

## CHAPTER 3 KARAKAZYK DISTRICT

### 3-1 Outline of geology and ore deposit

#### 3-1-1 Outline of geology

This survey district is underlain by the Paleozoic sedimentary and intrusive rock and by the Quaternary sediment. The geological map around the Karakazyk district is shown in Fig. II-3-1. Schematic geological column of this district is given in Fig. II-3-2.

According to a stratigraphy of the Turkestan-Alay area, the Paleozoic group around the Karakazyk district, belongs to the Gaumysh units (Fig. II-3-2). The survey district is underlain by carbonate rocks of the Alpalyk formation (Middle to Upper Devonian), the Adyrakou formation (Upper Devonian), the Ayalmin formation (Lower Carboniferous), and clastic rocks of the Kurukusay formation (Upper Carboniferous). These sedimentary rocks have been subjected by contact metamorphism. Carbonate rocks have been replaced by marble, and clastic rocks have been replaced by hornfels.

The intrusive rocks are divided into the Karakazyk and Ulukol complexes. The former is made of granodiorite of late Carboniferous to early Permian, and the latter is composed of alkali granite of early to late Permian.

The Quaternary system is composed chiefly of talus which covers the slope of the foot of mountain, and alluvial which covers the Kokusu valley.

#### 3-1-2 Outline of ore deposit

Gold and copper deposits and mineral manifestations such as Left Bank, Karakazyk, Right Bank, Kyzylsai, Kymysdykta and Aidarbek, distribute around this district. The Left-bank and Karakazyk deposits are situated in this survey district. Both of them are skarn deposit. Ore deposits and mineral manifestations in the survey district are shown in Fig. II-3-3.

The Left Bank deposit is a gold-copper bearing skarn type deposit, which has been formed at shear zone in the boundary between dolomite of the Alpalyk formation and marble of the Ayalmin formation. The deposit composed mainly of pyroxene skarn recognize as No.1 to No.5 orebodies. SKGE reported that reserves of the Left-bank deposit were estimated to be 1.7 tons of gold in possible reserves (C2), 8.5 tons of gold in potential reserves (P1), totally 10.2 tons of gold with average grade 14.0 g/t Au.

The Karakazyk deposit is made of gold-bearing zone from No.1 mineralization

zone to No.5 mineralization zone. No.1 and No.3 mineralization zone are located in contact zone between marble of the Ayalmin and granodiorite of the Karakazyk complex. No.2 and No.4 mineralization zone are situated in replaced rocks accompanied by shear zone. SKGE reported that potential reserves (P1) of the Karakazyk deposit was estimated to be 3.1 tons of gold, 7537 tons of copper with average grade 4.3 g/t Au and 1.0% Cu.

### **3-2 Geological survey**

#### **3-2-1 Purpose of survey**

The purpose of survey is to assess the relation between mineralization and geology or geological structure in the Karakazyk district by detailed geological survey. Detailed geological survey is performed with 12km<sup>2</sup>.

#### **3-2-2 Method of survey**

Topographic maps on a scale of 1:5,000 prepared by SKGE, is used as base maps for a field survey and an indoor analysis. A surveying route was decided referring to previous data. The field survey in the Left-bank and Karakazyk deposit was done by a dense route. The survey was carried out using clinocompass, altitude barometers and measuring tape. A summary survey was done around the mineralization zone, combined with making a relative position of each outcrop accurate. Geological observations were recorded on a field map.

Base camp for the survey was set up at 3,200m in altitude to the south of the Left Bank deposit.

Samples were collected for assay in length of one meter in principle. Chemical analysis was performed by the Laboratory of SKGE. Eight elements of gold, silver, copper, lead, zinc, arsenic, antimony and molybdenum were analyzed there.

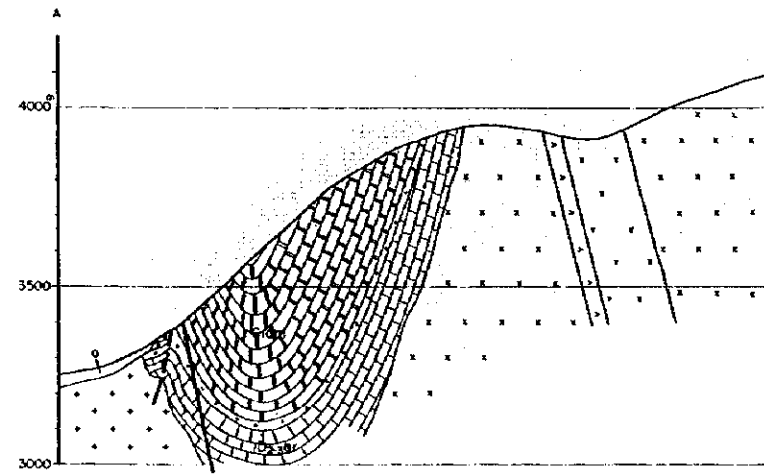
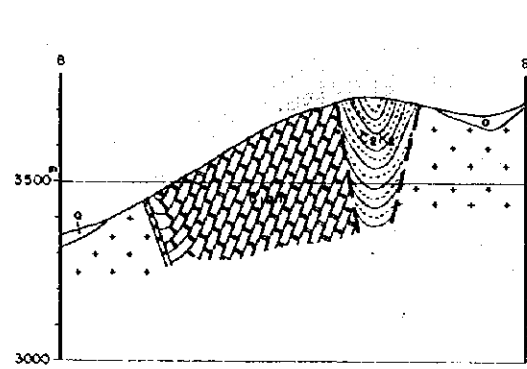
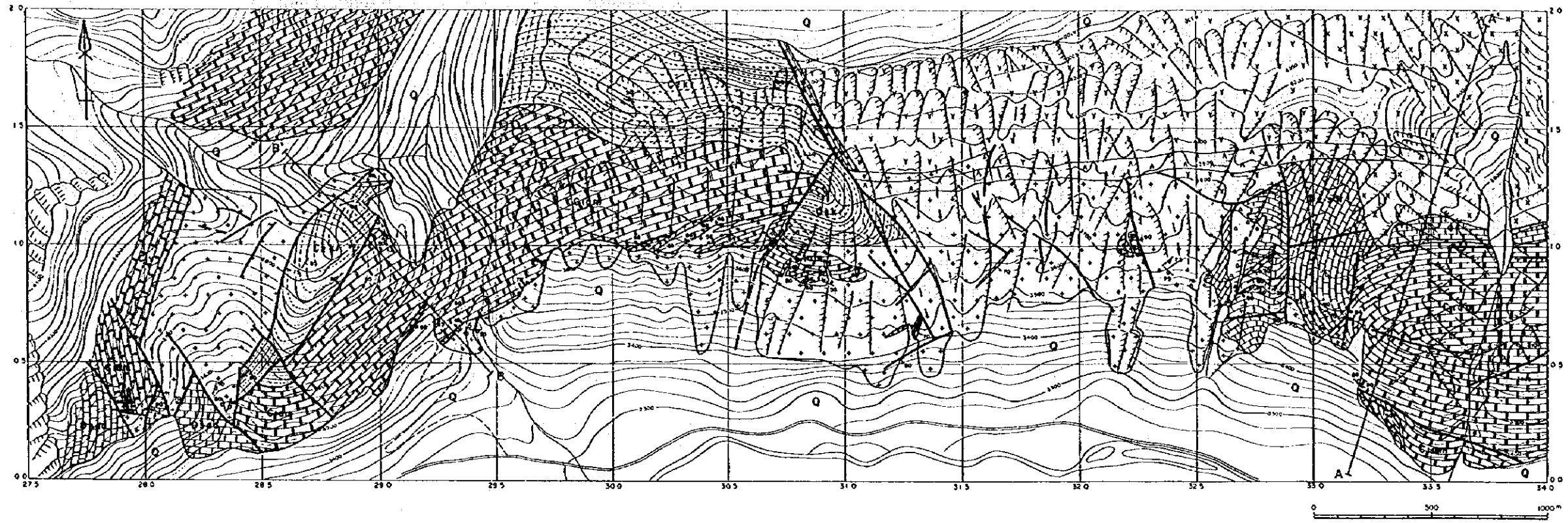
#### **3-2-3 Result of survey**

Geological map and cross section of the Karakazyk district are shown in Fig. II-3-1 and schematic geological column is revealed in Fig. II-3-2.

##### **1) Sedimentary rocks**

The Alpalyk formation covers around the Left Bank deposit and is made of dolomitic limestone. The limestone has generally undergone marble by the contact metamorphism. It is fine in size of re-crystal as compared with the Ayalmin formation which describes later.





**LEGEND**

Quaternary		Talus
Carboniferous		Sandstone, shale
Kuruksay Fm		Marble
Ayalma Fm		Limestone, Marble
Alpalyk Fm		
<b>Intrusive Rocks</b>		
Uluksol complex		Lamprophyre
		Syenite
		Monzonite
Karakazyk complex		Granodiorite
		Sborn
		Fractured zone
		Brecciated Rock
		Fault
		Fissure

Fig. II-3-1 Geological Map and Cross Section of the Karakazyk District



Age		Ma	Gaumysh Unit			
			Formation (thickness)	Geologic column	Lithology	
Cenoz.	Quaternary			△ △	talus Alluvial	
	Tertiary	1.64		△		
Mesozoic		65				
Permian		245				
Paleozoic	Carboniferous	Gzhelian	290			
		Late	Kasimovian	295		
			Moscovian	303	Kuruksay Fm. 450m (C <sub>2m2</sub> , C <sub>2kr</sub> )	sandstone, slate siltstone with limestone
		Middle	Bashkirian	311	Kulduntau Fm. <100m (C <sub>1-2</sub> , C <sub>1-2kt</sub> )	Conglomerate massive limestone siltstone
			Serpukhovian	323		
		Early	Visean	333	Ayalmin Fm. 600-800m (C <sub>1v</sub> , C <sub>1am</sub> )	massive marble
	Tournaisian		350			
	Devonian	Late	Famennian	363	Adyrakou Fm. 350-500m (D <sub>3ad</sub> )	light gray colored dolomite
			Frasnian	367		
		Middle	Givetian	377	Alpalyk Fm. 400m (D <sub>2-3ar</sub> )	light gray colored dolomitic marble
			Eifelian	381		
		E.	Coblentzian	386	F	
Gedinnian			409			

Fm : Formation F : Fault contact.  
Time scale : after Har land, W. B. et al., 1990

Fig. II -3-2 Schematic Geological Column of the Karakazyk District

The Adyrakou formation is composed of reddish brown limestone and marble. The formation covers the southeast of the Karakazyk deposit in a small scale. The formation is chiefly massive, and partially forms an bedding structure. The formation is assumed to conform to the underlying Alpalyk formation.

The Ayalmin formation is made of white calcitic limestone and covers around the Left Bank to Karakazyk deposits. The formation is completely subjected by re-crystallization and shows granoblastic texture more than several millimeters in grain size. The formation has kept hardly back the original texture and reveals massive and lacks bedding. Though this formation unconformably overlies the Adyrakou formation in general, the Adyrakou formation is deficient in this district and is in fault contact with the underlying Alpalyk formation.

The Kurukusay formation occupies around the Karakazyk deposit and covers the ridges more than 3,700m in altitude, to the east and northeast of the Karakazyk deposit. The formation is composed of dark gray sandstone, shale and siltstone. The formation has undergone hornfels. Irregular swarmed joints formed and crushed into fine grain. Calcite network is occurred along joints within several meter in width of the joint. Though this formation unconformably overlies the underlying Kulduntau formation in general, the Kulduntau formation is deficient in this district and is in fault contact with the underlying Ayalmin formation, or unconformably overlies the Ayalmin formation.

## 2) Intrusive rocks

The Karakazyk complex is composed of diorite porphyry, granodiorite and aplitic granite.

Diorite porphyry forms as dyke ranging from several tens centimeters to several meters in width. This rock which distributes around the boundary between granodiorite and marble of the Ayalmin formation in the central part, has kept back the original texture of andesite (phenocryst of plagioclase and clinopyroxene). It is foliated of re-crystallized biotite and hornblende. This rock is classified into meta-andesite in petrography.

Granodiorite is a predominant facies of the Karakazyk complex in this district. This rock extends 3.5km in an E-W direction in the mountain foot from the west of the Left Bank deposit to the Karakazyk deposit. In the eastern part of the granodiorite body, the body is in shear contact with the Ulukkol complex at the northern side of the body and has intruded the Alpalyk formation at the western side. In the western part of the body, it has intruded into the Ayalmin and

Kurukusay formations. It has subject skarnization to the intruded rocks at the contact with carbonate rocks. Granodiorite body distributes in NNE-SSW trending at the west of the Karakazyk deposit. At the west side, it intrudes into the Ayalmin formation. At the east and south sides, it is in fault contact with the Adyrakou, Ayalmin and Kurukusay formations. Under the microscope of typical granodiorite at 300m to the northwest of the Left Bank deposit (Apx. 1-3, 7T0036), it is medium-grained and is composed of quartz, plagioclase, potassium feldspar, biotite and hornblende, with minor amounts of zircon and apatite. It is fresh in general, but is associated with sericite and chlorite as altered minerals.

Aplitic granodiorite occurs as dyke in granodiorite. Under the microscope of sample from the Left Bank deposit (Apx. 1-3, 7N0078), it is fine-grained leucocratic granite with minor biotite. Quartz has strong wavy extinction and potassium feldspar is stained.

The Ulukol complex consists of monzonite and syenite. It is distributed in the northeastern part of the survey district. Monzonite has been intruded by syenite.

Hornblende in granodiorite which crops out on 300m to the northwest of the Left bank deposit, is dated as  $290 \pm 14$  Ma by K-Ar method (Apx. 1-11). Hornblende in granodiorite which has been contact with pyroxene skarn of No.1 mineralization zone in the Karakazyk deposit is dated as  $283 \pm 14$  Ma (Apx. 1-11). Both isotopic ages correspond to be latest Carboniferous to earliest Permian.

### 3) Skarn

Skarn is formed in the shear zone between marble and granodiorite.

Skarn in contact zone is formed well in the Karakazyk (No. 1 and No.3 mineralization zones) and Left Bank deposits. It is composed of pyroxene skarn, garnet-pyroxene skarn and wollastonite skarn. In general, skarn zone is widespread several meters in width and several tens meters in length.

Skarn in shear zone is recognized in the Left Bank and Karakazyk deposits. It is made of pyroxene skarn. At the Left Bank deposit, skarn is well formed in the shear zone between dolomitic marble of the Alpalyk formation and calcitic marble of the Ayalmin formation. At the Karakazyk deposit, skarn is formed in the shear zone between calcitic marble of the Ayalmin formation and hornfels of the Kurukusay formation. Pyroxene skarn which have been collected from the entrance of previous adit in the Left Bank deposit, is made of fine-grained clinopyroxene under the microscope (Apx. 1-3, 7N0077).



#### 4) Alteration

Kind of clay mineral was investigated because clay were formed in fractures and shear in this district. Results of X-ray diffraction analysis are given in Apx. 1-9-(1). As clay and related minerals, quartz, pyrophyllite and kaolinite were detected chiefly with minor amount of sericite. Pyrophyllite and kaolinite are considered to be typical minerals in a acidic alteration zone. On a basis of clay minerals, this district is inferred to belong to a acidic alteration zone.

#### 5) Geological structure

The main fractures in this survey district trend N-S, NW-SE, NE-SW and E-W. The fracture trending E-W has been formed the shear and mylonite zone which extends 2.5km in length with about 100m in maximum width along the southern margin of syenite body in the northern part of the Left Bank deposit. This fracture is called the Left Bank fracture. Along this fracture, many kinds of alteration, such as argillation, chloritization, serpentization, had been produced by replacement. Diorite porphyrite has been also swarmed along this fracture.

The fractures trending N-S are chiefly distributed around the Left bank deposit. The maximum fracture is situated to the west of the Left bank deposit. It extends more than 500m in length with 150m in maximum width. In the fracture zone, brecciated marble is filled with skarnized matrix.

The fractures trending NE-SW, are mainly distributed around the Karakazyk deposit. These fracture become boundary between the Ayalmin and Kurukusay formations, and between the Kurukusay formation and granodiorite.

The fractures trending NW-SE, are distributed in the whole district. They cut the Paleozoic group, granodiorite and syenite. These fractures cut the above mentioned Left Bank fracture and the fractures trending NE-SW. They have caused apparently the left-lateral displacement in granodiorite in the central part of the survey district.

In the Left Bank deposit, The Alpalyk and Ayalmin formations has formed a synclinal structure having a axial trace trending E-W. The south limb of syncline is cut by the faults trending NW-SE, and the north limb is cut by monzonite of the Ulukol complex, respectively.

