1-3 Consideration

1-3-1 Characteristics of geological structure and mineralization

The geological map of the Kichi-Sandyk district is shown in Plate II-1-1 and Fig. II-1-2, and the geological sections are shown in Plate II-1-2 and Fig. II-1-3. Plate II-1-3 and Fig. II-1-4 shows the location map of the collected rock specimens.

1) Geology

The geology of Kichi-Sandyk district mainly consists of crystalline limestone of Late Cambrian to Early Carboniferous (Visean) age and the Permian granodiorite porphyry (Chalmansay complex) intruding the limestone. Conglomerate of unknown age covers all of the above rocks.

Calcareous sediments are mostly of crystalline limestone and partially contain chert beds. They are widely distributed in the northern and the western parts of the district. Brecciated zones probably formed by thrust faulting are observed from place to place. Layered skarns occur along the contact of limestone and intrusives.

The granodiorite porphyry is leucocratic and has widely undergone hydrothermal alteration such as argillization, carbonatization, chloritization and silicification. It is accompanied with vein-like skarns trending NW-SE.

The conglomerate is mainly composed of round to subround gravel of crystalline limestone, granodiorite porphyry, skarn and sandstone which are 3-10 cm in diameter. The matrix is composed of sand and clay, the former being of the same materials as gravels.

2) Geological structure

The contact plane between calcareous sediments and granodiorite porphyry gently dips north or west and layered skarns often occur near the contact. A part of the limestone occurs as a large xenolith captured within the granodiorite porphyry. Conglomerate of unknown age is tectonically overlain by granodiorite porphyry and limestone with a thrust fault that gently dips SW in the eastern part of the district.

Topographic feature indicates the presence of parallel faults trending NW- SE. A number of fissures and joints which have the same trends and a steep southward dip were developed in the central mineralization zone. Cu-Au-bearing vein-like skarns were formed along these fractures. A number of crushed zones composed of granule- or sand-sized fragments with clayey materials have been detected by this year's drillings and they possibly belong to the above-mentioned thrust fault system.

3) Mineralization

(1) Types of mineralization

Two types of mineralization described below are recognized in the survey district.

① Endoskarn: As mentioned above, a number of fissures and joints striking NW-SE and steeply dipping SW were formed within granodiorite porphyry. Along these fractures, vein-like skarns accompanying copper and gold ores were often formed in close association with calcite veinlets. These endoskarns occur in the central mineralization zone and, also, below the layered skarns in the northern mineralization zone.

② Exoskarn: Layered skarns were formed in limestone at the contact with intrusives. This type of skarn occurs in the northern mineralization zone. In addition, pale green or pale brown limestone bearing minor skarn minerals (weakly skarnized limestone) are widely distributed in the survey district, although it is barren.

(2) Minerals

Garnet and clinopyroxene are the main skarn minerals and accompanied with minor amount of prehnite. Wollastonite is also observed in layered skarn. Chrysocolla, malachite, geothite, hematite and minor amounts of chalcopyrite and pyrite are identified as ore minerals.

(3) Size of ore body

Width of each vein-like skarns is in an order of 10～100 cm and they form together several Au-Cu ore bodies with the width of a few meters to a maximum of 25 m. Ore bodies seem to be of stockwork type as a whole, trending NW-SE parallel to the major fracture system. The extent of the central mineralization zone as an aggregate of Au-Cu ore bodies is presumed to be 300 m by 300 m. The downward extension of the mineralization zone is inferred to be in an order of 10-20 m with maximum of 30 m.

Outcrop of the layered skarns extends intermittently for 2 km in the NW-SE direction along the contact of limestone and granodiorite porphyry. The layered skarns are presumed to continue to a considerable depth and their width is in an order of 10-20 m.

(4) Ore grade

① Vein-like skarns: The maximum width and grade of the ore zones determined by the four drillings in the central mineralization zone are 1.2 g/t Au for 8 m (highest grade: 3.47 g/t Au for 1 m) in the MJKK-2 drillhole. Lower grade ores than 1 g/t Au were found in the other drillholes. The results of the last year's trenching for the central mineralization zone showed that the average grade and width were 3.1 g/t Au and 1.74 m, respectively. This implies that the grade of underground ore body is not higher than that on the surface.

On the other hand, vein-like skarn with the grade of 1.05 g/t Au for 13 m (high-grade part: 35.77 g/t Au for 0.3 m of calcite vein) has been found in granodiorite porphyry immediately below the limestone. Green copper minerals are recognized in this skarn. Vein-like skarn from the western part of the road cuts (R-1) show the grade of 1.16 g/t Au for 7.6 m (high-grade part: 2.58 g/t Au for 2.0 m).

② Layered skarns: The ore grade of 1.33 g/t Au for 16.2 m (high-grade part: 2.01 g/t Au for 6.1) and 1.10 g/t Au for 9.8 m (high-grade part: 2.14 g/t Au for 2.0 m) has been found from the road cuts near MJKK-5 drillhole.

(5) Model of mineralization

From the above-mentioned facts, the following model on the mineralization of this district is proposed.

① As a result of intrusion of the granodiorite porphyry into the limestone, layered skarns were formed along the contact plane. At the same time, the vein-like skarns were formed along the fractures of the NW-SE system in the granodiorite porphyry, mostly within the distance of 10～20 m from the contact plane.

② Ore solution passed along the fractures of the NW-SE system and deposited copper and gold ores in the pre-existing skarns.

③ The Kichi-Sandyk district was then tectonically deformed and was divided into small blocks by thrust faults.

④ In the central mineralization zone, the vein-like skarns were exposed on the surface due to intense erosion of limestone which was lying on the intrusives with gently dipping boundary. Reconcentration of copper and gold by meteoric water led to the formation of a secondary enrichment zone characterized by green copper minerals at shallow depth.

1-3-2 Potential for ore deposits

1) Central mineralization zone

The results of the drilling survey show that the underground mineralization is weaker than the surface mineralization revealed by the last year's trenching survey. Downward extension of the orebody is presumably 10-20 m on average with a maximum of 30 m.

Potential reserves of gold in this area are estimated about 0.7 t Au as calculated below, although it is difficult to expect the existence of economically workable ore deposits in this area due to the low grade of ore.

① Potential ore reserves (for three ore bodies with a width over 1.0 m including the inner waste (Fig. II-1-9).

- Cut-off grade: 1 g/t Au
- Upper area and grade of ore body

An ore body:	1,788 m^2	1.52 g/t Au
B ore body:	1,883 m^2	1.69 g/t Au
C ore body:	1,273 m^2	2.89 g/t Au
Total	4,944 m^2	1.94 g/t Au

- Bottom area and grade of ore body: the same as the upper
- Downward extension: 30 m (maximum)
- Potential ore reserves and grade

(Ore reserves) Area 4,944 m^2 × Depth 30 m × Specific gravity 2.6
=385,630 t

(Gold content) Ore reserves 385,630 t × Grade 1.94 g/t= 748 kg

② Potential ore reserves (reference value in case of vein mining) (Fig. II-1-8)

In case of vein mining for all veins with width over 1.0 m determined by the first year's trenching, the following potential ore reserves are estimated:

- Cut-off grade: 1 g/t Au
- Size and grade of veins determined by trenching

Number of veins: 72
Total width of veins: 125.0 m
Average width of veins: 1.74 m
Length in direction of strike: 50 m (assumed)
Average grade: 3.14 g/t Au

- Downward extension: 30 m (maximum)
- Potential ore reserves and grade

(Ore reserves) Width 125 m × Length 50 m× Depth 30 m × Specific
Gravity 2.6 = 487,500 t

(Gold content) Ore reserves 487,500 t × grade 3.14 g/t= 1,530 kg

In case of actual mining, the mineable depth limit is about 10 m. Therefore, the mineable gold content will be reduced to 510 kg (1,530 kg × 1/3).

2) Northern mineralization zone

The layered skarns occurring near the contact of the granodiorite porphyry and limestone as well as the endoskarns are the objects of this estimate. According to the results of this year's survey, the grade of the layered skarn is lower than 1 g/t Au.

On the other hand, a zone of vein–like skarns with grade over 1 g/t Au for more than 10 m was found beneath the layered skarns.

Though the grade of layered skarns is presumed to be 1-2 g/t Au, there is the possibility of existence of high-grade ore bodies because the previous exploration was done in a very limited area of the vast mineralization area.

Since the ore body of this type is a gently dipping stratiform, underground mining method will probably be adopted in case of mining. Considering poor infrastructure of this district for the transportation and electric power, the mineable ore grade is required to be at least 6-8 g/t Au

- Thickness: 10 m
- Width: 100 m
- Length: 1,500 m
- Percentage of existence: 20%
- Potential ore reserves and grade

(Ore reserves) Thickness 10 m × Width 100 m × Length 1,500 m ×
Specific gravity 2.6 × Percentage of existence 20% = 780,000 t

(Gold content) 780,000 t × 1 g/t= 780 kg Au (in case of 1 g/t Au)
780,000 t × 2 g/t= 1,560 kg Au (in case of 2 g/t Au)
780,000 t × 6 g/t= 4,680 kg Au (in case of 6 g/t Au)

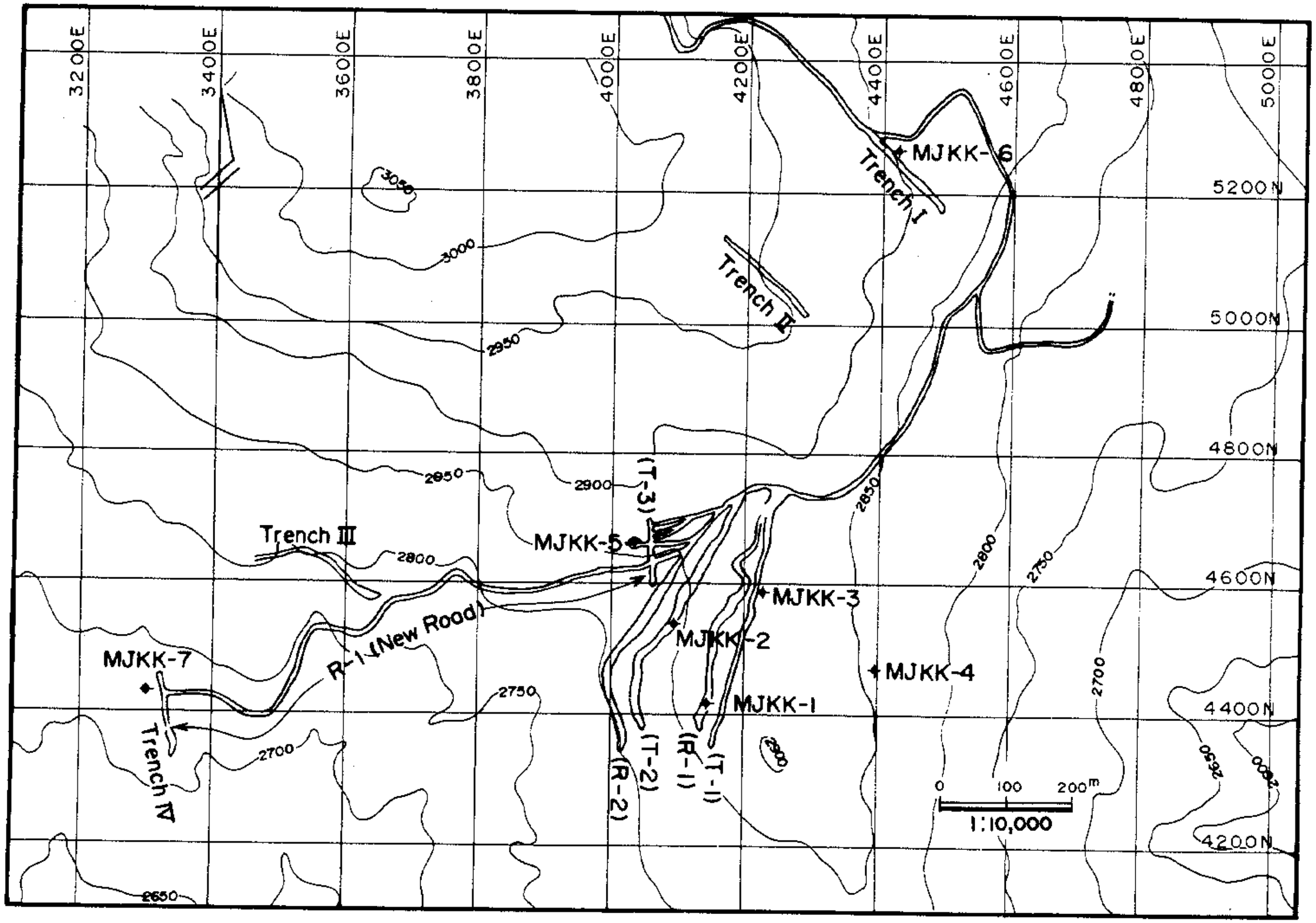
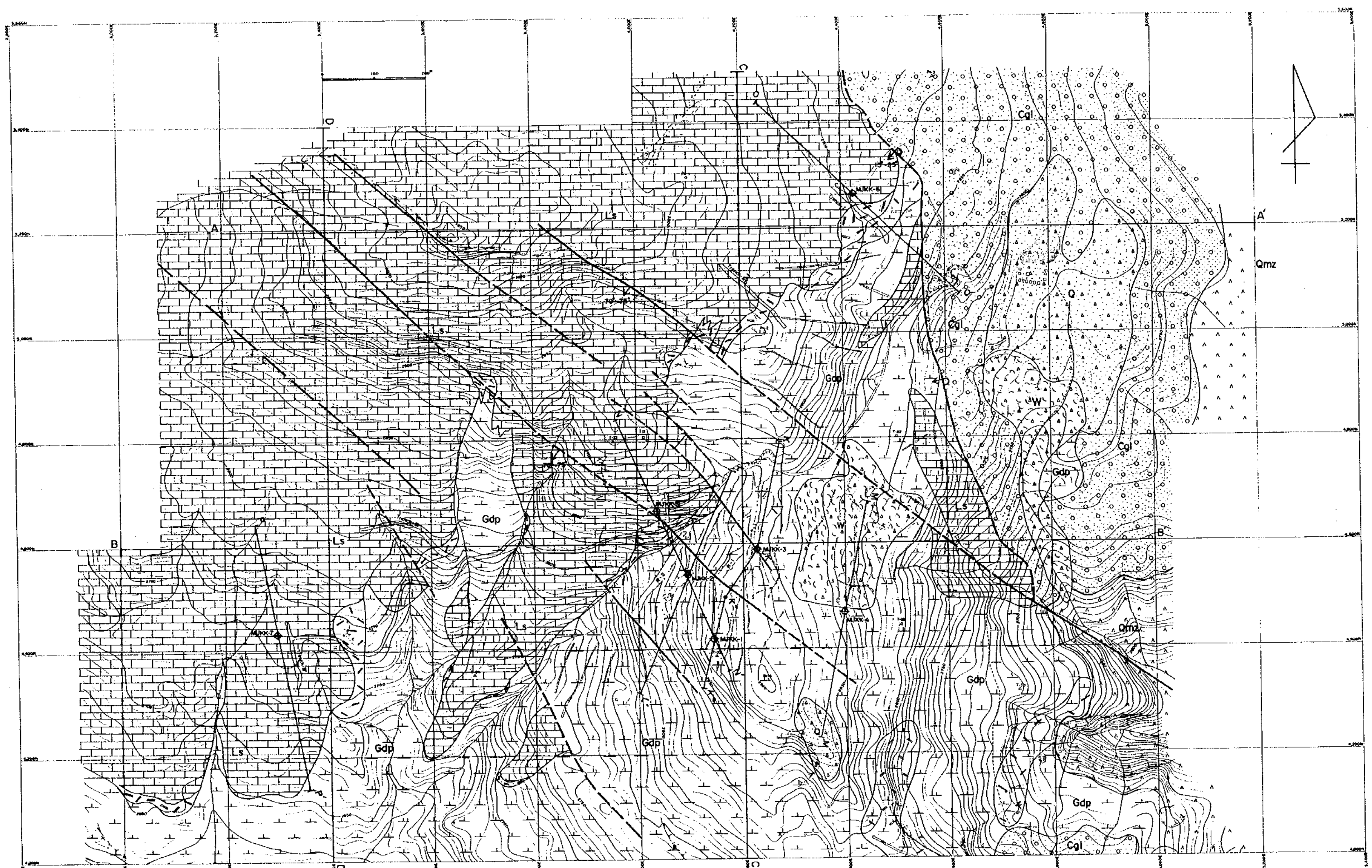


