excavated in the past may have been buried. As a result of dissemination with minerals like pyrrhotite, floats of metamorphosed shale consisting of quartz and biotite in trace quantities and floats of light-green wollastonite, which may have been caused by skarnization of limestone, were identified. Although floats having small quartz – muscovite veins were frequently observed, no conspicuous mineralization was identified other than minerals like pyrrhotite which is rarely observed.

[Laboratory test]

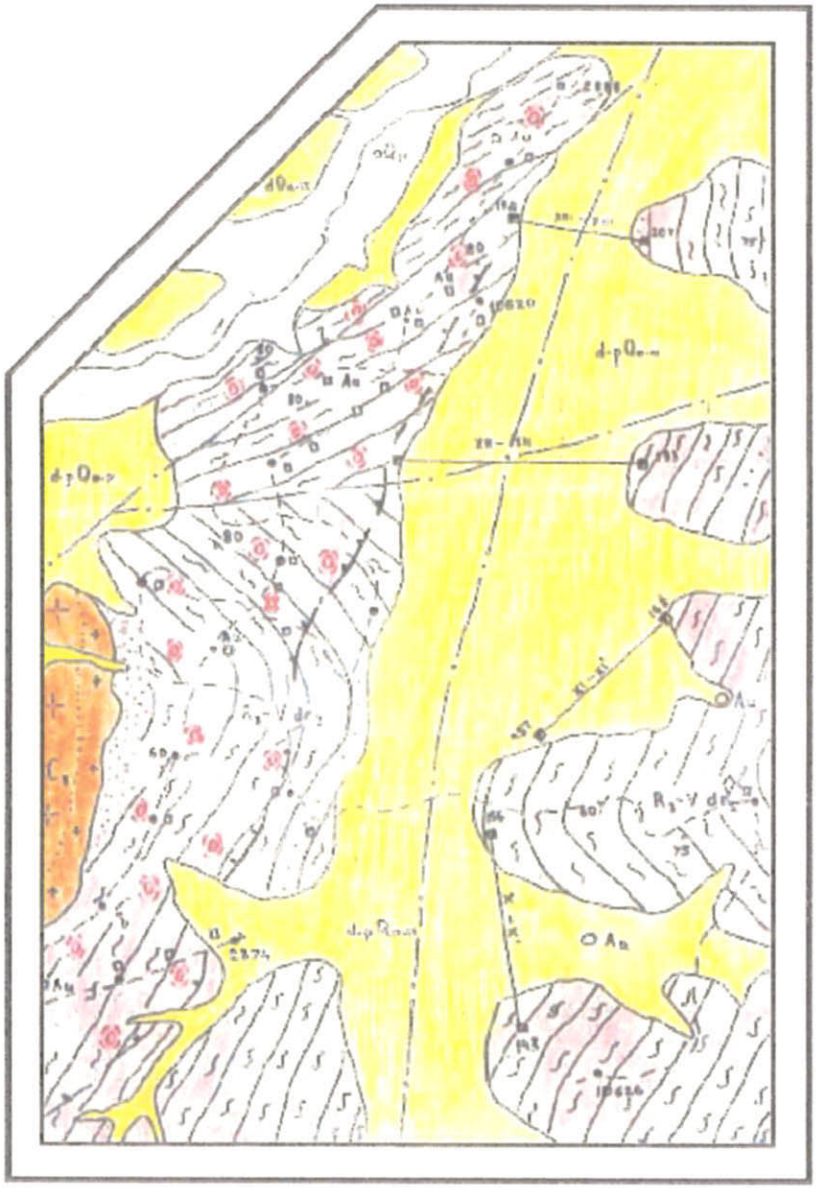
Resulting from microscopic observation, one of many floats of metamorphosed shale (M00IH111) was identified as aphyric dacite. As phenocryst, 3% or less small-sized plagioclase, biotite and iron oxide were included. Groundmass was consisted of medium grained holocrystalline quartz, potassic feldspar, plagioclase, biotite and iron oxide. From the tiexture of groundmass, occurrence of this rock is presumed as adyke.

With regard to M00IH112 (wollastonite), it was so difficult to presume the name of the original rock due to strong silicification and disappearrance of original texture. It mainly consists of fine grained quartzs which are engaged with one another, accompanying small or trace quantities of chlorite, calcite and iron ore.

M00MZ119 (wollastonite) mainly consists of fine grains quartz whose diameter is 0.1 mm -or less, accompanying small quantities of fine biotite and iron ore. It is difficult to presume the name of the original rock, since its original texture has disappeared because of strong silicification.

No high values were obtained for Au or Ag as a result of chemical analysis of quartz veins (M00HH118, M00MZ118 and M00MZ120).

As a result of measurement of oxygen isotope and fluid inclusion of quartz vein (M00MZ120) out of these samples, oxygen isotope ratio was 19.74‰, fluid inclusion homogenization temperature was 187-247℃ (average 215.7℃) and salinity of fluid inclusion



Geol[illegible]al map of the Gurvan buudal.
1:25 000 scale.

LEGEND

- Recent deposits
- Upper Quaternary - recent deposits
- Late Carboniferous intrusion
- Upper Riphean - Vendian Darkhad series
- Dykes and veins
- Hornfels
- Geological boundary
- Tectonic fault a) confirmed, b) infered
- Gold occurrence in pan concentrate
- Gold occurrence in lump sample
- Pit lines and their numbers
- Prospecting section line
- Lump sample
- Silicified zone and it's border

0 1,000 2,000m

The map extracted from the geological map sheet of 1:50,000 scale was prepared for the project by Mongolian GIC.

Fig. II-3-45 Geological map of the Gurvan buudal uul

was 1.40-4.18wt% (average 3.2wt%).

[Evaluation]

Since the assay data for Au and Ag analysis values are low and no values in excess of these results were obtained from the results of analysis conducted in this survey, The possibility of existing deposits having economical value is thought to be low.

(2-7) Khunkh tsakhir (Mineral occurrence No. 97)

[Representative latitude and longitude]

49° 36' 00.0" north latitude, 98° 23' 00.0" east longitude

[Topography and vegetation]

The mineral occurrence falls under the southeast extension of Sengileny nuruu mountainous district on the Russian side, constituting an extremely gentle mountain like a plateau. Almost the entire mountain is covered with short grasses, and all over the district was a steppe as far as the eye could reach. Talus sediments were exposed in part on the gentle mountainside. Dark-colored rock surface was locally exposed in the valley near the top of a small hill slightly jutting out.

[Access]

The mineral occurrence is located approximately 20 km to the west of Tsagaan uul town. It can be reached by driving approximately 15 km on unpaved roads westward from Tsagaan uul town along the trunk road, and then by driving about 5 km westward on the steppe of a gentle hill.

[Preceding survey]

According to the existing data (document No. 4428), geological survey in a scale of 1:50000, trenching (222.2 m^3), driilling (drilled length: 140 m), pitting (180 m). etc. were conducted. Two oxidized zones were observed on the surface, and the oxidized zone in the central part was distributed within a range of 0.8 km x 0.15 km in the NW-SE direction. Shale accompanying altered dark-colored oxidized ore and tuff is spread along this oxidized zone. The oxidized zone in the northwestern end is distributed in the NE direction within a range of 0.25km x 0.5km. Alteration includes high-temperature hydrothermal alteration and skarnization.

The major minerals are hematite and magnetite, and malachite or fluorite is also rarely identified. Spectrum analysis was conducted and results of 0.1-5% Mo, 1-30% Cu. 2-30% Zn and 0.01-0.2% Ag were obtained. The results of lamp sample were Cu:0.01-0.05%, Zn:0.01-0.05%, Mo:0.005-0.015%, Au:0.1g/t, and Ag:2.0g/t were obtained. As ore reserves (quantity of geological resources ?), 0.002t Ag, 0.367t Mo, 1.8% Pb, 7.0t Zn:and 7.3t Cu were calculated.

[Features on SAR image] (SAR image unit "Sharga")

A long lineament in the E-W direction exists to the north of this mineral occurrence, while short lineaments in the NW-SE direction are observed in both eastern and western sides of the

mineral occurrence. With a short lineament in their extension, it looks as if a long lineament were dislocated.

[Geology and geological structure]

According to the existing data, acid volcanic rocks of Khug formation of the Middle Palaeozoic and shale accompanying thin layers of silicificated limestone are distributed in the vicinity. Further, while limestone of Murun formation is distributed in the northern part, granitic body of the Middle Devonian is intruded into these sedimentary rocks in south part. (Figure II-3-46)

[Mineral showing and alteration]

In the southern part of this mineral occurrence where granitic body (coarse-grained quartz syenite) is distributed on both southern and northern sides, two trenches (gophered with a bulldozer) in the total length of approximately 400 m extend in the E-W and NW-SE directions, approximately 500 m away from each other. Two traces of drill hole about 500 m north-westward from the trench on the northern side. Cores are scattered around the traces of drill hole.

Between these two trenches, strongly silicificated rocks in dark-gray color (hornfels?) extending in the NNW-SSE direction are widely distributed, forming a small mountain. No mineral showing is identified which may show high values of Mo, Cu and Zn like the existing analysis results.

