

[Features on SAR image] (SAR image unit: “Bulgan”)

In SAR images, the investigated point is expressed in dark gray color and with smooth texture. Resistivity is low and no drainage system is found developed. In view of gentle slope, existence of argillized zone may be expected.

[Geology and geological structure]

Porphyritic andesite consisting of plagioclase phenocryst was distributed.

[Mineral showing and alteration]

The point was under weak silicification, and quartz veinlets were observed.

[Laboratory test]

Chemical assay was conducted on silicified andesite (M99RK0064R), and the results were <0.005 g/t Au (below the limit of detection), 0.2 g/t Ag, 33 ppm Cu, 10 ppm Pb and 28 ppm Zn.

[Evaluation]

Sectional silicification was observed in andesite. However, since no mineral showing was observed and analysis values were low, successive survey will not be necessary.

3.2.12 Bulgan West district

(1) Outline of the district

Figure II-3-34 shows the geology of Bulgan West district, and Figure II-3-35 shows the location of sampling points in this district.

(a) Location

This district is situated on the north of Sayhan, approximately 60 km west of Bulgan City in Bulgan Province.

(b) Topography and vegetation

This district, which is 1,600 m - 1,800 m above sea level, is hilly with little relative height. Generally, it is on the steppe. Shrubs may grow on the northern slope of the hilly country.

(c) Infrastructure and access

The Bulgan West district is beside the road leading to Sayhan that branches off from the highway running from Ulaanbaatar to Murun by way of Bulgan. It is close to Sayhan. The access from Bulgan is good and it takes about 2 hours to get to the district from Bulgan.

(d) Outline of geology and deposit

The Bulgan West district belongs to the Tuva-Mongol Unit by Sengor et al. (1996). Conglomerate, sandstone, and mudstone, which belong to the Molasse facies of the Jurassic age,

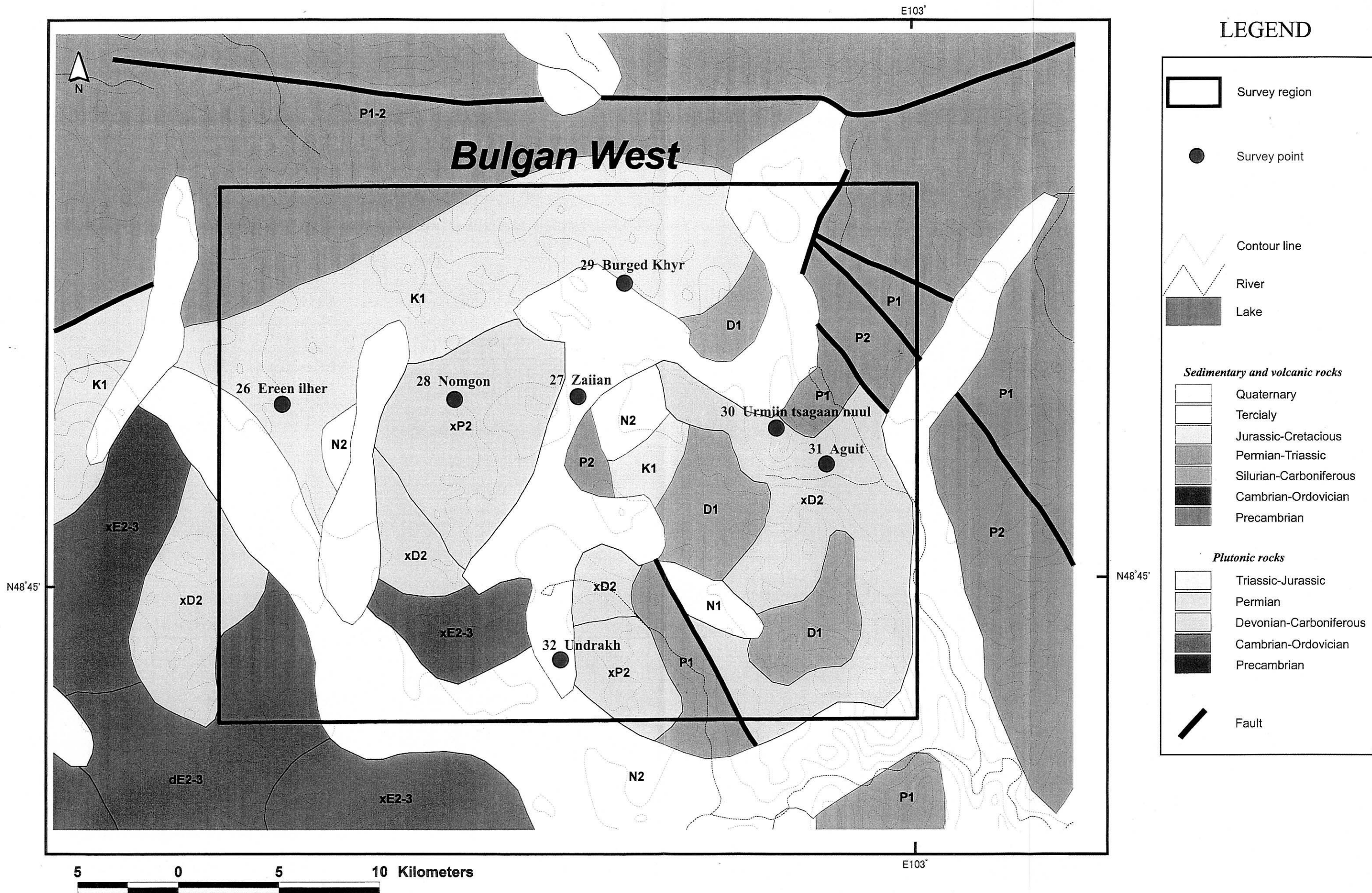


Fig. II-3-34 Geological map of Bulgan West region

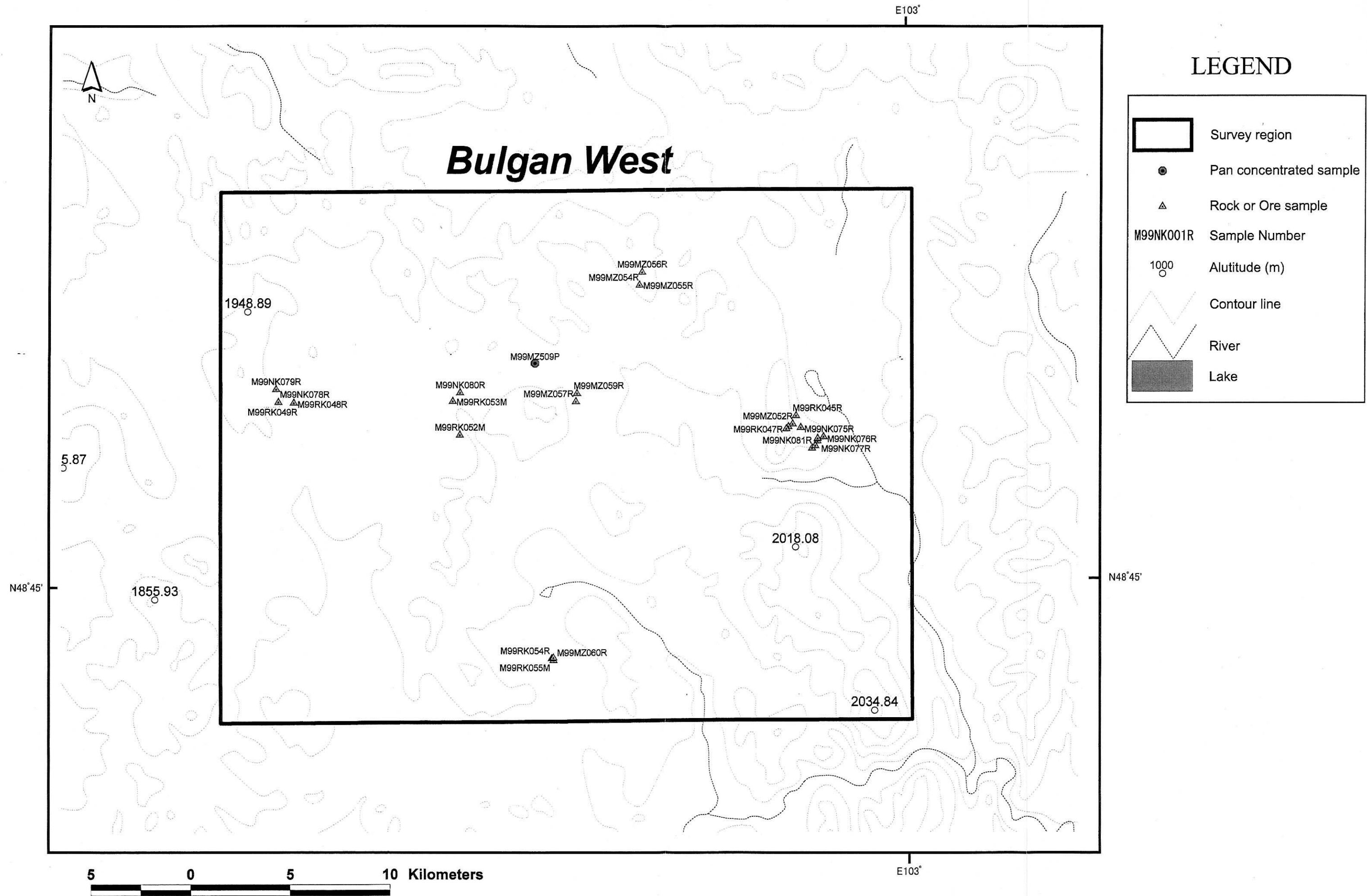


Fig. II-3-35 Sample locations of Bulgan West region

unconformably cover acidic plutonic rocks of the lower part of the Paleozoic, syenitic rhyolite of Permian age, syenitic dacite, comendite, basalt, basaltic pyroclastic rocks, sandstone, etc. In particular, volcanic rocks of Permian age are widely distributed in the northern and eastern parts of this district. Several prospects of copper and gold, which accompany acidic plutonic rocks and volcanic rocks, are known.

