

638 ppm, Zn 71 to 689 ppm, Au 2 to 10 ppb, Ag 1.1 to 10.1 ppm and Mo 3 to 188 ppm.

In the Erdenet SE (Oyut) ore deposit, the ore reserve is confirmed to be 41,890,000 t (Cu: 0.40 %, Mo: 0.007 %).

The previous geophysical survey in the Erdenet Mine area indicates that the Erdenet NW ore deposit is located in lowest magnetic zone, in a typical highest chargeability and in a relatively lower resistivity zone. The results of the previous geophysical survey have clearly detected the North-south fault.

2-4-5 The Danbatseren area

(1) Generalities

As shown in Fig. 2, the area is located 25 km southwest of Erdenet city with an approximate elevation of 1,240m to 1,440m. The topography shows steep to gentle hills as shown in Fig. II-2-35. The vegetation in the area consists of low grass in hills and along the streams.

From 1972 to 1983, geological mapping survey was carried out in the area. At the same time, a geochemical survey as well as geophysical surveys including magnetic survey and IP surveys were carried out in the area. From these results, weak geochemical anomalies of Cu, Pb, Zn, Mo and Au were detected as well as high resistivity anomalies and high IP anomalies.

(2) Geology

The geology of the area is shown in Fig. II-2-36. Stratigraphy, geological structure and mineralization are as follows:

(i) Stratigraphy

The area presents Permian volcanic rocks, Triassic to Jurassic volcanic rocks, Permian granites, stocks, dykes and Quaternary deposits.

The Permian is composed of early to middle Permian ($\alpha \lambda$ P1-2) consisting of rhyolite, liparite, dacite, andesite, basalt and tuff. The formation is distributed in southwestern part of the area.

The Triassic to Jurassic rocks is called as Mogod Suite ($\alpha \beta$ T2-J1) and consists of andesite – basalt, basalt, trachybasalt, tuff, tuffaceous conglomerate. The suite is distributed in northern part of the area.

The Permian granites called as Selenge complex is mainly composed of diorite (δ 1T1s) and granodiorite (δ γ 2T1s). The diorite (δ 1T1s) is distributed in central and southern parts of the area. The granodiorite (δ γ 2T1s) is distributed in the central and eastern parts of the area.

The stocks are composed of Jurassic liparite porphyry (λ π J1).

Dykes consist of andesite and basalt.

Quaternary deposits are composed of boulder, single, loam and clay.

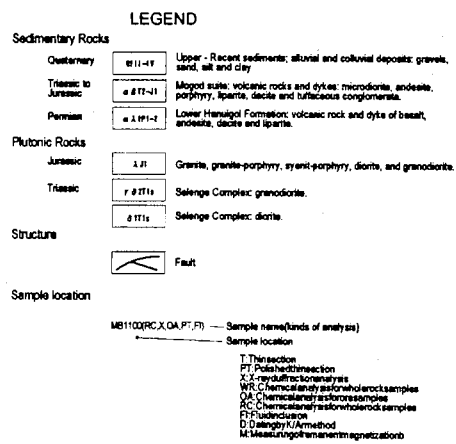
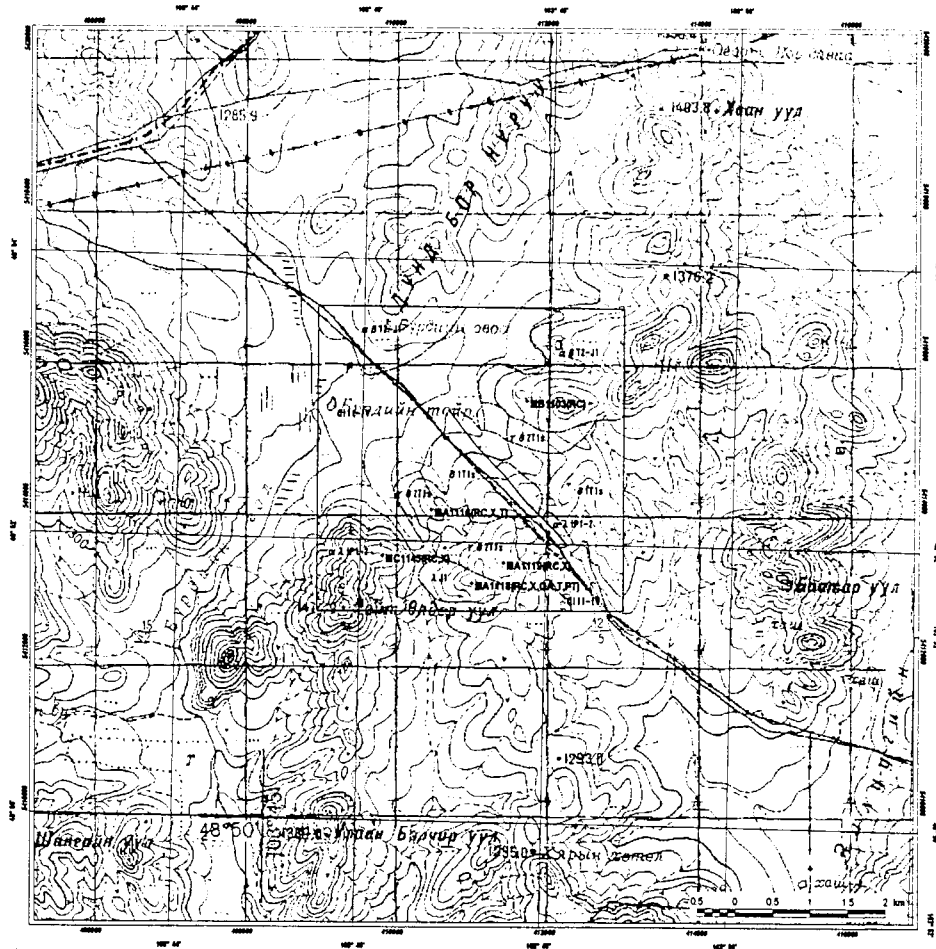