Geological structure is almost uncertain, because Ayalmin formation distributing in the central part to the Karakazyk deposit is subjected to marble, and the original texture has almost disappeared. Bedding strikes E-W and ENE-WSW, when it has appeared. The Kurukusay formation which conforms the structure of

the Ayalmin formation, strikes E-W and dips N in the central part of the survey district.

The Kurukusay formation forms a synclinal structure having a axial trace trending NE-SW near the Karakazyk deposit. The southeast limb of syncline is in fault contact with the Ayalmin formation, and the northwest limb is in fault contact with granodiorite.

## (2) Ore deposit

The Left Bank and Karakazyk deposit are described as representative deposits in this district. Ore deposits and mineral manifestations are sketched in Fig. II-3-4.

The Left Bank deposit is located on the left bank of the Kokusu valley around 3,300m to 3,500m in altitude. It is gold copper-bearing skarn deposit which has been formed in contact shear zone between dolomitic marble of the Upper Devonian system and marble of the Lower Carboniferous system. The orebody is mostly embedded in pyroxene skarn. The orebodies named No.1 to No.5 have been confirmed by the previous tunnel prospecting of the SKGE in the 1980's. Though the previous entrance of tunnel was located in 3,372m in altitude at the steep slope of the mountain, underground geological survey could not conduct because of complete close of the entrance. Thick talus covers the surface, a part of skarn crops out. At 37m higher position of the previous tunnel, pyroxene skarn corresponding to No.1 orebody, crops out in a small dimension of 10m by 7m. As pyroxene skarn dips 80° to 85° S and dips 60° N, it is presumed to be existence of a small synclinal structure. Chalcopyrite, pyrite, bornite, goethite and secondary copper oxide minerals are impregnated in skarn. Under the microscope (Apx. 1-5), tetrahedrite, sphalerite, chalcocite and covellite are observed. Assay of skarn in this survey ranges from 7.5 to 21.5 g/t Au, from 70 to 100 g/t Ag, and from 0.9 to 1.26 % Cu.

The orebodies of No.2 to No.5 had been confirmed in prospecting tunnel. On the basis of geological data of the Kyrgyz side, gold and copper mineralization had been concentrated partially in the mineralization zone and formed small body in pocket. Size of each orebody is various and irregular, and grades from 4m<sup>2</sup> to 1000m<sup>2</sup>. Looking at underground assay map of 1:200 in scale, grade is mostly less than 5 g/t Au, partially 10 to 40 g/t Au.

The Karakazyk deposit is located in 4km west of the left bank, around 3,350m to 3,800m in altitude. The area around the deposit is composed of marble of the Lower Carboniferous system, and sandstone, shale and siltstone of the Middle Carboniferous system. The area corresponds to the western disappearing part of the

granodiorite of the Karakazyk complex.

Gold-bearing mineralization zone are found No.1 to No.5 mineralization zone. No.1 and No.3 mineralization zone are formed in the contact zone between marble and granodiorite. No.2 and No.4 mineralization zone are formed in the replaced rocks associated with shear structure.

No.1 mineralization zone is the largest one, and is gold copper-bearing skarn orebody which had been formed the contact zone between granodiorite and marble. Mineralization zone extends trending NNE-SSW and dips 60' to 80' N. Dimension of this mineralization zone was confirmed in width of 20m and in length of 40m by this survey. Zonal arrangement of granodiorite, pyroxene skarn, garnet-pyroxene skarn, coarse wollastonite skarn, and marble, is recognized from east to west. Sulfide minerals as chalcopyrite and pyrite occur in garnet-pyroxene skarn and wollastonite skarn. Most of sulfide minerals is several centimeters in grain size, and is concentrated in pocket and nest (Fig. II-3-4). As ore minerals, pyrite, bornite and chalcopyrite are observed by naked eyes, and marcasite and arsenopyrite are detected under the microscope (Apx. 1-5, 7M0029). Assay results are revealed in Apx. 1-7. Assay ranges from 0.7 to 12.4 g/t Au, from 7 to 100g/t Ag and from 0.9 to 7.6 % Cu.

Table II-3-1 reveals statistic assay results of 21 samples collected from the surface of the Karakazyk district in this study. Correlation coefficients among analyzed elements are also given in Table II-3-1. Correlation coefficient showing more than 0.8, is one between arsenic and antimony. The fact suggests that element related to gold is hardly found.

Homogenization temperatures of fluid inclusions in calcite, quartz and garnet, which associated with ore in the Karakazyk district, were measured. Fluid inclusion was liquid inclusion. Gaseous inclusion and polyphase inclusion contained halite were not observed. Size of inclusion ranges from 3 to 10  $\mu$  m. Most inclusions scatter in mother crystals. The results of homogenization temperatures are given in Apx. 1-10-(3). Average homogenization temperature is 137°C, 132°C, 141°C in calcite, 227°C in garnet, 223°C in quartz.

### 3-3 Consideration

This survey district is underlain by dolomitic limestone of the Alpalyk formation of Middle to Upper Devonian, limestone and marble of the Adyrakou formation of Upper Devonian, calcitic limestone of the Ayalmin formation of Lower Carboniferous and elastic rocks of the Kurukusay formation of Upper Carboniferous.

Table II-3-1 Summary of Assay Result in the Karakazyk District

	Au (g/t)	Ag (g/t)	Cu (%)	Pb (10-3%)	Zn (10-2%)	As (10-2%)	Sb (10-2%)	Mo (10-4%)
Sample Number	21	21	21	21	21	21	21	21
Maximum	105.1	100	7.6	70	70	70	50	15
Minimum	0.07	<0.1	0.007	0.12	2	<1.2	<0.3	<1.2
Average	13.3	50.8	1.7	10.2	16.8	5.2	3.0	3.2

Correlation coefficient

	Au	Ag	Cu	Pb	Zn	As	Sb	Mo
Au	1.00							
Ag	0.45	1.00						
Cu	0.21	0.68	1.00					
Pb	0.62	0.44	0.55	1.00				
Zn	-0.10	0.42	0.64	0.51	1.00			
As	-0.08	0.32	0.24	0.19	0.60	1.00		
Sb	-0.04	0.26	0.30	0.21	0.62	0.96	1.00	
Mo	-0.05	-0.33	-0.34	0.16	-0.33	-0.19	-0.16	1.00

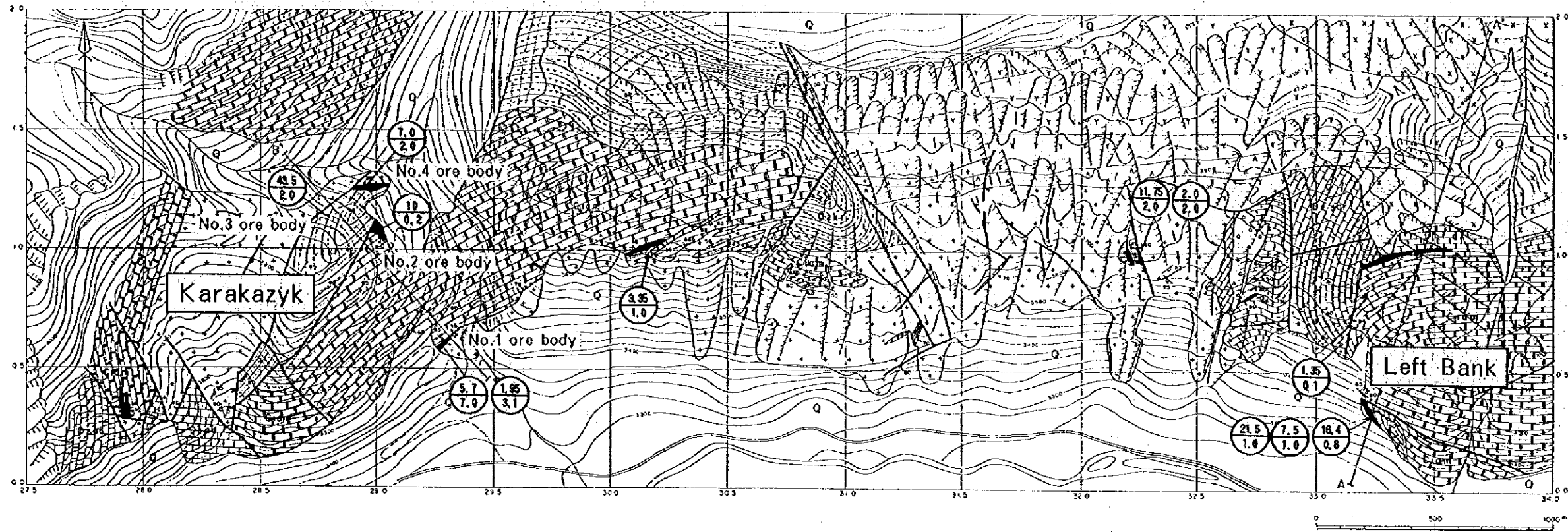
The district is intruded by the Karakazyk complex which is made mainly of granitic rocks of latest Carboniferous to earliest Permian, and the Ulukol complex which is composed of alkali granitic rocks of early to late Permian.

The Left Bank deposit is a gold-copper bearing skarn deposit, which has been formed along shear zone bordering the dolomitic and calcitic marbles. The Karakazyk deposit is a gold-copper bearing skarn deposit, which has been formed in the contact zone between granodiorite and marble, or metasomatic zone associated with shear zone.

Although the mineralization zone at the surface extends about 20m × 40m in a case of maximum size, the high grade zone occupies only a small part.

It is concluded that the deposits in this district could be hardly developed as things stand, because high grade ore occurs as spot in skarn body.





LEGEND

- |                   |  |                   |
|-------------------|--|-------------------|
| Quaternary        |  | Talus             |
| Carboniferous     |  |                   |
| Karaksay Fm       |  | Sandstone, shale  |
| Ayalmin Fm        |  | Marble            |
| Devonian          |  |                   |
| Alpalyk Fm        |  | Limestone, Marble |
| Intrusive Rocks   |  |                   |
| Ufukkot complex   |  | Lamprophyre       |
|                   |  | Syenite           |
|                   |  | Monzonite         |
| Karakazyk complex |  | Granodiorite      |
|                   |  | Skarn             |
|                   |  | Fractured zone    |
|                   |  | Brecciated Rock   |
|                   |  | Fault             |
|                   |  | Fissure           |
|                   |  | As (g/t)          |
|                   |  | Width (m)         |

Fig. II-3-3 Distribution of Ore Deposit and Mineral Manifestations in the Karakazyk District

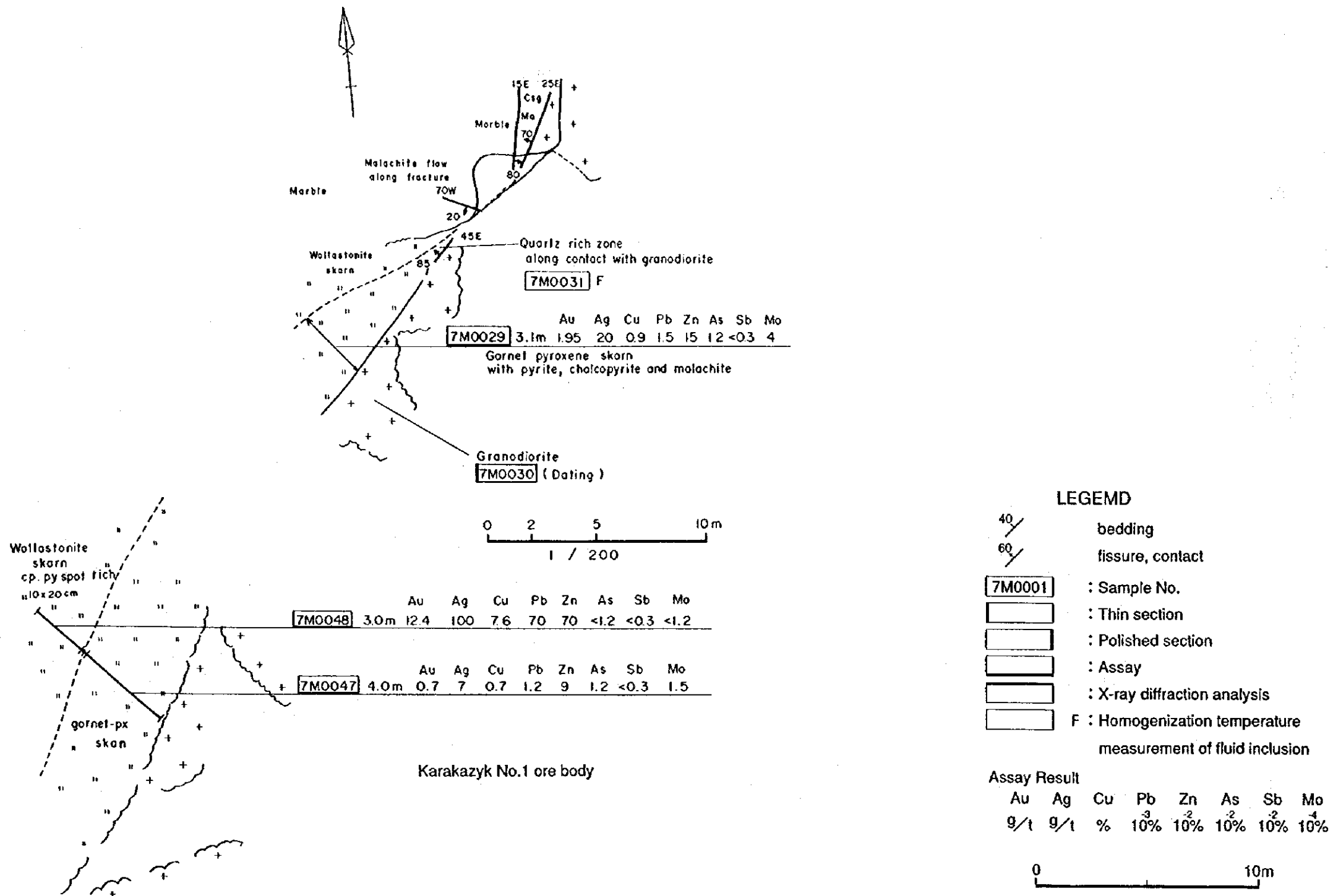
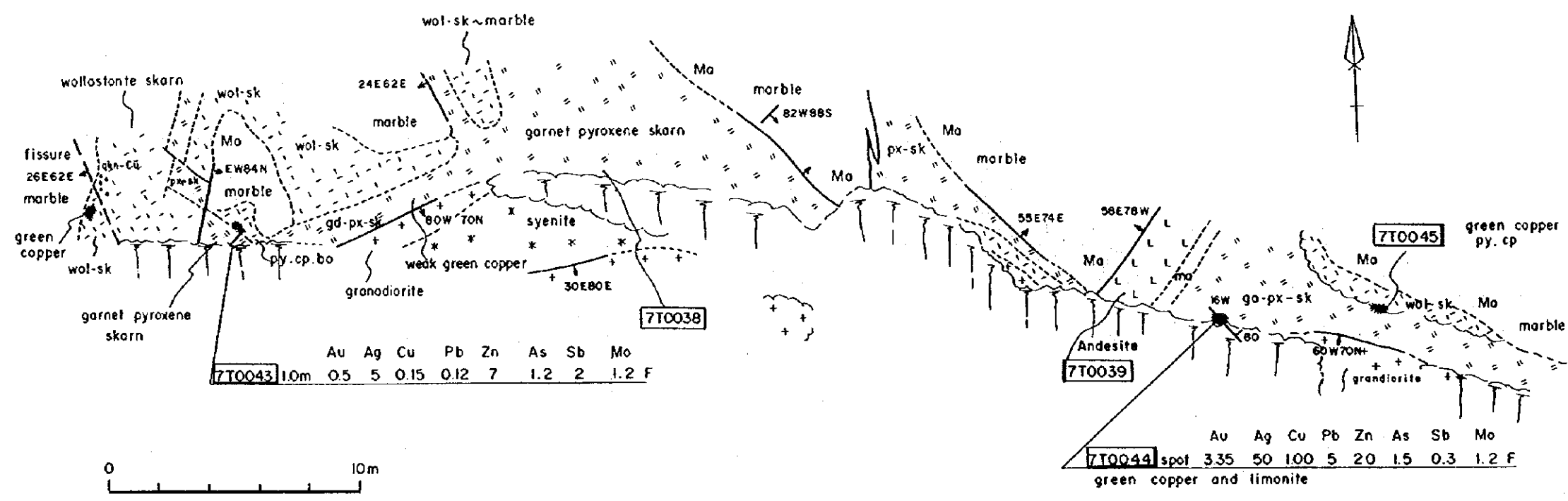


