According to the known data, K-Ar age of the sample located about 5-km northeast from the mine, shows 21.7 ± 0.7 Ma.

In the area, faults, veins and fractures with the N-S trend prevail and E-W, NW-SE trends are also obsevable.

(2) Alteration

No remarkable hydrothermal alteration is observed and rocks have undergone weak argillic alteration, moderate in local.

Alteration minerals are smectite and sericite.

(3) Mineralization

Black manganese oxide minerals fill the bedding planes of tuffs and fractures. Numerous old workings are exist epecially along to bedding planes and it is considered most of them are in a small scale because of little amounts of waste dump left.

Manganese mineralization reaches an area of about 500m x 1,000m.

Pyrite, chalcopyrite and green copper are observed very scarcely in a waste dump and two samples of these indicate almost no gold mineralization and Ag: 91.6g/t, 818g/t, Pb: 0.5%, 0.6%, Zn: 0.3%, 0.8%.

Under the microscope, small amount of sphalerite, galena, bornite, covellite, freibergite, polybasite and enargite are observed, besides pyrite and chalcopyrite (No.4992).

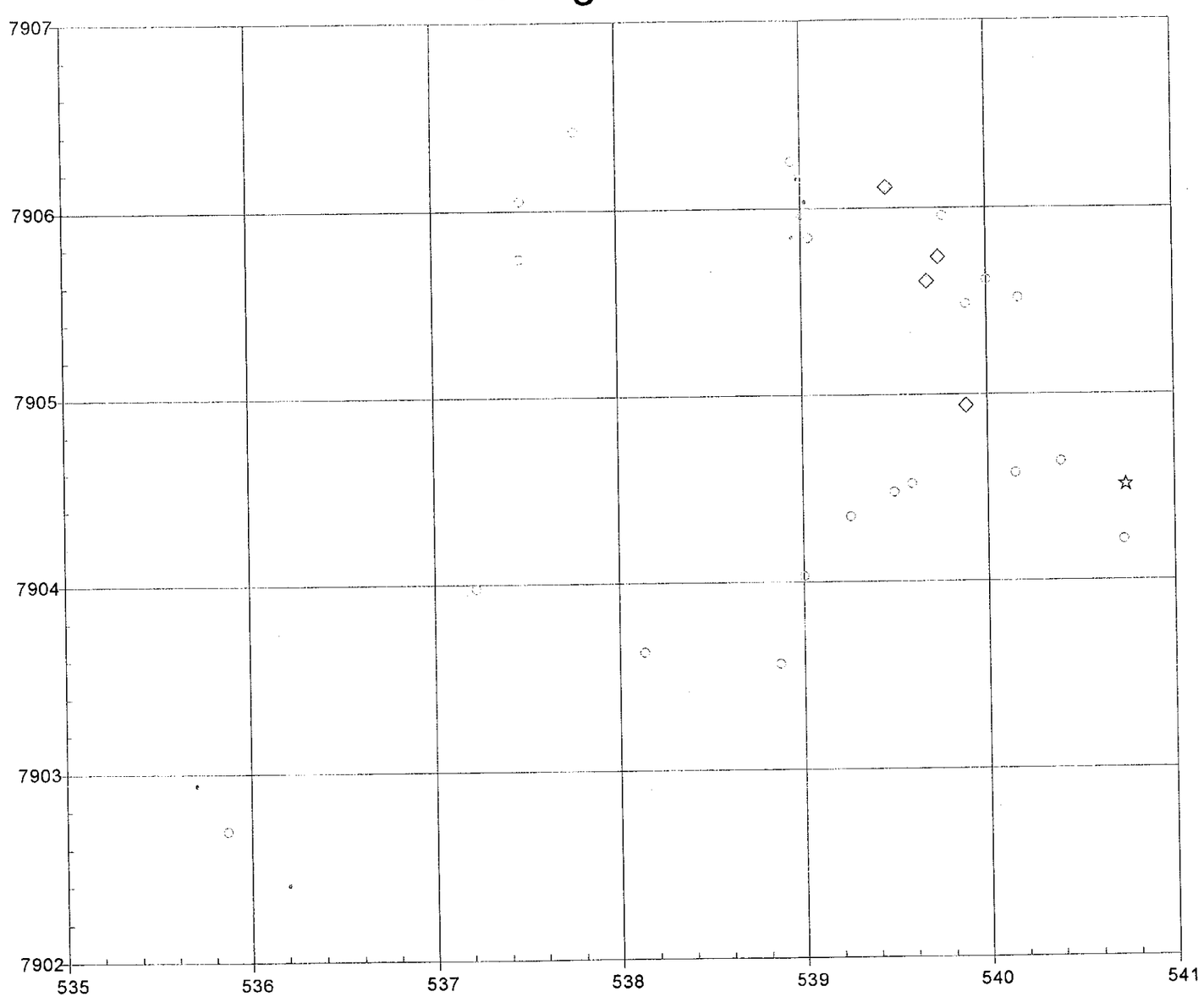
In order to study thermal properties of mineralization and chemical properties of ore-forming fluid, homogenization temperature and freezing temperature of fluid inclusions of one sample was measured. The measurements are shown in Table II-2-2.

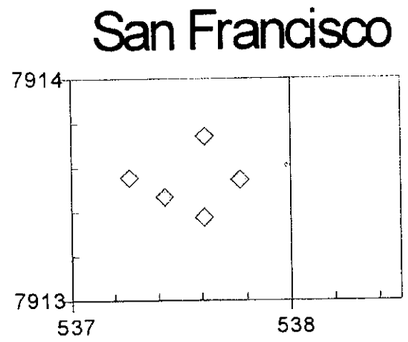
Table II-2-2 Homogenization Temperature and Freezing Temperature (San Francisco Mine)

Sample No.	Mineral	Homogenization Temperature			Freezing Temperature			
		Inc. No.	Range (℃)	Ave (℃)	Inc. No.	Range (℃)	Ave (℃)	Salinity (wt%)
4991	Qz	10	248 ~ 271	256	10	-1.3 ~ -0.8	-1.0	1.7

(4) Assay of geochemical samples

Six rock-chip samples were collected in this area.





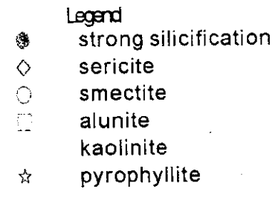


Fig.II-2-8 (2)Distribution Map of Alteration Minerals in the Carangas District

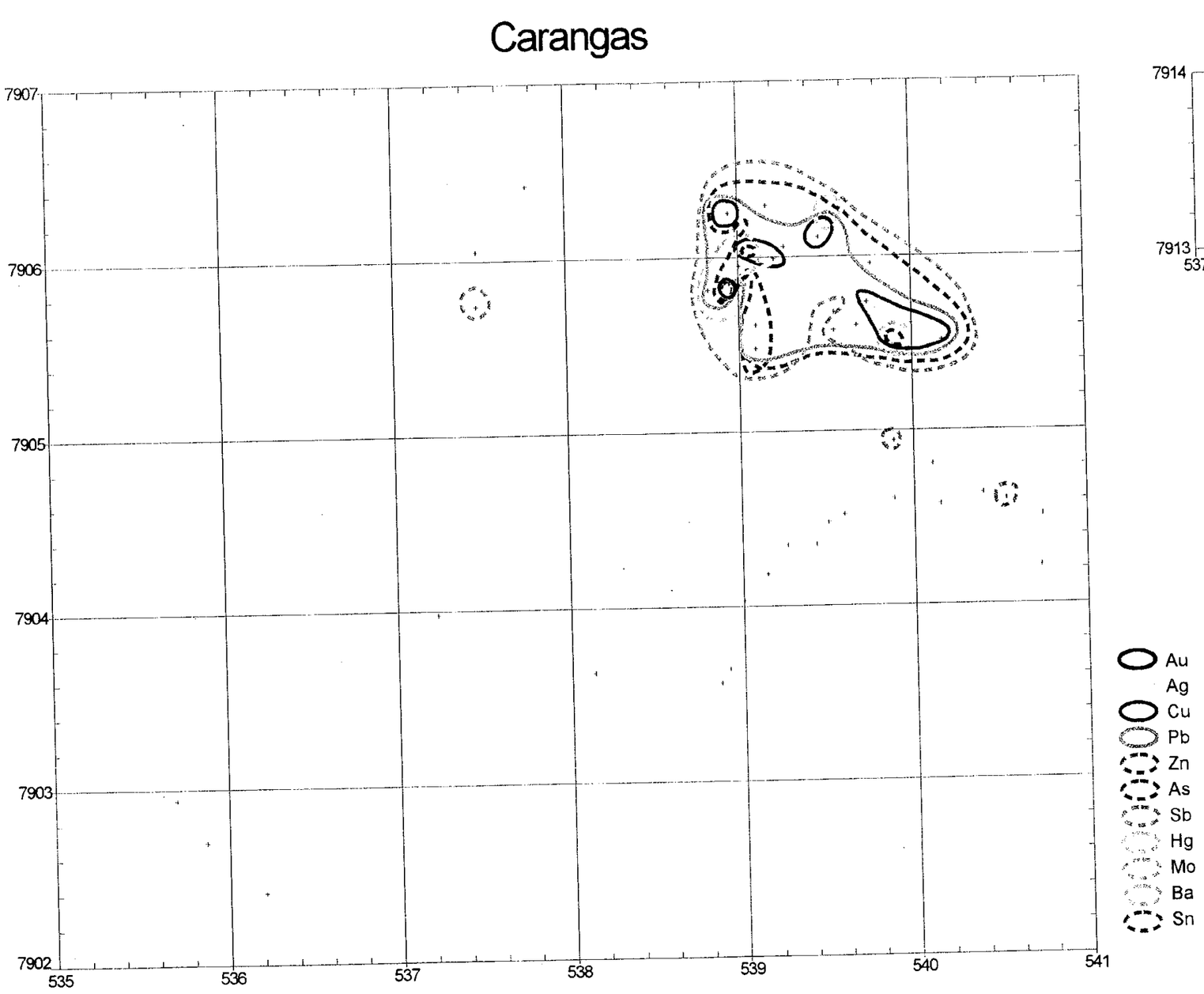


Fig.II-2-8 (3)Geochemical Anomaly Map of the Carangas District

The minimum, maximum and average assay values by elements (in the order of appearance) are as follows:

Au: <2ppb, 16ppb, 6ppb, Ag: <0.5ppm, 340ppm, 74.5ppm, Cu: 7ppm, 1,003ppm, 421ppm, Pb: 43ppm, 9,307ppm, 3,893ppm, Zn: 226ppm, 23,020ppm, 8,538ppm, As: 22ppm, 131ppm, 52ppm, Sb: 7ppm, 45ppm, 20ppm, Hg: <1ppm, <1ppm, <1ppm, Mo: <1ppm, 24ppm, 5ppm, Ba: 534ppm, 1,497ppm, 896ppm, Sn: <5ppm, <5ppm, <5ppm.

Geochemical anomalies of the respective elements are indicated in Fig. II-2-8 (3).

Au: All the samples indicate under 16ppb and show no anomalous value.

Ag: Two samples indicate an anomalous value of 30 ppm or higher.

Cu: Four samples indicated an anomalous value of 90ppm or higher overlap the lead anomaly portions.

Pb: Four samples indicated an anomalous value of 400ppm or higher overlap the copper anomaly portions.

Zn: Five samples indicated an anomalous value of 230ppm or higher overlap the antimony anomaly portions.

As: All the samples indicate under 140 ppm and show no anomalous value.

Sb: Five samples indicated an anomalous value of 10ppm or higher overlap the zinc anomaly portions.

Hg: All the samples are under 1 ppm and show no anomalous value.

Mo: All the samples are under 24 ppm and show no anomalous value.

Ba: All the samples are under 1,497 ppm and show no anomalous value.

Sn: All the samples are under the detection limit.

(5) Considerations

Silver- bearing manganese oxide mineralization is recognized in the fracture and bedding planes in San Francisco prospect. The alteration is weak and neutral type without tin anomaly.

The mineralization in this district is thought to be the epithermal precious metal deposit (Type III) related to shallow hypabyssal intrusives, although the existence of intrusives not yet confirmed.

However, the mineralization is probably weak as the alteration zone is not extensive and development of the fracture is poor.

2-8-2 Carangas Mine

(1) Geology

The area is underlain by pyroclastic rocks, andesite lava and rhyolite dome of Carangas Formation of late Oligocene age to early Miocene age.

Pyroclastic rocks are composed of dasitic pumice tuff, lapilli tuff and tuff breccia.

Rhyolite intrudes into pyroclastic rocks at the centre of the Co.Espiritu hill as a lava dome with an area of about 700m x 1,000m, and is dark gray to grayish white in color with flow texture having undergone hydrothermal brecciation. Based on the known data, K-Ar age shows 15.4 ± 0.5 Ma.

Pyroclastic rocks are covered whole hill of Co.San Antonio.

