Chapter 3 Ground Truth Survey

3.1 Selection of target survey dstricts and points

Since the survey area in the Ground truth of this year was vast and not easily accessible, it was divided into two sides and a survey was conducted on the eastern side. The emphasis of the survey was laid on the evaluation of a potential of existence of porphyry copper deposits around the Erdenet deposit as well as on the evaluation of a potential of existence of deposits from the northern part to the western part where there were no known mines. Judging from the existence of the Erdenet deposit, a porphyry copper deposit with a high potential of existence was selected as a target survey deposit type and ore type. Taking the infrastructure condition of this survey area into consideration, a gold deposit. which has high added value, was also included in this survey.

In selecting the Ground truth points, data on the prospect kept by the Geological Information Center, Mineral Resources Authority of Mongolia (GIC, MRAM) was used as a reference. Attention was given to the type and scale of alteration zones as well as to the copper and gold grades (Cu: 0.02 % or more and Au: 0.1 g/t or more).

In addition, the areas having the following features were extracted from the lineaments or topography that were read from the SAR image.

- A place crowded with lineaments: suggestion of the development of a fissure
- A place where lineaments intersect: suggestion of the development of a fissure
- The neighborhood of major lineaments: suggestion of the development of a fissure
- Ring-shaped lineaments: suggestion of the existence of instrusive rocks below the surface of the earth
- A sharp change in a continuous uniform topography: suggestion of the existence of an alteration zone
- Flat terrain surrounded by steep terrain: suggestion of the existence of an alteration zone

Next, places where the scale of alteration zones located in the area extracted from the SAR image was described or known prospect having a favorable grade analized were selected as SAR points.

In connection with the survey points extracted from the existing data analysis and SAR image, the survey points were determined from the information such as the access condition and at the request of our counterpart. In the South Camp area, a prospect was surveyed under the guidance of a geologic engineer working for a geological survey company which conducts the zuhaba investigation. A survey was also conducted in the Erdenet area based on the information and data supplied by a geological survey engineer well versed in the neighboring geology.

3.2 Survey results

Figure II-3-1 shows geology and location of survey prospects/points in the eastern part of survey area, and Table II-3-1 shows the simplified stratigraph of survey area. Furthermore, the cord of geological unit in Table II-3-1 corresponds to the code indicated on the geological map of each area.

As a result of the examination of the accessibility, the present Ground truth survey was divided into two parts: the first half and the second half. The southeastern part of the survey area, distant from Ulaanbaatar, the central part, and the eastern part of Lake Khuvsgul were surveyed in the first half (July) and the neighborhood of the Erdenet Mine in the eastern part of the survey area was surveyed in the latter half (August). Basically, two groups, the Japanese team and its counterpart, set up a camp near the target prospect or stayed at a hotel in a town nearby to conduct the survey.

The first half of the survey covered eight areas and the latter half covered five areas; a total of 13 areas and 80 prospects/target points were surveyed. Efforts were put into discovering an outcrop which clarifies the geology, mineralization and alternation representative of the prospect/points because the areas were generally difficult of access and the exposure was poor. Analysis samples were collected as necessary. In order to acquire a general geochemical anomaly in each area and each location of the prospect, panning samples of sand flowing out from a prospect or panning samples of sand of a swamp running near the prospect were collected for analysis.

Each prospect in which the field survey was conducted was described under the categories of [Typical latitude and longitude], [Topography and vegetation], [Access], [Preceding survey], [Features on SAR image], [Geology and geological structure], [Mineral showing and alternation], [Laboratory test], and [Evaluation]. The photographs taken during the field survey were added to the end of this report. The examination results were described below in almost regular order of date of field survey.

3.2.1 Zaamar district

(1) Outline of the district

Figure II-3-2 shows the geology of Zaamar district, and Figure II-3-3 shows the location of sampling points in the district.

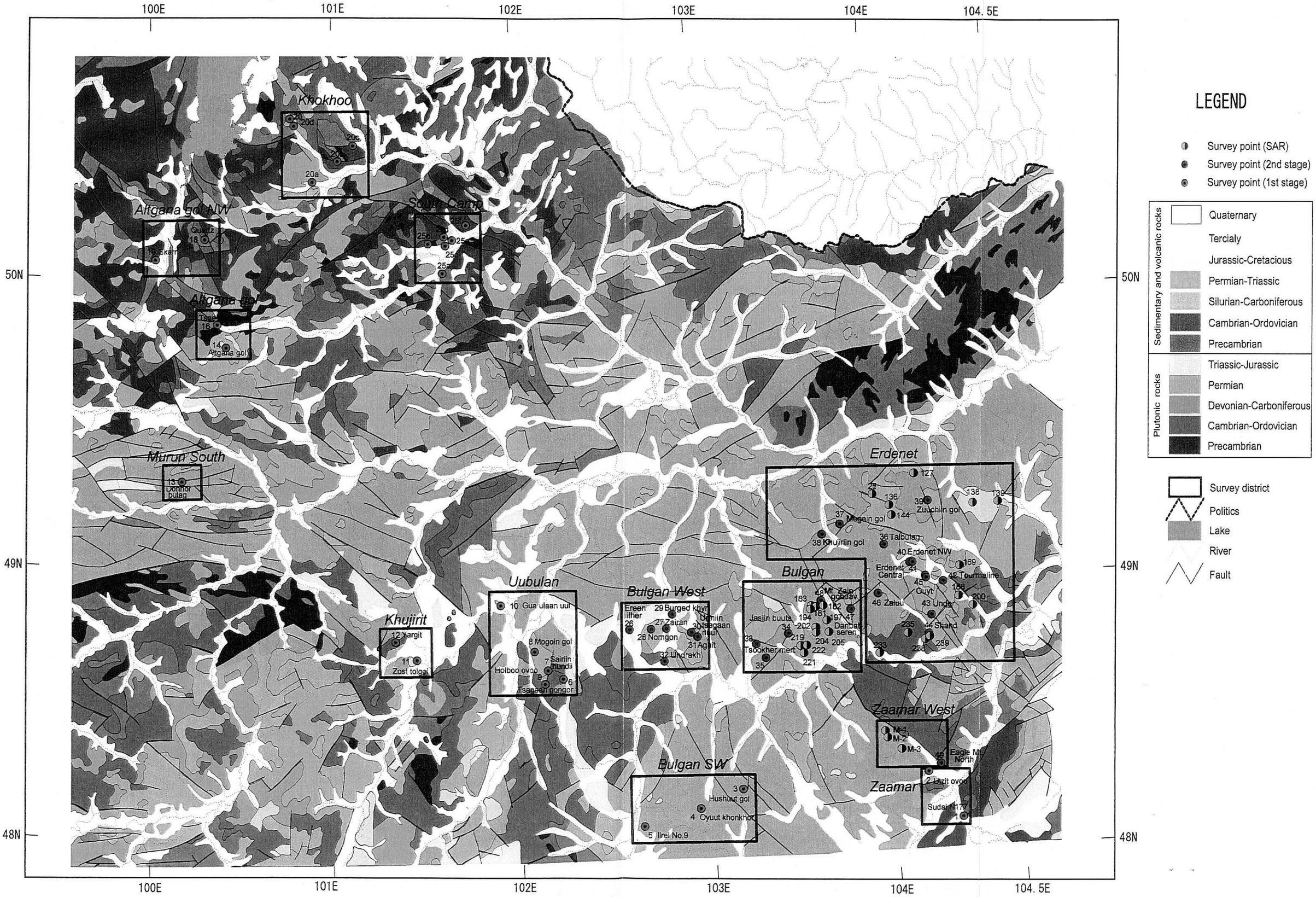
(a) Location

This district is located in the southeast part of survey area, and is 20 km long from east to west and 20 km width from north to south around 104° 20′ east longitude and 48° 10′ north latitude.

Tov Province, this area is situated in the southern end of the Zaamar mountain mass stretching in the NEN-SWS direction 200 km west of Ulaanbaatar.

(b) Topography and vegetation

The Zaamar mountain mass forms an approximately 50 km long and 25 km wide mountain. Also, from the topographic map and SAR image, it can be recognized as a remarkable mountain mass. The relative height is approximately 500 m, showing a landform having steep ups and downs. There



LEGEND

- Survey point (SAR)
- Survey point (2nd stage)
- Survey point (1st stage)

Sedimentary and volcanic rocks
- Quaternary
- Tercialy
- Jurassic-Cretacious
- Permian-Triassic
- Silurian-Carboniferous
- Cambrian-Ordovician
- Precambrian

Plutonic rocks
- Triassic-Jurassic
- Permian
- Devonian-Carboniferous
- Cambrian-Ordovician
- Precambrian

- Survey district
- Politics
- Lake
- River
- Fault

Fig. II-3-1 Location of survey points in eastern part of the central-north area, Mongolia

Table II-3-1 Stratigraphy of the central-north area, Mongolia

Sedimentary and Volcanic rock

	Period	Code		Lithofacies	Local Name
Cenozoic	Quaternary			Recent sediments: gravel, sand, sandy loam and clay	
Cenozoic	Quaternary			Upper-recent sediments: boulder beds deposits, sand, rockdebris, sandy loam, clay	
Cenozoic	Quaternary			Upper Quaternary: boulder, loam and clay	
Cenozoic	Quaternary			Middle-Upper Quaternary: sand, gravel, loam(QII-III), alkaline olivine basalt and trachybasalt	
Cenozoic	Quaternary			Middle Quaternary: gravel, sand, clay	
Cenozoic	Neogene	N2	N2-Q1	Pliocene: gravel, sand, clay(N2), trachybasalt, alkaline olivine basalt(bNII)	
Cenozoic	Neogene	N1		Miocene: trachybasalt, basalt	
Mesozoic	Cretaceous	K1	K1a	Cretaceous system(lower series): conglomerate, sandstone, aleurolite	
Mesozoic	Jurassic-Cretaceous	J3, J3a		Upper Jurassic-Lower Cretaceous series: conglomerate, sandstone, rhyolite and tuff	
Mesozoic	Jurassic			Middle-Upper serious: sandstone, conglomerate, aleurolite, brown coal	Sharyn gol suite
Mesozoic	Jurassic	J1-2		Lower-Middle series: conglomerate, gravelstone, sandstone, claystone with flora, brown coal and hard coal	Saikhan suite
Mesozoic	Triassic-Jurassic	T3-J1		Upper Triassic-Lower Jurassic series: andesite, andesite-basalt, trachybasalt, tuff, tuffcious conglomerate	Mogod suite(mg)
Paleozoic	Triassic	T2-3	T3	Non segmented sediments: sandstone, conglomerate, aleurolite	
Paleozoic	Triassic	T2		4th subsuite: siltstone, sandstone with flora	
Paleozoic	Triassic	T2		3rd subsuite: conglomerate, sandstone	
Paleozoic	Triassic	T2		2nd subsuite: sandstone, conglomerate, siltstone with flora	
Paleozoic	Triassic	T2		1st subsuite: conglomerate, sandstone, siltstone	
Paleozoic	Permian	P2-T1		Upper suite: trachybasalt, trachyandesite-basalt, trachyandesite and tuff, tuffcious sandstone with flora	
Paleozoic	Permian	P2		Middle suite: rhyolite, rhyodacite, trachyrhyolite, tuff with flora	
Paleozoic	Permian	P2		Lower suite: basalt, andesite-basalt, andesite, conglomerate (suite of basic and medial effusive rock)	
Paleozoic	Permian	P2		Non segmented sedimentary rocks: conglomerate, gravelstone, sandstone, siltstone with flora, acid tuff	
Paleozoic	Permian	P2		4th suite: trachybasalt, trachyandesite-basalt, bimodal effusion of pantellerite composition	
Paleozoic	Permian	P1-2		3rd and 2nd suite nonsegmented: rhyolite, trachyrhyolite, dacite, andesite, trachybasalt, basalt and tuff	
Paleozoic	Permian			3rd suite: siliceous siltstone with flora, sandstone, gravelstone, conglomerate, trachybasalt, tuff, basic and acid volcanic rock	
Paleozoic	Permian	P1		2nd suite: trachyrhyolite, trachydacite, trachrhyoritic dacite with bench of siltstone and sandstone with flora	
Paleozoic	Permian			1st suite: trachybasalt, basalt, trachyandesite-basalt, andesite-basalt, andesite, andesitic tuff, sandstone,gravelstone, conglomerate	
Paleozoic	Carboniferous	—	C1-2	Arteel suite: sandatone, conglomerate, aleurolite with flora	Arteel suite
Paleozoic	Carboniferous	C1		Nonsegmented sedimentary rocks: conglomerate, sandstone, siltstone with fauna and flora	
Paleozoic	Carboniferous			Upper subsuite: siltstone with interbed of sandstone and calcarious siltstone with fauna	
Paleozoic	Carboniferous			Lower subsuite: conglomerate, sandstone with fauna	
Paleozoic	Davonian	D2-3		Middle-upper series nonsegmented, sandstone, conglomerate, siltstone with fauna	
Paleozoic	Davonian	D2		Middle series, Bornuur suite: sandstone, siltstone, andesite, dacite, dacitic tuff	
Paleozoic	Davonian	D1-2	D1	Upper particle of lower-middle series, nonsegmented: Tariat suite: siltstone, sandstone, conglomerate with fauna	
Paleozoic	Davonian	S2-D1		Silurian system-lower series Devonian system, nonsegmented: andesite, dacite, rhyolite and rhyolitic tuff (Nariin suite)	Nariin suite
Paleozoic	Silrian	S		Silurian-systems: limestone, organic limestone, calcarious sandstone	
Paleozoic	Cambrian-Ordovician	E3-O1		Upper Cmbrian- Ordovician series, nonsegmented sedimentary rocks: clay-shale, siltstone, phillite, sandstone, gravelstone	
Paleozoic	Cambrian-Ordovician	E2-O1		Middle Cmbrian- Lower Ordovician series: sandstone, siltstone, claystone, phillite, sericite-chlorite-quartz shale	
Paleozoic	Cambrian	E1-2		Lower-Middle series: black limestone with fauna, limestone	Uzhigyn gol suite
Paleozoic	Cambrian	E1		Lower series, nonsegmented sedimentary rocks: layer and massive limestone, dolomite	
Paleozoic	Cambrian			Sandstone, tuffcious sandstone, claystone, shale, limestone, conglomerate	Ukhatol goi suite, Yamat uul suite(jm), Tsokhiryul rock mass
Paleozoic	Cambrian			Limestone, claystone, shale, sandy limestoe, andesite	Hordil suite
Paleozoic	Cambrian			Erkhel uul suite: Limestone, dolomite, sandstone, clay and shale(Xarmain and Bosgot suite), andesite, basalt, basaltic tuff, limestone, sandstone, congromerate(Burgelt suite)	Erkhel uul suite(Xarmain and Bosgot suite, Burgelt suite)
Proterozoic	Vendian-Cambrian	V-E1	V-E2-3	Vendian-Lower Cambrian: Dodnurskay suite(dolomite, limestone), Songinoulinskay rock mass(limestone, sandstone, shale, chlorite+sericite+quartz shale)	Dodnurskay suite(dh), Songinoulinskay rock mass(sh2)
Proterozoic			V		Ilwchirskay suite
Proterozoic		—	R3-E1	Riphean-Vendian: Darkhaskay series(sandstone, dolomite, conglomerate), Urk gol bskay suite(quartzite, dolomite, limestone)	Darkhaskay series, Urk gol bskay suite
Proterozoic		R3	R2-3	Riphean: Dzaokhanskay suite(limestone, shale)	Dzaokhanskay suite
Proterozoic		R2		Middle Riphean: metamorphic rocks(effusive rock, basic-medlian tuff, quartz-chlorite shale, sandstone, quartzite), clystallin limestone	
Proterozoic		PR1		Shale, amphibolite, marble, quartzite	