Fig. II-3-4 Geological Sketches of Mineral Manifestations in the Karakazyk District (1)





LEGEND  
See Fig. II-3-4 (1)

Fig. II-3-4 Geological Sketches of Mineral Manifestations in the Karakazyk District (2)



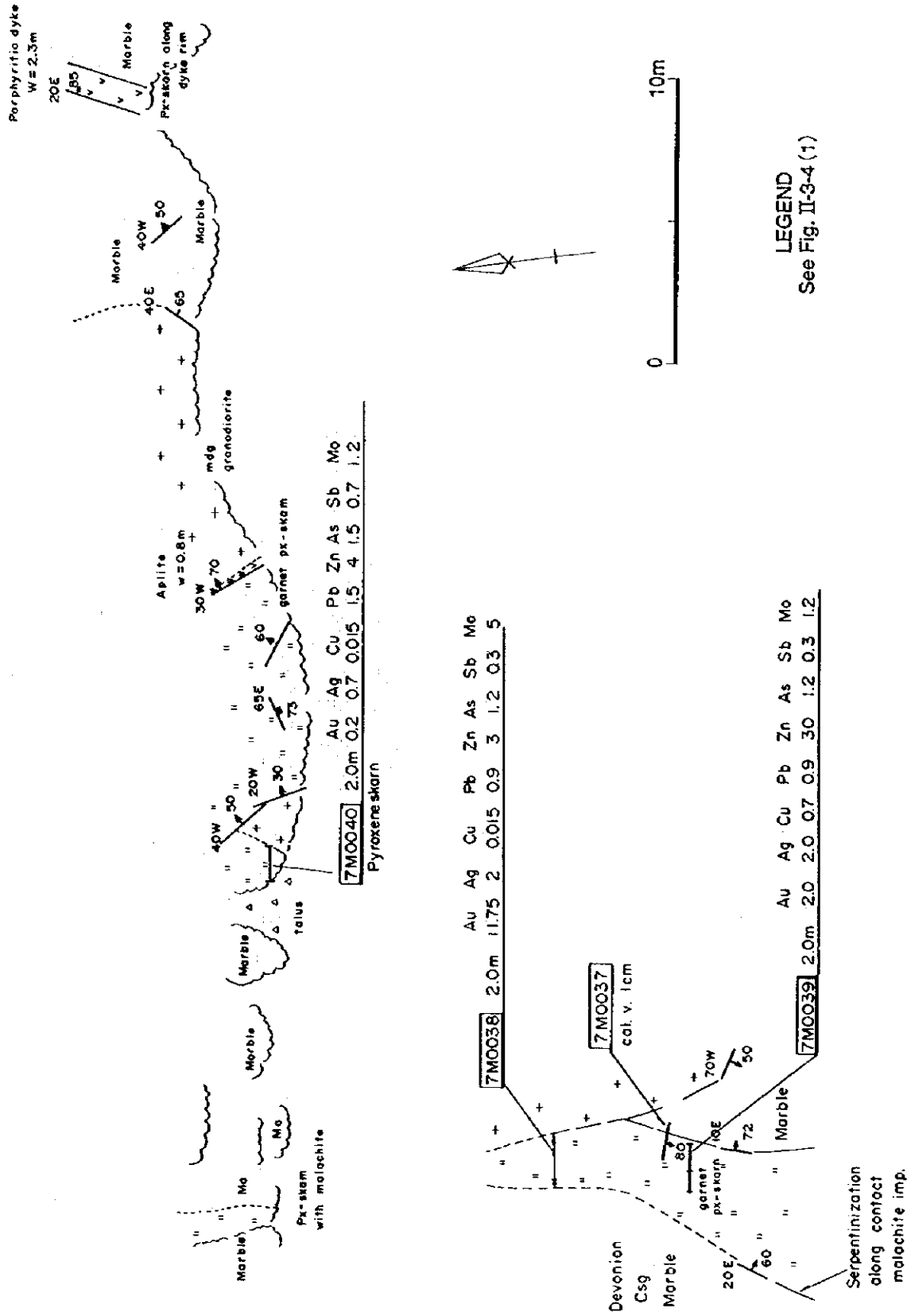


Fig. II-3-4 Geological Sketches of Mineral Manifestations in the Karakazyk District (3)

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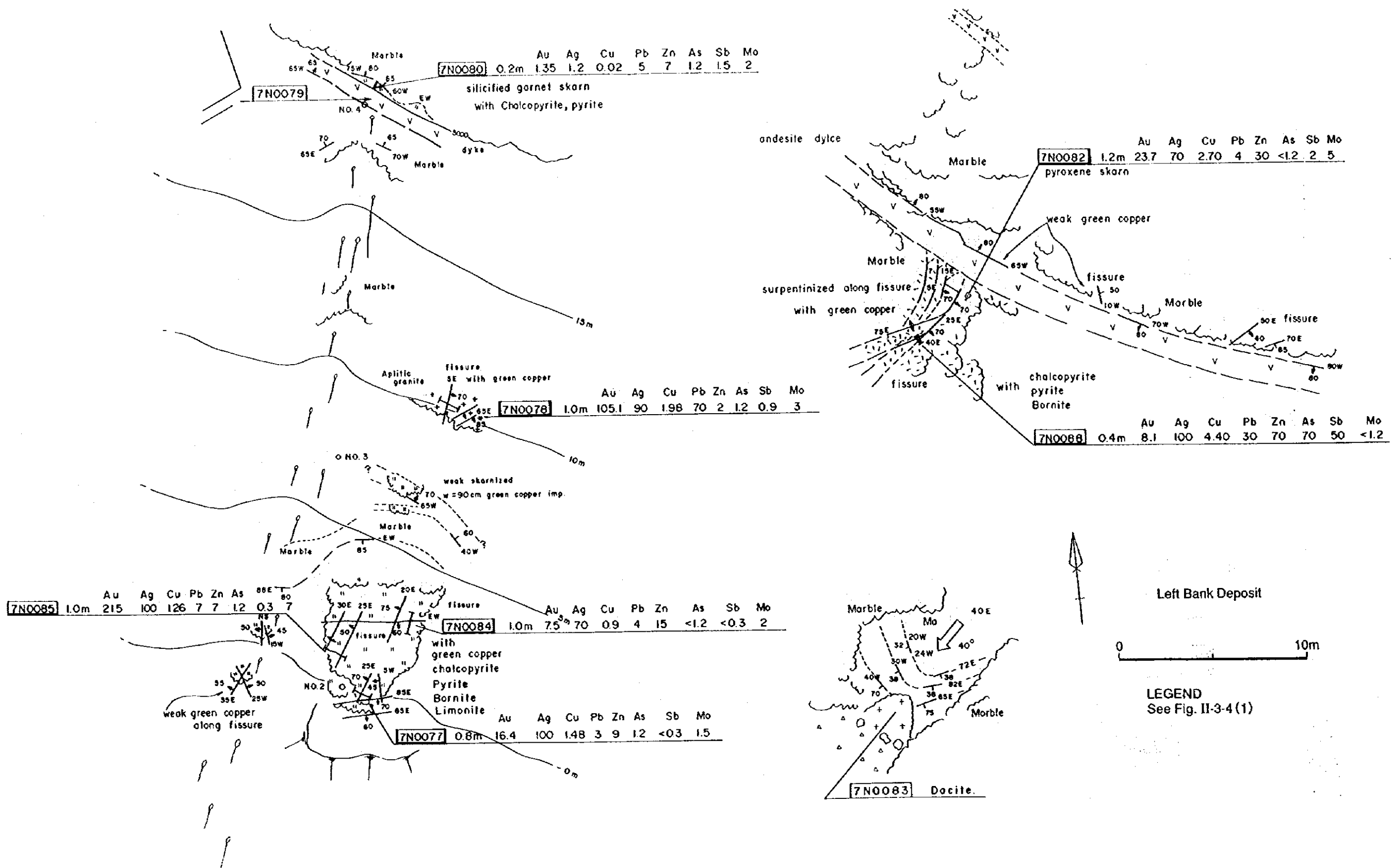


Fig. II-3-4 Geological Sketches of Mineral Manifestations in the Karakazyk District (4)



## **PART III**

### **CONCLUSION AND RECOMMENDATION**





## CHAPTER 1 CONCLUSION

The following conclusions were reached on the basis of the analysis of satellite image, the geological survey and the drilling survey in the Alay area.

### 1-1 Whole area

- (1) This survey area belongs to the Turkestan-Alay area in the Southern Tien Shan mountains. The area is divided into several tectonic belts which extend in an E-W direction by thrust faults.
- (2) The area is underlain by the Ordovician, Silurian, Devonian and Carboniferous systems. The Karakazyk, Archabashin, Surmetash and Trumsuy complexes of Hercynian orogeny intruded the Paleozoic sedimentary rocks.
- (3) In the Turkestan-Alay area, granitic rocks of the Karakazyk and Trumsuy complexes are related to copper-gold, gold-arsenic, silver-polymetal and tungsten mineralization. The Surmetash complex is related to tin-tungsten mineralization.
- (4) Ore deposits and mineral manifestations in this area are as follows; Altyn-Jylga ore field (Au, Cu), Kokusu ore field (Au, Ag, Cu, Bi, W, Sb, Pb, Zn), Augul-Gavian ore field (Au, Cu) and Allaudin ore field (Sn, W).
- (5) Thirty three geological units are classified on the basis of interpretation of false color synthetic satellite image. The result of interpretation has a good agreement with the geological map. Predominant directions of lineaments in the survey area are E-W and NE-SW. The Altyn-Jylga, Kokusu and Augul ore fields are distributed around the lineament swarm zone of an E-W trend. A close relationship between the mineralization and the E-W trending fractures is suggested.
- (6) Small-scale spectral anomalies by satellite image analysis are scattered on the southwestern part of the survey area where the intrusive complex revealing a circular structure is distributed. These anomalies may reflect presence of mineralization accompanied by the intrusive rocks.

### 1-2 Altyn-Jylga district

- (1) The deposit in this district is gold-copper bearing skarn deposit which has been formed in the contact zone between granodiorite of the Karakazyk complex and the Devonian limestone.
- (2) Skarn minerals consist of clinopyroxene, garnet and wollastonite. Skarn is made chiefly of clinopyroxene skarn, associated with clinopyroxene-garnet skarn

and wollastonite skarn. Silicified skarn which has formed from clinopyroxene skarn by silicification occurs commonly in the northern part of this district.

- (3) Ten drill holes has been done in No.4 skarn orebody in the northern part of the deposit. As the results of the survey, it has been confirmed that granodiorite body is more widespread in the deep than near the surface. On the other hand, skarn zone becomes sealed down in the deep. Although gold mineralization is widely recognized in the skarn body, gold concentration in skarn ore is generally low, ranging from 0.1 to 0.5 g/t Au. Except a small-scale high gold concentration (highest grade 55.6 g/t Au in width of 50cm), large-scale high gold orebodies has not been confirmed.
- (4) It has been reconfirmed by the underground survey of 1930m level adit that gold mineralization is predominant in No.3 skarn orebody. Mineralization zone confirmed there has average grade of 5-6 g/t Au with an area of about 3,000km<sup>2</sup>.
- (5) According to the underground geological survey of the previous adit, fractures showing the NE-SW and NW-SE trends are dominant in No.3 skarn orebody. Considering the close relationship between gold mineralization and fracture, gold mineralization is assumed to be concentrated around the intersection of both trends.
- (6) Average homogenization temperature of fluid inclusions ranges from 118° to 200°C. They shows lower than homogenization temperature ranging from 200° to 300°C at an ordinary gold deposit.
- (7) Gold-bearing arsenopyrite veins are formed in aplite and granodiorite around No.4 orebody in the northern part of the district. Arsenopyrite vein hardly occurs in No.3 orebody in the central part.
- (8) Aplite is predominant in the northern part, and lamprophyre is dominant in the central part.
- (9) A dyke swarm of lamprophyre crops out around No.3 skarn orebody. A lamprophyre dyke around the Altyn-Jylga gully has undergone skarnization accompanied with secondary copper oxides. Gold mineralization, ranging from 1.3 to 5.0 g/t Au in grade, has been recognized in a part of lamprophyre dyke.
- (10) K-Ar ages of both hornblende from granodiorite and lamprophyre are dated as  $282 \pm 14$  Ma and  $299 \pm 15$ Ma, respectively, and they correspond to latest Carboniferous to earliest Permian. Based on its distribution and occurrence, lamprophyre has formed in a later stage of igneous activity produced granodiorite. Skarn orebody has been intruded by lamprophyre. Therefore, skarn is presumed to be formed in latest Carboniferous to earliest Permian.

- (11) Gold mineralization is dominant in No.3 skarn orebody situated in the central part at the district, but the mineralization commonly trends poor to the north. The mineralization in the northern part is characterized by silicification, rich in arsenopyrite and low in homogenization temperature as compared with the mineralization in the central part. The above-mentioned facts suggest that the northern part represents a margin of the mineralization.
- (12) Both the lamprophyre dykes and the fractures of NE-SW trend is thought to have a close relationship with gold mineralization. Geochemical anomalies detected in the south-southeast of No.3 skarn orebody is thought to correspond to a center of mineralization.
- (13) High grade gold ore has been confirmed in the lower extension of No.3 skarn orebody by the previous drillings from 1930mL. The high grade ore is located at the lower position of 60m from 1930mL (1870mL). It has 13m in width and average grade of 25.7 g/t Au. Homogenization temperature of fluid inclusions in quartz veinlet, which has cut high grade ore, centers around 140 °C. Homogenization temperature of fluid inclusions in calcite accompanied with clinopyroxene, centers around 151°C. These homogenization temperatures are rather low as compared with a common homogenization temperature of gold bonanza. It is suggested that the high grade gold mineralization at 1870mL would continue to the most favorable orebody in the downward extension, on the basis of the distribution and structure of orebody and the homogenization temperature, although it is not conclusive because of only a few measurements.
- (14) The western part of the district is underlain widely by the pyroxene skarn zone with sulfides (No.8 and No.9 skarn orebody) with an area of 30m × 200m, which has a high gold concentration of 10 g/t Au.

### 1-3 Karakazyk district

- (1) The Left Bank deposit is a gold-copper bearing skarn deposit, which has been formed along shear zone bordering the dolomitic and calcitic marbles. The Karakazyk deposit is a gold-copper bearing skarn deposit, which has been formed in the contact zone between granodiorite and marble, or metasomatic zone associated with shear zone.
- (2) Although the mineralization zone at the surface extends about 20m × 40m in a case of maximum size, the high grade zone occupies only a small part.
- (3) It is concluded that the deposits in this district could be hardly developed as things stand, because high grade ore occurs as spot in skarn body.



## CHAPTER 2 RECOMMENDATION

As the results of the detailed geological and drilling survey in the Phase I, it is concluded that the No.3 skarn orebody of the Altyn-Jylga deposit could be developed and high grade ore would continue in the downward extension.

The Phase II survey is hoped to be carried out to clarify a potential of No.3 skarn orebody and is hoped to be aimed to a mining development in connection with much increase of minable reserves. As definite exploration method, it is recommended that a new adit on 1850mL is hoped to be opened and driven to confirm directly the gold mineralization of the high grade ore of No.3 orebody confirmed by previous drilling on the 1930mL. Horizontal and inclined drilling surveys from the 1850mL are hoped to be conducted to clarify the mineralization of deeper extension.

To grasp an entire mechanism of the mineralization in the Altyn-Jylga deposit, a drift on 1850mL is hoped to be extended to the lower extensions of No.5, No.1 and No.2 orebodies which are presumed as a center of the mineralization zone, and underground horizontal drillings are hoped to be conducted.

As prospective spaces in the Altyn-Jylga deposit, surface drillings are hoped to be conducted to clarify the mineralization between MJKA-10 hole and the adit of 1930mL, and horizontal drillings are hoped to be conducted to define an area of the orebody on 1930mL.

Moreover, it is proposed that information on the geology and the ore deposit is hoped to be collected and a reconnaissance geological survey is hoped to be carried out concerning mineral manifestations as Augul and Gavian which have been considered to be under the same mineralization conditions as the Altyn-Jylga deposit on the basis of regional geologic structure.