In the area, faults, veins and fractures with the NW-SE and WNW-ESE trends prevail.

(2) Alteration

The hydrothermal alteration zones cover about 3 km^2 and are in local at the Co. San Antonio.

Silicification and argillization are observed.

At the hill Co. Espiritu, rhyolite dome has undergone silicification, intensively at brecciated part of hilltop.

Though alteration minerals such as smectite, quartz and sericite are seen at entire area, kaolinite and alunite are observed at Co.Chapi Khollu to the south of Co. San Antonio.

(3) Mineralization

Manganese oxide minerals are abundant as fracture filling and dissemination at Co.Espiritu and Co.San Antonio.

Numerous drifts, shafts and inclined shafts are left since the colonial periods.

Sulfide minerals such as galena and sphalerite are rarely seen in a waste dump at mine entrance.

At surface many channel sampling sites are left.

A drift in the northeastern part of Co. Espiritu is driven about 200m with the direction of N30W in a pumice tuff being subjected weak hydrothermal alteration.

Another cross-cut at eastern part is driven about 240m northward and from entrance to about 30m lapilli tuff and tuff breccia are seen, there change to pumice tuff at a contact of a falt with N45E strike and 45SE dip. In the tunnel manganese-goethite veins with the direction of N60W to N80w are mined out (PL-19). A mining company of COMSUR has carried out 6 holes of drilling in the year 2000 with totally 15 holes by now.

No drilling has been done at Co.San Antonio.

Except Co. Espiritu and Co. San Antonio no remarkable mineralization is observable.

Fourteen ore samples collected from the Co. Espiritu and Co. Antonio indicate no gold mineralization and show Ag: <0.5g/t to 1,104g/t, Cu: 0.002% to 0.22%, Pb: 0.02% to 9.3%, Zn:

0.01% to 22.4%.

One ore sample collected from Co. Espiritu are composed of large amount of sphalerite, a small amount of pyrite, chalcopyrite, galena, bornite, covellite, pyrargyrite, polybasite and freibergite (No.6006), and samples from Co.San Antonio are of large amount of manganese oxide minerals asocciate with sphalerite, galena and a trace amount of tetrahedrite (No.5787), or with pyrite only (No.5794) under the microscope.

In order to study thermal properties of mineralization and chemical properties of ore-forming fluid, homogenization temperature and freezing temperature of fluid inclusions of four samples were measured. The measurements are shown in Table II-2-3.

Table II-2-3 Homogenization Temperature and Freezing Temperature (Carangas Minc)

Sample No.	Min eral	Homogenization Temperature			Freezing Temperature			
		Inc. No.	Range (℃)	Ave (℃)	Inc. No.	Range (℃)	Ave (℃)	Salinity (wt%)
4994	Qz	10	194 ~ 239	219	10	-0.5 ~ 0.0	-0.1	0.2
6005	Qz	10	176 ~ 233	196	10	-2.5 ~ -0.9	-1.9	3.3
6006	Qz	10	209 ~ 241	222	10	-3.4 ~ 2.5	-2.9	4.8
6006	sph	10	193 ~ 233	210	10	-5.5 ~ -1.3	-3.2	5.2
Average			176 ~ 241	212		-5.5 ~ 0.0	-2.0	3.4

Measured minerals are quartz (one sample from Co. San Antonio and two samples from Co. Espiritu) and sphalerite collected from Co. Espiritu.

Homogenization temperatures ranged from 176°C to 241°C, and average temperature was 212°C.

The freezing temperatures ranged from -5.5°C to -0.0°C, and average temperatur was -2.0°C.

The salinity (NaCl equivalent) that was calculated from these values was 3.4 wt.% in average.

(4) Assay of geochemical samples

Fourty-seven rock-chip samples were collected in this area.

The minimum, maximum and average assay values by elements (in the order of appearance) are as follows:

Au: <2ppb, <2ppb, <2ppb, Ag: <0.5ppm, 610ppm, 44.6ppm, Cu:2ppm, 4,021ppm, 149ppm, Pb: 6ppm, 14,458ppm, 1,546ppm, Zn: 20ppm, 9,398ppm, 587ppm, As: 6ppm, 282ppm, 61ppm, Sb: <5ppm, 300ppm, 39ppm, Hg: <1ppm, <1ppm, <1ppm, Mo: <1ppm, 9ppm, 2ppm, Ba: 204ppm, 11,198ppm, 1,433ppm, Sn: <5ppm, <5ppm, <5ppm.

Geochemical anomalies of the respective elements are indicated in Fig. II-2-8 (3).

Au: All the samples are under the detection limit.

Ag: Eight samples at Co. Espiritu and three samples at Co. San Antonio indicate an anomalous value of 30ppm or higher. These overlap the lead, zinc and antimony anomalous portions and copper anomalous portions in part.

Cu: Five samples at Co. Espiritu and four samples at Co. San Antonio indicate an anomalous value of 90ppm or higher.

Pb: Eleven samples at Co. Espiritu and seven samples at Co. San Antonio indicate an anomalous value of 400ppm or higher.

Zn: Twelve samples at Co. Espiritu and eight samples at Co. San Antonio indicate an anomalous value of 230ppm or higher.

As: Five samples at Co. Espiritu and one sample at Co. San Antonio indicate an anomalous value of 140ppm or higher.

Sb: All of the fifteen samples at Co. Espiritu and seven samples at Co. San Antonio indicate an anomalous value of 10 ppm or higher, besides one sample at west of Co. Espiritu and two samples at south-east of Co. San Antonio also show anomalous value.

Hg: All the samples are under the detection limit.

Mo: All the samples indicate under 9ppm and show no anomalou value.

Ba: Six samples at Co. Espiritu and one sample at Co. San Antonio indicate an anomalous value of 1,500ppm or higher.

Sn: All the samples are under the detection limit.

(5) Considerations

In Carangas mine an alteration zone is recognized at Co. Espiritu, and and it is weak at Co. San Antonio. Both of them are neutral and tin minerals are not yet found. The mineralization in this district is thought to be epithermal precious metal deposit (Type III) related to shallow hypabyssal intrusives which were recognized at Co. Espiritu.

Silver- bearing manganese oxide mineralization is observed along the fractures at Co. San Antonio. The mineralization seems to be weak

2-9 Culebra District (Figs.II-2-9,II-2-9(1 to 3))

2-9-1 Todos Santos Mine

(1) Geology

The mine area is underlain by volcanic rocks of Carangas Group.

In the studied area, andesite lava is intruded by rhyolite domes.

Rhyolitic pyroclastic rocks deposit before the intrusion underneath and surround of lava dome

At the contacts between upper rhyolite and lower tuffs, obsidian beds with 5m to 20m are

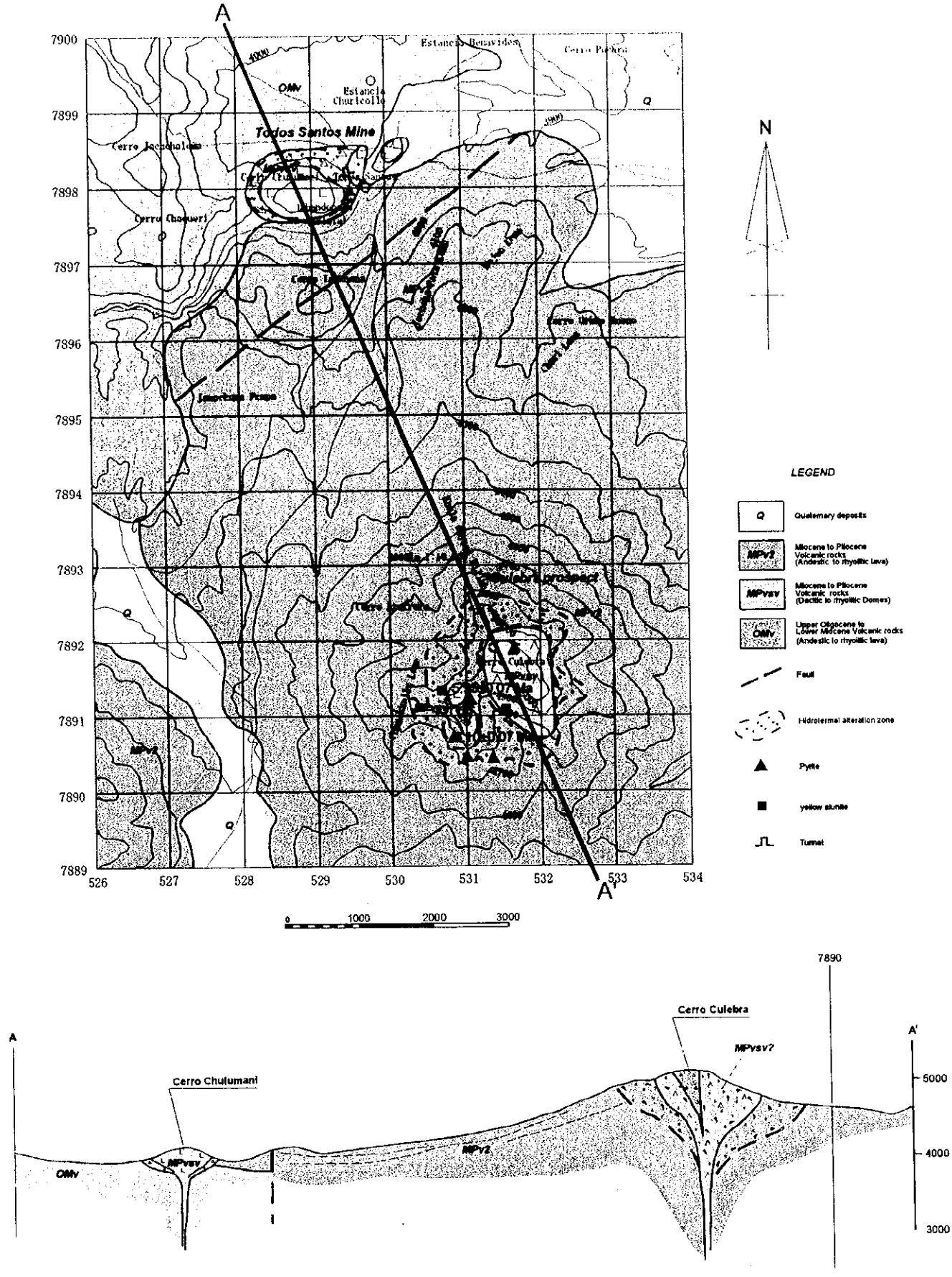


Fig. II-2-9 Geological Map of the Culebra District

intercalated.

Three Domes and/or intrusive rocks are intruded and the western dome is the biggest with 1 km x 0.8km in dimension, the center one is small with 0.2km x 0.4km and completely brecciated.

No study has done at the eastern dome.

Pyloclastic rocks, being white - grayish white - dark gray and of tuff breccia, lapilli tuff and tuff from the lower to upper, have tendency to become finer toward upper.

(2) Alteration

The hydrothermal alteration zones cover only about 0.5 km^2.

Silicification and argillization are observed. Silisification as veinlets of 2 to 3 cm in width with N25E strike and 70Wdip are included in a broad argillization zone.

Pyroclastic rocks have mostly undergone argillization and rhyolite domes, argillization and silicification.

Alteration minerals are quartz and smectite.

(3) Mineralization

Numerous tunnels are left since the colonial periods.

Geological mapping has been done in a drift, there limonite and clay veins with NW-SE and NE-SW trends and quartz veins with E-W trend are observed in argillized tuffs. Old workings show E-W direction.

Seven ore samples collected from the drift indicate no gold mineralization and show Ag: 19.3g/t to 240g/t, Cu: 0.001% to 0.01%, Pb: 0.20% to 1.95%, Zn: 0.07% to 6.38%.

(4) Assay of geochemical samples

Eleven rock-chip samples were collected in this area.

The minimum, maximum and average assay values by elements (in the order of appearance) are as follows:

Au: <2ppb, <2ppb, <2ppb,Ag: <0.5ppm, 807.0ppm, 80.5ppm, Cu: 2ppm, 9ppm, 21ppm, Pb: 17ppm, 6,540ppm, 1,261ppm, Zn: 25ppm, 2,472ppm, 382ppm, As: 9ppm, 98ppm, 41ppm, Sb: 6ppm, 75ppm, 18ppm, Hg: <1ppm, <1ppm, <1ppm, Mo: <1ppm, 8ppm, 3ppm, Ba: 851pm, 1,397ppm, 1,048ppm, Sn: <5ppm, <5ppm, <5ppm

Geochemical anomalies of the respective elements are indicated in Fig. II-2-9 (3).

Au: All the samples are under the detection limit.

Ag: Only one sample indicates an anomalous value of 807 ppm, others are under 29ppm and show no anomalous value.