Fig. II-1-1 Location Map of Drillholes and Trenches



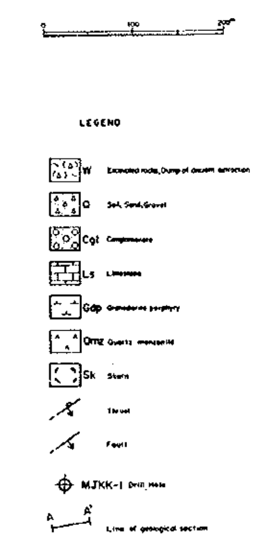


Fig.II-1-2 Geological Map of the Kichi-Sandyk District

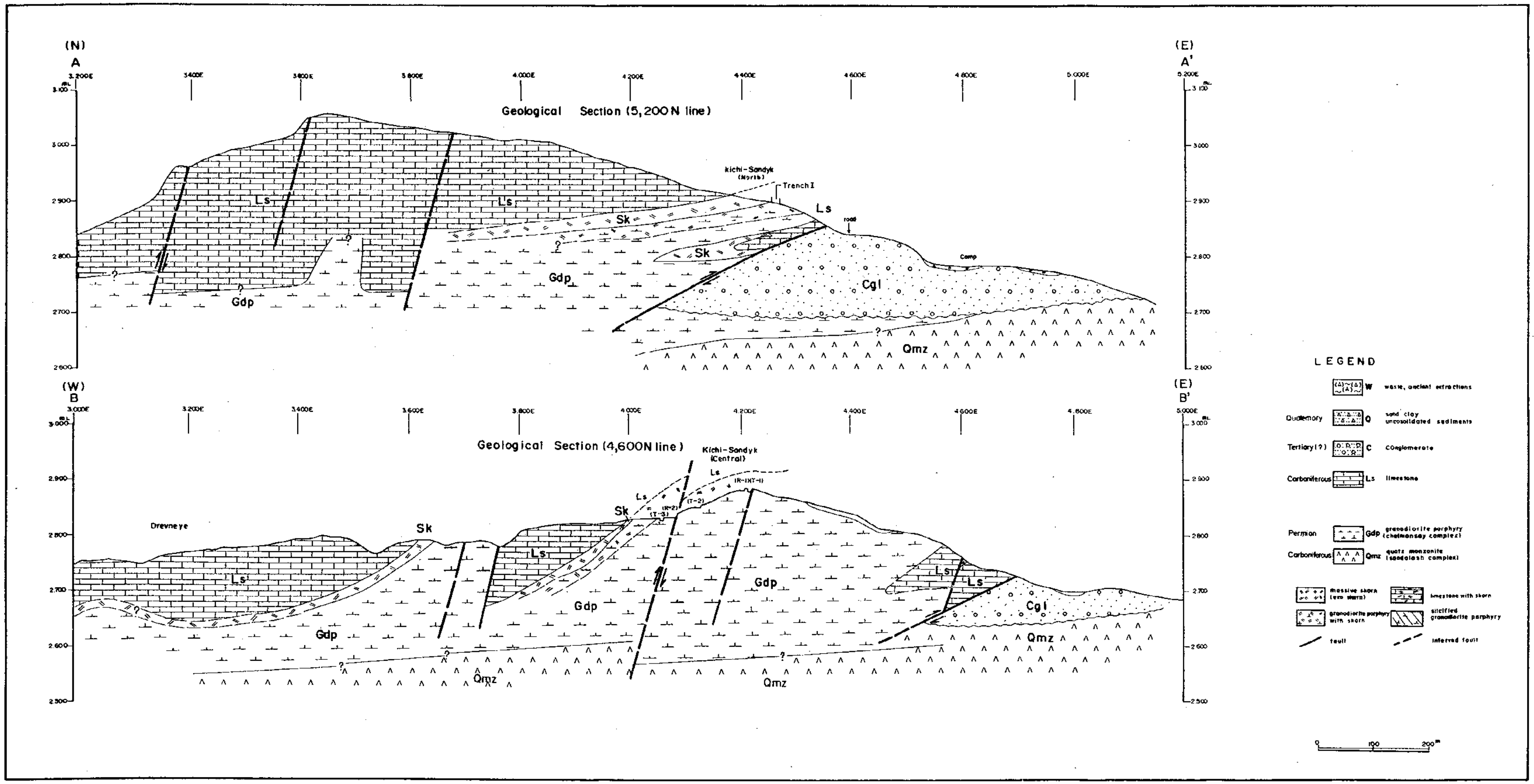


Fig. II-1-3 (1) Geological Cross Section of the Kichi-Sandyk District (A-A', B-B')

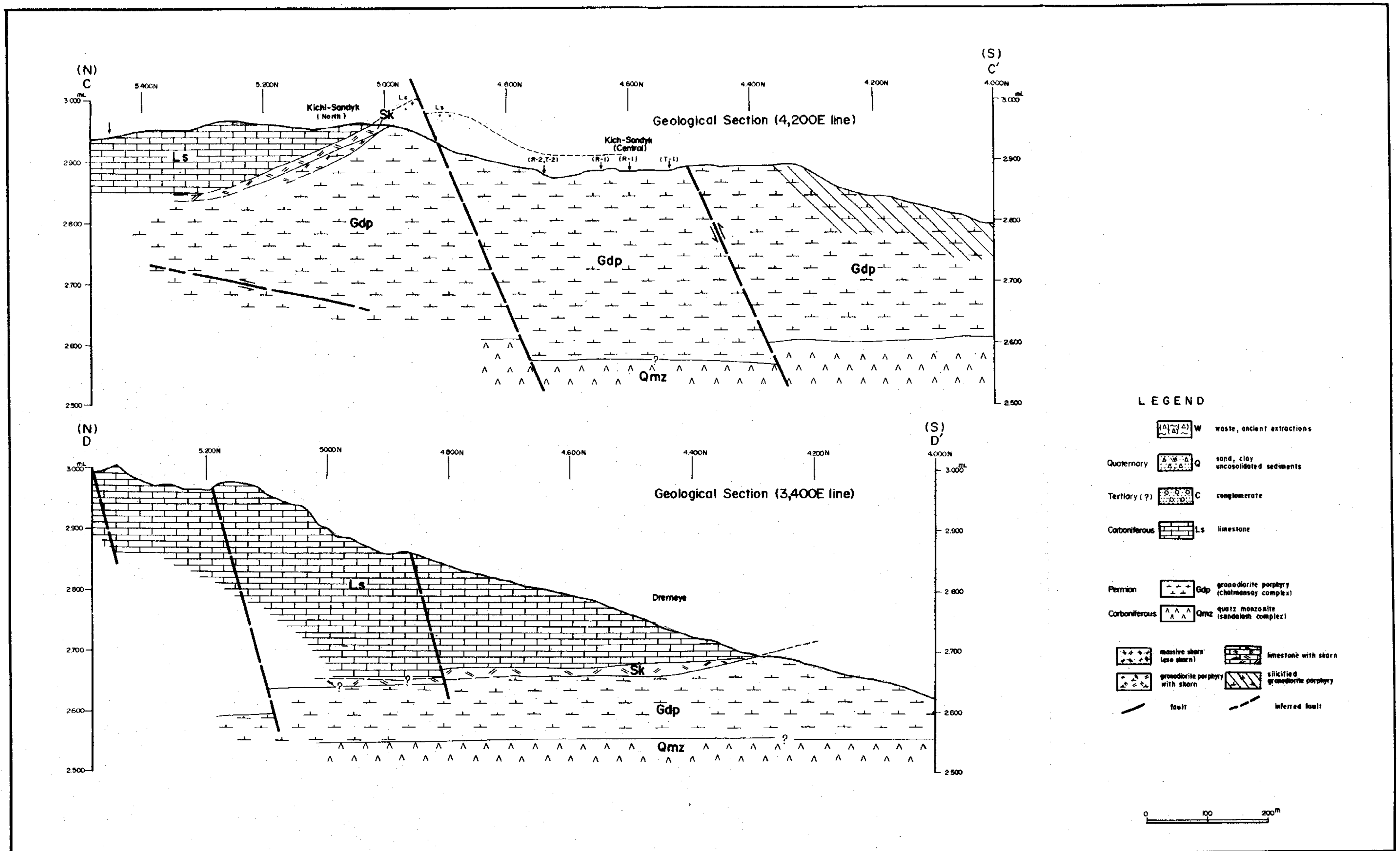
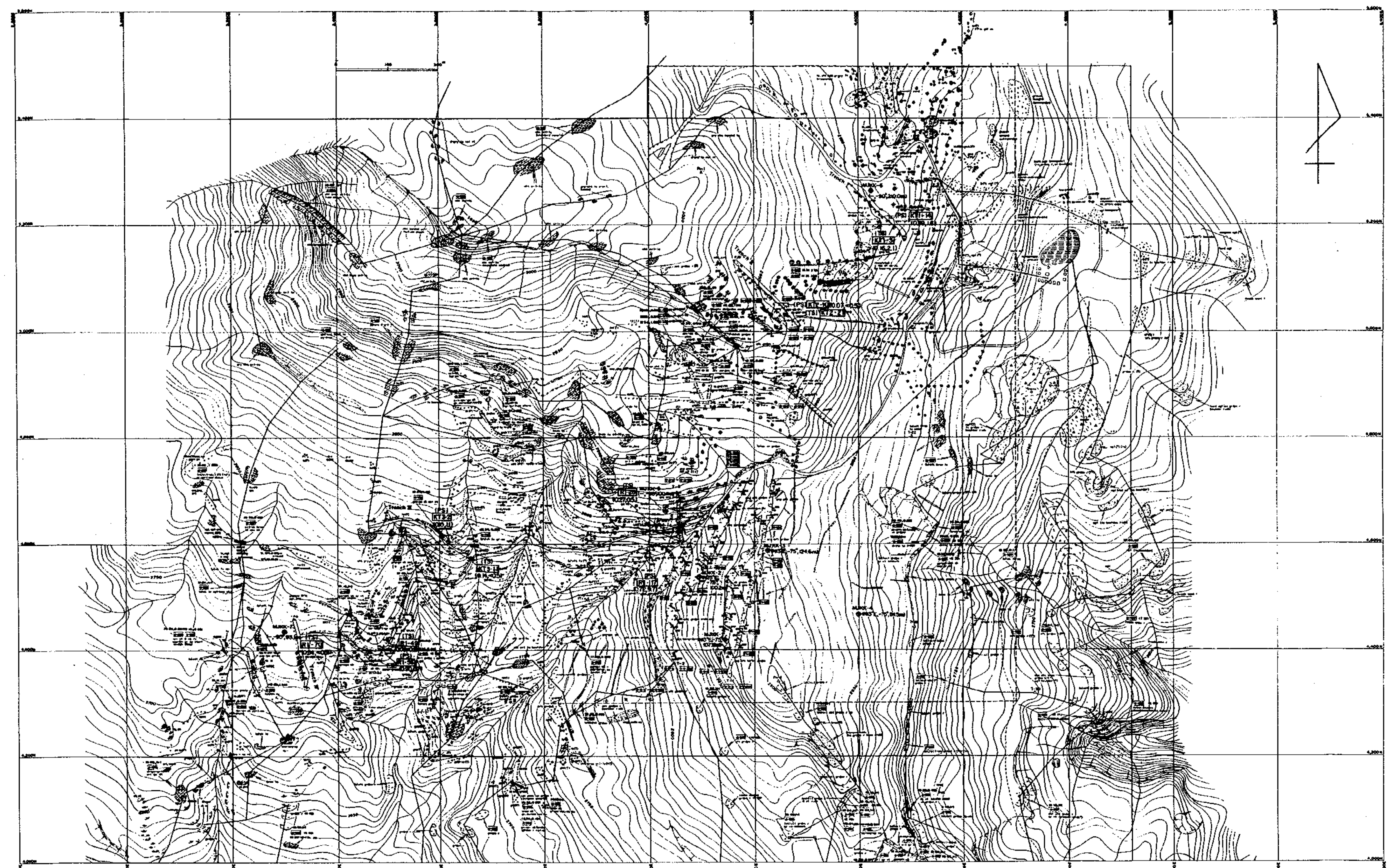


