2-2 Mineral Deposits

In the present survey area, which includes the Kichi-Sandyk deposit, skarn is frequently formed at the contact areas between the lower Carboniferous limestone and the Carboniferous and Permian intrusive rocks such as diorite, granodiorite, monzonite and granodiorite porphyry. Mineralization of copper-gold, antimony, tungsten and molybdenum are observed in the skarn. It is suggested that the skarn formed by early Permian granodiorite porphyry(Chalmansay complex) exhibits higher gold content than that by the Chandalash-Chatkal complex.

According to the results of the previous explorations by the Kyrghyz, two ore showings of Kichi-Sandyk and Turpak-Tushty have been identified as promising areas for copper-gold deposits. Furthermore, several other ore showings have been also entrapped. 200 tons of gold (140t in the Kichi-Sandyk district) and 350 thousand tons of copper are expected as the potential for this area.

Outlines of each mineral showing are described below.

2-2-1 Kichi-Sandyk ore showing area

The Kichi-Sandyk ore showing is situated in the 25 km^2 area on the southern slopes of the Pskem mountain range between the valley of Achyktash and the valley of Karayangryk. This region is known for having many ore showings, and is divided into two major sub-areas -- the Kichi-Sandyk ore showing area (consisting of the central and northern mineralization zones) in the central part of the Kichi-Sandyk anticline; and the surrounding ore showing area (Drevneye, Opolznevoye, Pologoye, Achyktash Left-bank, Kichi-Sandyk, Kvartzevoye and Neogenovoye) (Fig. I-3-4).

1) Kichi-Sandyk ore showing area

This is situated in the central part of the Kichi-Sandyk anticline which runs northeast, and mineralization occurs in association with the skarn which develops between silt-carbonate sediments of the upper Cambrian to the lower Carboniferous systems (Visean series) and the Chalmansay body of early Permian. A sharp fault topography running northwest is characteristically seen in this area, and it determines vein shaped mineralization zones in the granodiorite porphyry in the central mineralization zone.

The surface area is completely oxidized. The zone of oxidation (the residual of weathering) was mined in the 6th and the 7th century as deep as 10 to 20 meters. There are many sites of old open mining, of which the largest one is 800m long and 500m wide. It is expected that oxidization extends as deep as 20 to 25 meters below

the surface.

There are two types of mineralization, bedded mineralization of exo-skarn and vein shaped mineralization of endo-skarn, identified by the trenching survey, tunnel exploration (20m) in the shallow depth and cleaning of a group of ore veins conducted by the Kyrghyz.

Occurrence of gold (3.7～4.3g/t) and copper (0.52%) in the bedded mineralization zone (4～9.4m wide), and also gold (2.7～9.3g/t) and copper (0.38～1.28%) in the vein shaped mineralization zone (4～8.5m) has been confirmed and reported by the Kyrghyz.

Mineralization is related with garnet skarn, and rarely with pyroxene skarn. The garnet is composed of andradite-grossularite and pale green to brown in color, and it is replaced by carbonate minerals and epidote. The pyroxene is hedenbergite.

The major ore minerals in the mineralization zone are native gold, silver and copper minerals. Chrysocolla malachite and azurite are found frequently as secondary minerals of copper, in aggregate of 0.1mm～several millimeters. Native gold accompanies with these copper secondary minerals. The sizes of its grain are 0.01mm～1.0mm, and smaller grains are more numerous than larger grains.

As for sulfide minerals, bornite and chalcopyrite are most common, and chalcocite and covellite are found rarely. Bornite and chalcopyrite form closely aggregate, and high grade gold (10g/t～300g/t) and silver (100g/t～1,500g/t) are found in it.

2) The surrounding ore showing area

There are seven ore showing zones, Drevneye, Opolznevoye, Pologoye, Achyktash Left-bank, Kichi-Sandyk II, Kvartzevoye, and Neogenovoye, surrounding the western and southern sides of the Kichi-Sandyk ore showing area (Fig.I-3-4).

(1) Drevneye ore showing zone

This zone is situated about 1km west of the Kichi-Sandyk central mineralization zone. Skarn is found at the contact of granodiorite porphyry and crystalline limestone, part of which is covered with talus. There is evidence for past mining.

Distribution of the skarn is estimated to extend 150m×250m,and some bornite and a small amount of chalcopyrite are disseminated in the mineralized skarn (mining waste). Mineralization zones of gold with the grade at 9.0g/t and

18g/t have been found by the trenching survey.

(2) Opolznevoye ore showing zone

This zone is situated about 2.2km southwest of Kichi-Sandyk central mineralization belt, on the left side of Achyktash valley at the altitude between 2,700m and 2,750m.

Crystalline limestone is intruded by a small body of granodiorite porphyry, and pyroxene and garnet skarn is found along the boundary. The northern and eastern sides of the skarn are covered with talus. The skarn is as thick as 35m, and partially silicified. Sulfide copper and its secondary minerals are disseminated irregularly. There is evidence of past mining.

Lens and vein like garnet skarn develops in the granodiorite porphyry, Gold content of 2g/t is found in the skarn collected by the trenching survey, and lump samples with gold content of 12.5g/t, silver of 19.4g/t and copper of more than 1% have been confirmed.

(3) Pologoye ore showing zone

This zone is situated about 2.4km west of Kichi-Sandyk central mineralization zone. Crystalline limestone is intruded by dykes and small bodies of granodiorite porphyry, and garnet skarn is found along the boundary. Vein skarn is also fund in granodiorite porphyry. The thickness of the skarn is 3m to 7m and copper sulfide and its secondary minerals are disseminated. There is evidence of past mining. The skarn sample from the old trench contains 3.2g/t of gold.

(4) Achyktash left bank ore showing zone

This zone is situated about 3km west of Kichi-Sandyk central mineralization zone. Crystalline limestone is intruded by the stock of granodiorite porphyry, and skarn occurs in the limestone. The skarn zone composed of garnet skarn, garnet-clinopyroxene skarn and skarnized limestone occupies in approximate range of 180m × 250m, in which native gold bearing copper sulfide and its secondary minerals are observed.

There is evidence of past mining, and a range between 2.5g/t to 10g/t of gold content is confirmed.

(5) Kichi-Sandyk II ore showing zone

This zone is situated about 3.8km west of Kichi-Sandyk central

mineralization zone, on the left side of Achyktash valley at the altitude between 2,800m and 2,900m.

Crystalline limestone is intruded by dykes and stocks of granodiorite porphyry, and is partially overlain by reddish conglomerate of upper Neogene and talus of Quaternary. Along the contact between granodiorite porphyry and limestone, clinopyroxene-garnet skarn and garnet skarn extend about 30m × 180m. In the skarn sulfide minerals such as chalcopyrite, chalcocite, bismuthinite and stibnite and in the oxidized zone the secondary minerals are found.

Gold content ranges 0.5g/t to 1g/t and rarely reaches 5g/t, and copper of less than 0.5% and silver of 41.9g/t are also confirmed. The area with strong pyrite dissemination in granodiorite porphyry, extends in an approximate range of 250m × 300m , in which low gold content of 0.1g/t to 0.7g/t are known.

(6) Kvartzevoye ore showing zone

This zone is situated 0.7km to the south of Kichi-Sandyk central mineralization zone.

Networks of quartz veinlets have developed in the granodiorite porphyry, in which the remains of exo-skarn and end-skarn are also included. The southern part of the body is partially overlain by the conglomerate and loam of the upper Neogene. Networks of quartz veins with diverse directions and 0.5 to 3cm in width have developed in an approximate range of 600m × 500m, in which pyrite and chalcopyrite are disseminated. Low grade of gold at 0.7g/t (rarely 4.9g/t) are shown in this zone.

(7) Neogenovoye ore showing zone

This zone is situated 1.4km to the south of Kichi-Sandyk central mineralization zone. Granodiorite porphyry and skarn occur in brown clay and conglomerate of the Neogene like fenster. Skarn occupies a range of 360m^2, and quartz veins with diverse directions are observed. In this skarn chalcopyrite and stibnite are weakly disseminated in association with a small amount of native gold. Gold content of 1～1.5g/t, silver content of 4g/t, and copper content of 1.1% are obtained.

2-2-2 Turpak-Tushty Ore Showing Area

This zone is situated about 13km to the south of Kichi-Sandyk ore showing and is located in the left bank of lower part of Chandalash river and around the valley of Turpak-Tushty.

Geological survey of this mineral showing area began in 1963, the survey from 1969 to 1987 revealed a lot of mineral showings in the area between the Aksay valley and the Aktush valley (Fig. I -3-3).

Crystalline limestone of lower Carboniferous, volcanic sediments(Minbulak formation) of middle Carboniferous and diorite – granodiorite (Chandalash-Chatkal complex) of early Permian age which intrude into the Minbulak, are overlain on this area. A small quartzporphyry stock(Chalmansay complex) of early Permian and dikes of granodiorite-diorite are also intruded.

In the mineral showings fault geography is developed and the Dzhetyzingan fault and the Kokusay fault are exhibited as major fault.

Mineralization in this mineral showing is specialized for hydrothermal quartz-sulfide vein, bedded skarn and polymetals mineralization accompanied with gold and bismuth. In this area there are about 20 mineral showings such as Turpak-Tushty, Tegermen, Jetyzindan, Akkomou, Otvalnoe and Kokayky, and more than 55 mineralization points are confirmed. Main mineral showings are shown in Table II -2-2(1), (2).

1) Turpak-Tushty ore showing zone

This zone is situated on the left side of Chandalash valley and in the edge of the southwest of the Chandalash mountains, at the altitude between 2,780m and 3,200m.

From 1969 to 1976 geological survey, excavation by trenching and digging of a short tunnel were carried out in this mineralization area.

In the granodiorite porphyry accompanied with abundant pyrite, hydrothermal alteration zone consists of quartz and sericite, and embeds the mineralization of gold. The mineralization zone tends to northeast strike and strict inclination of 80° to 85° dip. This zone changes crushed zone in limestone associated wit sulfide toward the northeast direction. The width of this mineralization varies 1m to 12.6m and its average is 1.95m to 2.2m. The continuity of mineralization can be pursued for 1.5km to strike and might be estimated for 100m below.

The main constituent minerals are quartz, feldspar, chlorite, sericite and calcite, accompanying with pyrite, native gold, a little of chalcopyrite, galena, sphalerite, bismuth and molybdenite. As a result of the survey from 1980 to 1987, ore reserve(P1) are 695 thousand tons and 2.9 ton in gold (average grade is 4.22g/y).

Table II-2-2(1) List of Ore Deposits and Showings in the Kichi-Sandyk Area

Ore field	Name of ore showings	Location	Geological Characteristics	Description of mineralization
Turpak-Tushty	Turpak-Tushty	At the souyh-western end of Chandalash ridge on a left board of Chandalash valley.Distance from the deposit site to the nearest village of Jany-Bazar, using ground road, is 25km.	The deposit localized in steeply-falling zones of hydrothermally altered rocks, which consisted of quartz and sericite with a lot of pyrite. Zones cut granodiorite, also in exso-skarns.	Ore zone has a NE strike and steepdipping(80-85°)to SE. It transits into limestone in the form of crushing zone with a sulfide mineralization. Au grade in limestone is lower than in granodiorite. Width of the main ore body ranges 12.6m to 1m; average width is 1.95-2.2m. Traced extension along the strike is 1.5km; to the depth 100m.
Turpak-Tushty	Tegermen	At the right side of upper part of the Akkomu stream, to the south-west from the Turpak-Tushty deposit.	The area composed of carbonate rocks of lower Carboniferous, forming a folding in syncline	Mineralization is represened by two types of ore bodies:in skarns and quartz veins. Mineralization in skarns is poor, gold grade in veins is traces to 3g/t, silver from traces up to 18g/t. Width 0.1-2.0m,Max. 50m
Turpak-Tushty	Otavalno (Jetyzindan)	Jetzindan mountain, 3km to the south-west from yhe Turpak-Tushty deposit.	Limestones, where extended skarn deposits are developed	Mineralization shown in skarns and silisified limestone
Turpak-Tushty	Akkomou	At the upper part of the Akkomou stream, 2 km to the south-west from the Turpak-Tushty deposit.	The are composed of granodiorite framed by limestone in Visean age	Mineralization is related to feathering structure of Jetyzindan fault. Ore zone extends to ENE direction. Composed of quartz, hematite and beresite mineralization. An extention of ore bodies is up to 170m, width up to 2.5m, an average gold grade is 3-6g/t, Max.33g/t.
Turpak-Tushty	Kokayky	At the upper part of the Kokayky stream, 2 km to the north from the Turpak-Tushty deposit.	The area composed of diorite and granodiorite	Mineralization is localized in the crushing zone, crosscutting diorite and granodiorite. Width of the zone is 50m and been traced for 800m. Crushed rock consists of pyrite and chalcopyrite, in places where thse minerals intensively developed the Au grade reaches 8.5g/t, Ag 643g/t, Cu 0.7%.

Table II-2-2(2) List of Ore Deposits and Showings in the Kichi-Sandyk Area

Ore field	Name of ore showings	Location	Geological Characteristics	Description of mineralization
Turpak-Tushty	Turpak-Tushty Skarn	At the lower flow of the Turpak-Tushty river, in 3.5km to the north-west from the Turpak-Tushty deposit.	The area composed of the early Carboniferous limestone, intruded by granodiorite.	Mineralization is related to skarn deposition, width of the largest one is up to 30m, extension. Mineralization is polymetallic with high gold grade(up to 5g/t)silver from 1 up to 258g/t,copper;up to 6.5%, zinc;up to 1.2%.
Chandalash	Chandalash	At the middle and upper flow of the Chandalash river, elongated from the north-east direction along the Chandalash river for 15km with a width of 2-3km.	The area composed of carboniferous limestone ~terrigenous deposition of the Chandalash suite of Cambrian - midle Ordovician.In the south portion of the area the Eary Paleozoic depositions changing on limestone and dolomite of the Famen stage of Devonianage. All of these rocks intruded by granodiorite of the middle Chandalash massif of the middle Carboniferous age.	Mineralization is represented by two groups of ore showings:Mo-W-Au-Cu; 35 ore objects were registered within the area: 15 ore showings and 20 ore dots(Au-Cu mineralization) is registered in skarns and sulfide veins. Gold grade is usually low.
Tundyk	Tundyk	In axis of the Pskem range, in the north portion of license area	The area composed of plagiogranite and two mica granite(Beshtor complex). Granite bedding unconformably with conglomerate and overlapped by Riphean-Vendian molassa on a bottom.	25 ore showings 16 ore dots were registered within the area; Au, Au-Cu, Au-polymetal, Ag, As. Ore mineralization was noticed in zones and veins consisting sulfide. Gold gradde is up to 2g/t, silver up to 40g/t, copper up to 1%.
Karayangryk	Karayangryk	Within the watershed portion of the Pskem range, on the north-west portion of the area.	The area composed of plagiogranite of the eary Proterozoic age with diabase and quartz porphyrite dikes, small veins and pegmatite veinlets.	Mineralization is confined to fault zone on the area of 1.5km with a width of 70m. Represented by pyrite, hematite and chalcopyrite, localized within the silicification and crashing zones. Gold grade is up to 3g/t.

2) Tegermen ore showing zone

This zone is situated on the right side of Akkomou valley and in the southwest of the Turpak-Tushty. Limestone of lower Carboniferous and granodiorite, by which limestone is intruded, are overlain in this mineralization zone. Mineralization is controlled by the Jetyzindan fault with the northeast strike and is embedded in skarn and quartz vein. The width of quartz vein is 0.1m to 2m and its length reaches several meter to 50 meter. The mineralization in skarn is weak and quartz vein includes gold content of trace to 3 g/t and silver content of trace to 181 g/t .

3) Otavalno ore showing zone

This zone is situated on the northeast slope of the Jetyzindan mountains and 3 km southwest of the Turpak-Tushty mineralization zone. Mineralization are exhibited in the skarn developed at the contact between granodiorite and limestone, and copper mineralization also occurs in silicified limestone.

3) Akkomou ore showing zone

This zone is situated on the upper stream of the Akkomou river and 2 km southwest of the Turpak-Tushty mineralization zone. Limestone of lower Carboniferous and granodiorite, by which limestone is intruded, are overlain in this mineralization zone. The Jetyzindan fault zone with the northeast strike is developed as main fault, in which the mineralization is shown. The strike of mineralization extends east-northeast and east, 1m to 15m in width. Mineralization is related with crushed zone of quartz and hematite and The content of gold varies trace to 33g/t. Average grade in high grade ore is gold content of 3.6 g/t and silver content of 1 g/t, its width is several centimeter to2.5 meter and its length reaches 170meter.

In this mineralization zone it is excavated until 10m below surface in the past. From the assay results of the waste from there, we conjecture that there was probably high grade ore in the old pits.

4) Kokayky ore showing zone

This mineralization zone is situated on the upper stream of the Kokayky river and 2 km north of the Turpak-Tushty mineralization zone.

Quartz vein of crushed zone with the northeast strike in diorite – granodiorite exhibits mineralization of pyrite and copper. The width of the crushed zone is 50 m

and extends about 800 m. From the place strongly mineralized gold content of 8.5g/t, silver content of 643g/t and copper content of 0.7% are obtained.

6) Turpak-Tushty Skarn ore showing zone

This zone is situated on the lower stream of the Turpak-Tushty river and about 3.5km northwest of the Turpak-Tushty mineralization zone.

Limestone of lower Carboniferous is intruded by granodiorite. Skarn is developed at the contact of both and mineralization of polymetals accompanied with gold is developed in the skarn. A maximum width of the skarn is 30m and 400m in length. Gold content of trace to 5g/t, silver content of several g/t to 258 g/t are obtained. Average grade of whole skarn is not economic. It changes into limestone – dolomite of Devonian (famenian age). The dip of these strata shows low angle (15° to 20°) and also fold structure with gently dip. Above mentioned sediments are intruded by Chandalash – Chatkal complex of later Carboniferous.

2-2-3 Other Ore Showing Area

1) Chandalash Ore Showing

This zone is situated on the upper to lower stream of the Chandalash river and exhibits a rectangle of 15km in length and 2 to 3 km 3.5km.

There are 35 mineralization zones and 15 ore showings and 20 gold – copper mineralization points in this area. It is situated in the southwest end of the Brachia syncline. Limestone and terrigenous deposits of Chandalash formation in Cambrian to middle Ordovician period are overlain. These sediments are intruded by Chandalash – Chatkal complex of later Carboniferous. Felsite of Chalmansay complex (early Permian period) and a small dike of quartz porphyry also intrude in 5 to 6 meter width and associated with arsenopyrite, pyrite and chalcopyrite.

In this area there are rare two mineralization of metal – molybdenum – tungsten and gold – copper, the later is developed. Gold – copper mineralization is exhibited in the skarn formed on the contact between limestone of lower Carboniferous and the intrusive rocks of Chandalash body. Its width reaches several meters.

2) Tunduk Ore Showing

This ore showing is situated in the axis adjacent to the Pskem mountain range and about 10km WWN direction, in which 25 ore showings and 16 mineralization points were discovered.

Plagioclase granite of early Proterozoic and leucocratic two mica granite of Beshtor complex are intruded in this area, on which molasse deposits of middle to upper Proterozoic bearing conglomerate on the basement are overlain in related with unconformity.

Gold bearing quartz veins, silicification zone in granite associated with sulfide and veins along to fault with sulfide are exhibited. In which mineralization of gold, gold – copper, gold – polymetals, silver and arsenic are recognized, gold content of trace to 2 g/t, silver content of 40 g/t and copper content of 1% are obtained.