(e) Reason for selection

Acidic plutonic rocks of the lower part of the Paleozoic and volcanic rocks are distributed in this district. There are some similarities between the geology of the Erdenet district and that of this district. Several prospects of copper and gold are also known. For these reasons, this district was selected for the purpose of studying the necessity of future exploration as well as grasping the characteristics of these prospects.

(2) Survey results

(a) Ereen ikher (Mineral occurrence No. 26)

[Typical latitude and longitude]

48° 49' 10.5" north latitude, 102° 34' 49.0" east longitude

[Topography and vegetation]

As for the topography, the Ereen ikher prospect consists of a rolling hill. As for the vegetation, the prospect is covered with low grass and conifers are scattered from the ridge to the hillside.

[Access]

This prospect is approximately 80 km away from Bulgan in a straight line and it takes about half a day to get to the prospect by vehicle.

[Preceding survey]

A geological survey on a scale of 1: 5,000 was started in 1987. This prospect belongs to the North Mongolia fault zone. The mineralization is considered to be of metasomatic or metamorphic type. As for geology, it consists of extrusive rocks of Devonian age, diorite of the Selenge Complex (1st stage), and hypabyssal rock that intrudes those rocks. Alteration zone of 200 m wide, which was formed by silicification, contains such alteration minerals as sericite, kaolin and fluorite. The distribution of the alteration is restrained by a fissure. As the analysis content, 0.03 % Mo, 0.007 % Cu, 0.5 g/t Ag, 0.005 % Pb and 0.002 % Zn was reported.

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

The most part of this prospect is represented as a dark part on the SAR image and the surface of the ground is a little smooth. The district is slightly low in resistance and shows little development of the drainage. No lineament has been discovered.

[Geology and geological structure]

Syenite and fine-grained syenitic tuff were distributed. They were intruded by andesitic dike of 1 to 3 m wide.

[Mineral showing and alteration]

Weak silicification and white argillization could be recognized in the tuff. The portion of the argillic alteration was stained with calcite.

[Laboratory test]

As a result of the chemical analysis of the tuff (M99NK079R, RK48R, RK49R, RK50R, and RK51R) in which the silicification was recognized, Au and Ag are below the detection limits and no remarkable anomaly of Cu, Pb, or Zn was discovered. As a result of the microscopic observation of a thin district of the silicified tuff (M99NK078R and NK079R), quartz-sericite was recognized as a secondary mineral. Also, the powdery X-ray diffraction powder test of the tuff in which white alteration was recognized revealed that a combination of alteration minerals is quartz-sericite.

[Evaluation]

Although weak silicification and argillization zone, caused by neutral hydrothermal activity, were recognized, no geochemical anomaly was discovered. Therefore, it is concluded that no further survey is required.

(b) Zaiian (Mineral occurrence No. 27)

[Typical latitude and longitude]

48° 49' 17.5" north latitude, 102° 42' 08.7" east longitude

[Topography and vegetation]

This prospect on the steppe is hilly.

[Access]

This prospect is situated approximately 20 km north-northeast of Sayhan. It takes about 15 minutes to get to the prospect from a point which branches off from the highway running from Bulgan to Sayhan.

[Preceding survey]

Geological mapping on a scale of 1:50,000 was conducted in 1986 and a mineralization zone was discovered at the top of a mountain, where trenching and drilling were performed. The drilling revealed that there was only pyrite at the depths although a copper mineralization was found at a shallow part. Mineralization is found in a small-scale granitic stock and tourmaline, silicification, greisenization, potassium feldsparization and pyritization are recognized. The following analysis results were obtained. Cu were 0.3 - 1.0 %, Ag were 2 - 5 g/t, Pb were 0.001 - 0.03 %, and Zn were 0.01 - 0.05 %.

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

This prospect shows a dark tone. It is low in resistance and has little undulation. Development of the drainage system is low.

[Geology and geological structure]

The prospect consists of granitic rocks near the top of the hill. Andesite and porphyrite of the Permian period and conglomerate of the Jurassic period are distributed at the foot of the hill (according to the Mongolian data).

[Mineral showing and alteration]

Quartz-tourmaline veins developed in the granitic rocks. K-silicate alteration occurred on the border of the veins and the host rocks. A lot of quartz vein boulders, accompanied by malachite, azurite, and turquoise, are scattered at the top of the hill.

[Laboratory test]

The microscopic observation showed that the rock sample (M99NK080R) is biotite quartz monzonite porphyry with very weak alteration. It revealed that the granitic rock (M99RK053M) with dissemination of malachite and azurite contained 0.535 g/t Au, 82.8 g/t Ag and 4.91 % Cu.

[Evaluation]

Although geochemical anomaly of Au, Ag and Cu was detected on the top of the hill. In addition, it already goes to prove that only pyrite has occurred at depths through previous drilling. Therefore, it is concluded that there is no great necessity for further exploration.

(c) Nomgon (Mineral occurrence No. 28)

[Typical latitude and longitude]

48° 48' 59.0" north latitude, 102° 46' 59.7" east longitude

[Topography and vegetation]

The prospect is hilly and is covered with short grass.

[Access]

This prospect is situated 55 km west of the center of Bulgan city, and is accessible through unpaved road by vehicle to the investigated point.

[Preceding survey]

Geological survey on a scale of 1:200,000 (Report No. 2043), Geological survey on a scale of 1:50,000 (Report No. 4403) in 1986 and geophysical survey (Report No. 4396, 4524) were conducted.

[Features on SAR image] (SAR image unit: “Jargalant”)

When seen at a wide range, this prospect is situated in the area of the N-S system trend, south of the Selenge River. When seen at a close range, the prospect is situated in a dark gray - dark response right on the south, among bright gray responses that gradually become thin from the north side to the south side. A relatively bright response of the NW-SE system stretches like a whisker in this dark gray - dark response.

[Geology and geological structure]

The prospect is situated in the North Mongolian Fold Belt. Granodiorite and syenite of late Permian age are distributed. The granitic rocks contained a lot of magnetite, resulting in a high magnetic susceptibility (maximum 76.0×10^{-3} [SI]).

[Mineral showing and alteration]

Potassium feldspar, epidote, sericite and magnetite occurred as alteration mineral. Silicification and limonitization were also recognized. Especially, K-silicate alteration was remarkable.

[Laboratory test]

As whole rock analysis results, magnetite rich granitic rock (M99MZ057R and MZ059R) is characterized by the calc-alkali rock series, and have a relatively close correlation with that Erdenet Complex.

[Evaluation]

Granitic rocks, assumed to belong to the Selenge Complex, were distributed. They were accompanied by a lot of dissemination of fine-grained magnetite and veining of potassium feldspar - magnetite. Some magnetite that replaced mafic mineral of granitic rocks was also recognized. It was assumed that this was caused by the solidification of iron-rich magma in an oxygen-rich environment. It was also assumed that volatile components in this process formed veinlets of potassium feldspar - magnetite. Although no noteworthy mineral showing was recognized on the surface, the alteration accompanied by magnetite is conspicuous. Consequently, an exploration in the neighboring districts and deep areas will be required.

(d) Burged khyr (Mineral occurrence No. 29)

[Typical latitude and longitude]

48° 52′ 04.2″ north latitude, 102° 49′ 41.4″ east longitude

[Topography and vegetation]

This prospect is on a gentle hill. As for the vegetation, only short grass grows.

[Access]

This district is accessible through an unpaved road by vehicle from Bulgan city to Saykhan.

[Preceding survey]

Geological survey on a scale of 1:50,000, Trenching, electric sounding and magnetic prospecting were conducted in 1986. Although no mineral showing has been recognized on the surface, potassic alteration, and kaolin, etc. have occurred, and anomaly has also been found through a geophysical survey. As the results, 2 drill holes at depths of 118 and 200 m were excavated to carry out a survey by drilling and copper showing was discovered under the ground. The drilling showed that this district has 163,000 tons of ore reserves and contains 0.36 % Cu. Although survey activity on this prospect is now dormant, the MRAM Office does not allow devolution of mining rights to a third party.

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

The Burged khyr prospect shows dark gray tone on the SAR image. It is flat and low in resistance. Lineament of the N-S trend can be recognized nearby. Although drainage shows a radial distribution, it develops low.

[Geology and geological structure]

Granitic rocks of the Selenge Complex of Permian to Triassic ages were distributed, and conglomerates of the Saikhan owooglin Formation that was assumed to the Jurassic are distributed. Granitic rocks that underwent neither silicification nor argillization show a lithofacies rich in pinkish potassium feldspar.