Fig. II-1-3 (2) Geological Cross Section of the Kichi-Sandyk District (C-C', D-D')



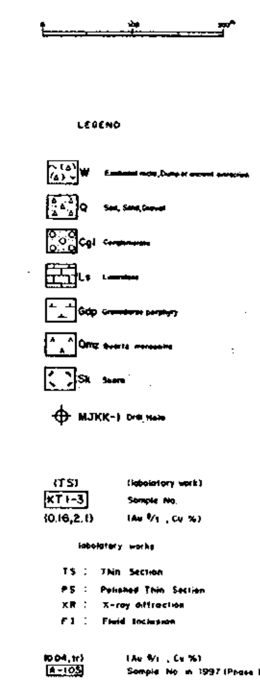


Fig. II-1-4

Location Map of Rock Samples

in the Kichi-Sandyk District

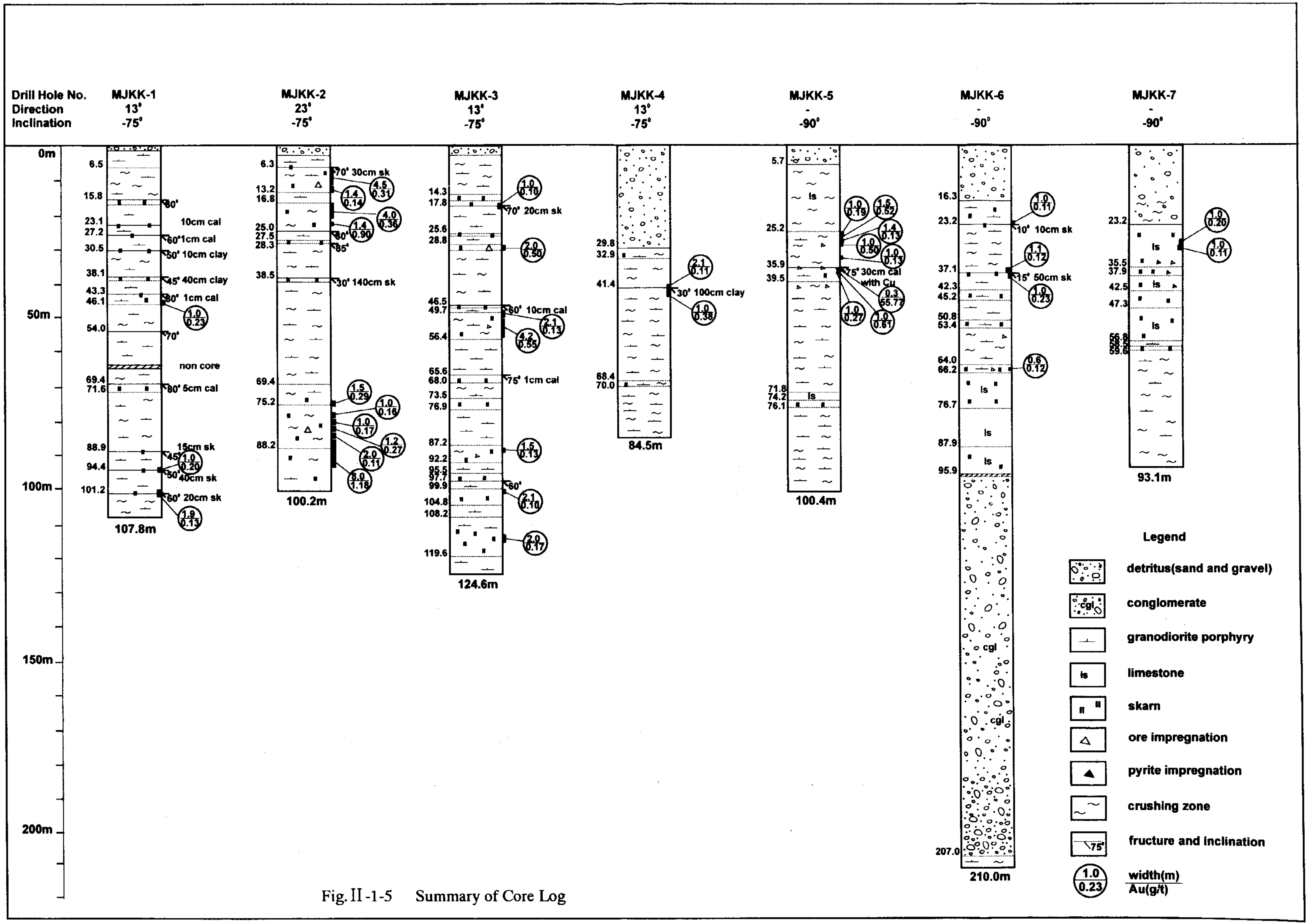


Fig. II-1-5 Summary of Core Log

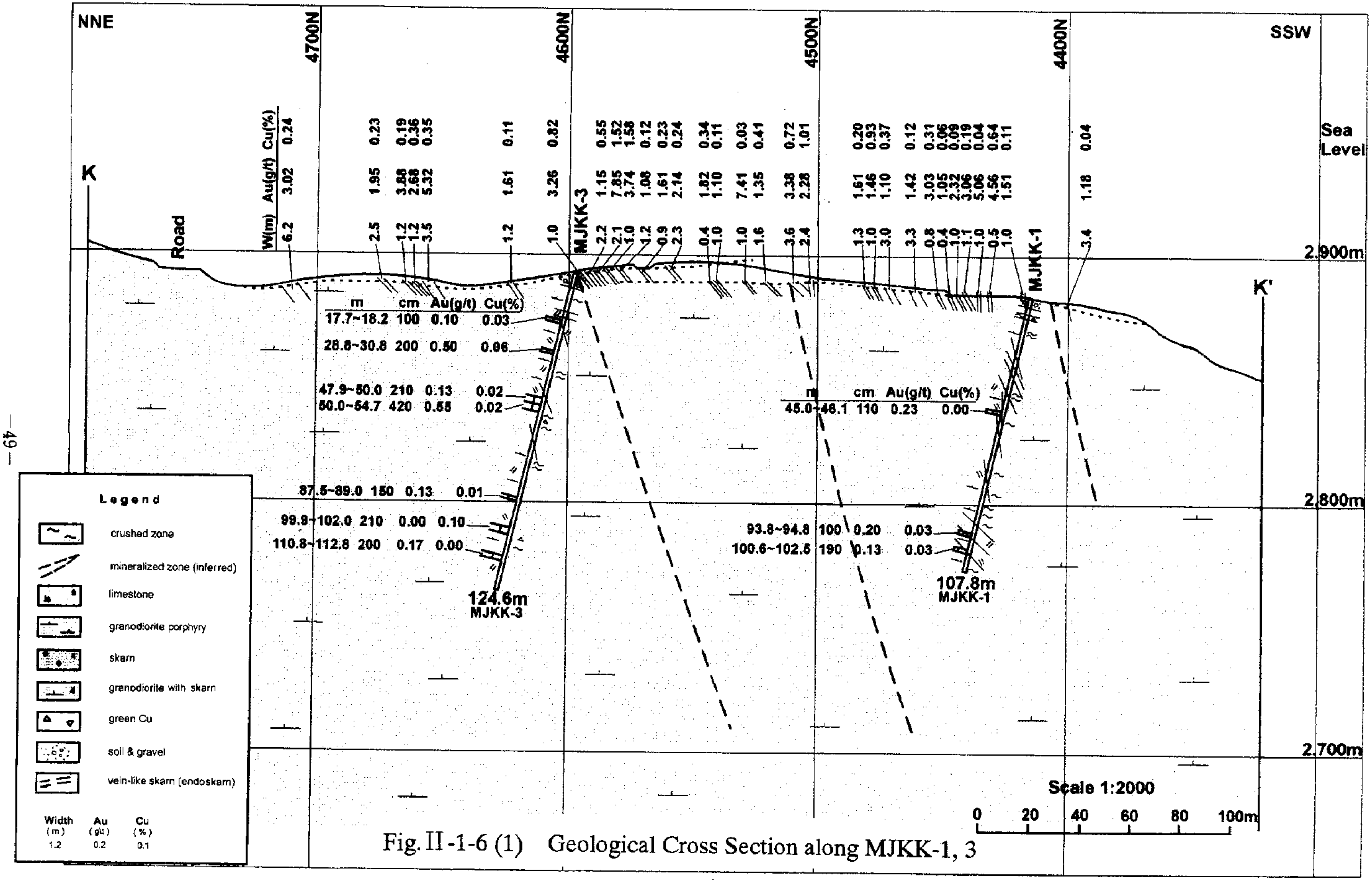


Fig. II-1-6 (1) Geological Cross Section along MJKK-1, 3

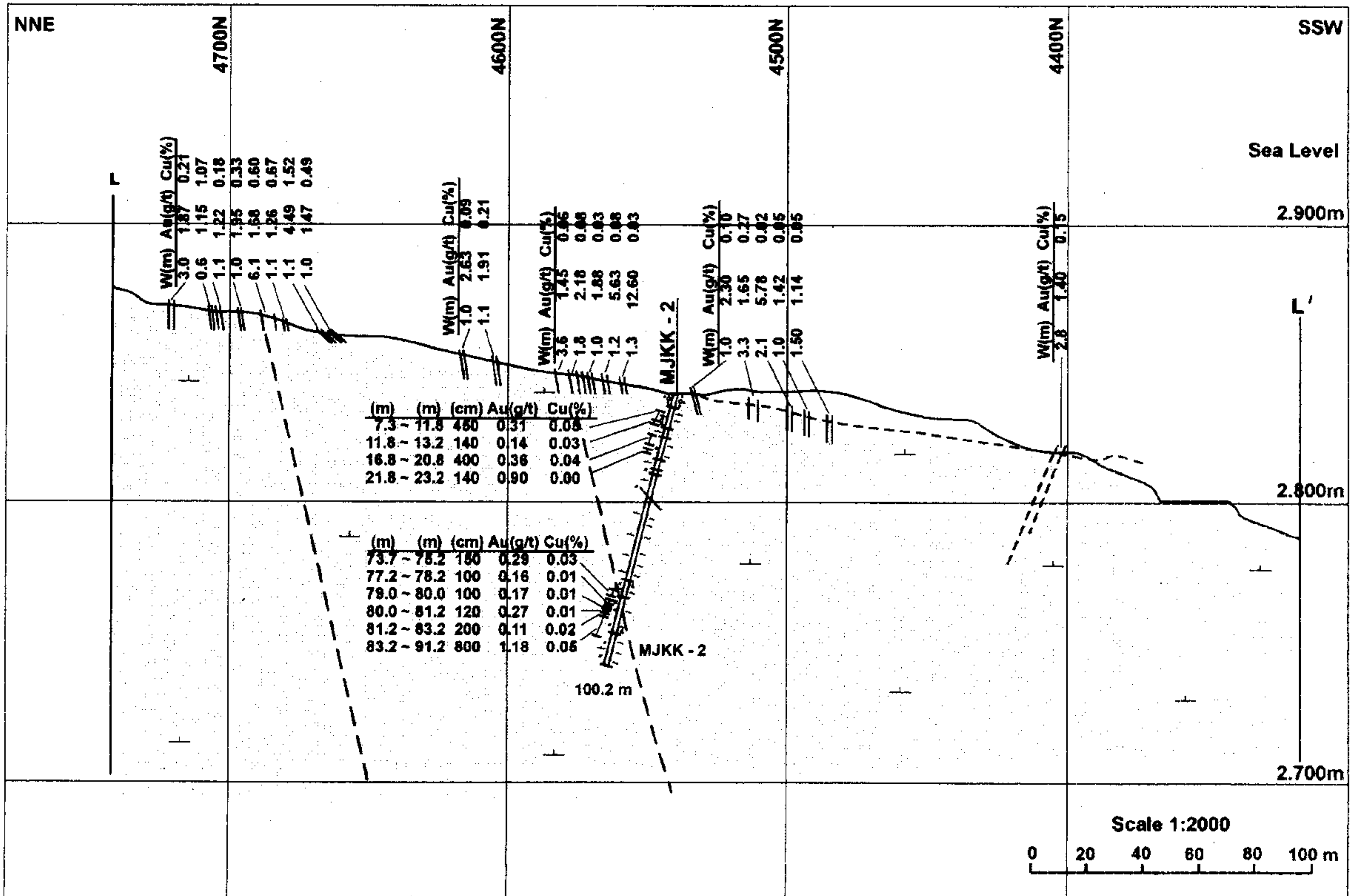


Fig. II-1-6 (2) Geological Cross Section along MJKK-2

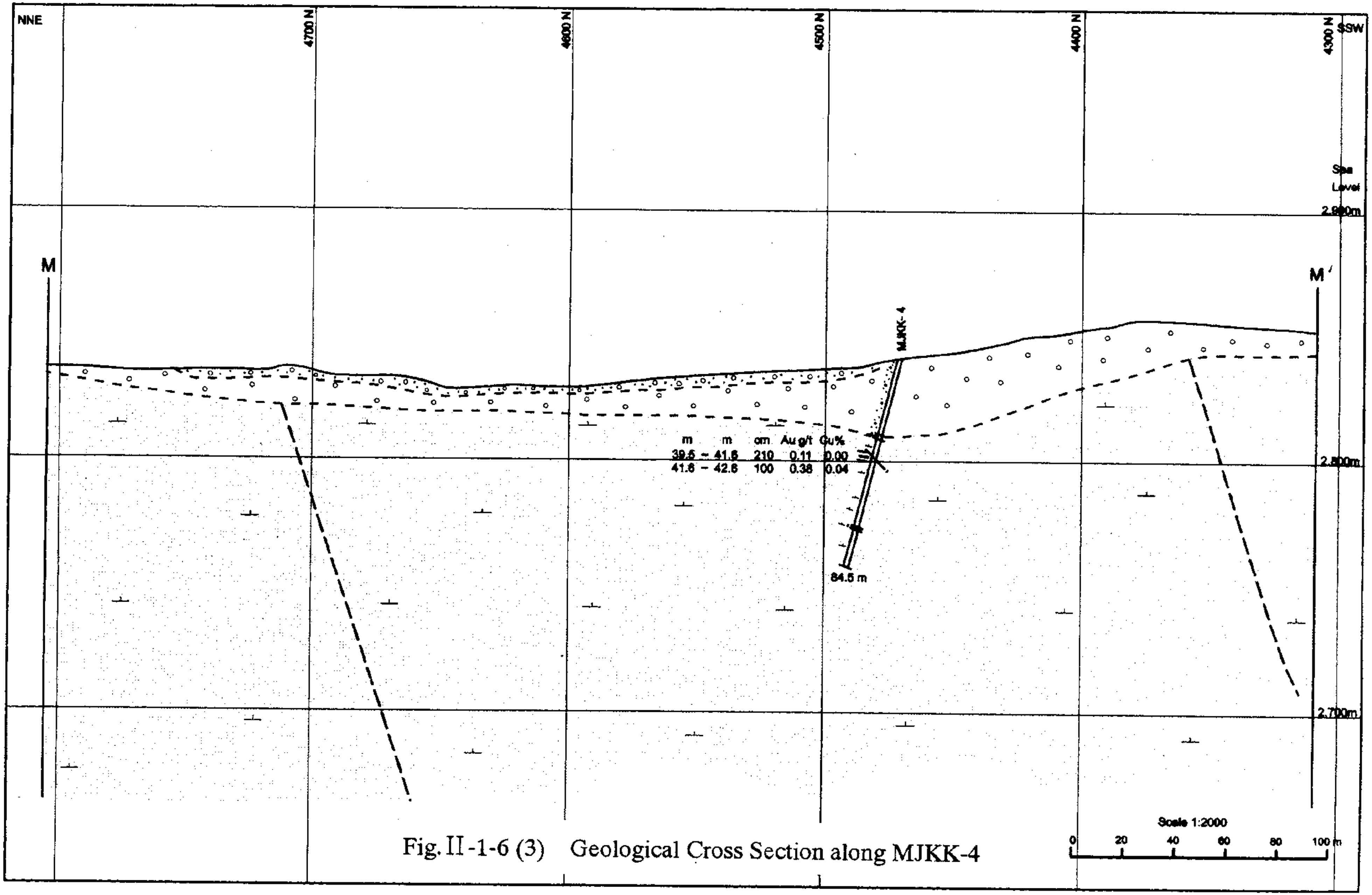


Fig. II-1-6 (3) Geological Cross Section along MJKK-4

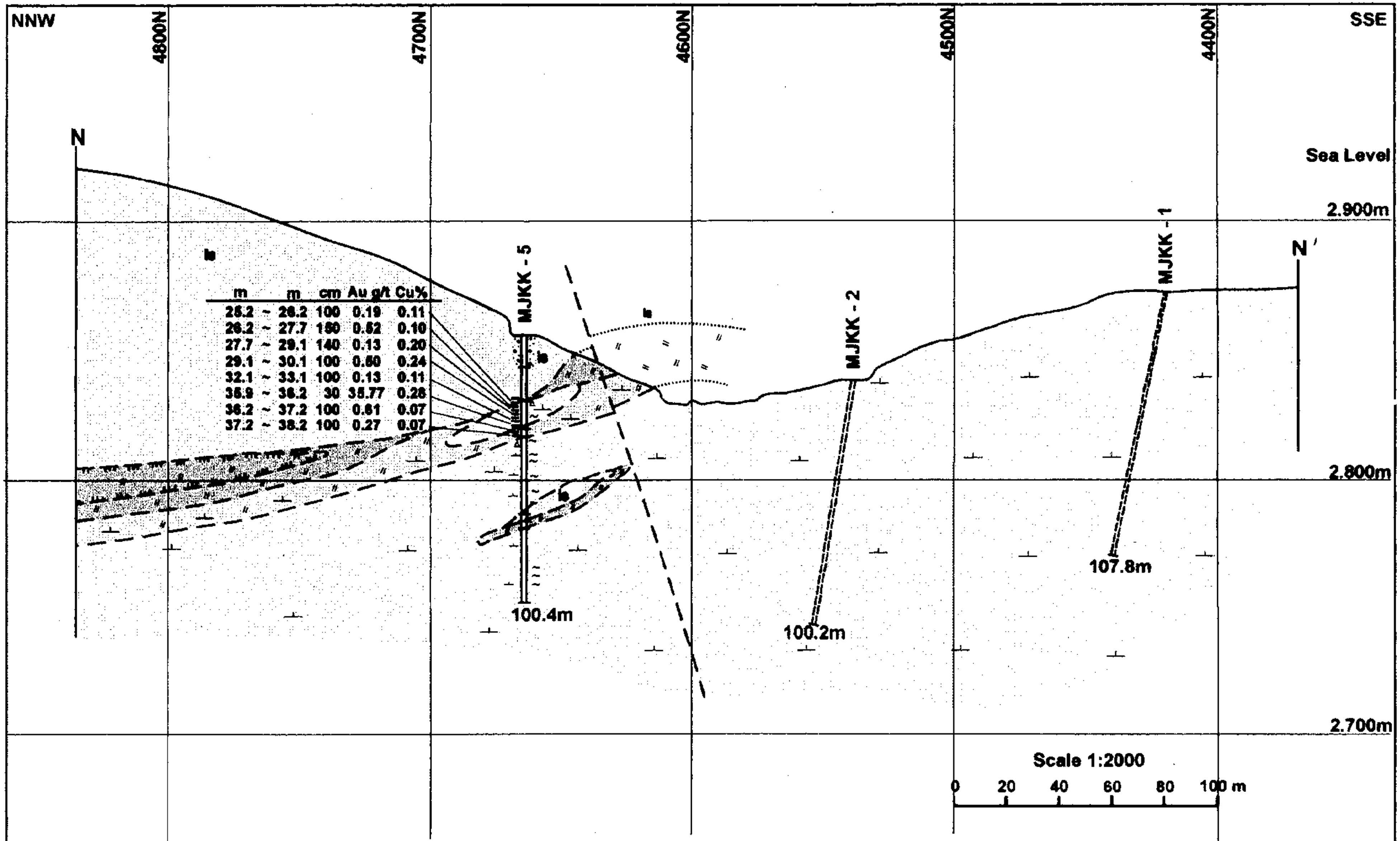


Fig. II-1-6 (4) Geological Cross Section along MJKK-5

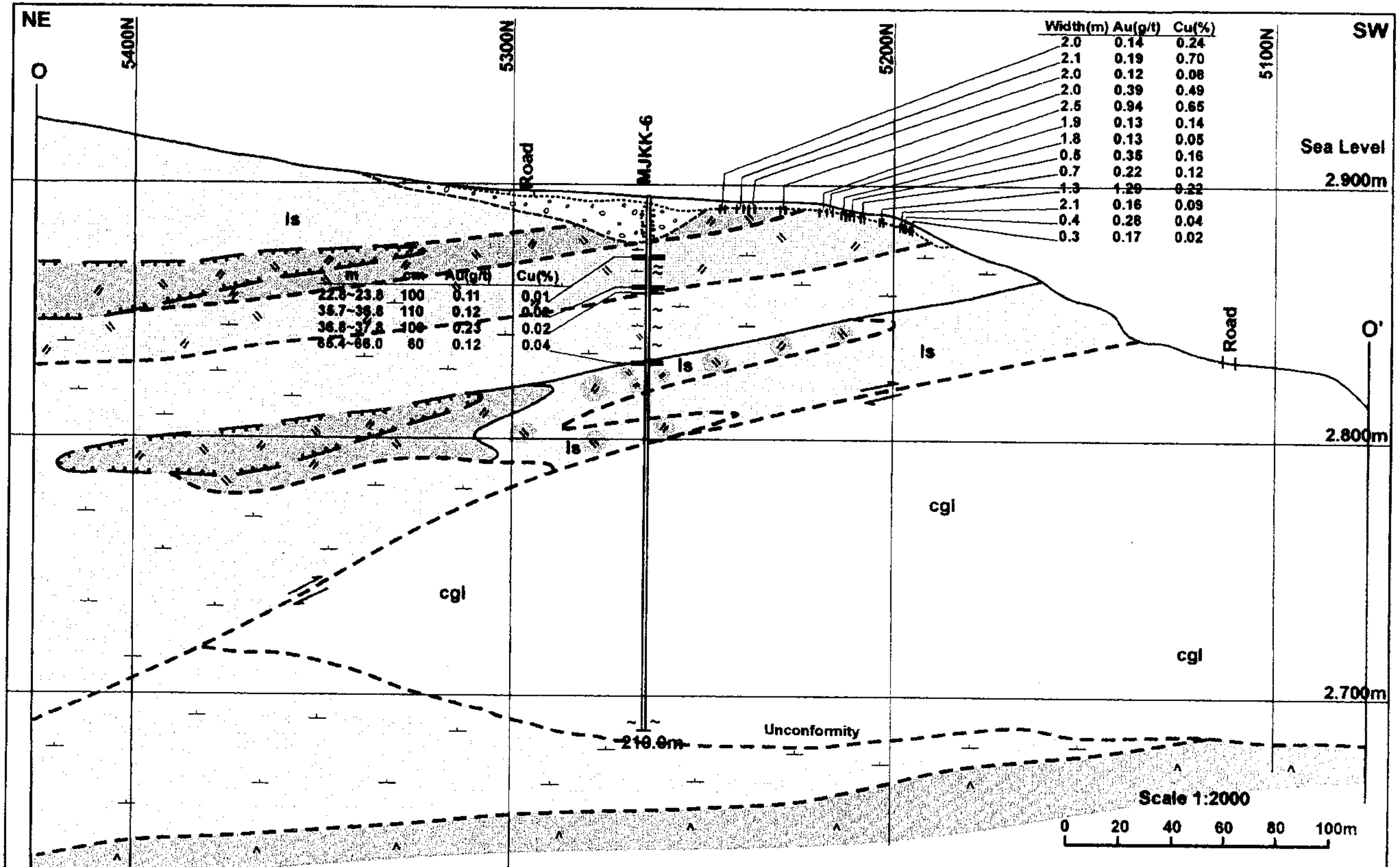


Fig. II-1-6 (5) Geological Cross Section along MJKK-6

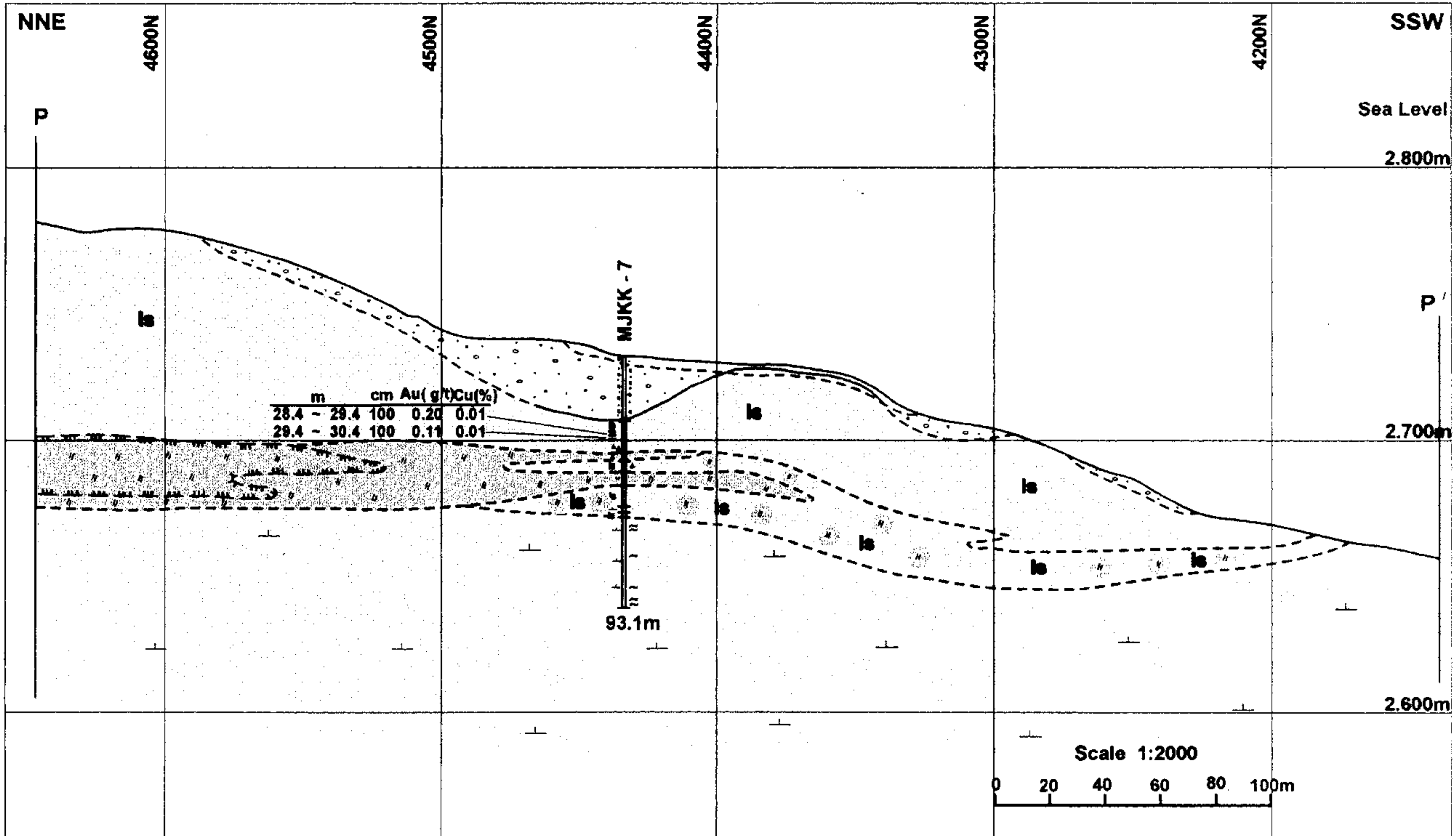


Fig. II-1-6 (6) Geological Cross Section along MJKK-7

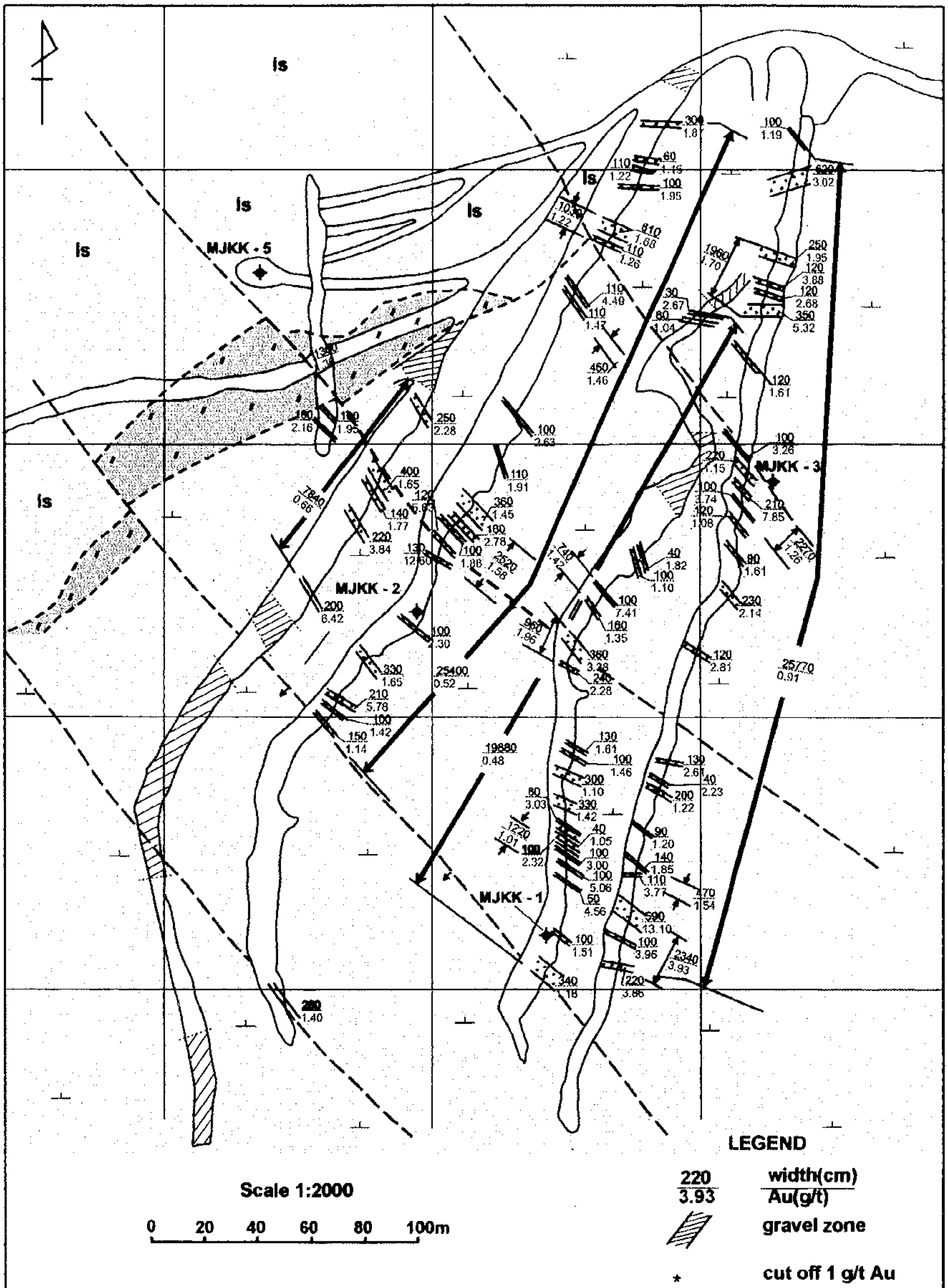


Fig. II-1-7 Gold Assay Map in the Kichi-Sandyk Central Mineralization Zone

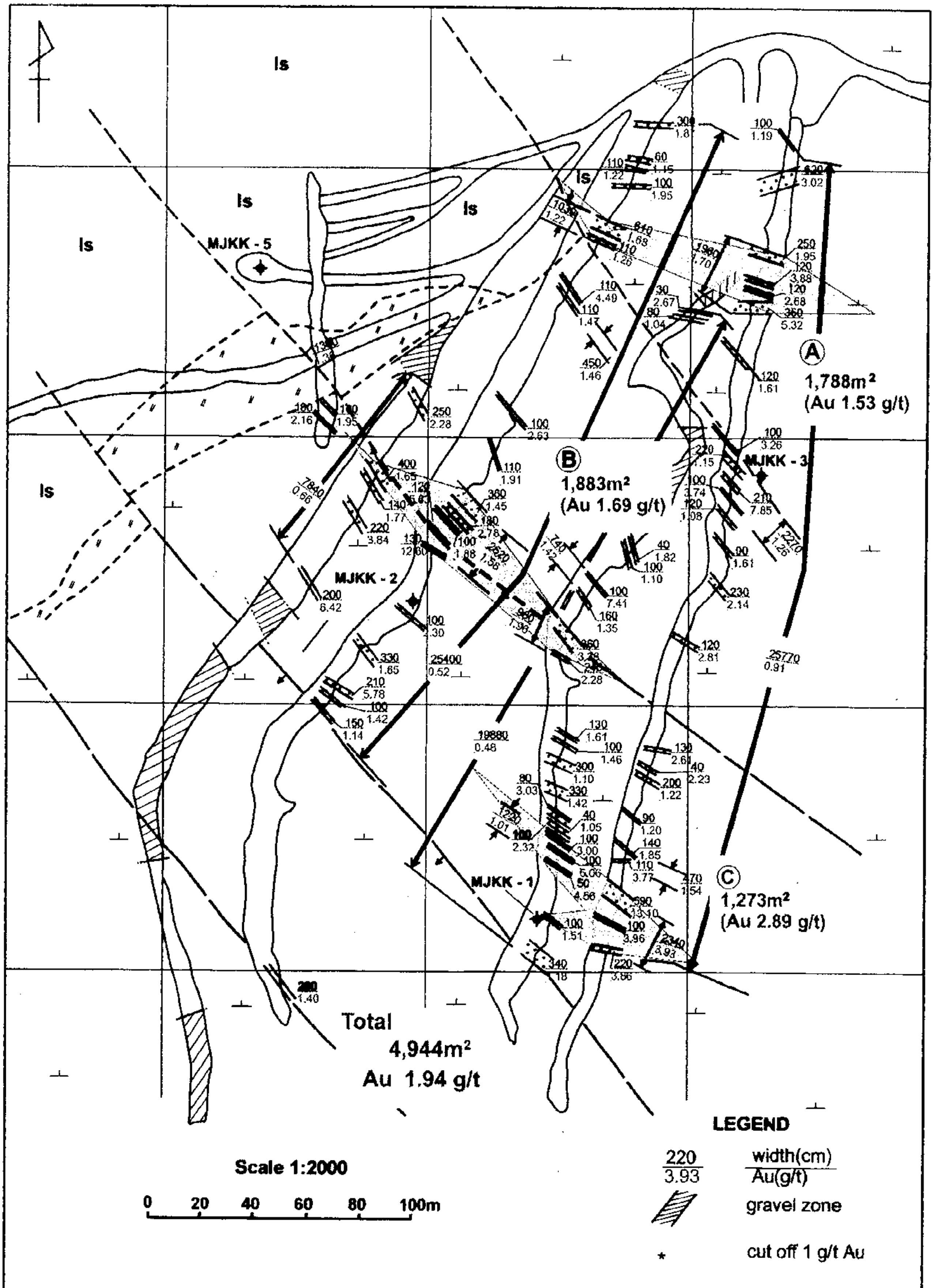


Fig. II-1-8 Map of Ore Bodies in the Kichi-Sandyk Central Mineralization Zone

CHPTER 2 TURPAC-TUSHTY DISTRICT

2-1 Geological survey

2-1-1 Purpose of survey

The district is situated in the Turpac-Tushty valley, left bank down the Chandalash River, about 13 km south of the Kichi-Sandyk district.

This district was selected as a prospective one by the last year's survey. A geological survey was conducted in this year to clarify the geological structure and outline the ore manifestations scattered in and around the district.

2-1-2 Method of survey