3) Karayangryk Ore Showing

This ore showing is situated in the upper most stream of Karayangryk river, near the watershed of the south slope of Pskem mountain range. Plagioclase granite belonging to the Beshtor complex of the early Proterozoic, diabase, dikes of quartz porphyry, small veins and a group of veinlets of pegmatite are distributed in this area. These bodies are divided by the northeast-striking Karakanysh fault, and mineralization is observed along this fault zone. This mineralization zone is 1.5km long and 70m wide, and runs northwest and northeast. Pyrite, hematite and chalcopyrite are found in the silicified rocks. Gold content of 3g/t has been also confirmed in the sample taken from silicified granite.

Many ore showings have been found also outside the Karakanysh fault zone with the sizes ranging from several meters to 40 meters in width and 300 meters in length. Gold content of tr.3g/t has been confirmed in some samples.

Not sufficient amount of survey has been conducted in this area because of geographical inaccessibility. However, there are known old gold exploration sites in granite north of this area in the territories of the Republic of Uzbekistan .

2-2-4 Potential of Gold Deposit

According to the state concern Kyrghyzaltyn (project finding study, 1997), the gold deposit potential (C2+P1+P2) in the Kichi-Sandyk ore showing area, which includes both Kichi-Sandyk (central and northern ore zones) and the surrounding ore zones, is estimated, based on the past surveys by the Kyrghyz, as 140 tons. Its details are shown below.

Districts	C2(t)	P1(t)	P2(t)	Sub-total(t)
Central/North min. zone	16.7	16.1	32	65
Drevneye			30	30
Kichi-Sandyk West			35	35
Kichi-Sandyk Northwest			10	10
Total	16.7	16.1	107	140

There is no report about gold deposit potential for other mineralization zones due to different levels of advancement in mineral exploration, except for the southern Turpak-Tushty mineralization zone where 3 tons (gold content) of P1 resources are expected. However, it is suggested that there is a total of 60 tons of gold deposits in the entire area.

1) Kichi-Sandyk Ore Showings Area

(1) Kichi-Sandyk ore showing

Deposit potential is estimated for the central and the northern mineralization zones. For those ore bodies whose continuity has been sufficiently confirmed by trenching at several places and those bodies whose boundary can be determined by the outcrops in the geological map, the reserves have been calculated. And for those ore bodies which lie below the pits of past mining and skarn outcrops, P1 resources are estimated. It is not possible to mine selectively from smaller veins of ore, because their width varies between 0.3m and 4.4m. Therefore, smaller veins are put together, including non-mineralization parts in between, and treated as a single ore body.

The width and ore grade of each ore body are estimated based on the results of chemical analysis for ore blocks. Continuity to the bottom is estimated as a half of the greatest figure obtained -- i.e. average of 100m.

Average specific gravity is estimated to be 3.3t/m^3 from the results of the

rock density measurements.

On the bases of those assumptions, 8,517,000 tons of ore tonnage and 33 tons (gold content) of reserves (average grade 3.85g/t) are estimated as category C2 and P1. However, there is no detailed data available about determination of ore blocks and standards for calculation of ore reserves are not at all clear. Therefore, it is best to assume that those figures are still provisional.

Table II-2-3 Summary of Reserves & Resources in the Kichi-Sandyk Deposit

Ore body	C2			P1			Tota l		
	Amou nt	Au grade	Au metal	Amount	Au grade	Au metal	Amou nt	Au grade	Au metal
	× 1000t	g/t	t	×1000t	g/t	t	× 1000t	g/t	t
Centralny*1	3,711	4.0	15.0	4,203	3.6	15.3	7,914	3.8	30.3
Severny*2	403	4.3	1.7	202	4.3	0.9	605	4.3	2.6
Total	4,114	4.1	16.7	4,405	3.7	16.1	8,519	3.9	32.9

＊ 1 : central ore zone、＊2 : north ore zone

The above figures are for parts of the central and the northern mineralization zones only, and do not indicate the entire potential.

No detailed surveys have been conducted in the southwestern part of the mineralization zone where there are past open pit mining sites, and the eastern part where exo-skarn and endo-skarn are covered with deposits of the Neogene and Quaternary systems. In addition, the northern part, where no trenching has been done, is promising given the scale of mining operations in the past. It is expected that there is 32 tons (gold content) of P2 resources in the above areas that have not been covered by the past surveys (assuming that similar geological conditions continue from the central and northern areas to these areas). Therefore, a total of 65 tons (gold content) of C2+P1 resources is estimated as the entire area's potential.

(2) Surrounding Areas of Ore showing

Drevneye ore showing is similar to the northern mineralization zone of Kichi-Sandyk ore showing area in development and distribution of the skarn, and 30 tons (gold content) of P1 resources is estimated.

There is a development of skarn along the edges of granodiorite porphyry stock in the western part of Kichi-Sandyk ore showing zone, and mineral showings of Pologoye, Achyktash Left-bank, Opolznevoye are distributed. This stock is the exposed top of a huge rock, and a larger distribution of skarn is expected in a relatively shallow area. 35 tons (gold content) of P2 resources is expected in those areas.

There is a distribution of crystalline limestone covered with thick layers of Quaternary sediments from the central mineralization zone to its northwest. Results from the past physical prospecting suggest that there is a granitic body at 150m～200m below the marble, with the skarn accompanied probably with copper-gold mineralization on the border between the two bodies. 10 tons of potential gold content is estimated for this area. In addition, a total of 75 tons (gold content) of P2 resources is expected in the remaining parts of the surrounding mineral showing zone.

Thus, it is assessed that Kichi-Sandyk ore showing area as a whole has a total of 140 tons (gold content) in resources.

2) Turpak-Tushty ore showing

For the silicification and sericitization zone with pyrite in the hydrothermal-altered granodiorite porphyry, P1 resources of 695,000 tons of crude ore and 2.9 tons of gold content (average grade 4.22g/t) is estimated.

3) Other Ore showing areas and zones

A total of 65 to 70 tons (gold content) of P2 resources is reported for the entire area including Tegermen ore showing area within the Turpak-Tushty and Chandalash ore showing areas. However, details are not clear.

CHAPTER 3 KICHI-SANDYK DISTRICT

3-1 Purpose and Method of Study

The purpose of study is to make a detailed survey on the 4 km^2 area in the Kichi-Sandyk district to clarify geological conditions and characteristics of mineralization so that new mineral deposits can be discovered.

The base camp was set in the north eastern part of the survey area. The transportation road from the nearest village Jany-Bazar to the survey area is shown in Fig.II-3-1. The 1:2,000 geographical map made by the state concern Kyrghyzaltyn was used as the basic for the survey, and positions were determined by the surveying compass, barometer and the global positioning system (GPS).

The survey routes were measured by measuring tapes and are set in such a way that the distance is kept within 250m of each other. In the geological survey, observed items were written down in the map and magnetic susceptibility was measured for each of the major rocks at outcrops.

Together with the geological survey, ore and rock samples were collected for chemical analysis and laboratory tests.

Because there were few outcrop in the survey area, existing trenches, pits and mining wastes from the survey conducted by the Kyrghyz 20 years ago were used for geological observations and sample collecting.

3-2 Geology

The carbonate rocks (mainly limestone) of lower Carboniferous (Visean system), the intruding middle Chandalash body of Chandalash – Chatkal complex and Kichi-Sandyk body of Chalmansay complex of early Permian are overlain in this survey area, on which conglomerate of lower Miocene and molasse deposits of Pleistocene to Holocene occur in relation with unconformity.

Limestone is widely crystallized in white to gray white color and a part of which located in the west of this area bears a number of fossils of brachiopods, crinoids and foraminifera. Wollastonite is formed in banded limestone interleaved with crystalline limestone.

The middle Chandalash body occurs in the south to the southeast of this survey area and consists of fine to medium-grained quartz monzonite. It has been identified as belonging to the activity of the late Carboniferous (304 ± 15 million years) by isotopic dating of radioactive minerals. It shows fresh lithofacies without alteration and does not

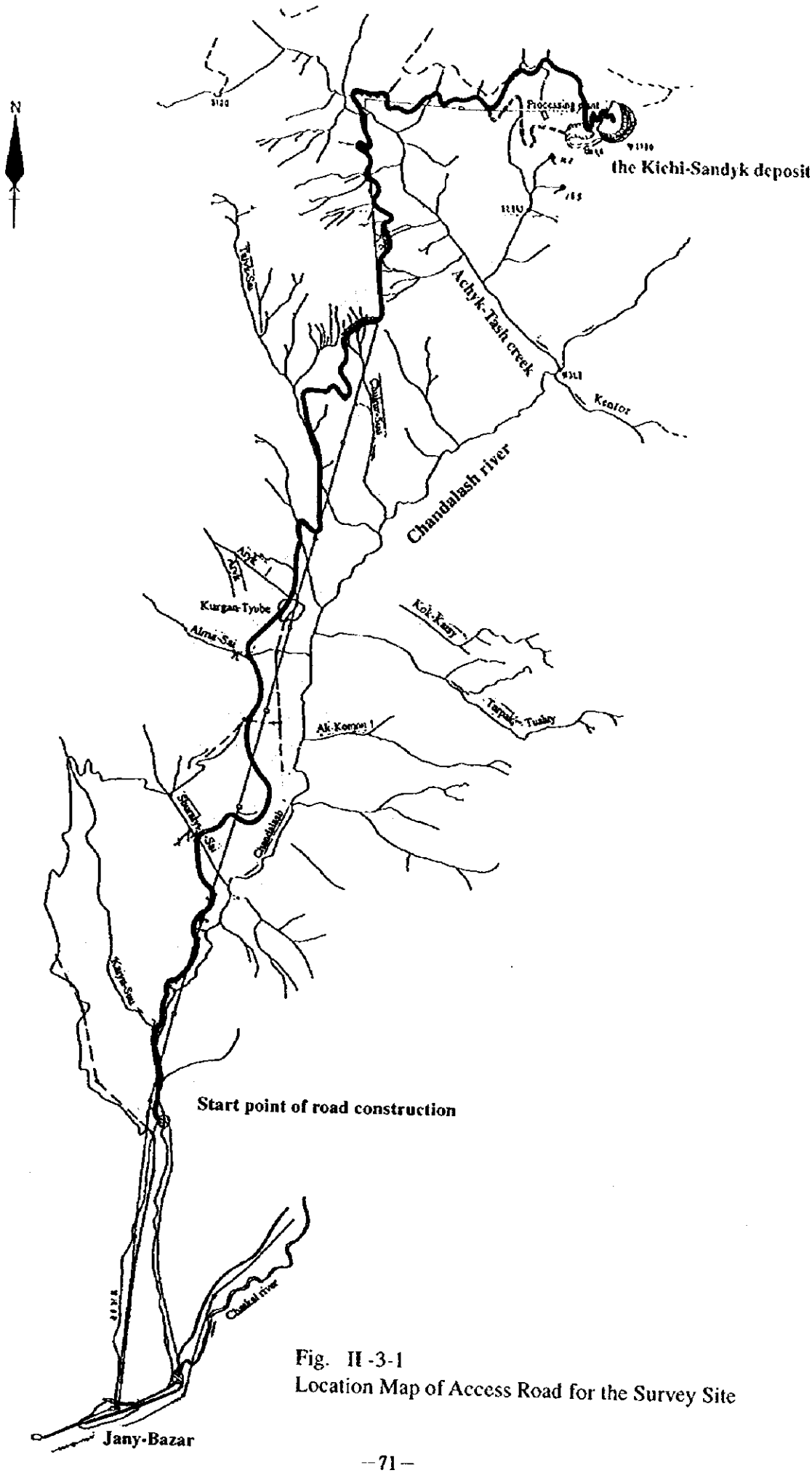

Fig. II -3-1
Location Map of Access Road for the Survey Site

skarnize to the contact with limestone.

Kichi-Sandyk body intrudes in the central of this survey area forming stocks and dikes, consist of medium to coarse-grained granodiorite. It has been identified as belonging to the activity of the early Permian (274±14 million years; Appendix 11) by isotopic dating of radioactive minerals. Exso-skarn composed of garnet, clinopyroxene and epidote forms in the contact between this body and limestone, along the inner of the same body endo-skarn is formed in vein shaped. Mineralization of gold-copper is exhibited in both skarns.

Faults, fissures and joints with NW-SW strike and SW steep dip are often observed in the survey area. In addition many fractures with NNE – SSW strike also extend. Vein shaped mineralization zone of endo-skarn in Kichi-Sandyk granodiorite porphyry is formed strongly controlled by the fractures of NW-SE strike. Intrusion of granodiorite porphyry is strongly influenced by the tectonic line of NNE-SSW strike. As a result, mineralization zone in exo-skarn extends to along the NNE – SSW direction

The direct relation between middle Chandalash body of late Carboniferous and Kichi-Sandyk body of Permian cannot be easily confirmed. The following geological evidences on the surface are observed; Kichi-Sandyk body (granodiorite porphyry) is altered and crushed. The middle Chandalash body (quartz monzonite – monzodiorite), shows massive form and is not altered. The evidence that the former intrudes to the later is not observed. In addition Kichi-Sandyk body overlies horizontally on the middle Chandalash body at the boundary of altitude 2,550m to 2,670m in the south to the southeast of this area. Based on these facts, there is an idea that Kichi-Sandyk body overlies on the middle Chandalash body in relation with thrust fault in very low angle.

The mineralization in Kichi-Sandyk district is specialized for Gold-copper mineralization in the skarn formed at the contact between Kichi-Sandyk body and surrounding limestone. I t is important of the structure of granodiorite porphyry to decide the potential of mineral exploration based on the continuity of mineralization below surface.

The terrigenous sediments of Miocene series are clastic rocs composed of medium to large sized pebbles with poor sorting of limestone, granodiorite and reddish sandstone. It is believed to be formed in relation with the upheaval movement of the continental. The terrigenous molasse deposits of Quaternary system is unconsolidated deposits, having characteristics of alluvium and alluvial deposit. A few placer deposit occurs in these sediments.

3-3 Results of Survey

Based on previous surveys, four places in the survey area are known to have mineral showing, Kichi-Sandyk (Central and Northern mineralization zones); Drevneye in the western part; Kvartzevoye in the central part; Neogenovoye in the southern part.

In this year, geological observation was made, and samples were collected from the existing trenches and pits in Kichi-Sandyk and three other mineral showing zones. A total of 152 samples were collected for geochemical analysis and for various laboratory tests (Plate II-3-5).

Although the data collected was not sufficient to discover new mineral showing areas other than the above four, it was possible to confirm distributions of the skarn and mineralization as well as the grades of gold-copper content for the existing mineral showing areas. The findings of the survey are summarized below.

(1) Drevneye Mineral showing Zone

Drevneye zone is situated about 400m to 1km west of the Central Kichi-Sandyk mineral showing belt.

There is a field of clinopyroxene-garnet skarn and garnet-epidote skarn and skarnized limestone occurring widely in this area. Gold-copper mineralization is observed in the skarn. It has become clear that the Drevneye mineral showing zone continues to the skarn and mineralization zone which lies 200m east of it, and thus those two are combined. Chemical analysis indicates that the highest ore grade obtained from the samples is 15.34g/t (A-149) for gold and 9.83% (A-010) for copper.

This skarn belt extends about 450m east and west with the width of 70m. To its west lies a 400m × 500m field of skarnized limestone surrounding this skarn belt. Gold-copper mineralization has been confirmed in the skarnized limestone, although their grade are rather low with the best figures being 0.09g/t (A-011) for gold, and 1.83% (A-006) for copper. It is probable that this skarnized limestone has some development at the bottom (Fig. II-3-2, II-3-3), and it will be a good candidate for future exploration.

(2) Kvartzevoye Mineral Showing Zone

Kvartzevoye mineral showing zone is situated about 600 to 850m southeast of the Central zone of Kichi-Sandyk mineralization area. It is gold-copper mineralization accompanied with strong silicification and skarnization、 and distributed in the granodiorite porphyry with the extent being 250m × 100m.