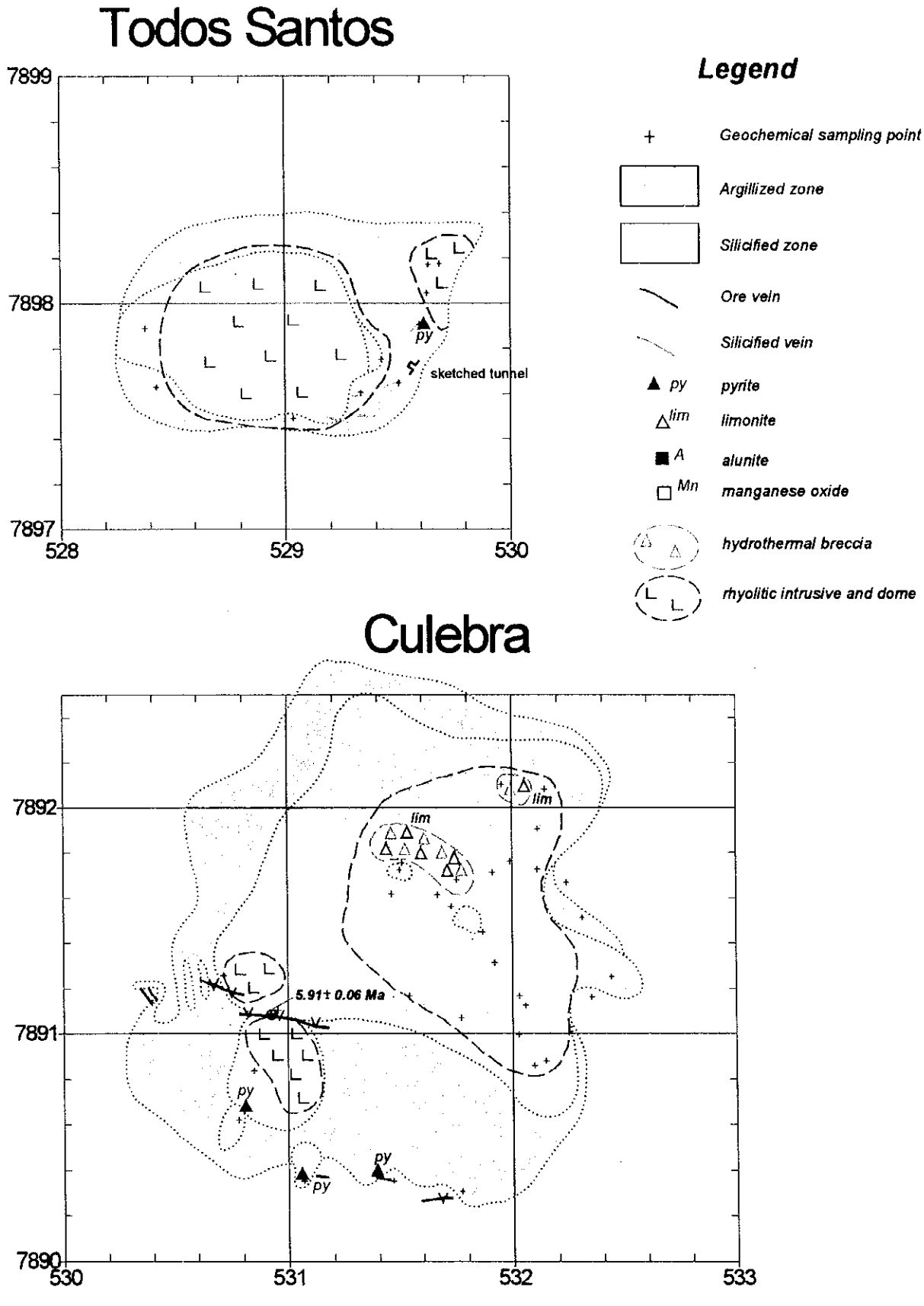


Fig.II-2-9 (1)Alteration Map of the Culebra District

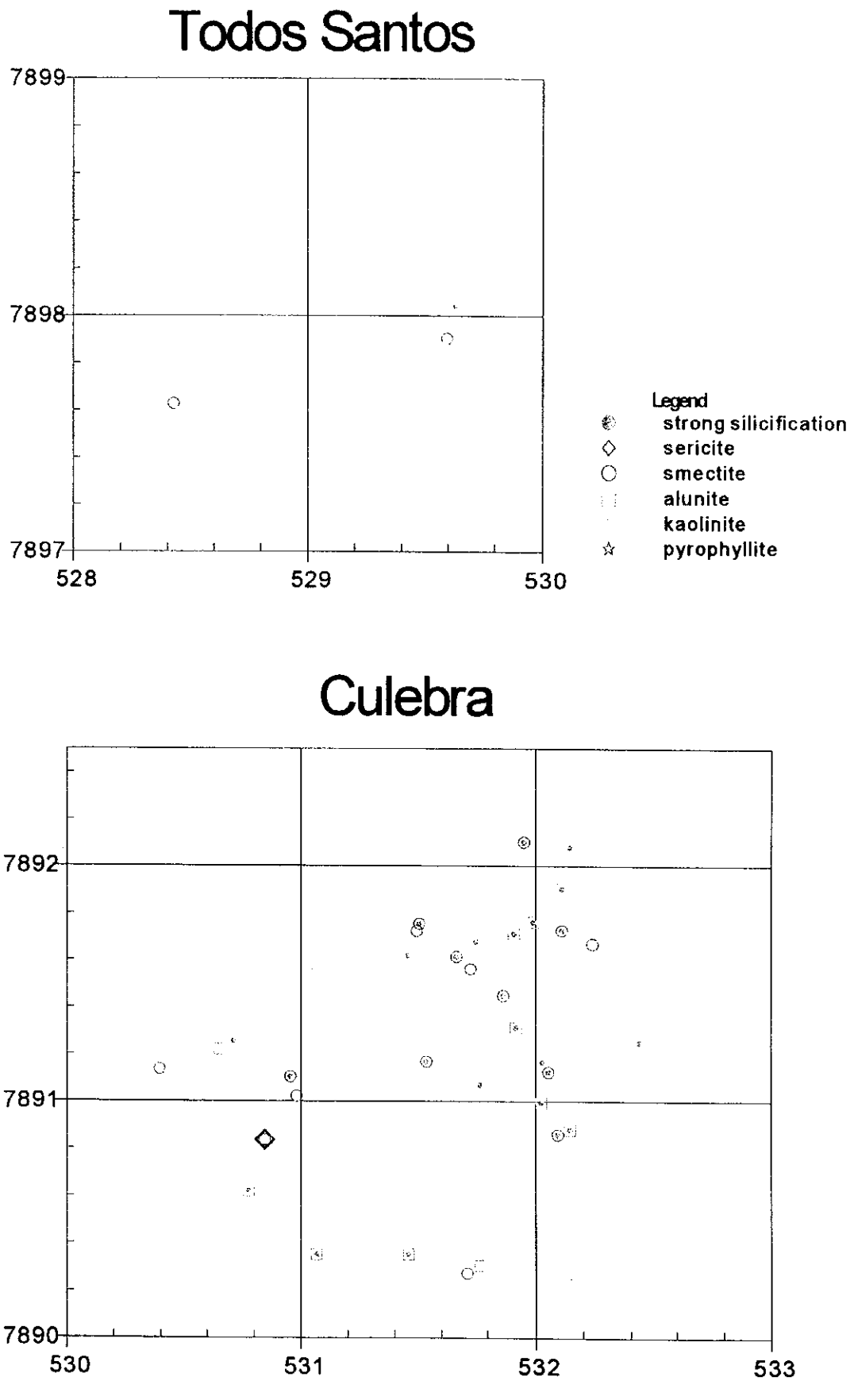


Fig.II-2-9 (2)Distribution Map of Alteration Minerals in the Culebra District

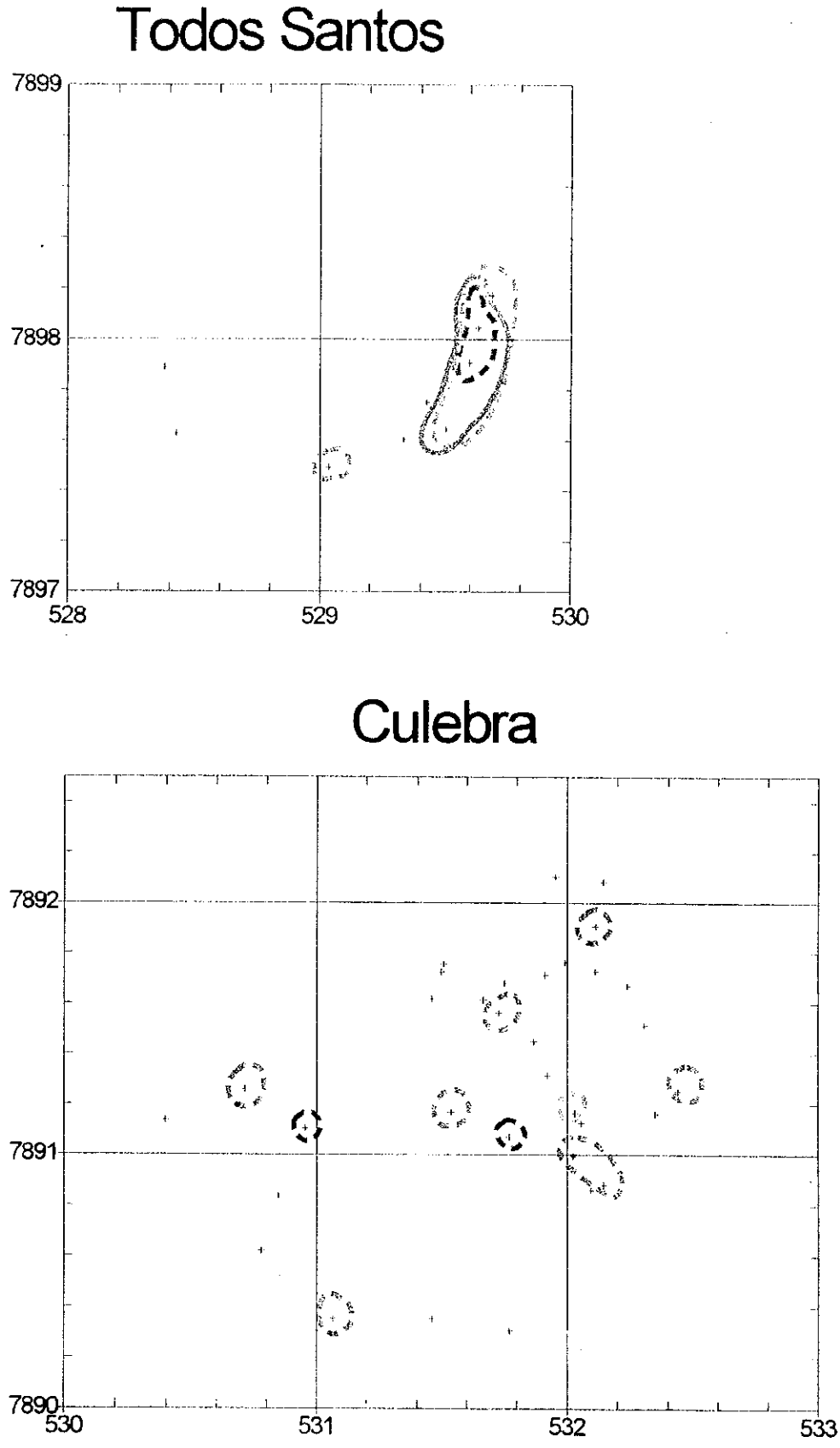


Fig.II-2-9 (3)Geochemical Anomaly Map of the Culebra District

Cu: All the samples indicate under 79ppm and show no anomalous value.

Pb: All the samples indicate under 16ppm and show no anomalous value.

Zn: Three samples indicate an anomalous value of 230ppm or higher.

As: All the samples indicate under 98 ppm and show no anomalous value.

Sb: Six samples indicate an anomalous value of 10ppm or higher.

Hg: All the samples are under the detection limit.

Mo: All the samples indicate under 8 ppm and show no anomalous value.

Ba: All the samples indicate under 1,397 ppm and show no anomalous value.

Sn: All the samples are under the detection limit.

(5) Considerations

As the alteration of Todos Santos mine is neutral and tin minerals are not recognized, the mineralization in this district appears to be epithermal precious metal deposit (Type III) related to shallow hypabyssal intrusives, which was observed at Todos Santos mine.

2-9-2 Culebra Prospect

(1) Geology

The area is underlain by volcanic rocks of Culebra stratovolcano of Miocene to Pliocene age, intruded by rhyolite and dacite, then andesite dykes of the same period cut all the rocks.

Culebra stratovolcano is composed of andesite lavas and its pyroclastic rocks.

Andesites are of fine-grained biotite-hornblende andesite and medium-grained biotite andesite.

Based on the known data, the K-Ar ages of two samples on the slope of Co.Culebra show 6.3 ± 0.2 Ma and 6.1 ± 0.2 Ma.