We set up a camp at a site, 2,885 m in altitude, located 500 m south of the Turpac-Tushty ore manifestation in the eastern part of the survey district.

Geological mapping on a scale of 1:10,000 was conducted and specimens of rock and ore were collected for assay analysis and laboratory test.

2-1-3 Result of survey

1) Geology and geological structure

The district is underlain mainly by crystalline limestone of Early Carboniferous age and granodiorite porphyry (Chandalash complex) of Late Carboniferous age, the latter intruding into the former. Diorite-quartz diorite, quartz syenite and diorite porphyry of Early Permian age are also distributed as dikes. Tertiary sedimentary rocks, mainly of conglomerate, and Neogene to early Quaternary sediments cover the -above older rocks.

An outstanding fault trending NE-SW runs from the Turpac-Tushty ore manifestation to the Ak-Kamou ore manifestation, which displaced the Tertiary sediments. Other faults trending E-W and N-S also exist in the area.

2) Mineralization

A number of ore manifestations are distributed in the district. Three types of mineralization; skarn type, fracture-filling type and placer type; are recognized. Principal ore manifestations are Turpac-Tushty, Ak-Kamou, Kok-Kaiky, Jety-Zindan, Perevalnoe and Bismutovoe. Among them, the ore manifestations of Turpac-Tushty and Ak-Kamou are relatively of large scale.

(1) Skarn-type mineralization

This type of mineralization is the most widespread and related to the Lower Chandalash granodiorite. Skarns occur throughout the district, but they are so thin as 5～30 m and their grade of gold is low. They consist of garnet, clinopyroxene, epidote and other minerals.

