2-4 Results of Geological Survey

2-4-1 The Zuukhiin gol area

(1) Generalities

The area is located 25 km northeast from Erdenet city and at an approximate sea level elevation between 1,100m to 1,400m. The topography shows gently undulating hills as shown in Fig. II-2-6. The vegetations in the area are composed of coniferous forests and tall grasses in the hill and valley and low grasses along the streams.

Zuukhiin gol mineralization was discovered by the cooperation work between the Czech-Slovakia and Mongolia in 1966. In the area, geological survey, geophysical survey and drilling survey were carried out. The results showed low potential for porphyry Cu-Mo mineralization.

From 1978 to 1980, the geological survey was performed in a wide area around the Erdenet Mine area including the Zuukhiin gol area. Following to the results of geological survey, geochemical survey and geophysical survey composed of magnetic and electrical surveys were performed in the area.

From 1981to 1985, systematic drilling survey was carried out in the area. Previous drilling survey showed that the analytical values of ore assay results were Cu: 0.006 to 0.2 %, Mo: 0.00 to 0.003%. Drilling data of Geological Information Center showed that the analytical values were Cu: 0.11% to .17% and Mo: 0.003% to 0.007%.

(2) Geology

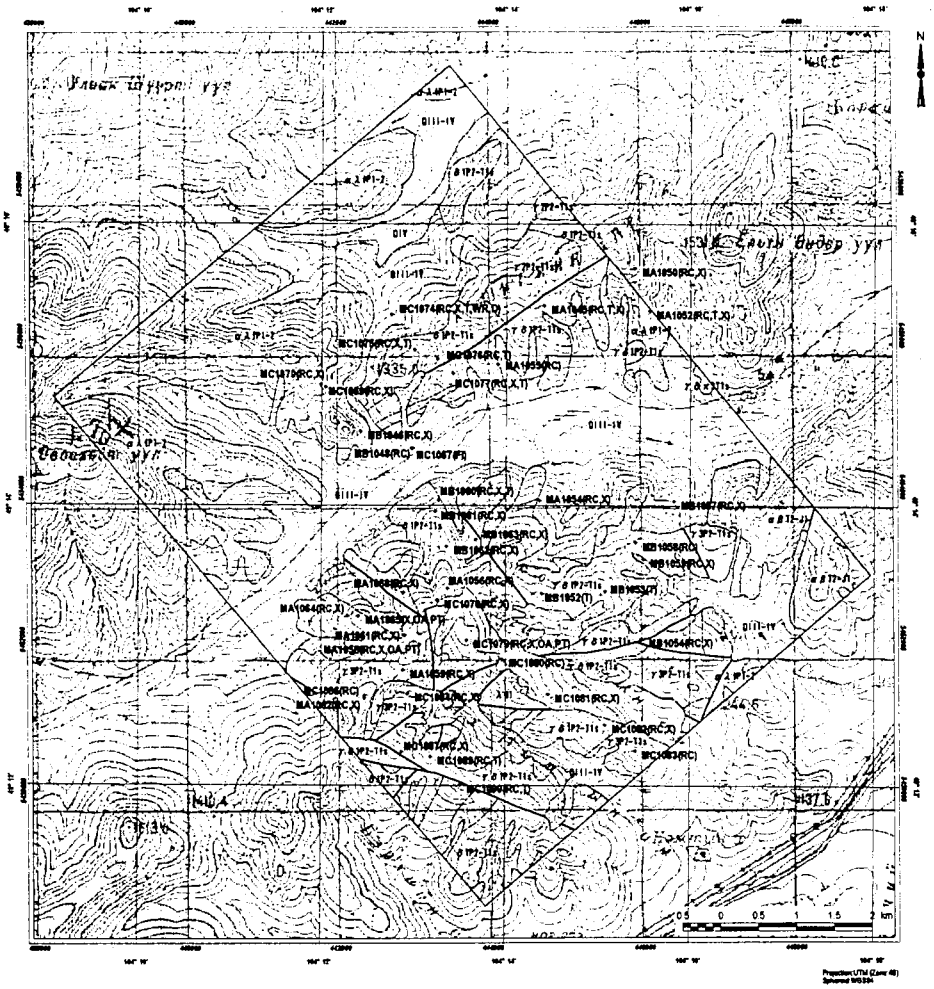
The geology of the area is shown in Fig. II-2-7. Stratigraphy, Geological structure and mineralization are as follows:

(i) Stratigraphy

The area presents Permian volcanic rocks, Triassic to Jurassic volcanic rocks and Triassic granites.

The Permian in the area, called as Hijii Formation, is composed of trachybasalt, basalt, trachyandesite-basalt, andesite-basalt, andesite, tuff, sandstone, gravel stone, conglomerate.

Triassic granites are called as Selenge complex and mainly composed of granodiorite. Selenge complex consists of late Permian to early Triassic granodiorite to granite(δ - δ γ P2-T1s), granite(γ P2-T1s), diorite(δ P2-T1s)、gabbroic diorite(ν δ P2-T1s)、granite porphyry(γ π P2-T1s)、syenitic granite (ξ γ P2-T1s). The granodiorite is distributed in the north and south of the central part of the area. The granodiorite is distributed in the central west of the area. The granite is distributed in central north part of the area. The dating results show that the granite indicates 183 Ma by K/Ar method. The granite is distributed in the east and west of the area. The granodiorite is distributed in the end of



LEGEND

Sedimentary Rocks

Quaternary	Q IV	Recent sediments: alluvial deposits: gravels, sand, silt and clay
	Q III-IV	Upper - Recent sediments; alluvial and colluvial deposits: gravels, sand, silt and clay
Jurassic	J-J1	Mogod suite: volcanic rocks and dykes: microdiorite, andesite, porphyry, liparite, dacite and tuffaceous conglomerate.
Triassic to Jurassic	σ ß T2-J1	Mogod suite: volcanic rock and dyke of liparite, dacite, andesite and their tuff.
Permian	σ Λ P1-T	Lower Hanuigol Formation: volcanic rock and dyke of basalt, andesite, dacite and liparite.