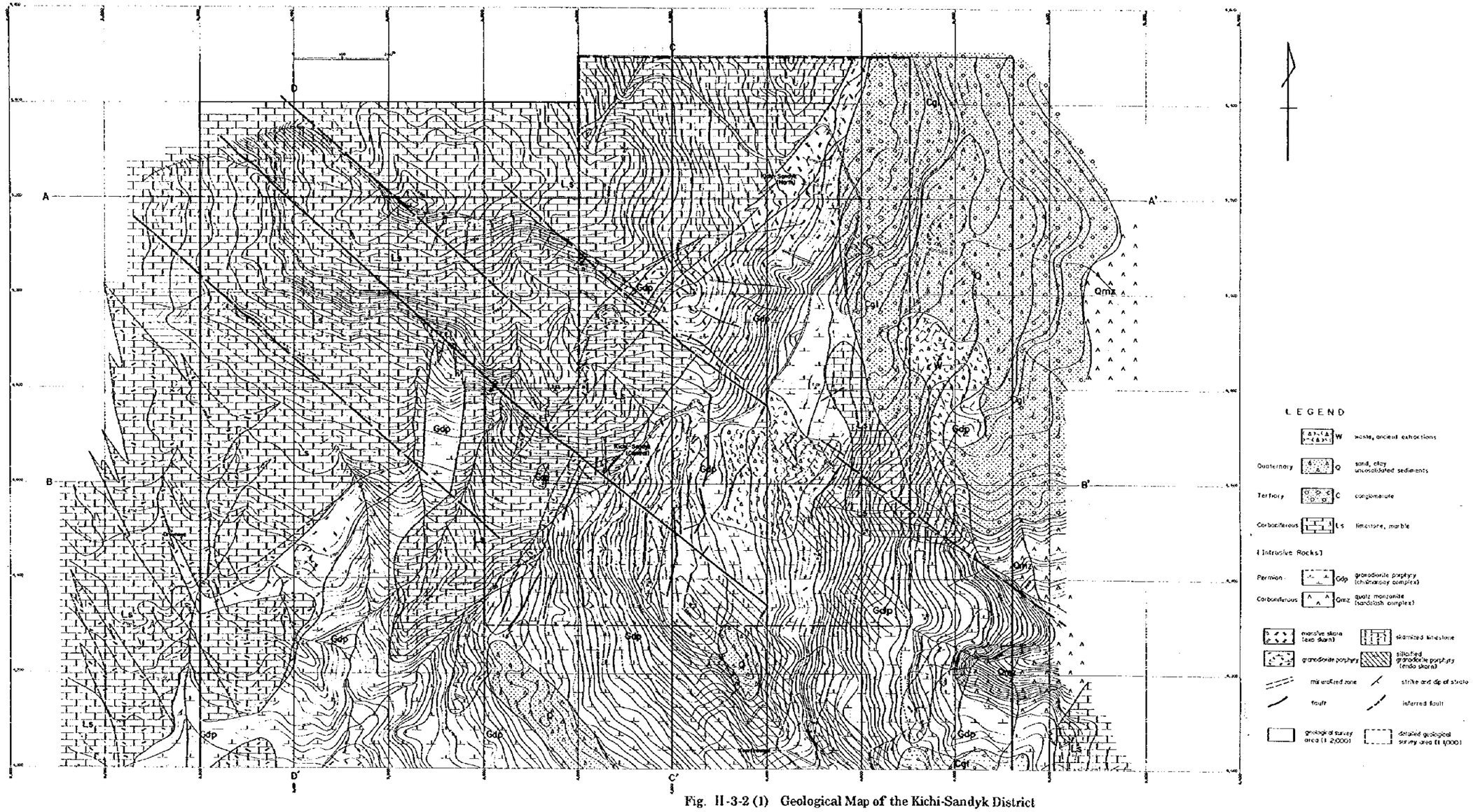

Fig. II-3-2 (1) Geological Map of the Kichi-Sandyk District

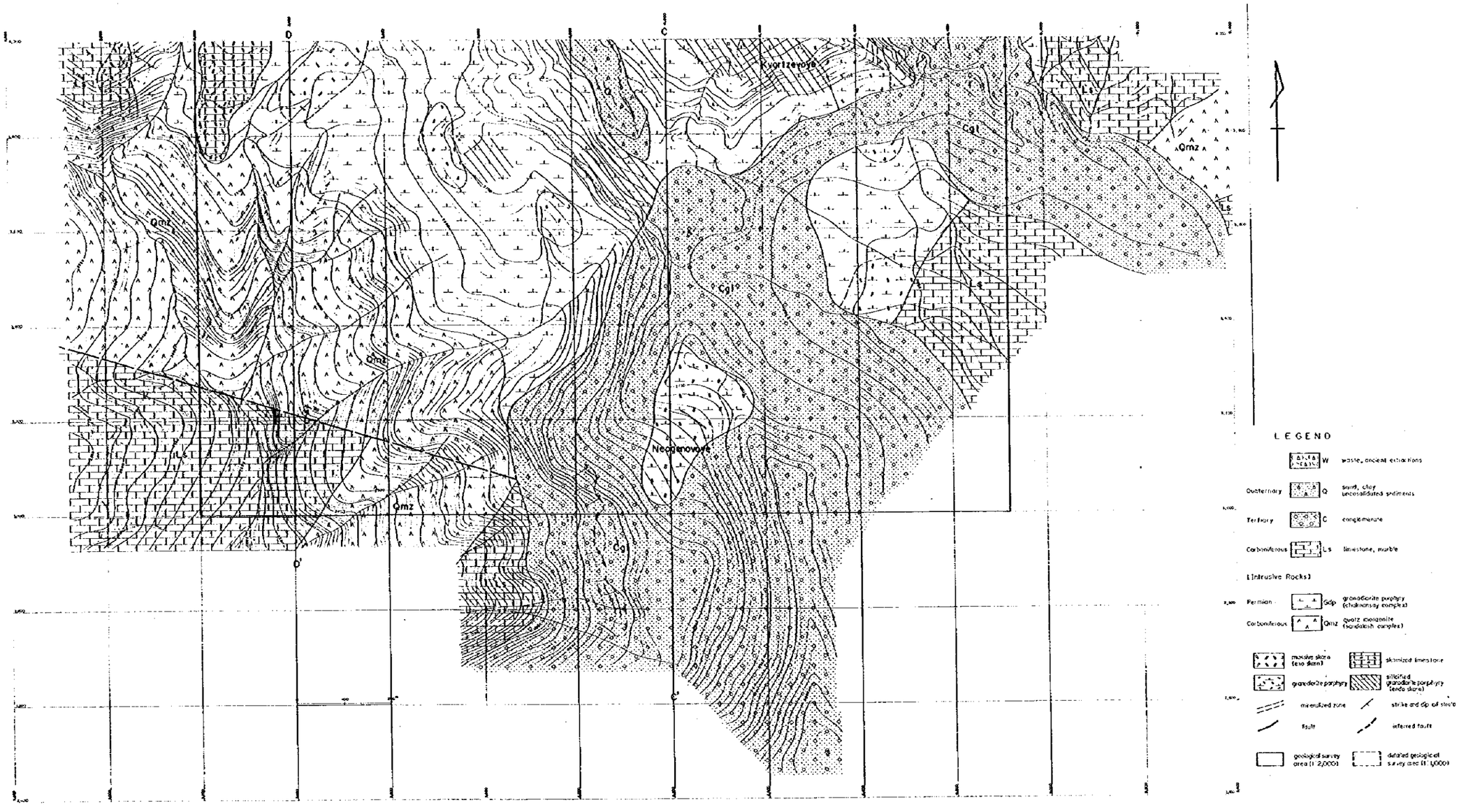

Fig. II-3-2 (2) Geological Map of the Kichi-Sandyk District

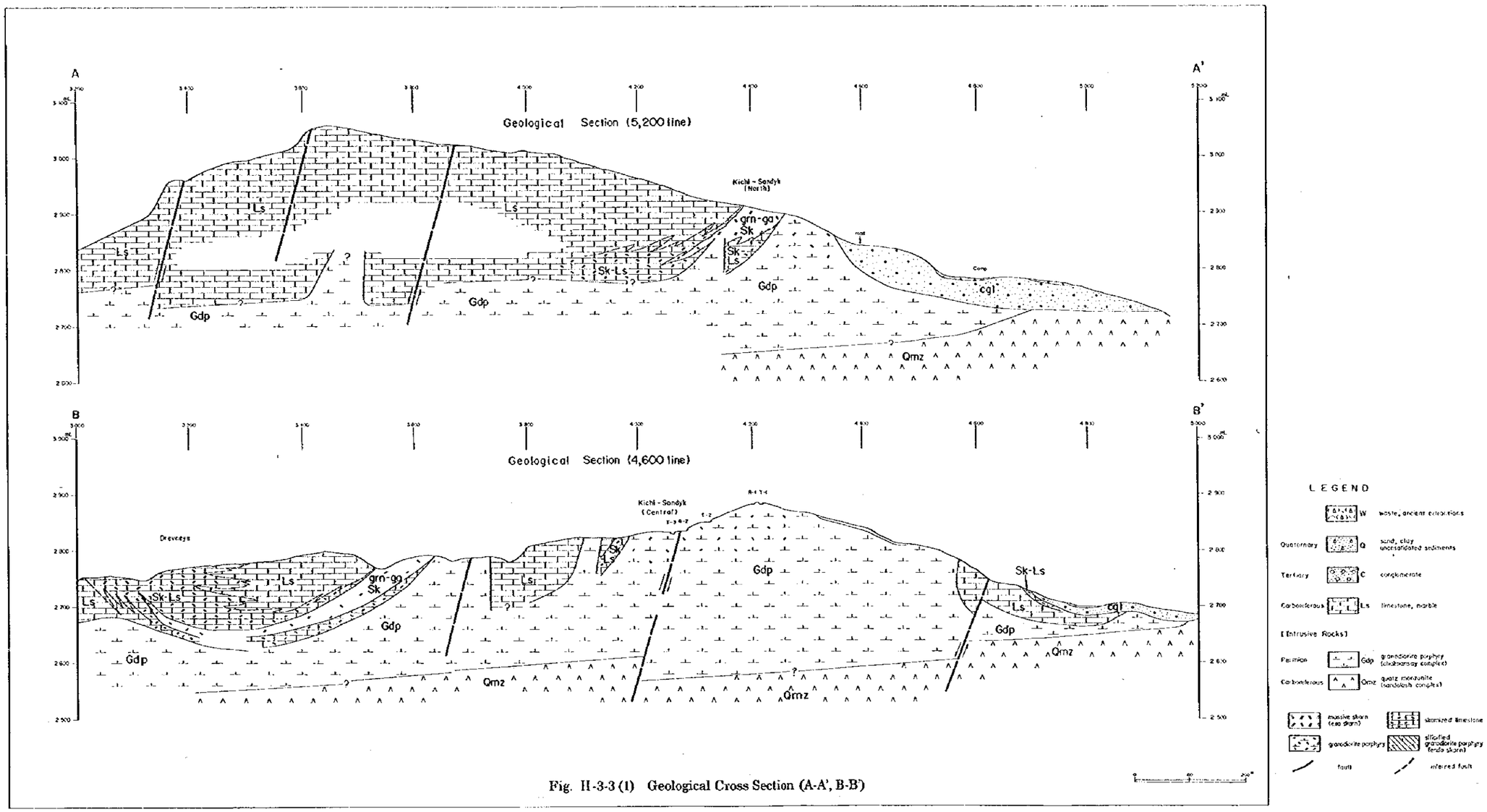

Fig. II-3-3 (1) Geological Cross Section (A-A', B-B')

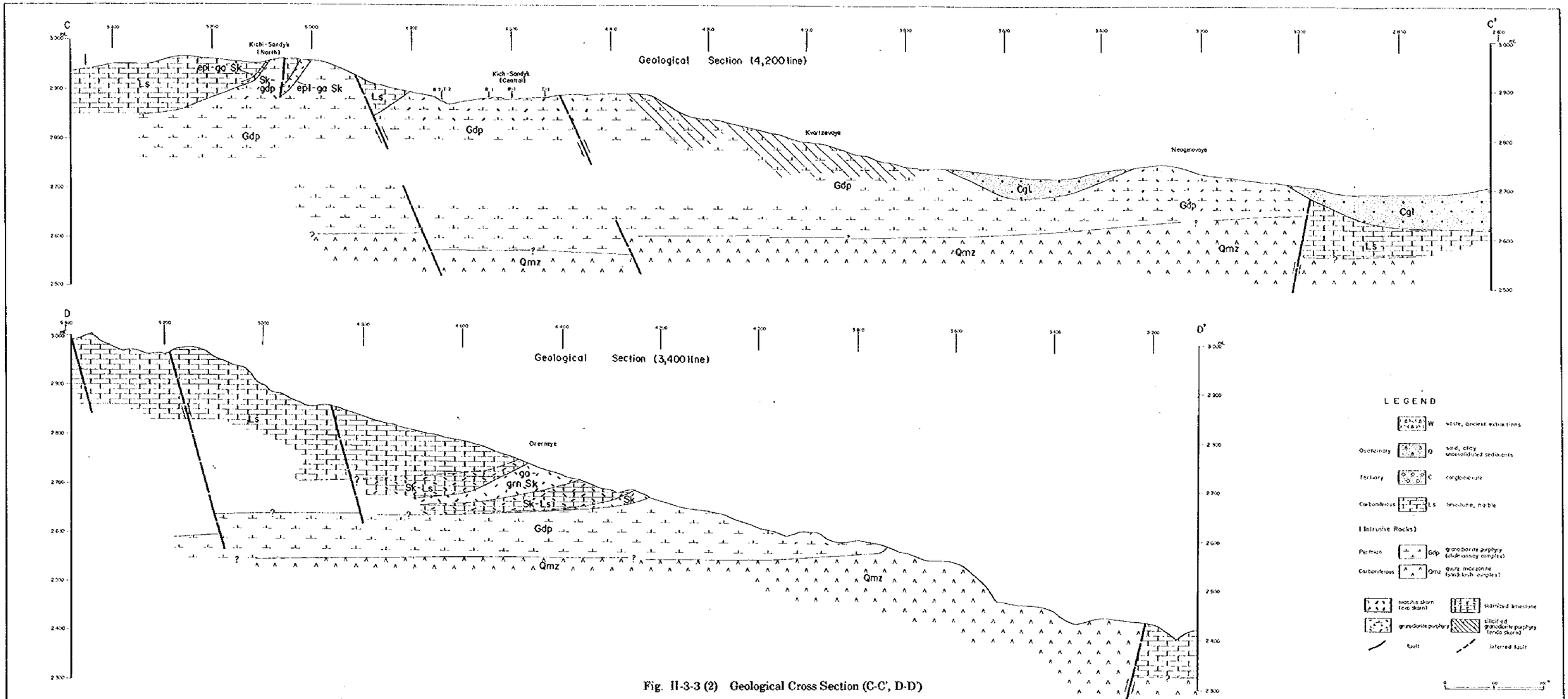

Fig. II-3-3 (2) Geological Cross Section (C-C', D-D')

This mineral showing is essentially a strong silicification belt, in which networks of quartz veins are developed. Vein shaped end-skarn composed of clinopyroxene-garnet-calcite occurs sporadically in this silicification.

Chemical analysis for the samples taken from this mineral showing zone indicates rather low grades of metal content, with the highest figure being 0.57g/t (A-080) for gold and 0.09% (A-067) for copper. Disseminated chalcopyrite and pyrite are observed at outcrop.

There is a strong silicification zone extending from the west of this mineral showing zone to northwest towards the central zone of Kichi-Sandyk mineral showing area. If this silicification zone is included, it may become a large sized mineral showing with the area of 600m × 500m. But both gold and copper contents show low grade in the surrounding area.

From the above geological facts, we conjecture that there was probably in the past some distribution of mineralized skarn (exo-skarn) that had been formed on the boundary between limestone and granodiorite porphyry on top of this mineral showing zone. Assuming a gold-copper mineralization system with exo-skarn (upper part) and endo-skarn (lower part), the present erosion surface is likely to be the bottom of the mineralized body which has been eroded.

(3) Neogenovoye Mineral Showing Zone

This is situated 1,100m to 1,400m south of the central mineralization belt of the Kichi-Sandyk mineral showing zone. It is a silicified and skarnized gold-copper mineralization zone in the granodiorite porphyry which extends 300m long and 100m wide, and is exposed like fenster in the terrigenous deposits of the Miocene composed of brown clay and conglomerate. Veins of endo-skarn which consist of garnet to epidote-garnet skarn in silicified granodiorite porphyry. Strongly skarnized zones have lost the structure of the original rock, and appear similar to exo-skarn. Like Kuvartzevoye mineral showing zone, developed network quartz veins are present, and dissemination of pyrite and chalcopyrite is seen among green copper ore and the stains of limonite.

Analysis of the samples taken from this mineral showing zone has produced a highest figure of 2.34g/t (A-042) for gold and 3.39% (A-052) for copper. Although these figures are not as high as those of the central mineralization zone of Kichi-Sandyk, but higher than those of Kuvartzevoye mineral showing zone.

Like Kuvartzevoye, there might have been a development of mineralized skarn above the present surface. However, given the conditions of alteration and

higher figures of gold and copper grade, erosion here might not have been as heavy as Kuvartzevoye.

(4) Southwestern part of the northern mineralization zone of Kichi-Sandyk Mineral showing Area.

This is situated in the southwestern part of the northern mineralization zone of Kichi-Sandyk mineral showing area. There are two parts (15m and 25m wide respectively) of gold – copper mineralized skarn which is composed of clinopyroxene–garnet–epidote on either side of a small body of granodiorite porphyry. Analysis of the samples collected from here indicates rather high grade of 6.62g/t(A-108) for gold and 1.91% (A-108) for copper.

This skarn belt extends beyond the fault in NW-SE direction, and probably continues further to the direction of southwest as skarnized limestone consisting of garnet. But it cannot be confirmed by surface observation alone. The analysis of the skarnized limestone collected from this area exhibits a highest figure of 51g/t (A-118) for gold and 1.68% (A-118) for copper. The chances are good that there is a development of mineralization under this area.

(5) Other Sites with Gold-Copper Mineral Showing

1) At 600m southwest of the central mineralization belt of the Kychi-Sandyk mineral showing zone, there is a small development of heavily skarnized granodiorite porphyry in which natural gold can be observed by naked eyes. Sample analysis shows the highest figures of 4.09g/t (A-033) for gold and 6.96% (A-032) for copper.

2) At 400m east of the central mineralization belt of the Kichi-Sandyk mineral showing zone, near the intersection of coordinate system 4,520 east-west and 4,600 north-south, there is an occurrence of silicified and skarnized granodiorite porphyry. Veins of endo-skarn which consist of clinopyroxene-garnet-epidote skarn and fine veins of quartz are conspicuously seen, and green copper ore is found together with chalcopyrite and pyrite. The results of chemical analysis shows a highest figure of 0.40g/t (A-089) for gold and 2.89% (A-092) for copper.

3-4 COMMENTS

It is believed that gold-copper mineralization found in the present survey area is

mostly embedded in the clinopyroxene – garnet - epidote skarn (exo-skarn) which is formed along the border between the carbonate rocks (mainly limestone) of lower Carboniferous (Visean system) and the intruding Kichi-Sandyk granodiorite porphyry of early Permian. In addition, it is important to note that strong gold-copper mineralization extends into the vein skarn (endo-skarn) in he granodiorite porphyry and its surrounding granodiorite porphyry suffered by hydrothermal alteration.

Let us assume a model, for this mineralization system, in which various metals are ordered from the top to the bottom in the following manner: weakly altered limestone - skarnized limestone - exo-skarn - skarnized (endo-skarn) granodiorite porphyry - strong silicificated (strongly altered) granodiorite porphyry - weakly altered granodiorite porphyry, in this model strongest gold-copper mineralization will be assigned to the zone involving exo-skarn and skarnized (endo-skarn) granodiorite porphyry. Applying this model to our survey area, the clinopyroxene – garnet - epidote skarn (exo-skarn) in Drevneye mineral showing and the southeastern part of the northern Kichi-Sandyk mineral showings may correspond with the exo-skarn zone which is the center of mineralization, and Neogenovoye mineral showing with the skarnized (endo-skarn) granodiorite porphyry zone. In addition, weakly mineralized skarnized limestone of Drevneye mineral showing area may correspond with the skarnized limestone zone which lies just outside of the center of mineralization, and Kvartzevoye mineral showing with the strongly silicificated (strongly altered) granodiorite porphyry zone.

* Note: It is assumed that the center of the mineralization formed in the skarnized granodiorite porphyry is the central Kichi-Sandyk mineralization zone.

Based on the above discussion, the next target of mineral exploration would be the following:

1) To confirm the depth of the central mineralization zone of the Kichi-Sandyk mineral showing;
2) To confirm the depth and geological conditions of the exo-skarn of the Drevneye mineral showing;
3) To confirm the depth and geological conditions of the mineralized part of the skarnized granodiorite porphyry in the northern mineralization belt of the Kichi-Sandyk mineral showing;
4) To confirm the depth of the mineralization in the skarnized granodiorite porphyry in the northern mineralization belt of the Kichi-Sandyk mineral showing.

CHAPTER 4 KICHI-SANDYK MINERAL DEPOSIT

4-1 Purpose and Methods of Survey

Kichi-Sandyk mineral deposit area has been discovered to be a promising area for gold-copper deposit by the past explorations conducted by the Republic of Kyrgyz. Two types of mineralization zones (mineralized vein skarn and bedded skarn) are known to exist there. It is expected that these two mineralization areas have a potential of 33 tons of gold (average grade Au=3.85g/t).

The objectives of the survey this year are; to grasp general geology and geological structure of the area and their relation with mineralization; to figure out the size, quality, structure and characteristics of the vein skarn and bedded skarn; and to discover new deposit.

The methods used are; detailed geological survey (0.9km^2, 1/1,000), including trenching survey (909m in total length, a scale of 1/100); and analysis of 1,005 ore samples from the same area with eight elements (Au, Ag, Cu, Pb, Mo, As, Sb) to figure out their distributions and quantities.

1/1,000 topographic maps made by the Kyrghyz were used for route surveys, positions for major mineralization areas, outcrops and trenches were measured and mutual relations were determined by a simple method using surveying compass. Positions were also confirmed by the Global Positioning System (GPS) for places with conspicuous topographical features.

Trench excavations were applied in a total of 3 places - two for the known vein skarn and one for the bedded skarn. The excavation was done at a right angle to the vein structure, as far as the fresh rock was confirmed.

In addition, various types of laboratory analyses, such as observations of thin sections of rocks and polished thin sections of ore samples, X-ray powder diffraction analysis, X-ray images analysis by EPMA、radioactive isotopic dating, and fluid inclusion measurements (filling temperature) were made in order to clarify the relationships between mineralization and skarnization.