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# Appendix 1

## Result of Laboratory Works



# Appendix 1-1

## Sample List of Geological Survey



Apx. 1-1 Sample List of Geological Survey (1)

Serial No.	Sample No.	Locality			Rock name	Laboratory work						Remarks
		District	Place	Width (m)		T	P	C	X	D	F	
1	7M0001	Altyn-Jylga	Trench K-3A	1.5	Pyroxene skarn			○				
2	7M0002	Altyn-Jylga	Trench K-3A	1.0	Pyroxene skarn	○	○					
3	7M0004	Altyn-Jylga	Transporting road	1.0	Amphibolite			○				
4	7M0005	Altyn-Jylga	Trench K-3	1.0	Lamprophyre	○		○				
5	7M0006	Altyn-Jylga	Trench K-3	1.0	Silicified skarn	○		○				
6	7M0007	Altyn-Jylga	Trench K-1A	0.1	White clay vein				○			
7	7M0008	Altyn-Jylga	Trench K-1A	1.0	Pyroxene-garnet skarn	○	○	○				
8	7M0009	Altyn-Jylga	Trench K-1A	1.0	Pyroxene skarn	○		○				
9	7M0010	Altyn-Jylga	Trench K-1A	0.1	Clay vein				○			
10	7M0011	Altyn-Jylga	Trench K-1A	1.0	Pyroxene-garnet skarn	○		○				
11	7M0012	Altyn-Jylga	Near Trench K-1A	0.1	Wollastonite skarn	○						
12	7M0013	Altyn-Jylga	Near Trench K-1A	0.1	Skarnized gabbro	○						
13	7M0014	Altyn-Jylga	Western part	0.1	Serpentinized pyroxene skarn	○						In marble
14	7M0016	Altyn-Jylga	West. Trench K-42	0.1	Serpentinite with malachite			○				
15	7M0018	Altyn-Jylga	West. Trench K-42	0.1	Pyroxene skarn with malachite			○				Limonitized
16	7M0019	Altyn-Jylga	West. Trench K-42	0.1	Serpentinized pyroxene skarn			○				
17	7M0020	Altyn-Jylga	Near MUKA-8	0.3	Malachite-limonite vein			○				
18	7M0021	Altyn-Jylga	Trench K-35	1.0	Pyroxene skarn			○				
19	7M0022	Altyn-Jylga	Trench K-37	1.0	Pyroxene skarn			○				
20	7M0023	Altyn-Jylga	Trench K-33	1.0	Serpentinized pyroxene skarn			○				
21	7M0025	Altyn-Jylga	West. Trench K-64	1.0	Altered granodiorite			○				
22	7N0001	Altyn-Jylga	Trench K-5A	0.3	Proxene skarn	○		○				
23	7N0002	Altyn-Jylga	Trench K-5A	0.3	Yellowish brown clay			○	○			
24	7N0003	Altyn-Jylga	Trench K-5A	0.5	Proxene skarn			○				
25	7N0004	Altyn-Jylga	Trench K-5A	0.2	Yellowish brown clay				○			

T: Thin section, P: Polished section, C: Chemical assay analysis, X: X-ray diffraction analysis

○: Dating, F: Homogenization temperature of fluid inclusion



Apx. 1-1 Sample List of Geological Survey (2)

Serial No.	Sample No.	Locality		Width (m)	Rock name	Laboratory work						Remarks
		District	Place			T	P	C	X	D	F	
26	7N0005	Altyn-Jylga	Trench K-5A	0.1	Lamprophyre	○						
27	7N0006	Altyn-Jylga	Trench K-19A	1.0	Proxene skarn			○				
28	7N0007	Altyn-Jylga	Trench K-19A	1.0	Pyroxene skarn			○				
29	7N0008	Altyn-Jylga	Trench K-18A	1.0	Yellowish brown clay			○				
30	7N0009	Altyn-Jylga	Trench K-17A	0.5	Yellowish brown clay			○				
31	7N0010	Altyn-Jylga	Trench K-17A	1.0	Silicified skarn			○				
32	7N0011	Altyn-Jylga	Trench K-17A	1.0	Silicified skarn			○				
33	7N0012	Altyn-Jylga	Trench K-18A	1.0	Silicified skarn			○				
34	7N0013	Altyn-Jylga	Trench K-18A	1.0	Silicified skarn			○				
35	7N0014	Altyn-Jylga	Trench K-18A	0.1	Lamprophyre	○						
36	7N0015	Altyn-Jylga	Trench K-26A	0.15	Yellowish brown zone			○				
37	7N0016	Altyn-Jylga	Trench K-26A	0.3	Yellowish brown zone			○				
38	7N0017	Altyn-Jylga	Trench K-3A	0.4	Silicified skarn			○				
39	7N0019	Altyn-Jylga	Trench K-8	0.1	Yellowish brown zone			○				
40	7N0020	Altyn-Jylga	Trench K-8	0.5	Silicified skarn			○				
41	7N0021	Altyn-Jylga	Trench K-23A	1.0	Yellowish brown zone			○				
42	7N0022	Altyn-Jylga	Trench K-23A	1.0	Yellowish brown zone			○				
43	7N0023	Altyn-Jylga	Trench K-23A	1.0	Yellowish brown zone			○				
44	7N0024	Altyn-Jylga	Trench K-23A	1.0	Proxene skarn			○				
45	7N0025	Altyn-Jylga	Trench K-5A	1.0	Proxene skarn			○				
46	7N0026	Altyn-Jylga	Trench K-5A	1.0	Proxene skarn			○				
47	7N0027	Altyn-Jylga	1930mL Adit	0.3	Limonite gossan			○				
48	7N0028	Altyn-Jylga	1930mL Adit	1.1	Pyroxene skarn			○				
49	7N0029	Altyn-Jylga	1930mL Adit	0.5	Pyroxene skarn			○				
50	7N0031	Altyn-Jylga	1930mL Adit	1.0	Pyroxene skarn			○				

T: Thin section, P: Polished section, C: Chemical assay analysis, X: X-ray diffraction analysis

D: Dating, F: Homogenization temperature of fluid inclusion

Apx. 1-1 Sample List (3)

Serial No.	Sample No.	Locality		Width (m)	Rock name	Laboratory work							Remarks	
		District	Place			T	P	C	X	D	F			
51	7N0032	Altyn-Jylga	1930mL Adit	0.4	Sheared zone			○						
52	7N0033	Altyn-Jylga	1930mL Adit	1.0	Pyroxene skarn			○						
53	7N0034	Altyn-Jylga	1930mL Adit	0.4	Sheared zone			○						
54	7N0035	Altyn-Jylga	1930mL Adit	0.5	Silicified skarn			○						
55	7N0036	Altyn-Jylga	1930mL Adit	0.2	Fissure with quartz vein			○	○				○	
56	7N0037	Altyn-Jylga	1930mL Adit	0.5	Silicified skarn			○						
57	7N0038	Altyn-Jylga	1930mL Adit	0.25	Sheared zone			○						
58	7N0039	Altyn-Jylga	1930mL Adit	0.3	Lamprophyre			○						
59	7N0040	Altyn-Jylga	1930mL Adit	0.7	Lamprophyre	○								
60	7N0041	Altyn-Jylga	1930mL Adit	0.3	Lamprophyre			○						
61	7N0042	Altyn-Jylga	1930mL Adit	0.2	Sheared zone			○						
62	7N0043	Altyn-Jylga	1930mL Adit	0.5	Silicified skarn			○						
63	7N0044	Altyn-Jylga	1930mL Adit	0.3	Sheared zone			○						
64	7N0045	Altyn-Jylga	1930mL Adit	0.6	Silicified shear			○						
65	7N0046	Altyn-Jylga	1930mL Adit	0.3	Sheared zone			○						
66	7N0047	Altyn-Jylga	1930mL Adit	0.5	Silicified skarn			○						
67	7N0048	Altyn-Jylga	1930mL Adit	0.3	Sheared zone			○						
68	7N0049	Altyn-Jylga	1930mL Adit	0.5	Silicified skarn			○						
69	7N0050	Altyn-Jylga	1930mL Adit	0.2	Sheared zone			○	○					
70	7N0051	Altyn-Jylga	1930mL Adit	0.5	Sheared zone			○						
71	7N0052	Altyn-Jylga	1930mL Adit	0.6	Sheared zone			○	○					
72	7N0054	Altyn-Jylga	1930mL Adit	0.2	Sheared zone			○						
73	7N0056	Altyn-Jylga	1930mL Adit	0.5	Pyroxene skarn			○						
74	7N0057	Altyn-Jylga	1930mL Adit	0.3	Sheared zone with clay			○						
75	7N0058	Altyn-Jylga	1930mL Adit	0.5	Pyroxene skarn			○						

T: Thin section. P: Polished section. C: Chemical assay analysis. X: X-ray diffraction analysis

D: Dating. F: Homogenization temperature of fluid inclusion

Apx. 1-1 Sample List of Geological Survey (4)

Serial No.	Sample No.	Locality		Width (m)	Rock name	Laboratory work							Remarks	
		District	Place			T	P	C	X	D	F			
76	7N0060	Altyn-Jylga	1930mL Adit	0.3	Sheared zone									
77	7N0061	Altyn-Jylga	1930mL Adit	0.5	Pyroxene skarn									
78	7N0062	Altyn-Jylga	1930mL Adit	1.0	Pyroxene skarn									
79	7N0063	Altyn-Jylga	1930mL Adit	0.5	Pyroxene skarn									
80	7N0064	Altyn-Jylga	1930mL Adit	0.5	Limonite druse									
81	7N0065	Altyn-Jylga	1930mL Adit	0.5	Pyroxene skarn									
82	7N0066	Altyn-Jylga	Transporting road	0.1	Fissure with clay									
83	7N0067	Altyn-Jylga	Transporting road	0.3	Fissure with clay									
84	7N0068	Altyn-Jylga	Transporting road	0.8	Pyroxene skarn									
85	7N0069	Altyn-Jylga	Transporting road	1.0	Silicified skarn									
86	7N0070	Altyn-Jylga	Transporting road	0.3	Sheared zone with green copper									
87	7N0071	Altyn-Jylga	Transporting road	0.1	Limonite along fissure									
88	7N0072	Altyn-Jylga	Transporting road	0.1	Lamprophyre									
89	7N0073	Altyn-Jylga	Transporting road	0.1	Olivine hornblendite									
90	7N0074	Altyn-Jylga	Adit	0.1	Pyroxene skarn with py and cp									
91	7N0075	Altyn-Jylga	Adit	0.1	Calcite vein									In px-garnet skarn
92	7N0076	Altyn-Jylga	Adit	0.1	Pyroxene garnet skarn									
93	7T0002	Altyn-Jylga	Trench K-25A	0.1	Lamprophyre									Dyke
94	7T0003	Altyn-Jylga	Trench K-25A	0.5	Silicified marble									
95	7T0004	Altyn-Jylga	Trench K-23A	0.1	Calcite in pyroxene skarn									
96	7T0005	Altyn-Jylga	Trench K-29A	0.1	Lamprophyre									
97	7T0007	Altyn-Jylga	Trench K-38A	0.7	Pyroxene skarn									Cp,py imp.
98	7T0008	Altyn-Jylga	Entrance of adit	1.0	Granodiorite									
99	7T0009	Altyn-Jylga	Trench K-91	1.0	Skarnized gabbro									
100	7T0010	Altyn-Jylga	Trench K-91	1.0	Pyroxene skarn									

T: Thin section, P: Polished section, C: Chemical assay analysis, X: X-ray diffraction analysis

D: Dating, F: Homogenization temperature of fluid inclusion

Apx. 1-1 Sample List of Geological Survey (5)

Serial No.	Sample No.	Locality		Rock name	Laboratory work							Remarks
		District	Place		Width (m)	T	P	C	X	D	F	
101	7T0011	Altyn-Jylga	Upper part of adit	1.0								2m from granodiorite
102	7T0013	Altyn-Jylga	South ridge of camp	0.5								
103	7T0015	Altyn-Jylga	Trench on south ridge	1.0								Azurite, cc imp.
104	7T0017	Altyn-Jylga	Trench on south ridge	0.1								
105	7T0019	Altyn-Jylga	West Trench K-23	1.0								Limonite, clay
106	7T0020	Altyn-Jylga	West Trench K-23	1.0								
107	7T0021	Altyn-Jylga	West Trench K-23	1.0								
108	7T0022	Altyn-Jylga	W. Trench K-23 upper	0.5								
109	7T0023	Altyn-Jylga	Western trench of K-23	1.0								
110	7T0025	Altyn-Jylga	Western trench of K-23	0.1								In marble
111	7T0026	Altyn-Jylga	West Trench K-65	2.0								In silicified marble
112	7T0027	Altyn-Jylga	West Trench K-62	1.0								
113	7T0028	Altyn-Jylga	South Trench K-11	2.0								
114	7T0029	Altyn-Jylga	South Trench K-11	2.0								Op. py, green copper
115	7T0030	Altyn-Jylga	South Trench K-11	2.0								Green copper
116	7T0031	Altyn-Jylga	South Trench K-6	0.5								Green copper of 20cm
117	7T0032	Altyn-Jylga	Southern part	0.8								Green copper
118	7T0033	Altyn-Jylga	Southern part	2.0								Malachite imp.
119	7T0034	Altyn-Jylga	South Trench K-36	2.0								
120	7T0035	Altyn-Jylga	West Trench K-63	0.4								
121	7M0026	Karakazyk	Karakazyk No.2 ore zone	0.1								
122	7M0027	Karakazyk	Karakazyk No.2 ore zone	0.1								Mmarble/hornfels
123	7M0028	Karakazyk	Karakazyk No.2 ore zone	0.1								Float. py. cp imp.
124	7M0029	Karakazyk	Karakazyk No.1 ore zone	3.1								
125	7M0030	Karakazyk	Karakazyk No.1 ore zone	0.1								

T: Thin section, P: Polished section, C: Chemical assay analysis, X: X-ray diffraction analysis

D: Dating, F: Homogenization temperature of fluid inclusion

Apx. 1-1 Sample List of Geological survey (6)

Serial No.	Sample No.	Locality		Width (m)	Rock name	Laboratory work							Remarks
		District	Place			T	P	C	X	D	F		
126	7M0031	Karakazyk	Karakazyk No.1 ore zone	0.1	Quartz rich zone								With op. malachite
127	7M0032	Karakazyk	Karakazyk No.2 ore zone	0.2	Pyroxene skarn with sulfide				○				Float
128	7M0033	Karakazyk	Karakazyk No.3 ore zone	0.2	Pyroxene skarn with sulfide				○				Float
129	7M0034	Karakazyk	Karakazyk No.3 ore zone	0.1	Calcite veinlet					○			In silicified hornfels
130	7M0035	Karakazyk	Karakazyk No.4 ore zone	2.0	Skarnized ore				○				Marble origin ?
131	7M0038	Karakazyk	West to Left bank	2.0	Pyroxene skarn				○				Malachite, pyrite rich
132	7M0039	Karakazyk	West to Left bank	2.0	Garnet pyroxene skarn				○				
133	7M0040	Karakazyk	West to Left bank	2.0	Pyroxene skarn				○				
134	7M0044	Karakazyk	West to Karakazyk	2.0	Garnet pyroxene skarn				○				
135	7M0046	Karakazyk	West to Karakazyk	1.0	Pyroxene skarn				○				
136	7M0047	Karakazyk	Karakazyk No.1 ore zone	4.0	Garnet pyroxene skarn				○				
137	7M0048	Karakazyk	Karakazyk No.1 ore zone	3.0	Wollastonite skarn				○				
138	7N0077	Karakazyk	Left bank deposit	0.8	Skarnized rock				○	○			Pyrite, malachite
139	7N0078	Karakazyk	Left bank deposit	1.0	Granite				○	○			Pyrite, op. malachite
140	7N0079	Karakazyk	Left bank deposit	0.1	Meta-andesite				○				
141	7N0080	Karakazyk	Left bank deposit	0.2	Garnet skarn					○			
142	7N0081	Karakazyk	Left bank deposit	0.1	Fissure zone					○			Foot wall in pit 3520m
143	7N0082	Karakazyk	Left bank deposit	1.2	Skarnized rock				○				
144	7N0084	Karakazyk	Left bank deposit	1.0	Skarnized rock				○				
145	7N0085	Karakazyk	Left bank deposit	1.0	Skarnized rock				○				
146	7N0086	Karakazyk	West of Left bank	0.5	Clay along calcite					○			
146	7N0087	Karakazyk	West of Left bank	0.2	Quartz vein								○
148	7N0088	Karakazyk	Left bank deposit	1.0	Skarnized rock					○			○
149	7T0036	Karakazyk	Left bank deposit	0.2	Granodiorite				○				
150	7T0037	Karakazyk	East to Karakazyk	0.2	Schistose meta-andesite				○				