Plutonic Rocks

Triassic	γ δ ε T1s	Selenge Complex: Lower Triassic: fine grained granodiorite porphyry.
Permian to Triassic	γ P2-T1s	Selenge Complex: granite.
	γ P2-T1s	Selenge Complex: granite.
	γ δ P2-T1s	Selenge Complex: granodiorite
	δ P2-T1s	Selenge Complex: diorite

Structure

Fault

Sample location

MB1100(RC,X,OA,PT,FI) — Sample name(kinds of analysis)

Sample location

T:Thinsection
PT:Polishedthinsection
X:X-raydiffractionanalysis
WR:Chemicalanalysisforwholerocksamples
OA:Chemicalanalysisfororesamples
RC:Chemicalanalysisforwholerocksamples
FI:Fluidinclusion
D:Datingby K/Armethod
M:Measuringofremanentmagnetizationb

Fig. II-2-6 Survey location and sample locations map of the Zuukhiin gol area

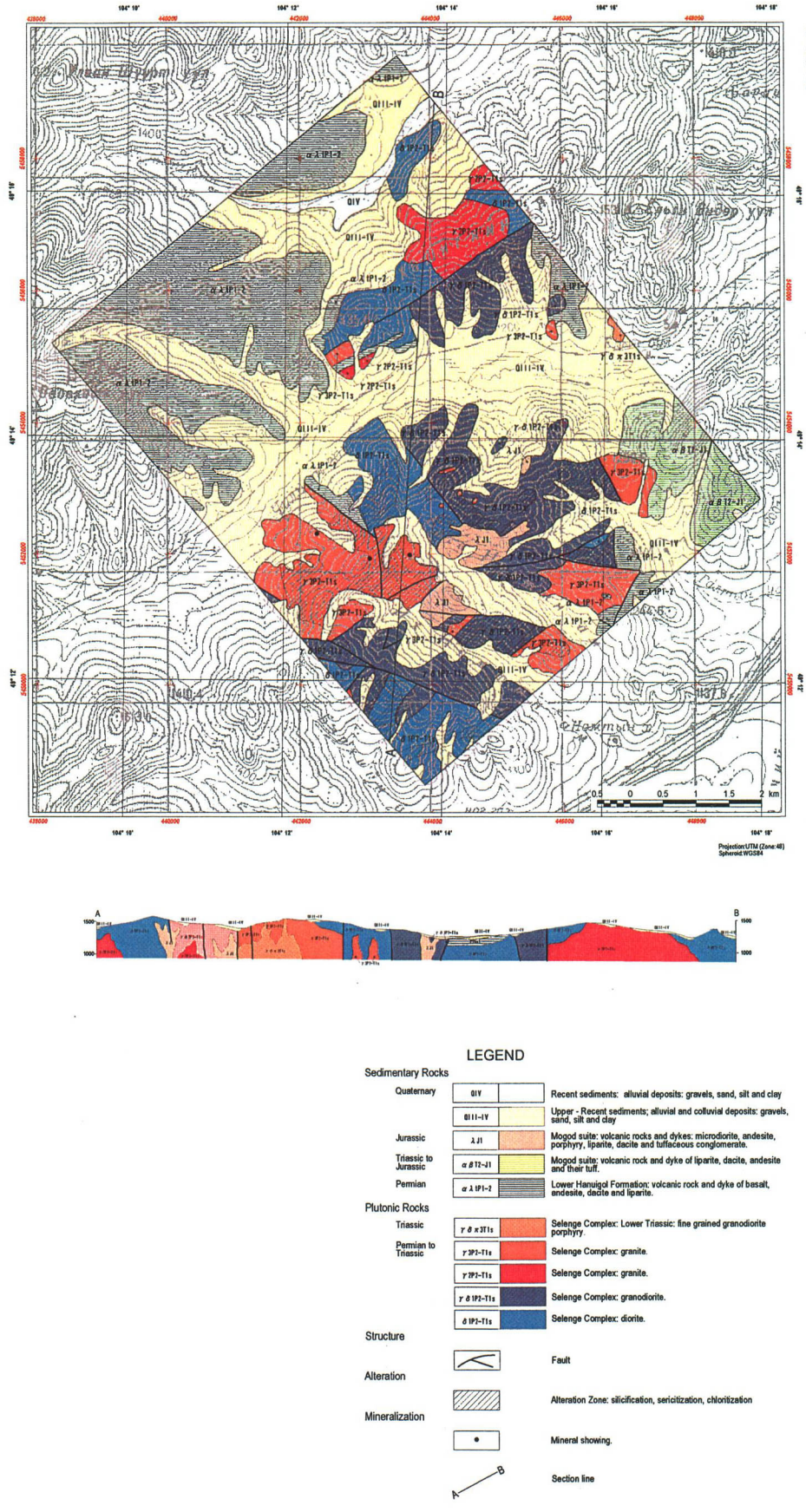


Fig. II-2-7 Geological map, geologic section and mineral showings of the Zuukhiin gol area

northeast of the area.

Dykes are composed of andesite porphyry($\alpha \pi$).

Quaternary deposits are distributed along stream and rivers, composed of boulder, single, loan and clay.

(ii) Geological structure

Fault structures are developed in the area along the NE-SW, WNW-ESE and EW directions.

The granitic bodies is elongated north to south.

(3) Mineralization

Mineralized zone is located in the central hill of the Zuukhiin gol area as shown Fig II-2-8.