[Mineral showing and alteration]

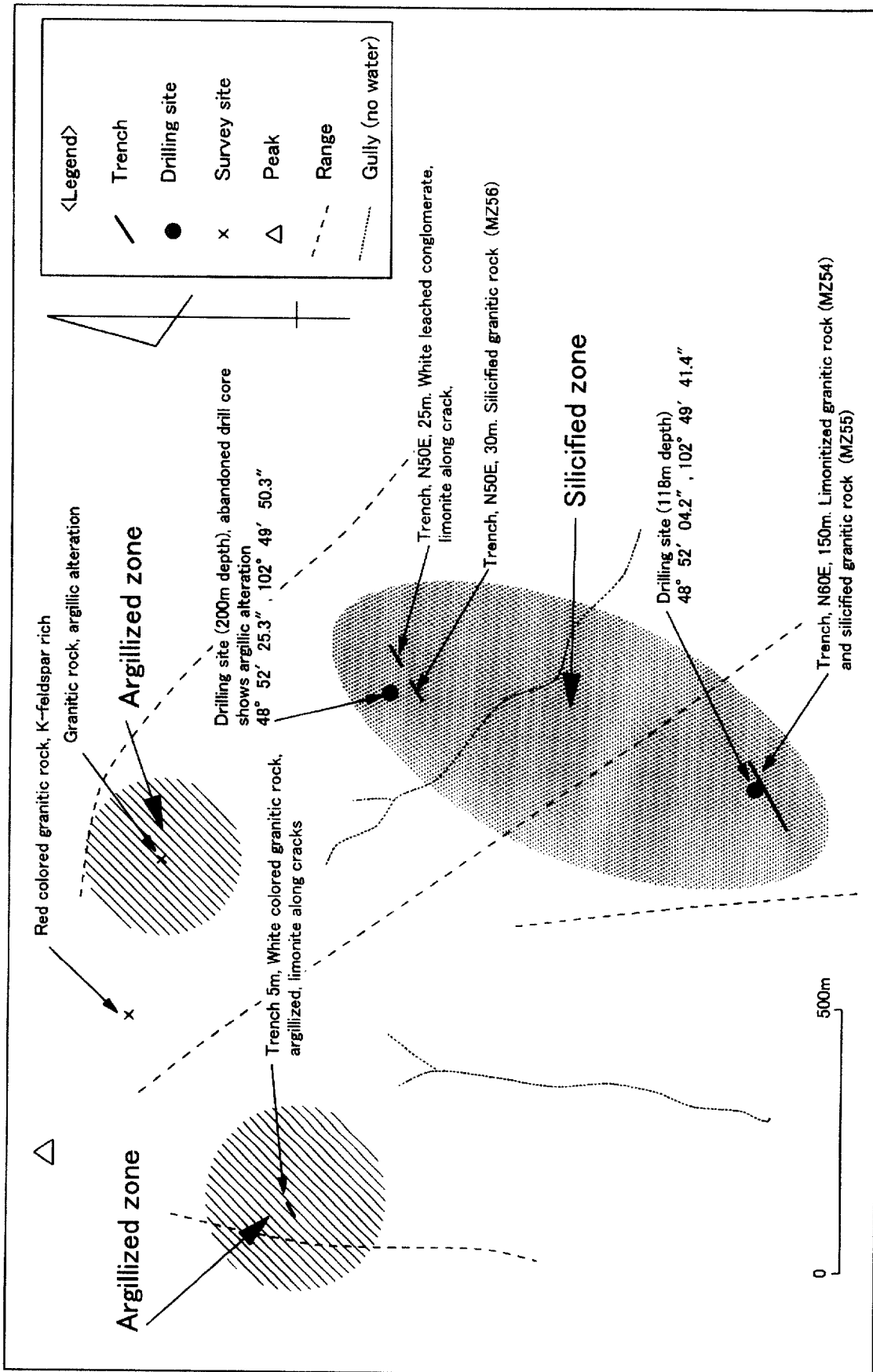
Figure II-3-36 shows the schematic map of the investigated area. Silicification was recognized in a range including three trenching sites and drilling sites. Most of the silicified rock was granitic rock by origin, and at the eastern margin of investigated area silicified conglomerate was identified. For this reason, it is assumed that a hydrothermal activity occurred in post Selenge Complex or two or more hydrothermal activities occurred. An argillization zone is distributed in the northern part of this prospect while an argillization zone accompanied by limonite was recognizable on a trenching site in the northwestern part of this prospect.

[Laboratory test]

The powdery X-ray diffraction test on silicified rock sample (M99MZ055R) detected sericite. Chemical assay of M99MZ054 - MZ056 sampled on the trenching site revealed that it contained 5 - 40 ppm Cu, which was a low value. However, from the petrochemical features analogized with granitic rocks of Erdenet NW deposits. therefore, the granitic rocks of this prospect may have mineralizing potential.

[Evaluation]

Although the existence of mineral showing has been recognized under the ground through the preceding drilling, no mineral showing was observed on the surface. This fact is construed to be caused by acid leaching. Because of only two drill holes, an overall evaluation has not been made on the alteration zone. In addition, these drill holes are not deep enough.



Schematic plan of the Burged khyar prospect (No. 29 mineral occurrence). There is no Cu mineralization on surface, but 163,000t of Cu 0.36% was calculated by drilling results of two holes. Further drilling survey is necessary to unveil the whole aspect of mineralization.

Fig. II-3-36 Schematic plan of the Burged khyar

It is necessary to perform a detailed mapping of the alteration zone on the surface, supplement a geophysical survey, and conduct a comprehensive survey of this prospect by drilling based on these results.

A sufficient follow-up survey such as an exploration by drilling has been conducted neither on the Burged khyr prospect discovered through geological survey in 1980's nor on the Undrakh prospect. This is because the start of operation of the Erdenet mine in 1978 made the Mongolian government shift its activity from exploration to geological survey. Consequently, it is critically important to carry out a survey of this prospect as well as the Undrakh prospect by drilling with the cooperation of the Japanese government for the purpose of completing the Mongolian government's geological survey.

(e) Urmiin tsgaan nuur (Mineral occurrence No. 30)

[Typical latitude and longitude]

48° 48' 11.2" north latitude, 102° 55' 51.7" east longitude

[Topography and vegetation]

A hill where thin groves are distributed.

[Access]

This prospect is approximately 50 km away from Bulgan in a straight line and it takes about half a day to get to the prospect by vehicle.

[Preceding survey]

Trenching was included in the preceding survey. Volcanic rocks of the alkali rock series of Khostai Series, trachytic porphyry, and syenite, dacite to rhyolitic volcanic rocks are distributed. Granite of the late Paleozoic to Jurassic age intruded them. The mineralization is considered to have occurred in the Jurassic period. The mineralization is deemed to be of hydrothermal type. A quartz vein, which is 11 m long and 0.3 - 0.4 m wide, is distributed. It has a white alteration, which is 5 km long and 2 km wide. Not only the quartz vein but also silicified rock contains gold. As for copper mineral, malachite and azurite in the form of sinter have been reported.

The target mineral types for the survey are Au, Ag, and Cu, and their grades obtained were 0.1 g/t Au, 2.3 - 6.6 g/t Ag and 0.008 - 0.01 % Cu.

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

This prospect is represented as dark part on the SAR image. It is low in resistance and in the development of the drainage. No lineament has been discovered on the prospect. The prospect corresponds to an extension of the lineament of the NNW-SSE system.

[Geology and geological structure]

Tuff and tuff breccia, which was assumed to belong to Triassic age, were distributed. They were locally welded. Syenite and aplite dike intruded in the direction of N20° E on the ridge.

[Mineral showing and alteration]

Silicification was recognized in syenitic tuff.

[Laboratory test]

Chemical assay was conducted on each sample of silicified syenitic tuff breccia and syenite (M99MZ052R, MZ053R, RK045R and RK046R) and the Assay results were <0.005 g/t Au and <0.2 g/t Ag (below the detection limits), Max 36 ppm Cu.

[Evaluation]

Although the existence of a silicification zone was confirmed in this prospect, no conspicuous geochemical anomaly was recognized. In the preceding survey, the analysis values were low. In addition, it was reported that the scale of the alteration zone was large, but no noteworthy alteration or mineral showing except the silicification was recognized. Consequently, it is concluded that no further survey is necessary.

(f) Aguit (Mineral occurrence No. 31)

[Typical latitude and longitude]

48° 47' 00.0" north latitude, 102° 57' 00.0" east longitude

[Topography and vegetation]

Hill to steep cliff is distributed in this prospect. The hill is on the steppe. The northern slope of the steep cliff is thickly wooded.

[Access]

The Aguit prospect is approximately 30 km west-southwest of Bulgan City. The prospect is near the road running from Bulgan to Saykhan. It takes about two hours to get there from Bulgan City by car.

[Preceding survey]

A copper prospect was discovered in 1973, and a geological survey on a scale of 1:50,000 was conducted in 1986. In addition, a geophysical survey (MT method) was carried out and 650 geochemical samples were analyzed. Alteration zone of 1,000 m long and 1 - 15 m wide was recognized. In this zone, a 10 m × 50 m dissemination zone of pyrite, malachite, and azurite also existed. The assay results were 0.001 - 0.005 % Cu, 0.0005 - 0.001 % Mo and 0.1 g/t Au.

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

The Aguit prospect is represented as a bright gray to dark gray. A knife-edge ridge is formed. The prospect shows a relatively strong resistance. The drainage remarkably develops.

[Geology and geological structure]

The prospect consists of neutral to acidic volcanic rocks of lower - middle Devonian age and the Selenge Complex of upper Permian - lower Triassic ages. Silicified rock forms a steep cliff for several hundreds of meters. The hill consists of trachyandesite.

[Mineral showing and alteration]

Some strongly silicified rhyolite had a conspicuous breccia structure. Silicified rock was often accompanied by limonite. In particular, limonitization was conspicuous in No. 2 trench, but no sulfide mineral was discovered.

