

CHAPTER 4 TURPAC-TUSHTY DISTRICT

Geological map and geological section are shown in Fig. II-4-1 and Fig. II-4-2 respectively.

4-1 Geology and geological structure

The district is underlain mainly by crystalline limestone of Early Carboniferous age and granodiorite porphyry (Sandalash 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.

4-2 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 Sandalash 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.

4-3 Particulars

(1) Turpac-Tushty ore manifestation (Appendix 9-17)

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.

① Geology

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

② Mineralization

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 (Appendix 16). 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 occurs 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 (Appendix 17). 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 (Appendix 18)

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 was 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 (Appendix 19)

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, goethite 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, goethite, pyrite, hematite and a small amount of chalcopyrite are identified as ore minerals.

4-5 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.

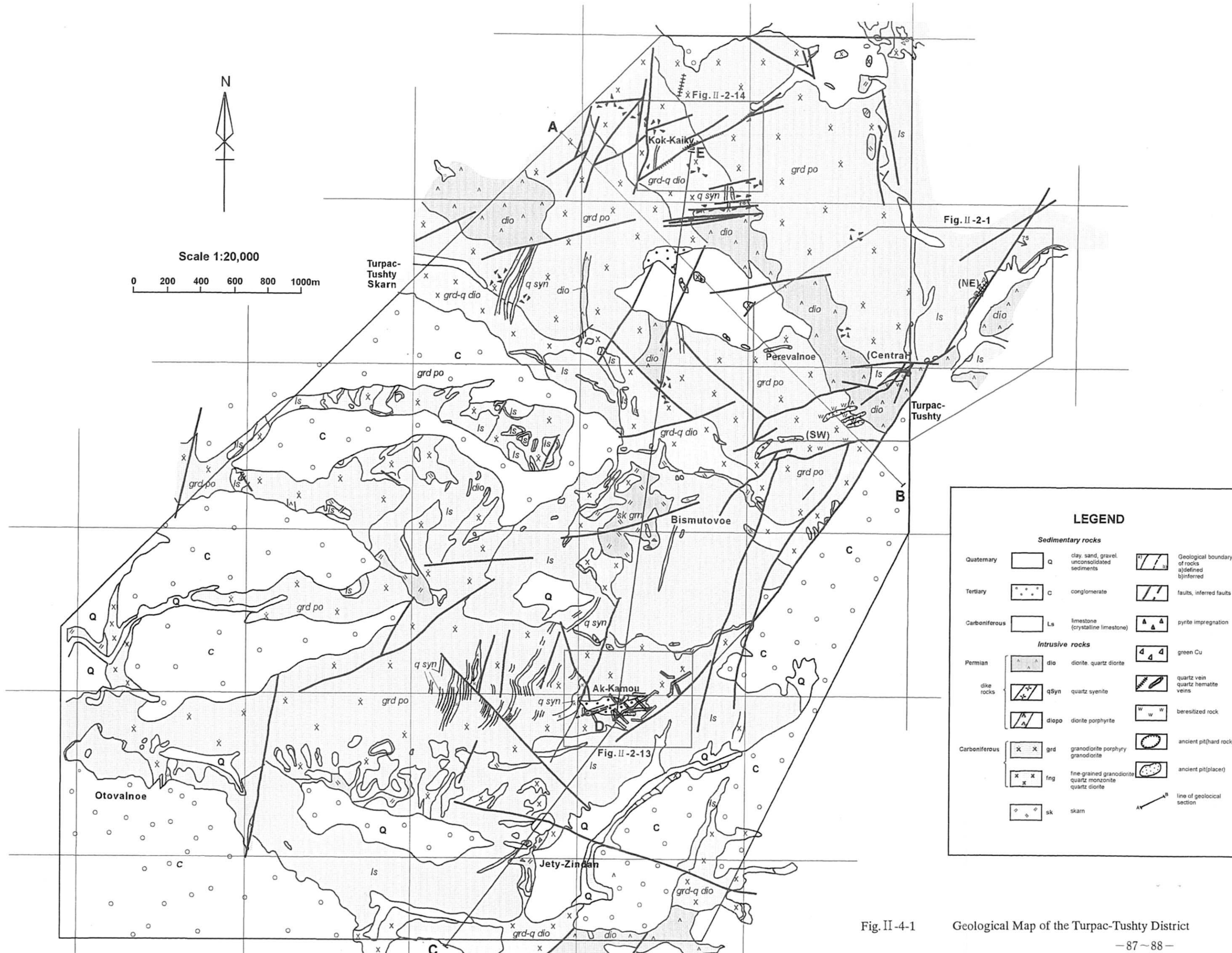


Fig. II-4-1

Geological Map of the Turpac-Tushty District

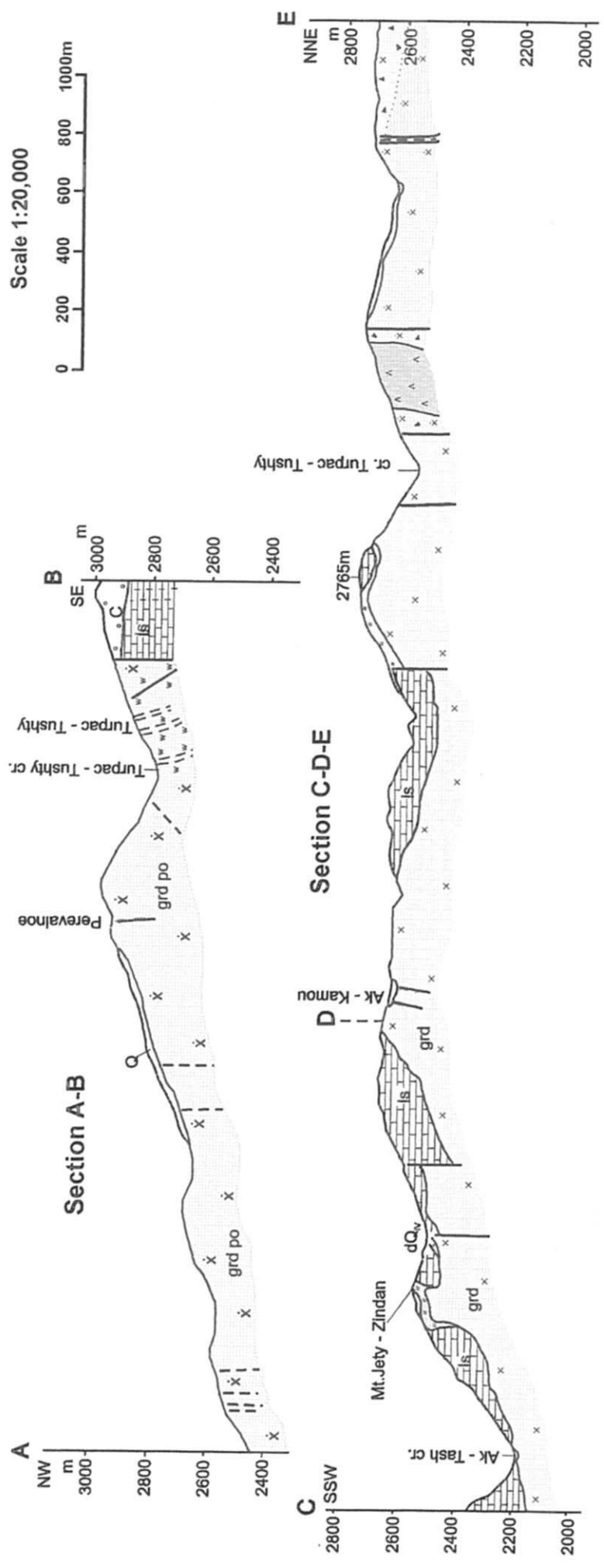


Fig. II -4-2 Geological Cross Section of the Turpac-Tushy District