Small rhyolite domes, gray with flow structure, crop out on the western top of Co. Culebra in the scale of about 300m x 500m and 200m x 200m. K-Ar age dating indicates 6.10 ± 0.07 Ma (No.4995).

Dacite is exposed on the eastern top of Co. Culebra forming dome? of about 1km x 1.4km in dimension.

Andesite dyke, fresh and grey with fine-grained biotite, pyroxene and hornblende, shows about 2m to 4m in width, N75W to 80W strike and vertical. K-Ar age dating indicates 5.95 ± 0.07 Ma (No.4996).

In the area, faults, veins and fractures with the WNW-ESE trend prevail.

(2) Alteration

The hydrothermal alteration zones cover over 3.5 km^2.

Silicification is surrounded by argillization.

Alteration minerals are quartz, smectite, alunite, sericite and kaolinite.

(3) Mineralization

Pyrite dissemination is observable in sseveral places and yellow alunite is in two places.

No other remarkable mineralization is seen.

(4) Assay of geochemical samples

Thirty-three rock-chip samples were collected in this area.

The minimum, maximum and average assay values by elements (in the order of appearance) are as follows:

Au: <2ppb, <2ppb, <2ppb, Ag: <0.5ppm, <0.5ppm, <0.5ppm, Cu: 3ppm, 36ppm, 7ppm,
Pb: 4ppm, 89ppm, 20ppm, Zn: 10ppm, 81ppm, 27ppm, As: 10ppm, 55ppm, 19ppm,
Sb: <5ppm, 12ppm, 8ppm, Hg: <1ppm, <1ppm, <1ppm, Mo: <1ppm, 11ppm, 3ppm,
Ba: 86ppm, 1,668ppm, 1,094ppm, Sn: <5ppm, 12ppm, <5ppm

Geochemical anomalies of the respective elements are indicated in Fig. II-2-9 (3).

Au: All the samples are under the detection limit.

Ag: All the samples are under the detection limit.

Cu: All the samples indicate under 36ppb and show no anomalous value.

Pb: All the samples indicate under 89 ppm and show no anomalous value.

Zn: All the samples indicate under 81 ppm and show no anomalous value.

As: All the samples indicate under 55 ppm and show no anomalous value.

Sb: Eight samples indicate an anomalous value of 10ppm or higher and anomalous portions are scattered.

Hg: All the samples are under the detection limit.

Mo: All the samples indicate under 11 ppm and show no anomalous value.

Ba:Only one sample indicates an anomalous value of 1,500ppm or higher.

Sn: Two samples indicate an anomalous value of 10ppm or higher.

Anomaly portions of antimony, barium and tin are distributed separately.

(5) Considerations

The mineralization in Culebra prospect is presumed to be a gold- silver- lead- zinc deposit (type II) related to shallow volcanic activity from the presence of tin minerals.

The mineralization is probably weak or deep-seated if exists.

2-10 Mendoza District

2-10-1 Co.Kancha Prospect(Figs.II-2-10,II-2-10(1 to 3))

(1) Geology

The area is underlain by pyroclastic rocks such as lapilli tuff, tuff breccia (volcanic breccia), andesite lavas and dacite intrusives of Tahua Formation of late Oligocene to early Miocene in age.

Pyroclastic rocks are white, gray, pale green and are seen at lower part in the area.

Andesite is composed of fine-grained to medium-grained grayish hornblende andesite and fine-grained dark gray basaltic andesite.

Dacite is gray, pale brown, grayish white and porphyritic with large crystal of feldspar reach max. 5 cm in length at Co.Pisku Tankhani and Co. Cancha and is seen as seven bodies of intrusives and/or domes. Dacite at Co. Pisku Tankhani are fresh with about 600m in diameter and indicate the K-Ar age of 7.27 ± 0.08 Ma (No.4990).

Based on the known data, dacitic laccolith at Jankho Jakke about 1 km north of Co. Pisku Tankhani shows Ar-Ar age of 8.0 ± 0.2 Ma

Intrusives distribute in the area of 400m x 700m at Co.Kancha, 700m x 700m at Co.Milluniloma and 1.3km x 1.6km at Co.Kiruni Chuto and all have undergone hydrothermal alteration.

In the area, faults, veins and fractures with the NW-SE and E-W trends are dominant and the NE-Swand N-S trends are also observable.

(2) Alteration

The hydrothermal alteration zones cover over 15 km^2.

Vein-like, lenticular and massive silicification zones are included in a broad argillization zone.

Alteration minerals are sericite, smectite, quartz, alunite and kaolinite.

The strongly argillized dacite sample collected on the slope of Co.Kiruni Chuto indicates K-Ar age of 16.37 ± 0.20 Ma (No.4989).

(3) Mineralization

An old drift at Co.San Lorenzo is driven eastward and copllapsed.

No ore minerals are seen in waste dump materials.

Fractures filled with manganese oxide minerals and goethite are seen on the eastern slope of Co.Kancha and are left small old shaft.

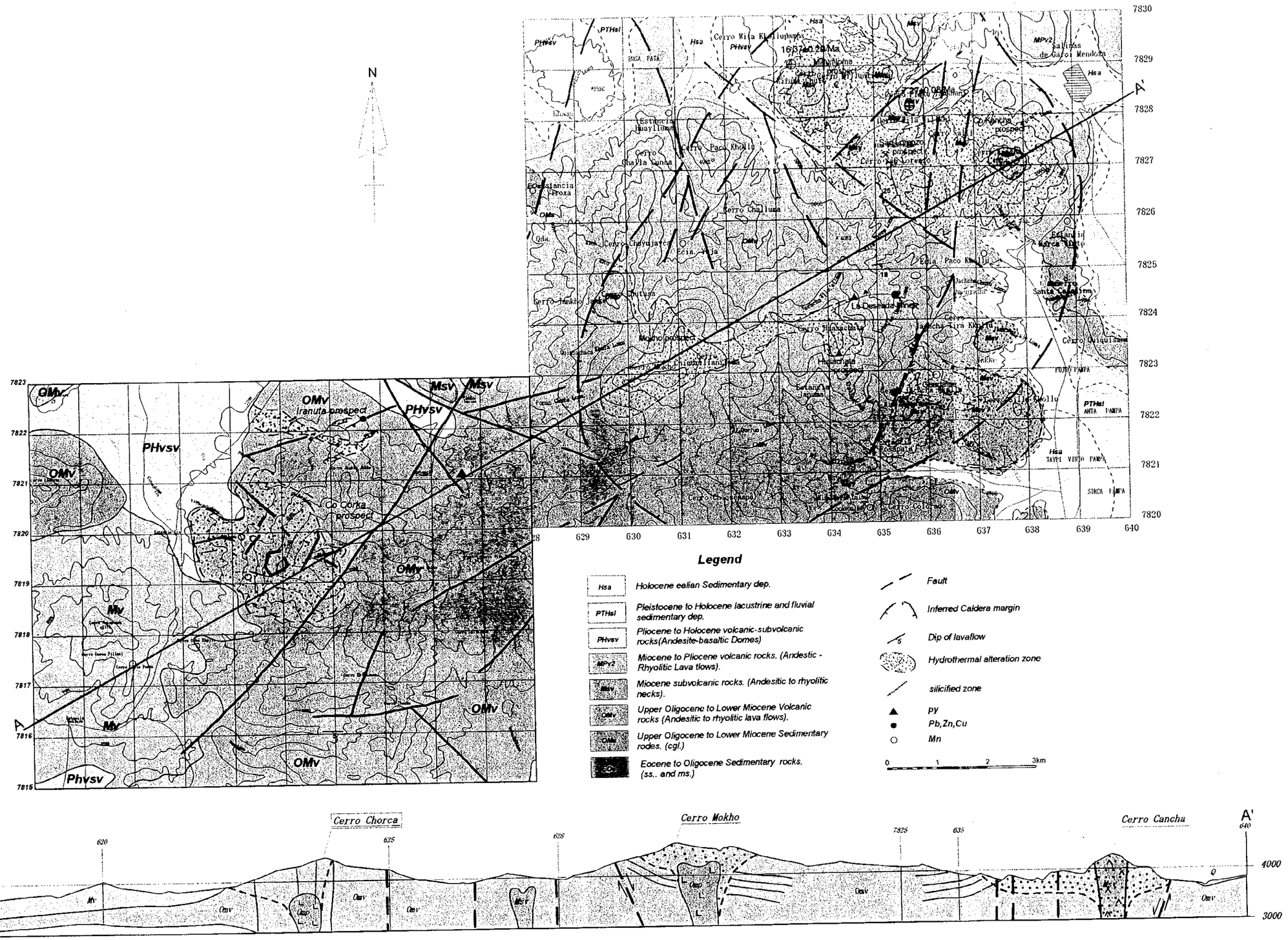


Fig. II-2-10 Geological Map of the Mendoza District

Mendoza
Kancha, San Lorenzo, Milluniloma

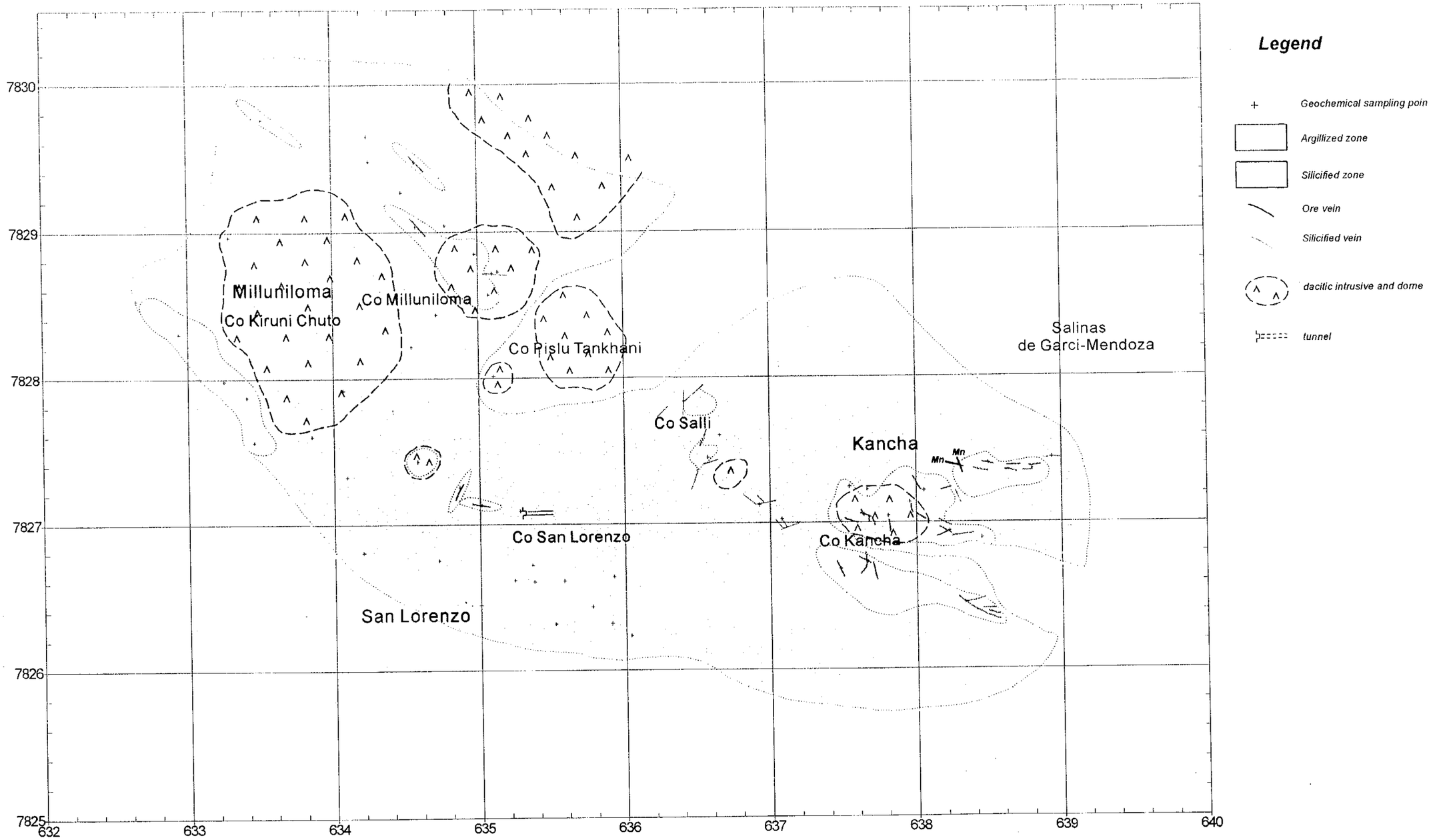


Fig.II-2-10 (1)Alteration Map of the Mendoza District (Kancha)