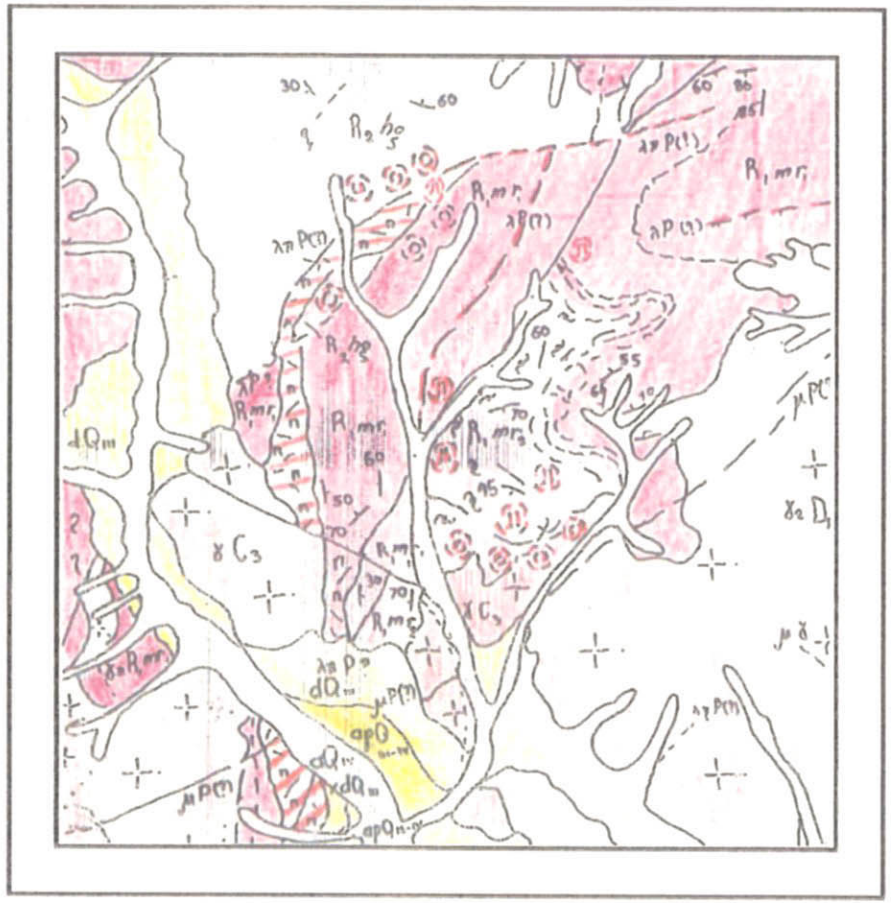
[Laboratory test]

Granite collected from the trench on the northern side (M00IH114) is a extremely fresh porphyritic muscovite granite as observed by microscopic obsevation. It shows porphyritic texture containing 40% of huge phenocryst of potassic feldspar and quartz in hypautomorphic to xenomorphic which length reachs to 7mm. Major constituent minerals in the order of larger to less quantity are potassic feldspar, quartz, plagioclase and biotite accompanying accessory mineral of muscovite and iron oxide and zircon in small or trace quantities. The occurrence of this rock is considered as a small-scaled intrusive rock. Chemical analysis of float of quartz vein collected near the western end of this trench (M00IH115) recorded that Au is less than detection limit (0.01 g/t), others are slightly higher values of 21 g/t Ag and 284 ppm Bi.

Microscopic observation of granite (M00HH119) collected from the vicinity of the southern end of the trench on the southern side revealed biotite and granitie porphyry. They are in medium grains with 1mm or less in diameter. In general, it represent xenomorphic or equigranular texture, and micrographic structure is identified in part. Further, no mineral in phenocryst size was observed. The granite mainly consists of quartz and potassic feldspar and accompanies small quantities of plagioclase and biotite. The occurrence of this rock is considered as either small-scaled intrusive rocks or dyke.

Light-gray silicified rock collected from the vicinity of the northern end of this trench

Geological map of the Khunkh tsakhir.
1:50 000 scale.



0 3,000m

LEGEND

- Recent deposit
- Upper Quaternary - recent deposits
- Upper Quaternary deposits
- Permian deposits
- Later Carboniferous granite
- Middle Devonian Tes complex Dykes
- Middle Devonian Tes complex Second phase
- Middle Devonian Tes complex Primary phase
- Middle Riphean Khugiin suite
- Lower Riphean Murun suite Middle sub-suite
- Lower Riphean Murun suite Lower sub-suite

The map extracted from the geological map sheet of 1:200,000 scale was prepared for the project by Mongolian GIC.

Fig. II-3-46 Geological map of the Khunkh tsakhir

(M00HH120) was determined as thermaly metamorphosed sandstone resulting from microscopic observation. The original rock was sandstone containing fine grain but engaged xenomorphic quartz (in diameter of 0.5 mm or less), trace quantities of hypautomorphic or xenomorphic muscovite due to weak thermal metamorphism. Only sericite was detected by X-ray diffraction of greisenized alteration rock (M00MZ121) collected from the vicinity, while its chemical analysis revealed a slightly higher value of Ag:8g/t.

The altered rock disseminated with malachite (M00MZ122) collected from the vicinity of drill hole traces was determined as heterogeneous greisen in unequal grains under microscopic observation, consisting of quartz (70%) and muscovite (30%) and accompanying 1% or less of plagioclase and iron oxide. They are in fine to coarse grains with quartz and muscovite firmly engaged with each other, and their original rocks are presumed as metamorphic rocks. Further, chemical analysis of this altered rock was recorded 0.2% Cu and 3.8g/t Ag. Moreover, as a result of X-ray diffraction of greisenized granite collected in the vicinity (M00IH117), only sericite was detected. In addition, drill core of mineralized granite (M00IH116, depth unknown) was obsereved under the microscopic. As a result, medium quantities of pyrite and galena as well as trace quantities of pyrite and magnetite were identified.

Although no microscopic observation was enforced on a strongly silicificated dark gray rock (M00IH113) from a small mountain located between the two trenches on the southern and northern sides, thermaly metamorphosed sandstone similar to the case of M00HH120 may possibly exist. Chemical analysis revealed that both Au and Ag were less than the detection limits with rather high values of 4,740 ppm P and 1,060ppm Sr.

[Evaluation]

Existence of greisen in a wide range of the upper part of granitic intrusive rocks was identified, but no interesting values were revealed by the preceding and present analyses. Although there is no record of calculation, the values resulting from the preceding calculation cannot be the object of the operation and, therefore, the possibility of existing deposits having economical value is thought to be low.

3.2.17 Tosontsengel district

(1) Outline of the district

(1-1) Location

This district is located in the southwestern part of the surveyed area ranging from 48° 20' to 49° 05' north latitude and from 97° 30' to 98° 30' east longitude, whose total area is approximately 7,200 km2 (approx. 80km in the E-W direction x approx. 90 km in the S-N

direction). The center of this district is approximately 150 km in rectilinear distance to the southwest from Murun City.

(1-2) Topography and vegetation

This district mostly consists of hills which are about 2,000 m above the sea level. The Ider River runs eastward through the central part of the district and Lake Telmen is located to its west. Vegetation consists of short grasses and a sparse forest of trees.

(1-3) Infrastructure and access

Telmen and Tosontsengel towns are located in the district. Since no other large towns exist there, the general infrastructure level is low. The main street runs through the district along the north shore of the Ider River. Since this district mostly consists of hills, a relatively easy access is provided.

(1-4) Features on SAR image

Intermittent E-W trending lineaments are extracted from the northern part of the district, and lineaments presumed as relatively continuous fault are read. In the central to southern parts, intermittent lineaments are extracted in trending of E-W, NW-SE and NWN-SES . A ring-like lineament in a diameter of about 10 km is extracted in the central part, while several annular lineaments in diameters of about 2 km are extracted in the southeastern part of the district.

(1-5) Outline of geology and deposit

Geological map of the district is shown in Figure II-3-47. Geology of this district consists of sedimentary rocks and metamorphic rocks such as sandstone, conglomerate, shale, limestone, and gneiss of the Ripheian to the Lower Cambrian, trachyte basalt to andesite, rhyolite, acidic tuff of the Permian as well as granite of the Devonian,Carboniferous and Permian.

In the northern part of this district, continuous faults in the E-W trends is identified on the border of alkali granodiorite to granitic intrusion of the Permian and volcanic rocks of the Permian. In the southern part of this district, faults in the NE-SW and NW-SE trends are identified on the border of volcanic rocks of the Permian, sedimentary rocks of the Cambrian and granites of the Devonian and the Carboniferous, and the former was found to cut the latter.

In the list of mineral occurrences, one mineral occurrence of copper occurrence and one mineral occurrence of copper and gold occurrence are referred to excluding sedimentary deposits. The types of deposits are described as of vein and skarn type. Host rocks of the deposits are gabbro, porphyritic granites and volcanic rocks, and alteration zone, quartz vein and quartz stock work are also referred to. Their grades are low, i.e. around Cu:0.02-1%.