The ore manifestations of Jety-Zinden, Otvalnoe, Vismutovoe and Turpac-Tushty represent this type of mineralization.

(2) Fracture-filling type mineralization

This type of mineralization is related to the faulting of NW-SE trend, which has taken place in Permian or later age. Ore manifestations of Kok-Kaiky, Perevalnoe, Ak-Kamou and Turpac-Tushty belong to this type. This type of mineralization is accompanied with so-called beresitized veins, which are hydrothermal veins in intrusive rocks and characterized by mineral assemblage of sericite, quartz and pyrite (T-106).

Quartz vein or lenticular quartz with strong pyrite impregnation occur in the axial part of the fault, being often brecciated and associated with hematite The gold grade reaches a maximum of 20～30 g/t.

(3) Placer type mineralization

Two groups of placer deposits, one in Tertiary fluvial deposits and the other in Quaternary deposits are recognized.

Tertiary conglomerate contains coarse-grained gold, 1.0～1.5 mm in diameter, which was probably derived from the gold manifestations in the neighboring areas.

Quaternary placer deposit is known in the downstream of the Perevalnoe ore manifestation.

3) Detailed description

(1) Turpac-Tushty ore manifestation (Fig. II-2-5～12)

This ore manifestation is subdivided into three parts; the southwestern, the central and the northeastern parts.

This ore manifestation was investigated by trenching and tunneling surveys during the periods of 1969-1976 and 1980-1987. As a result of this investigation, possible ore reserves (P1) of 695,000 t with average grade of 4.22 g/t Au (Au content is 2.9 t) have been estimated together in the central and southwestern parts.