[Laboratory test]

Rock sample (M99KN075R) is silicified rock having a conspicuous brecciated structure. The microscopic observation revealed a replacement by secondary quartz. The gold grade of this sample was below the detection limits.

[Evaluation]

Although a relatively large-scale silicified rock mass existed, other positive evidence that suggested the existence of a gold mineralization was nowhere to be found. It was assumed that copper mineral accompanied the activities of granite. For this reason, it is concluded that there is no great necessity for a future survey.

(g) Undrakh (Mineral occurrence No. 32)

[Typical latitude and longitude]

48° 42' 03.8" north latitude, 102° 45' 44.4" east longitude

[Topography and vegetation]

Plain where short grass grows thickly is distributed in this prospect.

[Access]

The Undrakh prospect is approximately 70 km away from Bulgan and it takes about half a day to get to the prospect. The prospect is directly accessible by vehicle.

[Preceding survey]

Geological survey on a scale of 1:50,000, trenching, geophysical exploration (magnetic prospecting and electric sounding by IP method), and drilling for the purpose of measuring the thickness of sedimentary rocks, 5 holes, conducted on a line, 1.5 m - 28 m depths, were carried out in 1987.

This prospect belongs to the North Mongolia Fault Zone. It is composed of diorite of the early Paleozoic and hypabyssal rock of late Permian to early Jurassic ages that is correlated with the Selenge Complex. The surface is covered with red clay. The mineralization is of a hydrothermal metasomatic type. An alteration zone is 300 m × 150 m. It is reported that alteration minerals

such as potassium feldspar and tourmaline occurred, and ore minerals such as malachite, chalcocite, bornite, azurite, and turquoise be found.

Assay results from point samples were 0.5 - 0.7 % Cu, 0.0003 - 0.07 % Mo, 5 - 10 g/t Ag and 0.0015 % Pb.

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

This prospect is represented as a dark part on the SAR image. The surface is slightly smooth. The prospect is low in resistance and the drainage shows little development. No lineament has been discovered.

[Geology and geological structure]

Fine to medium-grained Granite and leucocratic aplitic granite, which were covered with the Quaternary sediment, were distributed. Three trenches were recognized.

[Mineral showing and alteration]

A lithofacies rich in potassium feldspar and biotite was recognized and these rocks underwent a potassic alteration. The lithofacies rich in potassium feldspar was accompanied by quartz veins. Chalcopyrite was recognized in the quartz veins and there were vugs generated by the elution of sulfide.

The trenches were stained with malachite along a crack of granite. Generally, limonite was recognized. A recognizable alteration zone was 250 m × 100 m. The exact size of the alteration zone cannot be determined because it was covered with the Quaternary sediment.

[Laboratory test]

Chemical assay was conducted on each sample of the quartz veins (M99MZ060R, RK054R) and the granite (M99RK055M, RK057R). Assay results of quartz veins were 0.215 g/t Au, 33.8 g/t Ag and 0.183 % Cu, and those of granites were 0.005 g/t Au, 1.4 g/t Ag and 0.0886 % Cu. The observation of a polished section of the granite (M99RK056R, RK057M) showed that chlorite and sericite were generated as secondary mineral.

[Evaluation]

A porphyry type mineralization ranged over this prospect. A copper grade of 0.183 % was recognized in the trench. Since traces of the elution of sulfide were discovered on the surface, secondary enrichment of copper is expected. Since this survey revealed a mineralized zone only in a narrow range, this deposit may be small in size. It is advisable to grasp the underground condition because the surface is covered with the Quaternary sediment and the stretch of the mineralized zone in the horizontal and vertical directions has not been confirmed yet.

3.2.13 Zaamar West district

(1) Outline of the district

Figure II-3-37 shows the geology of Zaamar West district, and Figure II-3-38 shows the location

of sampling points in this district.

(a) Location

The Zaamar West district is situated in the southeastern part of the survey area, and is 30 km long from east to west and 20 km wide from north to south around 104° east longitude and 48° 30' north latitude. There are no towns in this survey district. The survey district is about 50 km away from Zaamar, the nearest town.

(b) Topography and vegetation

As for the topography, the southwestern part of the district is on a gentle hill and the northeastern part is on a relatively steep low mountain. This district is 1,400 to 1,700 m above sea level. No drainage develops in the survey district. Neither the ridge nor the valley shows any clear directivity. As for the vegetation, the district is covered with low grass and few trees are distributed.

(c) Infrastructure and access

This survey district has no infrastructure because there is no town.

A main road runs from Ulaanbaatar to Bulgan and Murun by way of Zaamar through the district in the NW-SE direction. Although unpaved, this is a main road. That does not have any big rivers and is in good condition. The district is about 50 km away from Zaamar and about 60 km from Bulgan. It takes half a day to get to the survey district from these cities by car.

(d) Outline of geology and deposit

Andesite, basalt, trachyte and trachytic tuff of Triassic to Jurassic ages are distributed from the western part to the southwestern part of this district. Granitic rocks that assumed to belong to middle Cambrian age were distributed from the northeastern part to the eastern part of the investigated district. Both of these rocks come in contact with each other at a fault of the NW-SE system. Moreover, the Riphean limestone was distributed in the southeastern part of the survey district.

(e) Reasons for selection

This district looks dark gray on the SAR image and its surface is relatively smooth. Lineament of the NW-SE system has been discovered. Circular topography suggesting the existence of intrusive rock was recognized. Information was also obtained from a geologist living in Erdenet city that a prospect exists in the southeastern part of this survey district. From these reasons, this district was selected for survey.

(2) Survey results

(a) Eagle Mt. North (Mineral occurrence No. 49)

[Typical latitude and longitude]

48° 17' 46.6" north latitude, 104° 13' 54.1" east longitude

LEGEND

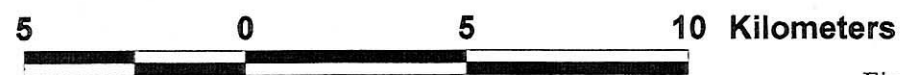
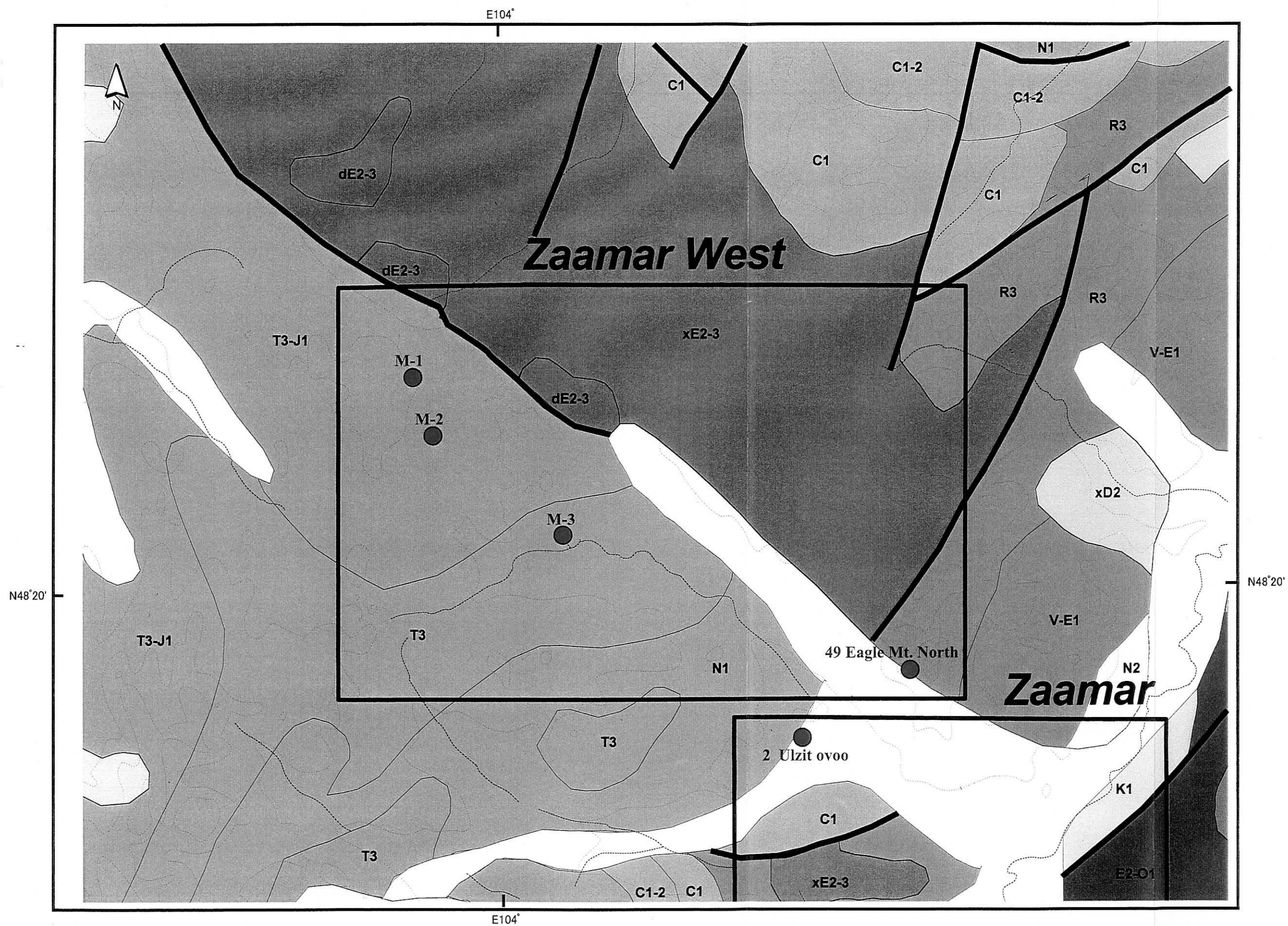
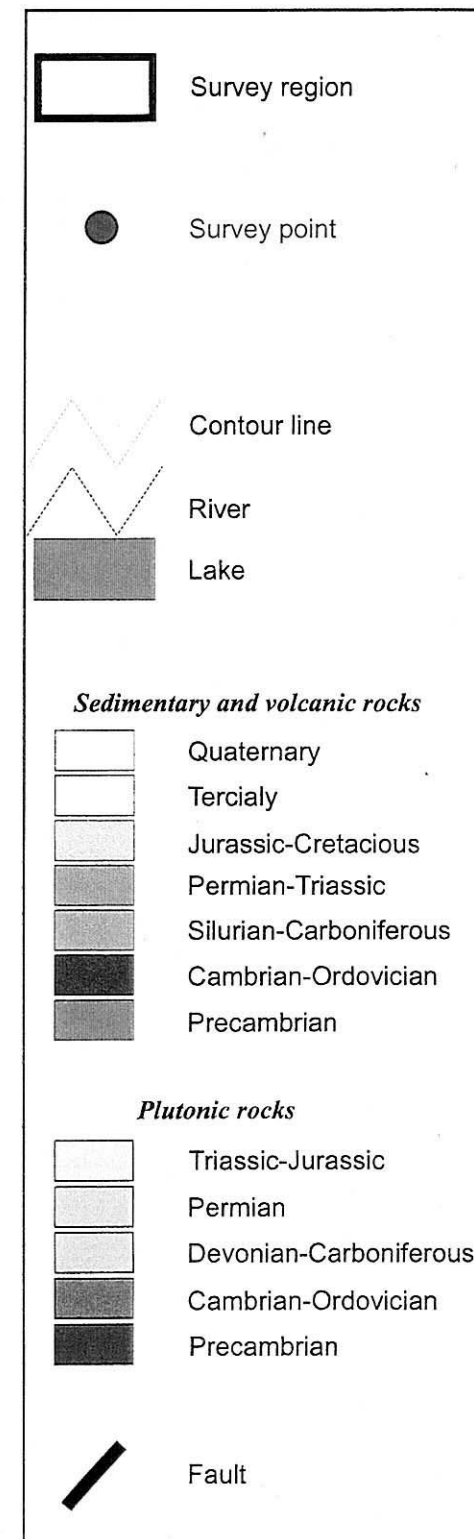