Five trenches were observed in the mineralized zone as shown in Fig.II-2-9. Samples for laboratory test were collected in the mineralized zone.

Permian to Triassic granodiorite plutonic body and basalt to andesite dykes are observed in the mineralized zone. Dissemination of malachite is observed along the fractures in granodiorite.

The granodiorite with very weak potassic alteration is mostly fresh and includes minerals of pinkish potassic feldspar and platy biotite. According to the results of the trench survey, it is confirmed that malachite is disseminated in the mafic minerals of the granodiorite and along the fractures in the rock. The disseminated zone with malachite minerals presents a continued trending along WNW-SSE direction and with a width of about 200m.

The host rock in the trench presents silicified granodiorite with malachite films along the fractures in the rock. According to X-ray diffraction analysis, alteration minerals of quartz, K-feldspar, albite, sericite and chlorite were detected. In the strong alteration zone as shown in Fig. II-2-10, alteration is composed of an assemblage of K-feldspar-sericite-chlorite.

Ore mineral observation indicates that ore mineral assemblage consists of malachite, pyrite, goethite, hematite and limonite. Analytical values for ore assay show Cu 0.213 % to Cu 0.464 % and Zn 0.013 % to Zn 0.019.

As shown in Fig.II-2-12, a mineralized zone of more than Cu 0.10 % trends WNW-ESE and with a width of 200m.

The results from fluid inclusion presented an average temperature of 241.3° and salinity of 3.9%.

(4) Previous geophysical survey

The previous geophysical survey carried out in the mineral showing in the Zuukhiin gol area shows the following characteristic in the IP geophysical survey as shown in Appendix 12.

i) High chargeability along EW direction

ii) Mineral showing in the south high chargeability zone

iii) Mineralized zone in a relatively low resistivity zone

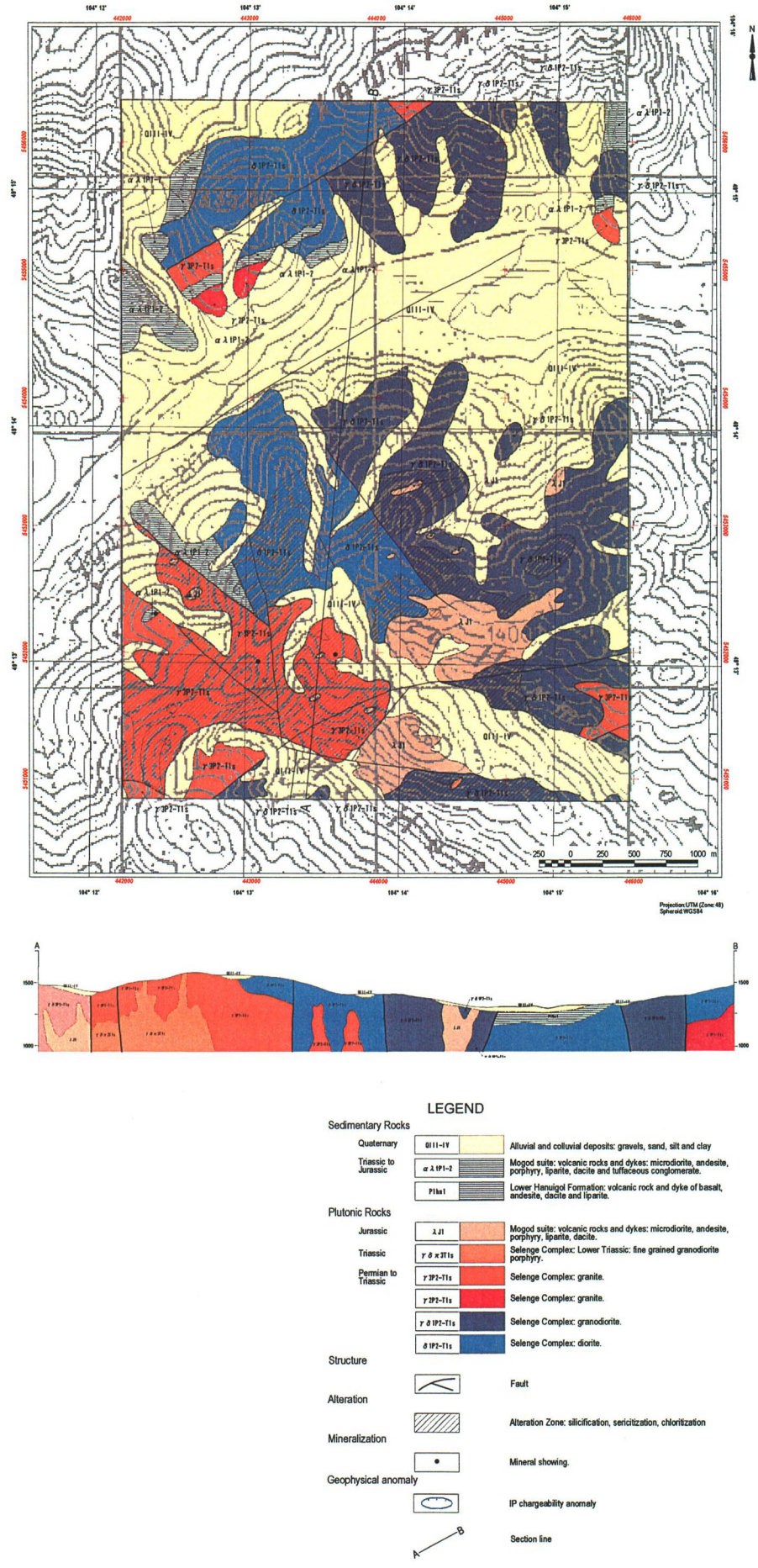


Fig. II-2-8 Geological map, geologic section and mineral showings of the Zuukhiin gol area