①Geology

The district is underlain mainly by granodiorite or granodiorite porphyry of the Lower Chandalash complex and Permian diorite and, in the northeastern part of the district, by the Carboniferous crystalline limestone.

②Mineralization

a) Southwestern part

Four parallel beresitized veins striking ENE-WSW have been ascertained. They are inferred to have been mined out down to 10 m from the surface.

- Size of ore deposit

Maximum width of the deposit determined by tunneling survey is 13.3 m. About 200 m length of the deposit was mined out, but the fissure can be traced for about 600 m.

- Minerals

Gold mineral was recognized in beresitized vein in granodiorite. The size of gold minerals is 0.5～1.0 mm in diameter (Mezgin, 1975).

- Grade of ore

High-grade ores, 4.8 g/t Au for 13.3 m in the tunnel, and 13.3 g/t Au for 4.6 m and 2.5 g/t for 1.8 m in the vertical shaft, have been reported from the largest ore vein (Fig. II-2-11). In this survey, 4.1 g/t Au (T-106) was obtained from this vein. From other veins, an assay result of 21.5 g/t Au for 1 m and 3.8 g/t for 1 m were also reported. In this survey, the grab sample assay shows a grade of 23.2 g/t Au (T-112).

b) Central part

Skarn zone and hematite-quartz zone occur between crystalline limestone and diorite. An alteration (beresitization) zone extends further toward the WSW.

- Size of ore deposit

The skarn zone extends over 300 m with a width of 1～40 m. In addition, a hematite-quartz ore body of 15～20 m thick extends over 1,100 m to the north of the skarn zone. This ore body trends ENE-WSW and dips steeply north.

An alteration (beresitization) zone with a maximum width of 50 m extends to the WSW for 200 m from the center of the skarn zone.

- Minerals

The main skarn minerals are garnet and epidote, showing brown color.

The hematite-quartz ore body is intensely brecciated. Under the microscope, it consists of quartz, goethite, hematite, chrysocolla and malachite, and is associated with minor amounts of chalcopyrite, covellite and chalcocite (T-105, T-127, and T-129).

- Grade of ore

The grade of skarn zone was reported as 0.5～9 g/t Au. In this survey, the assay of the pyrite-bearing garnet skarn shows 0.14 g/t Au and $<$ 0.03 g/t Au (T-131, T-132).

The grade of hematite-quartz ore body was reported as 10.0 g/t for 0.9 m width in a trench and 4.1 g/t Au for 6.5 m width in a tunnel (Fig. II-2-12). In this survey, the assay result shows 11.1 g/t Au, 4.1 g/t Au and so (T-110, T-126).

As the grade of beresitized vein, 6.1 g/t Au (maximum) for the width of 1.8 m and 2～4 g/t Au were reported in the previous investigation. In addition, an ore grade of 3.4 g/t Au for the width of 2.8 m was reported from the old drillhole No. 3.

c) Northeastern part

Mineralization in this part is of fracture-filling vein type within limestone. The fracture strikes NE-SW and steeply dips 75～85° SE.

- Size of ore deposit

Mineralization zone extends over 800 m and is composed of many ore veins with a width of 1～5 m.

- Minerals

The ore veins consist of lenticular hematite-quartz vein and brecciated limestone. The breccia of the limestone is cemented by light-gray calcite and reddish-brown iron hydroxide. Green copper minerals and pyrite are observed as ore minerals.

- Grade of ore

Ten trenches and an ore shaft have been dug previously. As a result of the work, an ore section of 18.3 g/t Au (width 2.5 m), 6.0 g/t Au (width 3.0 m) and 4.4 g/t Au (width 3.4 m) were found. In this survey, grab samples have been taken from the above ore section and assayed for a comparison. The result of this assay is similar to that of the previous result. Assay of the grab sample was taken from the 18.3 g/t Au section is 22.8 g/t Au (1.8% Cu) and the assay of the grab sample taken from the 5.0 g/t Au section is 12.9 g/t Au (2.1% Cu).

(2) Ak-Kamou ore manifestation (Fig. II-2-13)

Ore bodies of this area were mined during the 9th to 11th centuries. Recently, eight trenches and six exploration shafts were dug during 1969-1970.

① Geology

The major part of the area is underlain by granodiorite and the southeastern part by crystalline limestone.

A number of quartz syenite dikes striking N-S and dipping 70-80°W were intruded into the granodiorite west of this manifestation. Beresitization zones (1～1.5 m wide) were developed along the fractures near the quartz syenite dikes.

② Mineralization

Three types of mineralization; hematite-quartz vein, beresitized vein and skarn; are recognized in the area.

Hematite-quartz veins are often brecciated and contain visible gold minerals. The ore veins strike ENE and steeply dip south and are inferred to have an extension of about 300 m and a width of 1～2 m, based on assumption from the old workings. The ore is mainly of quartz and accompanied with sericite, goethite and hematite.

An existence of two parallel ore veins is inferred from the old workings. Northwestern vein has a maximum width of 2.5 m and a length of 120 m, and its ore grade of 7.2 g/t for 0.8 m width was reported from exploration shaft. Southwestern vein has a maximum width over 2 m and its ore grade was reported as 31.0 g/t for 1.0 m width from the exploration shaft. In this survey, assay result of grab samples shows a grade of 7.8 g/t Au (T-002).

(3) Kok-Kaiky ore manifestation

① Geology

The area of this ore manifestation is underlain by the medium-grained porphyritic granodiorite in the northeastern part and by the fine-grained granodiorite in the southwestern part. The boundary between the above two types of intrusive rock is gradational and roughly trending NW-SE.

② Mineralization

Ore deposits occupy the axial part of fracture zone trending WNW for length of 750 m within granodiorite Ore body is limonite-hematite-quartz vein, 0.2～1.5 m in width, and accompanied with oxidized pyrite, green copper minerals and tourmaline.

The grade of the ore was reported to be 8.5 g/t Au (1.0 m), 8.7 g/t Au (0.7 m), and 8.0 g/t Au (0.6 m). In this survey, assay result of grab samples shows grade of 7.93 g/t Au, 6.31 g/t Au and so. The average of the nine samples is 4.06 g/t Au.

(4) Perevalnoe ore manifestation

Ore veins of this area have been intensely worked before. An exploration shaft (10 m) and trenches were dug during 1969-1970.

① Geology

The area around this ore manifestation is underlain by porphyritic granodiorite.

② Mineralization

The ore deposit in this area is a quartz vein hosted in granodiorite and associated with beresitization. The vein strikes N-W and extends for about 200 m.

Grains of gold are rarely visible. Gold grains occur in a flaky form or as intergranular between pyrite crystals (Mezgin, 1998).

In the northeast of the area, a placer gold deposit was lain downstream. The deposit was partially mined.

(5) Bismutovoe ore manifestation

① Geology

Large skarn zone occurs along the contact of granodiorite and limestone, the latter lying on the former as a roof-pendant.

② Mineralization

The skarn zone extends over an area of 500 m × 500 m in the southern slope of the mountain and has a maximum thickness of 20-30 m. The skarn is composed of garnet, wollastonite and epidote. Large crystals of wollastonite, about 15 cm long, are often observed near limestone.

Eleven ore samples were collected and assayed in this year. Among them, only one sample (T-021) shows 1.18 g/t Au, 0.13% Bi, 2.9% Cu, 0.3% Pb and 0.3% Zn. Malachite, geothite and hematite are identified under the microscope on this sample.

(6) Jety-Zindan ore manifestation

① Geology

Silicified garnet skarn accompanied with pyrite, hematite and copper minerals occurs along the contact of granodiorite and limestone near the top of Mt. Jety-Zindan and on its western and southern slopes.

② Mineralization

Skarn consists of wollastonite, garnet and epidote. Assay result of grab sample in this survey shows 0.17 g/t Au, 56 g/t Ag, 0.5 % Cu, 0.5 % Pb, 0.3 % Zn and 0.02 % Bi (T-032).

(7) Otovalnoe ore manifestation

① Geology

The area is underlain by granodiorite. Skarns occur along the boundary between the granodiorite and roof-pendant limestone or limestone xenolith .

② Mineralization

Skarn zone of the area is rather small. The length of the skarn zone does not exceed 100 m. The skarn is composed of garnet, wollastonite and epidote. Six samples of skarn ore have been collected and assayed in this survey. Gold was not detected from any of these samples.

(8) Turpac-Tushty Skarn ore manifestation

① Geology

Lower Carboniferous limestone is intruded by granodiorite and skarns were formed at the contact.

② Mineralization

A large skarn extends for 400 m with a width of 30 m. Copper and gold mineralization is recognized in the hematite-quartz seams of the garnet skarn. Malachite, chrysocolla, geothite, pyrite, hematite and a small amount of chalcopyrite are identified as ore minerals.

4) Homogenization temperature of fluid inclusions

The results of the homogenization temperature measurements of the fluid inclusions are shown in Appendices 6 and 7.

Seven samples (No.7-13) from the Turpac-Tushty district was measured. Mineral used for the measurement was quartz.

The average homogenization temperatures that were obtained are as follows:

- Hematite-quartz vein of the Turpac-Tushty ore manifestation : 137° C
- Hematite-quartz vein of the Ak-Kamou ore manifestation: 125° C, 190° C.
- Quartz-pyrite vein of the Turpac-Tushty Skarn ore manifestation: 135° C, 206°C.
- Tourmaline-hematite-quartz vein and hematite-quartz vein of the Kok-Kaiky ore manifestation: 261° C and 281 °C, respectively.

Formation temperature of gold and silver is said to be about 110-250° C (T. Iiyama, 1989). Therefore, the temperature for the Kok-Kaiky ore manifestation is about the maximum temperature for gold formation. The temperature of both the Turpac-Tushty and the Ak-Kamou ore manifestations are comparatively low.

5) Assay result of ore

There are 67 ore samples chemically assayed for eight elements of Au, Ag, Cu, Pb, Zn, Mo, As and Sb. The results are shown in Appendix 9 and, according to the type of ore deposit, shown in Table II-1-4.

Correlation of Au and Ag has been studied on the samples having significant assay values over detection limit.

Average grade of the 39 samples from the fracture-filling type ores is as high as 3.38 g/t Au and 65 g/t Ag. Beresitized vein (T-112) and hematite-quartz vein (T-129, T-105 and T-110) from the Turpac-Tushty ore manifestation are as high as 23.2 g/t, 22.8 g/t, 12.9 g/t and 11.4 g/t, respectively.

Average grade of 28 skarn ore samples is only 0.13 g/t Au. The average grade of arsenic in both types of ore is 340 ppm. The correlation between the elements in the skarn ore is as high as 0.908 for Ag-Pb, 0.806 for Ag-Mo and 0.806 for Cu-Mo.

As for the assay results of the fracture-filling type ores (39 samples), high correlation can not be recognized.

Table II-1-4 Summary of Assay Result in the Turpac-Tushty District

1) Vein Type Ore in the Turpac-Tushty District

	Au	Ag	Cu	Pb	Zn	Mo	As	Sb
	g/t	g/t	%	ppm	ppm	ppm	ppm	ppm
Sample Number	39	39	39	39	39	39	39	39
Max.	23.210	865.300	3.1560	2006.00	2433.00	28.60	1990.00	19090.00
Min.	<0.03	<0.5	0.0005	7.00	9.60	<0.3	3.00	<1.25
Ave.	3.379	64.960	0.5342	427.79	411.97	7.98	344.56	1044.69

Correlation coefficient	Ag	Cu	Pb	Zn	Mo	As	Sb
Au	0.089	0.229	0.023	0.053	0.235	0.495	0.109
Ag		0.603	0.093	0.297	0.496	0.472	0.618
Cu			0.328	0.388	0.324	0.709	0.701
Pb				0.629	0.082	0.101	0.158
Zn					0.251	0.451	0.357
Mo						0.550	0.282
As							0.785

*) Sample Number (pieces); Au-Ag : 31, Au-x : 35, Ag-x : 32, Others : 39

2) Skarn Type Ore in the Turpac-Tushty District

	Au	Ag	Cu	Pb	Zn	Mo	As	Sb
	g/t	g/t	%	ppm	ppm	ppm	ppm	ppm
Sample Number	28	28	28	28	28	28	28	28
Max.	1.180	132.200	2.9470	8184.00	3441.00	36.30	4132.00	144.00
Min.	<0.03	<0.5	0.0003	2.00	14.10	<0.3	3.00	<1.25
Ave.	0.133	13.743	0.2130	759.93	399.42	4.54	341.46	8.05

Correlation coefficient	Ag	Cu	Pb	Zn	Mo	As	Sb
Au	0.397	0.704	0.055	0.509	0.737	0.025	-0.178
Ag		0.703	0.908	0.530	0.806	0.029	0.074
Cu			0.502	0.676	0.806	0.183	0.397
Pb				0.547	0.521	0.069	0.168
Zn					0.469	0.378	0.051
Mo						0.221	0.190
As							-0.001

*) Sample Number (pieces); Au-Ag : 10, Au-x : 10, Ag-x : 16, Others : 28

*) Assay result of Au and Ag less than assay limit are excluded in calculaion for correlation coefficient.

2-2 Consideration

2-2-1 Characteristics of geological structure and mineralization

1) Geology

The Carboniferous limestone and the Carboniferous to Permian intrusive rocks such as granodiorite and diorite are widely distributed in the survey area. Tertiary sediments cover all these rocks.

2) Geological structure

The limestone occurs as a roof on the intrusive rocks.

A prominent fault of the NE-SW direction runs from the Turpac-Tushty ore manifestation to the Ak-Kamou ore manifestation resulting in considerable displacement of Tertiary sediments. The faults trending E-W and N-S are also recognized.