Sampling sites for the above laboratory analyses are indicated in PL.-3-5. Results of the laboratory analyses are shown in Appendix 1 - Appendix 12.

4-2 Outlines of Geology and Deposits

Survey results are shown in the 1/1,000 geological map (attached, Fig. II-4-1, 2) and sketches of the trenches (attached, Appendix 13, 14).

In the survey area, there is a distribution of crystalline limestone of the lower

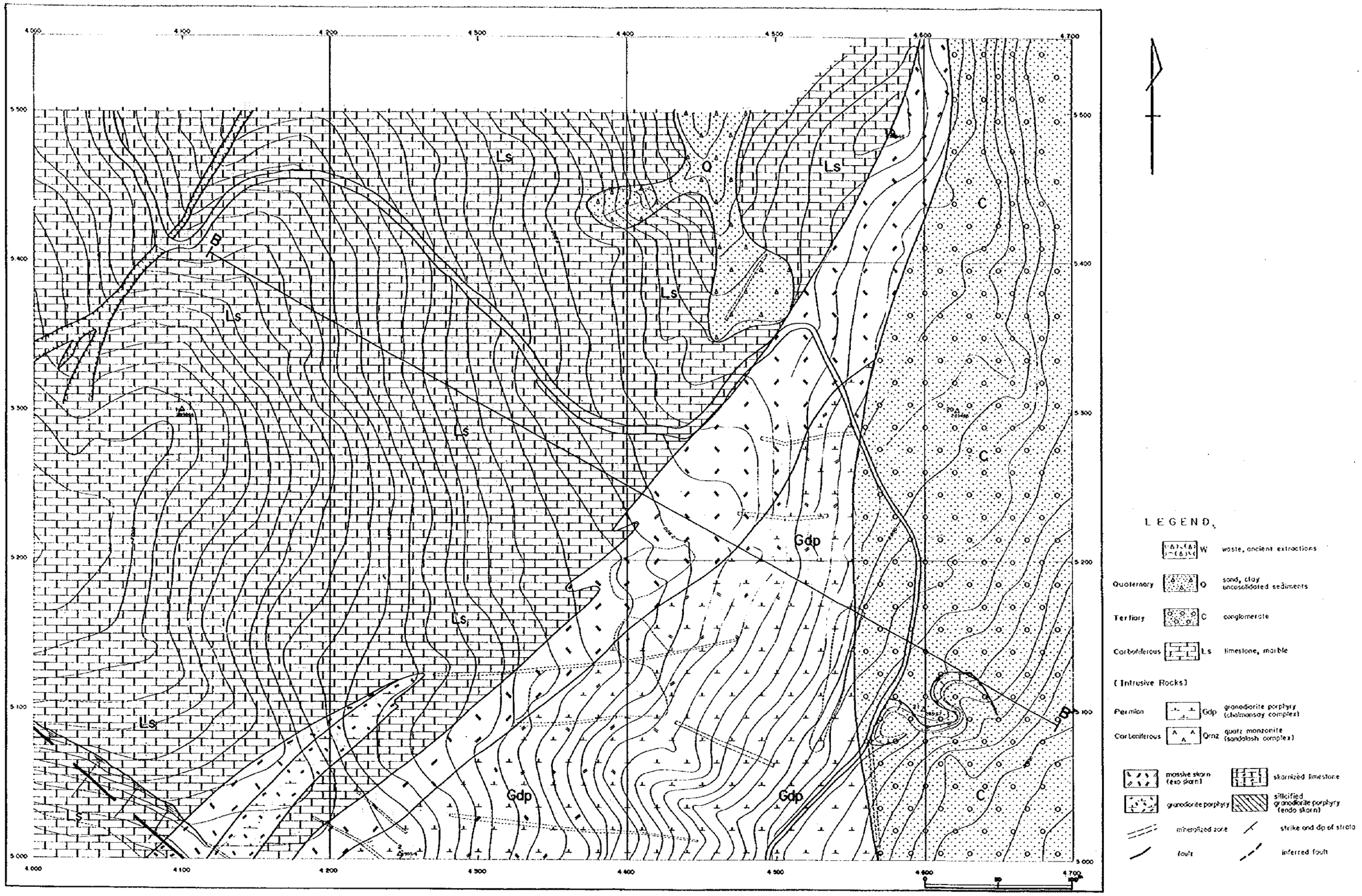

Fig. II-4-1 (1) Geological Map of the Kichi-Sandyk Deposit

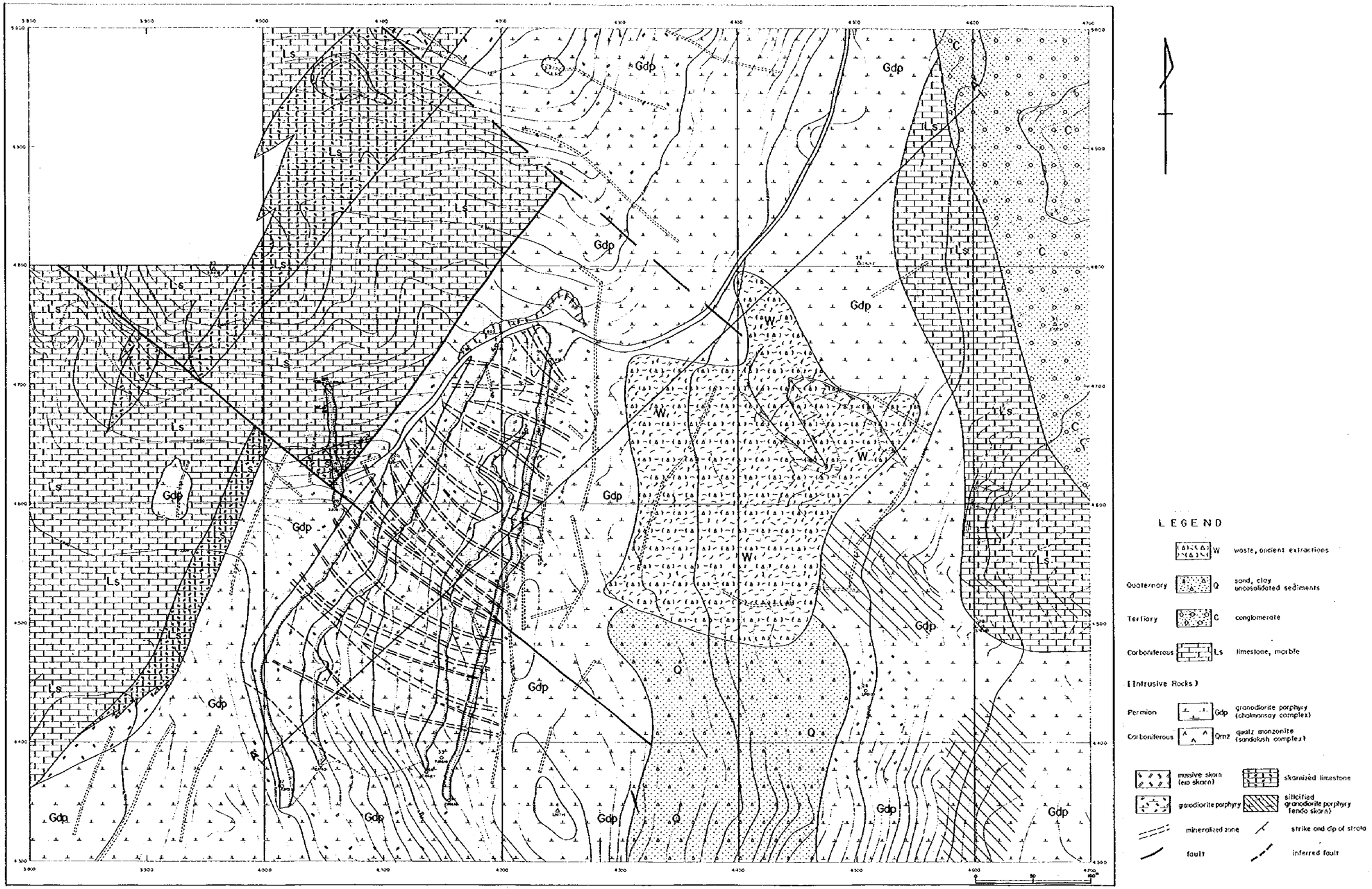

Fig. II-4-1 (2) Geological Map of the Kichi-Sandyk Deposit

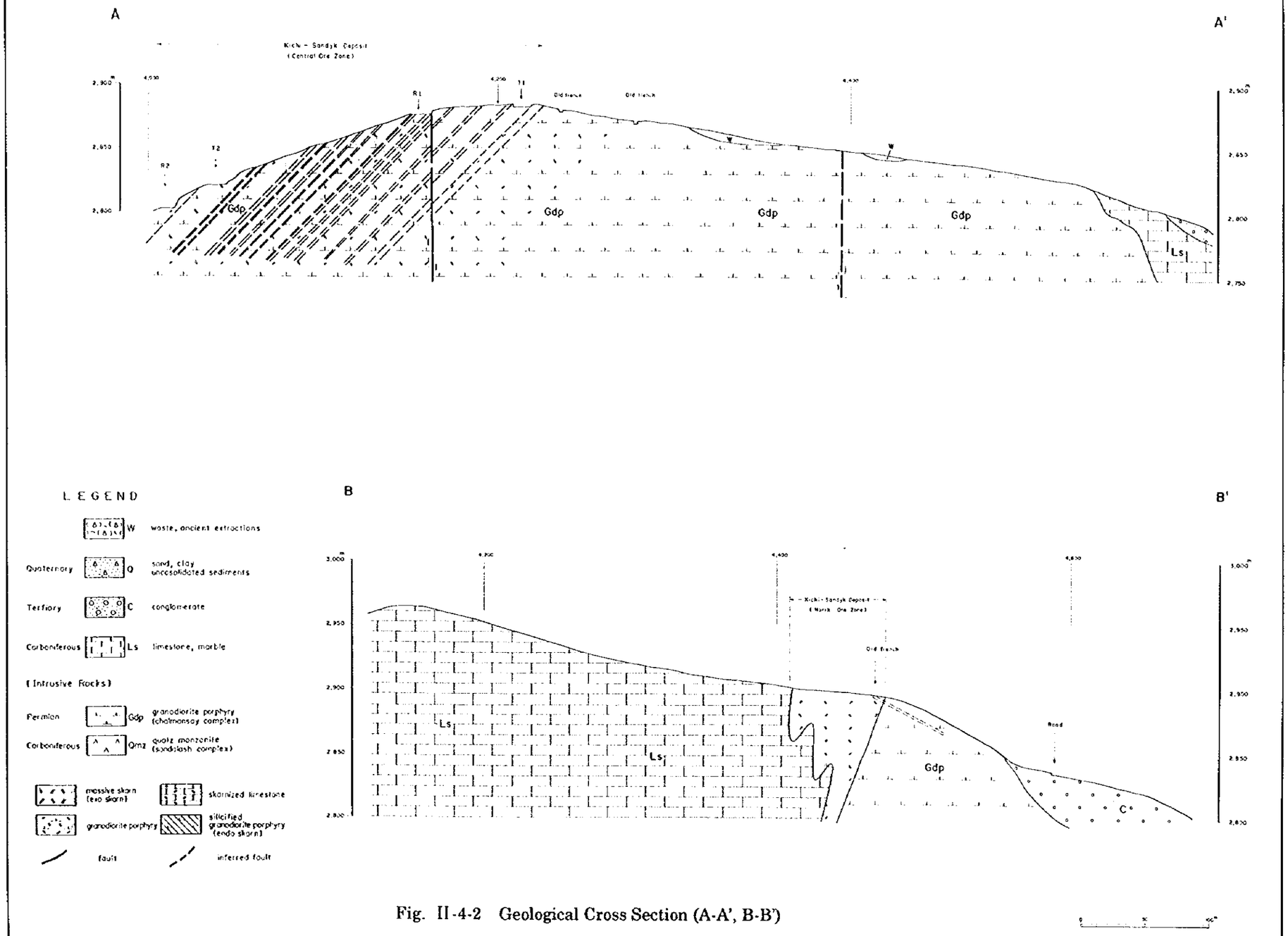

Fig. II-4-2 Geological Cross Section (A-A', B-B')

Paleozoic system (Visean stage) and the Kichi-Sandyk body (granodiorite porphyry) of the Chalmansay complex of the early Permian which intrudes the former. Along the boundary between the limestone and granodiorite porphyry, bedded green skarn composed mainly of garnet and epidote are formed, in which malachite chrysocolla, bornite and chalcopyrite are disseminated. This skarn extends to the direction of NE-SW reflecting the intrusive structure of the granodiorite porphyry. The dip direction in most parts is not known, but at trench T 3 north dip was confirmed. In the trench T3, the size of skarn is confirmed as approximately 20m in elongation and 5 to 30m in width at right angle.

Vein skarn develops along fissures and joints in the granodiorite porphyry, and green oxidized copper minerals such as malachite are common. Minute native gold are often observed coexisting with green copper minerals and oxidized iron minerals.

Vein skarn shows the mode of occurrence controlled by fissures and joints developing in the granodiorite porphyry, which is completely replaced along the fracture with 10 to 100cm in width. Skarnization zone of the granodiorite continues for a maximum of 30m. Oxidized iron minerals and clay occur in the center of the fractures, and vein skarn is formed interleaving them symmetrically.

As a result of the analysis made on a total of 453 fissures and joints observed in trench T1 and T2, it has become clear that fractures with strike of N46° W and dip of 60° SE are concentrated in this granodiorite porphyry (Fig. II-4-4).

4-3 Results of Surveys

4-3-1 Trenching Survey

Trench T 1 and T 2 were aimed at vein skarn, and T 3 at bedded skarn. Each trench was carefully directed so that it would make a right angle against the strike direction of the mineralization. The two exploration roads which run parallel to the old trenches were also cleared by bulldozer and made into survey targets. Their positions are indicated in Fig.II-4-3.

Trenching survey was targeted at those walls where more freshly exposed rocks could be observed. The survey was conducted at the accuracy scale of 1/100, focusing on such characteristics as lithology, existence of alteration and mineralization, their types and degrees, and development of fissures and joints.

Ore samples for chemical assay were collected continuously by channel sampling method. Each sample weighed between 5 and 7 kg, and none weighed less than 5 kg. The sizes of the samples taken are as follows:

a) Mineralization and Skarn areas: W5-10cm × D2-3cm × L50-100cm

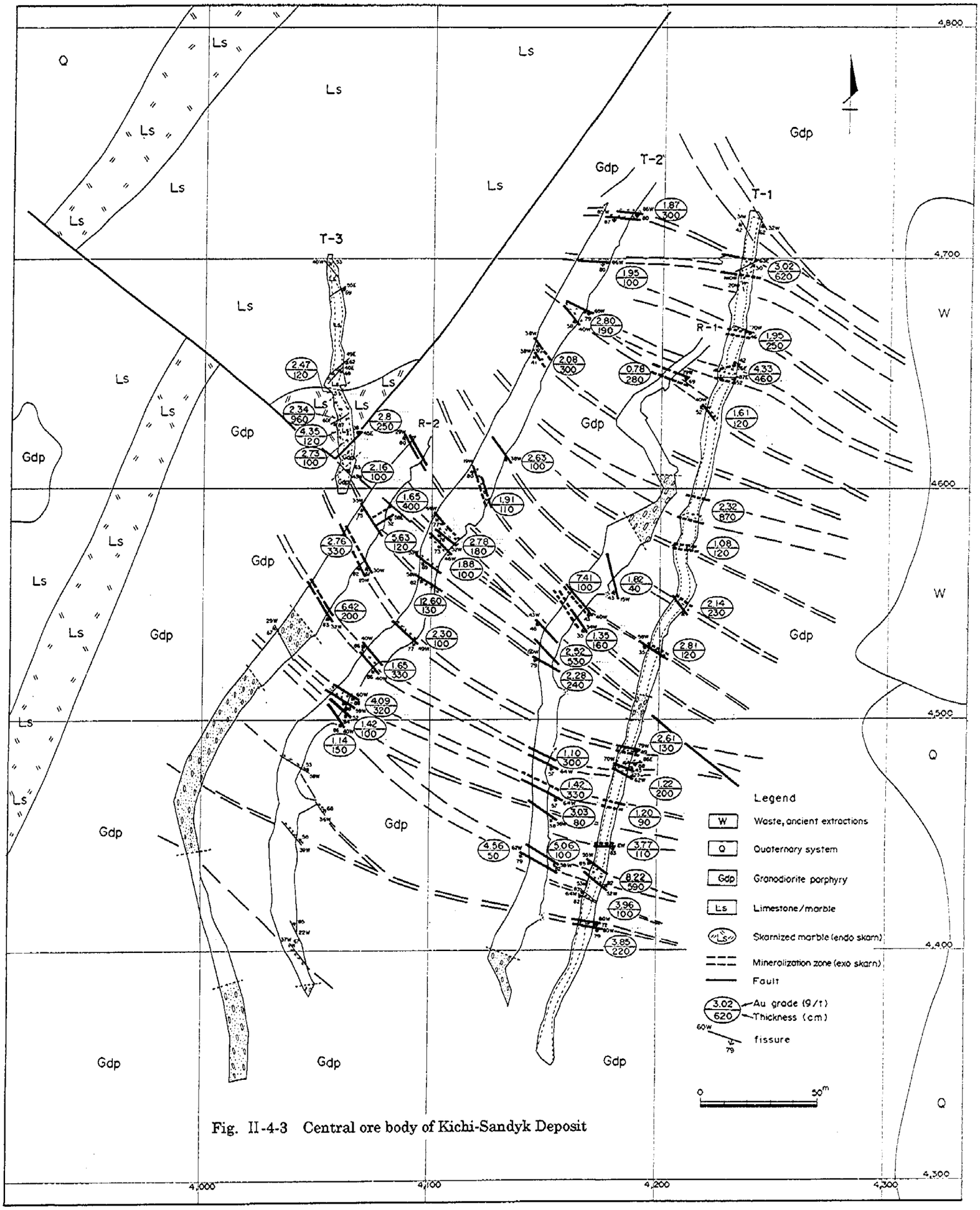

Fig. II-4-3 Central ore body of Kichi-Sandyk Deposit

b) Unmineralized granodiorite porphyry/limestone: W5-7cm × D2-3cm × L100-200cm

1) Trench T 1 (altitude: 2,878m, length: 387m)

This trench was excavated at 50m west of the surveying point Pn4 in the southern part of the survey area, along the ridge running nearly north and south. This trench runs completely through the granodiorite porphyry, and hydrothermal alteration such as argillic alterarion、silicification、carbonatization、chloritization is seen commonly. The K-Ar isotope dating applied to a weakly altered sample (T1-212) has produced a result of 261±13Ma, which indicates that this rock body is from the Permian activities.

There is a development of fractures of NW trend in the granodiorite porphyry, and along those fractures pale green garnet skarn is formed. A fracture analysis on the 162 fractures which control the vein skarn, has revealed N45° W and 56° SW to be the most dominant direction (Fig. II-4-5).

In this skarn, green copper ore which consists of malachite and chrysocolla is disseminated, associated with bornite and chalcopyrite. Notably, one can observe with naked eyes native gold in many areas where green copper ore and goethite are in close coexistence. Gold of high grade is observed in the southern part of the trench with the highest figures being Au 54g/t and 1.2m wide(Fig. II-4-3).

The following figures indicate the places of gold mineralization with high grade and good sizes (Au>1g/t, Width>1m) detected by geochemical analysis.