Intrusion

	Period	Code		Lithofacies	Local Name
Paleozoic	Jurassic	xJ3, xJ2, shJ2, xJ1-2		Granite, Granite porphyry, syenite porphry, diorite and granodiorite	
Paleozoic	Late Triassic-Early Jurassic	xT3-J1		Granite, granodiorite(gd)	
Paleozoic	Late Triassic-Early Jurassic	dT3-J1		Gabbro-diorite, diorite(d)	
Paleozoic	Late Permian	xP2, cP2, dP2, mbP2, shP2		Monzonite(en), monzosyenite, syenite and granosyenite(ge), granodiorite(gd), granite	
Paleozoic	Late Permian		lP1, rioP1, xP1,	Gabbro, gabbro-diorite, diorite(d), gabbro-syenite(ne)	
Paleozoic	Middle-Upper Carboniferous	—	cC3, dC3, shC3, xC3	Granite(g), granodiorite, adamellite, tonalite, quartz diorite	
Paleozoic	Middle Devonian	xD2	xD3	Non segment granite, granosyenite(ge)	
Paleozoic	Middle Devonian			Fine grained lucocratic alaskite granite and aplite (3rd phase)	
Paleozoic	Middle Devonian			Medium grained biotite granite, alkaline alaskite granite (2nd phase)	
Paleozoic	Middle Devonian			Biotite-hornblende granite (1st phase)	
Paleozoic	Early Devonian	mrioD1, shD1		Olivine-augite gabbro, gabbro-syenite, syenite-diorite, monzonite, nepheline syenite, terolite, melteigite, ijolite, urtite	
Early Paleozoic		—	cO2, dO2, xO2	Non segment granite, adamellite, granodiorite, diorite	
Paleozoic	Middle Cmbrian	cE2-3, dE2-3, xE2-3, cE2		Gabbro, gabbro-pyroxenite, pyroxenite	
Proterozoic-Paleozoic	Late Riphean-Early Cambrian	cR3, xcR3, xR3	cV	Metagabbro, leucocratic gabbro, gabbro-diabase	
Proterozoic-Paleozoic	Late Riphean-Early Cambrian			Dunite, harzburgite, werlite, serpentinite(1), serpentinite melange(2)	
Proterozoic	Riphean	cR2, xcR2		Granite, leucocratic granite, gneiss-granite	
Proterozoic	Riphean			Gabbro, gabbro-amphibolite, pyroxenite, serpentinite	
Early Proterozoic		xPR1, cPR1		Granite-gneiss, migmatite, granite, granodiorite	

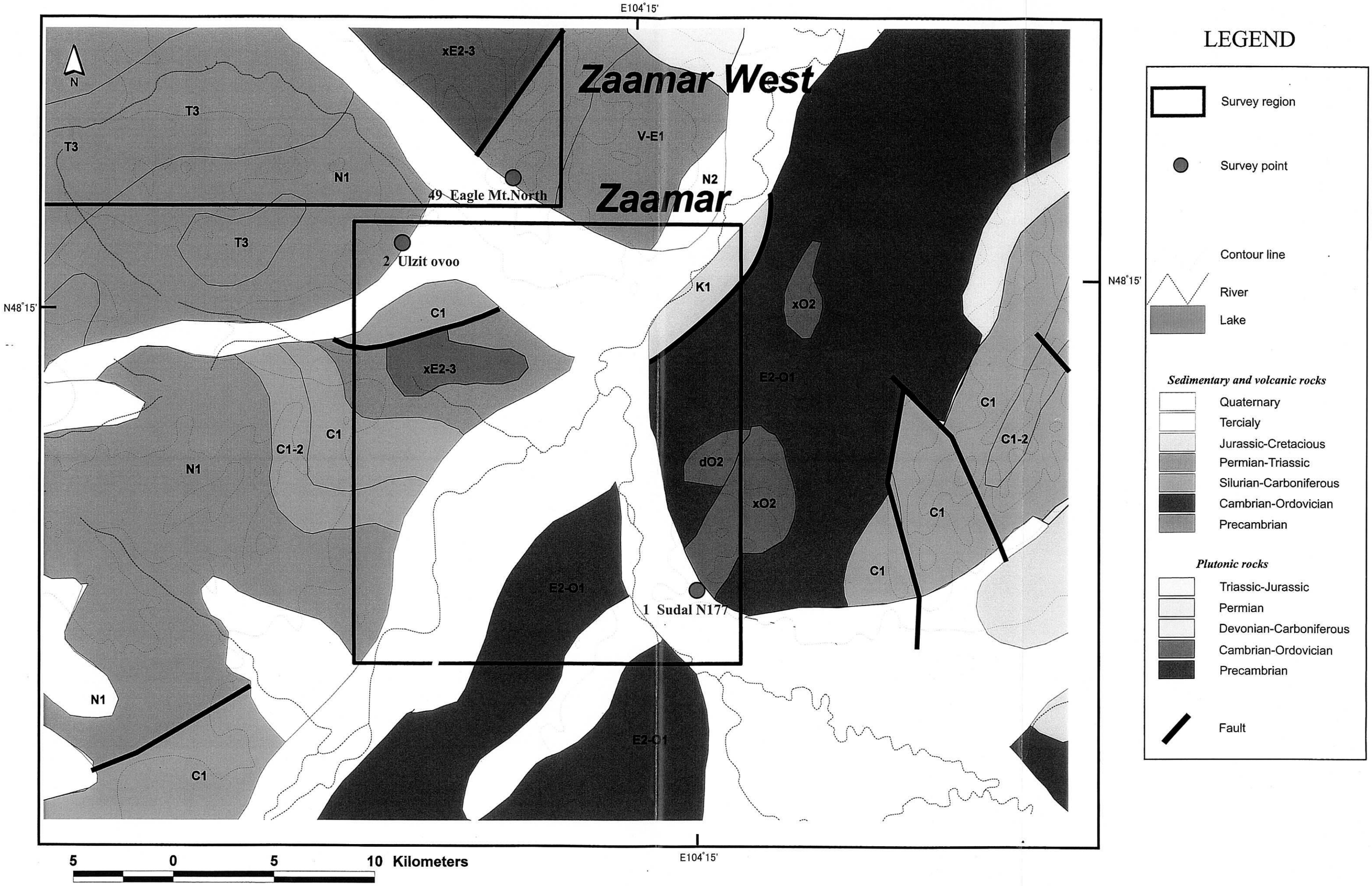


Fig. II-3-2 Geological map of Zaamar region

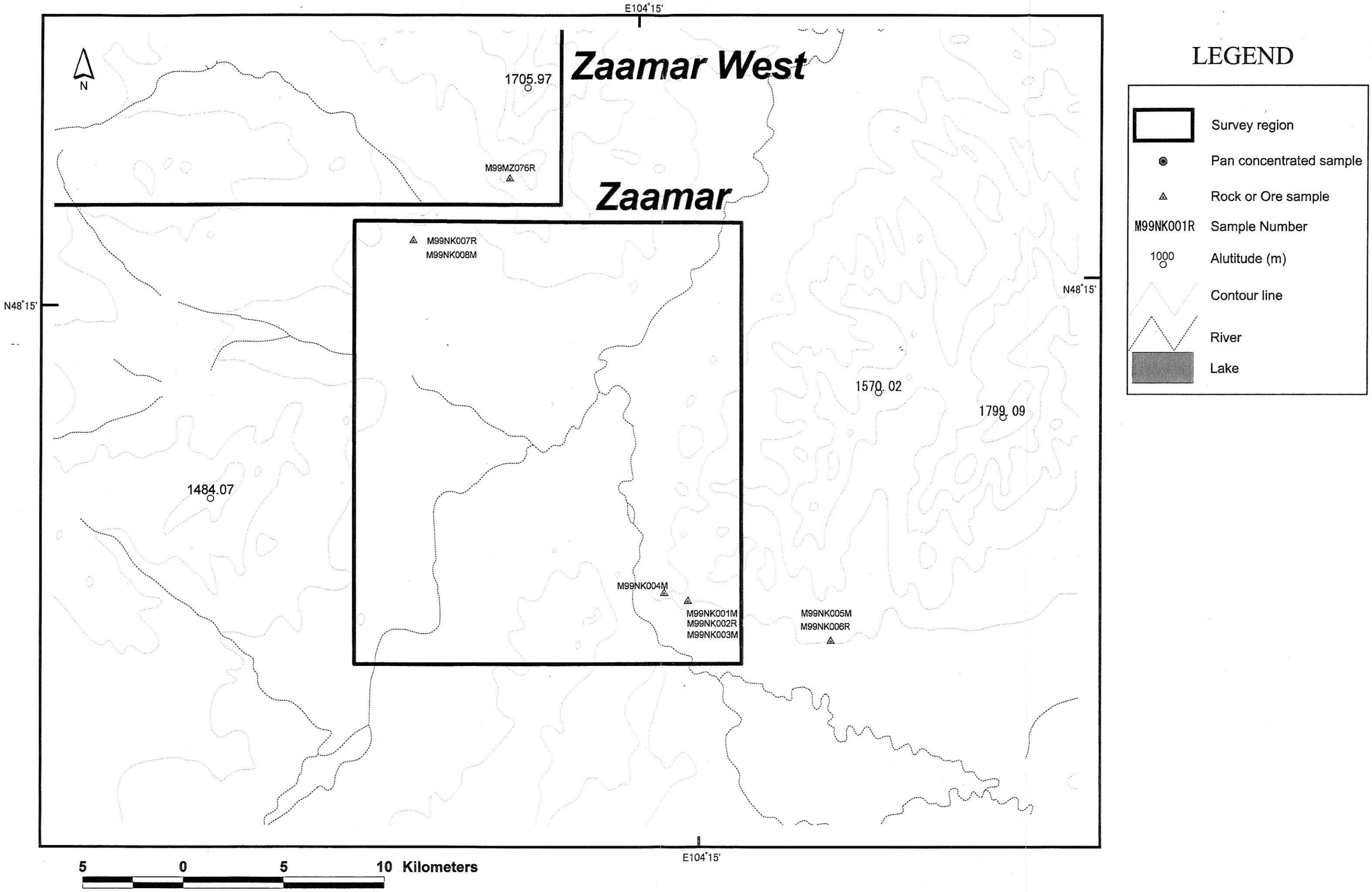


Fig. II-3-3 Sample locations of Zaamar region

is an outcrop zone from the slope to the top of the mountain. There is a gentle alluvial fan at the foot. The mountain is thinly covered with shrubs, and the lowland is a plain.