Fig. II-2-35 Survey location and sample locations map of the Danbatseren area

(ii) Geological structure

Fault structures are developed in the area along the main directions NW-SE to WNW-ESE. The granitic bodies are distributed trending north to south direction.

(3) Mineralization

The Danbatseren mineral showing is observed in the southern hill of the Danbatseren area. Previous geological surveys were conducted from 1982 to 1983 and elaborated the geological map at 1: 25,000 in scale. At the same time, geochemical and geophysical surveys were also conducted. The geological map is shown in Fig. II-2-37.

In the Danbatseren mineral showing, it is observed secondary quartzite and strongly silicified zone and accompanied with hydrothermal breccia. Many quartz veinlets are observed in the silicified rocks. The secondary quartzite includes many equigranular quartz grains. The host rock is not clear but it may be liparite according to the previous data. The trench of 60 m in length is observed on the top of the hill.

According to the results of X-ray diffraction analysis (Fig. II-2-38), the alteration minerals assemblage of quartz-jarosite-Kaolinite type is confirmed in the secondary quartzite as shown in Appendix 4. Ore mineral observations indicated that ore mineral assemblage consists of goethite, hematite and limonite. Analytical values for ore assay show Cu 0.004 %, Pb 0.004 % and Zn 0.004 %. The results of rock geochemistry is shown in Fig. II-2-39 and Fig. II-2-40.

(4) Previous geophysical survey

As shown in Appendix 17, previous geophysical survey carried out around the mineral showing of the Danbatsern area indicated the following characteristic in the magnetic survey and IP geophysical survey:

- i) Mineral showing is located in relatively high magnetic zone
- ii) High chargeability zone presents an elliptical shape along EW direction
- iii) Mineral showing is located in a south high chargeability zone

(5) Summary

Secondary quartzite and strongly silicified zone is developed in the Danbatseren mineral showing, accompanied with hydrothermal breccia. Many quartz veinlets are observed in the silicified rocks. Ore mineral observations indicated that ore mineral assemblage consists of goethite, hematite and limonite.

The Danbatseren mineral showing is distributed in the previous geophysical anomalies that show relatively high magnetic zone and high chargeability zone.

The alteration minerals assemblage is the quartz-jarosite-kaolinite type. The values of Al