Fig. II-3-37 Geological map of Zaamar West region

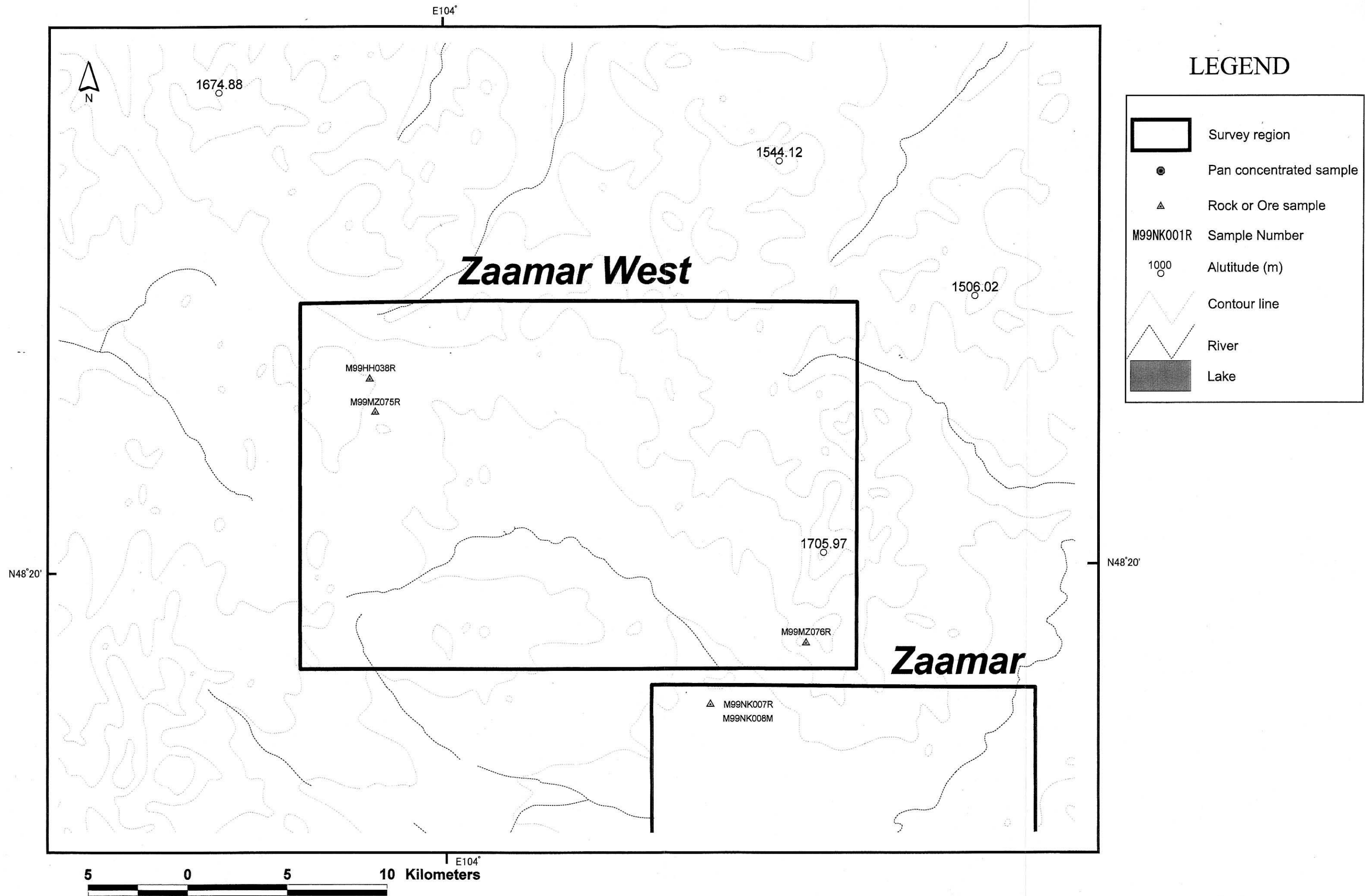


Fig. II-3-38 Sample locations of Zaamar West region

[Topography and vegetation]

This prospect is in a mountainous region. As for the vegetation, it is on the grassland where only short grass grows.

[Access]

The site is accessible through a forked road from an unpaved main road running from Zaamar to Bulgan city. A concrete bridge spans the Tuul River flowing west of Zaamar. There is no problem in crossing it by car.

[Preceding survey]

Although the Eagle Mt. North prospect was once described as a mineral occurrence, its details are not known.

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

This prospect shows light gray response on the SAR image. It is rich in fine undulations and is low to medium in resistance. The development of drainage is medium to high and shows a radial distribution.

[Geology and geological structure]

Black limestone and green - gray tuff of Riphean age were distributed as a roof pendant in granitic rocks of the Paleozoic, and this was intruded by a basaltic dike. A strike and dip of the Riphean system was N20° E and 75° E. The intrusion of basalt was concordant with this structure.

[Mineral showing and alteration]

Silicified tuff was distributed, and it has been locally epidotized.

[Laboratory test]

Chemical assay of silicified rock sample (M99MZ076) showed that it contained 25 ppm Cu and <0.005 g/t Au and <0.2 g/t Ag (below the detection limits).

[Evaluation]

Although the silicification was recognized, it is not accompanied by mineralization. Consequently, this prospect cannot be a future survey target.

(b) SAR M-1 point

[Typical latitude and longitude]

103° 56' 34.0" east longitude, 48° 25' 21.0" north latitude

[Topography and vegetation]

This point is in a mountainous district with gentle undulations where grass grows.

[Access]

This point is situated beside a main road running from Ulaanbaatar to Murun. It takes about two hours to get to the point from Bulgan city by car.

[Preceding survey]

No survey has been conducted.

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

The point shows dark response on the SAR image. It is low in resistance and a relatively conspicuous circular structure is discernible.

[Geology and geological structure]

Andesitic lava and andesitic tuff breccia with a well-developed columnar joint were distributed.

[Mineral showing and alteration]

Tuff breccia shows epidotization and also has a portion on which chalcedonic quartz veinlets develop.

[Laboratory test]

Samples were not collected for laboratory test.

[Evaluation]

The circular structure can be judged attributable to erosion. Since alteration related to mineralization has not been recognized, it can be concluded that this point is not worth further survey.

(c) SAR M-2 point

[Typical latitude and longitude]

48° 42' 03.8" north latitude, 102° 45' 44.4" east longitude

[Topography and vegetation]

As for the topography, this point is on a gentle hill. It is low in resistance and does not show any development of drainage. As for the vegetation, short grass grows.

[Access]

It is possible to go near this prospect by vehicle. The prospect is approximately 60 km away from Bulgan city and it takes about half a day to get to the prospect by vehicle.

[Preceding survey]

No survey has been conducted.

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

In this prospect, a circular structure is discernible. It can be expected that intrusive rock will exist under ground of this prospect.