Mendoza
Kancha, San Lorenzo, Milluniloma

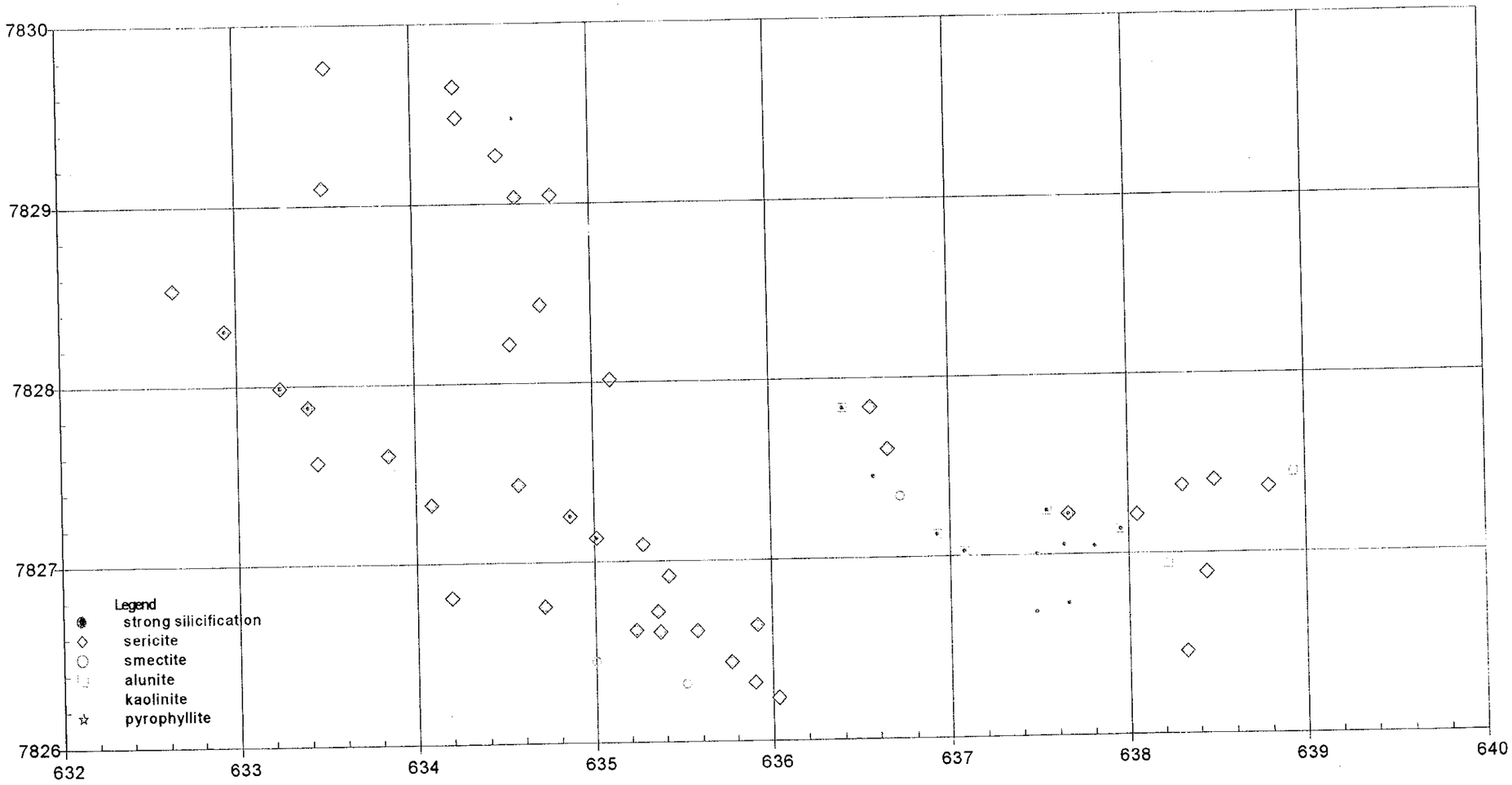


Fig.II-2-10 (2)Distribution Map of Alteration Minerals in the Mendoza District (Kancha)

Mendoza
Kancha, San Lorenzo, Milluniloma

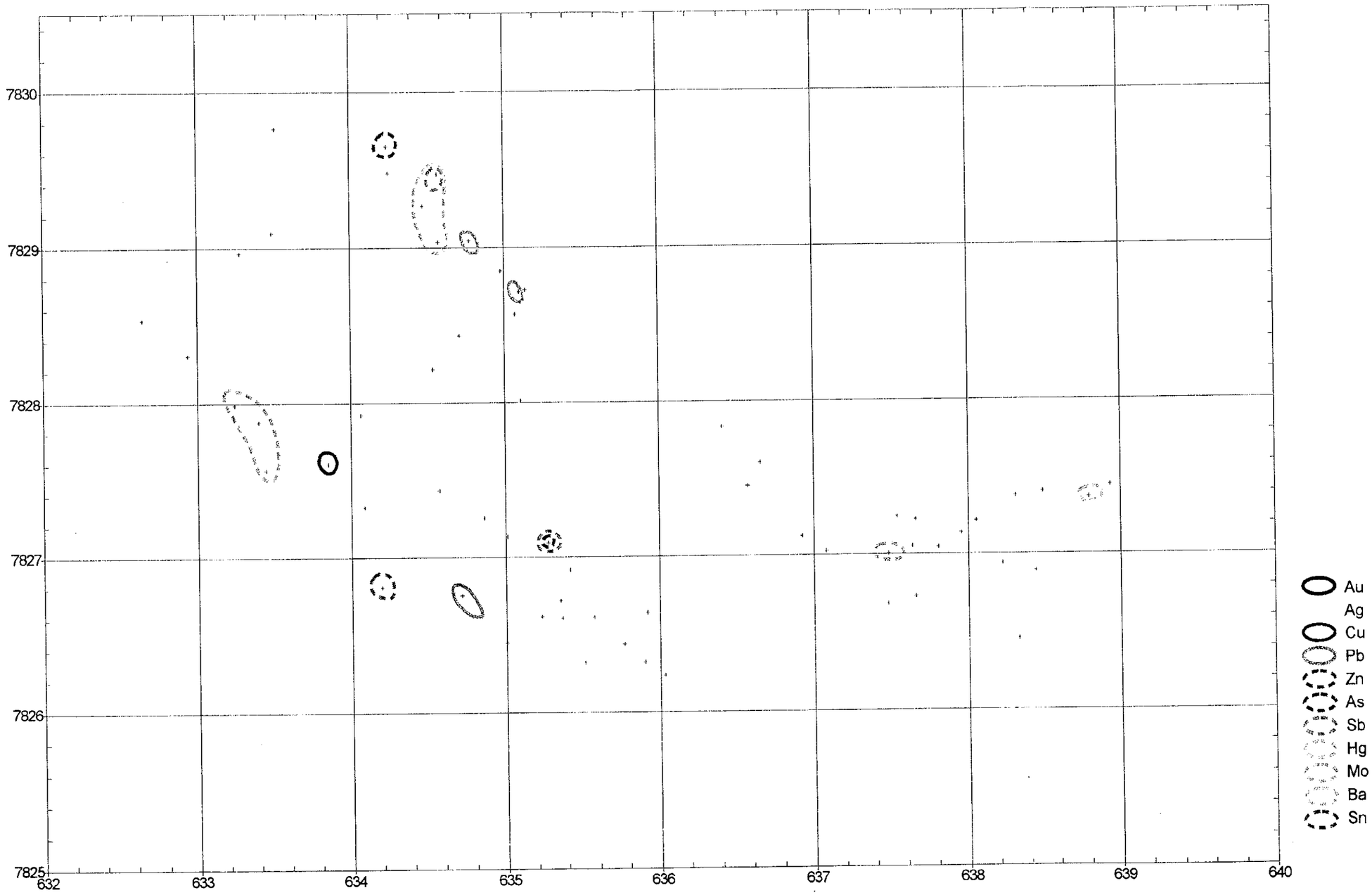


Fig.II-2-10 (3)Geochemical Anomaly Map of the Mendoza District (Kancha)

(4) Assay of geochemical samples

Sixty-two rock-chip samples were collected in this area.

The minimum, maximum and average assay values by elements (in the order of appearance) are as follows:

Au: <2ppb, 13ppb, <2ppb, Ag: <0.5ppm, 12.2ppm, 0.6ppm, Cu: 2ppm, 90ppm, 15ppm,
Pb: 6ppm, 1,635ppm, 99ppm, Zn: 9ppm , 1,001ppm, 62ppm, As: <5ppm, 101ppm, 17ppm,
Sb: <5ppm, 18ppm, <5ppm, Hg: <1ppm, <1ppm, <1ppm, Mo: <1ppm, 20ppm, 5ppm,
Ba: 108ppm, 2,496ppm, 852ppm, Sn: <5ppm, 7ppm, <5ppm

Geochemical anomalies of the respective elements are indicated in Fig. II-2-10 (3).

Au: All the samples indicate under 13ppb and show no anomalous value.

Ag: All the samples indicate under 12.2ppb and show no anomalous value.

Cu: Only one sample indicates an anomalous value of 90 ppm or higher.

Pb: Three samples indicate an anomalous value of 400ppm or higher and anomalous portions are locally spotted.

Zn: Two samples indicate an anomalous value of 230ppm or higher and anomalous portions are locally spotted.

As: All the samples indicate under 101ppb and show no anomalous value.

Sb: Three samples indicate an anomalous value of 10ppm or higher and anomalous portions are locally spotted.

Hg: All the samples are under the detection limit.

Mo: Only one sample indicates an anomalous value of 20 ppm.

Ba: Eight samples indicate an anomalous value of 1,500ppm or higher and concentrate at four places.

Sn: All the samples indicate under 7ppb and show no anomalous value.

(5) Considerations

The presence of epithermal gold- silver- lead- zinc deposit (Type II) related to shallow volcanic activity is presumed in Co. Kancha. The result of K-Ar dating of the alteration minerals shows 16 Ma, corresponding to middle Miocene, while the age of dacite laccolith intrusive in the east of the area is 8.0 Ma, it is suggested that the hydrothermal alteration took place at least twice in the area. The mineralization, however, is probably weak or deep-seated, as the geochemical anomalies are weak and scattered.

2-10-2 La Deseada Mine(Figs.II-2-10,II-2-10(4 to 7))

(1) Geology

The area is underlain by pyroclastic rocks such as lapilli tuff, tuff breccia (volcanic breccia), and andesite lavas of Tahua Formation of late Oligocene to early Miocene age.

Pyroclastic rocks are pale green and have undergone chloritization (propyritic alteration).

Clasts of Pyroclastic rocks are mostly of andesite reached 40cm to 50cm in diameter.

Andesite is composed of fine-grained to medium-grained pale greenish gray hornblende andesite and alteration minerals such as chlorite, epidote and sericite are observed under the microscope (No.4985).

Based on the known data, monzoni-diorite of Co.Chufusa intrusives, 1 km west of Co. Mokho shows K-Ar age of 17.6 ± 0.2 Ma.

In the area, faults, veins and fractures with the E-W and ENE-WSW trends are dominant.

(2) Alteration

The hydrothermal alteration zones cover over 4 km^2.

Silicification, argillization and propylization are observed.

Argillization zone is 1m to 2m in width arround the vein at mine site and changes to propyritic zone.

The zone has tendancy to become narrow eastward and wide westward.

At Co.Mokho, east extension of the La Deseada vein, vein-like and lenticular silicification portions are included in a broad argillization zone.

Alteration minerals are quartz, sericite, smectite, alunite and kaolinite.

Chlorite, epidote and sericite are seen in the propyrite zone.

(3) Mineralization

La Deseada Mine is now no workable mine and has 2.5million tons of ore reserves with 0.4g/t Au, 280g/t Ag and 30 thousands tons of dump ore reserves with 0.3g/t Au, 400g/t Ag are reported.

Besides several levels of drifts, a lot of vertical and inclined shafts are driven, and more than two drillholes have been done.

La Deseada deposit is an Au-Ag-Pb-Zn quartz vein with 1 to several meters in width, 1.5km in extension. Strike of vein is a combination of E-W and N70E and dip, 75N to 90.

The changes of mineralization (vein materials) from the upper margin to the lower of the deposit are well observed (Fig.II-2-10 (7)).

Ore minerals such as galena, sphalerite, pyrite, trace amounts of tetrahedrite and polybasite, pyrargyrite as silver minerals are observed under the microscope (No.5749, No.5751 and No.5755).

In order to study thermal properties of mineralization and chemical properties of ore-forming fluid, homogenization temperature and freezing temperature of fluid inclusions of two samples were measured. The measurements are shown in Table II-2-4.

Table II-2-4 Homogenization Temperature and Freezing Temperature (La Deseada Mine)

Sample No.	Mineral	Homogenization Temperature			Freezing Temperature			
		Inc. No.	Range (℃)	Ave (℃)	Inc. No	Range (℃)	Ave (℃)	Salinity (wt%)
4986	Qz	10	168 ~ 218	188	10	-1.5 ~ -0.0	-0.4	0.8
4987	Qz	10	162 ~ 196	188	10	-4.5 ~ -0.9	-2.5	4.1
Average			162 ~ 218	188		-4.5 ~ -0.0	-1.5	2.5

All the two samples measured are quartz, whose homogenization temperatures ranged from 162°C to218°C, and average temperature was 188°C.