The NW-SE lineament extending from the Kichy-Sandyk district was selected by satellite image analysis in the first year. The results of this year's survey show that a series of small diorite stock intruded along the above lineament but no significant fault was found.

3) Mineralization

A number of ore manifestations are distributed in the survey area. Major ore manifestations are located in Turpac-Tushty, Ak-Kamou, Kok-Kaiky, Jety-Zinden, Perevalnoe and Bismutovoe.

Mineralization in the district is classified into the following three types.

① Skarn-type mineralization: Skarns occur along the contact of limestone roof and intrusives with 5-30 m thickness. They are composed of garnet, clinopyroxene, and wollastonite, and accompanied with gold-copper mineralization and, in part, polymetalic mineralization. These ore manifestations are widely distributed on the surface. However, its thickness is thin and metal grade is low, so it is hard to expect a promising mineral deposit.

② Vein-type mineralization: Gold-copper mineralization occurs in association with major faults of NE-SW trend and subordinate faults of ENE-WSW trend. Pyrite-quartz-sericite vein (so-called beresitized vein) and hematite-quartz vein, both in association with the faults of ENE-WSW trend, as well as the breccia-like veins in association with fault-fracture zone of NE-SW trend often accompany a copper-gold mineralization. Vein-type ore manifestation is characterized by beresitized vein or hematite-quartz vein where high-grade ores over 10 g/t Au are often detected.

③ Placer-type mineralization: Placer gold deposits occur in Tertiary conglomerate and Quaternary sand and gravel beds. The latter is said to have been mined long ago.

Homogenization temperature of fluid inclusion is as high as 261° C and 281 ° C for the Kok-Kaiky ore manifestation. This suggests that the deeper part of the ore vein may have been exposed. On the other hand, homogenization temperature is as low as 125° C and 190° C for the Turpac-Tushty and the Ak-Kamou ore manifestations, suggesting that a downward extension of the vein may be expected.

In summary, both the manifestations of Turpac-Tushty and Ak-Kamou seem to be most promising in regard to ore grade, deposit size and expected downward extension.

2-2-2 Potential for ore reserves

As a result of this survey, it is concluded that small but high-grade vein-type ore deposits may be expected in both the Turpac-Tushty and the Ak-Kamou ore manifestations.

Kyrgyzstan side has previously estimated 695,000 t of possible ore reserves (P1) with 2.9 t Au (average grade: 4.22 g/t) for the Turpac-Tushty ore manifestation. In this survey, it is not sufficient up to now to make an estimation of the potential ore reserves. If assuming that the potential ore zone in the Turpac-Tushty ore manifestation has 2 km length, 2 m width, 100 m depth, 5 g/t Au and 30% rate of existence, 0.7 t of gold reserves may be estimated.

We recommend that further exploration to confirm potential of ore reserves be conducted.

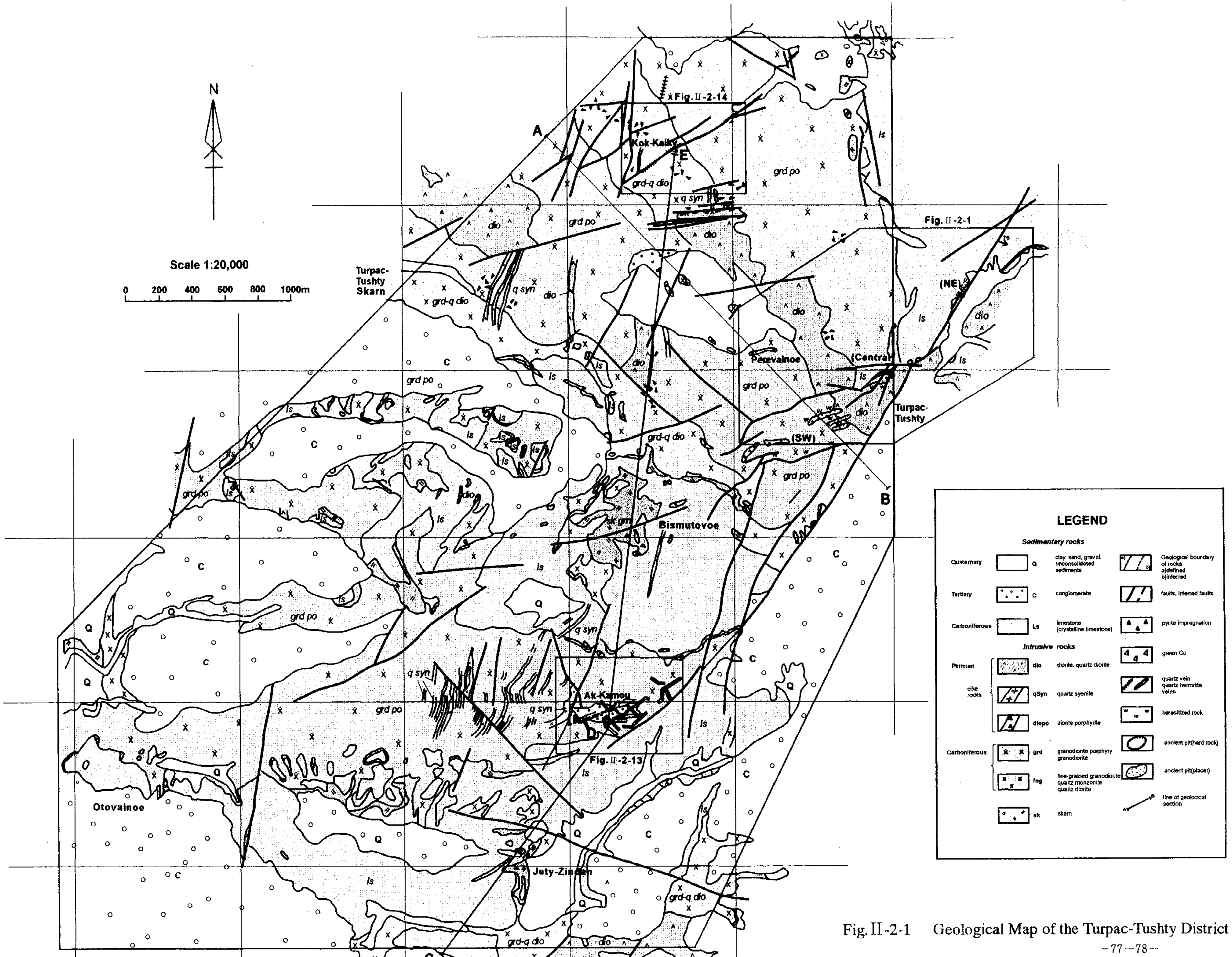


Fig. II-2-1 Geological Map of the Turpac-Tushty District

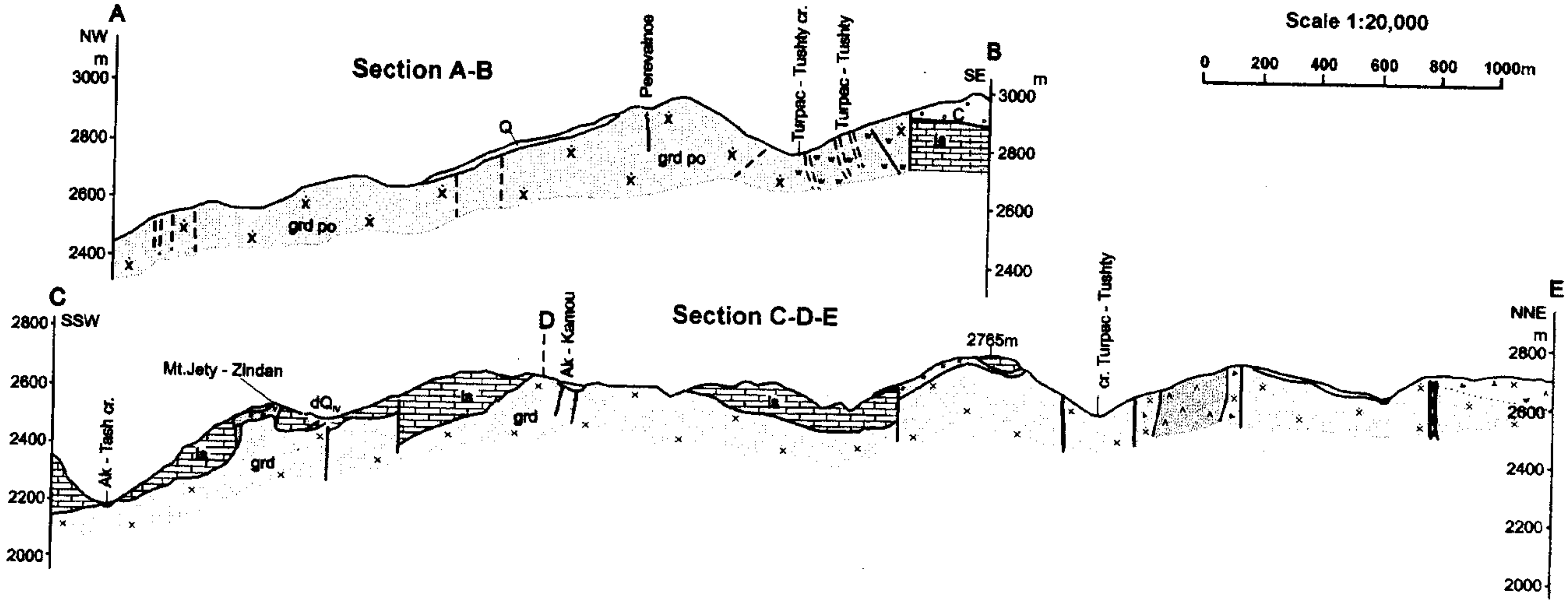
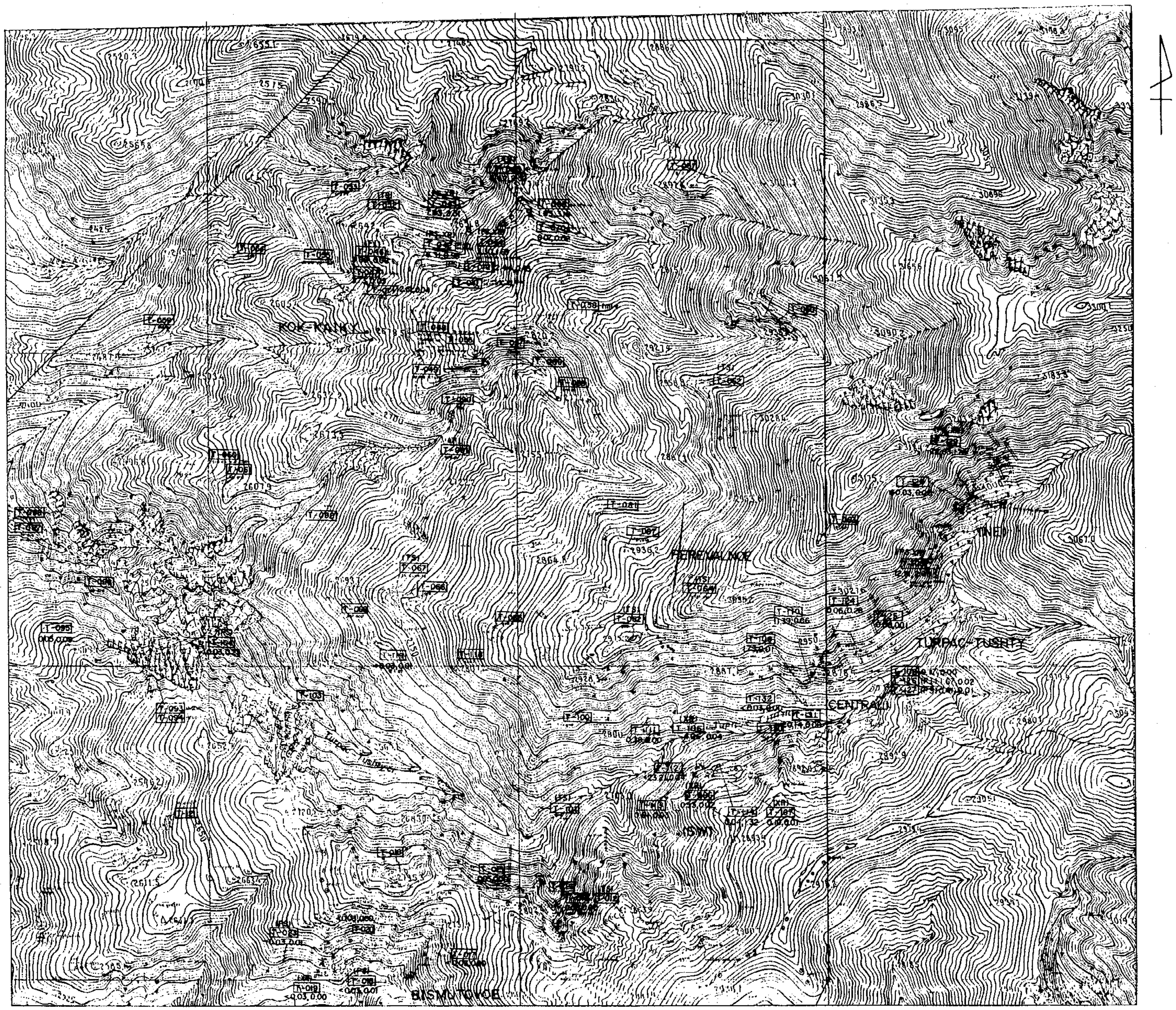