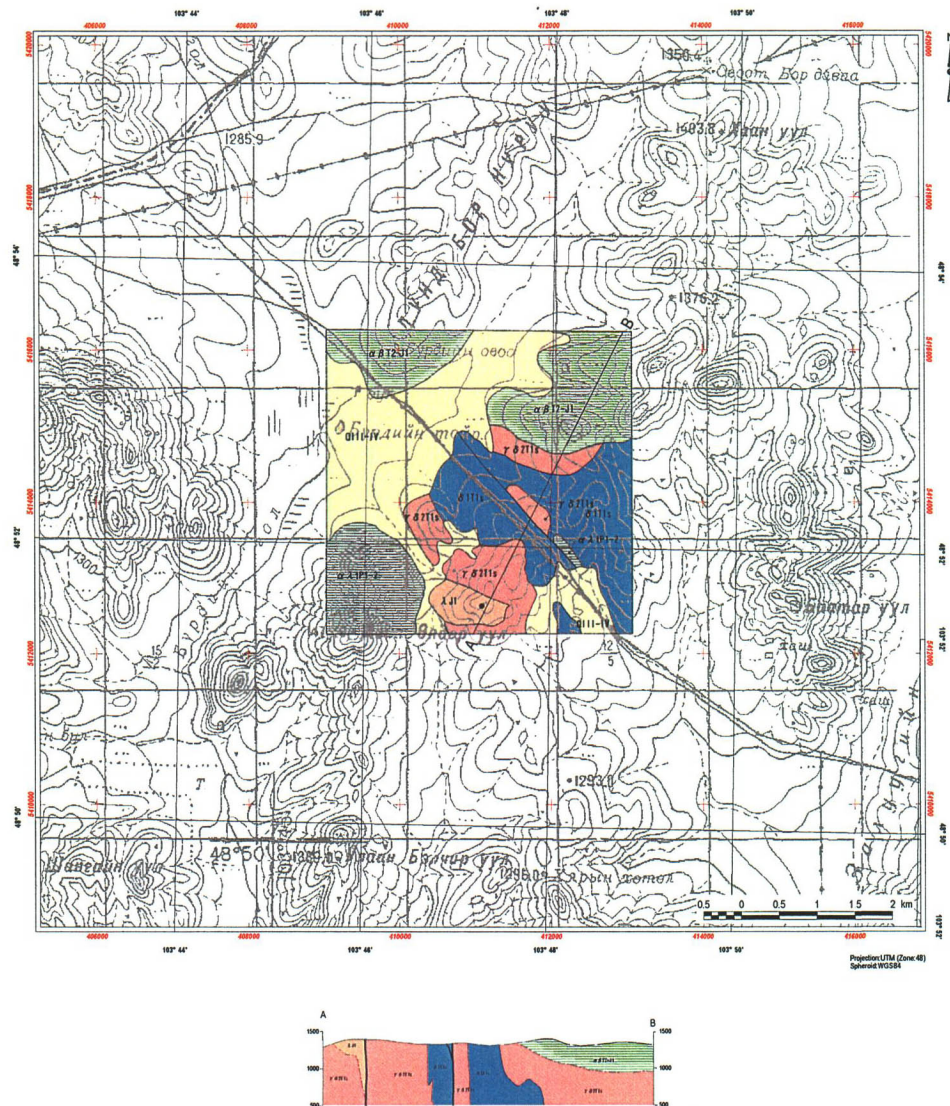


Fig. II-2-36 Geological map, cross section and mineral showings of the Danbatseren area