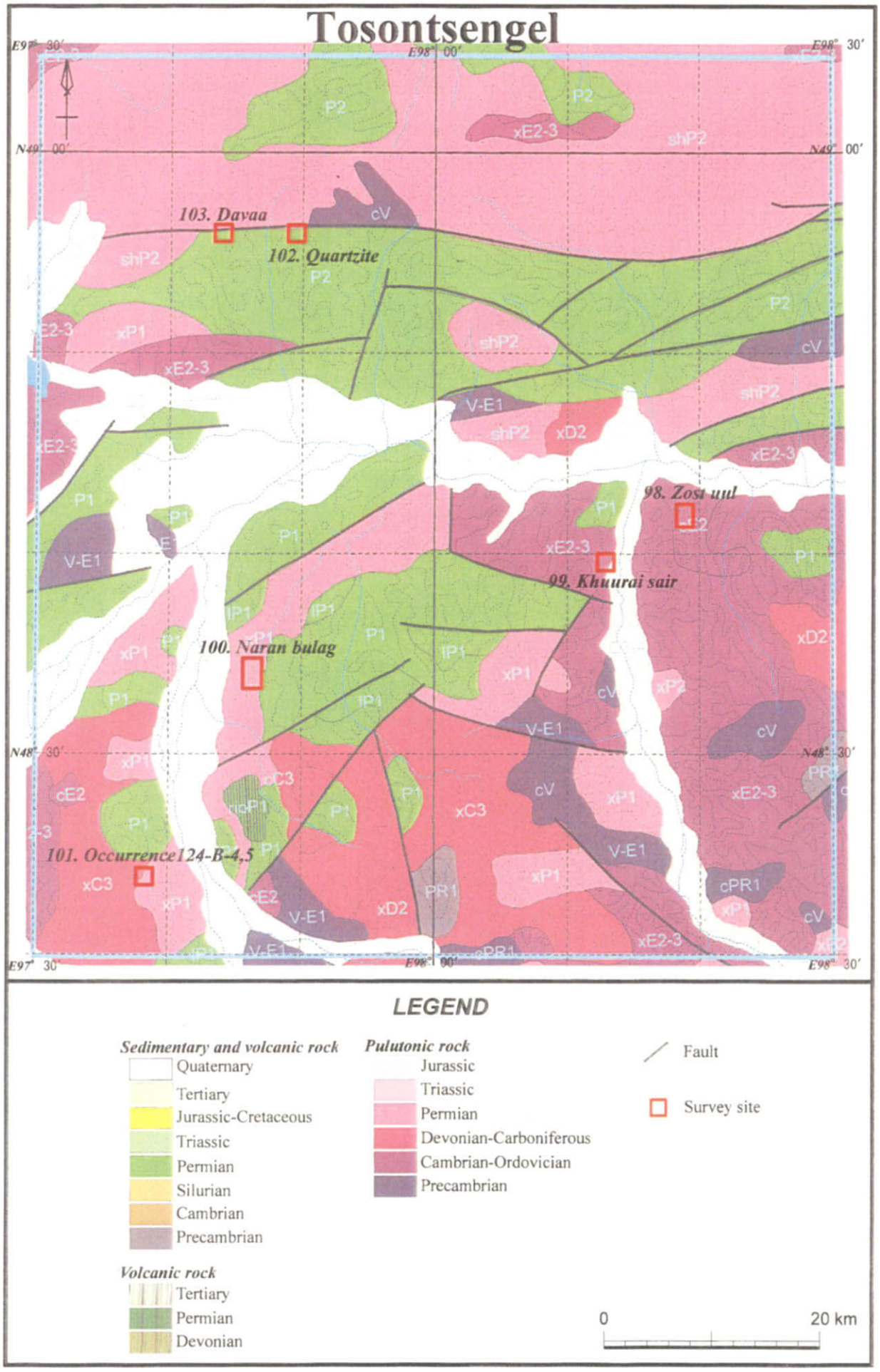


Fig. II-3-47 Geological map of the Tosontsengel district

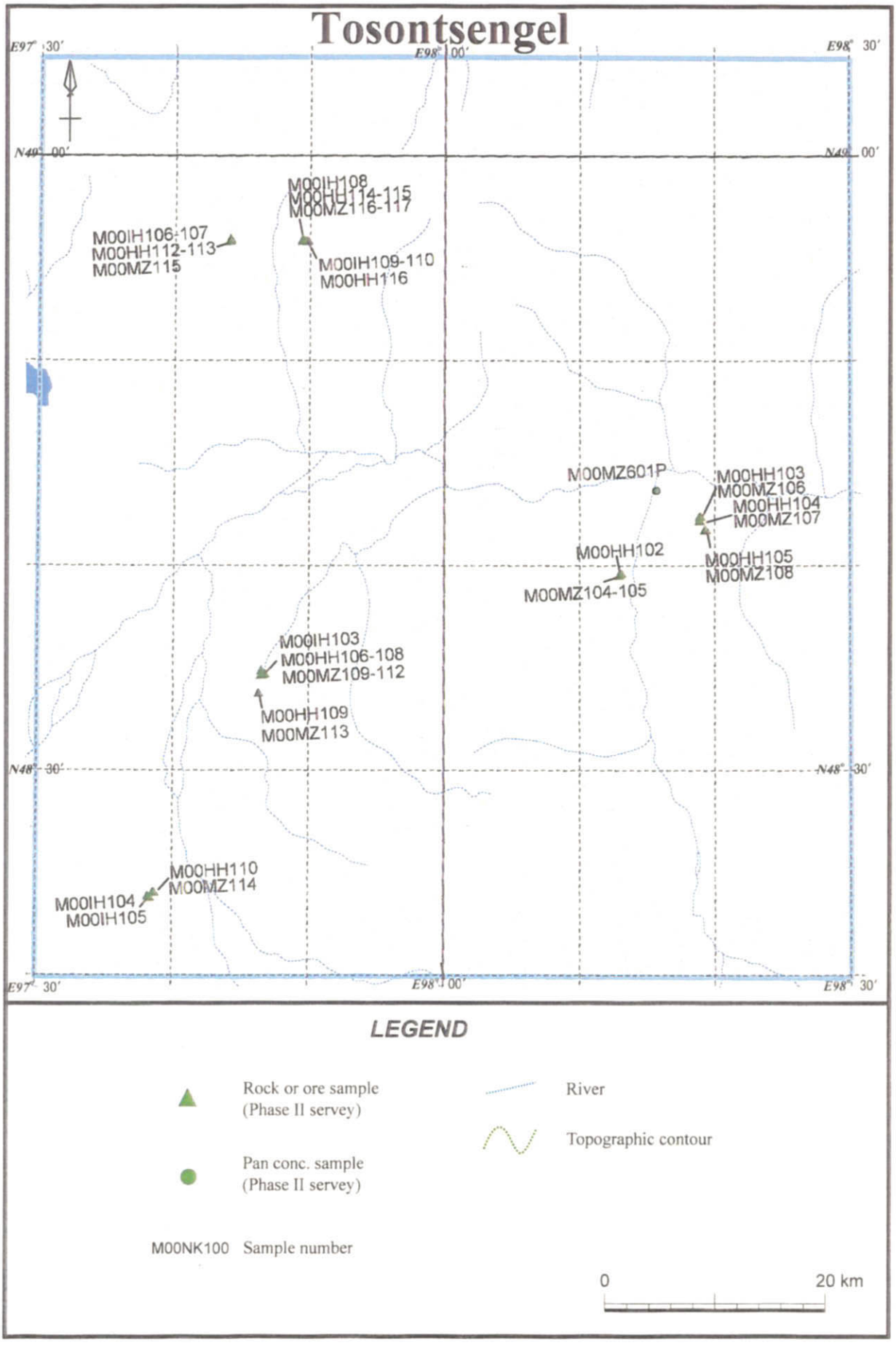


Fig. II-3-48 Sample locations of the Tosontsengel district

(1-6) Reason for selection

According to the list of mineral occurrences, copper mineral occurrences and copper/gold mineral occurrences concentrate in the district. Khuurai sair and Zost uul mineral occurrences are located along the edge of an annular lineament extracted through SAR image analysis, and since granitic rocks are also distributed in its vicinity, porphyry type copper deposits are anticipated. Its copper grade is 1% at maximum, and gold grade is 0.02g/t at maximum.(both in Occurrence 124-B-4,5). Although their values are not high, this district was selected for the above reason.

(1-7) Survey content

Our survey of this district was enforced to examine the characteristics of alteration and existence of mineral showing near the latitudes and longitudes referred to in the list of mineral occurrences on Zost uul, Khuurai sair, Naranbulag, the mineral occurrence of Occurrence 124-B-4,5 Quartzite and Davaa mineral occurrence. Figure II-3-48 shows sampling location in this district.

(2) Survey result

(2-1) Zost uul (Mineral Occurrence No. 98)

[Representative latitude and longitude]

48° 42' 25.1" North Latitude, 98° 18' 56.3" east longitude (the southern trench of the ore body on the west side)

[Topography and vegetation]

The mineral occurrence is a hilly zone of 1,850-2,000 m above the sea level. The top of Mount Zost in its vicinity is 2,023.9 m above the sea level. Short grasses are dominant there, but forests are seen in part depending on the directions of slopes.

[Access]

The mineral occurrence is located 8km to the southeast of Tosontsengel town. No. 8 Mineral occurrence (Khurai-sair) can be reached by driving for forty minutes from the camping spot which is 6 km to the west of Tosontsengel, and then it takes for twenty minutes from there.

[Preceding survey]

In 1978, geological reconnaissance survey (route length 104.7 km), rock chip geochemical exploration, (5,348 samples), drilling (12 holes, 1,268.8 m), trenching (12 trenches, 1,771 m) pitting (132 m^3) were conducted for a range of 9.0 km^2. In the drill hole No. 13 (length: drilled length: 190.6 m), crystalline shale and granite and granitic porphyry having intruded into

crystalline shale were identified. Quartz veinlets were frequently observed and mineralization of copper and molybdenum in the zone of pyritization, greisenization and epidotization, etc. were noted. Analysis results of < 0.1%-0.18% Cu and <0.1% Mo were obtained.