Au 3.20 (620 cm),	Au 1.95 (250 cm),	Au 4.33 (460 cm),
Au 1.61 (120 cm),	Au 2.32 (870 cm),	Au 1.08 (120 cm),
Au 2.14 (230 cm),	Au 2.81 (120 cm),	Au 2.61 (130 cm),
Au 1.22 (200 cm),	Au 1.20 (90 cm),	Au 3.77 (110 cm),
Au 8.22 (590 cm),	Au 3.96 (100 cm),	Au 3.85 (220 cm),

2) Trench T2 (altitude: 2,872 m, length: 418 m)

This trench is located at 100 meters west of T1 and runs nearly parallel with it (N25° E in direction). Geological conditions of T2 closely resemble with those of T1. Alteration and mineralization in T2 are similar to those in T1, and the same mineralization continues from T1 to T2. A development of joints and fractures of the NW trend is seen in the granodiorite porphyry, and a fracture analysis on the 291 fractures revealed the strike of N47° W and the dip of 74° SW as the most dominant

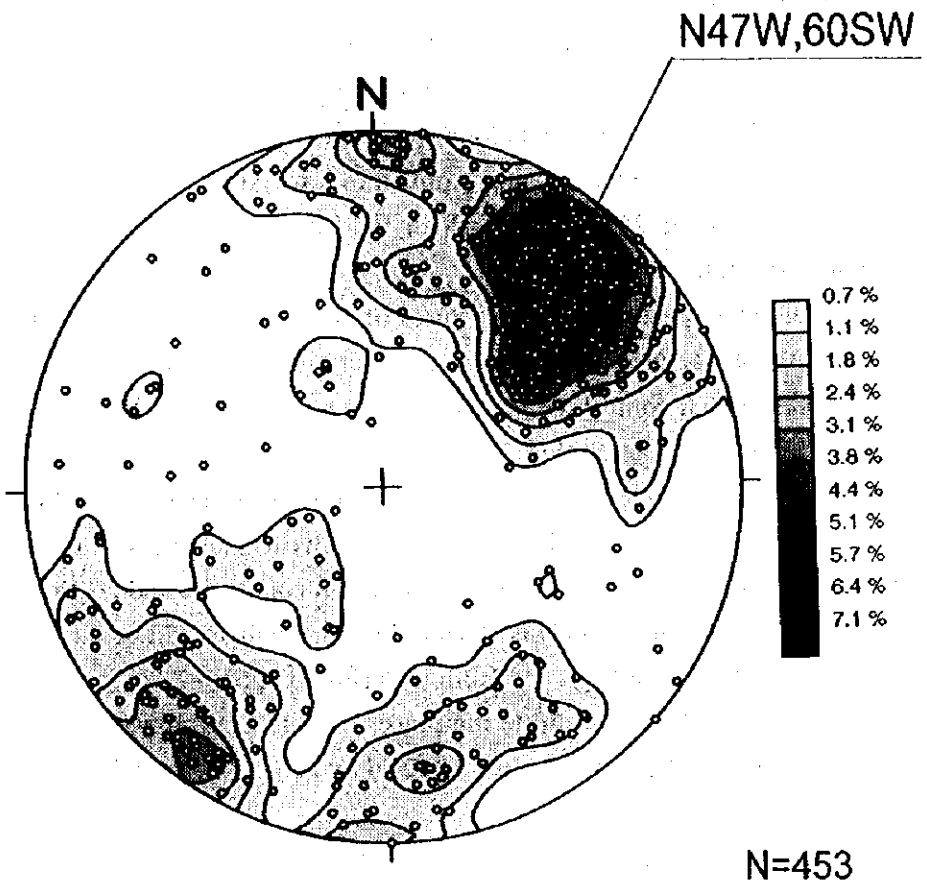

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Fig.II-4-4 π-diagram of the fracture system at trench T1 & T2

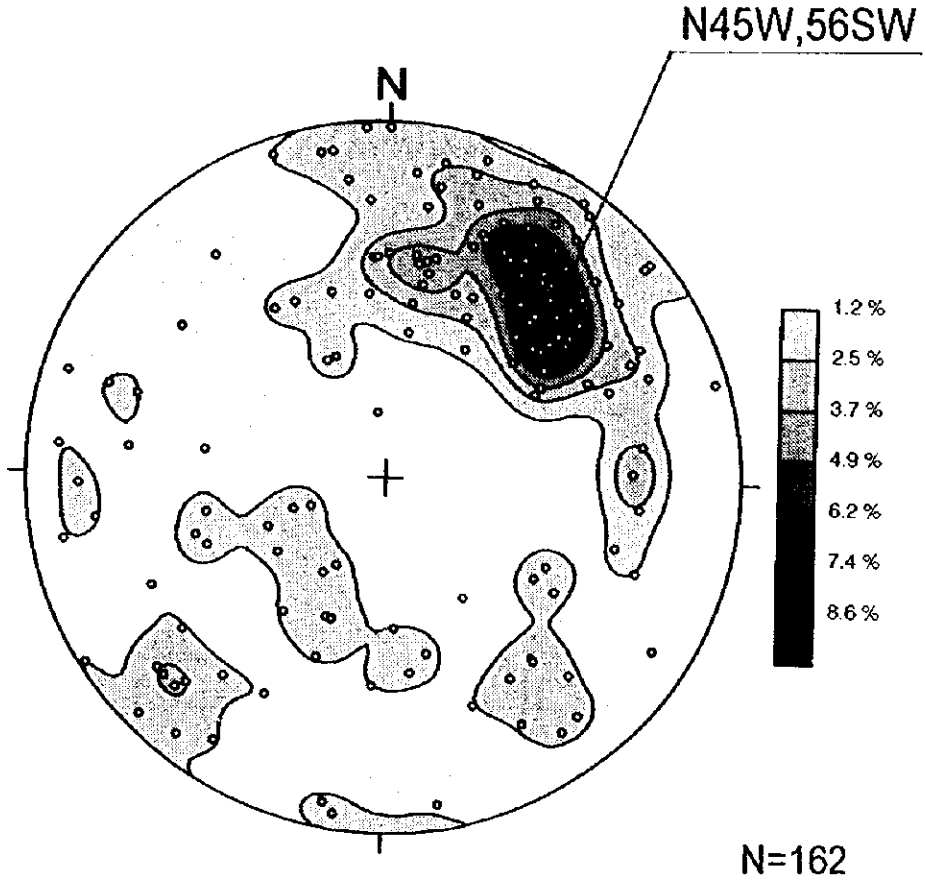

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Fig.II-4-5. π -diagram of the fracture system at trench T1

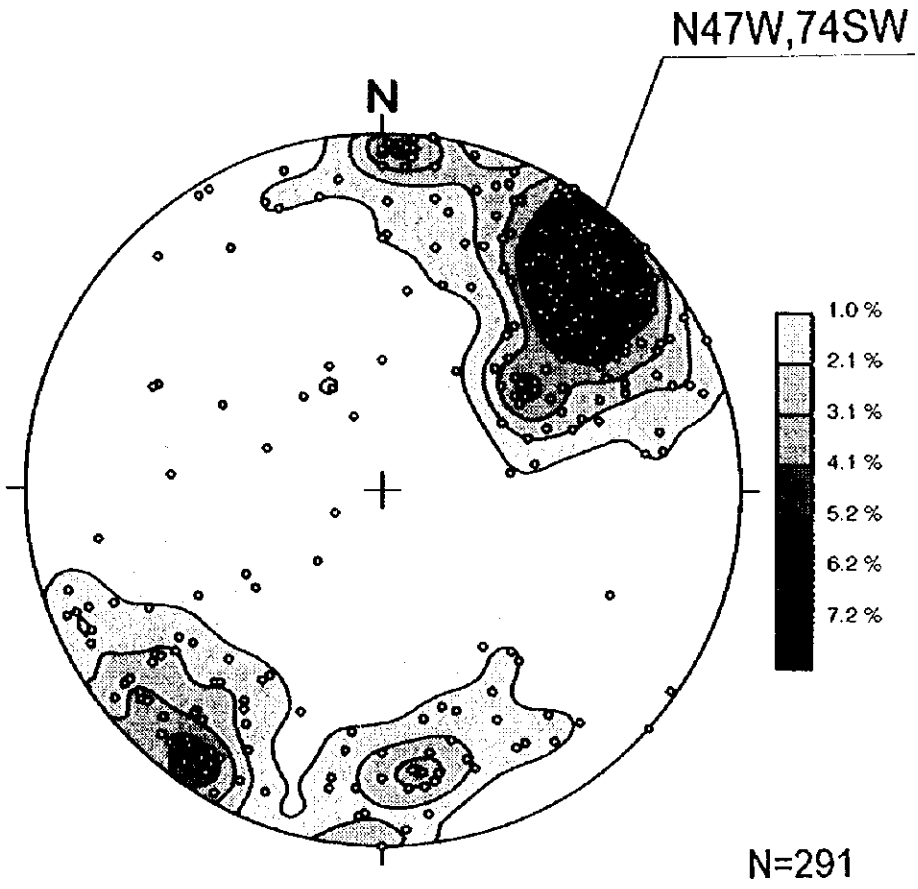

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Fig.II-4-6 π -diagram of the fracture system at trench T2

direction.

The following figures are obtained from the geochemical analysis to indicate places with high grade gold mineralization (Fig. II-4-6).

Au 1.87 (300 cm),	Au 1.95 (100 cm),	Au 2.80 (190 cm),
Au 2.08 (300 cm),	Au 2.63 (100 cm),	Au 1.91 (110 cm),
Au 2.78 (180 cm),	Au 1.88 (100 cm),	Au 2.60 (130 cm),
Au 2.30 (100 cm),	Au 1.65 (350 cm),	Au 4.09 (320 cm),
Au 1.42 (100 cm),	Au 1.14 (150 cm)	

3) Trench T3 (altitude: 2,879 m, length: 109 m)

This trench is located at about 150 meters southeast of surveying point T23 in the west of the central part of the survey area. Its direction is nearly north and south (N2° W).

The area is mostly of limestone, and it shifts to granodiorite porphyry at about 80 meters from the north end of the trench. Skarnization starts to appear as one approaches the dividing line, and it becomes a skarn zone at 30 meters before the dividing line. Skarnization is moderate, and limestone is not completely replaced by skarn minerals. Its constituent minerals are garnet and calcite, and a small amount of clinopyroxene and epidote accompany with them. Like trenches T1 and T2, gold and copper mineralization is observed in trench T3.

There appears to be a fault between the limestone and the granodiorite porphyry with the strike direction of N45° E and the dip of 38° NW.

The following figures are obtained from the geochemical analysis to indicate the places of gold mineralization with high grades and good sizes (Fig II-4-3). All of these are located within the skarnized limestone zone, and none was discovered in the granodiorite porphyry.

Au 2.47 (120 cm), Au 2,34 (960 cm), Au 4.25 (120 cm), Au 2.73 (100cm)

4-3-2 Characteristics of the Skarn

1) Bedded skarn

Bedded skarn is formed near the boundary between the limestone and the granodiorite porphyry, in layers and masses. In some places there are developments of quartz veinlets in the granodiorite porphyry side near the boundary.

Its constituent minerals are mainly garnet, wollastonite, clinopyroxene and

epidote, and are accompanied by calcite, quarts and prehnite (Appendix 3 and 10). It occurs in massive aggregates in fine grained and euhedral crystal. Malachite and bornite are observed sporadically by the naked eye in this skarn. Under the microscope the interstices of euhedral skarn minerals are filled with anhedral calcite and clinopyroxene is replaced by carbonate minerals and quartz. The filling temperature of fluid inclusions of calcite (No. N-23) coexisted with skarn minerals shows a maximum of 289℃ and a minimum of 112℃. Ore minerals are composed of malachite, chrysocolla, bornite, chalcopyrite, hematite and limonite. In addition, as a result of microscopic observation and electron probe micro analysis (EPMA), chalcocite, covellite, electrum, bismuthinite and native copper are also confirmed (Appendix 5, 6 and 11).

2) Vein Skarn

The shapes of this skarn are of veins or small lenses, and its distribution is controlled by the fractures in the granodiorite porphyry. It has finer grains than bedded skarn, and its colors are generally pale greenish gray to lightly brownish gray. Its constituent minerals are mainly garnet which exhibits two kinds of tint in color (pale greenish gray and pale brown) and accompanying clinopyroxene、wollastonite, prehnite, calcite and quartz (Appendix 2 and 9). It is relatively poor in epidote. The chemical composition of garnet, according to the X-ray diffraction analysis and EPMA analysis (EDX), is probably andradite and grossularite with the proportion of 6:4, and relatively rich in aluminum content. The clinopyroxene is partially replaced by carbonate minerals and actinolite. The results of filling temperature measurements of skarn minerals and others are shown in the next table.

Minerals	No.	F.T.(Max.)	F.T.(Min.)	Average
garnet	R1-64	261℃	251℃	256℃
calcite A	M –03	218℃	174℃	198℃
calcite B	T3-79	217℃	146℃	185℃
quartz	M –02	254℃	129℃	175℃

F.T. : filling temperature of fluid inclusions

calcite A : coexisting with garnet skarn、calcite B : veinlet in skarn

Ore minerals are malachite, chrysocolla, azurite, bornite, cuprite, chalcopyrite, chalcocite, covellite, pyrite, arsenopyrite, hematite, limonite and electrum (Appendix 5, 6 and 11).

4-3-3 Ore Chemical Analysis

1105 pieces of sample ore from the trenches, including 100 from the Kichi-Sandyk district, are collected in this year's survey. Those are analyzed for 8 constituent elements: Au, Ag, Cu, Pb, Zn, Mo, As, and Sb. The results of the chemical analysis are indicated in Appendix 7.

Table II-4-1 shows the results of chemical analysis, according to the four different groups of materials (A～D) :

Group A : Skarn
Group B : Skarnization granodiorite porphyry and/or limestone
Group C : Altered granodiorite porphyry (including argillic alteration)
Group D : Weakly or unaltered granodiorite porphyry and/or limestone

In addition, correlation among the above-mentioned eight elements are shown in each material group in Table II-4-2. While scatter plots of the combinations of elements with relatively high correlation (Au-Ag, Au-Cu, Pb-Zn and Pb-Sb) are shown in Fig. II-4-7 and Fig. II-4-8.

Coefficients of correlation among the 8 elements are generally low, and there is no combination in which the elements have mutually close relations. As far as the scatter plots (Fig.II-4-5, Fig.II-4-6) show, there are no high correlation in distribution between Pb and Zn and Pb and Sb, the combinations that have showed relatively higher correlation. This is probably because most of the figures obtained from the analysis are below the detection limits, and this unnatural distribution of data has caused apparently high correlation. In addition, most of the samples are oxidized ore whose metallic elements had been largely decomposed and moved from the original state. Since the original states of the 8 elements were not preserved in the sample ore, the chances are good that natural relationships between those elements are not detected.

4-4 Discussion

The following points have been made clear as a result of our detailed geological surveys including trenching survey, and geochemical analysis. In addition, characteristics of mineralization in the two types of skarn which represent the current survey area in Table II-4-3.

－A number of places with gold and copper mineralization have been discovered in the central mineralization zone of Kichi-Sandyk mineral deposit with the vein skarn which develops along the fractures. Furthermore, some of those places exhibit very high grade of gold (Au>10g/t). The central mineralization

Table II-4-1 Assay results for Samples in 4 Different Rock Types

	elements	units	Group A Skarn 55 pieces	Group B Skarnized Rocks 289 pieces	Group C Altered* Rocks 369 pieces	Group D Unaltered Rocks 392 pieces
Average	Au	g/t	2.89	1.25	0.40	0.26
	Ag	g/t	10.0	6.0	4.0	5.1
	Cu	%	0.922	0.273	0.092	0.064
	Pb	ppm	44	26	29	26
	Zn	ppm	251	716	181	171
	Mo	ppm	4	3	3	3
	As	ppm	59	45	37	33
	Sb	ppm	77	6	7	6
Maximum	Au	g/t	81.61	54.00	20.09	9.09
	Ag	g/t	82.1	74.4	43.0	50.0
	Cu	%	6.965	9.835	3.450	1.279
	Pb	ppm	600	140	390	80
	Zn	ppm	2,560	25,450	9,860	1,030
	Mo	ppm	31	50	23	12
	As	ppm	440	230	210	160
	Sb	ppm	3,810	150	250	130
Minimum	Au	g/t	0.03	0.01	0.01	0.01
	Ag	g/t	0.1	0.1	0.1	<0.1
	Cu	%	0.001	0.001	0.001	0.001
	Pb	ppm	25	25	25	25
	Zn	ppm	10	10	5	5
	Mo	ppm	3	3	3	3
	As	ppm	10	5	5	5
	Sb	ppm	5	5	5	5

＊ : hydrothermal alteration

Table Ⅱ-4-2 Correlations among 8 Elements in Ore Samples

	Au	Ag	Cu	Pb	Zn	Mo	As	Sb
Au	1.00	0.07	0.19	0.34	0.02	0.01	0.10	0.02
Ag		1.00	0.57	0.28	0.17	0.04	0.20	0.23
Cu			1.00	0.32	0.25	0.29	0.33	0.20
Pb				1.00	0.08	0.07	0.57	0.89
Zn					1.00	0.04	0.04	0.05
Mo						1.00	0.09	0.07
As							1.00	0.65
Sb								1.00

Group A & B samples(344 pieces)

	Au	Ag	Cu	Pb	Zn	Mo	As	Sb
Au	1.00	0.04	0.45	-0.01	0.10	0.00	0.27	0.54
Ag		1.00	0.17	0.09	0.14	-0.03	-0.10	0.05
Cu			1.00	0.00	0.19	-0.03	0.30	0.53
Pb				1.00	0.79	0.02	0.16	0.21
Zn					1.00	-0.05	0.16	0.35
Mo						1.00	0.02	0.00
As							1.00	0.29
Sb								1.00

Group C & D samples(761pieces)

	Au	Ag	Cu	Pb	Zn	Mo	As	Sb
Au	1.00	0.07	0.25	0.25	0.06	0.03	0.15	0.04
Ag		1.00	0.42	0.19	0.16	0.02	0.07	0.17
Cu			1.00	0.23	0.28	0.24	0.32	0.21
Pb				1.00	0.24	0.05	0.38	0.68
Zn					1.00	0.04	0.10	0.07
Mo						1.00	0.08	0.07
As							1.00	0.48
Sb								1.00

Total samples(1,105pieces)

Table Ⅱ-4-3 Characteristics of mineralization in Kichi-Sandyk deposit

	Central ore zone(Centralny)	North ore zone(Severny)
Ore minerals	malachite, chrysocolla,azurite, cuprite, chalcocite	malachite, chrysocolla,chalcocite, covellite
	covellite, bornite, electrum, hematite, goethite	bornite, tetrahedrite, electrum, bismuthinite,
	pyrite, Cu-Fe-Si	Cu-Fe-Si, native Cu, hematite, goethite
Skarnization		
Skarn minerals	Gar > Cpx, Epi, Preh > Act	Gar, Epi, Wol
Mode of occurrence	vein, lense	massive, bedded
Scale	10cm ～ 1m(skarnized zone; max.30m)	5 m ～ 70 m
Electrum		
Mode of occurrence	- free particle in cavity and interstice in garnet skar	- small grain coexisted with Bismuthinite in Cp crystal
		- free particle in cavity and interstice in garnet skarn
		- free particle on the fringe of Cu-Fe-Si mineral
Grain size	5 ～ 100 μ m	5 ～ 100 μ m
Gangue minerals	garnet, clinopyroxene, wollastonite, quartz, calcite, plagioclase, K-feldspar, chlorite, sericite, serpentine	garnet, epidote, clinopyroxene, wollastonite, quartz, calcite,
Filling temperature of fluid inclusion(℃)	Sample No. Max. Min. Ave.	Sample No. Max. Min. Ave.
Quartz	M-2 254 129 175	
Calcite	M-3 218 174 198	N-23 289 112 183
Garnet	R1-64 261 251 256	
Remarks	hydrothermal alteration in host rock is common.	