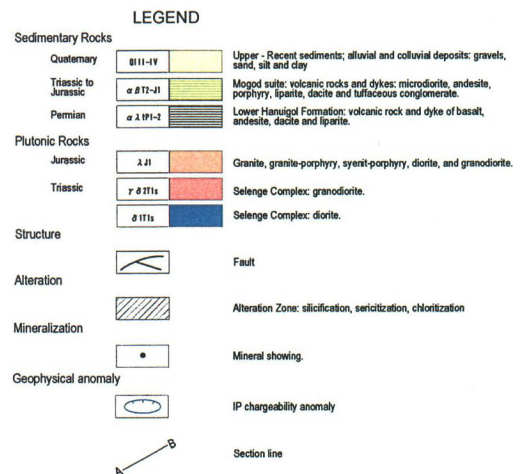
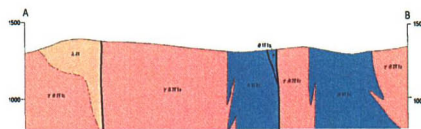
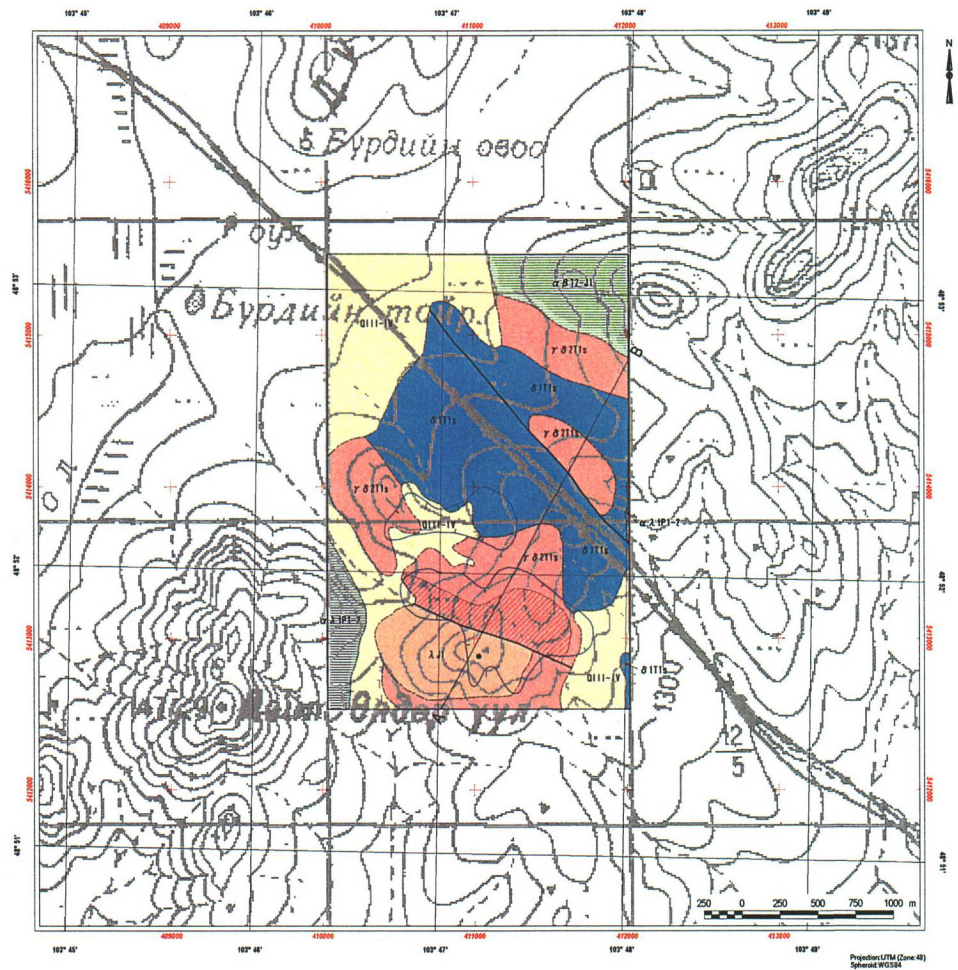
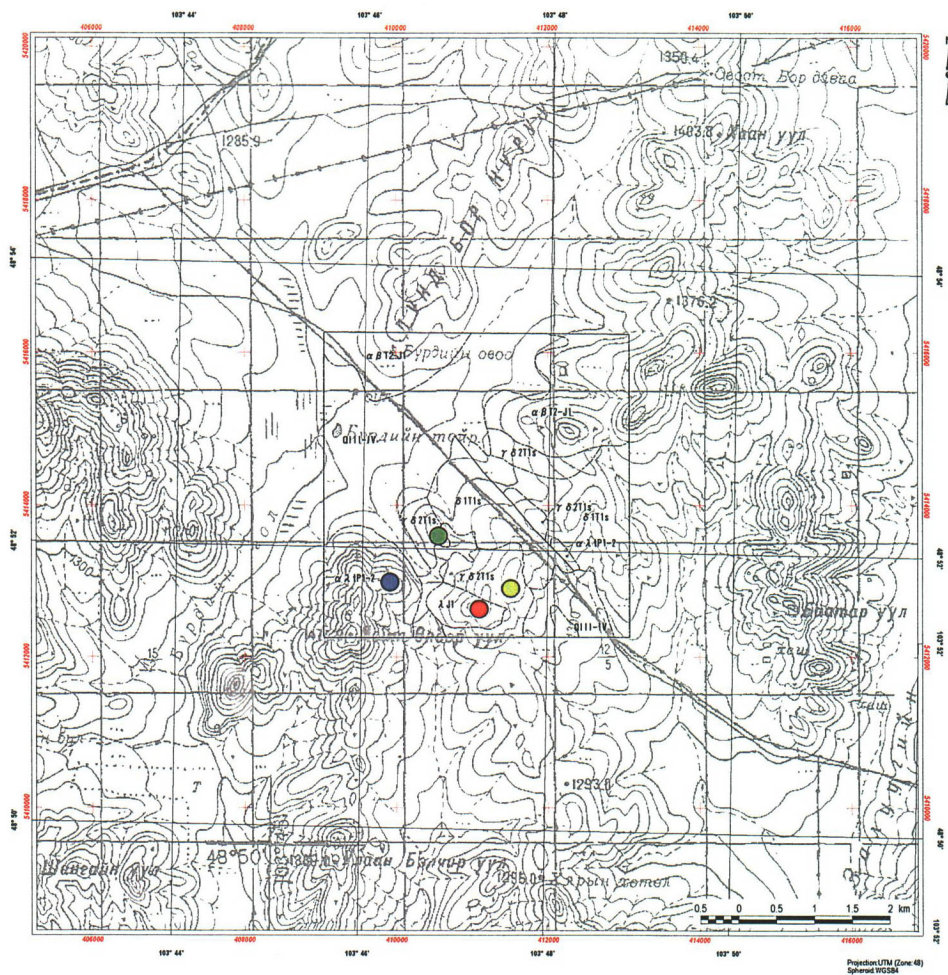