[Features on SAR image] (SAR image unit "Tosontsengel")

The mineral occurrence is located on the southern side of the Ideriin River in the east-west system, and on the border of the light -gray zone (on the southeastern side) and dark color (on the northwestern side). Narrow structures which are considered as swamp (or ridge) in the NW-SE to WNW-ESE system were developed in the light-gray zone.

[Geology and geological structure]

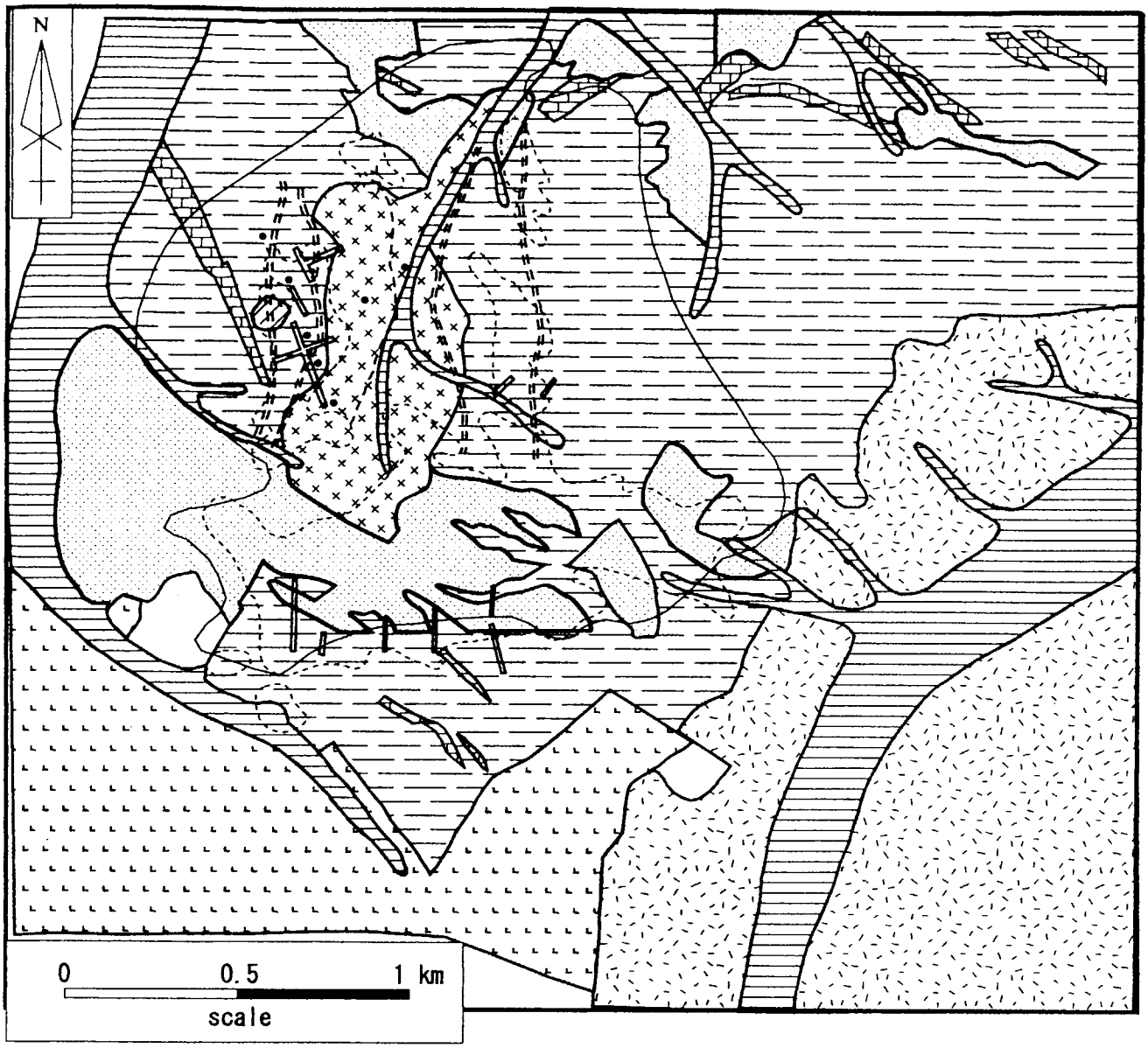
Geological map of this mineral occurrence is shown in Figure II-3-49. Metamorphic rocks and gneiss of the Upper Proterozoic are distributed. Granities of the Permian to Triassic intruded into them in the state of stock and dyke. Moreover, diorite, diabase porphyry, microgranodiorite and micro-diabase dyke are also developed. In the southwestern part of the surveyed district, basic to alkali gabbro and diorite of the Upper Proterozoic are distributed. Metamorphic rocks of the Upper Proterozoic consist of biotite amphibolite, crystalline biotite shale, gneiss, and crystalline limestone.

[Mineral showing and alteration]

From the preceding survey, mineralized zones were identified at three localities (Eastern ore body: in the scale of 230 m x 1200m, Western ore body: in the scale of 160 m x 700 m, and Southern ore body: in the scale of 180 m x 1400 m), and their grades of 0.02-0.03% Cu and 0.02% Mo were obtained. In this survey, five trenches (150-200 m long) were found to lie at right angle to the above. Rocks in the trenches were quartz porphyry, gneiss, felsite, etc. Quartz porphyry was altered, and quartz, white clay mineral and pyrite were identified in it. In some of the trenches, quartz veinlets disseminated with pyrite accompanying sericitic alteration was found, and dissemination with trace quantities of chalcopyrite and molybdenite was identified. In the vicinity of the hill top between the western and southern ore bodies, outcrops of a quartz vein were discovered for a range of 20 m x 20 m. In the surroundings of the southern ore body, four trenches in the N-S directions (according to the existing data, five trenches in length of 100 – 300 m) were identified consisting of altered rocks and porphyry. The surface of altered rock was brown with limonite contained, and malachite and azurite were identified.

[Laboratory test]

As a result of microscopic observation, M00HH104 (felsite) was identified as hornblende dacite. X-ray diffraction was conducted, and quartz-sericite, quartz-plagioclase-potassic feldspar-sericite was identified in altered rocks (M00MZ106 and M00MZ107). Quartz-potassic feldspar-albite-sericite was identified in quartz porphyry (M00HH103). As a result of geochemical analysis of M00HH103, M00HH105, M00MZ106, M00MZ107 M00MZ108,



Legend

- Modern proluvial-talus deposits: clayey-sandy-debris and landwest-sandy deposits
- Upper Proterozoic metamorphic strata. Crystalline shale and gneiss with biotite-amphibolite, amphibolite-biotite and rarely biotite-garnet and with marble limestone beds
- Granite porphyry and fine grained porphyry formed leucocratic granite
- Granodiorite, rarely granite with biotite-hornblendec, gtanodiorite-porphyry and quartz-diorite
- Gneiss formed granite rarely leucocratic and pegmatoid
- Diorite and gabbro-diorite, rarely gabbro
- Limestone
- The contour of quartzization, sericitization and pyritization stockwork rocks. (Limonitization on the surface)
- The secondary dispersed aureole with molybdenum content:0.001-0.01%
- Stockwork zone of molybdenum mineralization
- Trench
- Drill hole

Fig. II-3-49 Geological map of the Zost uul

values of 43-431 ppm Mo were obtained from them excluding M00HH103.

[Evaluation]

Slight copper/molybdenum mineralization was identified in the sample of some of the trenches. Anomalies in molybdenum were detected as a result of geochemical analysis. However, since such findings were in small scales and no mineral showing of gold was identified, possibility of existing deposits having economical value is thought to be low.

(2-2) Khuurai sair (Mineral occurrence No. 99)

[Representative latitude and longitude]

49° 36' 00.0" north latitude, 98° 23' 00.0" east longitude

[Topography and vegetation]

The mineral occurrence is a rocky mountain jutting out in the north-northeast direction from Tarvagaitay mountainous district (3,200 m above the sea level). On the eastern slope where the mineral showing exists, rocks are exposed here and there and soil is scarcely developed. Short grasses sparsely grow, and few bushes are observed. The slope along the Khojuulin gol River running at the foot of the mineral occurrence is covered with River sand.

[Access]

The mineral occurrence is located 12km to the south of Tosontsengel town and along the western shore of the Khojuulin gol River which is a branch of the Ider River.

By crossing the bridge over the Ider River running on the southern shore of Tosontsengel town and by going westward for approximately 4 km on an unpaved road on the right shore, you will arrive at a bridge over the Khojuulin gol River. From this bridge, the road is bad and you will arrive at the foot of a small ridge by further driving approximately 10 km on a bad road.

[Preceding survey]

A geological survey on a scale of 1:50,000, rock chip geochemical exploration (725 samples), trenching (222.2 m^3), drilling (140 m) and pitting (180 m^3), etc. were conducted. The preceding survey revealed that the ore body existed in a fracture zone in N-S trending in a range of 0.2 km^2 with its total length of 0.5 km. The major minerals are pyrite, iron hydroxide, chalcopyrite and malachite sinter. The maximum value of Cu:0.09% was obtained through chemical analysis.