T: Thin section, P: Polished section, C: Chemical assay analysis, X: X-ray diffraction analysis

D: Dating, F: Homogenization temperature of fluid inclusion

Apx. 1-1 Sample List of Geological Survey (7)

Serial No.	Sample No.	Locality		Width (m)	Rock name	Laboratory work						Remarks	
		District	Place			T	P	C	X	D	F		
151	7T0039	Karakazyk	East to Karakazyk	0.1	Meta-andesite	○							
152	7T0041	Karakazyk	East to Karakazyk	0.1	Schistose meta-andesite	○							
153	7T0042	Karakazyk	East to Karakazyk	0.1	Clay vein				○				
154	7T0043	Karakazyk	East to Karakazyk	1.0	Pyroxene skarn				○			○	Calcite vein. cp. py
155	7T0044	Karakazyk	East to Karakazyk	1.0	Proxene skarn				○	○		○	
156	7T0045	Karakazyk	East to Karakazyk	0.1	Proxene skarn				○				

T: Thin section, P: Polished section, C: Chemical assay analysis, X: X-ray diffraction analysis

D: Dating, F: Homogenization temperature of fluid inclusion



## Appendix. 1-2

### Core Sample List





Ap. 1-2 Core Sample List (1)

Serial No.	Sample No.	Locality		Rock name	Laboratory work						Remarks				
		Drill hole No.	Depth (m)		Length (m)	T	P	C	X	F					
1	7A0001	MJKA-10	0~1.0	1.0	Silicified skarn										
2	7A0002	MJKA-10	1.0~2.0	1.0	Silicified skarn										
3	7A0003	MJKA-10	2.0~3.0	1.0	Silicified skarn										
4	7A0004	MJKA-10	3.0~4.0	1.0	Silicified skarn										
5	7A0005	MJKA-10	4.0~5.0	1.0	Silicified skarn										
6	7A0006	MJKA-10	5.0~6.0	1.0	Silicified skarn										
7	7A0007	MJKA-10	6.0~7.0	1.0	Silicified skarn										
8	7A0008	MJKA-10	7.0~8.0	1.0	Silicified skarn										
9	7A0009	MJKA-10	8.0~9.0	1.0	Granodiorite										
10	7A0010	MJKA-10	13.5~14.4	0.9	Granodiorite										
11	7A0011	MJKA-10	14.4~15.5	1.1	Pyroxene skarn										
12	7A0012	MJKA-10	15.5~16.5	1.0	Silicified skarn										
13	7A0013	MJKA-10	16.5~17.5	1.0	Silicified skarn										
14	7A0014	MJKA-10	17.5~18.3	0.8	Silicified skarn										
15	7A0015	MJKA-10	18.3~19.0	0.7	Pyroxene skarn										
16	7A0016	MJKA-10	19.0~20.0	1.0	Silicified skarn										
17	7A0017	MJKA-10	20.0~21.0	1.0	Pyroxene skarn with cal-py vein										20.8m(P)
18	7A0018	MJKA-10	21.0~22.0	1.0	Pyroxene skarn with calcite vein										21.4m(F)
19	7A0019	MJKA-10	22.0~23.0	1.0	Pyroxene skarn										
20	7A0020	MJKA-10	23.0~24.0	1.0	Pyroxene skarn										23.3m(T)
21	7A0021	MJKA-10	24.0~25.0	1.0	Pyroxene skarn										
22	7A0022	MJKA-10	25.0~26.0	1.0	Pyroxene skarn with py imp.										25.6m(P)
23	7A0023	MJKA-10	26.0~27.0	1.0	Pyroxene skarn										
24	7A0024	MJKA-10	27.0~28.0	1.0	Pyroxene skarn										
25	7A0025	MJKA-10	28.0~29.0	1.0	Pyroxene skarn										

T: Thin section, P: Polished section, C: Chemical assay analysis,

X: X-ray diffraction analysis, F: Homogenization temperature of fluid inclusion

Apx. 1-2 Core Sample List (2)

Serial No.	Sample No.	Locality		Rock name	Laboratory work						Remarks			
		Drill hole No.	Depth (m)		Length (m)	T	P	C	X	F				
26	7A0026	MJKA-10	29.0~30.0	1.0	Pyroxene skarn									
27	7A0027	MJKA-10	30.0~31.0	1.0	Pyroxene skarn									
28	7A0028	MJKA-10	31.0~32.0	1.0	Pyroxene skarn									
29	7A0029	MJKA-10	32.0~33.0	1.0	Pyroxene skarn									
30	7A0030	MJKA-10	33.0~34.0	1.0	Pyroxene skarn									
31	7A0031	MJKA-10	34.0~35.0	1.0	Pyroxene skarn									
32	7A0032	MJKA-10	35.0~36.0	1.0	Pyroxene skarn									
33	7A0033	MJKA-10	36.0~36.5	0.5	Pyroxene skarn									
34	7A0034	MJKA-10	36.5~37.5	1.0	Wollastonite skarn									
35	7A0035	MJKA-8	0~1.0	1.0	Silicified skarn									
36	7A0036	MJKA-8	1.0~2.0	1.0	Silicified skarn									
37	7A0037	MJKA-8	2.0~3.0	1.0	Silicified skarn									
38	7A0038	MJKA-8	3.0~4.0	1.0	Silicified skarn									
39	7A0039	MJKA-8	4.0~4.5	0.5	Epidote skarn with arsenopyrite vein									4.5m(P)
40	7A0040	MJKA-8	4.5~5.1	0.6	Marble									5.8m(P)
41	7A0041	MJKA-8	5.1~6.3	1.2	Silicified skarn with pyrite veinlets									
42	7A0042	MJKA-8	6.3~7.3	1.0	Marble									
43	7A0043	MJKA-8	7.3~8.3	1.0	Marble									
44	7A0044	MJKA-8	8.3~9.2	0.9	Marble									
45	7A0045	MJKA-8	9.2~10.2	1.0	Silicified skarn									
46	7A0046	MJKA-8	10.2~11.2	1.0	Silicified skarn									
47	7A0047	MJKA-8	11.2~12.2	1.0	Silicified skarn									
48	7A0048	MJKA-8	12.2~12.8	0.6	Silicified skarn									
49	7A0049	MJKA-8	12.8~13.6	0.8	Diorite porphyry									
50	7A0050	MJKA-8	13.6~14.6	1.0	Silicified skarn									

T: Thin section, P: Polished section, C: Chemical assay analysis,

X: X-ray diffraction analysis, F: Homogenization temperature of fluid inclusion

Ap. 1-2 Core Sample List (3)

Serial No.	Sample No.	Locality		Rock name	Laboratory work						Remarks				
		Drill hole No.	Depth (m)		Length (m)	T	P	C	X	F					
51	7A0051	MJKA-8	14.6~15.2	0.6	Epidote pyroxene skarn										
52	7A0052	MJKA-8	15.2~16.2	1.0	Silicified skarn										
53	7A0053	MJKA-8	16.2~17.2	1.0	Silicified skarn										
54	7A0054	MJKA-8	17.2~18.9	1.7	Silicified skarn										
55	7A0055	MJKA-8	18.9~20.0	1.1	Skarnized lamprophyre										19.8m(T)
56	7A0056	MJKA-8	20.0~21.2	1.2	Silicified skarn										
57	7A0057	MJKA-8	21.2~22.2	1.0	Pyroxene skarn										21.8m(T)
58	7A0058	MJKA-8	22.2~22.9	0.7	Pyroxene skarn										
59	7A0059	MJKA-8	22.9~23.9	1.0	Silicified skarn										
60	7A0060	MJKA-8	23.9~24.9	1.0	Silicified skarn										
61	7A0061	MJKA-8	24.9~25.9	1.0	Silicified skarn										25.0m(T)
62	7A0062	MJKA-8	25.9~26.9	1.0	Silicified skarn										
63	7A0063	MJKA-8	26.9~27.9	1.0	Silicified skarn										
64	7A0064	MJKA-8	27.9~28.9	1.0	Silicified skarn										
65	7A0065	MJKA-8	28.9~29.5	0.6	Silicified skarn										
66	7A0066	MJKA-8	29.5~30.2	0.7	Granodiorite porphyry										29.8m(T)
67	7A0067	MJKA-8	30.2~31.2	1.0	Silicified skarn										
68	7A0068	MJKA-8	31.2~32.2	1.0	Silicified skarn										
69	7A0069	MJKA-8	32.2~33.2	1.0	Silicified skarn										
70	7A0070	MJKA-8	33.2~34.2	1.0	Silicified skarn										
71	7A0071	MJKA-8	34.2~35.2	1.0	Silicified skarn										
72	7A0072	MJKA-8	35.2~36.2	1.0	Silicified skarn										
73	7A0073	MJKA-8	36.2~37.2	1.0	Silicified skarn										
74	7A0074	MJKA-8	37.2~38.2	1.0	Silicified skarn										
75	7A0075	MJKA-8	38.2~39.2	1.0	Silicified skarn										

T: Thin section, P: Polished section, C: Chemical assay analysis,

X: X-ray diffraction analysis, F: Homogenization temperature of fluid inclusion

Ap. 1-2 Core Sample List (4)

Serial No.	Sample No.	Locality		Rock name	Laboratory work						Remarks		
		Drill hole No.	Depth (m)		Length (m)	T	P	C	X	F			
76	7A0076	MJKA-8	39.2~40.2	1.0	Silicified skarn								
77	7A0077	MJKA-8	40.2~41.2	1.0	Silicified skarn								
78	7A0078	MJKA-8	41.2~42.3	1.1	Silicified skarn								
79	7A0079	MJKA-8	42.3~43.3	1.0	Altered skarnized andesite								
80	7A0080	MJKA-8	43.3~44.3	1.0	Altered skarnized andesite								
81	7A0081	MJKA-8	44.3~45.3	1.0	Altered skarnized andesite								44.4m(T)
82	7A0082	MJKA-8	45.3~46.3	1.0	Silicified skarn								
83	7A0083	MJKA-8	46.3~47.3	1.0	Silicified skarn								
84	7A0084	MJKA-8	47.3~48.3	1.0	Silicified skarn								
85	7A0085	MJKA-8	48.3~49.3	1.0	Silicified skarn								
86	7A0086	MJKA-8	49.3~49.9	0.6	Silicified skarn								
87	7A0087	MJKA-8	49.9~51.2	1.3	Silicified skarn								
88	7A0088	MJKA-8	51.2~52.2	1.0	Pyroxene skarn with malachite vein								52.5m(P)
89	7A0089	MJKA-8	52.2~53.4	1.2	Pyroxene skarn								
90	7A0090	MJKA-8	53.4~54.4	1.0	Silicified skarn								
91	7A0091	MJKA-8	54.4~55.4	1.0	Silicified skarn								
92	7A0092	MJKA-8	55.4~56.4	1.0	Silicified skarn								
93	7A0093	MJKA-8	56.4~57.4	1.0	Silicified skarn								
94	7A0094	MJKA-8	57.4~58.4	1.0	Silicified skarn								
95	7A0095	MJKA-8	58.4~59.4	1.0	Silicified skarn								
96	7A0096	MJKA-8	59.4~60.4	1.0	Silicified skarn								
97	7A0097	MJKA-8	60.4~61.4	1.0	Silicified skarn								
98	7A0098	MJKA-8	61.4~62.4	1.0	Silicified skarn								
99	7A0099	MJKA-8	62.4~63.4	1.0	Silicified skarn								
100	7A0100	MJKA-8	63.4~64.4	1.0	Silicified skarn								

T: Thin section, P: Polished section, C: Chemical assay analysis,  
X: X-ray diffraction analysis, F: Homogenization temperature of fluid inclusion

Apx. 1-2 Core Sample List (5)

Serial No.	Sample No.	Locality		Rock name	Laboratory work						Remarks		
		Drill hole No.	Depth (m)		Length (m)	T	P	C	X	F			
101	7A0101	MJKA-8	64.4~65.4	1.0	Silicified skarn								
102	7A0102	MJKA-8	65.4~66.7	1.3	Silicified skarn								
103	7A0103	MJKA-8	66.7~67.8	1.0	Silicified marble								
104	7A0104	MJKA-8	67.8~68.8	1.0	Silicified skarn								
105	7A0105	MJKA-8	68.8~69.8	1.0	Silicified skarn								
106	7A0106	MJKA-8	69.8~70.8	1.0	Silicified skarn								
107	7A0107	MJKA-8	70.8~71.8	1.0	Silicified skarn								
108	7A0108	MJKA-8	71.8~72.8	1.0	Silicified skarn								
109	7A0109	MJKA-8	72.8~73.8	1.0	Silicified skarn								
110	7A0110	MJKA-8	73.8~74.8	1.0	Silicified skarn								
111	7A0111	MJKA-8	74.8~75.8	1.0	Silicified skarn								
112	7A0112	MJKA-8	75.8~76.8	1.0	Weak silicified marble								
113	7A0113	MJKA-8	76.8~77.8	1.0	Weak silicified marble								
114	7A0114	MJKA-8	77.8~78.8	1.0	Weak silicified marble								
115	7A0115	MJKA-8	78.8~79.8	1.0	Weak silicified marble								
116	7A0116	MJKA-8	79.8~80.8	1.0	Weak silicified marble								
117	7A0117	MJKA-8	80.8~81.8	1.0	Weak silicified marble								
118	7A0118	MJKA-8	81.8~82.8	1.0	Weak silicified marble								
119	7A0119	MJKA-8	82.8~83.6	0.8	Weak silicified marble								
120	7A0120	MJKA-8	83.6~84.3	0.7	Shear with clay								84.2m(X)
121	7A0121	MJKA-8	84.3~85.3	1.0	Weak silicified marble								
122	7A0122	MJKA-8	85.3~86.3	1.0	Weak silicified marble								
123	7A0123	MJKA-8	86.3~87.3	1.0	Weak silicified marble								
124	7A0124	MJKA-8	87.3~88.3	1.0	Weak silicified marble								
125	7A0125	MJKA-8	88.3~89.3	1.0	Weak silicified marble								

T: Thin section, P: Polished section, C: Chemical assay analysis,

X: X-ray diffraction analysis, F: Homogenization temperature of fluid inclusion

Ap. 1-2 Core Sample List (6)

Serial No.	Sample No.	Locality		Rock name	Laboratory work						Remarks		
		Drill hole No.	Depth (m)		Length (m)	T	P	C	X	F			
126	7A0126	MJKA-8	89.3~90.3	1.0	Weak silicified marble				○				
127	7A0127	MJKA-8	90.3~91.3	1.0	Weak silicified marble				○				
128	7A0128	MJKA-8	91.3~92.3	1.0	Weak silicified marble				○				
129	7A0129	MJKA-8	92.3~93.3	1.0	Weak silicified marble				○				
130	7A0130	MJKA-8	93.3~94.3	1.0	Weak silicified marble				○				
131	7A0131	MJKA-8	94.3~95.3	1.0	Weak silicified marble				○				
132	7A0132	MJKA-8	95.3~96.3	1.0	Weak silicified marble				○				
133	7A0133	MJKA-8	96.3~97.3	1.0	Weak silicified marble				○				
134	7A0134	MJKA-8	97.3~98.3	1.0	Weak silicified marble				○				
135	7A0135	MJKA-8	98.3~99.3	1.0	Weak silicified marble				○				
136	7A0136	MJKA-8	99.3~100.3	1.0	Weak silicified marble with quartz v				○			○	99.5m(F)
137	7A0137	MJKA-8	100.3~101.1	0.8	Weak silicified marble				○				
138	7A0138	MJKA-10	37.5~38.5	1.0	Wollastonite skarn				○				
139	7A0139	MJKA-10	38.5~39.5	1.0	Wollastonite skarn				○				
140	7A0140	MJKA-10	39.5~40.5	1.0	Wollastonite skarn				○				
141	7A0141	MJKA-10	40.5~41.5	1.0	Wollastonite skarn				○				
142	7A0142	MJKA-10	41.5~42.5	1.0	Wollastonite skarn				○				41.7m(T)
143	7A0143	MJKA-10	42.5~43.5	1.0	Wollastonite skarn				○				
144	7A0144	MJKA-10	43.5~44.1	0.6	Wollastonite skarn				○				
145	7A0145	MJKA-10	44.1~45.1	1.0	Pyroxene skarn				○				
146	7A0146	MJKA-10	45.1~46.15	1.05	Pyroxene skarn				○				
147	7A0147	MJKA-10	46.15~47.15	1.0	Silicified skarn				○				
148	7A0148	MJKA-10	47.15~48.15	1.0	Silicified skarn				○				
149	7A0149	MJKA-10	48.15~49.15	1.0	Silicified skarn				○				
150	7A0150	MJKA-10	49.15~50.15	1.0	Wollastonite skarn				○				

T: Thin section, P: Polished section, C: Chemical assay analysis.