The freezing temperatures ranged from -4.5°C to -0.0°C, and average temperature was -1.5°C.

The salinity (NaCl equivalent) that was calculated from these values was 2.5 wt.% in average.

(4) Assay of geochemical samples

Fourty-seven rock-chip samples were collected in this area.

The minimum, maximum and average assay values by elements (in the order of appearance) are as follows:

Au: <2ppb, 4,122ppb, 123ppb, Ag: <0.5ppm, 246.4ppm, 25.8ppm, Cu: 5ppm, 2,025ppm, 93ppm, Pb: 5ppm, 65,400ppm, 2,423ppm, Zn: 7ppm, 1,585ppm, 106ppm, As: <5ppm, 2,371ppm, 98ppm, Sb: <5ppm, 348ppm, 18ppm, Hg: <1ppm, <1ppm, <1ppm, Mo: <1ppm, 44ppm, 7ppm, Ba: 88ppm, 7,176ppm, 1,361ppm, Sn: <5ppm, 30ppm, <5ppm.

Geochemical anomalies of the respective elements are indicated in Fig. II-2-10 (6).

Au: Eight samples indicate an anomalous value of 70ppb or higher and are seen at the upper part of the La Deseada vein and western-end of Co.Mokho alteration zone.

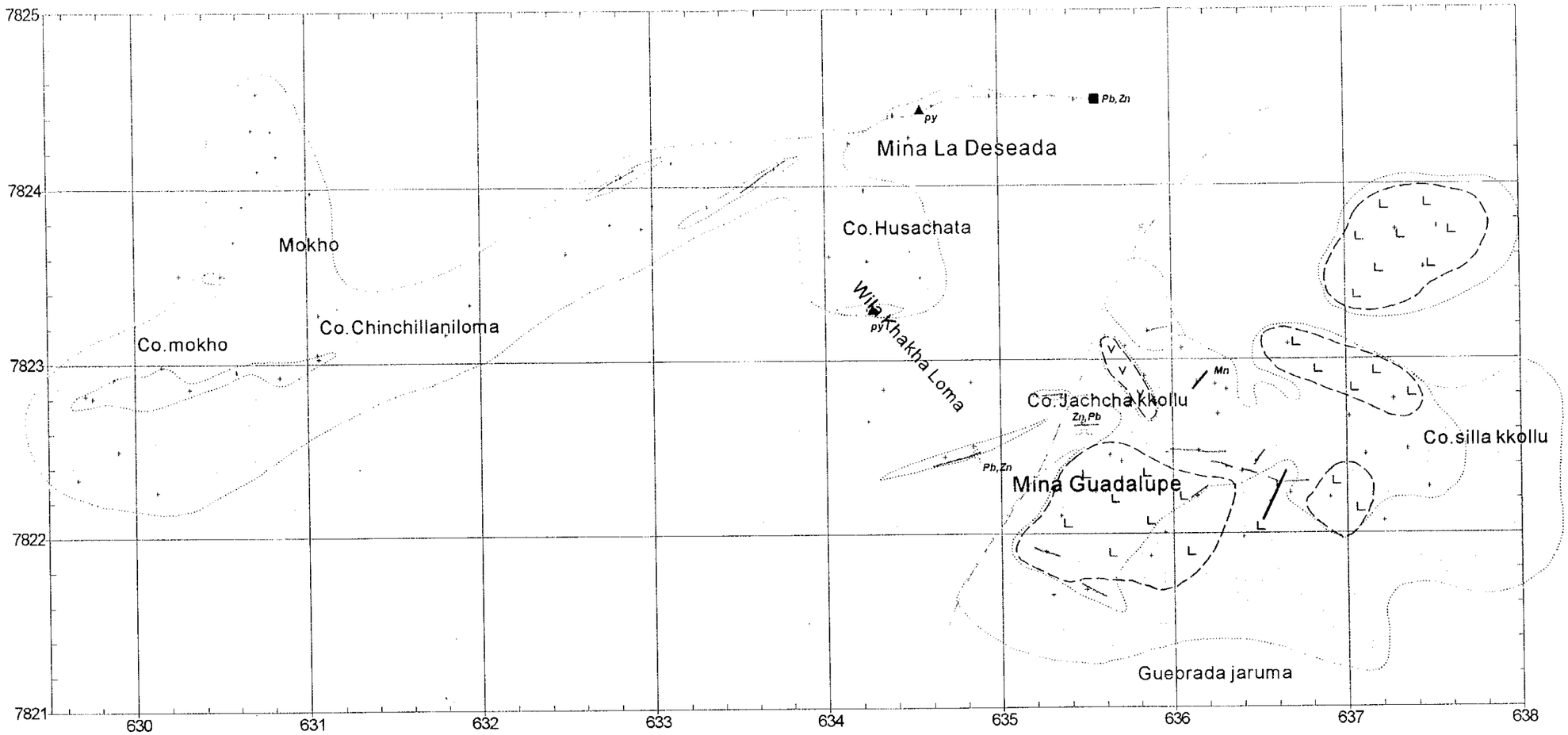
Ag: Seven samples indicate an anomalous value of 30ppm or higher and are seen at the middle and lower parts of the La Deseada vein and Co.Husachata.

Cu: Six samples indicate an anomalous value of 90ppm or higher and are seen at the middle and lower parts of the La Deseada vein.

Pb: Anomalous portions of over 400ppm values are seen at all over the La Deseada vein and western-end of Co.Mokho alteration zone.

Zn: Four samples indicate an anomalous value of 230ppm or higher and are seen at lower

Mendoza
Mina La Deseada, Mokho, Husachata, Mina Guadalupe



Legend

- Geochemical sampling point
- Argillized zone
- Silicified zone
- Ore vein
- Silicified vein
- py pyrite
- Pb,Zn
- hydrothermal breccia
- rhyolitic intrusive and dome
- andesitic intrusive and dome
- fault
- tunnel

Fig.II-2-10 (4)Alteration Map of the Mendoza District (La Deseada, Guadalupe, Maria Luisa)

Mendoza
Mina La Deseada, Mokho, Husachata, Mina Guadalupe

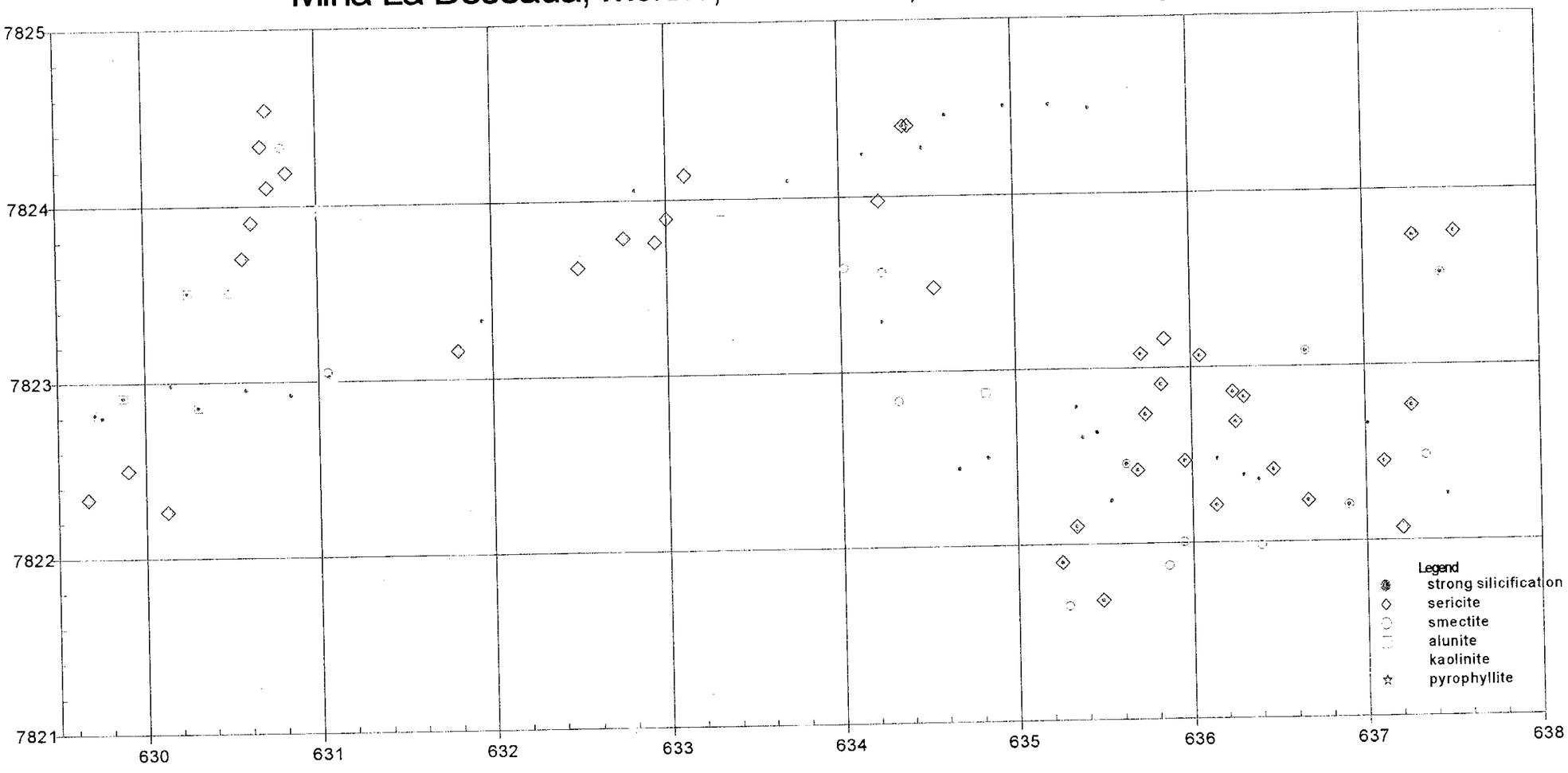


Fig.II-2-10 (5)Distribution Map of Alteration Minerals in the Mendoza District (La Deseada , Guadalupe, Maria Luisa)

Mendoza
Mina La Deseada, Mokho, Husachata, Mina Guadalupe

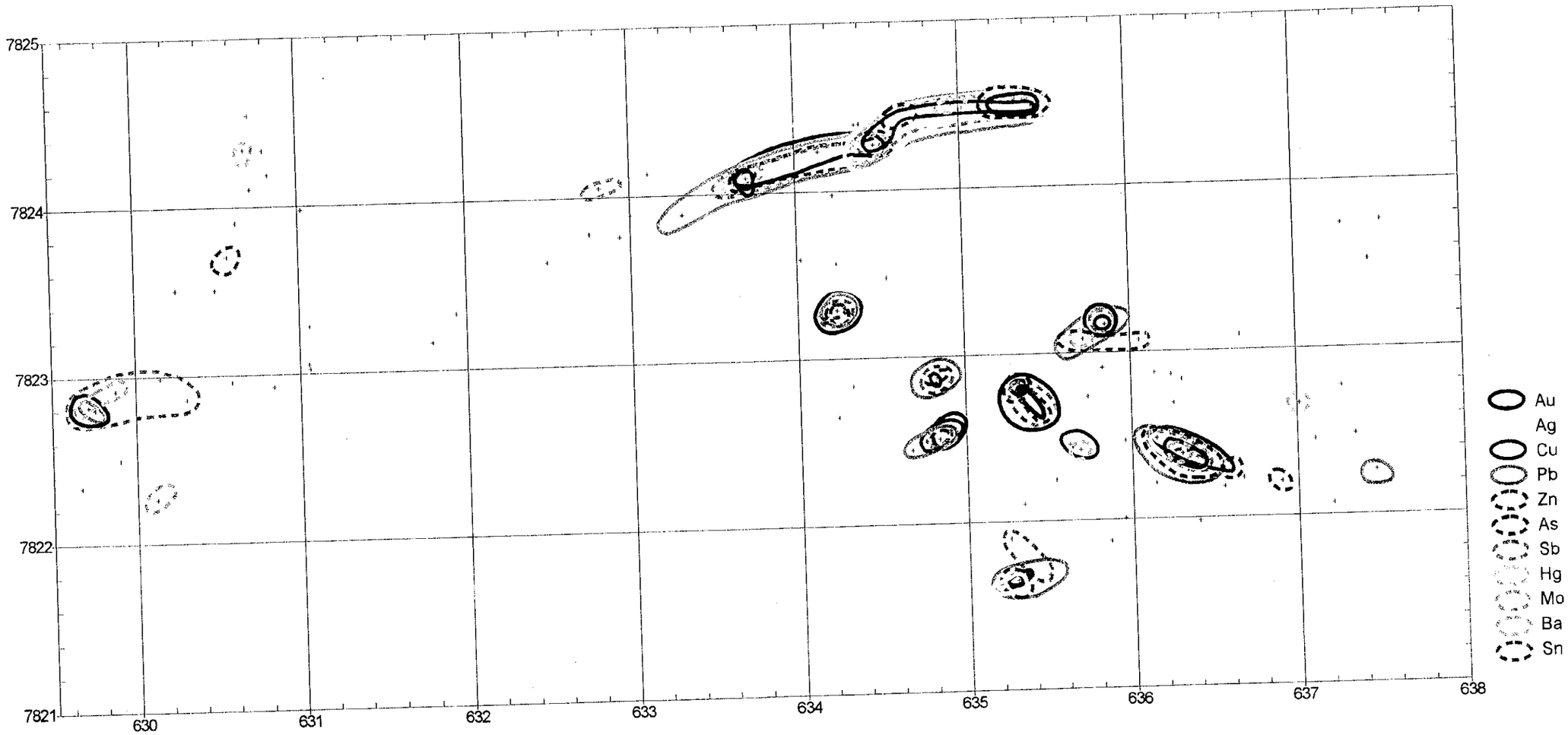


Fig.II-2-10 (6)Geochemical Anomaly Map of the Mendoza District (La Deseada , Guadalupe, Maria Luisa)