[Features on SAR image] (SAR image unit "Sharga")

Lineaments in the ENE-WSW, NNW-SSE and WNW-ESE directions are identified on the northern, western and southern sides of this mineral occurrence respectively, and the mineral occurrence is located within a range surrounded by these lineaments. The lineament in the WNW-ESE direction out of the above is a part of the lineament belt continued from the Solongot mineral occurrence in the southeastern part.

A relatively clear arc structure which is considered as the southern half of a ring structure is located at about 10 km to the southwest of this mineral occurrence. Roughly observing the distribution of lineaments from this viewpoint, lineaments in the ENE-WSW, N-S and NNW-SSE directions appear to be arranged radial shape, though vaguely, from the western side1 to the southern side of this arc structure.

[Geology and geological structure]

Shale accompanying thin layers of acidic volcanic rocks and silicificated limestone in Khug formation of the Middle Paleozoic are distributed in the entire vicinity. In the northern part marble limestone in Murun formation is distributed. While in the southern part granitic rocks of the Middle Devonian is intruded into them. Near the mineral occurrence, fine-grained acidic effusive rocks (felsoporhyry and andesite) of the Lower Cambrian and granite of the Devonian are distributed.

[Mineral showing and alteration]

Based on the existing data (document No. 3569, geological map in scale of 1:1,000 (Figure II-3-50), the existing four trenches (K-2, K-34, K-22 and K-37) were surveyed. In the stockwork quartz and epidote accompanied with a part of felsitic vein intruding into andesite, weak pyrite dissemination and rare a trace quantity of chalcopyrite dissemination are identified, and trace quantities of malachite and azurite are generated. Felsite dykes are divided into two types. One is leucocratic felsite accompanying quartz veinlets and malachite, the other is brecciated felsite accompanying malachite are observed in felsite dyke.

[Laboratory test]

As a result of microscopic observation, andesite (M00HH102) was determined as biotite dacite. Porphyritic texture is developed and it includes 20% of large-scaled phenocryst. Constituent minerals are plagioclase, iron ore and biotite in the order from larger to less in quantities, and most of them are plagioclase. Groundmass is coarse grained and holocrystalline consisting of quartz, potassic feldspar, plagioclase, iron ore, and biotite. Alteration degree is rather strong and epidote, chlorite, quartz, and iron ores generated. In view of its groundmass tissue, this rock is presumed as a dyke or a small-scaled intrusive rock.

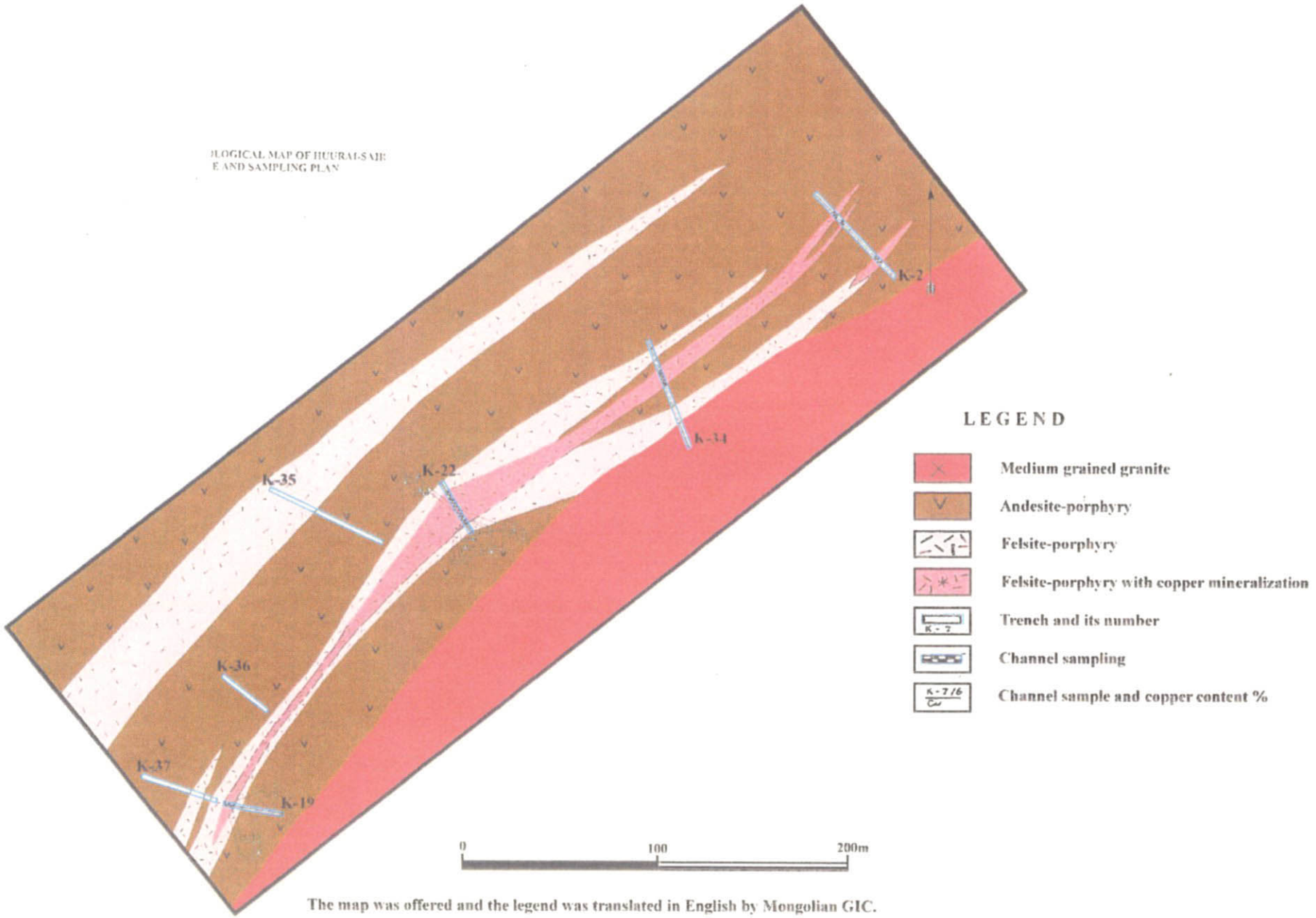
As a result of geochemical analysis of leucocratic felsite accompanying malachite (M00MZ104 and MZ105), notable anomalous values are as follows:

M00MZ104 - Cu:0.1% (1,120 ppm), Au:<0.005 ppm, Ag:0.8 ppm

M00MZ105 - Cu:0.8% (8,090 ppm), Au:0.03 ppm, Ag:20.8 ppm

[Evaluation]

In view of the facts that the existing analysis results of channel samples are low with Cu:0.09% at a maximum, that the results of this survey also indicate weak Cu mineralization, and that there is no proof of its becoming dominant in deeper layers, possibility of existing deposits having economical value is thought to be low.



The map was offered and the legend was translated in English by Mongolian GIC.
The original scale is 1 : 1,000

Fig. II-3-50 Geological map of the Khuurai sair

(2-3) Naranbulag (Mineral occurrence No. 100)

[Representative latitude and longitude]

48° 34' 40.2" north latitude, 97° 46' 27.8" east longitude, and 2,050 m above the sea level (at the point of sampling M00MZ111 where the main mineral showing was observed).

[Topography and vegetation]

The mineral occurrence is a gentle hill with vegetation of dominant short grasses and sparsely existing local forests.

[Access]

The site can be reached by crossing a bridge over the Ider River running eastward from Tosontsengel town and by driving in a vehicle on unpaved roads. It takes about two hours and a half to get there.

[Preceding survey]

The mineral occurrence was discovered when geological survey on a scale of 1:100,000 were enforced in 1966. From 1977 to 1979, geological survey, trenching, and geophysical exploration were conducted. Ore reserve of 22 million tons as well as the average grades of 0.28% Cu and 0.001 to 0.015% Mo were calculated as copper deposit like stockwork associated with granitic rocks. Although no record of drill holes exists, traces of drill holes (considered to be short) were observed at two spots in the site. With regard to trenches, a lot of them exist in addition to those indicated in Figure II-3-51.

[Features on SAR image] (SAR image unit "Tosontsenge")

The mineral occurrence is in dark-gray color, flat with few undulations, and no lineament is extracted. Because of dark color tone, no drainage system is identified. Rock resistance is also low, and no bedding plane is identified.

[Geology and geological structure]

According to the existing data (document No. 3576 and 2581), this mineral occurrence belongs to Ider structure belt of North Mongolian folding system, and trachyte, dacite and basalt of the Lower Permian system and intrusive rocks of the Lower and the Upper Permian are said to be distributed.

At the site, mineral occurrence of granite-granodiorite and aplite in fine to medium grained and leucocratic granite and micro-gabbro and andesite dyke in medium grained were observed. Andesite dyke in the width of approximately 1 m has a structure of strike:N40° W and dip: vertical.

[Mineral showing and alteration]

Oxide copper mineralizations associated with granite-granodiorite, aplite and leucocratic granite were observed (Figure II-3-51). The copper oxide consists of malachite and azurite.

In the major mineralized part, copper oxide are intensely concentrated along the crack of leucocratic granite, and black copper pitch is also locally accompanied.