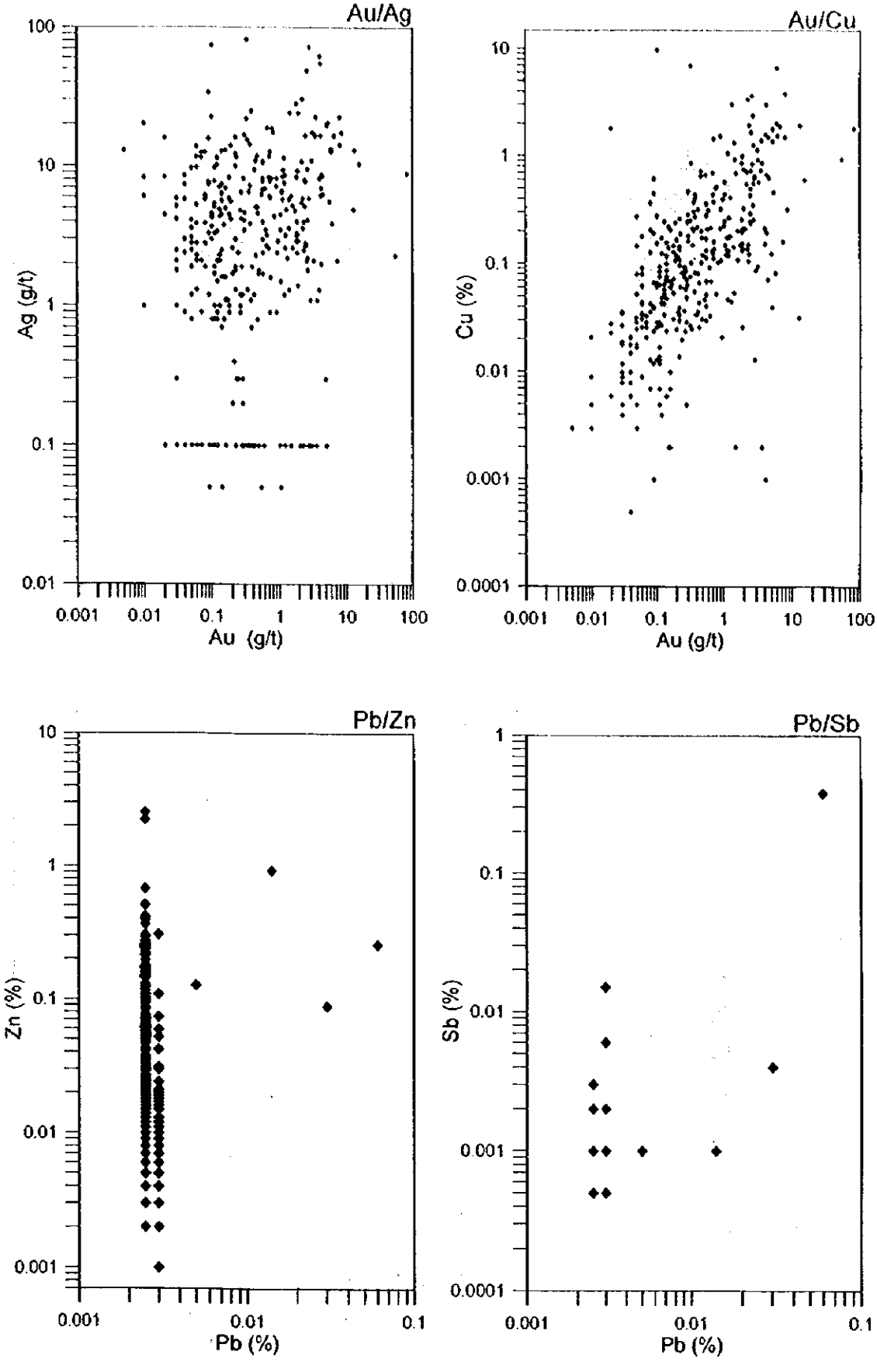


Fig.II-4-7 Scatter Plots (logarithmic) for Skarnized Rocks

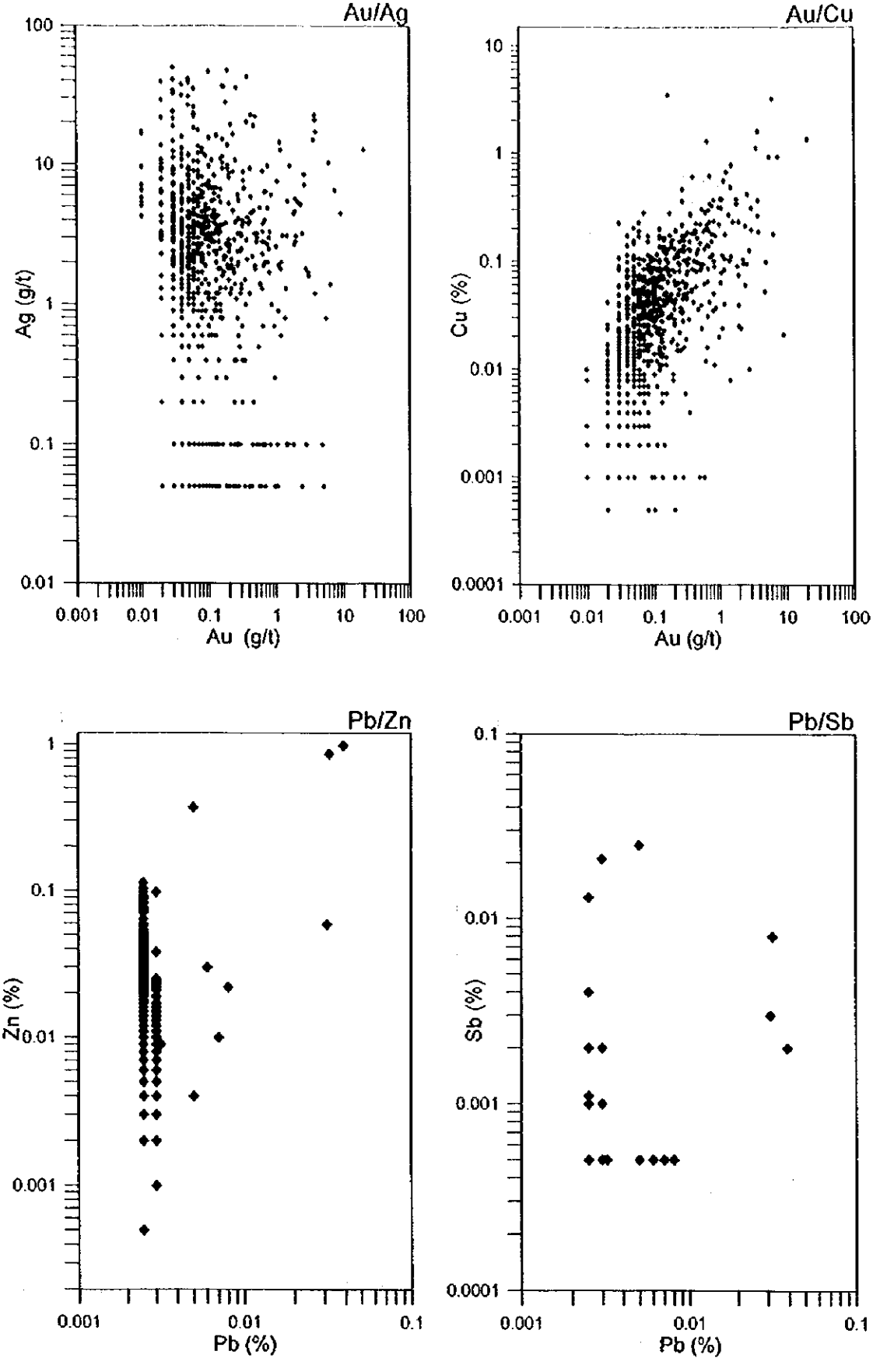


Fig.II-4-8 Scatter Plots (logarithmic) for Fresh Rocks

belt is likely to be near the center, if not the center itself, of the mineralization part of which is observable from the surface in the survey area.

—Gold and copper mineralization has been also discovered in the bedded skarn in the northern part of the survey area. The size of this skarn zone is larger than that of the vein skarn, and it is probable that mineral deposit is contained in it. However, its surface distribution is so limited that the exact structure of this skarn zone is still unknown. Therefore, it is necessary to confirm the size and depth of this skarn zone, as well as the conditions of its mineralization, in order to estimate the full potential of mineralization in the current survey area.

—Because there is a considerable amount of development (10m or more) of oxidation zone at the surface, the conditions of primary mineralization are not clarified by this year's survey. While, a small amount of sulfide minerals is discovered by observations with naked eyes and microscopes. For example, electrum occurs as free particles in the skarn, and in close mineral assemblage with chalcopyrite, bornite and bismuthinite as well. Therefore, it is conjectured that electrum coexists with sulfide minerals in the deep place in this mineralization area.

PART III CONCLUSIONS

CHAPTER 1 CONCLUSIONS

In the phase 1 survey, satellite images were analyzed in order to grasp the regional geological structure and classify into geological units the entire 800 km^2 extent of Kichi-Sandyk survey area. In addition, detailed surveys, including trenching aimed for geological structure and its relation with mineralization, were carried out for the inner Kichi-Sandyk district (4km^2) and Kichi-Sandyk deposit area (0.9km^2). Here are the findings. (Summarized results of the survey are indicated in the table below.)

1) From the satellite image analysis, it has become clear that the center of the survey area is promising for mineral exploration, with a considerable amount of concentration of lineaments and spectral anomaly zones. The Kichi-Sandyk deposit lies within this promising area. In addition, the area with mineral showings at Turpak-Tushty, which is expected to be second most promising after Kichi-Sandyk, is located at the southern end of the above mentioned promising area on the extension of the NNW-SSE lineaments, which control mineralization of the Kichi-Sandyk deposit, and accompanied with spectral anomaly zones. These facts together with many mineral showings confirmed on the surface, lead to a conclusion that this too is a promising area for exploration.

2) Trenching survey has detected in the central mineralization zone the following sites of gold mineralization (unit: g/t).

Trench T1:	Au 3.20(620cm)、Au 1.95(250cm)、Au 4.33(460cm)、
	Au 1.61(120cm)、Au 2.32(870cm)、Au 1.08(120cm)、
	Au 2.14(230cm)、Au 2.81(120cm)、Au 2.61(130cm)、
	Au 1.22(200cm)、Au 1.20(90cm)、Au 3.77(110cm)、
	Au 8.22(590cm)、Au 3.96(100cm)、Au 3.85(220cm)、
Trench T2:	Au 1.87(300cm)、Au 1.95(100cm)、Au 2.80(190cm)、
	Au 2.08(300cm)、Au 2.63(100cm)、Au 1.91(110cm)、
	Au 2.78(180cm)、Au1.88(100cm)、Au1 2.60(130cm)、
	Au 2.30(100cm)、Au 1.65(350cm)、Au 4.09(320cm)、
	Au 1.42(100cm)、Au 1.14(150cm)、

The analysis of the fracture pattern which controls mineralization

indicates that the above gold mineralization zone has the structure with the strike of N45° ~47° W and the inclination 56° ~74° SW. Considering the area in which trenching survey was conducted, mineralization of gold will extend at least 200m in the strike direction and 100m below. It will be necessary to figure out the downward continuity (structure and magnitude) and conditions of mineralization in order to evaluate its potential.

Taking into consideration, the conditions of outcrops in this area, thick oxidation zone, and a large amount of waste dump caused by past mining activities, to continue the surface survey further will provide little additional information for clarifying the entire picture of the mineralization.

3) Detailed geological survey (1/2,000) of the Kichi-Sandyk district revealed that bedded skarn of the northern mineralization area extends, though not continuously, as much as 2km to the direction of southwest along the boundary between granodiorite porphyry and limestone. This skarn is accompanied with copper and gold mineralization, and inclines deeper in the north. It will be the next task in exploration to analyze the structure of this bedded skarn and figure out the size and strength of mineralization.

CHAPTER 2 Proposals for the Second Year Survey

Based on the findings of this year's survey, we propose the following for the second year.

1) Drilling survey to confirm directly the depth of mineralization and the extent of mineralization to the strike direction, as well as its conditions of mineralization, at the central mineralization zone of the Kichi-Sandyk deposit. These are the conditions for the drilling survey.

- Target for inclined drilling should be set at 50m and 100m levels below the surface.
- According to the fracture analysis applied to the fractures obtained from the trenches, mineralization is likely to be controlled by the fractures with following directions:

T1 : Strike N45 W, dip 56 SW
T2 : Strike N47 W, dip 74 SW

It would be best to assume that the mineralization area runs along the

above structure, and to plan the drilling accordingly.

2) Drilling surveys targeted at the boundary between limestone and granodiorite porphyry to find out the distribution and structure of bedded skarn which is typical in the northern mineralization zones, as well as detailed geological surveys (1/100-1/500), including surveys with trenches on the outcrop of the bedded skarn.

3) Geological survey of the area which, according to the satellite image analysis, meets most conditions to be a promising area for mineral exploration, especially those mineral showing areas in Turpak-Tushty in the south of the Kichi-Sandyk district and other promising areas.

Summarized Results of the Phase 1 Survey

Survey Area	Area(km^2)	Methods	Results of the Survey
Kichi-Sandyk Area	800 km^2	Satellite Image Analysis	- Major lineaments exhibit NE-SW strike Kichi-Sandyk deposit located on the NNE-SSW lineaments. where their concentration high - According to the analysis of spectral anomaly detects oxidized iron, distributed heavily around the existing mineral deposits
Kichi-Sandyk District	4 km^2	Detailed Geological Survey (1:2,000)	- **Drevneye Mineral Showing :** Gold-copper mineralization of high grade confirmed Promising area for mineral exploration in the future - **Kvartvoye Mineral Showing :** Gold-copper mineralization confirmed with strong silicification and weak skarnization Likely to be the bottom part of the mineralization - **Neogenovoye Mineral Showing :** Similar to Kvartvoye Mineral Showing Data indicates this area to be closer to the center of the mineralization - **Southwestern part of the northern mineralization zone of** **Kichi-Sandyk Mineral Showing Area :** High grade ore collected from this area.The chances are good that thereis a development of mineralization under this area.
Kichi-Sandyk Deposits	0.9 km^2	Detailed Geological Survey (1:1,000) Trenching Survey (1:100)	- **The central mineralization zone of Kichi-Sandyk :** Development of vein skarn along the fractures with NW strike and S dip Numerous places with mineralization defected in the skarn Size of skarn, both vertical and strike direction, needs to be confirmed - **Northern mineralization zone of Kichi-Sandyk(bedded skarn) :** Bedded skarn of nothern mineralization zone extends as much as 2km. Strong mineralization confirmed by analysis of surface samples Clarification of the structure of the bedded skarn, as well as confirmation of mineralization at deeper places needed

COLLECTED DATA

1.Tectonic Map of the Sandalash-ChatkalOre Region, 1977, scale 1:100,000

2.Geological & Geophysical Sections, Kichi-Sandyk District, 1977, scale 1:5,000

3.Map of Schems Pk, drawn upon the Data of the Combined Profiling Method (CPM), Kichi-Sandyk District, 1977, scale 1:5,000

4.Map of the Results of Geophysical Survey, Projected on the Schematic Geological Basis, Kichi-Sandyk District, 1977, scale 1:5,000

5.Map of the Abnormal Magnetic Field (Isoline Z), Kichi-Sandyk District, 1977, scale 1:5,000

6.Scheme of Sampling on the Kichi-Sandyk Gold Deposit, Centralny District (No.1), 1977, scale 1:5,000

7.Scheme of Sampling on the Kichi-Sandyk Gold Deposit, Centralny District (No.2), 1977, scale 1:5,000

8.Scheme of Sampling on the Kichi-Sandyk Gold Deposit, Centralny District, 1977, scale 1:200

9.Schematic Geological Map of the Kichi-Sandyk Gold Deposit Centralny District, 1977, scale 1:1,000

10.Report on Prospecting-revision Works on Sandalash-Chatkal Ore District, 1973 – 1976 (Kichi-Sandyk Geological Party), Volume-1, Text of Report,

Appendices

LIST OF APPENDICES

Appendix 1 List of Laboratory Works

Items	Kichi-Sandyk District ($4km^2$)	Kichi-Sandyk Deposit ($0.9km^2$)	Total	Laboratory
	quantity	quantity	quantity	
1. Thin section	20	10	30	Mitsui Kinzoku R & D Center*1
2. Polished thin section	10	10	20	ditto
3. Ore analysis (Au,Ag,Cu,Pb,Zn,Mo,As,Sb)	100	1000	1100	Alex Stewart(Assayers)LTD*2
4. Measurement of filling temperature	5	5	10	Mitsui Kinzoku R & D Center
5. X-ray diffraction analysis	10	5	15	ditto
6. X-ray image analysis by EPMA	0	5	5	ditto
7. Isotopic dating by K-Ar method	2	2	4	Teledyn Brown Engineering Environmental Services*3

*1 : Ageo city, Saitama-ken, Japan

*2 : Kara-Baruta, Kyrghyz

*3 : New Jersey, U.S.A.