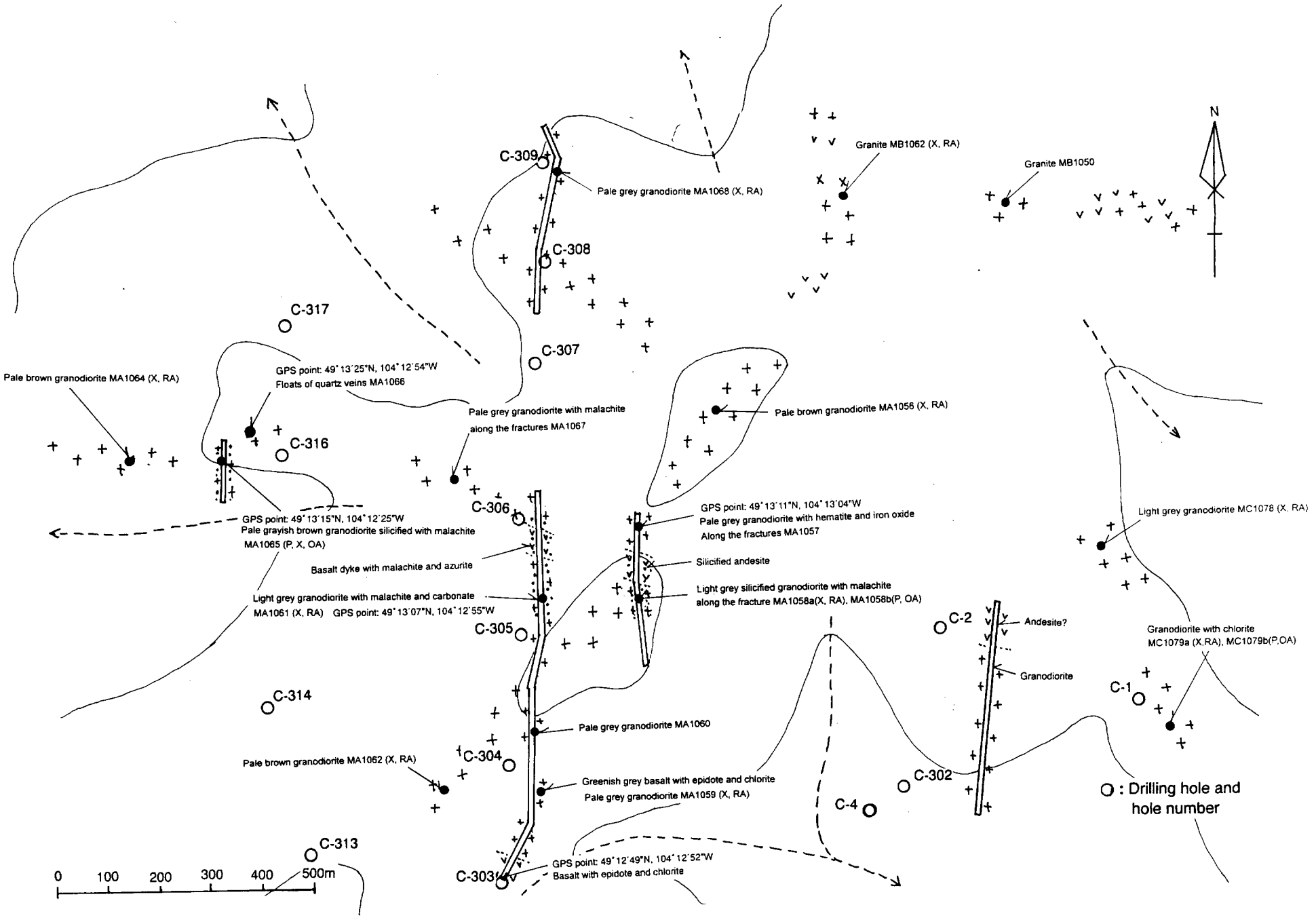


Fig. II-2-9 Rout map and sketch map in and around the mineralized zone in the Zuukhiin gol area

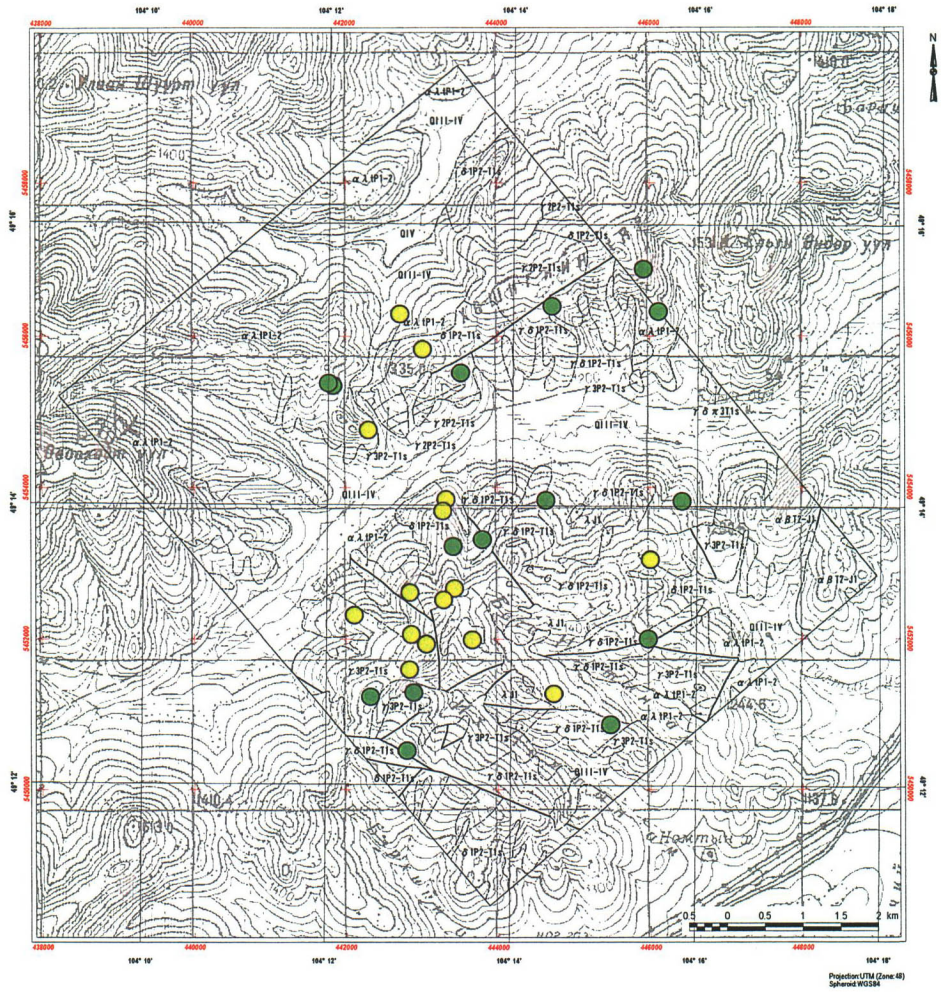
Table II-2-1 Analytical data of ore assay in the Zuukhiin gol mineral showing