Fig. II-2-37 Geological map, cross section and mineral showings of the Danbatseren area



LEGEND

Sedimentary Rocks	
Quaternary	□ 0111-IV Upper - Recent sediments; alluvial and colluvial deposits: gravels, sand, silt and clay
Triassic to Jurassic	□ α BT2-III Mogod suite: volcanic rocks and dykes; microdiorite, andesite, porphyry, liparite, dacite and tuffaceous conglomerate.
Permian	□ α λ IP1-2 Lower Hanuigel Formation: volcanic rock and dyke of basalt, andesite, dacite and liparite.
Plutonic Rocks	
Jurassic	□ λ II Granite, granite-porphyry, syenit-porphyry, diorite, and granodiorite.
Triassic	□ γ δ IT1s Selenge Complex: granodiorite.
	□ δ IT1s Selenge Complex: diorite.
Structure	
	— Fault
Alteration Type	
● Oz-(Jaro)-(Kao)	● Oz-Ser-(Kf)-(Kao)
● Oz-Alu-(P-Pr)- (Kao)	● Oz-Pyro-(Kao)
● Oz-Alu-Ser-(Kao)	● Oz-And
● Ser-(Smec)	● Oz-And-Ser
● Ser-Chl-(Smec)	
● Chl	
● Kao	
● Fresh	

Fig. II-2-38 Distribution map of alteration mineral assemblages in the Danbatseren area

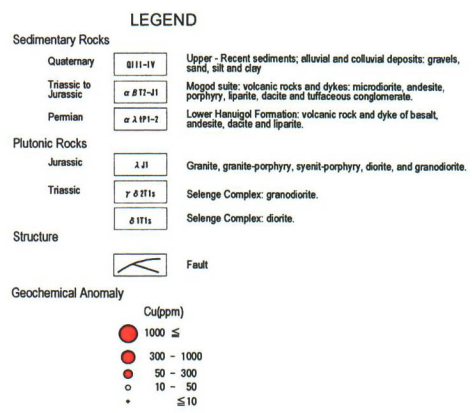


Fig. II-2-39 Distribution map of Cu anomaly in the Danbatseren area

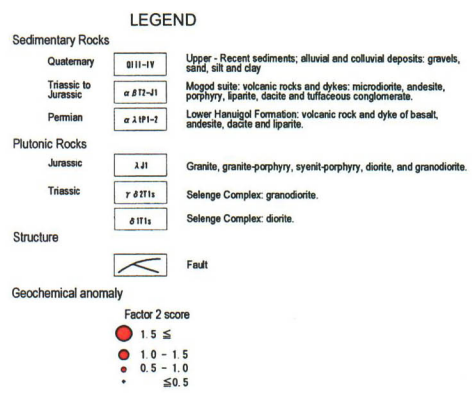


Fig. II-2-40 Distribution map of factor 2 scores in the Danbatseren area

contents are low. Analytical values for ore assay show Cu 0.004 %, Pb 0.004 % and Zn 0.004 %.

(6) Discussion

The alteration mineral assemblage of quartz-jarosite-kaolinite type is observed in the white argillized and silicified zone and shows the deeper part of the litho-cap and the path of the hydrothermal water with high temperature. The previous geochemical exploration did not detect the geochemical anomaly, but the previous geophysical exploration detected a small-scale zone with high chargeability values.

The porphyry copper mineralization may have occurred in the area but since the scale of the mineralization is small, the mineral potential in the area is inferred to be low.

2-4-6 The Undrakh area

(1) Generalities

As shown in Fig. 2, the area is located about approximately 50 km west from Erdenet city with an approximate elevation of 1,440m to 1,500m. The topography shows gentle hills as shown in Fig. II-2-41. The vegetation in the area consists of low grass in hills and along the streams.

Mineralization is located at the geographic coordinates 48° 42' 03" N and 102° 45' 45" E with very small outcrops of mineralization.

In 1986, geological mapping survey was carried out in the area resulting in the discovery of mineralization. As a follow up, trench survey, geophysical survey including magnetic survey and IP survey and drilling survey were carried out in the area.