X: X-ray diffraction analysis, F: Homogenization temperature of fluid inclusion

Ap. 1-2 Core Sample List (7)

Serial No.	Sample No.	Locality			Rock name	Laboratory work						Remarks	
		Drill hole No.	Depth (m)	Length (m)		T	P	C	X	F			
151	7A0151	MJKA-10	50.15~51.15	1.0	Silicified skarn								
152	7A0152	MJKA-10	51.15~52.15	1.0	Silicified skarn								
153	7A0153	MJKA-10	52.15~53.5	1.35	Silicified skarn								
154	7A0154	MJKA-10	53.5~55.0	1.5	Pyroxene wollastonite skarn								
155	7A0155	MJKA-10	55.0~56.0	1.0	Pyroxene wollastonite skarn								
156	7A0156	MJKA-10	56.0~56.95	0.95	Pyroxene wollastonite skarn								
157	7A0157	MJKA-10	56.95~57.95	1.0	Pyroxene wollastonite skarn								
158	7A0158	MJKA-10	57.95~58.5	0.55	Silicified epidote skarn								
159	7A0159	MJKA-10	58.5~59.5	1.0	Pyroxene wollastonite skarn								
160	7A0160	MJKA-10	59.5~60.5	1.0	Pyroxene wollastonite skarn								
161	7A0161	MJKA-10	60.5~61.5	1.0	Pyroxene wollastonite skarn								
162	7A0162	MJKA-10	61.5~62.5	1.0	Pyroxene wollastonite skarn								
163	7A0163	MJKA-10	62.5~63.5	1.0	Silicified skarn								
164	7A0164	MJKA-10	63.5~64.5	1.0	Silicified skarn								
165	7A0165	MJKA-10	64.5~65.5	1.0	Silicified skarn								
166	7A0166	MJKA-10	65.5~66.5	1.0	Silicified skarn								
167	7A0167	MJKA-10	66.5~67.5	1.0	Silicified skarn								
168	7A0168	MJKA-10	67.5~68.4	0.9	Silicified skarn								
169	7A0169	MJKA-10	68.4~68.8	0.4	Epidote skarn								
170	7A0170	MJKA-10	68.8~69.8	1.0	Silicified skarn								
171	7A0171	MJKA-10	69.8~70.8	1.0	Silicified skarn								
172	7A0172	MJKA-10	70.8~71.8	1.0	Silicified skarn								
173	7A0173	MJKA-10	71.8~72.8	1.0	Silicified skarn								
174	7A0174	MJKA-10	72.8~73.5	0.7	Silicified skarn								
175	7A0175	MJKA-10	75.0~76.0	1.0	Silicified skarn								

T: Thin section, P: Polished section, C: Chemical assay analysis,

X: X-ray diffraction analysis, F: Homogenization temperature of fluid inclusion



Ap. 1-2 Core Sample List (8)

Serial No.	Sample No.	Locality		Rock name	Laboratory work						Remarks	
		Drill hole No.	Depth (m)		Length (m)	T	P	C	X	F		
176	7A0176	MJKA-10	76.0~77.0	1.0	Silicified skarn							
177	7A0177	MJKA-10	77.0~78.0	1.0	Silicified skarn							
178	7A0178	MJKA-10	78.0~79.0	1.0	Silicified skarn							
179	7A0179	MJKA-10	79.0~80.0	1.0	Silicified skarn							
180	7A0180	MJKA-10	80.0~81.0	1.0	Silicified skarn							
181	7A0181	MJKA-10	81.0~82.0	1.0	Silicified skarn							
182	7A0182	MJKA-10	82.0~83.0	1.0	Silicified skarn							
183	7A0183	MJKA-10	83.0~84.0	1.0	Silicified skarn							
184	7A0184	MJKA-10	84.0~85.0	1.0	Silicified skarn							
185	7A0185	MJKA-10	85.0~86.0	1.0	Silicified skarn							
186	7A0186	MJKA-10	86.0~87.0	1.0	Silicified skarn							
187	7A0187	MJKA-10	87.0~88.0	1.0	Silicified skarn							
188	7A0188	MJKA-10	88.0~89.0	1.0	Silicified skarn							
189	7A0189	MJKA-10	89.0~89.8	0.8	Silicified skarn							
190	7A0190	MJKA-10	89.8~90.8	1.0	Weak silicified marble							
191	7A0191	MJKA-10	90.8~91.8	1.0	Weak silicified marble							
192	7A0192	MJKA-10	91.8~92.8	1.0	Weak silicified marble							
193	7A0193	MJKA-10	92.8~93.8	1.0	Weak silicified marble							
194	7A0194	MJKA-10	93.8~94.8	1.0	Weak silicified marble							
195	7A0195	MJKA-10	94.8~95.8	1.0	Weak silicified marble							
196	7A0196	MJKA-10	95.8~96.8	1.0	Weak silicified marble							
197	7A0197	MJKA-10	96.8~97.8	1.0	Weak silicified marble							
198	7A0198	MJKA-10	97.8~98.8	1.0	Weak silicified marble							
199	7A0199	MJKA-10	98.8~99.8	1.0	Weak silicified marble							
200	7A0200	MJKA-10	99.8~100.8	1.0	Weak silicified marble							

T: Thin section, P: Polished section, C: Chemical assay analysis,

X: X-ray diffraction analysis, F: Homogenization temperature of fluid inclusion

Ap. 1-2 Core Sample List (9)

Serial No.	Sample No.	Locality		Rock name	Laboratory work						Remarks	
		Drill hole No.	Depth (m)		Length (m)	T	P	C	X	F		
201	7A0201	MJKA-10	100.8~101.8	1.0	Weak silicified marble							
202	7A0202	MJKA-10	101.8~102.8	1.0	Weak silicified marble							
203	7A0203	MJKA-10	102.8~103.8	1.0	Weak silicified marble							
204	7A0204	MJKA-10	103.8~104.8	1.0	Weak silicified marble							
205	7A0205	MJKA-10	104.8~105.8	1.0	Weak silicified marble							
206	7A0206	MJKA-10	105.8~106.8	1.0	Weak silicified marble							
207	7A0207	MJKA-10	106.8~107.8	1.0	Weak silicified marble							
208	7A0208	MJKA-10	107.8~108.8	1.0	Weak silicified marble							
209	7A0209	MJKA-10	108.8~109.8	1.0	Weak silicified marble							
210	7A0210	MJKA-10	109.8~110.8	1.0	Weak silicified marble							
211	7A0211	MJKA-10	110.8~111.9	1.0	Weak silicified marble							
212	7A0212	MJKA-9	4.9~5.9	1.0	Silicified skarn							
213	7A0213	MJKA-9	5.9~6.9	1.0	Silicified skarn							
214	7A0214	MJKA-9	6.9~7.9	1.0	Silicified skarn							
215	7A0215	MJKA-9	7.9~8.8	0.9	Silicified skarn							
216	7A0216	MJKA-9	8.8~10.0	1.2	Silicified skarn							
217	7A0217	MJKA-9	10.0~11.0	1.0	Silicified skarn							
218	7A0218	MJKA-9	11.0~12.0	1.0	Pyroxene skarn							
219	7A0219	MJKA-9	12.0~12.9	0.9	Pyroxene skarn							
220	7A0220	MJKA-9	12.9~13.9	0.7	Silicified skarn							
221	7A0221	MJKA-9	13.9~14.9	1.0	Silicified skarn							
222	7A0222	MJKA-9	14.9~15.9	1.0	Silicified skarn							
223	7A0223	MJKA-9	15.9~16.9	1.0	Silicified skarn							
224	7A0224	MJKA-9	16.9~17.9	1.0	Silicified skarn							
225	7A0225	MJKA-9	17.9~18.9	1.0	Silicified skarn							

T: Thin section, P: Polished section, C: Chemical assay analysis.

X: X-ray diffraction analysis, F: Homogenization temperature of fluid inclusion

Ap. 1-2 Core Sample List (10)

Serial No.	Sample No.	Locality		Rock name	Laboratory work						Remarks	
		Drill hole No.	Depth (m)		Length (m)	T	P	C	X	F		
226	7A0226	MJKA-9	18.9~19.9	1.0	Silicified skarn							
227	7A0227	MJKA-9	19.9~20.9	1.0	Silicified skarn							
228	7A0228	MJKA-9	20.9~21.9	1.0	Silicified skarn							21.0m(T)
229	7A0229	MJKA-9	21.9~22.9	1.0	Silicified skarn							
230	7A0230	MJKA-9	22.9~23.9	1.0	Silicified skarn							
231	7A0231	MJKA-9	23.9~24.9	1.0	Silicified skarn							
232	7A0232	MJKA-9	24.9~25.9	1.0	Silicified skarn							
233	7A0233	MJKA-9	25.9~27.3	1.4	Silicified skarn							
234	7A0234	MJKA-9	27.3~28.3	1.0	Chloritized granodiorite							
235	7A0235	MJKA-9	34.9~35.9	1.0	Chloritized granodiorite							
236	7A0236	MJKA-9	35.9~36.9	1.0	Pyroxene skarn							
237	7A0237	MJKA-9	36.9~37.9	1.0	Silicified skarn							
238	7A0238	MJKA-9	37.9~38.9	1.0	Silicified skarn							
239	7A0239	MJKA-9	38.9~39.9	1.0	Silicified skarn							
240	7A0240	MJKA-9	39.9~40.9	1.0	Silicified skarn							
241	7A0241	MJKA-9	40.9~41.9	1.0	Silicified skarn							
242	7A0242	MJKA-9	41.9~42.9	1.0	Silicified skarn							
243	7A0243	MJKA-9	42.9~43.9	1.0	Silicified skarn							
244	7A0244	MJKA-9	43.9~44.9	1.0	Silicified skarn							
245	7A0245	MJKA-9	44.9~45.9	1.0	Silicified skarn							
246	7A0246	MJKA-9	45.9~46.9	1.0	Silicified skarn							
247	7A0247	MJKA-9	46.9~47.9	1.0	Silicified skarn							
248	7A0248	MJKA-9	47.9~48.9	1.0	Silicified skarn							
249	7A0249	MJKA-9	48.9~49.9	1.0	Silicified skarn							
250	7A0250	MJKA-9	49.9~50.9	1.0	Silicified skarn							

T: Thin section, P: Polished section, C: Chemical assay analysis,

X: X-ray diffraction analysis, F: Homogenization temperature of fluid inclusion

Ap. 1-2 Core Sample List (11)

Serial No.	Sample No.	Locality		Rock name	Laboratory work						Remarks		
		Drill hole No.	Depth (m)		Length (m)	T	P	C	X	F			
251	7A0251	MJKA-9	50.9~51.6	0.7	Silicified skarn								
252	7A0252	MJKA-9	51.6~52.6	1.0	Silicified skarn								
253	7A0253	MJKA-9	52.6~54.0	1.4	Pyroxene wollastonite skarn								
254	7A0254	MJKA-9	54.0~55.0	1.0	Pyroxene skarn								
255	7A0255	MJKA-9	55.0~56.0	1.0	Pyroxene skarn								
256	7A0256	MJKA-9	56.0~57.0	1.0	Pyroxene skarn								
257	7A0257	MJKA-9	57.0~58.0	1.0	Pyroxene skarn								
258	7A0258	MJKA-9	58.0~59.0	1.0	Pyroxene skarn								
259	7A0259	MJKA-9	59.0~60.0	1.0	Pyroxene skarn with py-quartz v								60.0m(P, F)
260	7A0260	MJKA-9	60.0~61.0	1.0	Pyroxene skarn								
261	7A0261	MJKA-9	61.0~62.0	1.0	Pyroxene skarn								
262	7A0262	MJKA-9	62.0~63.0	1.0	Pyroxene skarn								
263	7A0263	MJKA-9	63.0~64.0	1.0	Pyroxene skarn								
264	7A0264	MJKA-9	64.0~65.0	1.0	Pyroxene skarn								
265	7A0265	MJKA-9	65.0~66.0	1.0	Pyroxene skarn								
266	7A0266	MJKA-9	66.0~67.0	1.0	Pyroxene skarn								
267	7A0267	MJKA-9	67.0~68.0	1.0	Pyroxene skarn								
268	7A0268	MJKA-9	68.0~69.0	1.0	Pyroxene skarn								
269	7A0269	MJKA-9	69.0~70.0	1.0	Pyroxene skarn								
270	7A0270	MJKA-9	70.0~71.4	1.4	Pyroxene skarn								
271	7A0271	MJKA-9	71.4~72.4	1.0	Limonitized granodiorite								
272	7A0272	MJKA-9	72.4~73.4	1.0	Limonitized granodiorite								
273	7A0273	MJKA-9	73.4~73.8	0.4	Pyroxene skarn								
274	7A0274	MJKA-9	74.0~75.0	1.0	Epidote skarn								
275	7A0275	MJKA-9	75.0~76.1	1.1	Lamprophyre								

T: Thin section, P: Polished section, C: Chemical analysis.

X: X-ray diffraction analysis, F: Homogenization temperature of fluid inclusion

Ap. 1-2 Core Sample List (12)

Serial No.	Sample No.	Locality		Rock name	Laboratory work						Remarks	
		Drill hole No.	Depth (m)		Length (m)	T	P	C	X	F		
276	7A0276	MJKA-9	76.1~77.1	1.0	Epidote skarn							
277	7A0277	MJKA-9	77.1~78.1	1.0	Epidote skarn							
278	7A0278	MJKA-9	78.1~79.1	1.0	Mozodiorite							
279	7A0279	MJKA-9	84.1~85.1	1.0	Mozodiorite	○						84.6m(T)
280	7A0280	MJKA-9	85.1~86.4	1.3	Pyroxene skarn with pyrite imp.			○				85.3m(P)
281	7A0281	MJKA-9	86.4~87.4	1.0	Granodiorite							
282	7A0282	MJKA-11	0.5~1.0	0.5	Silicified skarn							
283	7A0283	MJKA-11	1.0~2.0	1.0	Silicified skarn							
284	7A0284	MJKA-11	2.0~3.0	1.0	Silicified skarn							
285	7A0285	MJKA-11	3.0~4.0	1.0	Silicified skarn							
286	7A0286	MJKA-11	4.0~5.0	1.0	Silicified skarn							
287	7A0287	MJKA-11	5.0~6.0	1.0	Silicified skarn							
288	7A0288	MJKA-11	6.0~7.0	1.0	Silicified skarn							
289	7A0289	MJKA-11	7.0~8.0	1.0	Silicified skarn							
290	7A0290	MJKA-11	8.0~9.0	1.0	Silicified skarn							
291	7A0291	MJKA-11	9.0~10.0	1.0	Silicified skarn							
292	7A0292	MJKA-11	10.0~11.0	1.0	Silicified skarn							
293	7A0293	MJKA-11	11.0~12.4	1.4	Silicified skarn							
294	7A0294	MJKA-11	12.4~13.0	0.6	Pyroxene skarn							
295	7A0295	MJKA-11	13.0~14.0	1.0	Silicified skarn							
296	7A0296	MJKA-11	14.0~15.0	1.0	Silicified skarn							
297	7A0297	MJKA-11	15.0~16.0	1.0	Silicified skarn							
298	7A0298	MJKA-11	16.0~17.0	1.0	Silicified skarn							
299	7A0299	MJKA-11	17.0~18.0	1.0	Silicified skarn							
300	7A0300	MJKA-11	18.0~19.0	1.0	Silicified skarn							

T: Thin section, P: Polished section, C: Chemical assay analysis,

X: X-ray diffraction analysis, F: Homogenization temperature of fluid inclusion

Apx. 1-2 Core Sample List (13)