Results of Ore Assay

Ser. No.	Sample No.	Location (Area)	Coordination		Description	Au (g/t)	Ag (ppm)	Cu (%)	Fe (%)	Mo (%)	Pb (%)	Zn (%)
			N	E								
1	MA1058b	Zuukhiin gol	49°13′03″	104°13′05″	silicified granodiorite with malachite along the fractures	<0.01	<5	0.464	2.38	<0.001	0.005	0.019
2	MA1065	Zuukhiin gol	49°13′15″	104°12′24″	silicified granodiorite with malachite spots	<0.01	<5	0.213	2.52	<0.001	0.005	0.013
3	MC1079b	Zuukhiin gol	49°13′05″	104°13′35″	weak altered, granodiorite with malachite along the fracture.	<0.01	<5	0.423	1.81	0.001	0.007	0.012

Results of Rock Analysis

Ser. No.	Sample No.	Location (Area)	Coordination		Description	Au (ppb)	Ag (ppm)	Cu (ppm)	Fe (%)	Mo (ppm)	Pb (ppm)	Zn (ppm)
			N	E								
1	MA1056	Zuukhiin gol	49°13′27″	104°13′23″	coarse grained granodiorite	<1	<0.5	23	3.75	<1	59	69
2	MA1058a	Zuukhiin gol	49°13′03″	104°13′05″	silicified granodiorite with malachite along the fractures	1	2.0	11,740	2.23	2	60	405
3	MA1059	Zuukhiin gol	49°12′52″	104°12′54″	granodiorite in trench	3	<0.5	255	2.77	<1	64	51
4	MA1061	Zuukhiin gol	49°13′07″	104°17′55″	granodiorite with malachite along the fracture	1	1.4	4,709	2.42	<1	71	336
5	MA1062	Zuukhiin gol	49°12′40″	104°12′29″	granodiorite	2	<0.5	144	2.88	<1	80	49
6	MA1064	Zuukhiin gol	49°13′15″	104°12′18″	granodiorite with hornblende and biotite	4	<0.5	129	2.68	<1	60	39
7	MA1068	Zuukhiin gol	49°13′25″	104°12′54″	granodiorite	<1	<0.5	274	2.48	<1	56	57
8	MC1078	Zuukhiin gol	49°13′22″	104°13′16″	granodiorite weakly altered	4	<0.5	253	2.54	<1	77	48
9	MC1079a	Zuukhiin gol	49°13′05″	104°13′35″	weak altered, granodiorite with malachite along the fracture.	4	1.0	1,874	1.66	<1	68	74



LEGEND

Sedimentary Rocks

Quaternary	QIV	Recent sediments: alluvial deposits: gravels, sand, silt and clay
	QIII-IV	Upper - Recent sediments; alluvial and colluvial deposits: gravels, sand, silt and clay
Jurassic	λ J1	Mogod suite: volcanic rocks and dykes: microdiorite, andesite, porphyry, liparite, dacite and tuffaceous conglomerate.
Triassic to Jurassic	α β T2-J1	Mogod suite; volcanic rock and dyke of liparite, dacite, andesite and their tuff.
Permian	α λ P1-2	Lower Hanuigol Formation: volcanic rock and dyke of basalt, andesite, dacite and liparite.

Plutonic Rocks

Triassic	γ δ π3T1s	Selenge Complex: Lower Triassic: fine grained granodiorite porphyry.
Permian to Triassic	γ 3P2-T1s	Selenge Complex: granite.
	γ 2P2-T1s	Selenge Complex: granite.
	γ δ 1P2-T1s	Selenge Complex: granodiorite.
	δ 1P2-T1s	Selenge Complex: diorite.