[Geology and geological structure]

Hornblende-andesite was distributed. A lot of cavities caused by removal of gas were recognized on andesite, and zeolite was generated in these vesicle.

[Mineral showing and alteration]

Alteration or mineral showing was not recognized.

[Laboratory test]

Assay results of andesite (M99MZ075R) having zeolite in it were <0.005 g/t Au (below detection limit), 133 ppm Cu, 14 ppm Pb and 108 ppm Zn.

[Evaluation]

Because alteration related to mineralization has not been recognized and the analysis contents were low, no further survey is necessary.

(d) SAR M-3 point

[Typical latitude and longitude]

104° 01' 38.0" east longitude, 48° 21' 22.0" north latitude

[Topography and vegetation]

This point is in a mountainous district with gentle undulations where grass grows.

[Access]

This point is situated beside a main road running from Ulaanbaatar to Murun. It takes about two hours to get to the point from Bulgan city by car.

[Preceding survey]

No survey has been conducted.

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

The point shows dark response on the SAR image. It is low in resistance and a relatively conspicuous circular structure is discernible.

[Geology and geological structure]

Teachy andesitic was distributed widely. Froat rocks of granite and porphyritic andesite were recognized.

[Mineral showing and alteration]

No alteration and mineralization occur in investigated area.

[Laboratory test]

Samples were not collected for laboratory test.

[Evaluation]

The circular structure can be judged attributable to erosion. Since alteration related to mineralization has not been recognized, it can be concluded that this point is not worth further survey.

Chapter 4 Consideration

4.1 Consideration

Figure II-4-1 shows distribution of granitic rocks and location of mineral occurrences surveyed through this project.

Based on our survey results, the features of geological structure, lineament, alteration and mineral showing for each district are summarized as follows.

4.1.1 Zaamar district

Geology of the district consists of sedimentary rocks of the late Proterozoic to early Paleozoic and granitic rocks of the middle Paleozoic that intruded into the sedimentary rocks. Lineaments in the NW-SE and N-S trends were extracted. As alteration and mineral showing, quartz veins were identified in granite which was considered as of the middle Paleozoic, and skarn was observed in the sedimentary rocks. Weak gold mineralization was identified in quartz veins in the granite.

4.1.2 Bulgan SW district

Geology of this district consists of andesitic rocks of the middle to late Mesozoic. Lineament in the N-S direction was extracted. Although no associated igneous rocks occur on the surface, silicification and kaolinization were identified accompanying copper mineralization. Consequently, existence of porphyry type mineralization is presumed.

4.1.3 Uubulan district

Geology of this district consists of basic rocks, granite porphyry, diorite porphyry and pegmatite that were considered as of the late Mesozoic as well as trachyte and andesite of the middle Mesozoic onward. Lineament with good continuity in the E-W direction was extracted. Hydrothermal alteration zone characterized by silicification and sericitization, and weak skarnization were identified. However, no distinctive mineral showing was observed.

4.1.4 Khujirit district

Geology of this district consists of andesitic rocks of the late Paleozoic and granitic rocks which were considered as of the late Paleozoic to the early Mesozoic. No characteristic lineament was extracted. In granite, hydrothermal alteration including silica, sericite, quartz veins, etc. were identified. Concerning the mineralization, copper oxide was observed along the crack.

4.1.5 Murun South district

Geology of this district consists of basalt, andesite, dacite and rhyolite of the late Paleozoic, as

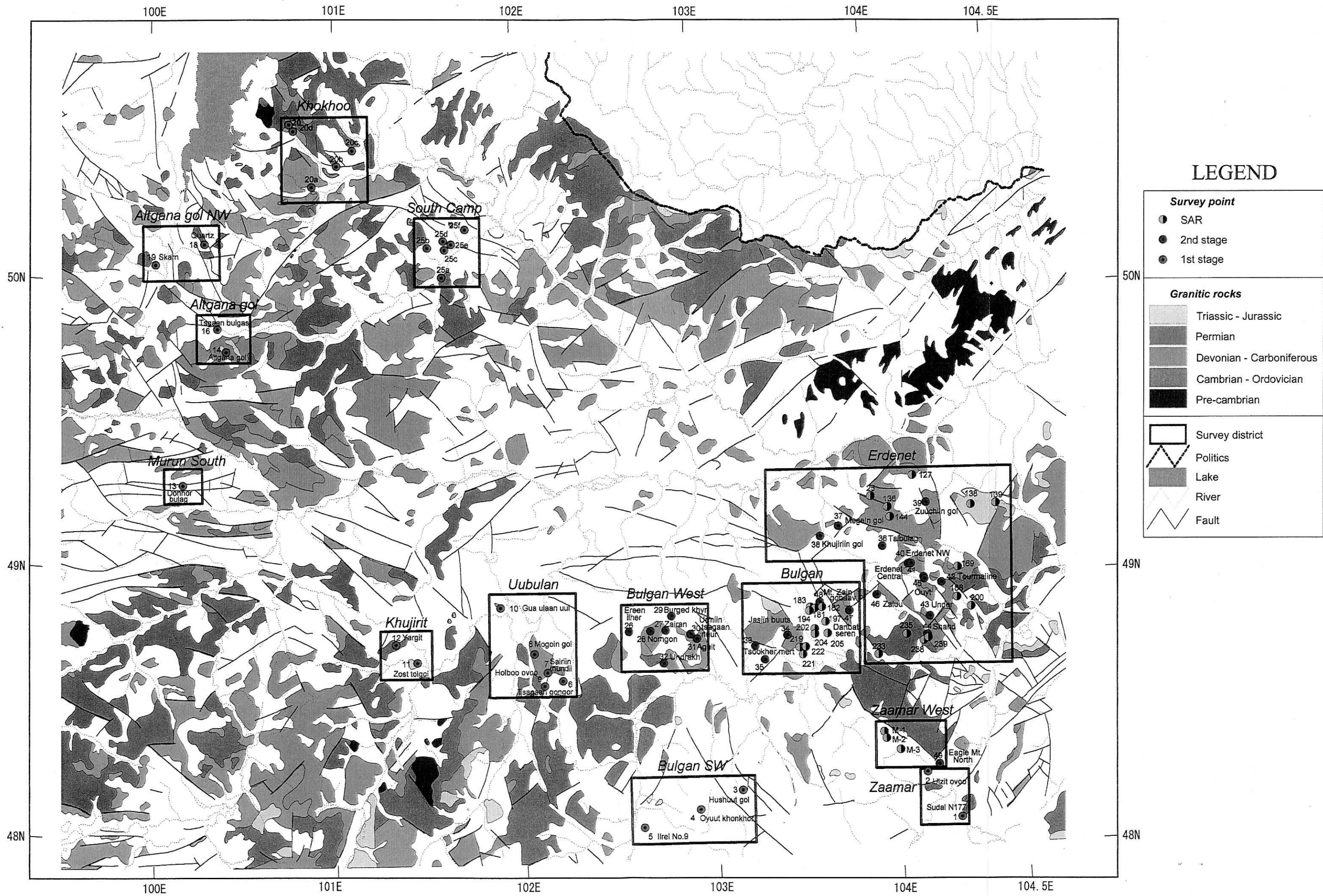


Fig. II-4-1 Distribution of granitoids and location of survey points in eastern part of the central-north area, Mongolia

well as acidic tuff, sandstone and conglomerate, into which monzonite, trachyte and granodiorite of the late Paleozoic intruded. Lineament with good continuity in the E-W direction was extracted. Although alterations such as silicification, sericitization and weak pyritization were identified, no mineralization was identified.

4.1.6 Altgana gol district

Geology of this district consists of ultrabasic rocks, sedimentary rocks and granitic rocks of the early Paleozoic and granite intruding into them in the late Paleozoic. Lineaments in the NW-SE and NE-SW directions are extracted, and the mineral occurrence is located at their intersection. Quartz veins were observed in granite. Although molybdenite was found in quartz veins, its grade was low and no anomalies of gold and silver were noted. Also no anomalies of nickel and chromium were identified in ultrabasic rocks.

4.1.7 Altgana gol NW district

Geology of this district consists of carbonate rocks, basic rocks of the early Paleozoic, into which granitic rocks of the middle Paleozoic intruded. No characteristic lineament was extracted. However, faults in the NW-SE and NE-SW directions were reported in the unpublished report. Alteration, silicification and quartz veins were observed in greenschist and limestone. Though mineralization related to metamorphogenic or Carlin-type gold mineralization had been expected, no gold showing was identified.

4.1.8 Khokhoo district

Geology of this district consists of metamorphosed sedimentary rocks (metamorphic rocks) of the early Paleozoic and granitic rocks of the Proterozoic to the early Paleozoic. Lineaments in the E-W and NE-SW directions were extracted, and mineralization was located at their intersection. Hydrothermal alteration accompanying quartz veins, etc. was noted in the granodiorite body. Mineral showings such as galena, malachite, etc. were identified. It is desirable to confirm the potential of skarn-type mineralization at the contact with granitic intrusive rocks.

4.1.9 South Camp district

Geology of this district consists of sedimentary rocks of the late Proterozoic, ultrabasic rocks of the late Proterozoic to the early Paleozoic, granitic rocks of the Paleozoic and sedimentary rocks of the middle Mesozoic. Lineaments show in the E-W and NW directions extracted in the vicinity. Quartz vein network of accompanying weak gold mineralization was observed in granitic rocks. Also, it was reported that gold grains are contained in unconsolidated sand and gravel of alluvium.