Granites have a feature of not being under hydrothermal alteration such as silicification and argillization, and biotite included in them is also fresh. It is considered, therefore, that chalcopyrite was primarily generated in potassic alteration zone through mineralization of porphy copper deposit of hypogene type and that it secondarily changed to copper oxide ore.

In the leucocratic granite at the outskirts eastward from the main mineralized part, dissemination with pyrite and hematite as its secondary mineral is identified, and manganese oxide is generated on the surface of out crop.

[Laboratory test]

As a result of microscopic observation, granites were identified as granodiorite porphyry, granitic porphyry and tonalite (M00HH109, M00MZ109, M00MZ110 and M00MZ113). Chemical composition of M00MZ113 and M00HH109 are calc-alkali granite in AFM diagram, correspond to granodiorite in Norm Qtz-Or-Ab diagram, and island arc-type granite in Rb-(Y+Nb) diagram. In REE pattern, they show similar tendency to the granitic rocks in Erdenet deposit (Appendix Figure A-4). The result of K-Ar age determination for the whole rock of M00MZ113 was obtained as 110±6Ma representing the Middle Cretaceous.

As a result of X-ray diffraction, sericite was identified in granites of M00MZ109 and M00MZ110. They were observed as fresh as a result of microscopic observation; they are fresh and consist of quartz, plagioclase, potassic feldspar, muscovite, etc. Especially in granodiorite porphyry (M00MZ109), co-existence of cummingtonite, biotite and muscovite was observed. These samples were collected from the vicinity of the mineralized zone. Occurrences that biotite was xenomorphic and potassic feldspar was replaced by biotite were identified under microscopic observation, these granites are considered as suffered potassic alteration.

Chemical analysis of ore samples revealed the values of 2.48% Cu: and 5.32% Cu for M00HH108 and M00MZ111 respectively which were collected from the vicinity of mineralized zone, and existence of high-grade minerals was confirmed. However, concerning M00HH106, M00MZ109 and M00MZ110 which are the samples collected from the places other than the mineralized part, their analysis results were within the range of 121-880 ppm Cu, indicating a large fluctuation in grades. With regard to the analysis results of Au, 0.03g/t for M00MZ111 was at the highest value, and the rock was determined as low grade as far as Au was concerned.

[Evaluation]

In this mineral occurrence, since outcrops were not sufficient in the places other than trenches, it was difficult to confirm the extent of the major mineralized part (FigureII-3-51). Moreover, it was considered that chalcopyrite was primarily generated in potassic alteration zone because of mineralization of porphyry copper deposit of hypogene type and that it

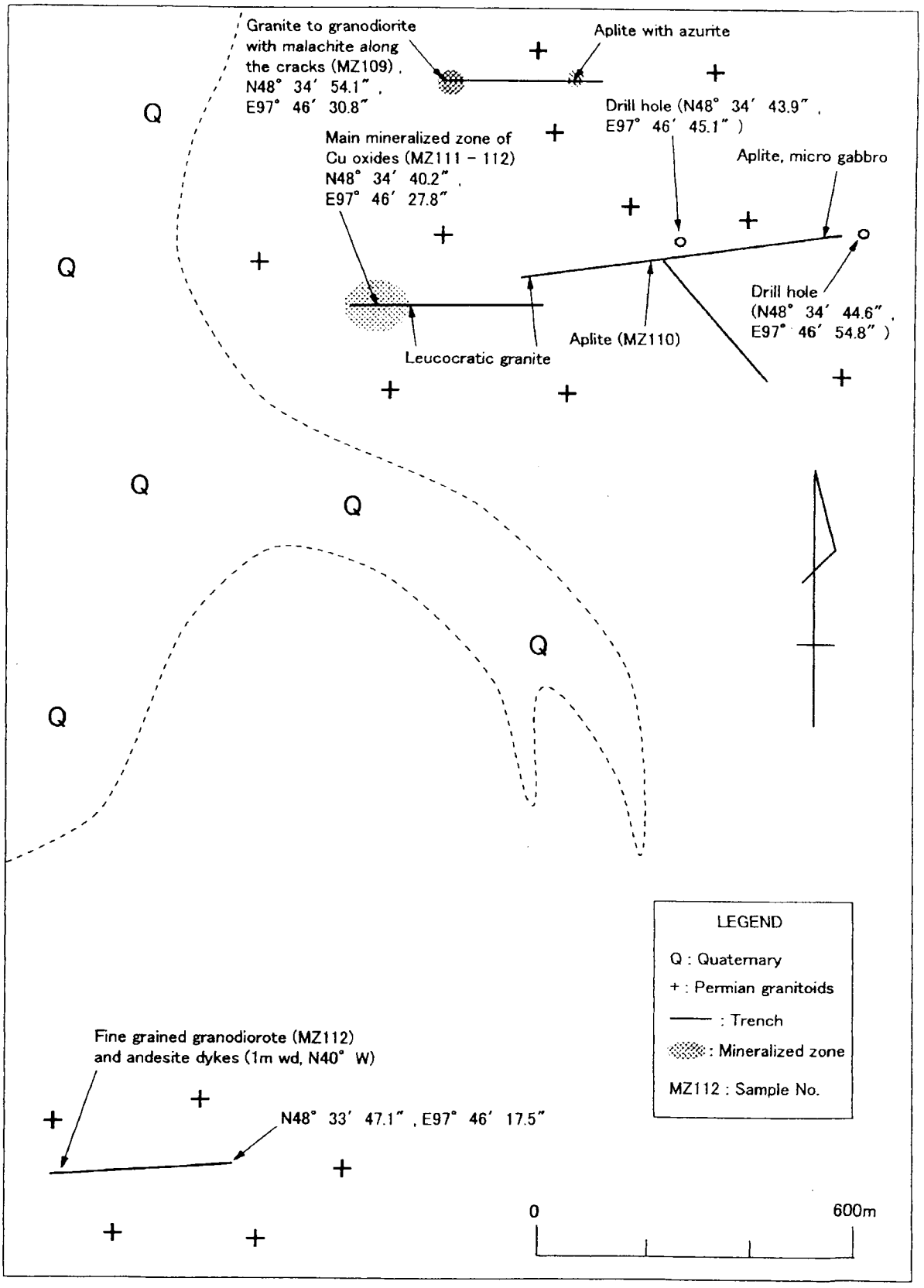


Fig. II-3-51 Schematic plan of the Naranbulag

secondarily changed to copper oxide ore. It is expected, therefore, that sulfide ores with chalcopyrite dissemination may exist in the lower part of this mineral occurrence. On the other hand, if occurrences of copper oxide ore identified on surface extend into lower parts, possibility of development by SX-EW may exist. Therefore, lateral and vertical extension of known mineral occurrences is recommended to grasped in the future by drilling, etc.

(2-4) Occurrence l24-B-4,5 (Mineral occurrence No. 101)

[Representative latitude and longitude]

48° 24' 01.9" north latitude, 97° 38' 41.4" east longitude (hilltop in the central part of the surveyed area)

[Topography and vegetation]

The mineral occurrence is a hilly zone of 2,200-2,300 m above the sea level. Short grasses are dominant on the hills of the surveyed area, and forests are also seen in its periphery.

[Access]

The mineral occurrence is located 60km to the southwest of Tosontsengel town. It can be reached by driving two hours and forty minutes from the camping spot 6 km to the west of Tosontsengel.

[Preceding survey]

This mineral occurrence was discovered when a geological survey was enforced on a scale of 1/200,000. Geological reconnaissance and sampling were conducted in the survey.

[Features on SAR image] (SAR image unit "Tosontsengel")

This mineral occurrence is located to the south of the Ideriin River in the NE-SW trend. It is located in a west side of dark-gray response within a bright-gray response (considered as a topographical rise). A short (around 1 km in length) linear response is identified in its periphery..

[Geology and geological structure]

According to the existing data (document No. 3576), Uliastai complex of the Upper Permian (granite, granodiorite and granitic syenite) are distributed in the western part of the surveyed area. Gabbro and gabbro amphibolite are also distributed in part. Moreover, trachyte dacite, trachytite rhyolite, dacite, rhyolite and dacite of the Lower Permian are distributed in the central to eastern parts (Figure II-3-52).