(c) Infrastructure and access

The main road extending from Ulaanbaatar to Murun and the road, which branches from the main road, running northward along the Tuul River are kept in good condition. It takes about six hours from Ulaanbaatar to the diverging point. There are several placer gold mining camps along the Tuul River, where electricity is also supplied.

(d) Outline of geology and deposit

The Zaamar mountain mass is situated at the northern end of Khangai-Khenty Unit (Sengor et al., 1996) and shows an NNE-SSW system trend. The Tuul River on the west of the mountain mass suggests the existence of a remarkable fault of the NNE-SSW system. The late Cambrian to the early Ordovician Sandstone and shale are distributed in the western half of the mountain mass, and the Permian to the Carboniferous sandstone, shale, and conglomerate are widely distributed on the east. of the Silurian to the Devonian granites. The Zaamar mountain mass is a gold deposit zone, stretching from Boroo on the northeast of Ulaanbaatar, where a lot of auriferous quartz veins are known. Some high grade parts contain as much as 30 g/t Au. A joint venture between Mongolia and Canada is now prospecting for gold in Bonbat, the northern part of the mountain mass. A stretch from the western slope of the mountain mass to Tuul River is an alluvial gold zone that may have derived from the auriferous quartz veins of the mountain mass, where some companies including a joint venture between Mongolia and Russia are now prospecting for gold.

(e) Reason for selection

As stated above, the Zaamar district was selected as a survey district because it is one of the most important gold zones in Mongolia and a lot of auriferous quartz veins are known. This survey aims not only to acquire the features of the mineralization but also to study the future prospecting value.

(2) Results of survey

(a) Sudal N177 (Mineral occurrence No. 1)

[Typical latitude and longitude]

48° 06′ 11.0″ north latitude, 104° 20′ 10.0″ east longitude

[Topography and vegetation]

The relative height of this prospect is approximately 500 m, showing a landform having relatively steep ups and downs. Outcrops are distributed on the top of the mountain and the lowland is covered with shrubs and low grasses.

[Access]

The Sudal N177 is situated along the main road extending from Ulaanbaatar to Murun and the

foot of the mountain is accessible through the plain by car.

[Preceding survey]

Since this prospect is a gold deposit zone, a geological survey on a scale of 1:50,000 was conducted in 1986. In addition, drilling, electric prospecting, magnetic prospecting, and trenching were conducted in 1993. Although the Mongolian internal data records a 1 km long and 5 to 12 meter wide continuous alteration zone containing quartz veins, a lot of the quartz veins are generally several tens of centimeters wide and 200 m long or less.

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

The Sudal N177 prospect shows a gray to grayish white tone on the SAR image. It is high in resistance and full of undulations. It has a well-developed drainage that shows a sub-arborescent distribution.

[Geology and geological structure]

This prospect is situated at the southern end of the Zaamar mountain mass. It consists of an alternation of the late Cambrian to the early Ordovician sandstone and shale (Zaamar formation) and granites which intrude this altered strata.

[Mineral showing and alteration]

Almost all the quartz veins exist in granites and some of them are also recognized in shale. The strike of the quartz veins indicates the trend of the NW-SE, N-S, and NE-SW system. The quartz veins are accompanied by limonite and calcite. The quartz is not chalcedonic. Most of it is slightly whity. The quartz vein discovered in this survey is maximum 2 m width at its widest. According to the data supplied by Mongolia, a value of 14.5 g/t Au was obtained. The edge of the vein shows a weak alteration. Greisenization and pyritization were discovered across several tens of centimeters. Arsenopyrite was also recognized as alteration mineral.

[Laboratory test]

The oxygen isotopic ratio, and the homogenization temperature and salinity of fluid inclusions were measured on two quartz vein samples (M99NK003M and M99NK005M) obtained from this area. The oxygen isotopic ratio of muscovite which exists para-genetically in the quartz vein was also measured on M99NK003M. The measurements are included in the data at the end of this report (Tables A-11 and A-15).

The oxygen isotopic ratio of M99NK003M is +15.1 ‰ to +16.6 ‰ and that of the muscovite which exists para-genetically with it is +11.8 ‰ and +11.9 ‰. From the oxygen isotopic fractionation factor (Kieffer, 1982) between the quartz and the muscovite, which depend on temperature, the temperature at which the quartz and muscovite were kept in equilibrium can be assumed to range from 144 ℃ to 230 ℃. The fluid inclusion homogenization temperature ranges from 136 ℃ to 184 ℃. The oxygen isotopic ratio of the quartz of M99NK005M ranges between +18.6 ‰ and +18.7 ‰ and the fluid inclusion homogenization temperature ranges from 109 ℃ to

151 ℃.

The average value of the homogenization temperature of the fluid inclusion about M99NK003M and M99NK005M are 158.2 ℃ and 127.2 ℃, respectively. The data at the end of this report (Table A-15) shows the oxygen isotope ratio of the water that was kept in equilibrium with the quartz calculated from the oxygen isotope fractionation coefficient (Matsuhisa et al., 1979) between the quartz and the water at these temperatures. The oxygen isotope ratio of the water ranges from +0.4 ‰ to +1.9 ‰. The oxygen isotope ratio of meteoric water has usually a low value and that in Japan, in Korean Peninsula, and in the northeastern part of China ranges between -15 ‰ and -5 ‰ (Mizota and Kusakabe, 1994). Based on the data on the Tsookher mert prospect described later, the oxygen isotope ratio of meteoric water during mineralization is assumed to be approximately -11 ‰ while that of magmatic water ranges from +6 ‰ to +9 ‰ (Taylor, 1974), which indicates a high value. Therefore, the value of +0.4 ‰ to +1.9 ‰ in this area is relatively high and there are two conceivable reasons for this. One reason is that the water involved in the formation of the quartz vein is a mixture of meteoric water and magmatic water and the magmatic water made a significant contribution. The other reason is that although the water involved in the formation of the quartz vein originated from meteoric water, it shifted to a high value because a sufficient isotopic exchange with a rock having a high oxygen isotopic ratio occurred. As far as these two possibilities are concerned, since the generation temperature is low, it is inconceivable that a high-temperature magmatic component is deeply involved. Consequently, it is appropriate to consider the water originating from meteoric water shifted to a high value. However, the above data may not have represented gold mineralization in this area because the gold analysis value of both these samples is below the detection limit.

[Evaluation]

The type of mineralization is considered to be epithermal type because the homogenization temperature of the fluid inclusion and the oxygen isotope composition of the quartz vein temperature are low. However, this may be a mineralization related to plutonic rock because it is not accompanied by argillic alteration but by narrow greisenization, it has often granitic rock as host rock, and no volcanic or hydrothermal activities can be recognized near by. Upon consideration of the possibility of the existence of a promising deposit in combination with the Mongolia's preceding survey results by Mongol side, it is judged that this prospect cannot be a positive future survey target because although some quartz veins have high-grade ores, the grade of the ores is variable and their distribution is also sporadic.

(b) Ulziit ovoo (Mineral occurrence No. 2)

[Typical latitude and longitude]

48° 15′ 50.7″ north latitude, 104° 09′ 57.3″ east longitude

[Topography and vegetation]

The Ulziit ovoo prospect is on the flatlands, where short grasses grow, sandwiched between hills.

[Access]

This prospect is situated 12 km west from a bridge in Zaamar in a straight line. It is necessary to go up north from a midpoint on the road leading to Bureghangay located in the west from Zaamar. The survey point is accessible by car.

[Preceding survey]

A geological survey on a scale of 1:200,000 (Report No. 2575), a geological survey on a scale of 1:50,000 (Report No. 4597), a geophysical prospecting (magnetic prospecting) for the purpose of recognizing the boundary between the granite and the lower sedimentary rocks, and an electric prospecting (IP method) were conducted. A total of two holes were bored (the bottom of the hole is 292 m below the surface of the earth) for the purpose of investigating a magnetic anomaly (11,000 γ) and an IP anomaly (η = 5 %) detected through the geophysical prospecting. A skarn mineralized zone (containing sphalerite, chalcopyrite, and magnetite) was acquired although its scale is unknown. The ore grade of the skarn mineralized zone is as follows: 0.2 g/t Au, 0.07 to 0.5 % Zn, and 0.07 % Cu.

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

When seen at a wide range, this is situated in the trend of the NW-SE system and N-S system, south of the Selenge River. When seen at a close range, although a dark gray to gray response is dominant around this prospect, a bright gray ridge-like response with a strong contrast develops. The local trend indicates the ENE-WSW system and NNW-SSE system, assuming an aspect that the ridge-like response of the NNW-SSE system is cut by the response of the ENE-WSW system. Since the top of the ridge-like response is roundish, it is judged that weathering and erosion have developed well. The SAR image of this prospect is similar to that of the Sudal N177 prospect.

[Geology and geological structure]

The existing geological map shows that the geology of this prospect consists of late Cambrian to middle Ordovician metasedimentary rocks (Originl rocks are the late Proterozoic to early Cambrian age) and the Permian granite.

The interspersion of small outcrops of granite and andesite on gently undulating hills was confirmed by this survey. Granite around the trench has coarse grains and assumes a pink color of potassium feldspar. The fracture system having the strike of N12° W develops. A drilling core abandoned on the surface of the ground is composed of metasedimentary rocks (the source rock is black shale). Sandstone is medium grain, including granules of ϕ5 to 10 mm. And it is distributed at the foot of Mt. Eagle.

[Mineral showing and alteration]

It was reported in the preceding survey that the scale of the mineralized zone is 700 m × 250 m.

Andesite distributed on the surface of the ground assumes a green color due to the alteration of chlorite and epidote. A dissemination of magnetite of very fine grain to fine grain and pyrrhotite was recognized in the drilling core composed of metasedimentary rocks.

[Laboratory test]

According to the assay results, the amount of almost all the trace elements of the andesite (M99NK007R) that observed chlorite and epidote alteration was the same level as that of the crustal abundance. Copper content of the andesite was as low as 0.5 ppm.

According to the analysis results, the black shale (M99NH008M) in which the dissemination of magnetite and pyrrhotite was recognized is high in heavy metal concentration because it observed mineralization: 22 % Fe, 176 ppm Co, 498 ppm Cu, and 1,305 ppm Zn. On the other hand, it is low in 2.3 % Na and 4 ppm Sr.

[Evaluation]

Although skarnized zone at depths was acquired, the past drilling results and assay results of this survey showed that neither copper grade nor zinc grade pays. Since the past drilling was performed at a magnetic anomaly (caused by magnetite) and an IP anomaly (caused by pyrrhotite) although its scale is unknown, it can be thought that the almost center of the mineralized zone was acquired. A deeper mineralized zone may be a future survey target. For this reason, a geophysical survey by means of the most sophisticated technique and method will be required.

3.2.2 Bulgan SW district

(1) Outline of the district

Figure II-3-4 shows the geology of Bulgan SW district, and Figure II-3-5 shows the location of sampling points.

(a) Location

The Bulgan SW district is situated in the southeast of the survey area and is 50 km long from east to west and 25 km wide from north to south around 102° 50′ east longitude and 48° 15′ north latitude. It is located approximately 100 km southwest of Bulgan, the capital of Bulgan province in a straight line. This district has two cities, Mogot and Ulziyt.

(b) Topography and vegetation

As for the topography, the Bulgan SW district consists, on the whole, of rolling hills. This area is 800 to 2,000 m above sea level. Although there is a big difference between these values, the most part of the survey district is 1,500 to 2,000 m above sea level. The Khorhon River approximately 100 m wide, which flows into the Selenge River, is running north through the survey district. The ridge and the rivers indicate, on the whole, the trend of the N-S system. As for the vegetation, the district is covered with low grass and conifers can be rarely seen on the ridge.