Appendix 2 List of Rocks and Ore Samples for Laboratory Works

Sample No.	Sample Name	TS	PTS	XDF	K-Ar	FI
A-009	Skarnized limestone(exo skarn)		○			
A-015	Garnet skarn		○			
A-017	Quartz vein in dioritic rock					○
A-018	Granodiorite porphyry	○			○	
A-021	Epidote-garnet skarn		○			
A-027	Garnet-wollastonite skarn	○		○		
A-028	Monzodiorite	○				
A-031	Garnet-clinopyroxene skarn	○		○		
A-032	End-skarn		○			
A-036	Granodiorite porphyry	○				
A-039	Granodiorite porphyry	○				
A-040	Monzodiorite	○				
A-042	Skarnized granodiorite porphyry		○			
A-046	Dioritic rock					○
A-060	Dioritic rock					○
A-061	Granodiorite porphyry	○		○		
A-067	Skarnized granodiorite porohyry		○			
A-068	Dioritic rock					○
A-069	Silicified skarn	○		○		
A-081	Silicified skarn	○				
A-089	Garnet-clinopyroxene skarn	○		○		
A-092	Epidote -Garnet skarn		○			
A-096	Granodiorite porphyry	○				
A-098	Granodiorite porphyry	○		○		
A-099	Quartz monzonite	○		○		
A-108	Garnet-clinopyroxene skarn	○		○		
A-113	Garnet-clinopyroxene skarn	○	○			
A-120	Siricified rock					○
A-123	Siricified skarn	○				
A-125	Epidote-clinopyroxene skarn		○			
A-132	Wollastonite-clinopyroxene skarn	○		○		
A-134	Quartz monzonite	○			○	

Sample No.	Sample Name	TS	PTS	XDF	K-Ar	FI
A-138	Quartz monzonite	○		○		
A-146	Garnet skarn		○			
M-001	Cu ore		○			
M-002	Calcite vein in skarn					○
M-003	Calcite with gar-skarn					○
M-004	Green skarn with Cu			○		
T1-092	Granodiorite porphyry	○				
T1-097	Clinopyroxene-garnet skarn	○		○		
T1-132	Garnet skarn	○		○		
T1-150	Mineralized skarnized limestone		○			
T1-185	Mineralized skarnized limestone		○			
T1-212	Granodiorite porphyry	○		○	○	
T2-Au	Au bearing green Cu ore		○			
T2-Bn	Bn,Cp bearing green Cu ore		○			
T2-143	Grarnet skarn	○				
T2-226	Granodiorite porphyry	○		○	○	
T3-038	Grarnet skarn	○				
T3-048	Grarnet skarn	○				
T3-076	Grarnet skarn	○				
T3-079	Granite	○				○
N-008	Garnet-Epidote skarn		○			
N-019	Skarn with green Cu		○			
N-046	Bn bearing oxide Cu ore		○			
N-048	Skarn (exo skarn)		○			
R1-064	Quartz vein in skarn					○
R1-095	Calcite in skarn					○
R1-150	Grarnet skarn		○			
Total		**30**	**20**	**15**	**4**	**10**

TS : Microscopick Observation of Thin Section

PTS : Microscopick Observation of Thin Section

XDF : X-ray Diffraction Analysis

K-Ar : Potassium-Argon Dating

FI : Filling Temperature Measurement of Fluid Inclusion

Appendix 3 Microscopic Observations of Thin Sections

No.	Sample No.	Rock Name	Grade	Primary minerals												Secondary minerals													
				Qz	Pl	Kf	Bi	Hb	Cpx	Opx	Mt	Sph	Zr	Ap	All	Qz	Ser	Sm	Chl	Ep	Cal	Gar	Cpx	Wol	Prh	Act	Sph	Hm	Gt	Mal
1	A-018	Granodiorite porphyry	D	○	○	△	△	△			·		·	·	·		·		·				·			·	·			
2	A-027	Garnet-wollastonite skarn	A																	○	△	○		◎						
3	A-028	Monzodiorite	E	△	○	△	△	△	○	△	·	·	·	·			·	·			·					·				
4	A-031	Garnet-clinopyroxene skarn	A																		△	○	○	·				·	·	
5	A-036	Granodiorite porphyry	C	△	○	△	·	△			·	·		·			·	·		·	·		△				·			
6	A-039	Granodiorite porphyry	B	△	○	△											·						△			·	·			
7	A-040	Monzodiorite	E	·	◎	△	△		△	△	·			·			·													
8	A-061	Granodiorite porphyry	B	○	○	△										○		·					△	·	○		·			
9	A-069	Silicified skarn	A		○	△										◎	·	·			·	·	○				·			
10	A-081	Silicified skarn	A													○					△	○	△		△					
11	A-089	Garnet-clinopyroxene skarn	A													·					△	○	○		·				·	
12	A-096	Granodiorite porphyry	B	○	◎	△											△				·		○		·		·			
13	A-098	Granodiorite porphyry	B	○	◎	△											·				·		○		·		·		·	
14	A-099	Quartz monzonite	E	△	○	○	△	△	·		·	·	·	·			·	·												
15	A-108	Garnet-clinopyroxene skarn	A													·					△	○	◎					·	·	
16	A-113	Garnet-clinopyroxene skarn	A													·					△	○	○					·		
17	A-123	Silicified skarn	A													◎					△	△						·		△
18	A-132	Wollastonite-clinopyroxene skarn	A																				◎	○	·					
19	A-134	Quartz monzonite	E	△	○	○	△	·	○	△	·			·	·		·													
20	A-138	Quartz monzonite	E	△	○	○	△	△	·		·	·	·	·			·			·										
21	T1-092	Granodiorite porphyry	E	○	◎	△	△	△	·		·	·		·			·	·	·											
22	T1-097	Clinopyroxene-garnet skarn	A													·					·	◎	△	△						
23	T1-132	Garnet skarn	A													·					△	◎								
24	T1-212	Granodiorite porphyry	D	○	◎	△	△	△	△		·	·	·	·			·						·			·	·			
25	T2-143	Garnet skarn	A													·			·	·	△	◎		·				·		
26	T2-226	Granodiorite porphyry	B	○	◎	△	△	△						·						·	·		○		△		·			
27	T3-038	Garnet skarn	A													·				·	○	◎	·					·		·
28	T3-048	Garnet skarn	A													·				·	○	◎						·	·	·
29	T3-076	Garnet skarn	A																	·	○	◎	·							
30	T3-079	Granite	A	○	○	○		△				·		·			·	·		·	·		△		△		·			

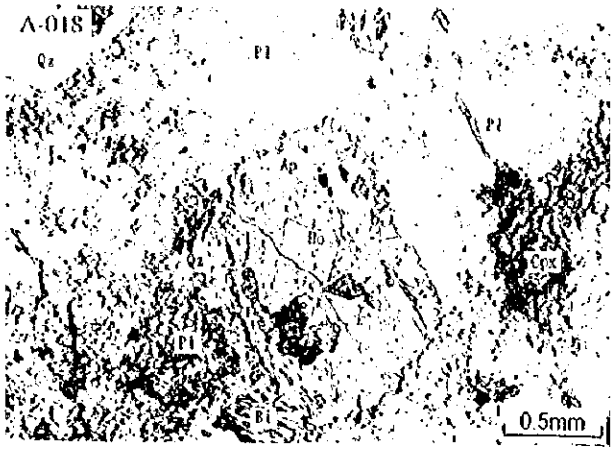
[Abbreviations]
Act:actinolite, All:allanite, Ap:apatite, Bi:biotite, Cal:calcite, Chl:chlorite, Cpx:clinopyroxene,
Ep:epidote, Gar:garnet, Gt:goethite, Hb:hornblende, Hm:hematite, Kf:K-feldspar, Mal:malachite, Mt:magnetite,
Opx:orthopyroxene, Pl:plagioclase, Prh:prhenite, Qz:quartz, Sm:smectite, Sph:sphene, Ser:sericite, Zr:zircon

[Legende]
◎ Abundant, ○ Common, △ Poor, · Rare
Grade : grade of skarnization, A high, B moderate, C low, D very low, E none

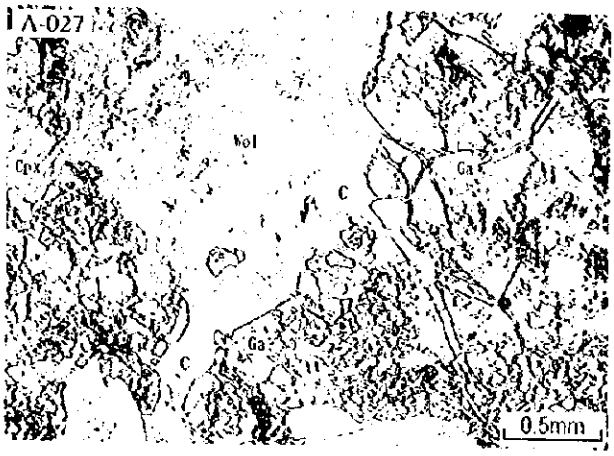
Appendix 4 Photomicrographs of Thin Sections

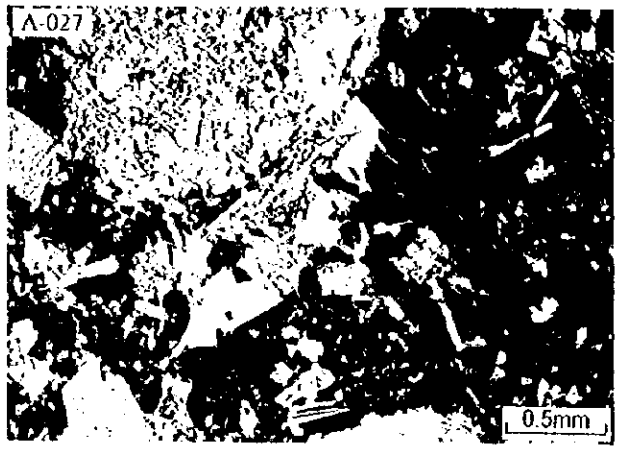
[Abbreviations]

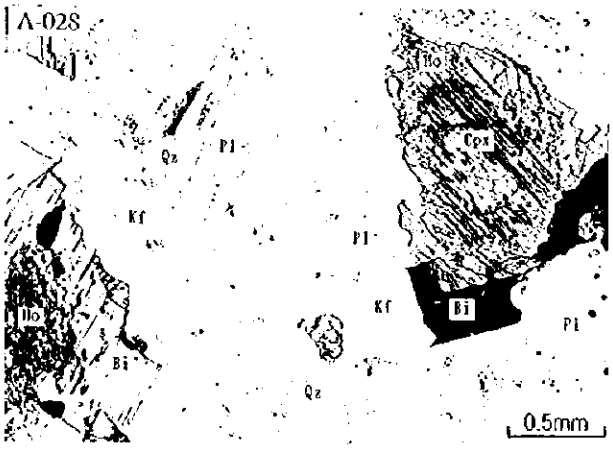
Ap	: apatite
Bi	: biotite
C	: calcite
Ch	: chlorite
Cpx	: clinopyroxene
Ga	: garnet
Hm	: hematite
Ho	: hornblende
Kf	: K-feldspar
Mal	: malachite
Opx	: orthopyroxene
Pl	: plagioclase
Prh	: prhenite
Qz	: quartz
Sph	: sphene
Wol	: wollastonite