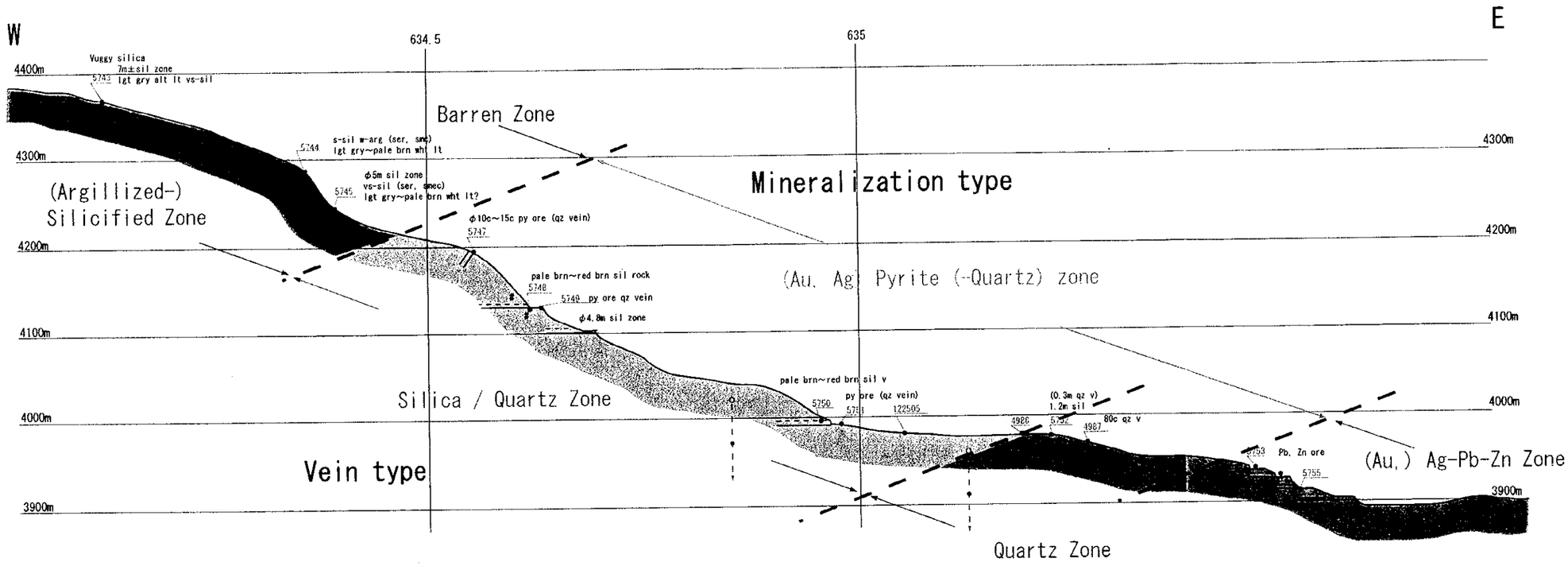


Fig. II-2-10 (7) Schematic section of mineralization at the La Deseada Mine

part of the La Deseada vein and northern slope of Co.Mokho.

As: Five samples indicate an anomalous value of 140ppm or higher and are seen at the upper part of the La Deseada vein, Co.Husachata and western-end of Co.Mokho alteration zone.

Sb: Ten samples indicate an anomalous value of 10ppm or higher and are seen at all over the La Deseada vein, Co.Mokho and Co.Husachata.

Hg: All the samples are under the detection limit.

Mo: Only one sample of La Deseada vein indicates an anomalous value of 44 ppm.

Ba: Six samples indicate an anomalous value of 1,500ppm or higher and anomalous portions are locally spotted.

Sn: Two samples of La Deseada vein and one sample of Co.Husachata indicat an anomalous value of 10ppm or higher.

(5) Considerations

The ore deposits of La Deseada mine are epithermal gold- silver- lead-zinc deposit (Type II) related to shallow volcanic activity. The existence of the similar ore deposit to La Deseada ore deposit is expected beneath the geochemical anomaly of Co. Mokho. Besides, as the alteration zone of Co. Mokho is continuously extended to La Deseada mine, the mineralization of two areas is probably connected.

2-10-3 Guadalupe Mine , Maria Lúisa Mine(Figs.II-2-10,II-2-10(4 to 6))

(1) Geology

The area is underlain by pyroclastic rocks such as lapilli tuff, tuff breccia (volcanic breccia), andesite lavas and andesite, rhyolite intrusive rocks of Tahua Formation of late Oligocene to early Miocene age.

Rhyolite apears four intrusive bodies of 0.3km x 0.4km, 0.3km x 1.0km, 0.6km x 1.0km and 0.8km x 1.0km in dimension and one dyke with 50cm in width, strike of N20E and dip of 65SE, and all have undergone hydrothermal alteration.

Andesite intrusive rock apears closely to the north of the Guadalupe Mine in a shape of ellipse of 100m x 500m with the direction of N30W and dip of 70W. Andesite intrusive rock is younger than rhyolite, because of no alteration.

In the area, faults, veins and fractures with the E-W and WNW-ESE trends are dominant.

At the col between Co.Husachata and Co.Jachcha Kkollu, a fault, limiting alteration zones with NE-SWstrike is presumed.

(2) Alteration

The hydrothermal alteration zones cover over 5 km^2.

Silicification, argillization and propylization are observed.

Silicification zone is rather big around the mine and silicified veins are also involved.

Intrusive rocks have undergone mostly silicification and localy argillization.

Alteration minerals are quartz, sericite, smectite, alunite and kaolinite.

Chlorite, epidote and sericite are seen in the propyrite zone.

(3) Mineralization

Both the Guadalupe Mine and the Maria Lúisa Mine are now no workable and for the former 2.5million tons of ore reserves with 0.4g/t Au, 280g/t Ag and 20 thousands tons of dump ore reserves with 0.4g/t Au, 400g/t Ag are reported. For the latter 175,400 tons of ore reserves with 471g/t Ag, 1.11% Pb, 1.83%Zn are calculated by Rocha (1983).

The Guadalupe deposit is an Au-Ag-Pb-Zn quartz vein with maximum six meters in width.

Strike of vein is a combination of E-W and N80E and dip, 85N to 90.

After microscopic study of one sample collected from a waste dump at the entrance of the Guadalupe drift, enargite is observed and enargite-pyrite-quartz ore is brecciated strongly, filling with fine-grained quartz among clasts (No.6344).

While in the sample collected from the Maria Lúisa Mine, several grains of electrum are observed (No.6385).

In order to study thermal properties of mineralization and chemical properties of ore-forming fluid, homogenization temperature and freezing temperature of fluid inclusions of two samples were measured at the Maria Lúisa Mine. The quartz of the Guadalupe mine were too small to measure. The measurements are shown in Table II-2-5.

Table II-2-5 Homogenization Temperature and Freezing Temperature (Maria Lúisa Mine)

Sample No.	Mineral	Homogenization Temperature			Freezing Temperature			
		Inc. No.	Range (℃)	Ave. (℃)	Inc. No.	Range (℃)	Ave. (℃)	Salinity (wt%)
6385	Qz	10	230 ~ 247	239	10	-0.3 ~ -0.2	-0.2	0.4
6389	Qz	10	259 ~ 279	272	10	-0.2 ~ -0.1	-0.1	0.2
Average			230 ~ 279	256		-0.3 ~ -0.1	-0.2	0.3

All the two samples measured are quartz, whose homogenization temperatures ranged from

230°C to279°C, and average temperature was 256°C.

The freezing temperatures ranged from -0.3°C to -0.1°C, and average temperature was -0.2°C.

The salinity (NaCl equivalent) that was calculated from these values was 0.3 wt.% in average.

(4) Assay of geochemical samples

Fourty-nine rock-chip samples were collected in this area.

The minimum, maximum and average assay values by elements (in the order of appearance) are as follows:

Au: <2ppb, 116ppb, 77ppb, Ag: <0.5ppm, 2,200ppm, 55.5ppm, Cu: 3ppm, 773ppm, 107ppm, Pb: 8ppm, 7,498ppm, 874ppm, Zn: 17ppm, 2,716ppm, 211ppm, As: <5ppm, 1,633ppm, 75ppm, Sb: <5ppm, 172ppm, 11ppm, Hg: <1ppm, 1.0ppm, <1ppm, Mo: <1ppm, 45ppm, 4ppm, Ba: 67ppm, 2,664ppm, 113ppm, Sn: <5ppm, 80ppm, <5ppm.

Geochemical anomalies of the respective elements are indicated in Fig. II-2-10 (6).

Au: Seven samples indicate an anomalous value of 70ppb or higher and anomalous portions are spotted.

Ag: Five samples indicate an anomalous value of 10ppm or higher and anomalous portions spotted in three locations overlap the gold anomaly portions.

Cu: Seven portions indicated an anomalous value of 90ppm or higher overlap the gold anomaly portions.

Pb: Seven portions indicated an anomalous value of 400ppm or higher overlap the gold anomaly portions.

Zn: Five samples indicate an anomalous value of 230ppm or higher and anomalous portions are spotted.

As: Five samples indicate an anomalous value of 140ppm or higher and anomalous portions locally spotted overlap the gold anomaly portions.

Sb: Ten samples indicate an anomalous value of 10ppm or higher and anomalous portions locally spotted in six locations overlap the gold anomaly portions.

Hg: Only one sample indicates 1.0 ppm and all other samples are under the detection limit.

Mo: All the samples indicate under 10ppm and show no anomalous value..

Ba: Five samples indicate an anomalous value of 1,500ppm or higher and anomalous portions are locally spotted.

Sn: Fiva samples indicated an anomalous value of 10ppm or higher, overlap the gold anomaly portions.

(5) Considerations

The mineralization of both Guadalupe mine and Maria Lúisa mine is presumed to be an epithermal gold- silver- lead- zinc deposit (Type II) related to shallow volcanism assumed from the presence of tin minerals. On the other hand, enargite collected from the waste of the portal suggest that there was a high-sulfidation epithermal mineralization (Type IV). As the ore of enargite and pyrite is brecciated, two stages of mineralization have probably taken place.

2-10-4 Co.Chorka , Iranuta Prospects(Figs.II-2-10,II-2-10(8 to 10))

(1) Geology

The area is underlain by pyroclastic rocks such as lapilli tuff, tuff breccia (volcanic breccia), and andesite lavas of Tahua Formation of late Oligocene to early Miocene age. Based on the known data, rhyolite intrusive rocks are reported at 2 km north of Iranuta Village.

Pyroclastic rocks are pale greenish and have undergone weak chloritization and include maximum 1 m in diameter of angular to sub rounded clasts of coarse-grained porphyritic andesite and brown tuff.

Andesite is composed of medium-grained to fine-grained pale greenish gray hornblende-biotite andesite and medium-grained to coase-grained pyroxene andesite, both of them have undergone weak propylization.

In the area, faults, veins and fractures with the ENE-WSW, NE-SW and NW-SE trends are dominant.

(2) Alteration

The hydrothermal alteration zones cover over 5 km^2.

Silicification, argillization and propylization are observed.

At Co.Chorka argillization zones expand westward from the top of the mountain.

Silicified portions are involved in argillization zone and hydrothermal breccia shows vein-like and many breccia pipes are on the line.

At the western foot of the mountain, vein-like silicification is acompanied by argillization, there remain original rock textures locally.

Breccia pipes show cylindrical shape with several meters to several tens meters in diameter, and crescent or semicircular shape in places. At the magin of pipes brecciation with 1 cm to 40 cm silicified rock fragments, at centre deposition of fine-grained silica are observed.

Center of pipe becomes hollow frequently by erosion and no rock crops out.