(c) Infrastructure and access

The survey district has small towns such as Mogot and Ulziyt, which is provided with electric power but has no facilities such as a hospital. Generally speaking, the infrastructure is poor. The means of transportation is limited to vehicles, horses, and cows. It takes almost a day by car to get to

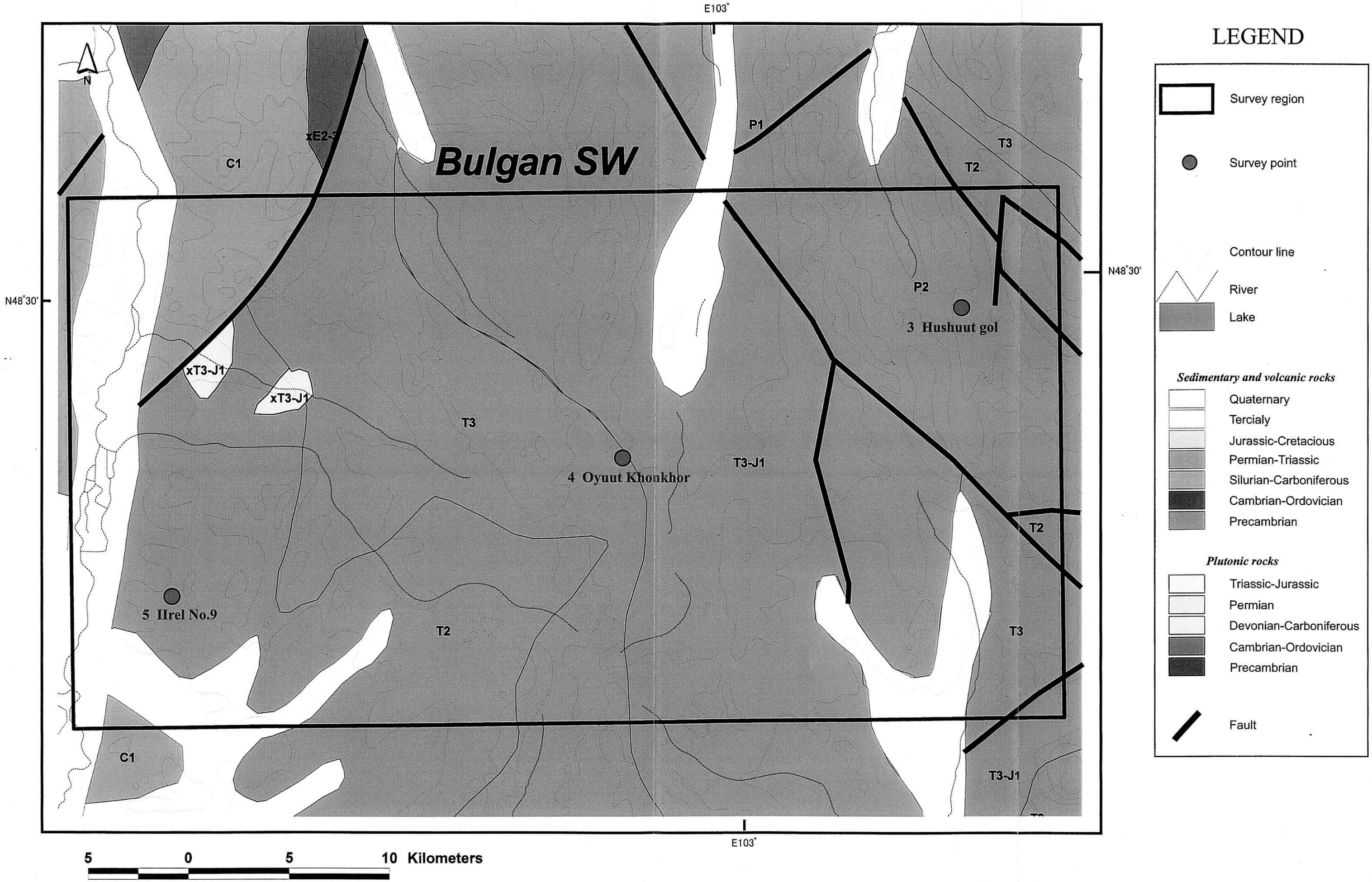
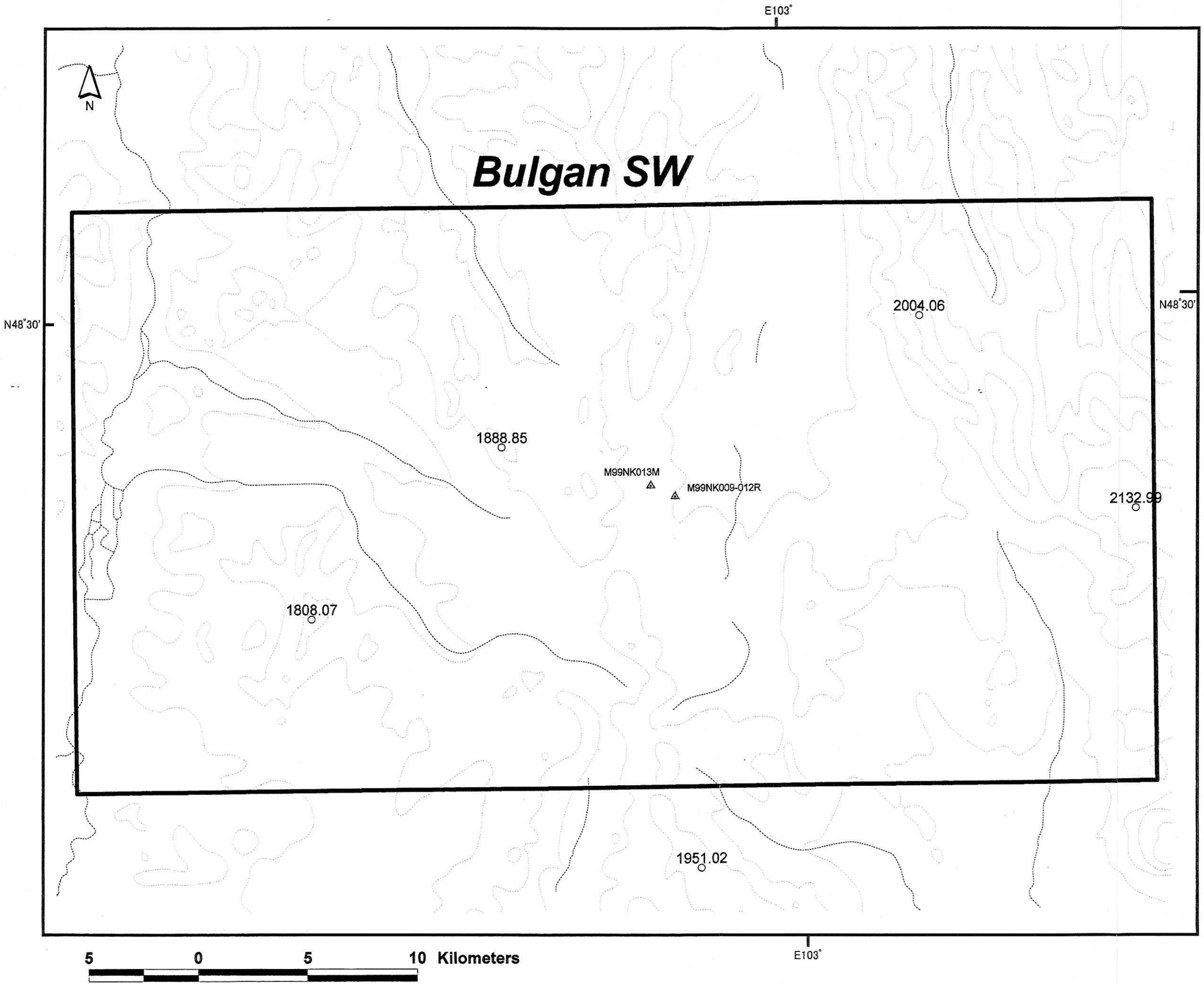


Fig. II-3-4 Geological map of Bulgan SW region



LEGEND

- Survey region
- Pan concentrated sample
- Rock or Ore sample
- M99NK001R — Sample Number
- 1000 — Alutitude (m)
- Contour line
- River
- Lake

Fig. II-3-5 Sample locations of Bulgan SW region

the survey area from Bulgan, the nearest city. The road has not been paved even in the inside of the town. At some distance from the town, an unpaved road runs through the steppe and a part of it is in an extremely bad state of repair. Since a river in the survey district has no bridge, there is no choice but to move to a place where there is a bridge or to find a shallow place and have a tractor or a truck pull to cross the river.

(d) Outline of geology and deposit

Carboniferous sandstone and conglomerate are distributed in the northwest of the survey district. Sandstone and conglomerate of Triassic age and andesite, basalt, trachybasalt, and trachytic tuff of the Triassic system to Jurassic age are distributed over the whole survey area. A fault separates sedimentary rocks of Carboniferous age from sedimentary rocks and volcanic rocks of Triassic to Jurassic ages. In the northwest of the survey district, the intrusion of granites of Triassic to Jurassic ages can be recognized in a narrow range.

(e) Reason for selection

The extension of the valley and ridge indicates, on the whole, the N-S system on the SAR image and the lineaments of the N-S system and the NNW-SSE system are densely distributed to some extent. The existence of a fracture system can be expected. There is a description about a copper prospect around granitic intrusive rock that is considered to belong to Permian to Triassic ages. This prospect was extracted as a survey district.

(2) Survey results

(a) Khuskhuut gol (Minral occurrence No. 3)

[Typical latitude and longitude]

48° 14′ 15.4″ north latitude, 103° 10′ 01.4″ east longitude

[Topography and vegetation]

This prospect has a topography of plain and mountain and the hilly topography is dominant. As for the vegetation, it is in the steppe where only short grass grows.

[Access]

It is possible to get near this site by car through an unpaved road from Khising Ondor or Mogod, the nearest towns.

[Preceding survey]

Geological survey on a scale of 1:100,000 was conducted in 1960 and the existence of a copper mineralization zone of 300 m × 50 m was reported. It is considered that this mineralization was caused by the metasomatism and phenocrystic copper mineralization is recognized in tuff breccia.

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

The Khuskhuut gol prospect has a dark gray tone. It has medium-level undulation and resistance. The drainage system develops on a low to medium level. The swamps are radial but a swamp in the NNE-SSW direction is linear.

[Geology and geological structure]

Andesitic tuff breccia that is considered to belong to the Carboniferous system is distributed, assuming a reddish gray color on the whole.

[Mineral showing and alteration]

Andesitic tuff breccia partially assumes a green color due to epidotization. Quartz veinlets accompanied by epidote were discovered, but no copper mineral showing was recognized.

[Laboratory test]

Sampling for laboratory test was not conducted.

[Evaluation]

The existence of copper mineralization could not be recognized. It is assumed that epidote was mistaken for copper oxide in the preceding survey. It is judged that no continuous survey is required.

(b) Oyuut khonkhor (Mineral occurrence No. 4)

[Typical latitude and longitude]

48° 10′ 24.4″ north latitude, 102° 56′ 10.8″ east longitude

[Topography and vegetation]

This prospect has topography of plain and hill, and the slope is gentle. As for the vegetation, it is in the steppe where only short grass grows.

[Access]

It is possible to get near this site by car through an unpaved road from Mogod, the nearest town.

[Preceding survey]

Chinese mined for turquoise before the revolution of 1921. Geological survey on a scale of 1:200,000 was conducted in 1977. In 1987, geological survey on a scale of 1:50,000, geophysical prospecting (electric and magnetic), trenching, drilling (7 holes, a total depth of 525 m), etc. were conducted. The acquired copper grade was 0.01%. It was judged that no further prospecting was required. However, according to a scientific investigation conducted in 1997, a gold grade of 8.8 g/t was obtained from brecciated rhyolite.

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

The Oyuut khonkhor prospect has a dark gray tone and flat undulations. It has an eroded landform and its resistance is considered to be low. No drainage system is recognized on the image.

[Geology and geological structure]

Figure II-3-6 shows the schematic plan of this prospect.

Andesite of Mogod Formation that belongs to Triassic to Jurassic ages and its alterated rock were distributed. As shown in Figure II-3-6, the site had a gentle dip from west to east. Silicified rock was distributed on the lowlands in the east and fresh dark gray andesite lava was distributed on the highlands in the west.

[Mineral showing and alteration]

A pit of turquoise existed on the lowlands in the east, and white to gray silicified rock was distributed around its neighboring trench. The silicified rock transitioned to weakly silicified rock replaced by opal-like silica toward the highlands in the west, and then changes to fresh andesite through smectite alteration zone. Also, hydrothermal breccia was distributed in the northwestern part. An assay result of gold, 8.8 g/t, was obtained in the past. Around this hydrothermal breccia, the distribution of a new that was recognized in this survey.

[Laboratory test]

As assay results of rock samples (M99NK009R - NK013R), these samples contained 3 - 459 ppm Cu, one sample contained 0.015 g/t Au, and other elements were below the detection limit.

Because kaolin and sericite were detected with the powdery X-ray diffraction on rock samples (M99NK009R - NK011R), acid alteration may overlap neutral alteration.

[Evaluation]

The existence of turquoise led to the discovery of the Erdenet deposit. Turquoise exists in this prospect, too. Silicification on the surface was accompanied by kaolin, indicating a possibility of advanced argillic alteration. Although the existence of a copper deposit is expected under the ground, drilling in the preceding prospecting, at its deepest point, was 110 m deep. It may be necessary to conduct drilling survey at greater depths. Although gold mineralization could not be recognized through this chemical assay, it is desirable that a systematic investigation on the gold mineralization be conducted in parallel with a future prospecting for copper.