4.1.10 Erdenet district

Geology of this district consists of gabbro and granitic rocks of the early Paleozoic era in the southern part, and basalt, andesite, tuff and sedimentary rocks of the late Paleozoic in the entire district, into which granitic rocks of the late Paleozoic to the early Mesozoic intruded. Lineament in the NW and N-S directions were extracted, and mineralizations were often observed in the intersections of them. Silicification, sericitization, and acidic argillization accompanying copper mineralization were noted in the volcanic rocks and granitic rocks of the late Paleozoic. This district has high potential for existence of porphyry copper deposit.

From petrological point of view, granitic rocks around the Erdenet deposit belong to the calc-alkaline rock series and have characteristics of island arc igneous activity.

4.1.11 Bulgan district

Geology of this district consists of volcanic and sedimentary rocks of the late Paleozoic, into which granitic rocks of the late Paleozoic and the early Mesozoic intruded. Lineaments of the NW-SE and N-S directions were extracted. Alterations of silicification, sericitization, quartz veins and acid argillization were noted in granitic rocks, accompanying copper mineralization. In Tsookhermert occurrence, gold mineralization accompanying copper and lead were identified in quartz veins.

4.1.12 Bulgan West district

Geology of this district consists of granitic rocks of the early Paleozoic and granitic and volcanic rocks of the late Paleozoic overlain by sedimentary rocks of the middle Mesozoic. No characteristic lineament was extracted. Alteration including silicification, sericitization and limonitization were identified accompanying copper mineralization and gold anomaly.

4.1.13 Zaamar West district

Geology of this district consists of limestone of Proterozoic, granitic rocks of the early Paleozoic, and volcanic rocks of the late Paleozoic to middle Mesozoic. Lineament in the NW-SE direction was extracted. As alteration, silicification and epidotization were observed in tuff in the vicinity of granitic rocks. However, no mineral showing was identified.

4.1.14 Conclusion of the survey results

Common points and tendencies on the mineral occurrences considered from the results of the survey on each district are summarized as follows.

Excluding nickel, chromium and platinum deposits, etc., associated with ultrabasic rocks, mineralization which was identified in each district tends to be associated with activities of granitic rocks. Mineralizations including porphyritic deposits, epithermal gold deposit, skarn-type lead and

zinc deposits were identified in our survey of this year.

Geology of the survey area was roughly divided into the northern and southern parts with remarkable faults in the E-W direction. Geology of the northern part consists of granitic, sedimentary and intrusive rocks of the Proterozoic to the middle Paleozoic, while volcanic, sedimentary and intrusive rocks of the early Paleozoic to Mesozoic were dominant in the southern part. Mineralization in the northern part is considered to have been accompanied with granitic rock activities of the early to middle Paleozoic, while that in the southern part is considered to have been caused by granitic rocks of the late Paleozoic to early Mesozoic.

Major elements of structures are represented by lineaments in the E-W direction. However, concerning mineralization it is important to clarify the relations between lineaments in the NW-SE and N-S directions. In particular, the Erdenet deposit is located at the intersection of the lineaments, and Erdenet Complex that is considered to be the related igneous rock related to the mineralization intruded also in the NW-SE direction. This direction is considered to be perpendicular to direction of the subduction of the late Paleozoic to early Mesozoic.

From petrological examination, granitic rock which is related to mineralization of the Erdenet deposit proved to belong to the calc-alkaline rock series having characteristics of igneous activities of the island arc. Also, from characteristics of REE pattern, it was clarified that differentiation in tonalite-trondhjemite rock series are more advanced compared with undifferentiated granitic rocks in the continental crust.

It is evident that the Erdenet district has high potential of copper mineralization. However in Bulgan district and Bulgan West district, both of which are to the west of Erdenet district, grades of gold as well as that of copper are high.

Both Zaamar gold deposit in the southeast and Tavnagar deposit in the northern part of the survey area are vein-type deposits hosted by sedimentary rocks of the Proterozoic to the early Paleozoic. The cause of their formation and types of mineralization has not been clarified yet. It is assumed that these deposits have been caused by granitic igneous activities of the early to middle Paleozoic. They may have characteristics definitely different from those of porphyry copper deposit.

The survey area is considered to have been formed by the plate subduction and additional tectonics toward the continental margin with multiple micro-continents and island arcs as its core occurred from the Precambrian to the early Mesozoic, and igneous activities occurred in the continental margin caused generation of ore/mineral deposits.

4.2 Selection of promising districts and mineral occurrences

In the eastern part of the central north area of Mongolia, ground truth was conducted on mineral occurrences extracted by analyses of the existing data and remote sensing satellite images. From the results, the following promising areas were selected and classified, paying attention to the degree of

exploration stage, scales of altered and mineralized zones and characteristics of the alteration.

- Uubulan district: Gua ulaan uul (Mineral occurrence No. 10; Cu, Au)
- Khujirit district: Zost tolgoi (Mineral occurrence No. 11; Cu, Au)
- Murun South district: Donkhor bulag (Mineral occurrence No. 13; Cu, Au)
- Erdenet district: Talbulag and Tsagaan chuluut (Mineral occurrence No. 36; Cu, Au)
- Erdenet district: Megein gol (Mineral occurrence No. 37; Cu, Au)
- Erdenet district: Under (Mineral occurrence No. 43; Cu, Au)
- Erdenet district: SAR233 point (Cu, Au)
- Erdenet district: SAR204 point (Cu, Au)
- Bulgan district: Mt. Zain gobaav (Mineral occurrence No. 48; Cu, Au)

* The sites from which the surface alteration may be expected and judged as promising in view of their laboratory test results.

Figure II-4-2 shows promising mineral occurrences in the eastern part of the survey area.

Table II-4-1 summarizes the laboratory test, reasons for selecting mineral occurrences as promising sites and comments on mineral occurrences to have been surveyed. In the table, mineral occurrences for which exploration and ore reserves estimation have been completed are also included. All the mineral occurrences referred to in the table have not been covered by mining concessions of any private companies, or have been covered by mining concessions of the Mongolian government.

In the evaluation, mineral showings and alteration took priority from which porphyry deposit may be expected and whose site can be identified. No evaluation was made on infrastructure and access for individual occurrences.

Through examination based on ground truth with laboratory tests, Tsagaan chuluut, Megein gol, Danbatseren and SAR139 point of Erdenet district were extracted as the mineral occurrences to have top priority based on their silicification and whitened alteration, generation of pyrophyllite and andalusite, and existence of advanced argillic alteration as representative alterations in the upper part of porphyry deposits.

At Mt. Zain gobaav in Bulgan district, silicification and whitened argillization were identified, high-temperature acidic hydrothermal activities were noted, and copper showing was observed in the vicinity. In view of possible existence of porphyry deposit based on the above factors, the occurrence was extracted as having a high priority. In Tsookher mert, existence of copper and lead mineralization were identified in quartz veins and assay result of 6.29 g/t Au was obtained. Therefore, it may be corresponding to the margin of the zonation of porphyry copper system. Consequently, mineral occurrence was extracted as having high priority for exploration.

In Oyuut khonkhor of Bulgan SW district, silicification accompanying hydrothermal breccia and acidic alteration were observed and, therefore, porphyry deposit and gold deposit of high sulfidation type gold deposit may exist there. However, since no distinctive anomaly was noted in the laboratory