According to MMAJ (2001), the mineralization type was inferred to be hydrothermal metasomatism type. The scale of the alteration is small in the area. The alteration minerals of K-feldspar and tourmaline are confirmed in the mineralized zone. Ore minerals consist of malachite, bornite, covelite, azurite and Turkish stone. The values of the ore assay are Cu 15,000 to 7,000 ppm, Mo 3 to 700 ppm, Ag 10 to 10 ppm and Pb 15 ppm.

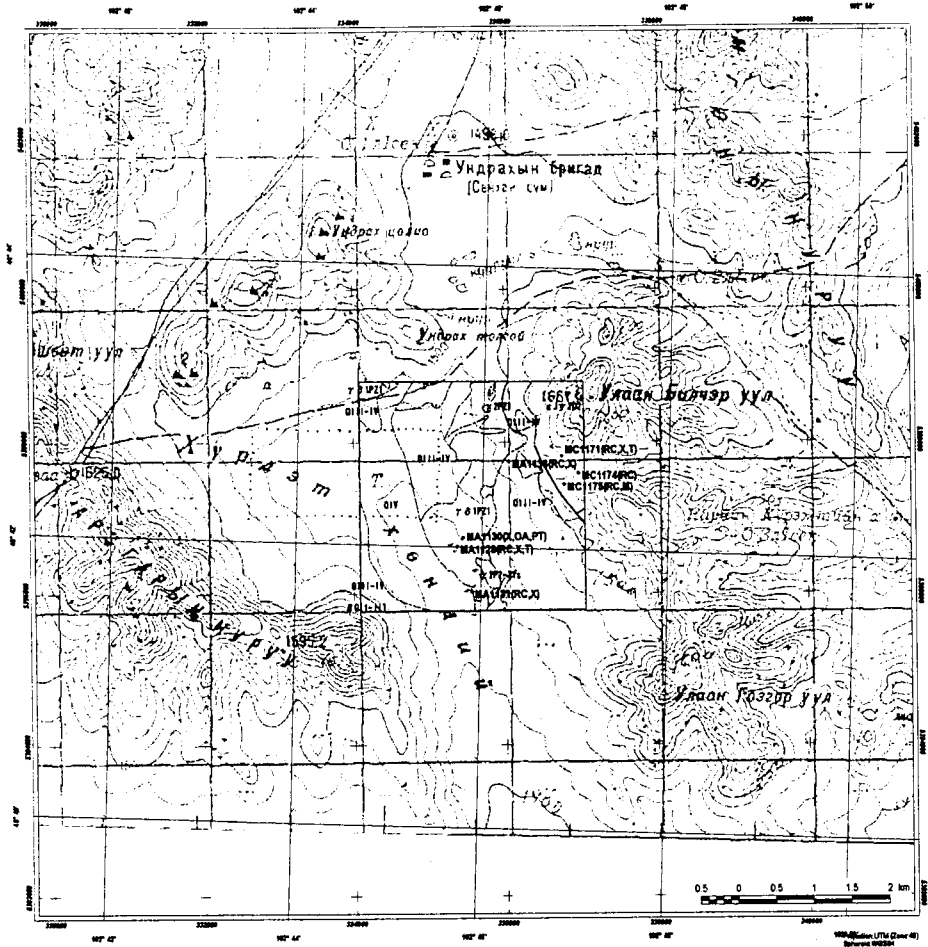
(2) Geology

The geology of the area is shown in Fig. II-2-42. Stratigraphy, geological structure and mineralization are as follows:

(i) Stratigraphy

The area presents early Paleozoic granite, Devonian granite, Permian to Triassic granites, stocks, dykes, Quaternary volcanic rocks and Quaternary deposits.

The Paleozoic granite consists of granodiorite ($\gamma \delta$ 1PZ1), granodiorite ($\gamma \delta$ 2PZ1) and granite ($\gamma \delta$ 2PZ1). The granodiorite ($\gamma \delta$ 1PZ1) is widely distributed in the area while the granodiorite ($\gamma \delta$



LEGEND

Sedimentary Rocks

Quaternary

- Q1Y Recent sediments: alluvial deposits: gravels, sand, silt and clay
- Q2Y Non segmented sediments: conglomerate, gravel, sand, loam
- Q11-Y Upper - Recent sediments; alluvial and colluvial deposits: gravels, sand, silt and clay
- Q11-111 Basalt with olivine-pyroxene.

Plutonic Rocks

Permian to Triassic

- T1P1-T1s Selenge Complex: granite.

Devonian

- D1P1-T1s Selenge Complex: granite to syenite

Devonian

- D1P1-T1s Medium grained biotite granite, alkaline diorite, granite. Second phase

Paleozoic

- P1P21 Biotite granite, plagioclase-granite.