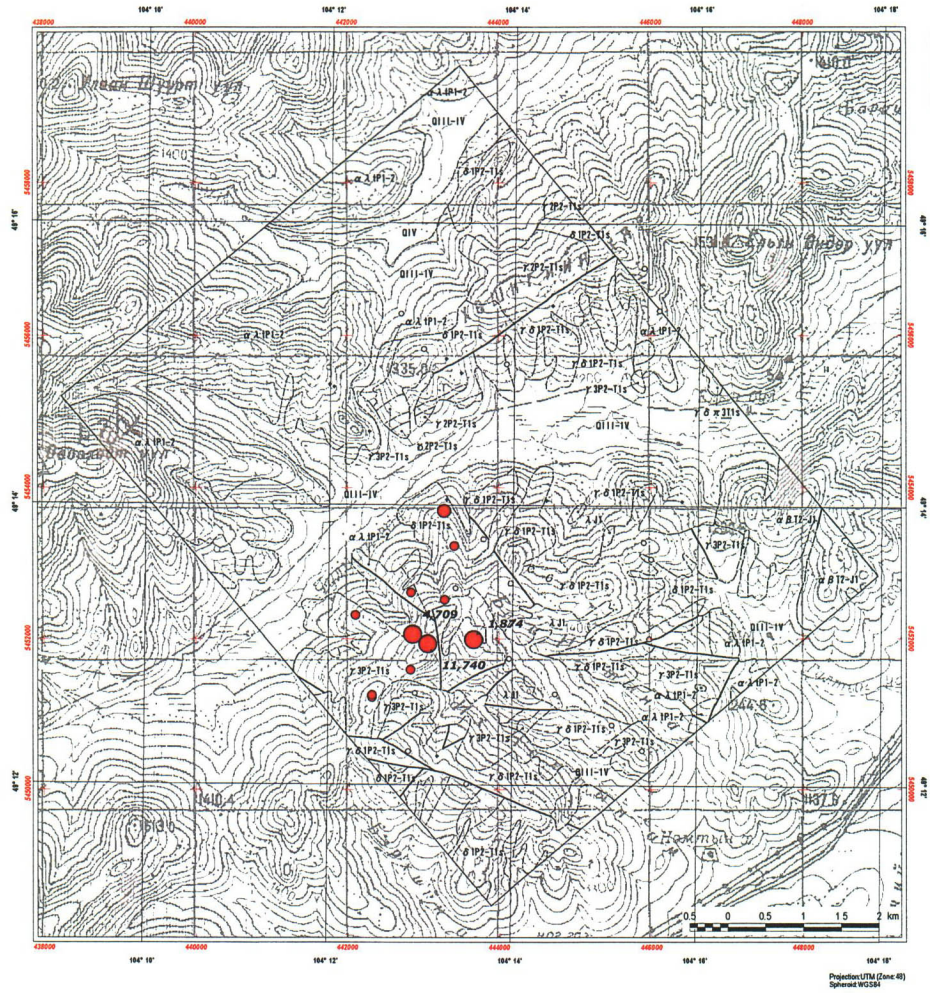
Structure

Fault

Alteration Type

- Qz-(Jaro)-(Kao)
- Qz-Alu-(Pyro)-(Kao)
- Qz-Alu-Ser-(Kao)
- Ser-(Smec)
- Ser-Chl-(Smec)
- Chl
- Kao
- Fresh
- Qz-Ser-(Kf)-(Kao)
- Qz-Pyro-(Kao)
- Qz-And
- Qz-And-Ser

Fig. II-2-10 Distribution map of alteration mineral assemblages in the Zuukhiin gol area



LEGEND

Sedimentary Rocks

Quaternary	QIV	Recent sediments: alluvial deposits: gravels, sand, silt and clay
	QIII-IV	Upper - Recent sediments; alluvial and colluvial deposits: gravels, sand, silt and clay
Jurassic	λJ1	Mogod suite: volcanic rocks and dykes: microdiorite, andesite, porphyry, liparite, dacite and tuffaceous conglomerate.
Triassic to Jurassic	αβT2-J1	Mogod suite: volcanic rock and dyke of liparite, dacite, andesite and their tuff.
Permian	αλP1-2	Lower Hanuigol Formation: volcanic rock and dyke of basalt, andesite, dacite and liparite.

Plutonic Rocks

Triassic	γδπT1s	Selenge Complex: Lower Triassic: fine grained granodiorite porphyry.
Permian to Triassic	γP2-T1s	Selenge Complex: granite.
	γP2-T1s	Selenge Complex: granite.
	γδP2-T1s	Selenge Complex: granodiorite.
	δP2-T1s	Selenge Complex: diorite.