Serial No.	Sample No.	Locality		Rock name	Laboratory work						Remarks	
		Drill hole No.	Depth (m)		Length (m)	T	P	C	X	F		
301	7A0301	MJKA-11	19.0~20.0	1.0	Silicified skarn							
302	7A0302	MJKA-11	20.0~21.0	1.0	Silicified skarn							
303	7A0303	MJKA-11	21.0~22.0	1.0	Silicified skarn							
304	7A0304	MJKA-11	22.0~23.0	1.0	Silicified skarn							
305	7A0305	MJKA-11	23.0~24.0	1.0	Silicified skarn							
306	7A0306	MJKA-11	24.0~25.0	1.0	Silicified skarn							
307	7A0307	MJKA-11	25.0~26.0	1.0	Silicified skarn							
308	7A0308	MJKA-11	26.0~27.0	1.0	Silicified skarn							
309	7A0309	MJKA-11	27.0~27.9	0.9	Silicified skarn							
310	7A0310	MJKA-11	31.8~32.8	1.0	Chloritized granodiorite							
311	7A0311	MJKA-11	32.8~33.8	1.0	Silicified skarn							
312	7A0312	MJKA-11	33.8~34.8	1.0	Silicified skarn							
313	7A0313	MJKA-11	34.8~35.8	1.0	Silicified skarn							
314	7A0314	MJKA-11	35.8~36.8	1.0	Silicified skarn							
315	7A0315	MJKA-11	36.8~37.8	1.0	Silicified skarn							
316	7A0316	MJKA-11	37.8~38.8	1.0	Silicified skarn							
317	7A0317	MJKA-11	38.8~39.8	1.0	Silicified skarn							
318	7A0318	MJKA-11	39.8~40.8	1.0	Silicified skarn							
319	7A0319	MJKA-11	40.8~41.8	1.0	Silicified skarn							
320	7A0320	MJKA-11	41.8~42.8	1.0	Silicified skarn							
321	7A0321	MJKA-11	42.8~43.8	1.0	Silicified skarn							
322	7A0322	MJKA-11	43.8~44.8	1.0	Silicified skarn							
323	7A0323	MJKA-11	44.8~45.8	1.0	Silicified skarn							
324	7A0324	MJKA-11	45.8~46.8	1.0	Silicified skarn							
325	7A0325	MJKA-11	46.8~47.8	1.0	Silicified skarn							

T: Thin section, P: Polished section, C: Chemical assay analysis,

X: X-ray diffraction analysis, F: Homogenization temperature of fluid inclusion

Ap. 1-2 Core Sample List (14)

Serial No.	Sample No.	Locality		Rock name	Laboratory work						Remarks	
		Drill hole No.	Depth (m)		Length (m)	T	P	C	X	F		
326	7A0326	MJKA-11	47.8~48.8	1.0	Silicified skarn			○				
327	7A0327	MJKA-11	48.8~49.8	1.0	Silicified skarn with quartz vein			○			○	49.3m(F)
328	7A0328	MJKA-11	49.8~50.8	1.0	Silicified skarn			○				
329	7A0329	MJKA-11	50.8~51.8	1.0	Silicified skarn			○				
330	7A0330	MJKA-11	51.8~52.8	1.0	Silicified skarn			○				
331	7A0331	MJKA-11	52.8~54.0	1.2	Silicified skarn			○				
332	7A0332	MJKA-11	54.0~55.0	1.0	Lamprophyre	○						55.0m(T)
333	7A0333	MJKA-6	0~1.0	1.0	Wollastonite pyroxene skarn			○				
334	7A0334	MJKA-6	1.0~2.0	1.0	Wollastonite pyroxene skarn			○				
335	7A0335	MJKA-6	2.0~3.0	1.0	Wollastonite pyroxene skarn			○				
336	7A0336	MJKA-6	3.0~4.0	1.0	Quartz pyroxene wollastonite skarn			○				
337	7A0337	MJKA-6	4.0~5.0	1.0	Quartz pyroxene wollastonite skarn			○				
338	7A0338	MJKA-6	5.0~6.0	1.0	Quartz pyroxene wollastonite skarn			○				
339	7A0339	MJKA-6	6.0~7.0	1.0	Quartz pyroxene wollastonite skarn			○				
340	7A0340	MJKA-6	7.0~8.0	1.0	Quartz pyroxene wollastonite skarn			○				
341	7A0341	MJKA-6	8.0~9.0	1.0	Quartz pyroxene wollastonite skarn			○				
342	7A0342	MJKA-6	9.0~10.0	1.0	Quartz pyroxene wollastonite skarn			○				
343	7A0343	MJKA-6	10.0~11.0	1.0	Quartz pyroxene wollastonite skarn			○				
344	7A0344	MJKA-6	11.0~12.0	1.0	Quartz pyroxene wollastonite skarn			○				
345	7A0345	MJKA-6	12.0~12.5	0.5	Quartz pyroxene wollastonite skarn			○				
346	7A0346	MJKA-6	12.5~13.5	1.0	Granodiorite porphyry			○				
347	7A0347	MJKA-6	13.5~14.4	0.9	Granodiorite porphyry			○				
348	7A0348	MJKA-6	14.4~15.6	1.2	Pyroxene wollastonite skarn			○				
349	7A0349	MJKA-6	15.6~16.0	0.4	Granodiorite porphyry			○				
350	7A0350	MJKA-6	16.0~16.5	0.5	Brecciated shear zone			○		○		16.3m(X)

T: Thin section, P: Polished section, C: Chemical assay analysis,

X: X-ray diffraction analysis, F: Homogenization temperature of fluid inclusion

Ap. 1-2 Core Sample List (15)

Serial No.	Sample No.	Locality		Rock name	Laboratory work						Remarks		
		Drill hole No.	Depth (m)		Length (m)	T	P	C	X	F			
351	7A0351	MJKA-6	16.5~17.5	1.0	Marble								
352	7A0352	MJKA-6	20.5~21.5	1.0	Marble								
353	7A0353	MJKA-6	21.5~22.5	1.4	Pyroxene wollastonite skarn								
354	7A0354	MJKA-6	22.5~23.5	1.0	Pyroxene wollastonite skarn								
355	7A0355	MJKA-6	23.5~24.5	1.0	Pyroxene wollastonite skarn								
356	7A0356	MJKA-6	24.5~25.5	1.0	Pyroxene wollastonite skarn								
357	7A0357	MJKA-6	25.5~26.5	1.0	Pyroxene wollastonite skarn								
358	7A0358	MJKA-6	26.5~26.9	0.4	Brecciated zone								
359	7A0359	MJKA-6	26.9~27.7	0.8	Pyroxene wollastonite skarn								
360	7A0360	MJKA-6	27.7~29.2	1.5	Silicified skarn								
361	7A0361	MJKA-6	29.2~30.2	1.0	Pyroxene wollastonite skarn								
362	7A0362	MJKA-6	30.2~31.2	1.0	Pyroxene wollastonite skarn								
363	7A0363	MJKA-6	31.2~32.7	1.5	Pyroxene wollastonite skarn								
364	7A0364	MJKA-6	32.7~33.95	1.3	Pyroxene skarn								
365	7A0365	MJKA-6	33.95~35.5	1.55	Granodiorite porphyry								
366	7A0366	MJKA-6	35.5~36.5	1.0	Quartz pyroxene wollastonite skarn								
367	7A0367	MJKA-6	36.5~37.5	1.0	Quartz pyroxene wollastonite skarn								
368	7A0368	MJKA-6	37.5~38.5	1.0	Quartz pyroxene wollastonite skarn								
369	7A0369	MJKA-6	38.5~39.5	1.0	Quartz pyroxene wollastonite skarn								
370	7A0370	MJKA-6	39.5~40.5	1.4	Quartz pyroxene wollastonite skarn								
371	7A0371	MJKA-6	40.5~41.5	1.0	Quartz pyroxene wollastonite skarn								
372	7A0372	MJKA-6	41.5~42.7	1.2	Quartz pyroxene wollastonite skarn								
373	7A0373	MJKA-6	42.7~44.0	1.3	Silicified skarn								
374	7A0374	MJKA-6	44.0~45.0	1.0	Quartz pyroxene wollastonite skarn								
375	7A0375	MJKA-6	45.0~46.0	1.0	Quartz pyroxene wollastonite skarn								

T: Thin section, P: Polished section, C: Chemical assay analysis,

X: X-ray diffraction analysis, F: Homogenization temperature of fluid inclusion



Ap. 1-2 Core Sample List (16)

Serial No.	Sample No.	Locality		Rock name	Laboratory work						Remarks
		Drill hole No.	Depth (m)		Length (m)	T	P	C	X	F	
376	7A0376	MJKA-6	46.0~47.0	1.0	Quartz pyroxene wollastonite skarn			○			
377	7A0377	MJKA-6	47.0~48.0	1.0	Quartz pyroxene wollastonite skarn			○			
378	7A0378	MJKA-6	48.0~49.0	1.0	Quartz pyroxene wollastonite skarn			○			
379	7A0379	MJKA-6	49.0~50.1	1.1	Quartz pyroxene wollastonite skarn			○		○	49.2m(F), quartz v
380	7A0380	MJKA-6	50.1~51.0	0.9	Silicified skarn			○			
381	7A0381	MJKA-6	51.0~51.7	0.7	Pyroxene skarn			○			
382	7A0382	MJKA-6	51.7~52.8	1.1	Chloritized granodiorite			○			
383	7A0383	MJKA-6	61.35	0.1	Shear zone				○		61.35m(X)
384	7A0384	MJKA-9	140.7	0.1	Arsenopyrite-quartz vein			○			140.7m(P)
385	7A0385	MJKA-9	173.8	0.1	Granodiorite porphyry	○					173.8m(T)
386	7A0386	MJKA-11	28.0	0.1	Shear zone with clay				○		28.0m(X)
387	7A0387	MJKA-1	43.6	0.1	Brecciated granodiorite	○					43.6m(T)
388	7A0388	MJKA-1	44.7	0.1	Shear zone with clay				○		44.7m(X)
389	7A0389	MJKA-1	58.6~59.6	1.0	Granodiorite with clay				○		59.6m(X)
390	7A0390	MJKA-1	59.6~60.6	1.0	Chloritized pyroxene skarnized rock				○		
391	7A0391	MJKA-1	60.6~62.0	1.4	Chloritized pyroxene skarnized rock				○		
392	7A0392	MJKA-1	62.0~63.0	1.0	Granodiorite				○		
393	7A0393	MJKA-1	63.0~64.0	1.0	Granodiorite				○		
394	7A0394	MJKA-1	64.0~65.0	1.0	Granodiorite				○		
395	7A0395	MJKA-1	65.0~66.0	1.0	Granodiorite				○		
396	7A0396	MJKA-1	66.0~67.0	1.0	Granodiorite				○		
397	7A0397	MJKA-1	67.0~68.0	1.0	Granodiorite				○		
398	7A0398	MJKA-1	68.0~69.1	1.1	Granodiorite				○		
399	7A0399	MJKA-1	69.1~70.1	1.0	Silicified wollastonite pyroxene skarn				○		
400	7A0400	MJKA-1	70.1~71.1	1.0	Silicified wollastonite pyroxene skarn				○		

T: Thin section, P: Polished section, C: Chemical assay analysis.

X: X-ray diffraction analysis, F: Homogenization temperature of fluid inclusion

Apx. 1-2 Core Sample List (17)

Serial No.	Sample No.	Locality		Rock name	Laboratory work						Remarks	
		Drill hole No.	Depth (m)		Length (m)	T	P	C	X	F		
401	7A0401	MJKA-1	71.1~72.1	1.0	Silicified wollastonite pyroxene skarn							
402	7A0402	MJKA-1	72.1~73.1	1.0	Silicified wollastonite pyroxene skarn							
403	7A0403	MJKA-1	73.1~74.1	1.0	Silicified wollastonite pyroxene skarn							73.4m(P)
404	7A0404	MJKA-1	74.1~75.1	1.0	Silicified wollastonite pyroxene skarn							
405	7A0405	MJKA-1	75.1~76.1	1.0	Silicified wollastonite pyroxene skarn							
406	7A0406	MJKA-1	76.1~77.1	1.0	Silicified wollastonite pyroxene skarn							
407	7A0407	MJKA-1	77.1~78.1	1.0	Silicified wollastonite pyroxene skarn							
408	7A0408	MJKA-1	78.1~79.1	1.0	Silicified wollastonite pyroxene skarn							
409	7A0409	MJKA-1	79.1~80.1	1.0	Silicified wollastonite pyroxene skarn							
410	7A0410	MJKA-1	80.1~81.1	1.0	Silicified wollastonite pyroxene skarn							
411	7A0411	MJKA-1	81.1~82.1	1.0	Silicified wollastonite pyroxene skarn							
412	7A0412	MJKA-1	82.1~83.1	1.0	Silicified wollastonite pyroxene skarn							
413	7A0413	MJKA-1	83.1~84.1	1.0	Silicified wollastonite pyroxene skarn							
414	7A0414	MJKA-1	84.1~85.1	1.0	Silicified wollastonite pyroxene skarn							
415	7A0415	MJKA-1	85.1~86.1	1.0	Silicified wollastonite pyroxene skarn							
416	7A0416	MJKA-1	86.1~87.1	1.0	Silicified wollastonite pyroxene skarn							
417	7A0417	MJKA-1	87.1~88.1	1.0	Silicified wollastonite pyroxene skarn							
418	7A0418	MJKA-1	88.1~89.1	1.0	Silicified wollastonite pyroxene skarn							
419	7A0419	MJKA-1	89.1~90.1	1.0	Silicified wollastonite pyroxene skarn							
420	7A0420	MJKA-1	90.1~91.1	1.0	Silicified wollastonite pyroxene skarn							
421	7A0421	MJKA-1	91.8~92.0	0.9	Silicified wollastonite pyroxene skarn							
422	7A0422	MJKA-1	92.0~93.0	1.0	Limonitized silicified skarn							
423	7A0423	MJKA-1	93.0~94.0	1.0	Limonitized silicified skarn							
424	7A0424	MJKA-1	94.0~95.0	1.0	Limonitized silicified skarn							
425	7A0425	MJKA-1	95.0~96.0	1.0	Limonitized silicified skarn							

T: Thin section, P: Polished section, C: Chemical assay analysis.

X: X-ray diffraction analysis, F: Homogenization temperature of fluid inclusion

Ap. 1-2 Core Sample List (18)

Serial No.	Sample No.	Locality		Rock name	Laboratory work						Remarks	
		Drill hole No.	Depth (m)		Length (m)	T	P	C	X	F		
426	7A0426	MJKA-1	96.0~96.7	0.7	Silicified skarn							
427	7A0427	MJKA-1	96.7~97.7	1.0	Silicified skarn							
428	7A0428	MJKA-1	97.7~99.3	1.6	Silicified skarn							
429	7A0429	MJKA-1	99.3~100.3	1.0	Limonitized silicified skarn							
430	7A0430	MJKA-1	100.3~100.9	0.6	Limonitized silicified skarn							
431	7A0431	MJKA-1	100.9~101.9	1.0	Silicified skarn							
432	7A0432	MJKA-1	101.9~102.9	1.0	Silicified skarn							
433	7A0433	MJKA-1	102.9~103.9	1.0	Silicified skarn							
434	7A0434	MJKA-1	103.9~104.9	1.0	Silicified skarn							
435	7A0435	MJKA-1	104.9~105.9	1.0	Silicified skarn							
436	7A0436	MJKA-1	105.9~107.1	1.2	Silicified skarn							
437	7A0437	MJKA-1	107.1~108.1	1.0	Limonitized silicified skarn							
438	7A0438	MJKA-1	108.1~109.1	1.0	Limonitized silicified skarn							
439	7A0439	MJKA-1	109.1~110.1	1.0	Limonitized silicified skarn							
440	7A0440	MJKA-1	110.1~111.1	1.0	Limonitized silicified skarn							
441	7A0441	MJKA-1	111.1~112.4	1.3	Limonitized silicified skarn							
442	7A0442	MJKA-1	112.4~113.4	1.0	Silicified skarn							
443	7A0443	MJKA-1	113.4~114.4	1.0	Silicified skarn							
444	7A0444	MJKA-1	114.4~115.4	1.0	Silicified skarn							
445	7A0445	MJKA-1	115.4~116.4	1.0	Silicified skarn							
446	7A0446	MJKA-1	116.4~117.4	1.0	Silicified skarn							
447	7A0447	MJKA-1	117.4~118.4	1.0	Silicified skarn							
448	7A0448	MJKA-1	118.4~119.4	1.0	Silicified skarn							
449	7A0449	MJKA-1	119.4~120.8	1.4	Silicified skarn							
450	7A0450	MJKA-1	120.8~121.8	1.0	Limonitized silicified skarn							

T: Thin section, P: Polished section, C: Chemical assay analysis.