- P1P22 Adenellite, granodiorite, tonalite.

- P1P23 Adenellite, granodiorite, tonalite.

Structure

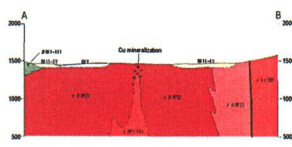
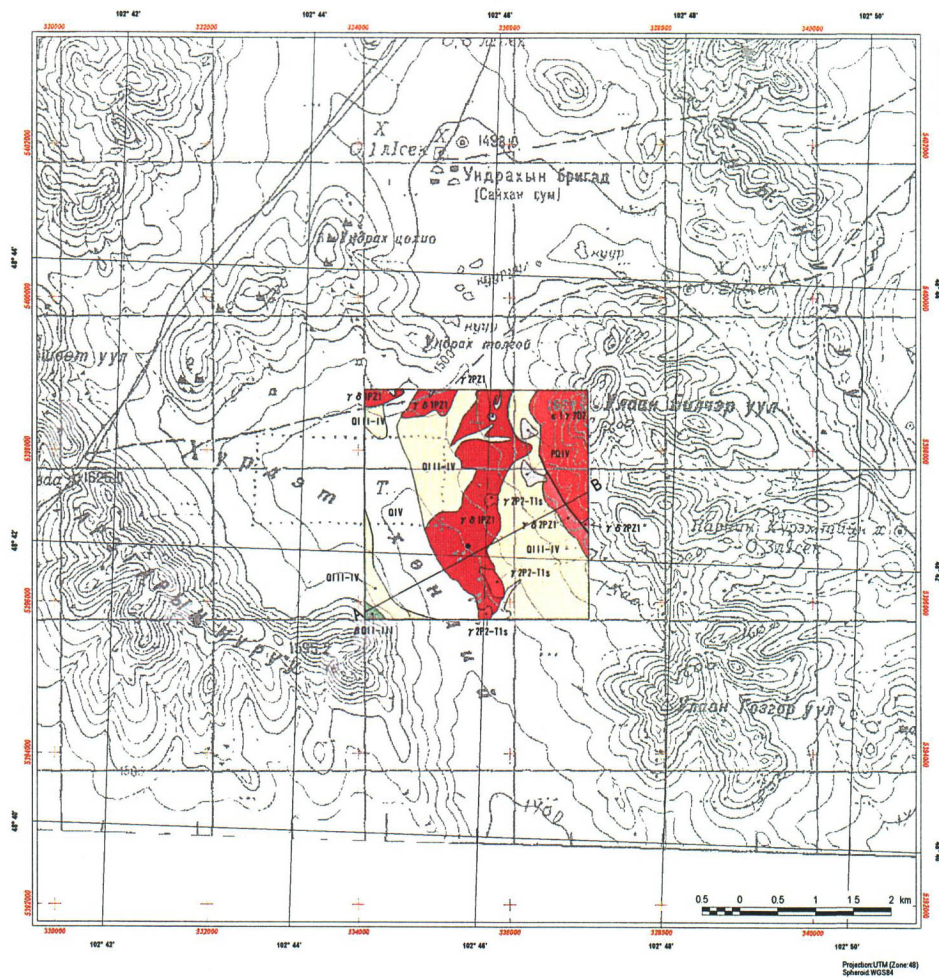
- Fault

Sample location

- MB1100(RC,X,OA,PT,F) Sample name (kind of analysis)
- Sample location

- T. Thin section
- PT. Petrochemical reaction
- X. X-ray fluorescence
- WR. Chemical analysis for whole rock samples
- CA. Chemical analysis for carbonate samples
- RC. Chemical analysis for whole rock samples
- P. Thin section
- D. Datasheet
- M. Massingol method
- M. Massingol method