Structure

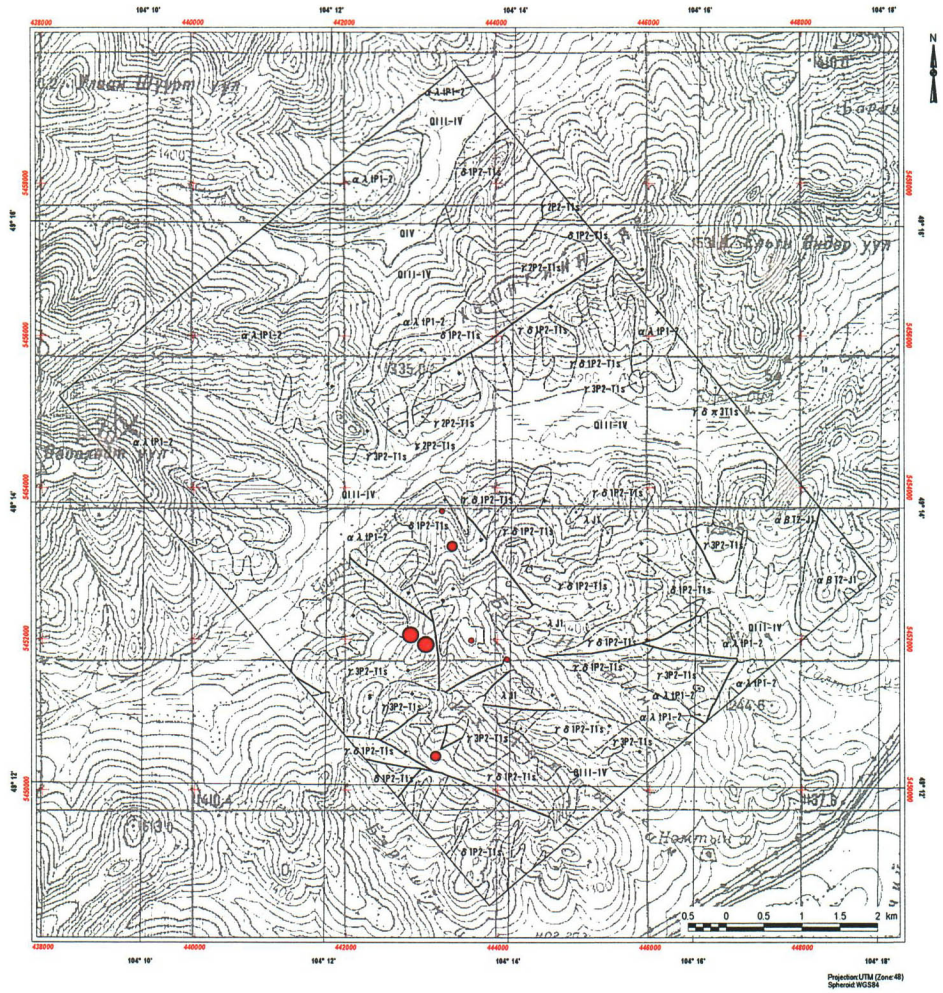
Fault

Geochemical Anomaly

Cu(ppm)

1000 ≦
300 - 1000
50 - 300
10 - 50
≦10

Fig. II-2-11 Distribution map of Cu anomaly in the Zuukhiin gol area



LEGEND

Sedimentary Rocks

Quaternary	QIV	Recent sediments: alluvial deposits: gravels, sand, silt and clay
	QIII-IV	Upper - Recent sediments; alluvial and colluvial deposits: gravels, sand, silt and clay
Jurassic	λ J1	Mogod suite: volcanic rocks and dykes: microdiorite, andesite, porphyry, liparite, dacite and tuffaceous conglomerate.
Triassic to Jurassic	α β T2-J1	Mogod suite: volcanic rock and dyke of liparite, dacite, andesite and their tuff.
Permian	α λ P1-2	Lower Hanuigol Formation: volcanic rock and dyke of basalt, andesite, dacite and liparite.

Plutonic Rocks

Triassic	γ δ ж T1s	Selenge Complex: Lower Triassic: fine grained granodiorite porphyry.
Permian to Triassic	γ P2-T1s	Selenge Complex: granite.
	γ P2-T1s	Selenge Complex: granite.
	γ δ P2-T1s	Selenge Complex: granodiorite.
	δ P2-T1s	Selenge Complex: diorite.

Structure

Fault

Geochemical Anomaly

Factor 2 score

1.5 ≦

1.0 - 1.5

0.5 - 1.0

≦0.5

Fig. II-2-12 Distribution map of factor 2 scores in the Zuukhiin gol area

(5) Summary

In view of the results of the geological survey in the area, more than Cu 0.10 % values of ore assay and rock geochemical analysis are detected in the area along a WNW-ESE direction with 2km in elongation and 200 m in width.

According to previous existing data, geological, geophysical and drilling surveys were conducted in the past. The previous geophysical data indicated that the Zuukhiin gol mineral showing is located in the center of an area within a zone of high chargeability and relatively high resistivity. The drilling section is shown in Appendix 12. The dimensions of the area with more than 0.1 % is 800 m to 1,100 m along north to south and more than 300 m in depth.

The porphyry type copper and molybdenum mineralization exists in the area and primary chalcopyrite was oxidized and changed secondary to malachite in the mineralized zone. Ore assay results indicated that the values of ore samples are Cu 0.21 % to 0.46 % and Zn 0.013 % to 0.019 %. The previous data indicated that the values were less than Cu 2,550 ppm and but showed partly Cu 8,750 ppm in maximum.

(6) Discussion

The results of the geological survey are shown in Fig. II-2-10. The alteration in the mineralized zone of the area consists of sericite-chlorite type and chlorite type indicated in propylitic alteration. Especially, the center of the Zuukhiin gol mineralized zone presents alteration of sericite-chlorite type, which is the same as the alteration mineral assemblage in the Erdenet mine area. The results of rock chemical analysis indicated that values of more than Cu 50 ppm with Cu 11,740 ppm in maximum are concentrated in the Zuukhiin gol mineralized zone and the factor score of more than 0.5 relate to the porphyry copper type mineralization is also distributed in the mineralized zone.

Consequently, the potential is inferred to be high and that porphyry type copper mineralization exists in the area. According to the previous survey data, it is inferred that the mineralization is continued up to 300 m in depth. For further works, it is considered that the IP geophysical survey will be conducted in the mineralized zone in order to clarify the scale of the mineralization. If the results of the survey turns out to be promising, drilling survey should be conducted in the geophysical anomaly.

2-4-2 The Mogoin gol/Khujiriin gol area

(1) Generality

The area is located approximately 25 km northwest from Erdenet city and about 1,240m to 1,700masl. As shown in Fig.II-2-13, the topography consists of steep to gentle hills. The vegetation in the area is composed of coniferous forests and tall grass in the hill and valley and low grass along