Fig. II-2-2 Geological Cross Section of the Turpac-Tushty District



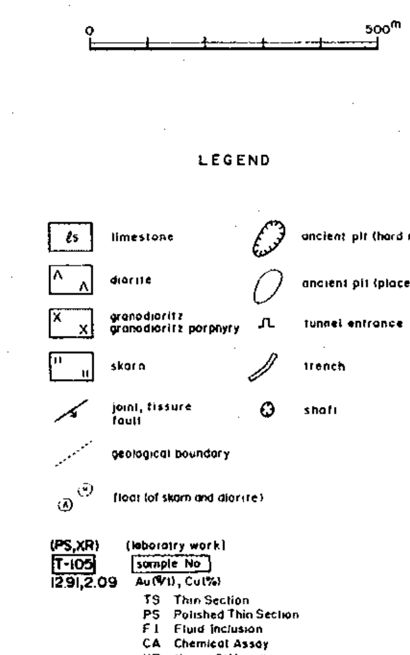


Fig. II-2-3 (1)

Location Map of Rock Samples

in the Turpac-Tushty District (NE)

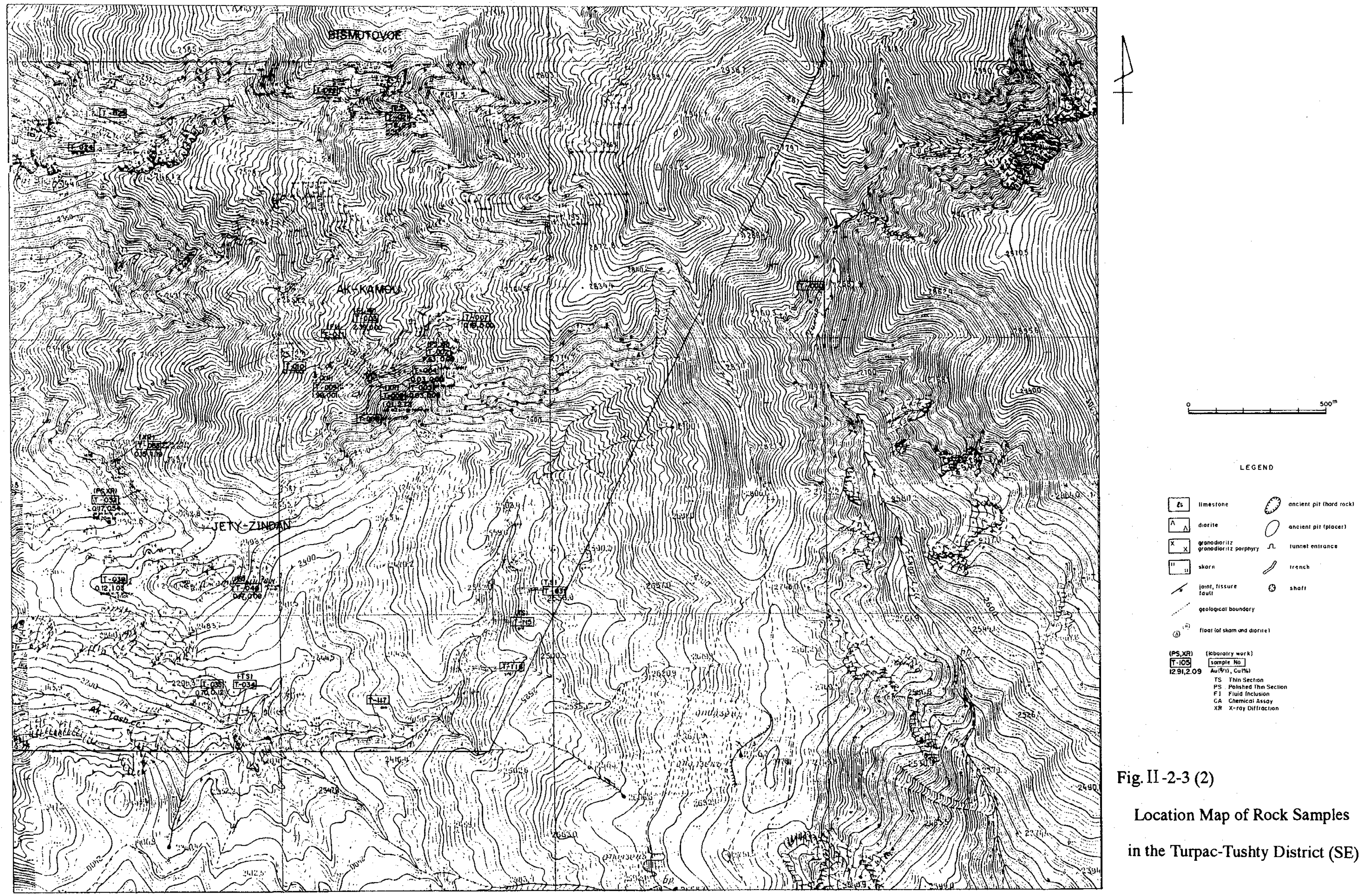
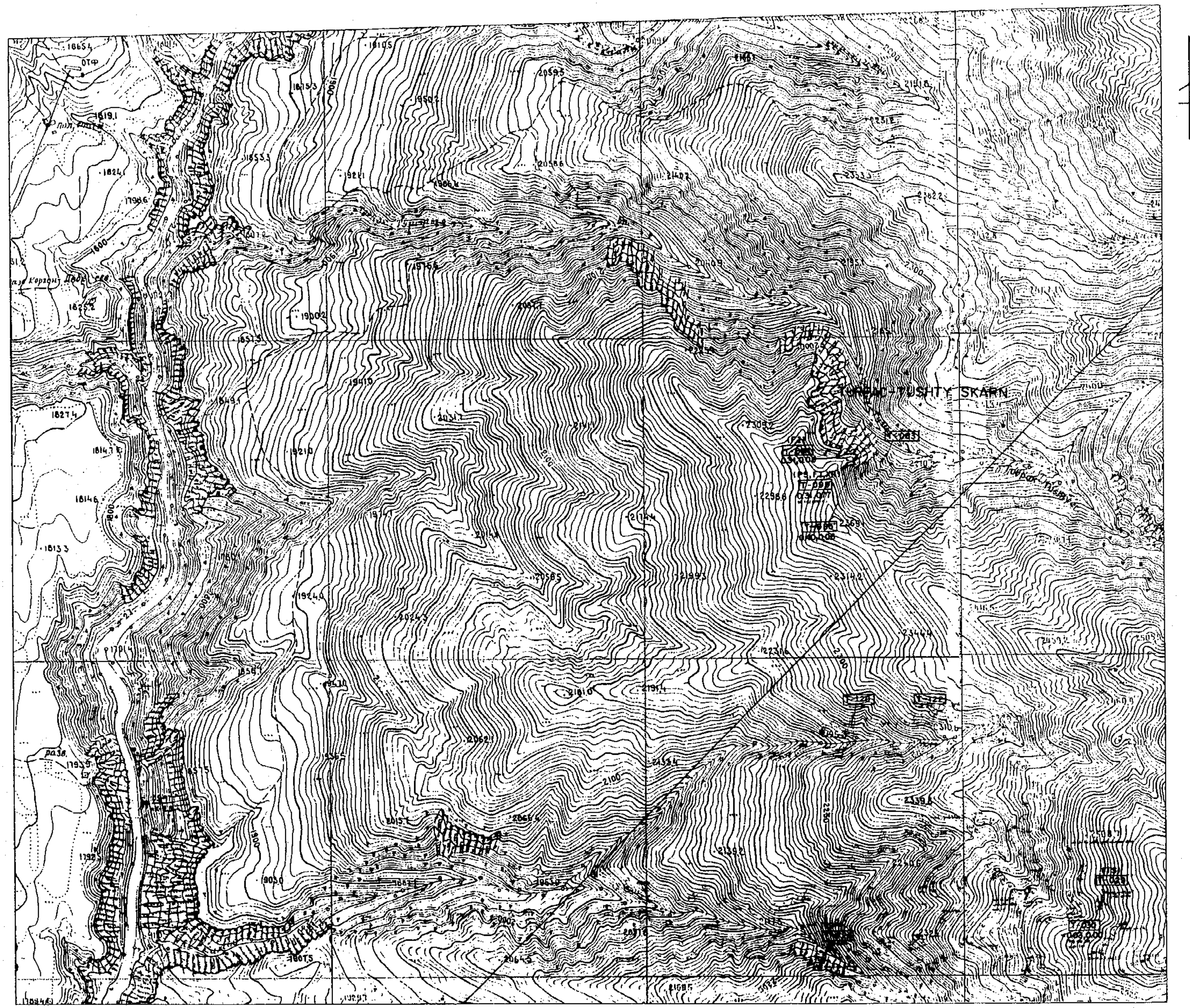


Fig. II-2-3 (2)

Location Map of Rock Samples

in the Turpac-Tushty District (SE)



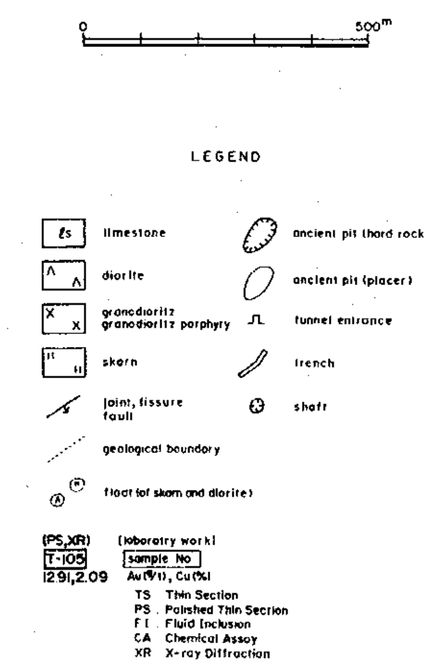


Fig. II-2-3 (3)

Location Map of Rock Samples in the Turpac-Tushty District (NW)

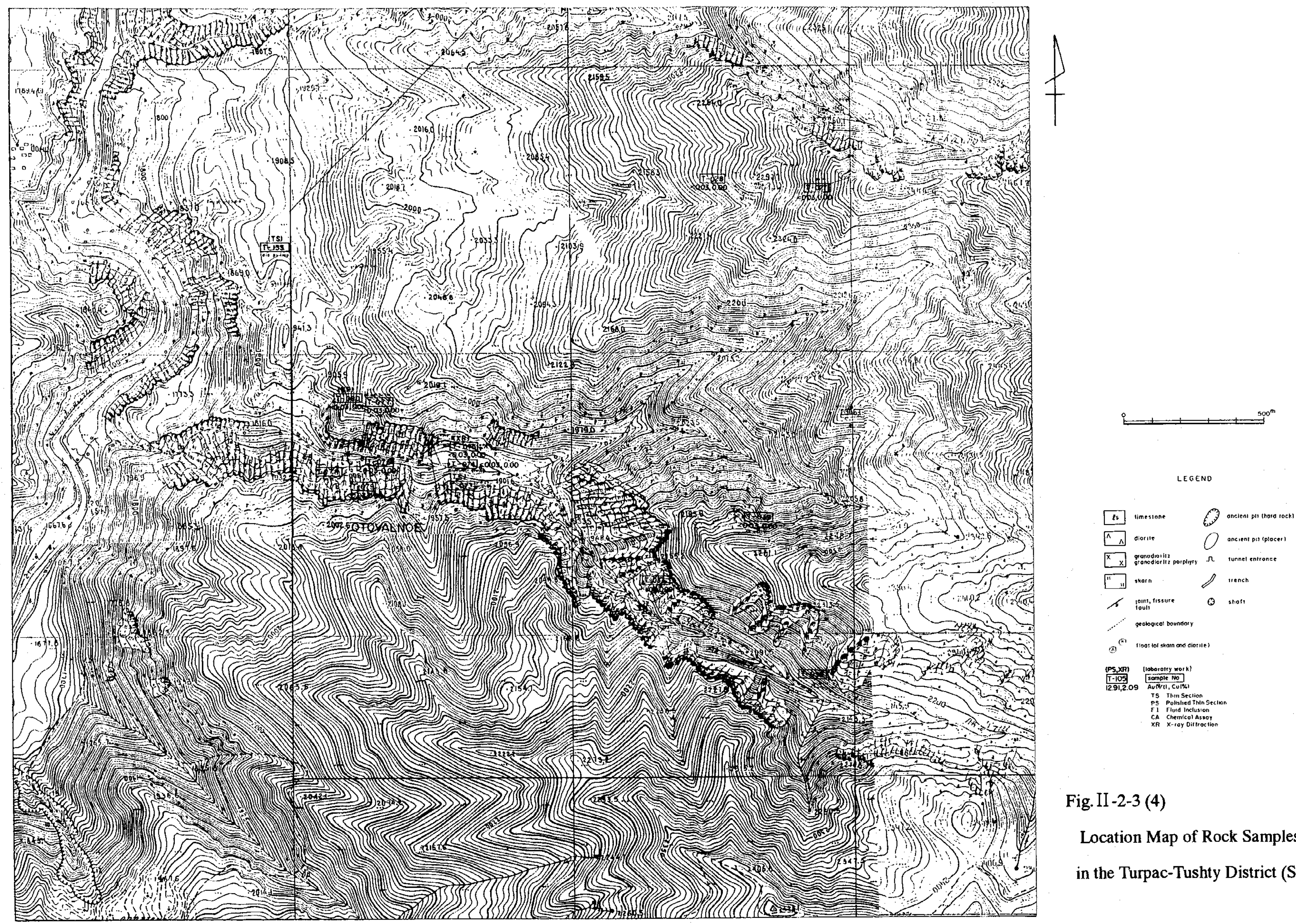


Fig. II-2-3 (4)

Location Map of Rock Samples

in the Turpac-Tushty District (SW)