Fig. II-2-41 Survey location and sample locations map of the Undrak area



LEGEND

Sedimentary Rocks									
Quaternary	<table border="0"> <tr> <td>QIV</td> <td>Recent sediments: alluvial deposits: gravels, sand, silt and clay</td> </tr> <tr> <td>Q0IV</td> <td>Non segmented sediments; conglomerate, gravel, sand, loam</td> </tr> <tr> <td>Q11-IV</td> <td>Upper - Recent sediments; alluvial and colluvial deposits: gravels, sand, silt and clay</td> </tr> <tr> <td>Q011-111</td> <td>basalt with olivine-pyroxene.</td> </tr> </table>	QIV	Recent sediments: alluvial deposits: gravels, sand, silt and clay	Q0IV	Non segmented sediments; conglomerate, gravel, sand, loam	Q11-IV	Upper - Recent sediments; alluvial and colluvial deposits: gravels, sand, silt and clay	Q011-111	basalt with olivine-pyroxene.
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Q11-IV	Upper - Recent sediments; alluvial and colluvial deposits: gravels, sand, silt and clay								
Q011-111	basalt with olivine-pyroxene.								
Plutonic Rocks									
Permian to Triassic	<table border="0"> <tr> <td>γ P21-11s</td> <td>Selenge Complex: granite.</td> </tr> <tr> <td>γ G P22-11s</td> <td>Selenge Complex: granite to syenite.</td> </tr> </table>	γ P21-11s	Selenge Complex: granite.	γ G P22-11s	Selenge Complex: granite to syenite.				
γ P21-11s	Selenge Complex: granite.								
γ G P22-11s	Selenge Complex: granite to syenite.								
Devonian	<table border="0"> <tr> <td>ε 1 γ 202</td> <td>Medium grained biotite granite, alkaline alkalsite, granite. Second phase</td> </tr> </table>	ε 1 γ 202	Medium grained biotite granite, alkaline alkalsite, granite. Second phase						
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Paleozoic	<table border="0"> <tr> <td>γ P21</td> <td>Biotite granite, plagioclase-granite.</td> </tr> <tr> <td>γ G P21</td> <td>Adamellite, granodiorite, tonalite,</td> </tr> <tr> <td>γ G P21</td> <td>Adamellite, granodiorite, tonalite,</td> </tr> </table>	γ P21	Biotite granite, plagioclase-granite.	γ G P21	Adamellite, granodiorite, tonalite,	γ G P21	Adamellite, granodiorite, tonalite,		
γ P21	Biotite granite, plagioclase-granite.								
γ G P21	Adamellite, granodiorite, tonalite,								
γ G P21	Adamellite, granodiorite, tonalite,								
Structure									
	<table border="0"> <tr> <td></td> <td>Fault</td> </tr> </table>		Fault						
	Fault								
Mineralization									
	<table border="0"> <tr> <td></td> <td>Mineral showing.</td> </tr> <tr> <td></td> <td>Section line</td> </tr> </table>		Mineral showing.		Section line				
	Mineral showing.								
	Section line								

Fig. II-2-42 Geological map, cross section and mineral showings of the Undrak area

2PZ1) is partly distributed in west part of the area, and the granite (γ 2PZ1) is partly distributed in northern part of the area.

The Devonian granite consists of late Devonian granite (ϵ \cup γ D2). The granite is distributed in the northeastern part of the area.

The Permian to Triassic granites called as Selenge complex are composed of granite(γ 2P2-T1s), syenitic diorite(γ ξ 2P2-T1s). The granite(γ 2P2-T1s) is distributed in the central part of the area. The syenitic diorite(γ ξ 2P2-T1s) is distributed in the northern part of the area.

The Dykes consist of diabase, fine grained diorite and granite basalt.

The Quaternary volcanic rocks consists of amigdaloidal alkaline basalt (β Qii-iii).

The Quaternary deposits are composed of boulder, single, loan and clay.

(ii) Geological structure

Fault structures are developed in the area along the main directions NW-SE.

(3) Mineralization

The geological map of the mineralized zone is shown in Fig. II-2-43. The mineralized zone is observed in the central low ground of the Undrakh area and consists of alteration zone with malachite minerals along fractures in granite. The trenches are observed in central part of the mineralized zone.

The host rock is altered by weak potassium alteration and weak silicification. The quartz veinlets are weakly developed in the granodiorite accompanied with malachite and limonite minerals. The scale of the alteration is small and weak.

In view of the results of X-ray diffraction analysis (Fig. II-2-44), alteration minerals of quartz and sericite were detected as shown in Appendix 4. Ore mineral observation indicated that ore mineral assemblage consists of pyrite, goethite and hematite.

Analytical values for ore assay show Cu 0.011 %, Pb 0.002 % and Zn 0.002 %. As shown in Fig.II-2-45 and Fig.II-2-46, the rock chemical anomalies could not be observed in the Undrak mineral showing of the area.

(4) Previous geophysical survey

As shown in Appendix 18, previous geophysical surveys were carried out around the mineral showing in the Undrakh area indicated the following IP characteristics:

- i) High chargeability zone along NS direction
- ii) Mineral showing is located on an unclear high chargeability zone
- iii) Mineralized zone is located on a relatively high resistivity zone

(5) Summary

In the Undrak mineral showing, the host rock is altered by weak potassium alteration and weak