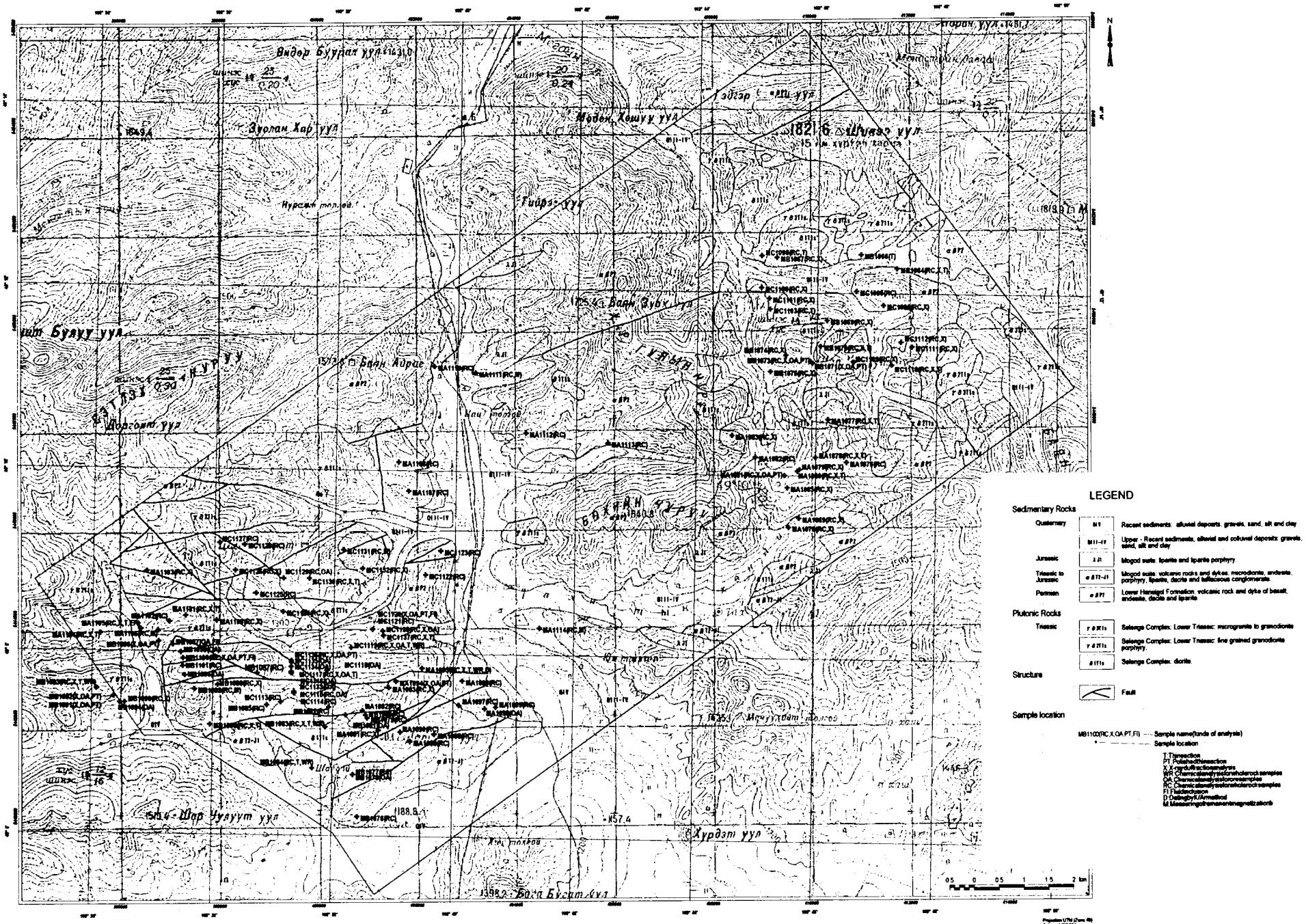


Fig. II-2-13 Survey location and sample locations map of the Mogoin gol/Khujiriin gol area

streams. The condition of the outcrop is bad because of the high and abundant grass.

Two mineral showings exist in the area: Mogoin gol mineral showing in eastern part and Khujiriin gol mineral showing in western part.

It takes about 1.5 hours to go from Erdenet city to the Khujiriin gol mineral showing. Accessibility is good. The height is 1,195 m asl. The copper oxide minerals are observed in the mineral showing. The direction of the mountain ridge and the streams is along the WSW-ENE direction. Topography becomes low towards the ENE direction.

According to the previous existing data, the Mogoin gol mineralized zones were discovered in the area in 1967. In 1971, geological mapping survey was carried out in a scale of 1: 50,000, while in 1981, the 1: 25,000 geological mapping was performed.

In the Mogoin gol mineral showing, secondary quartzite with copper minerals was confirmed in the areas of 15m×0.5km and 4km×2km. Previous analytical data indicates that ore assay were Cu 0.034 % to 0.074 % and Mo 0.002 % to 0.018 %. Shout drillings were conducted in mineral showings but the typical mineralizations were not detected.

(2) Geology

The geology of the area is shown in Fig. II-2-14. Stratigraphy, Geological structure and mineralization are as follows:

(i) Stratigraphy

According to the previous data of the geological map (1: 25,000 in scale), the area presents Permian volcanic rocks, Triassic to Jurassic volcanic rocks, Permian to Triassic granites, Jurassic stocks, dykes and Quaternary deposits.

The Permian in the area is called as Khanigol Formation ($\alpha\beta$P2) and consists of 3rd suite of siliceous siltstone with flora, sandstone, gravel stone, conglomerate, tuffogene basalt, trachy-basalt, tuff, basic and acidic volcanic rock. The formation is widely distributed in the central to eastern part of the area.

Triassic to Jurassic is called Mogod suite and consists of volcanic rocks of andesite, basalts and their tuff. The suite is distributed in the southwestern part of the area.

Jurassic is composed of liparite, dacite and andesite and distributed in the northeastern part of the area.

Permian to Triassic granites in the area are called as Selenge complex and mainly composed of early Triassic diorite(δT1s), granodiorite($\delta\gamma$T1s) and granite(γT1s). The diorite(δT1s) is distributed in the western, central and eastern parts of the area. The granodiorite($\delta\gamma$T1s) is distributed in the western and eastern parts in the area. The dating results indicated that the age of the granodiorite is 195 Ma and in the early Jurassic of the geologic age. The granite(γT1s) is distributed in the eastern part of the area.