(c) Ilerel No. 9 (Mineral occurrence No. 5)

[Typical latitude and longitude]

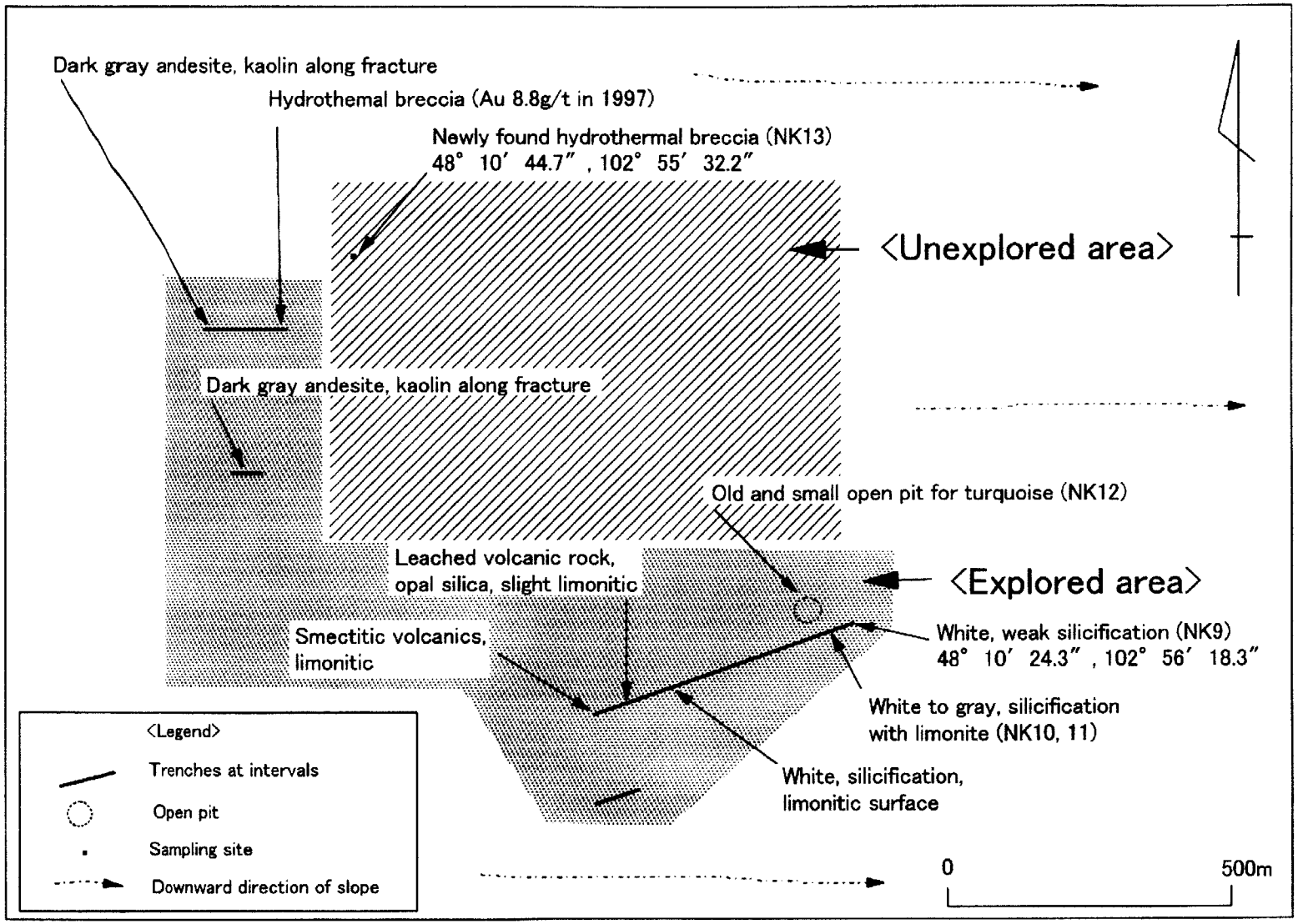
48° 06′ 53.8″ north latitude, 102° 38′ 14.3″ east longitude

[Topography and vegetation]

This prospect has topography of hill and mountain, and the slope is gentle. As for the vegetation, it is in the steppe where only short grass grows.

[Access]

This prospect is situated 125 km west from a bridge in Zaamar in a straight line. It is 33 km



Schematic plan of the Oyuut khonkhor prospect (No.4 mineral occurrence).
Previously 7 holes of average 60m depth were conducted along the trenches for Cu exploration in 1970's.

Fig. II-3-6 Schematic plan of the Oyuut Khonkhor

away from Oyuut Khonkhor prospect. It is accessble from Mogod by car.

[Preceding survey]

In 1988, Geological survey on a scale of 1:200,000 (Report No. 2765) and geophysical prospecting (Report No. 4396) were conducted.

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

When seen at a regional range, Ilrel No. 9 prospect is situated in the zone predominated the lineament of the N-S and NNW-SSE system, south of the Selenge River. When seen at a local range, this prospect is within an area where a dark gray to gray tone response is dominant and its trend is not clear. In the north and east, a bright gray response like a lineament of the NE-SE system stretches like whiskers. If these responses are extrapolated to the specified point, it can be considered that this prospect has a trend of the NE-SW system.

[Geology and geological structure]

This prospect is situated on the North Mongolia Fold Belt. It corresponds to the border between sandstone of middle to late Carboniferous age and granite of late Triassic to early Jurassic ages that intruded the sandstone.

Sandstone having well-developed stratification was distributed.

[Mineral showing and alteration]

The hydrothermal alteration zone was observed along the fissure between sedimentary rocks and granite. The alteration zone was characterized by limonite and cataclasite in 50 - 70 cm wide. Four quartz veins could be recognized. One of them had a strike of N40° E, 70 - 100 m length and 1 - 3 m width. Through preceding survey, assay results of Au (no grade data) and 30 g/t Ag, and existence of siderite, Manganese minerals and pyrite were obtained.

Neither mineral showing nor alteration was recognized in this survey.

[Laboratory test]

No samples were collected.

[Evaluation]

As a result of Ground truth survey, neither mineral showing nor alteration, both of which were recognized through the preceding survey, was confirmed. It is a possibility that the survey team could not reach the very point. Judging from the fact that igneous rocks related with mineralization has not been discovered, this prospect is not worth of next survey.

3.2.3 Uubulan district

(1) Outline of district

Figure II-3-7 shows the geology of Uubulan district, and Figure II-3-8 shows the location of sampling points in the district.

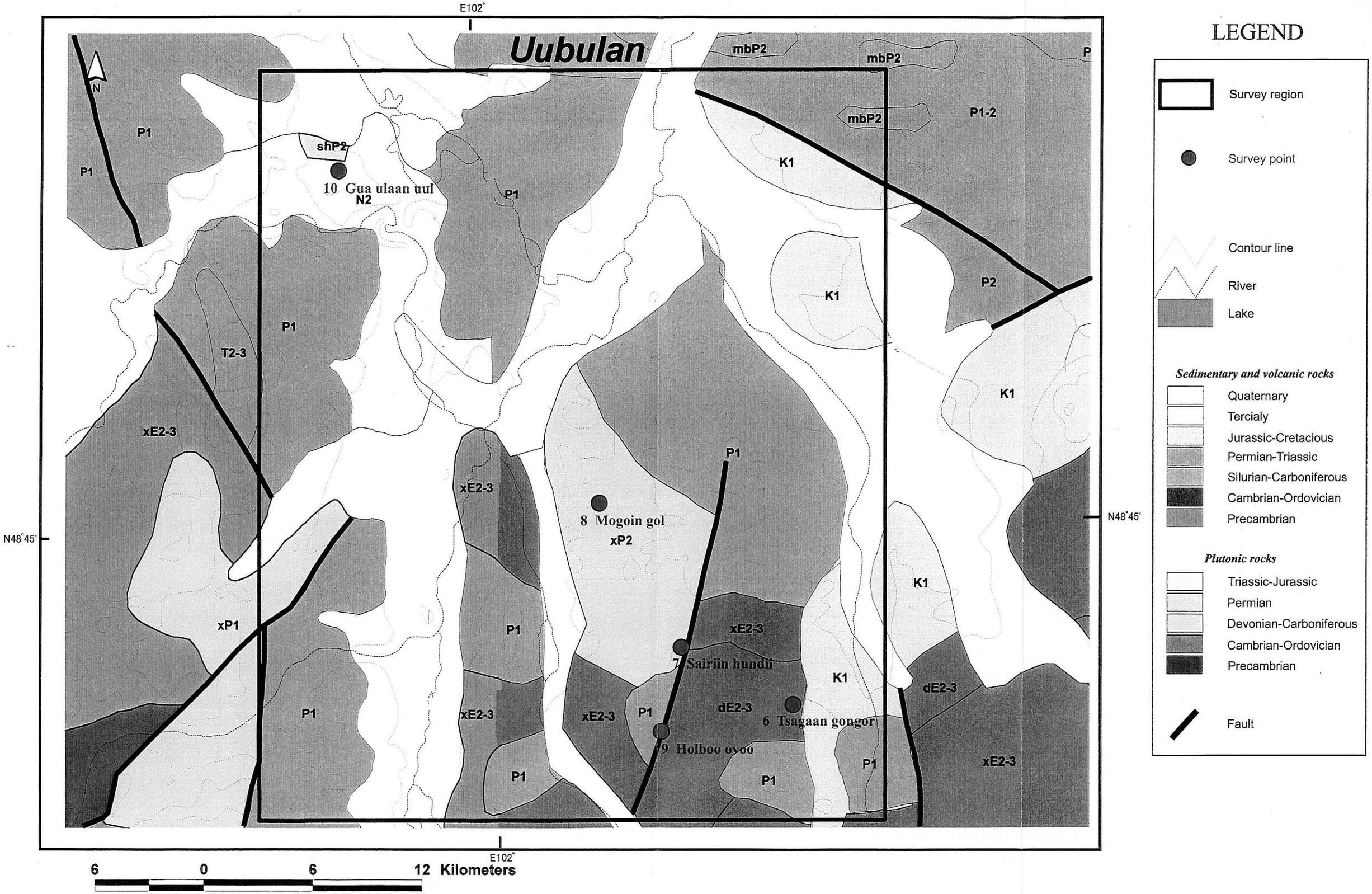


Fig. II-3-7 Geological map of Uubulan region

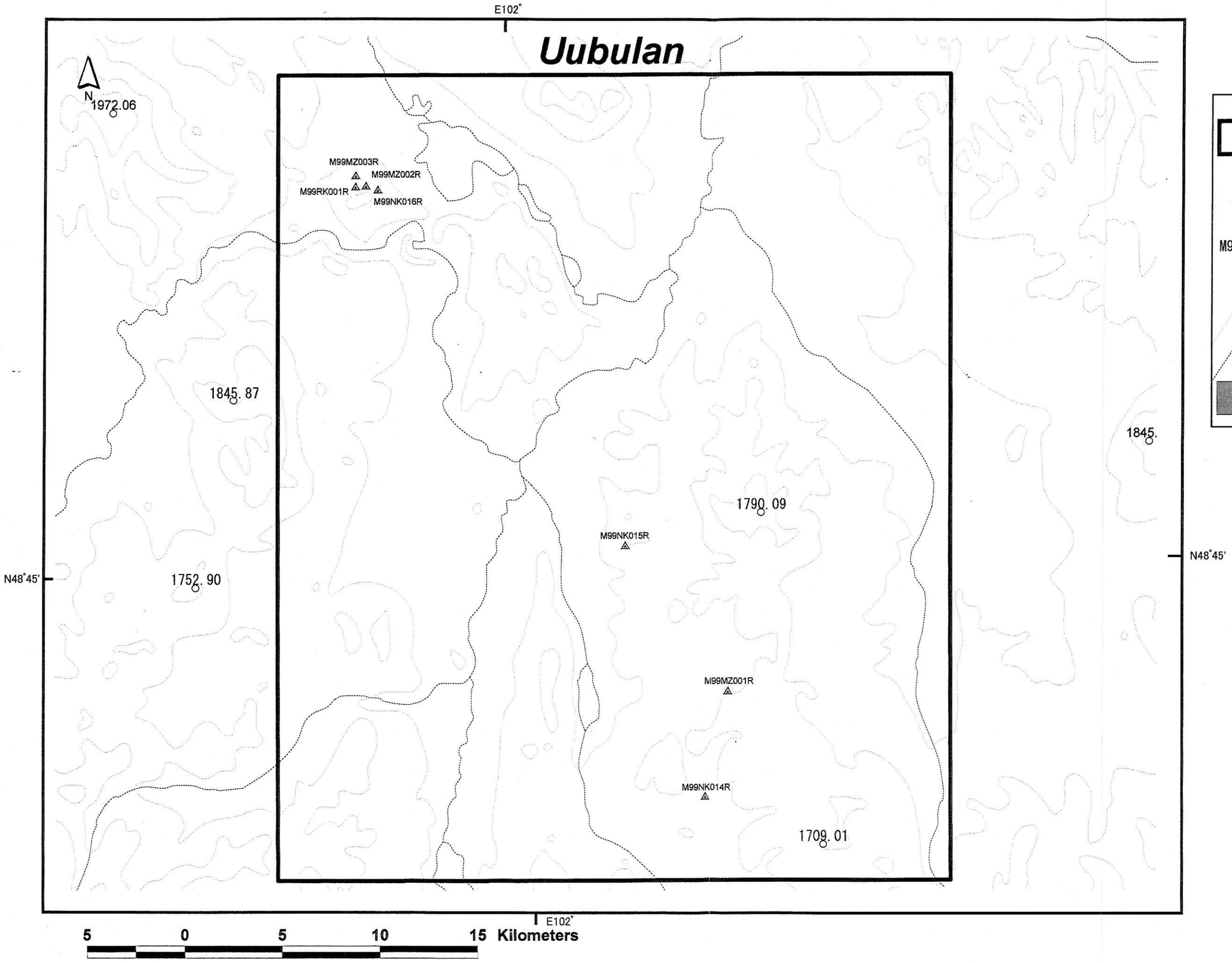


Fig. II-3-8 Sample locations of Uubulan region

(a) Location

This district is situated slightly southeast of the central part of the survey area and is 30 km long from east to west and 50 km wide from north to south around 102° east longitude and 48° 40′ north latitude. It is located approximately 100 km west of Bulgan city in a straight line. There are no cities in this district. The nearest town is Khayrkhan.