[Mineral showing and alteration]

It is reported as a result of the preceding survey that B-4 ore body in hydrothermally altered zone in the scale of 0.7km x 0.7 km which is developed in the area where gabbro is distributed and that B-5 ore body in hydrothermal alteration in the scale of 150 m x 150 m which is developed in gabbro-granodiorite accompanying pyrite, malachite and azurite. In this survey, granite gabbro (diorite) and andesite dyke were observed on the hills. All of them are not altered. Granite, diorite, (granodiorite) and gabbro were identified on the slope of hills,

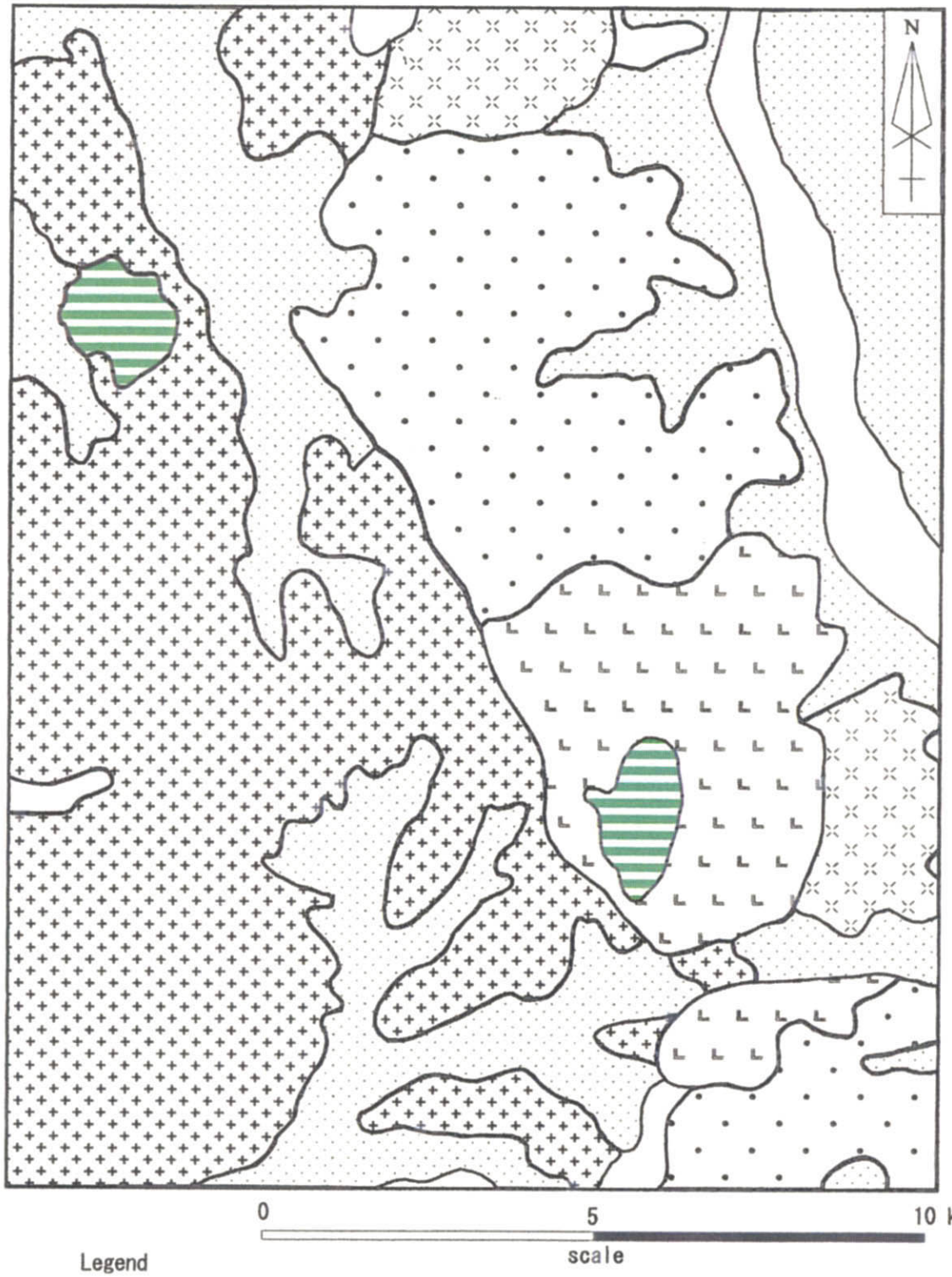


Fig. II-3-52 Geological map of the Occurrence 124-B-4, -5

and weak dissemination with malachite was identified in gabbro.

[Laboratory test]

As a result of microscopic observation, M00IH104 (ultrabasic rock) was identified as olivine/pyroxene amphibolite. M00HH105 (gabbro) and M00HH110 (diorite) were identified as amphibole gabbro. Resulting from X-ray diffraction of M00HH110 (diorite), albite-chlorite>amphibole-quartz-sericite were identified. Chemical analysis of M00MZ114 (gabbro) revealed the value of Cu:295 ppm.

[Evaluation]

Since detailed location of the ore body was unknown, no ore body was identified in the Phase-2 survey. In view of the fact that no distinctive alteration was identified, the possibility of existing deposits having economical value is thought to be low.

(2-5) Quartzite (Mineral occurrence No. 102)

[Representative latitude and longitude]

48° 55' 51.6" north latitude, 97° 49' 42.4" east longitude (the northern end of the trench in the central part of the survey area)

[Topography and vegetation]

The mineral occurrence is a hilly zone of 2,000-2,150 m above the sea level where short grasses are dominant.

[Access]

The mineral occurrence is located 40 km to the northwest of Tosontsengel town, and it can be reached by driving in a vehicle for about an hour from the camping spot which is 6 km to the west of Tosontsengel and then on foot for about three minutes.

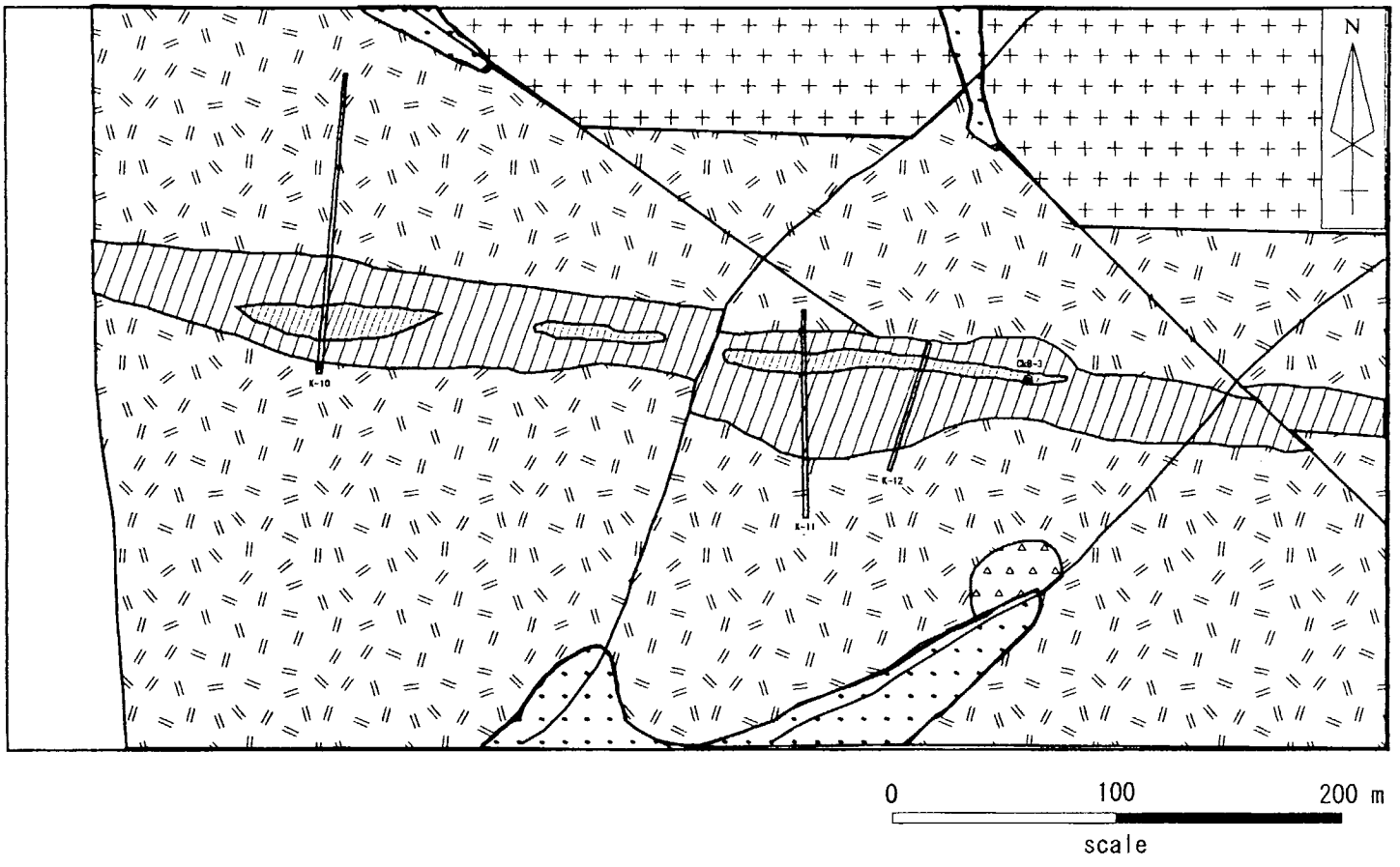
[Preceding survey]

This mineral occurrence was discovered when a geological survey was conducted on a scale of 1:200,000 from 1976 to 1977. In 1979, trenching (452.2 m^3 or 307 m) and drilling (65 m) were conducted. In drill hole No. 3, (drilled length:65 m), silicification, epidotization and pyritization were identified in porphyry, breccia and granitic porphyry. Their grades were≦ 0.01% Cu, ≦0.015% Mo, ≦0.01% Zn and ≦0.001% Pb.

[Features on SAR image] (SAR image unit "Tosontsengel")

This mineral occurrence is situated on the northern side of the Ideriin River. Seen in a wide range, the mineral occurrence showing dark response is situated between the two areas where light-gray responses in the E-W system are distributed. Although no remarkable features are observed in the vicinity, a few short and discontinuous responses are noted in the E-W direction.