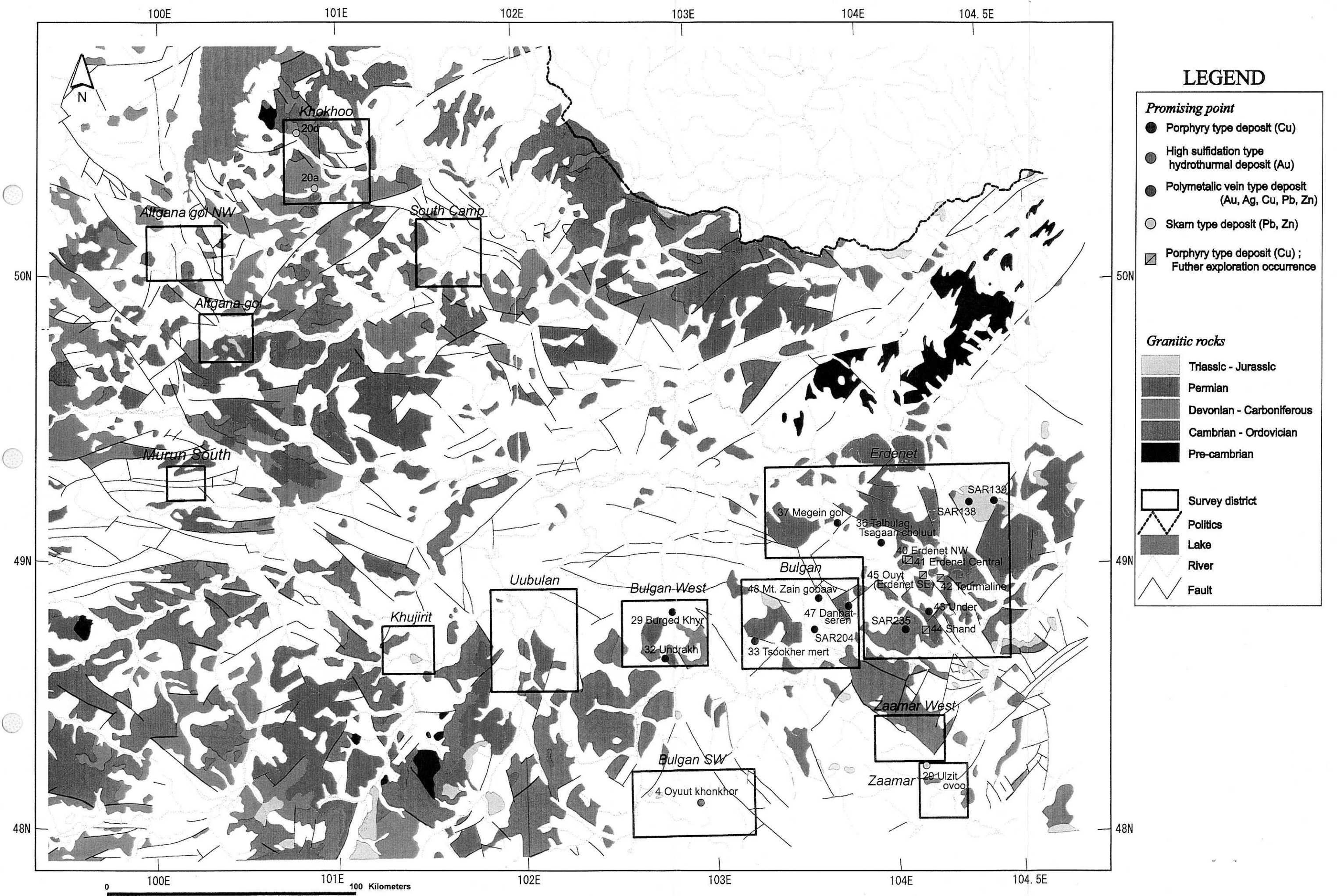


Fig. II-4-2 Interpretation map of eastern part of the central-north area, Mongolia

Table II-4-1 Promising mineral occurrences and survey points in the eastern part of the central-north area, Mongolia

Region	Mineral Occurrence	Results of Previous Survey	Geology	Analysis Results	Alteration	Mineralization	Comments	Expectative Deposit type	Evaluation
Erdenet	Tabulg, Tsagaan cholult	Drilling Core: 15m length. Cu 0.75%	Mesozoic andesite, dacite	Cu 50ppm, Pb 130ppm and Zn 70ppm	Silicification and argillization (andalusite)	No mineralization	Possibility of lithocap from alteration style	Porphyry	
Erdenet	Megein gol	Silicified zone: 500m x 1500m and 300m x 1000m, Cu 0.07%	Late Paleozoic granitoid, Late Paleozoic - Early Mesozoic andesite and dacite	Cu 25ppm, Pb 26ppm and Zn 18ppm	Silicification and argillization (andalusite)	No mineralization	Possibility of lithocap from alteration style	Porphyry	
Erdenet	Darbatseren	Weak geochemical anomaly	Late Paleozoic granitoid, Early Mesozoic dacite	Ag 1.2g/t, Cu 27ppm, Pb 22ppm and Zn 16ppm	Silicification and argillization (pyrophyllite, kaolin, andalusite)	No mineralization	Possibility of lithocap from alteration style	Porphyry	Expectation of copper mineralization by porphyry system at depth or peripheral area
Erdenet	SAR139	Mineralization zone: 40m x 0.5m, Cu 1.1%	Late Paleozoic - Early Mesozoic granitoid and basalt dyke	Au 0.11g/t, Ag 13.2g/t, Cu 2.1%, Pb 18ppm and Zn 52ppm	silicification with hydrothermal breccia, limonitization	Malachite along crack	Rare earth elements of granitic rock have the same characteristic as granitic rocks of the Erdenet NW deposit.	Porphyry	
Bulgan West	Burged Khvr	Drilling: 2holes. Ore reserve: 0.16 million tons, Cu 0.36%	Late Paleozoic - Early Mesozoic granitoids, Mesozoic Conglomerate	Cu 40ppm, Pb 50ppm and Zn 120ppm	silicification, sericitization and limonitization in weak leached zone	No mineralization	Rare earth elements of granitic rock have the same characteristic as granitic rocks of the Erdenet NW deposit.	Porphyry	
Bulgan West	Undrakh	Alteration zone: 300m x 150m, Cu 0.7%, M: 0.07% and Ag 10g/t	Paleozoic? Granitoid	Au 0.215g/t, Ag 33.8g/t, Cu 1.83%, Pb 50ppm and Zn 26ppm	Silicification and limonitization in leached zone	Dissemination of chalcopyrite, malachite along crack.	Secondary enrichment of copper is able to be expected under the surface.	Porphyry	
Bulgan	Mt. Zain gobaaiv	---	Late Paleozoic - Early Mesozoic Andesite	Ag 4.8g/t, Cu 0.03%, Pb 6ppm and Zn 54ppm	Weak silicification, pyritization, argillization(kaolin, pyrophyllite)	Dissemination of oxidized copper	Peripheral mineralization of porphyry system	Porphyry	
Bulgan	Tsookher mert	Quartz vein with gold and copper mineralization. Au 10g/t, Ag 500g/t and Cu 0.3%	Late Paleozoic - Early Mesozoic Granitoids	Au 6.29g/t, Ag 554g/t, Cu 1940ppm, Pb 1.9% and Zn 396ppm	Quartz vein with copper and lead mineralization. Size of the quartz vein is 120m length x <10cm width.	Mineralization of gold, copper and lead	The analysis results show a high gold value (6.29 g/t Au).	Polymetallic vein	
Erdenet	Under	Detection of IP anomaly	Late Paleozoic Granitoid	Cu 50ppm, Pb 16ppm and Zn 54ppm	Silicification and Sericitization with limonite	No mineralization	---	Porphyry	Possibility of expanding alteration and mineralization zone
Bulgan SW	Oyuut khonkhor	Drilling: Cu:0.01%, Geological survey: Au:8.8g/t	Mesozoic Andesite	Au 0.015g/t, Ag 1.6g/t, Cu 459ppm, Pb 166ppm and Zn 416ppm	silicification with hydrothermal breccia, argillization (kaolin)	No mineralization	Possibility of high sulfidation type epithermal gold deposit from alteration style	Epithermal (high sulfidation)	
Khokhoo	20a, 20d	Trenching (No geophysical and geochemical data)	Middle Paleozoic Granitoid	Ag 23.2g/t, Cu 1135ppm and Pb 5210ppm	Quartz vein with copper, lead and silver mineralization	Mineralization of copper, lead and silver	Possibility of skarn deposit by contact of sedimentary rocks and granodiorite	Skarn?	
Zaamar	Ulzit ovoo	Mineralization zone: 700m x 250m, Au 0.2g/t, Cu 0.07% and Zn 0.5%	Middle Cambrian-Ordovician sedimentary rocks	Cu 498ppm, Pb 26ppm and Zn 1305ppm	Skarnization in drilling core	No mineralization	Possibility of mineralization in intrusive rocks related to skarnization.	Skarn	Possibility of existing ore body at depth
Bulgan	SAR204	Cu 0.56%	Late Paleozoic andesite	Ag 10g/t, Cu 0.76%-2%, Pb 30ppm and Zn 56ppm	Quartz veinlets, epidotization	Malachite along crack	The analysis results show a high copper value (2%)	Porphyry	
Erdenet	SAR138	Cu 0.6%	Late Paleozoic granitoid	Cu 1580ppm, Pb 66ppm and Zn 170ppm	No alteration	No mineralization	Rare earth elements of granitic rock have the same characteristic as granitic rocks of the Erdenet NW deposit.	Porphyry	Possibility of existing porphyry system in the depth or peripheral area
Erdenet	SAR235	Cu 0.05%	Paleozoic granitoid and andesite dyke	Cu 16ppm, Pb 26ppm and Zn 34ppm	No alteration	No mineralization	Rare earth elements of granitic rock have the same characteristic as granitic rocks of the Erdenet NW deposit.	Porphyry	
Erdenet	Erdenet NW	Ore reserve: 512 million tons, Cu 0.84% and Mo 0.016%					Operating (Erdenet mine)	Porphyry	
Erdenet	Erdenet Central	Ore reserve: 0.56 million tons, Cu 0.4%						Porphyry	
Erdenet	Erdenet SE	Ore reserve: 1.09 million tons, Cu 0.4%						Porphyry	Further exploration occurrence
Erdenet	Tourmaline	Drilling: 6holes						Porphyry	
Erdenet	Shand	Ore reserve: 0.5 million tons, Cu 0.2%						Porphyry	

test, its priority was judged to be low.

At Burged Khyr and Undrakh in Bulgan West district, since silicification/acidic alteration and limonitization were observed, the occurrence was extracted as a promising site for existence of porphyry deposits. However, it is desirable to confirm the scale of alteration zones.

In Ulziit ovoo of Zaamar district, ore shoot was said to have been noted through preceding surveys. Although skarn was identified in a drilling core, evaluation is recommended through geophysical exploration and drilling.

Points 20a and 20d in Khokhoo district, mineral showings of copper, lead and silver were noted in granodiorite. Therefore, mineralization including skarn may exist near the contact with granodiorite.

Out of 17 mineral occurrences extracted as promising through the survey of this fiscal year, occurrence no.7, 3 and 2 are located in Erdenet, Bulgan and Bulgan West districts respectively. Most of mineral occurrences extracted as promising occur in the above three districts. Based on the results, presumed mineralization types are porphyry copper deposit, associated epithermal gold deposit of high sulfidation type and skarn deposit.

Since the Tavyt deposit in the northeastern part of the survey area and a gold deposit near the border with Russia were not surveyed, none of the data was included in the evaluation.