X: X-ray diffraction analysis, F: Homogenization temperature of fluid inclusion

Ap. 1-2 Core Sample List (19)

Serial No.	Sample No.	Locality		Rock name	Laboratory work						Remarks	
		Drill hole No.	Depth (m)		Length (m)	T	P	C	X	F		
451	7A0451	MJKA-1	121.8~123.3	1.5	Limonitized silicified skarn							
452	7A0452	MJKA-1	125.3~126.3	1.0	Limonitized silicified skarn							
453	7A0453	MJKA-1	126.3~127.3	1.0	Limonitized silicified skarn							
454	7A0454	MJKA-1	127.3~128.3	1.0	Limonitized silicified skarn							
455	7A0455	MJKA-1	128.3~129.3	1.0	Limonitized silicified skarn							
456	7A0456	MJKA-1	129.3~130.3	1.0	Limonitized silicified skarn							
457	7A0457	MJKA-1	130.3~131.2	0.9	Limonitized silicified skarn							
458	7A0458	MJKA-1	131.2~132.2	1.0	Limonitized chloritized granodiorite							
459	7A0459	MJKA-1	132.2~133.2	1.0	Limonitized chloritized granodiorite							
460	7A0460	MJKA-1	133.2~134.2	1.0	Limonitized chloritized granodiorite							
461	7A0461	MJKA-1	134.2~135.2	1.0	Limonitized chloritized granodiorite							
462	7A0462	MJKA-1	135.2~136.2	1.0	Limonitized chloritized granodiorite							
463	7A0463	MJKA-6	52.8~53.5	0.7	Limonitized apite							
464	7A0464	MJKA-6	53.5~54.5	1.0	Chloritized granodiorite							
465	7A0465	MJKA-6	54.5~55.5	1.0	Chloritized granodiorite							
466	7A0466	MJKA-6	55.5~56.5	1.0	Chloritized granodiorite							
467	7A0467	MJKA-6	56.5~57.5	1.0	Chloritized granodiorite							
468	7A0468	MJKA-6	57.5~58.1	0.6	Chloritized granodiorite							
469	7A0469	MJKA-6	58.1~58.9	0.8	Pyroxene skarn							
470	7A0470	MJKA-6	58.9~59.9	1.0	Aplite							
471	7A0471	MJKA-6	59.9~60.9	1.0	Aplite							
472	7A0472	MJKA-6	73.8~74.8	1.0	Chloritized granodiorite							
473	7A0473	MJKA-6	74.8~75.8	1.0	Chloritized granodiorite							
474	7A0474	MJKA-6	75.8~76.8	1.0	Chloritized granodiorite							
475	7A0475	MJKA-6	76.8~77.8	1.0	Chloritized granodiorite							

T: Thin section, P: Polished section, C: Chemical assay analysis,  
X: X-ray diffraction analysis, F: Homogenization temperature of fluid inclusion

Ap. 1-2 Core Sample List (20)

Serial No.	Sample No.	Locality		Rock name	Laboratory work						Remarks		
		Drill hole No.	Depth (m)		Length (m)	T	P	C	X	F			
476	7A0476	MJKA-6	77.8~78.9	1.1	Chloritized pyroxene skarn								
477	7A0477	MJKA-6	78.9~80.5	1.6	Chloritized granodiorite								
478	7A0478	MJKA-6	80.5~81.5	1.0	Chloritized granodiorite								
479	7A0479	MJKA-6	81.5~82.5	1.0	Chloritized granodiorite								
480	7A0480	MJKA-6	82.5~83.5	1.0	Quartz pyroxene skarn								
481	7A0481	MJKA-6	83.5~84.2	0.7	Quartz pyroxene skarn								
482	7A0482	MJKA-6	84.2~85.2	1.0	Quartz pyroxene wollastonite skarn								
483	7A0483	MJKA-6	85.2~86.2	1.0	Quartz pyroxene wollastonite skarn								
484	7A0484	MJKA-6	86.2~87.2	1.0	Quartz pyroxene wollastonite skarn								
485	7A0485	MJKA-6	87.2~88.2	1.0	Quartz pyroxene wollastonite skarn								
486	7A0486	MJKA-6	88.2~89.2	1.0	Quartz pyroxene wollastonite skarn								
487	7A0487	MJKA-6	89.2~90.2	1.0	Quartz pyroxene wollastonite skarn								
488	7A0488	MJKA-6	90.2~91.2	1.0	Silic. brec. pyroxene skarnized rock								
489	7A0489	MJKA-6	91.2~92.2	1.0	Silic. brec. pyroxene skarnized rock								
490	7A0490	MJKA-6	92.2~93.2	1.0	Silic. brec. pyroxene skarnized rock								94.3m(P)
491	7A0491	MJKA-6	93.2~94.4	1.2	Silic. brec. pyroxene skarnized rock								
492	7A0492	MJKA-6	94.4~95.4	1.0	Quartz pyroxene wollastonite skarn								95.6m(T)
493	7A0493	MJKA-6	95.4~96.4	1.0	Quartz pyroxene wollastonite skarn								
494	7A0494	MJKA-6	96.4~97.4	1.0	Quartz pyroxene wollastonite skarn								
495	7A0495	MJKA-6	97.4~98.4	1.0	Quartz pyroxene wollastonite skarn								
496	7A0496	MJKA-6	98.4~99.4	1.0	Quartz pyroxene wollastonite skarn								
497	7A0497	MJKA-6	99.4~100.4	1.0	Quartz pyroxene skarn								
498	7A0498	MJKA-6	100.4~101.4	1.0	Quartz pyroxene skarn								
499	7A0499	MJKA-6	101.4~102.4	1.0	Quartz pyroxene skarn								
500	7A0500	MJKA-6	102.4~103.4	1.0	Quartz pyroxene skarn								

T: Thin section, P: Polished section, C: Chemical assay analysis.

X: X-ray diffraction analysis, F: Homogenization temperature of fluid inclusion

Ap. 1-2 Core Sample List (21)

Serial No.	Sample No.	Locality		Rock name	Laboratory work						Remarks	
		Drill hole No.	Depth (m)		Length (m)	T	P	C	X	F		
501	7A0501	MJKA-6	103.4~104.4	1.0	Quartz pyroxene skarn							103.6m(P)
502	7A0502	MJKA-6	104.4~105.5	1.1	Quartz pyroxene skarn							
503	7A0503	MJKA-6	105.5~106.5	1.0	Aplite							
504	7A0504	MJKA-6	106.5~107.5	1.0	Aplite							
505	7A0505	MJKA-6	107.5~108.5	1.0	Aplite							
506	7A0506	MJKA-6	108.5~109.5	1.0	Aplite							
507	7A0507	MJKA-6	109.5~110.9	1.4	Aplite							
508	7A0508	MJKA-6	110.9~111.9	1.0	Pyroxene skarn with py asp cal vein							111.2m(P)
509	7A0509	MJKA-6	111.9~112.8	0.9	Pyroxene skarn with cp py asp imp.							112.7m(P)
510	7A0510	MJKA-6	112.8~113.8	1.0	Silicified weak skarnized marble							
511	7A0511	MJKA-6	113.8~114.8	1.0	Silicified weak skarnized marble							
512	7A0512	MJKA-6	114.8~115.8	1.0	Silicified weak skarnized marble							
513	7A0513	MJKA-6	115.8~117.0	1.2	Silicified weak skarnized marble							
514	7A0514	MJKA-6	117.0~117.45	0.45	Marble							
515	7A0515	MJKA-6	117.45~117.9	0.45	Quartz pyroxene wollastonite skarn							
516	7A0516	MJKA-6	117.9~118.9	1.0	Silicified skarnized marble							
517	7A0517	MJKA-6	118.9~119.8	0.9	Silicified skarnized marble							
518	7A0518	MJKA-6	119.8~120.8	1.0	Marble and skarnized marble							
519	7A0519	MJKA-6	120.8~122.1	1.3	Garnet pyroxene skarnized marble							
520	7A0520	MJKA-6	122.1~123.6	1.5	Quartz wollastonite skarn							
521	7A0521	MJKA-6	123.6~124.0	0.4	Garnet pyroxene skarnized marble							
522	7A0522	MJKA-6	124.0~124.5	0.5	Aplite with pyrite							
523	7A0523	MJKA-6	124.5~125.5	1.0	Garnet px-wo skarnized marble							
524	7A0524	MJKA-6	125.5~127.0	1.5	Garnet px-wo skarnized marble							
525	7A0525	MJKA-6	127.0~128.0	1.0	Garnet pyroxene skarnized marble							

T: Thin section, P: Polished section, C: Chemical assay analysis,

X: X-ray diffraction analysis, F: Homogenization temperature of fluid inclusion

Apx. 1-2 Core Sample List (22)

Serial No.	Sample No.	Locality		Rock name	Laboratory work						Remarks	
		Drill hole No.	Depth (m)		Length (m)	T	P	C	X	F		
526	7A0526	MJKA-6	128.0~129.0	1.0	Garnet pyroxene skarnized marble							
527	7A0527	MJKA-6	129.0~130.0	1.0	Chloritized granodiorite porphyry							
528	7A0528	MJKA-6	130.0~131.0	1.0	Chloritized granodiorite porphyry							
529	7A0529	MJKA-6	131.0~132.3	1.3	Chloritized granodiorite porphyry							
530	7A0530	MJKA-6	132.3~133.6	1.3	Marble							
531	7A0531	MJKA-6	133.6~134.6	1.0	Black silicified rock							
532	7A0532	MJKA-6	134.6~135.6	1.0	Black silicified rock							
533	7A0533	MJKA-6	135.6~136.4	0.8	Black silicified rock							
534	7A0534	MJKA-6	136.4~137.4	1.0	Marble							
535	7A0535	MJKA-6	137.4~138.7	1.3	Marble							
536	7A0536	MJKA-6	138.7~139.7	1.0	Black silicified marble							
537	7A0537	MJKA-6	139.7~140.9	1.0	Black silicified marble							
538	7A0538	MJKA-6	140.9~142.5	1.6	Black silicified marble							
539	7A0539	MJKA-6	142.5~143.5	1.0	Silic. garnet px-wo skarn							
540	7A0540	MJKA-6	143.5~144.5	1.0	Silic. garnet px-wo skarn							
541	7A0541	MJKA-6	144.5~146.0	1.5	Silic. garnet px-wo skarn							
542	7A0542	MJKA-6	146.0~146.7	0.7	Marble							
543	7A0543	MJKA-6	146.7~147.7	1.0	Silic. garnet px-wo skarnized marble							
544	7A0544	MJKA-6	147.7~148.7	1.0	Black silicified marble							
545	7A0545	MJKA-6	148.7~149.7	1.0	Silic. px skarnized marble							
546	7A0546	MJKA-6	149.7~150.7	1.0	Silic. px skarnized marble							
547	7A0547	MJKA-6	150.7~151.7	1.0	Silic. px skarnized marble							
548	7A0548	MJKA-6	151.7~152.9	1.2	Silic. px skarnized marble							
549	7A0549	MJKA-6	152.9~153.8	0.9	Silicified wollastonite skarn							
550	7A0550	MJKA-6	153.8~154.4	0.6	Silicified marble							

T: Thin section, P: Polished section, C: Chemical assay analysis.

X: X-ray diffraction analysis, F: Homogenization temperature of fluid inclusion

Ap. 1-2 Core Sample List (23)

Serial No.	Sample No.	Locality			Rock name	Laboratory work						Remarks	
		Drill hole No.	Depth (m)	Length (m)		T	P	C	X	F			
551	7A0551	MJKA-6	154.4~155.4	1.0	Silicified wollastonite skarn								
552	7A0552	MJKA-6	155.4~156.6	1.2	Silicified wollastonite skarn								
553	7A0553	MJKA-6	156.6~157.6	1.0	Silicified marble								
554	7A0554	MJKA-6	157.6~158.6	1.0	Silicified marble								
555	7A0555	MJKA-6	158.6~160.1	1.5	Silicified marble								116.4m(X)
556	7A0556	MJKA-2	116.4	0.1	Shear with cream colored sticky clay								27.0m(X)
557	7A0557	MJKA-2	27.0	0.1	Olive gray clay								15.9m(P), 16.1m(F)
558	7A0558	MJKA-7	15.5~16.3	0.8	Brecciated px skarn with pyrite and cal v								
559	7A0559	MJKA-7	16.3~16.5	0.2	Pyroxene skarn								
560	7A0560	MJKA-7	16.5~17.6	1.1	Brecciated px skarn with pyrite								
561	7A0561	MJKA-7	17.6~18.6	1.0	Pyroxene skarn								18.6m(T)
562	7A0562	MJKA-7	18.6~20.3	1.7	Px skarn with altered granodiorite								
563	7A0563	MJKA-7	20.3~22.0	1.7	Pyroxene skarn								
564	7A0564	MJKA-7	22.0~23.0	1.0	Pyroxene skarn								
565	7A0565	MJKA-7	23.0~23.9	0.9	Pyroxene skarn								23.7m(P)
566	7A0566	MJKA-7	23.9~24.1	0.2	Shear zone								24.0m(X)
567	7A0567	MJKA-7	24.1~25.3	1.2	Pyroxene skarn								
568	7A0568	MJKA-7	25.3~26.3	1.0	Pyroxene skarn								
569	7A0569	MJKA-7	26.3~27.3	1.0	Pyroxene skarn								
570	7A0570	MJKA-7	27.3~28.3	1.0	Pyroxene skarn								
571	7A0571	MJKA-7	28.3~29.3	1.0	Pyroxene skarn								
572	7A0572	MJKA-7	29.3~30.3	1.0	Pyroxene skarn								
573	7A0573	MJKA-7	30.3~31.3	1.0	Pyroxene skarn								
574	7A0574	MJKA-7	3.0~4.0	1.0	Chloritized granodiorite								
575	7A0575	MJKA-7	4.0~5.0	1.0	Chloritized granodiorite								

T: Thin section, P: Polished section, C: Chemical assay analysis,

X: X-ray diffraction analysis, F: Homogenization temperature of fluid inclusion



Ap. 1-2 Core Sample List (24)

Serial No.	Sample No.	Locality		Rock name	Laboratory work						Remarks	
		Drill hole No.	Depth (m)		Length (m)	T	P	C	X	F		
576	7A0576	MJKA-7	5.0~6.0	1.0	Chloritized granodiorite			○				
577	7A0577	MJKA-7	6.0~7.1	1.1	Chloritized granodiorite			○				
578	7A0578	MJKA-7	7.1~8.1	1.0	Quartz wollastonite pyroxene skarn			○				
579	7A0579	MJKA-7	8.1~9.1	1.0	Quartz wollastonite pyroxene skarn			○				
580	7A0580	MJKA-7	9.1~10.1	1.0	Quartz wollastonite pyroxene skarn			○				
581	7A0581	MJKA-7	10.1~11.1	1.0	Quartz wollastonite pyroxene skarn			○				
582	7A0582	MJKA-7	11.1~12.1	1.0	Quartz wollastonite pyroxene skarn			○				
583	7A0583	MJKA-7	12.1~13.1	1.0	Quartz wollastonite pyroxene skarn			○				
584	7A0584	MJKA-7	13.1~14.1	1.0	Quartz wollastonite pyroxene skarn			○				
585	7A0585	MJKA-7	14.1~15.5	1.4	Quartz wollastonite pyroxene skarn			○				
586	7A0586	MJKA-2	129.1	0.1	Granodiorite porphyry	○						129.6m(T)
587	7A0587	MJKA-7	31.3~32.3	1.0	Pyroxene skarn			○				
588	7A0588	MJKA-7	32.3~33.2	1.0	Pyroxene skarn			○				
589	7A0589	MJKA-7	32.3~35.2	1.9	Pyroxene skarn			○				
590	7A0590	MJKA-7	35.2~37.2	2.0	Pyroxene skarn			○				
591	7A0591	MJKA-7	37.2~38.8	1.6	Granodiorite			○				
592	7A0592	MJKA-7	38.8~41.0	2.2	Granodiorite			○				
593	7A0593	MJKA-7	41.0~42.4	1.4	Granodiorite			○				
594	7A0594	MJKA-7	42.4~43.4	1.0	Chlorite pyroxene skarnized rock			○				
595	7A0595	MJKA-7	43.4~44.6	1.2	Chlorite pyroxene skarnized rock			○				
596	7A0596	MJKA-7	44.6~45.6	1.0	Limonitized aplitic rock			○				
597	7A0597	MJKA-7	45.6~46.6	1.0	Limonitized aplitic rock			○				
598	7A0598	MJKA-7	44.6~48.1	1.6	Limonitized aplitic rock			○				
599	7A0599	MJKA-7	48.1~49.1	1.0	Granodiorite			○				
600	7A0600	MJKA-7	49.1~50.1	1.0	Granodiorite			○				

T: Thin section, P: Polished section, C: Chemical assay analysis.  
X: X-ray diffraction analysis, F: Homogenization temperature of fluid inclusion