(b) Topography and vegetation

As for the topography, the Uubulan district consists, on the whole, of rolling hills. This district is 1,400 to 1,900 meters above sea level. The ridge and valley in the entire area of the survey district indicate the trend of the NNW-SSE system and the extension of the ridge shows little clear regularity. As for the vegetation, low grass grows and conifers are thinly distributed on the ridge.

(c) Infrastructure and access

There are no towns in the district. No infrastructure is provided. It takes almost a day from Bulgan, the nearest city, to the survey district by car. A road that leads to Murun runs in the direction of NW-SE through the survey area. An unpaved road runs through the steppe and a part of it is in an extremely bad state of repair.

(d) Outline of geology and deposit

The SAR image is composed of dark and bright parts. Although no lineaments have been extracted in the survey area, the neighboring lineament indicates the E-W system.

Granitic rocks of Carboniferous age and trachyte, trachytic andesite, andesite, basalt, and basaltic tuff of Permian age are distributed. Monzonite, granodiorite, and granite of Permian age intrude the above rocks. A fault of the NNE-SSE system is recognized around these granitic rocks of Permian age.

(e) Reason for selection

This district was selected as a survey area because granite of Permian age was distributed in the center of the district and there was a description about a copper prospect, which is considered to be a porphyry mineralization, around it. It was reported that the copper mineralization in this district is characterized by a relative high content of gold.

(2) Survey results

(a) Tsagaan gongor (Mineral occurrence No. 6)

[Typical latitude and longitude]

48° 38′ 59.7″ north latitude, 102° 13′ 02.5″ east longitude

[Topography and vegetation]

The Tsagaan gongor prospect consists of rolling hills and main valleys having the trend of the

N-S system are recognized. No clear extending trend of the ridge is recognized. As for the vegetation, only short grass grows.

[Access]

This prospect is approximately 10 km away from Khayrkhan, the nearest town. It is accessible by car by an unpaved road running through the steppe.

[Preceding survey]

This prospect was discovered by an airborne geophysical survey on a scale of 1:50,000 conducted in 1988. The deposit is of a hydrothermal type or metasomatic type. Cu and Ag were the targets for exploration. It was reported that the assay results were 0.01 - 1 % Cu, 0.1 - 50 g/t Ag and 0.001 - 0.2% Pb. In addition, it was obtained that the mineralization zone was considered to stretch 150 - 300 m in the NW-SE trend.

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

This prospect is represented as a dark part on the SAR image. It is low in resistance and shows little development of the drainage system. This prospect is situated on the edge of the lineament of the E-W system having a good continuity.

[Geology and geological structure]

As for geology, granite (Selenge complex) of late Permian to early Triassic ages was widely distributed. One to five meter wide granite porphyry, diorite porphyry and pegmatite intrude the above granite in the trend of the NW-SE system.

[Mineral showing and alteration]

Epidote could be recognized as alteration mineral in the pegmatite dike.

[Laboratory test]

Sampling for laboratory test was not conducted.

[Evaluation]

No further survey is required because alteration suggesting the mineralization was not recognized.

(b) Sairiin hundii (Mineral occurrence No. 7)

[Typical latitude and longitude]

48° 40′ 35.7″ north latitude, 102° 08′ 07.8″ east longitude

[Topography and vegetation]

The Sairiin hundii prospect consists of rolling hills and is 1,500 to 1,700 m above sea level. The development of valleys shows the trend of the N-S system. The extension of the ridge shows no

clear direction. As for the vegetation, only short grass grows.

[Access]

This prospect is approximately 10 km north from Khayrkhan, the nearest town. Although the road through this prospect has not been paved, it is in good condition. This prospect is accessible by car.

[Preceding survey]

An airborne geophysical survey (IP method, magnetic prospecting, resistivity method and radioactive prospecting) on a scale of 1:50,000 and geological survey on a scale of 1:200,000 have been conducted so far. The deposit was considered to be caused by the mineralization of hydrothermal origin and alteration was recognized near the border between extrusive rocks and intrusive rocks. As for mineral showing, there was a description about dissemination of chalcopyrite and sinter-like malachite.

As the assay results, 0.001 - 0.002 % Cu, 0.001 - 0.003 % Pb, and 0.001 - 0.002 % Mo were obtained.

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

This prospect is represented as a dark response on the SAR image. It is low in resistance and shows little development of the drainage system. A lineament of the NNE-SSW system is extracted near the mineral showing.

[Geology and geological structure]

Basic rocks of early Permian age, granitic rocks (Selenge Complex) from late Permian to early Triassic ages, stock (Hostai Formation) of trachyte porphyry, andesite porphyry and dacite porphyry of middle to late Jurassic age, were distributed.

[Mineral showing and alteration]

Strong limonitization could be locally recognized.

[Laboratory test]

Chemical assay of dacite (M99MZ001R) in which silicification and limonitization were recognized showed that Au and Ag were below the detection limit and the contents of Cu, Pb, and Zn were 4 ppm Cu, 26 ppm Pb, and 58 ppm Zn, respectively. Noticeable mineralization could not be confirmed.

[Evaluation]

Neither alteration suggesting mineralization nor mineral showing was recognized. Since the analysis values are also low, it is concluded that no further survey is required.

(c) Mogoin gol (Mineral occurrence No. 8)

[Typical latitude and longitude]

48° 44′ 58.0″ north latitude, 102° 03′ 58.0″ east longitude

[Topography and vegetation]

The Mogoin gol prospect has a landform composed of a plain and hills. It is on the steppe and only short grass grows.

[Access]

This prospect is accessible through an unpaved road by car from Hayrhan, the nearest town.

[Preceding survey]

Geological survey, trenching of an extension of 21 m, drilling at a depth of 45 m, etc. were conducted in 1977. Mineral showing of copper that accompanies diorite was discovered and a copper grade of 0.003 - 0.01 % was obtained.

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

This prospect shows a gray to white tone. It has medium undulations and resistance. The development of the drainage system is medium, indicating a radial distribution.

[Geology and geological structure]

Granite, granodiorite, and tonalite of the Selenge Complex considered to belong to late Permian to early Triassic ages were distributed. A dyke of pinkish granite, andesite and dacite intruded the above rocks. The intrusion had the strike of N50° E. Leucocratic rock composed of quartz and muscovite was locally distributed, too.

[Mineral showing and alteration]

Greenstone, considered to be andesitic intrusive rock, existed in granites in block, which was accompanied by showing of copper oxide and manganese oxide. The greenstone was speckled with copper oxide, which was considered to be autochthonous oxidation. A small scale of hydrothermal alteration was recognized. The scale of this mineral showing is very small.

Granitic rocks were accompanied by a barren quartz vein of a maximum width of 15 cm at N40° E strike and 30° NW dip. No hydrothermal alteration could be recognized on the barren quartz vein.

[Laboratory test]

The assay results of rock sample (M99NK015M) showed that it contained 952 ppm Cu, 0.085 g/t Au, 16.2 g/t Ag, >10,000 ppm Mn.

[Evaluation]

Weak mineralization of copper and gold was recognized. This prospect cannot be included in the future survey because the scale of mineralization is very small.

(d) Holboo ovoo (Mineral occurrence No. 9)

[Typical latitude and longitude]

48° 37′ 57.9″ north latitude, 102° 07′ 13.5″ east longitude

[Topography and vegetation]

The Holboo ovoo prospect is in the steppe composed of rolling hills.

[Access]

This prospect is situated approximately 15 km west-northwest of Hayrhan in Arkhangai Province. It takes about 40 minutes to get this prospect from this town by car.

[Preceding survey]

The airborne magnetic prospecting was conducted in 1988. At the same time, a ground magnetic prospecting, electric prospecting, and geochemical survey were conducted, too. As a result, augite - garnet skarn was recognized near the border between granites and andesite above this. It was recorded that the assay results were 0.03 - 0.05% Cu, 0.05% Zn, 0.005 %Mo, and 0.5 g/t Ag. In addition, the magnetic prospecting discovered a high magnetic anomaly.

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

The prospect shows a from dark to dark gray tone on the SAR image. It is low in resistance and shows little development of the drainage system.

[Geology and geological structure]

In this prospect, andesite, dacite and sedimentary rocks of Permian age were distributed, and granitic rocks of late Permian age intruded the above rocks.

[Mineral showing and alteration]

Only weak skarnization with pyroxene was recognized in the andesite in this survey.

[Laboratory test]

No noticeable anomaly was detected through the chemical assay of the rock sample (M99NK014).

[Evaluation]

Since the exposure of the prospect was bad because it was in the steppe, factors available to make evaluations from the areal prospecting ware limited. In addition, No distribution of carbonate rock has been reported, and only a small-scale skarnization that was formed by the intrusion of granitic rocks existed. Therefore, it can be concluded that this prospect is not worth a future survey.

(e) Gua ulaan uul (Mineral occurrence No. 10)

[Typical latitude and longitude]

48° 54′ 53.4″ north latitude, 101° 53′ 49.0″ east longitude

[Topography and vegetation]

The Gual ulaan uul prospect is in a relatively steep mountainous area. The ridge of this area has the trend of expanding in E-W direction. and the base rock is exposed. Short grass grows and some places are densely covered with shrubs.

[Access]

This prospect in Khuvsgul Province is situated approximately 35 km north of Hayrhan, Arkhangai Province. This is near the road leading to Murun and accessible to the foot of a hill where this prospect was located.

[Preceding survey]

A geological survey on a scale of 1:200,000, geochemical prospecting, geophysical prospecting, trenching (extension of approximately 100 m) and drilling (the number of drill holes was unknown) were conducted in 1973 through 1976. As a result, the alteration zone on an approximately 4,500 m long and 150 - 200 m wide, which was distinguished by quartz and kaolin, was discovered. The chemical assay of samples collected in the alteration zone showed that they contained 0.25 % Cu, 0.05% Mo, 0.01 % Sn, 0.06 % W and 0.1 g/t Ag.

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

This prospect shows a dark gray to gray tone. It has medium resistance. The lineament of the WNW-ESE system indicating the continuity of a ridge is noticeable. The drainage system is not inconspicuous.

[Geology and geological structure]

The prospect consists of Hostai Formation composed of syenitic andesite and dacite of early to middle Triassic age and trachytic pyroclast and syenogranite stock that intruded these rocks.

[Mineral showing and alteration]

A white alteration zone accompanied by silicification was widely distributed on E-W direction.

[Laboratory test]

Powdery X-ray diffraction test of silicified breccia (M99NK016) detected quartz and potassium feldspar. As the result of chemical assay, 0.01 g/t Au was obtained.

[Evaluation]

the white alteration zone was widely distributed on E-W direction. but the original structure of host rock remained in the alteration zone. If hydrothermal activities of low sulfidation type had

occurred, the depths would have already been appeared. Therefore, it can be concluded that a bonanza is not likely to be discovered through future surveys.

3.2.4 Khujirt district

(1) Outline of district

Figure II-3-9 shows the geology of Khujirt district, and Figure II-3-10 shows the location of sampling points in the district.