[Geology and geological structure]



Legend

- Modern talus-proluvial deposits
- Sub volcanic granosyenite-pophyry
- Sub volcanic granite-pophyry
- Liparite-pophyry (including tuff)
- Argillization zone
- Secondary quartzite
- CKB-3 Drill hole
- K-10 Trench

Fig. II-3-53 Geological map of the Quartzite

According to the existing data (document No. 3122), volcanic rocks, lipalit porphyry, granitic porphyry and granitics syenite porphyry of the Permian are distributed. On the western side of the mineral occurrence, quartzite and syenite porphyry dykes were observed. On the northern side, acidic rocks including the mineral occurrence and granites are in contact with each other at the fault in the east and west direction (Figure II-3-53).

[Mineral showing and alteration]

In Trench No. 1 (direction: N20° E, length: approximately 150 m, width: approximately 1m), granite (in coarse grains), acidic tuff breccia and acidic tuff (silicificated in part) were found. In Trench No. 2 (direction: N-S, length: approximately 100 m, width: approximately 2 m), alteration rock (weakly silicificated), altered lapilli tuff (white argillization) and alteed rock whose surface is covered with iron oxide were observed. In Trench No. 3 (direction: N60° W, length: approximately 80 m, width: approximately 1 m), silicified rocks (in grayish white color and in pink to red color) were observed. Outcrops consists of andesite and silicificated rocks.

[Laboratory test]

Under microscopic observation, M00IH108 (syenite) was identified as dacite-lapilli tuff, while M00MZ117 (rhyolite) was identified as aphyric dacite or fine-grained tuff. Resulting from X-ray diffraction of silicificated rocks (M00IH109, M00IH110, M00HH115 and M00HH116) and altered rock (M00HH114), quartz, plagioclase, potassic feldspar and sericite (pyrite) were identified. Resulting from their chemical analysis, no conspicuous geochemical anomaly was detected.

[Evaluation]

In the Phase-2 survey, no mineral showing of copper or molybdenum was confirmed. Since grades of Cu and Mo were also low, these mineralization is determined as low although it exists.

Further, since no Au occurrence was confirmed, and no geochemical anomaly related to Au mineralization was observed, the possibility of existing deposits having economical value is thought to be low.

(2-6) Davaa (Mineral occurrence No. 103)

[Representative latitude and longitude]

48° 55' 57.1" north latitude, 97° 44' 03.4" east longitude (silicfied zone beside the trench in the central part of the survey area)

[Topography and vegetation]

This mineral occurrence is a hilly zone of 2,000 – 2,100 m above sea level, where short grasses are dominant.

[Access]

The mineral occurrence is located 45km to the northwest of Tosontsengel town, and it can

be reached by driving in a vehicle for an hour and twenty minutes from the camping spot which is 6 km to the west of Tosontsengel. Arriving at the site by a vehicle is available.

[Preceding survey]

The mineral occurrence was discovered when geological survey on a scale of 1:200,000 was conducted from 1976 to 1977. At the same time, drilling (total drilled length: 142.8 m) and trenching (185.5m or 313.15m^3) were conducted. In drill hole No. 2 (drilled length: 85 m, dip: vertical), quartz veinlets and chlorite-epidote-carbonitization were identified in andesite, syenite, and syenite porphyry. The grades of the mineral occurrence were Cu:≦0.05%, Mo:≦0.0015%, Zn:≦0.008% and pb:≦0.0008%.

[Features on SAR image] (SAR image unit "Tosontsengel")

The mineral occurrence is situated on the northern side of the Iderin River of the east and west trend. Seen in a wide range, this mineral occurrence as a response in dark color exists between the two areas where light-gray responses in the E-W trends are distributed. In the periphery, a short response (1 km or less in length) in the E-W trends is identified among the responses in the N-S trend.

[Geology and geological structure]

According to the existing data (document No. 3122), quartz syenite (Selenge complex) of the Upper Permian is distributed in the central to the northern parts of the survey area, while andesite and andesite porphyry of the Permian are distributed on the southern side. In the north where quartz syenite is distributed, diorite rock body in medium and fine grains of the Lower Palaeozoic is also identified. The border of quartz syenite and andesite and andesite porphyry constitutes a structure zone in the east and west direction where silicified rocks are distributed. The width of the structure zone is 70 – 100 m, and its total length is 450 – 500 m (Figure II-3-54).

[Mineral showing and alteration]

A trench exists crossing over the border of quartz syenite and andesite and andesite porphyry (direction: N20° E, length:200m, width:2m). In the syenite distributed on the top of the hill beside the trench, quartz stockwork is developed and epidote is rarely identified. Drill hole traces are on the opposite side of the trench, and outcrops of silicified zone accompanying quartz stockwork exist beside the trench. The quartz stockwork is 1.5 m wide. and its strike is the E-W system extending approximately 100 m eastward. No other mineral occurrence is identified.

[Laboratory test]

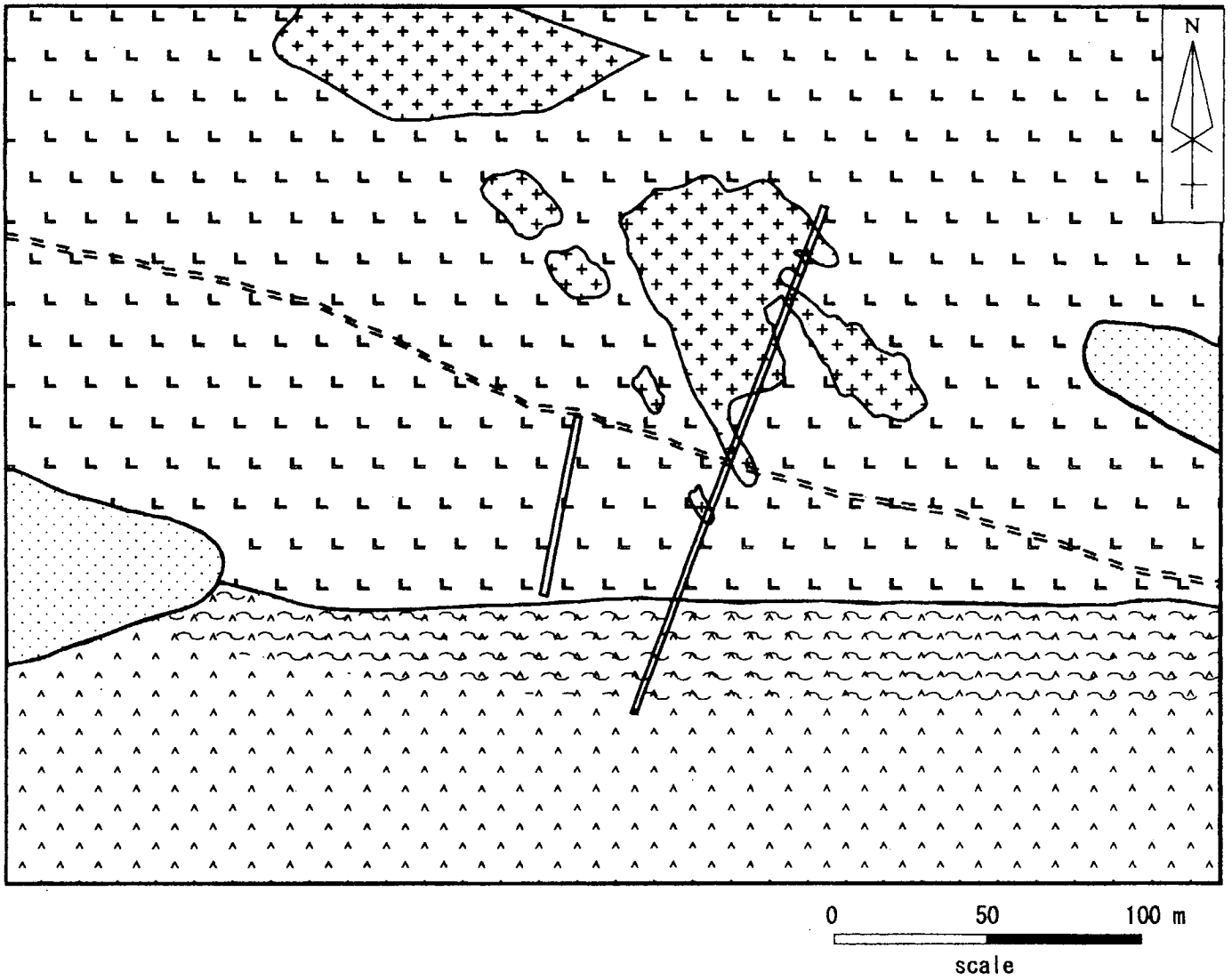
No remarkable anomaly was identified during the chemical analysis of silicified rocks (M00IH107 and M00HH113) and altered rock (M00MZ115).

[Evaluation]

No mineral occurrence of copper or molybdenum was identified in the Phase-I survey.

Since the grades of Cu and Mo were also low, it seems to be only slight mineralization although it exists.

Also, since no geochemical anomaly on Au was obtained, the possibility of existing deposits having economical value is thought to be low.



Legend

Quaternary talus-proluvial deposits

Andesite-porphyrite and andesite

Medium and fine grained quartz-syenite

Fine and medium grained diorite

The borders of quartzization and argillization zone

Cataclasis(dislocated)rocks

Trench and number of interval, which was channel sampling

Holes, its number and depth

Length(thickness)of sampling intervals and content of useful components by the spectral analysis%

Fig. II-3-54 Geological map of the Davaa