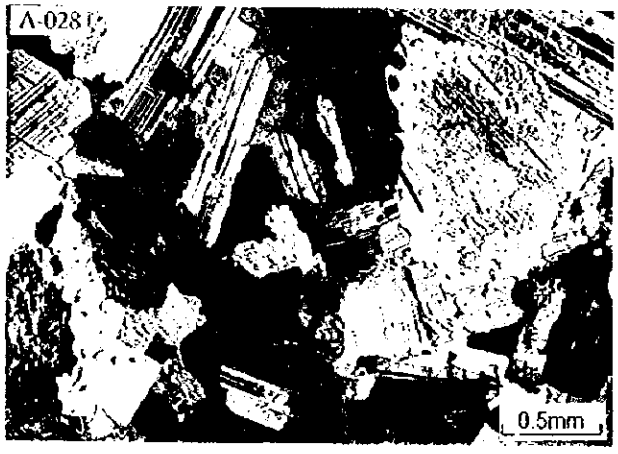

A-018
Qz
Pl
Pl
Ho
Cpx
Pl
Bi
0.5mm

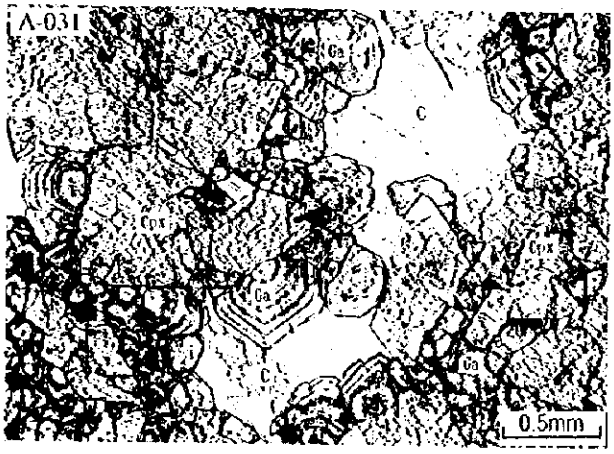

A-018
0.5mm

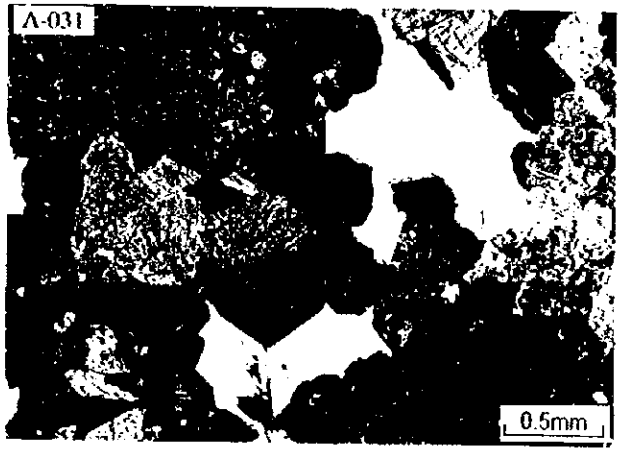

A-027
Wol
Cpx
Ga
C
C
Ga
0.5mm

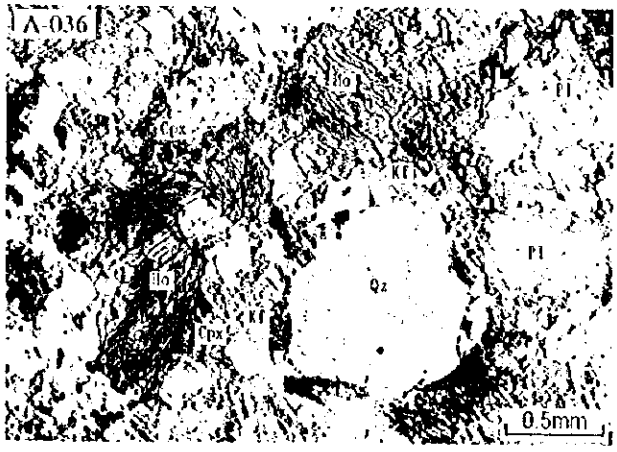

A-027
0.5mm

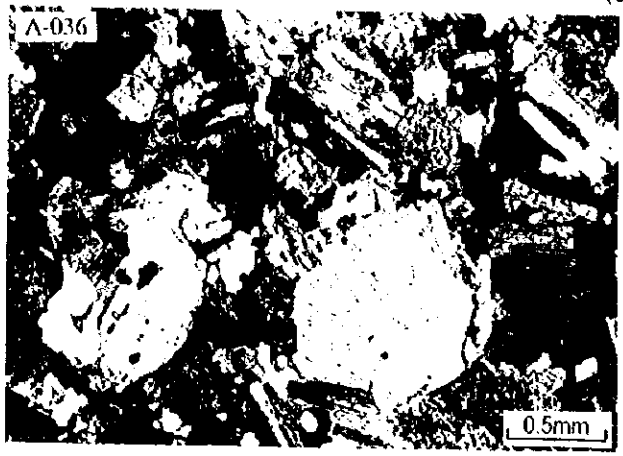

A-028
Ho
Cpx
Qz
Pl
Kf
Pl
Kf
Bi
Pl
Ho
Bi
Qz
0.5mm

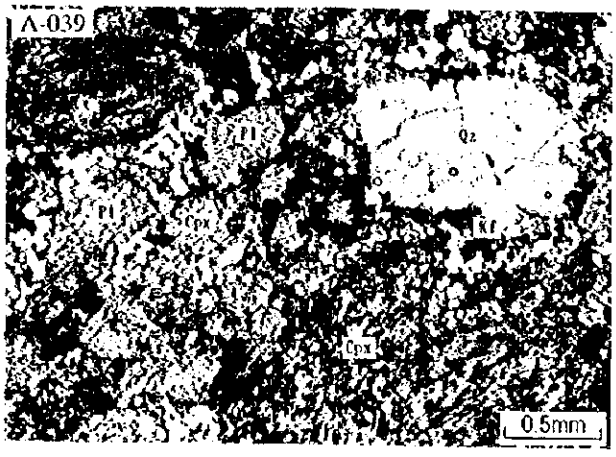

A-028
0.5mm

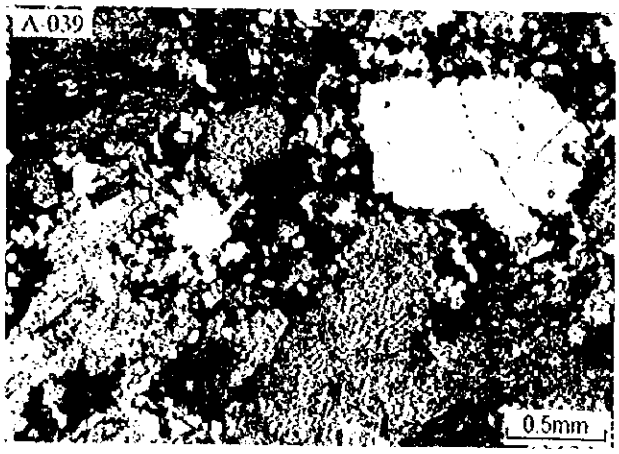

A-031
Ga
C
Cpx
Cpx
Ga
Ga
C
0.5mm

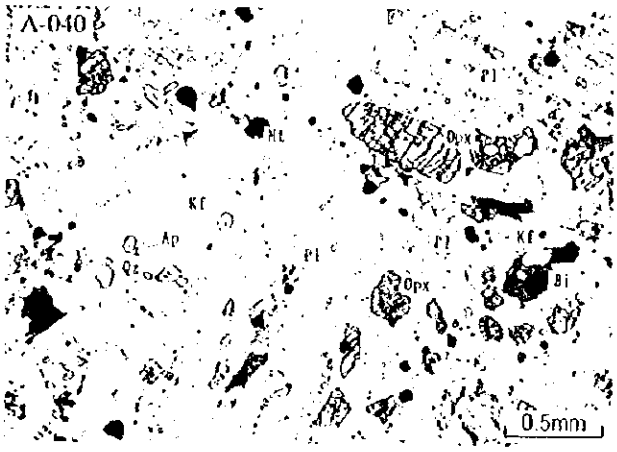

A-031
0.5mm

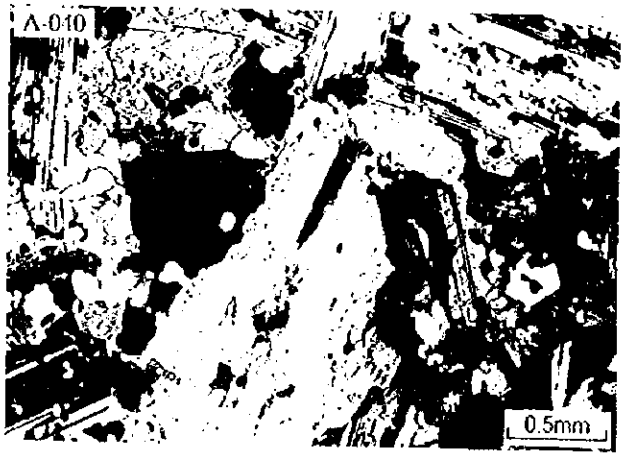

A-036
Bio
Pl
Cpx
Kf
Qz
0.5mm

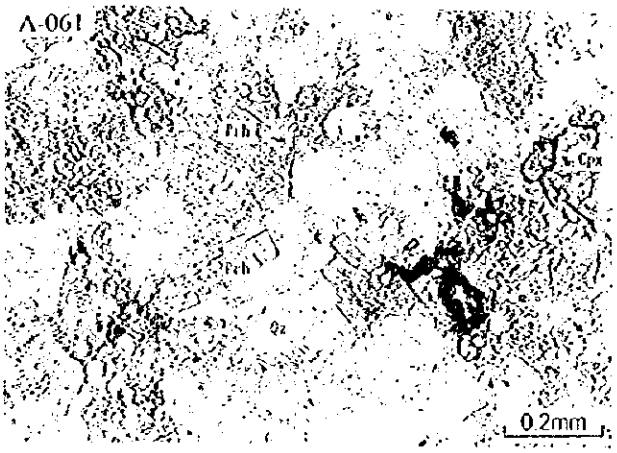

A-036
0.5mm

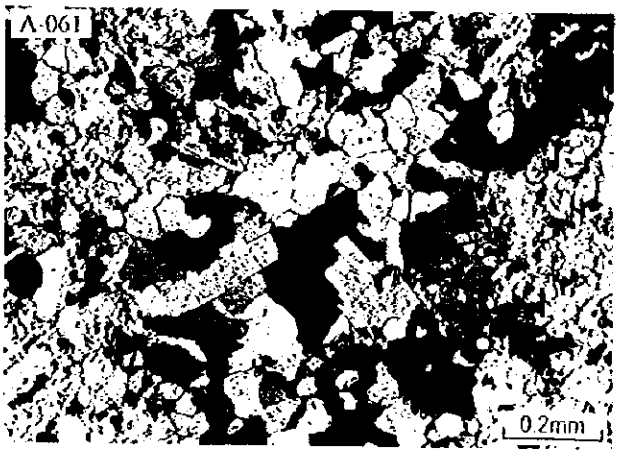

A-039
Pl
Qz
Cpx
Kf
0.5mm

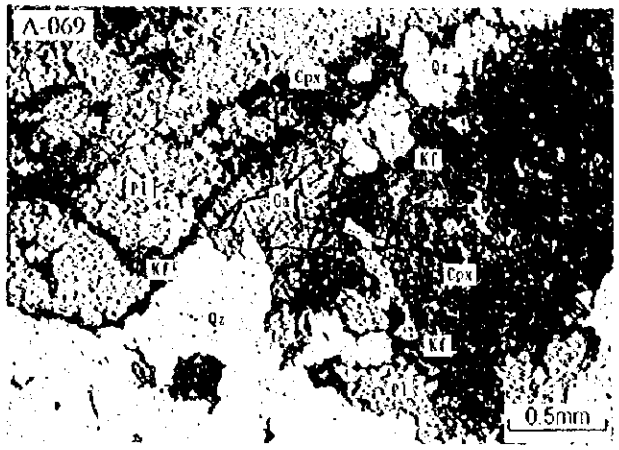

A-039
0.5mm

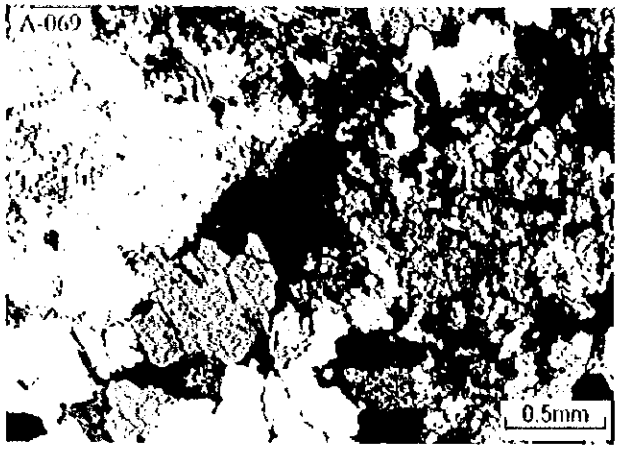

A-040
Pl
Kf
Ap
Qz
Opx
Bi
0.5mm

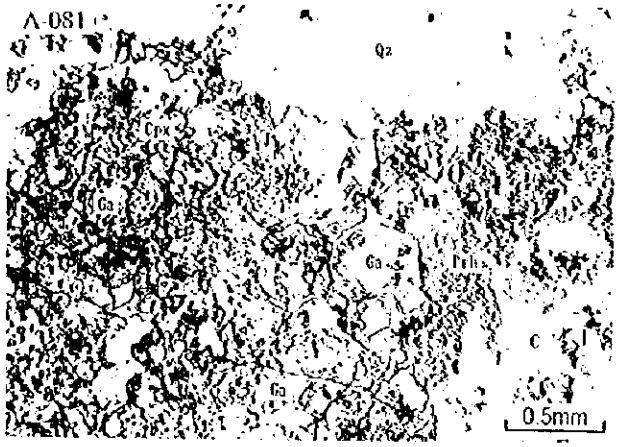

A-040
0.5mm

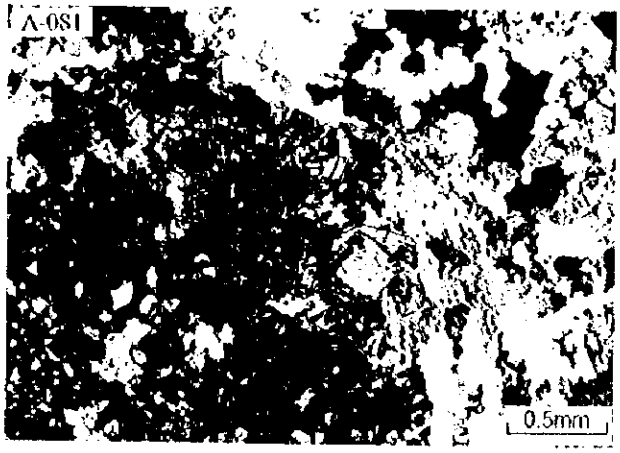

A-061
Prh
Cpx
Qz
0.2mm

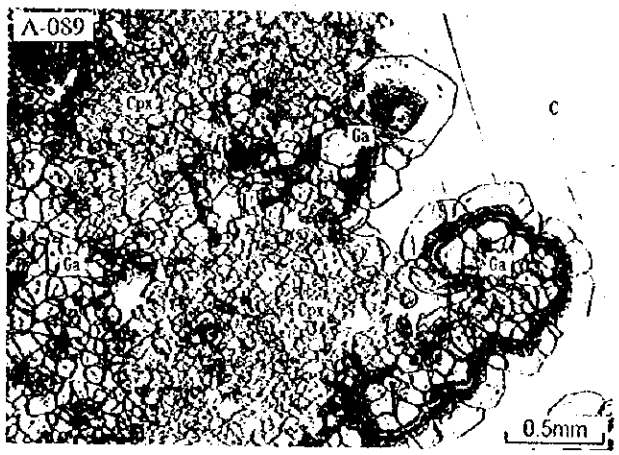

A-061
0.2mm

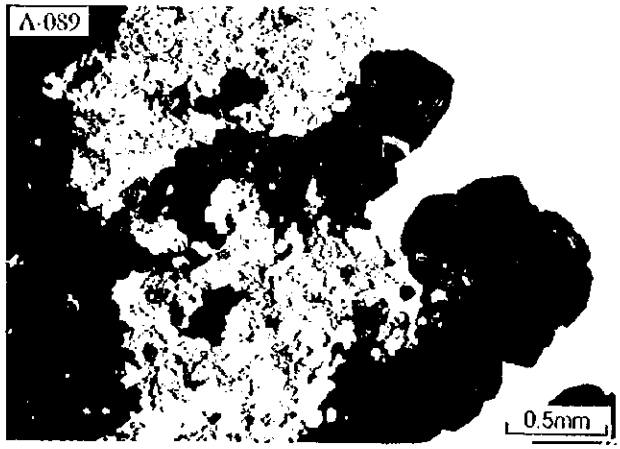

A-069
Cpx
Qz
Kf
Pl
Ga
Kf
Cpx
Qz
Kf
Pl
0.5mm


A-069
0.5mm

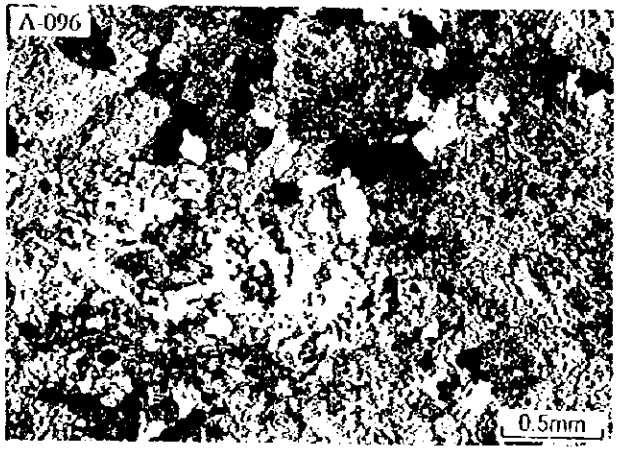

A-081
Qz
Cpx
Ga
Ga
Pl
C
Ga
0.5mm


A-081
0.5mm

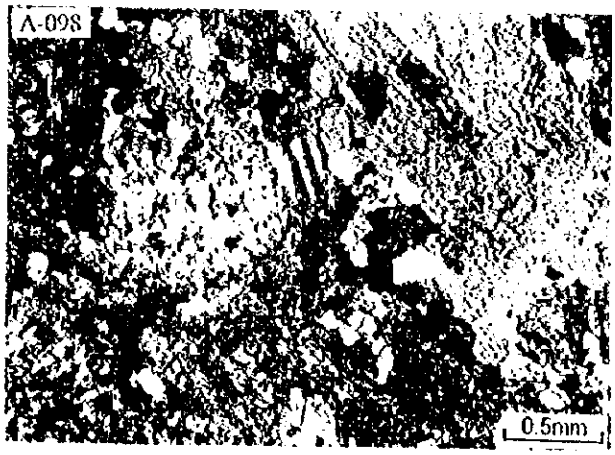

A-089
Cpx
Ga
C
Ga
Ga
Cpx
0.5mm


A-089
0.5mm


A-096
Pl
Qz
Pl
Pl
Cpx
0.5mm


A-096
0.5mm

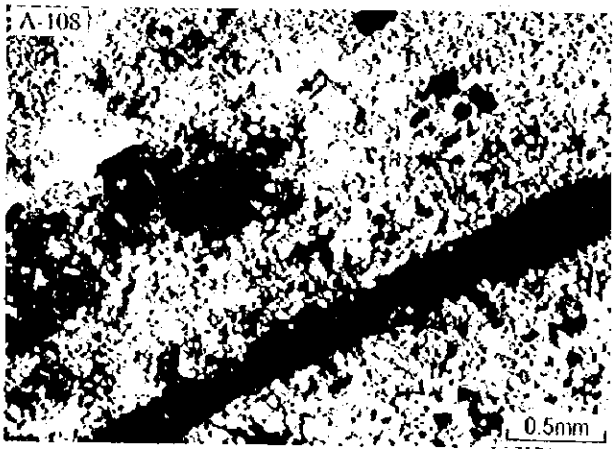

A-098
Pl
Cpx
Qz
Pl
Cpx
0.5mm

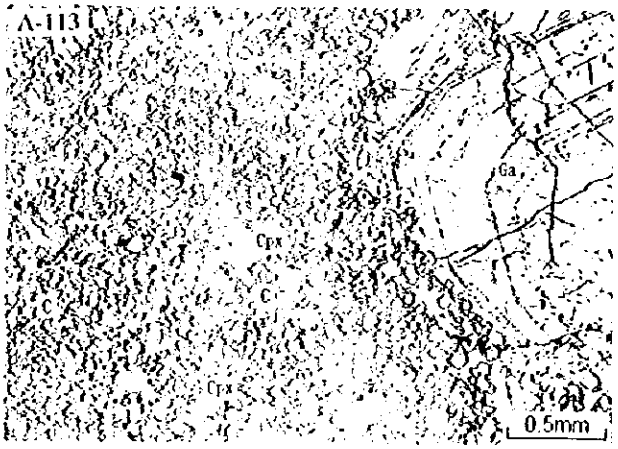

A-098
0.5mm

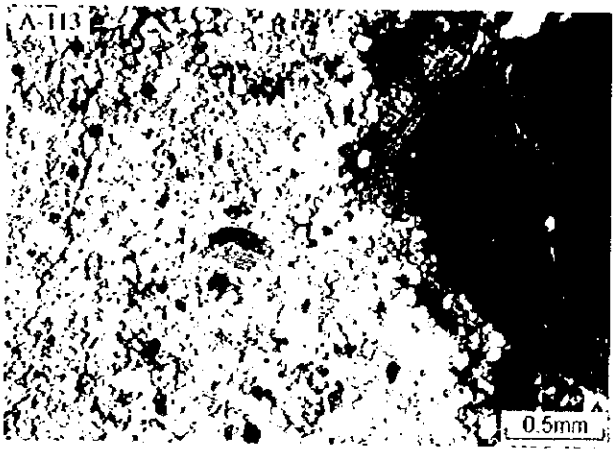

A-099
Pl
Qz
Cpx
Ilo
Ilo
Kf
Qz
Pl
Ml
Kf
Kf
Bi
Kf
Kf
0.5mm


A-099
0.5mm

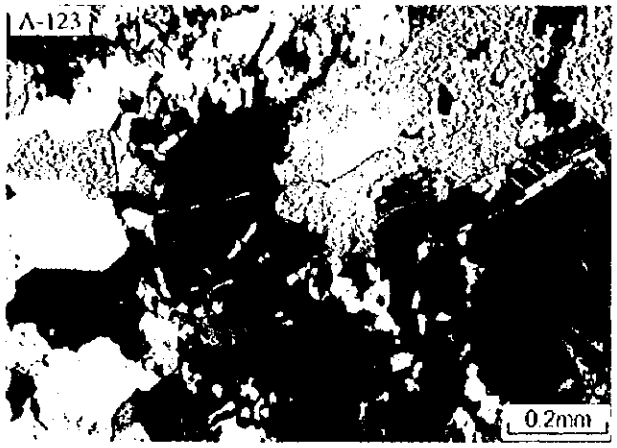

A-108
Ilo
C
C
Ga
Cpx
Ga
Cpx
0.5mm

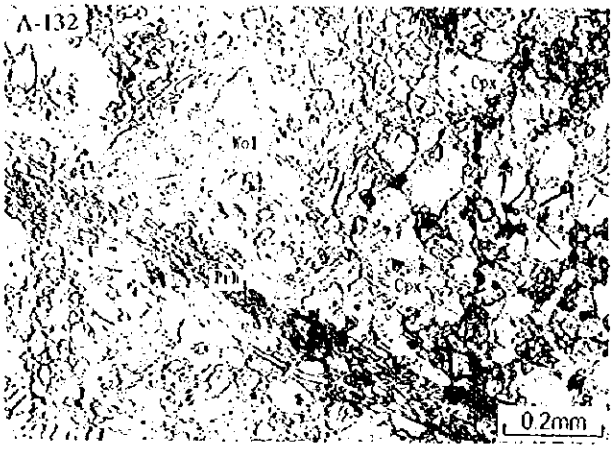

A-108
0.5mm

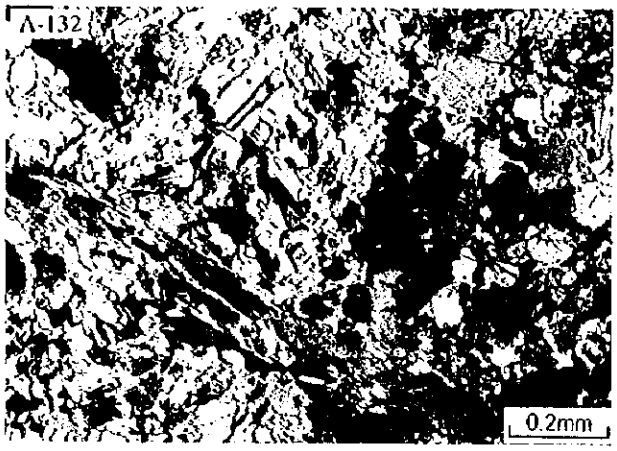

A-113
Ga
Cpx
C
Cpx
0.5mm

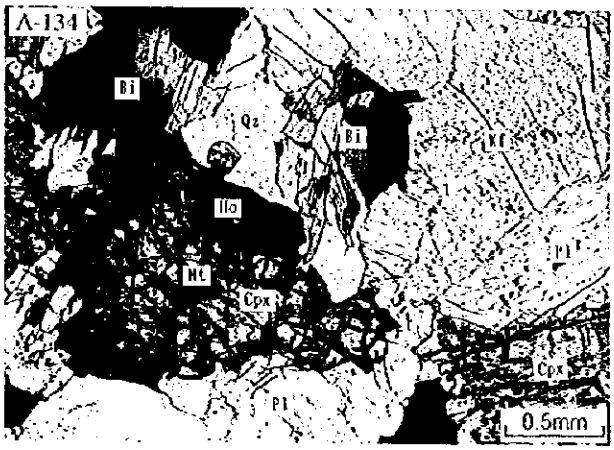

A-113
0.5mm

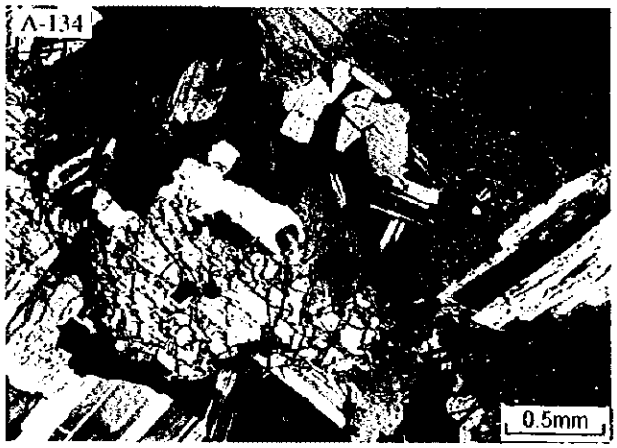

A-123
Hbl
Ga
Qz
0.2mm

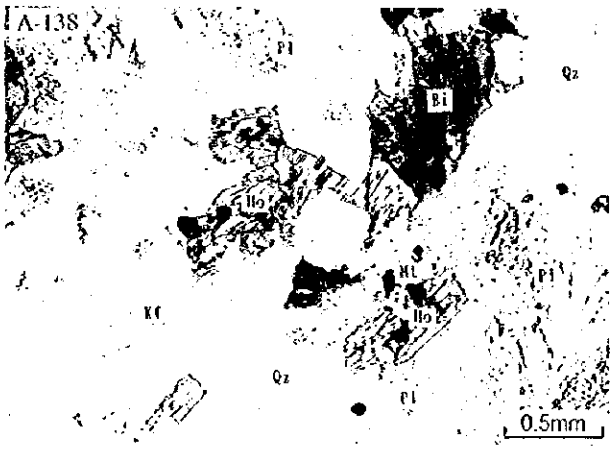

A-123
0.2mm

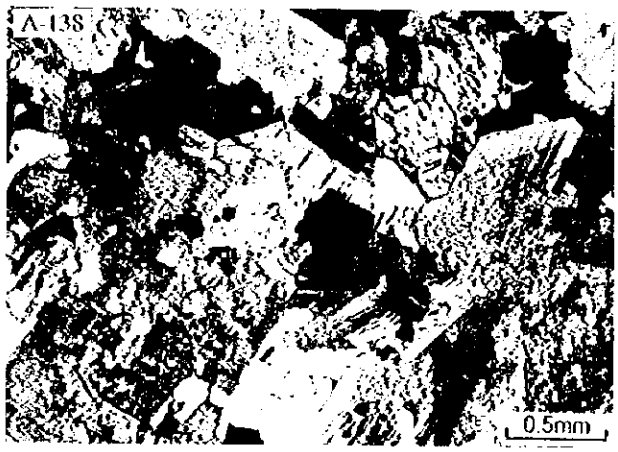

A-132
Cpx
Hbl
Pl
0.2mm


A-132
0.2mm


A-134
Bi
Qz
Kf
Ilo
Mt
Cpx
Pl
0.5mm


A-134
0.5mm


A-138
Pl
Qz
Bi
Ilo
Mt
Kf
0.5mm


A-138
0.5mm