(a) Location

The Khujirt district is situated almost in the center of the survey area and is 25 km long from east to west and 25 km wide from north to south around 101° 15′ east longitude and 48° 50′ north latitude. It is located approximately 100 km southeast of Murun in a straight line. The survey district has a town called Tsetserleg.

(b) Topography and vegetation

As for the topography, the Khujirt district consists, on the whole, of gentle hills. This district is 1,500 to 2,000 m above sea level. There is a continuous river the NNE-SSW system in the center of the survey district. Swamps and plains stretch around this river. Arborescent mountain streams develop around these swamps and plains. The trend of extension of the ridge does not show much clear regularity. As for the vegetation, short grass grows and conifers occasionally grow thinly on the ridge.

(c) Infrastructure and access

There is a town called Tsetserleg in the survey district. Although Tsetserleg is supplied with electricity, it has no facilities such as a hospital and its general infrastructure is poor. It takes almost a day or a day and a half to go to this survey district from Bulgan by car. It takes a whole day to get there from Murun by car. Nearby roads have not been paved, running through the steppe. Some of them are in bad condition.

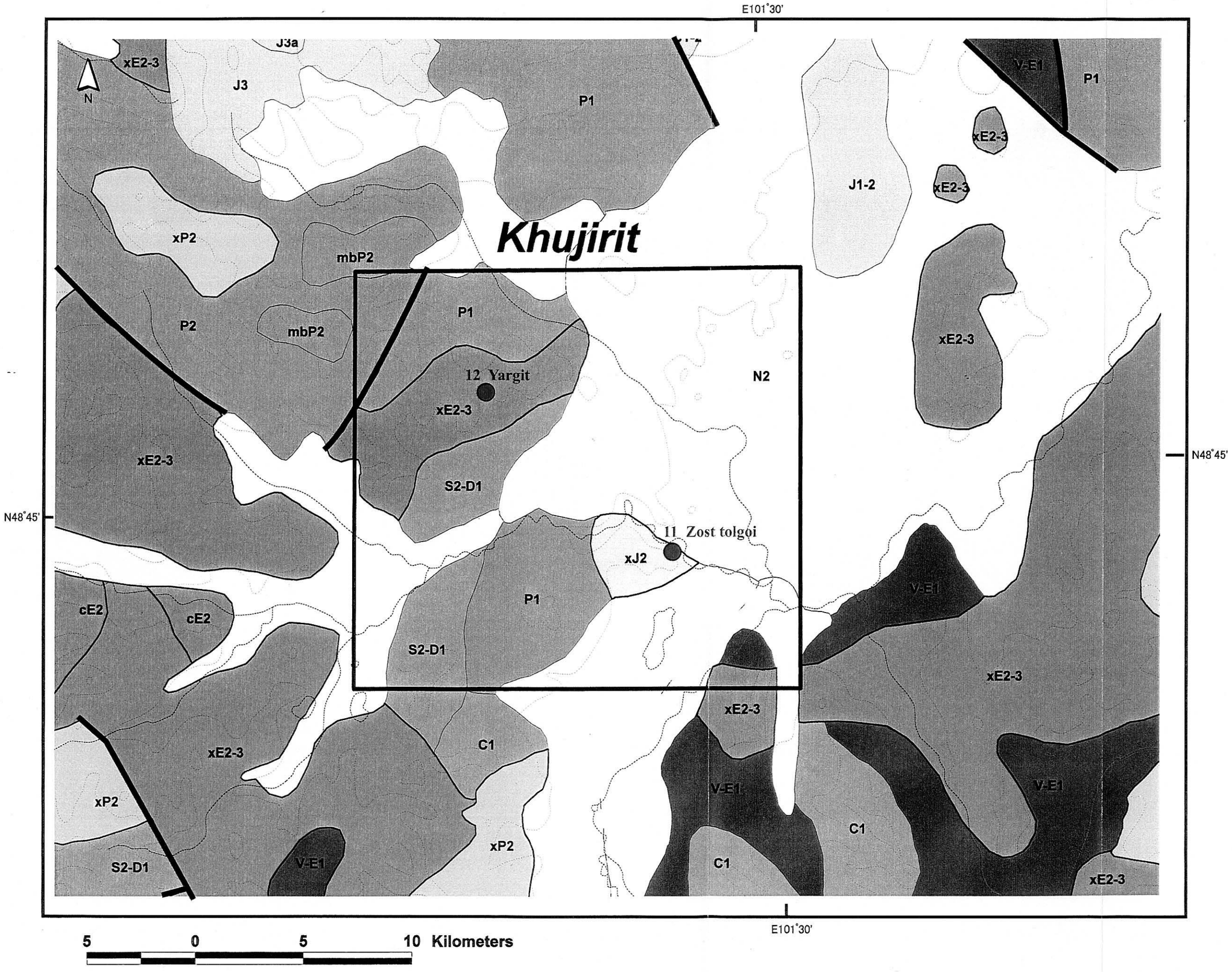
(d) Outline of geology and deposit

This district shows a dark gray tone on the SAR image. Its texture is relatively smooth. This district is low in resistance and in development of the drainage system. The lineament has not been extracted in the survey district.

Granitic rocks of Carboniferous age, andesite, dacite, rhyolite and rhyolitic tuff of Silurian age, and trachyte, andesite and basalt of Triassic age were distributed. Granite, granite porphyry, trachyte and granodiorite of Jurassic age intruded these rocks.

(e) Reason for selection

Since there is a copper prospect in the distribution area of granite of Carboniferous age and granite of Jurassic age, there is a possibility that a porphyry copper deposit may exist. For this reason, this was selected as a survey district.



LEGEND

- Survey region
- Survey point
- Contour line
- River
- Lake

Sedimentary and volcanic rocks

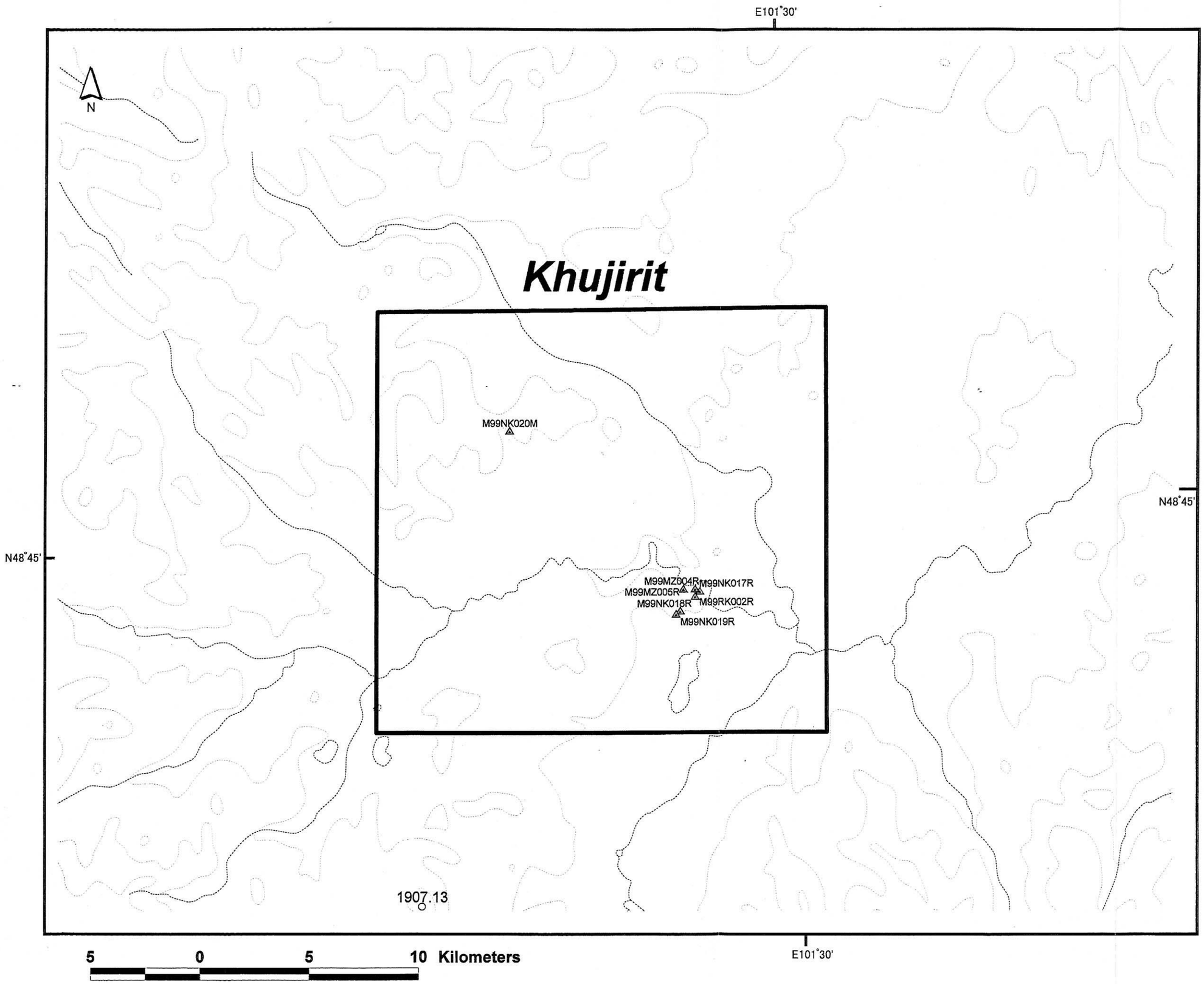
- Quaternary
- Tercialy
- Jurassic-Cretacious
- Permian-Triassic
- Silurian-Carboniferous
- Cambrian-Ordovician
- Precambrian

Plutonic rocks

- Triassic-Jurassic
- Permian
- Devonian-Carboniferous
- Cambrian-Ordovician
- Precambrian

- Fault

Fig. II-3-9 Geological map of Khujirt region



LEGEND

- Survey region
- Pan concentrated sample
- Rock or Ore sample
- M99NK001R — Sample Number
- 1000 — Alutitude (m)
- Contour line
- River
- Lake

Fig. II-3-10 Sample locations of Khujirit region

(2) Survey results

(a) Zost tolgoi (Mineral occurrence No. 11)

[Typical longitude and latitude]

48° 43′ 38.2″ north latitude, 101° 25′ 54.1″ east longitude

[Topography and vegetation]

The Zost tolgoi prospect is on a rolling hill. It has a steppe and a swamp where short grass grows. As for the vegetation, only short grass grows and no trees can be seen.

[Access]

This prospect is situated approximately 30 km south of Tsetserleg, the nearest town. The prospect is easily accessible by car because the landform is flat.

[Preceding survey]

The previous survey was started in 1983, including geophysical survey (airborne magnetic prospecting and resistivity method), geochemical survey, drilling (3 drill holes by vertical drilling, length of 202.8 m and 137.5 m) and trenching (E-W trend).

There is a description that this prospect belongs to the North Mongolia Metalogenic Zone and the mineralization is of hydrothermal metasomatic type. As for the geology, this propsect consists of leucocratic granite and granite porphyry of late Permian to early Jurassic age, and andesite and andesitic tuff of early Permian age. The mineralization is considered to have occurred in late Permian age. There is description about an alteration zone consisting of silicification, muscovitation and propylitization, having 2 - 2.5 km long and 0.8 - 1 km wide.

It is reported that results of chemical assay were 0.007 - 0.03 % Cu, 0.005 % Mo, 0.1 g/t Ag and 0.0001 % Sn.

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

This prospect is represented as a dark tone on the SAR image. It is low in resistance and no lineament has been extracted.

[Geology and geological structure]

Granodiorite, leucocratic granite and andesite was distributed.

[Mineral showing and alteration]

Silicification and sericitization, which was accompanied by dissemination of pyrite, could be recognized.

[Laboratory test]

Chemical assay was conducted on each sample of silicified granite (M99NK017R, NK019R),

argillized andesite (M99NK018R), silicified rock (M99MZ004R), granite (M99MZ005R), and silicified tuff breccia (M99RK002R). The results were <0.005 g/t Au (below detection limits), <0.2 - 1.6 g/t Ag, <1 - 34 ppm Cu, 30 - 780 ppm Pb and 2 - 24 ppm Zn.

[Evaluation]

Although sericitization, accompanied by dissemination of pyrite, was distributed, no proof of hydrothermal activity such as a quartz vein could be recognized. Mineral showing could not be recognized during the field survey. Since gold was not detected through the preceding survey, gold mineralization has not been discovered. There is little likelihood that gold mineralization occurred because the content of gold was below detection limits. Other laboratory tests revealed that there was no promising mineralization because although the content of Pb was slightly high, that of Ag and Cu was low. Therefore, it can be concluded that further survey is not required.

(b) Yargit (Mineral occurrence No. 12)

[Typical longitude and latitude]

48° 47′ 39.1″ north latitude, 101° 18′ 54.5″ east longitude

[Topography and vegetation]

The Yargit prospect is on a rolling hill and 1,556 m to 1,665 m above sea level. It has a steppe and a swamp where short grass grows. As for the vegetation, only short grass grows and no trees can be seen.

[Access]

This prospect is situated approximately 20 km south of Tsetserleg, the nearest town. The prospect is easily accessible by car because the landform is flat.

[Preceding survey]

Trenching was conducted. There was a description that the deposit is of hydrothermal type. The mineralization was considered to have occurred in late Permian age. The deposit is of a stockwork type and is controlled by NE-SW fracture. The dimension of fracture is 200 m long and 40 m wide.

As for geology, leucocratic granite porphyry, granite, granitic trachyte and andesite considered to belong to Cambrian age were distributred. Such alteration as epidotization, silicification, and tourmalinization have been reported. In particular, skarn minerals, potassium feldspar, pyrite, chlorite, tourmaline and silicification were recognized in the trench. Oxide mineral of copper such as malachite, azurite, and bornite was discovered.

As assay results, 0.007 - 0.3 % Cu was obtained.

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

This prospect is represented as a dark part (steppe) and a bright part (ridge) on the SAR image. Its resistance is medium and the development of the drainage system is low. The lineament of the

NW-SE system and E-W system has been extracted in the west of the prospect.

[Geology and geological structure]

Granodiorite and dacite were distributed.

[Mineral showing and alteration]

quartz stockwork occurred in granite. In addition, malachite and azurite were recognized along crack.

[Laboratory test]

Chemical assay was conducted on granite (M99NK020M) that stained by malachite and azurite. The results were <0.005 g/t Au (Below detection limits), 6.2 g/t Ag and 4,360 ppm Cu.

[Evaluation]

Quartz stockwork were distributed and mineral showing of malachite and azurite was recognized along crack. However, the alteration and mineralization were weak and small in scale. Since sulfide mineral could not be recognized, it is concluded that there is little likelihood that a large-scale deposit exists.

3.2.5 Murun South district

(1) Outline of district

Figure II-3-11 shows the geology of Murun South district, and Figure II-3-12 shows the location of sampling points in the district.

(a) Location

The Murun South district is situated almost in the center of the survey area and is 20 km long from east to west and 20 km wide from north to south around 100° east longitude and 49° 30′ north latitude. It is approximately 30 km south of Murun city in a straight line. Tsetserleg is located in this district.

(b) Topography and vegetation

As for the topography, the Murun South district consists of a slightly steep ridge and valley and is 1,700 - 2,400 m above sea level. A river runs through the center of this district in the E-W trend. The ridge and valley lines tend to stretch in the E-W to NW-SE trends. For the vegetation, low grass grows in the valley and lowlands and a thin wood composed of conifers can be seen on the ridge.

(c) Infrastructure and access

There is a village, Tumurbulag near this survey district. In the survey area, Murun, the largest city next to Erdenet and Bulgan is located nearby. A regular flight service by light airplane is operated from Ulaanbaatar to Murun and a hotel for tourists is also available. It takes two or three hours by car from Murun to the survey district. Although unpaved, a road runs through the steppe to

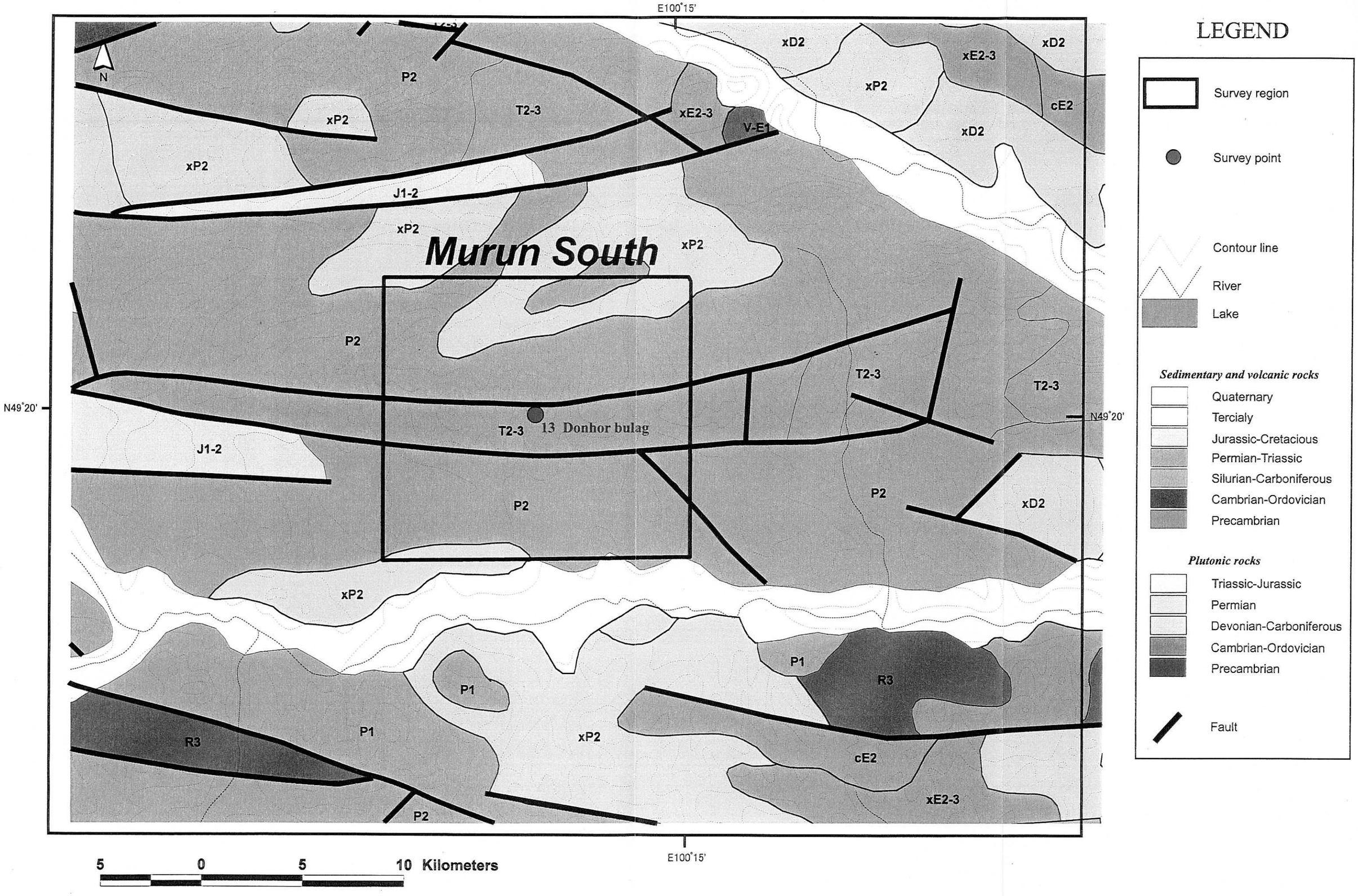


Fig. II-3-11 Geological map of Murun South region

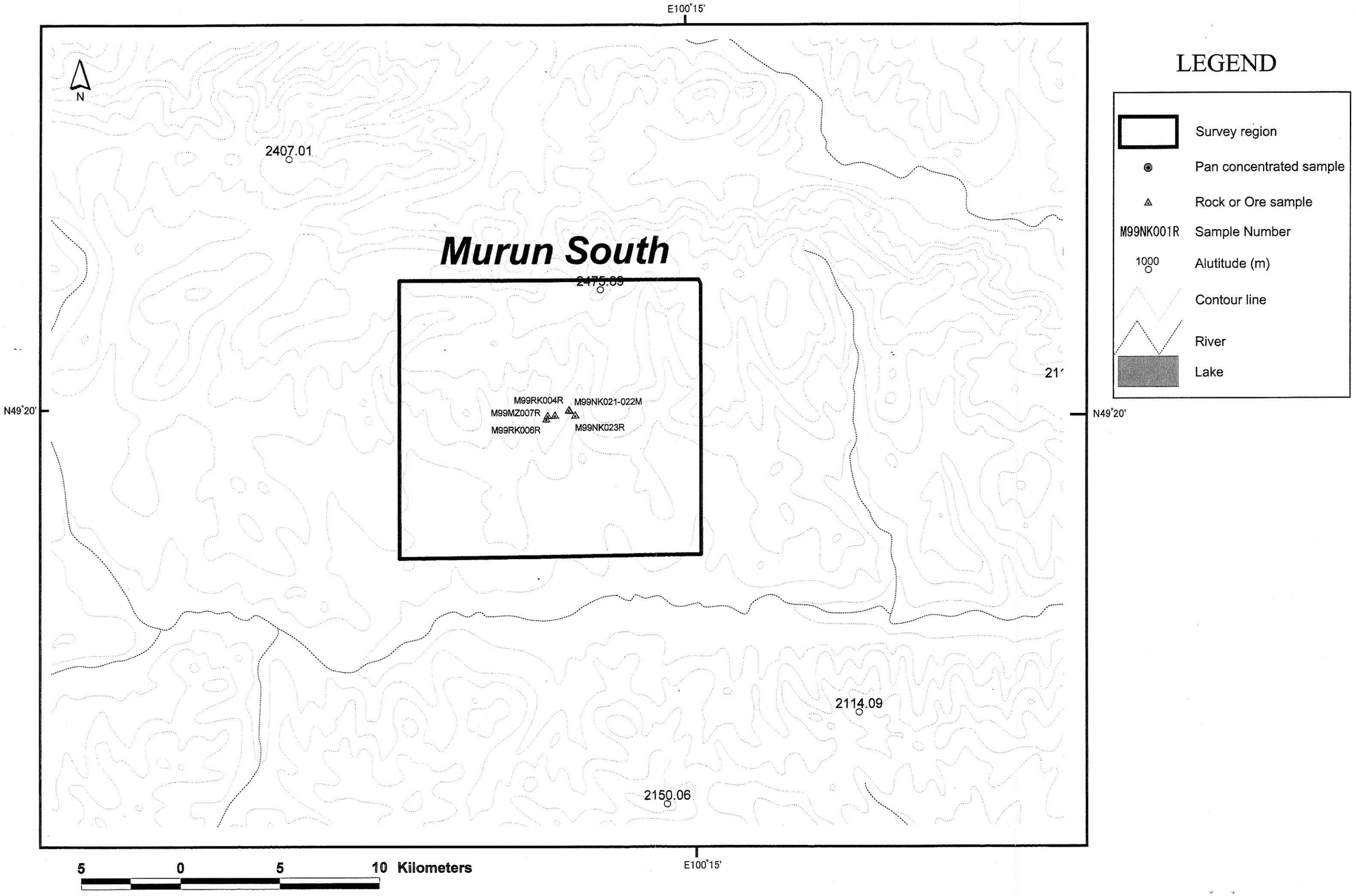


Fig. II-3-12 Sample locations of Murun South region

Murun. The district is easily accessible.

(d) Outline of geology and deposit

This district is represented as a dark part and coarse texture on the SAR image. The lineament of good continuity on the E-W system is dominant. Basalt, trachyte, andesite, dacite, rhyolite, rhyolitic tuff, sandstone and conglomerate of middle Permian age are distributed. Monzonite, trachyte, granodiorite and granite intrude these rocks. Faults with a good continuity of the E-W system can be recognized in the district. These faults correspond to a part of the Hangai Deep Fracture. There was a description about a gold prospect along this fracture.

(e) Reason for selection

As for the geology, granitic intrusive rock of Permian age is distributed. Also, there was a description about a gold prospect controlled by fault with a good continuity of the E-W system. For these reasons, the Murun South district was selected as a survey district.

(2) Survey results

(a) Donkhor bulag (Mineral occurrence No. 13)

[Typical longitude and latitude]

49° 22′ 17.6″ north latitude, 100° 09′ 55.0″ east longitude

[Topography and vegetation]

The Donkhor bulag prospect has relatively steep undulations and the valley line develops. It is on a low mountain where short grass grows and floats are distributed in the debris.

[Access]

The prospect is about 35 km away from Murun and it takes two or three hours by car. It is possible to go near the prospect by car, but it takes about half an hour on foot to get to the prospect because it is at the top of the low mountain with a relative height of about 200 m.

[Preceding survey]

The previous survey had been started in 1975. And geological survey on a scale of 1:200,000, prospect survey, trenching and geochemical survey (channel sampling) were conducted.

This prospect belongs to the North Mongolia Tectonic Zone. As for the geology, the prospect consists of trachytic and acidic tuff of early Permian age. It is reported that sedimentary rocks of Triassic age and those of Permian age are distributed on the south and north of fault.

The distribution of alteration and mineralization zones is strongly controlled by a fault (Iderus Deep Fault) of the E-W system. Also, it is situated in the North Mongolia Metalogenic Belt and its mineralization type is hydrothermal metasomatism.

The alteration zone is controlled by fault and is 1 km long and 300 m wide. Kaolin can be recognized in its center, and sericitization occurres around that. It is considered that hydrothermal