In the Iranuta area, about 2km north of Co.Chorka, tuff bed has mainly undergone silicification and silicified veins and quartz veins with ENE-WSW trend are observed.

Mendoza
Chorka, Iranuta

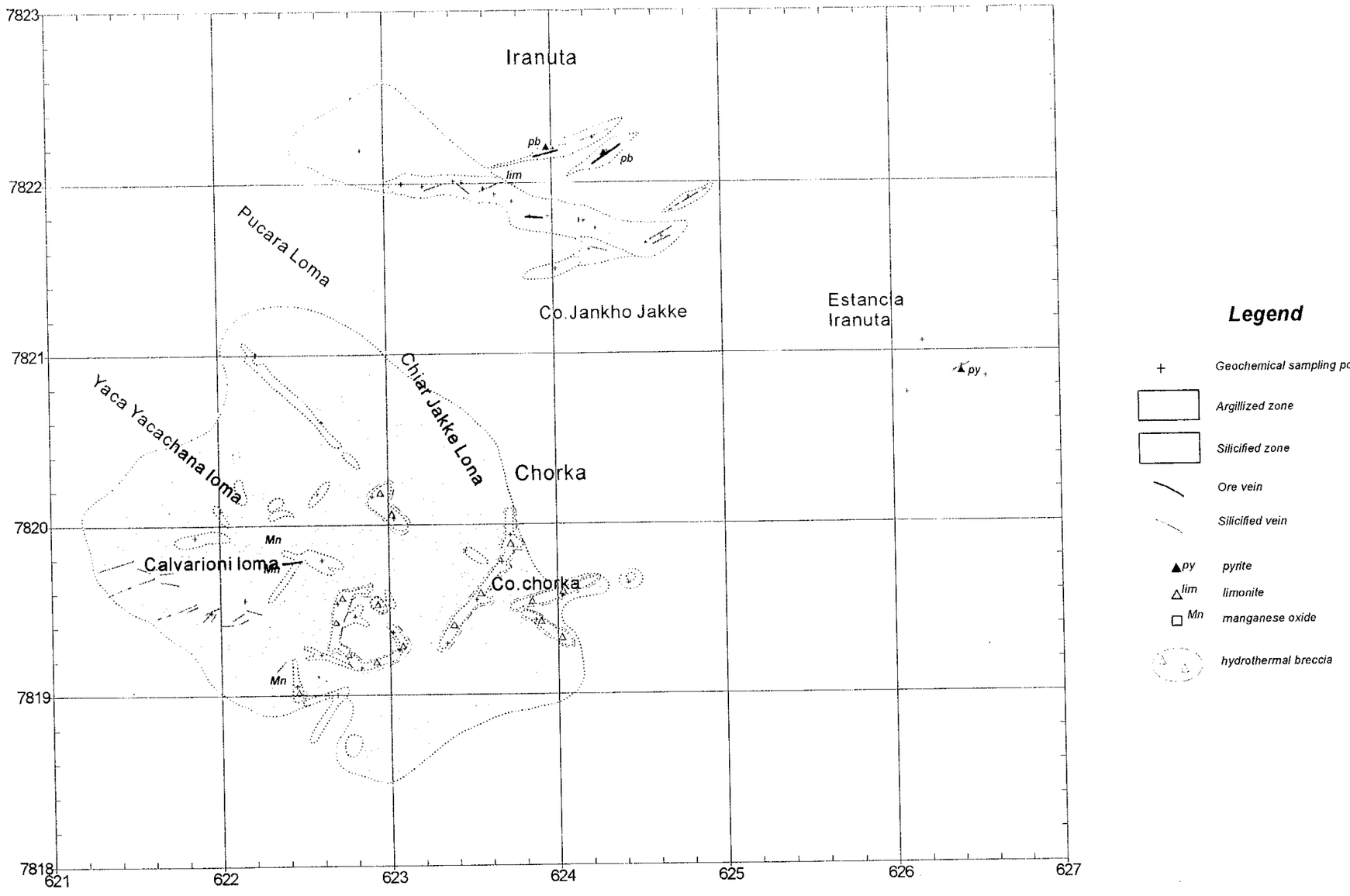


Fig.II-2-10 (8)Alteration Map of the Mendoza District (Chorka)

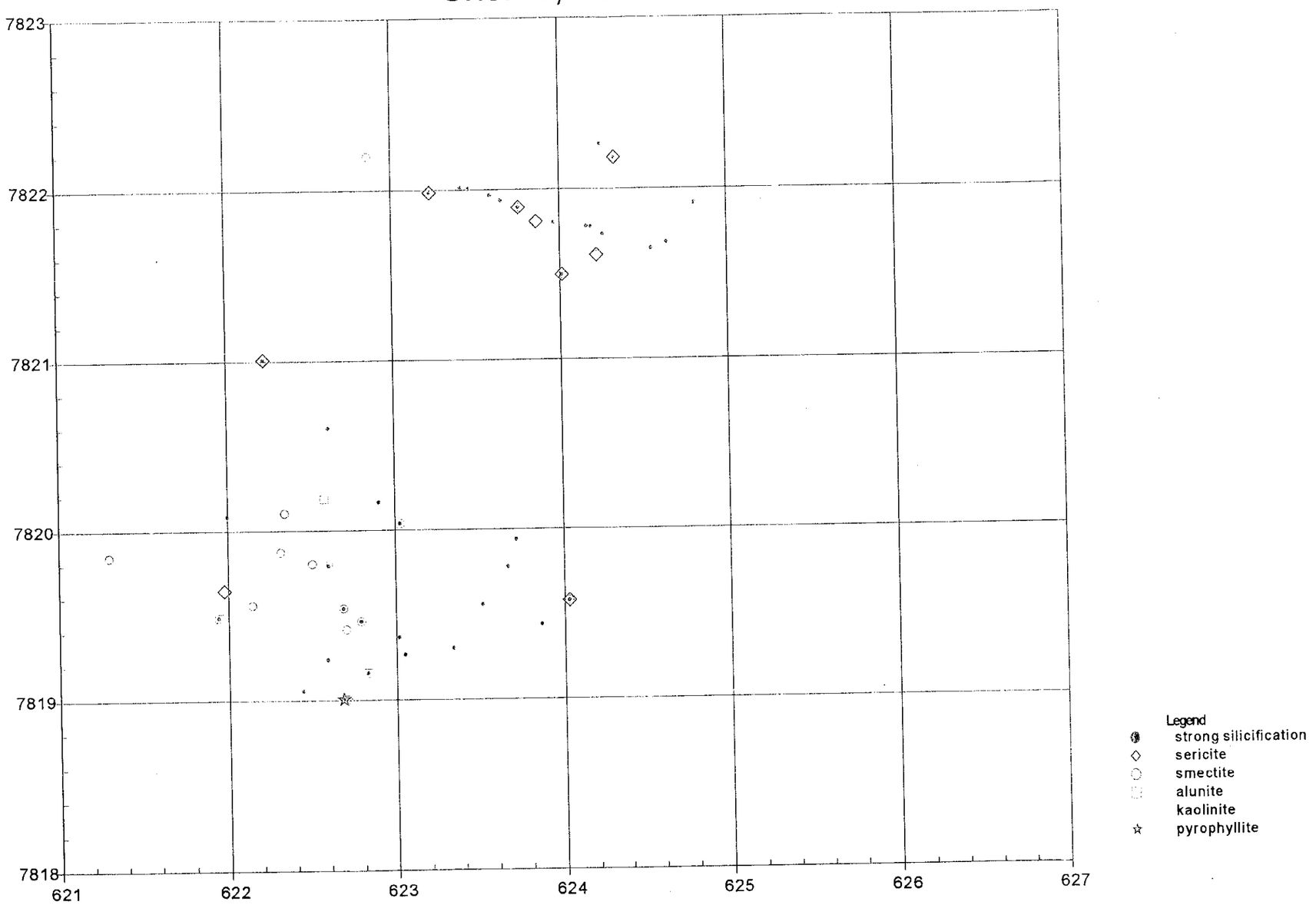


Fig.II-2-10 (9)Distribution Map of Alteration Minerals in the Mendoza District (Chorka)

Alteration minerals are quartz, smectite, kaolinite, alunite, sericite and pyrophyllite at Co.Chorka, quartz, smectite and kaolinite at Iranuta.

Chlorite, epidote and sericite are in propylitic portions.

(3) Mineralization

Vein-like lead mineralization is seen in propylite at Iranuta. Galena veinlets of maximum 3 cm in width are observed in clay veins with 60 cm in width and strike of N60E, dip of 70 SE (PL-23).

Galena is acompanied by cerussite under microscope (No.6336).

Small quartz veins with strike of N50E to N70E and pyrite dissemination are seen in propylite at about 500m southeastern part of Iranuta village. Except pyrite no ore mineral is observed under the microscope (No.6332).

Only manganese oxide minerals and goethite veins exist at three places in Co. Chorka area.

In order to study thermal properties of mineralization and chemical properties of ore-forming fluid, homogenization temperature and freezing temperature of fluid inclusions of five samples were measured. The measurements are shown in Table II-2-6.

Table II-2-6 Homogenization Temperature and Freezing Temperature (Iranuta Prospect)

Sample No.	Mineral	Homogenization Temperature			Freezing Temperature			
		Inc. No.	Range (℃)	Ave (℃)	Inc. No.	Range (℃)	Ave (℃)	Salinity (wt%)
6316	Qz	10	165 ~ 270	221	10	-1.2 ~ -0.9	-1.2	2.0
6325	Qz	11	239 ~ 290	254	10	-0.2 ~ -0.1	-0.2	0.3
6335	Qz	10	242 ~ 268	253	10	-0.3 ~ -0.1	-0.2	0.3
6338	Qz	10	249 ~ 272	266	10	-0.3 ~ 0.0	-0.2	0.3
6332	Cal	10	243 ~ 373	297	10	-0.5 ~ -0.1	-0.3	0.5
Average			165 ~ 373	258		-1.2 ~ 0.0	-0.5	0.7

Four samples measured are quartz, and one sample is calcite, whose homogenization temperatures ranged from 165°C to 373°C, and average temperature was 258°C.

The freezing temperatures ranged from -1.2°C to -0.0°C, and average temperature was -0.5°C.

The salinity (NaCl equivalent) that was calculated from these values was 0.7 wt.% in average.

(4) Assay of geochemical samples

Fifty-two rock-chip samples were collected in this area.

The minimum, maximum and average assay values by elements (in the order of appearance) are as follows:

Au: <2ppb, 60ppb, 5ppb, Ag: <0.5ppm, 20.6ppm, 2.4ppm, Cu: 2ppm, 465ppm, 31ppm, Pb: 4ppm, 36,100ppm, 1,310ppm, Zn: <2ppm, 3,673ppm, 172ppm, As: <5ppm, 543ppm, 58ppm, Sb: <5ppm, 81ppm, 8ppm, Hg: <1ppm, 2.0ppm, <1ppm, Mo: <1ppm, 28ppm, 4ppm, Ba: 43ppm, 15,885ppm, 862ppm, Sn: <5ppm, 8ppm, <5ppm.

Geochemical anomalies of the respective elements are indicated in Fig. II-2-10 (10).

Au: Two samples indicate 60 ppb and 42 ppb, near anomalous value, are found at Co.Chorka.

Ag: All the samples indicate under 20.6 ppm and show no anomalous value.

Cu: Three samples at Iranuta indicate an anomalous value of 90 ppm or higher and 68 ppm was the highest at Co.Chorka.

Pb: Six samples at Iranuta and four samples at Co.Chorka indicate an anomalous value of 400 ppm and higher.

Zn: Seven samples indicated an anomalous value of 230ppm or higher overlap the copper anomaly portions.

As: Three samples at Iranuta indicated an anomalous value of 140ppm or higher overlap the copper anomaly portions.

Sb: Five samples at Iranuta and seven samples of breccia pipes on the top of Co.Chorka indicate an anomalous value of 10 ppm and higher.

Hg: Only one sample at Iranuta indicates 2.0 ppm of anomalous value and all the others are under the detection limit.

Mo: All the samples indicate under 28 ppm and show no anomalous value.

Ba: Each one sample at both Iranuta and Co.Chorka indicate an anomalous value of 1,500ppm or higher.

Sn: All the samples indicate under 8 ppm and show no anomalous value.

(5) Considerations

The mineralization of Iranuta prospect correspond to epithermal deposit (type III) related to shallow hypabyssal intrusion judged from the alteration is neutral and tin minerals are not recognized.

Homogenization temperature of fluid inclusion shows 258℃ in average, suggesting that the mineralized temperature correspond to the deeper part of mineralized zone. Additionally, it is possible to exist porphyry type ore deposit beneath the mineralized zone.

The mineralization at Co. Chorka is presumed to be high- sulfidation epithermal deposit (Type IV), judged from the presence of acidic alteration minerals such as kaolinite, alunite and pyrophyllite, although the geochemical anomaly is not remarkable. As the anomalies of lead and

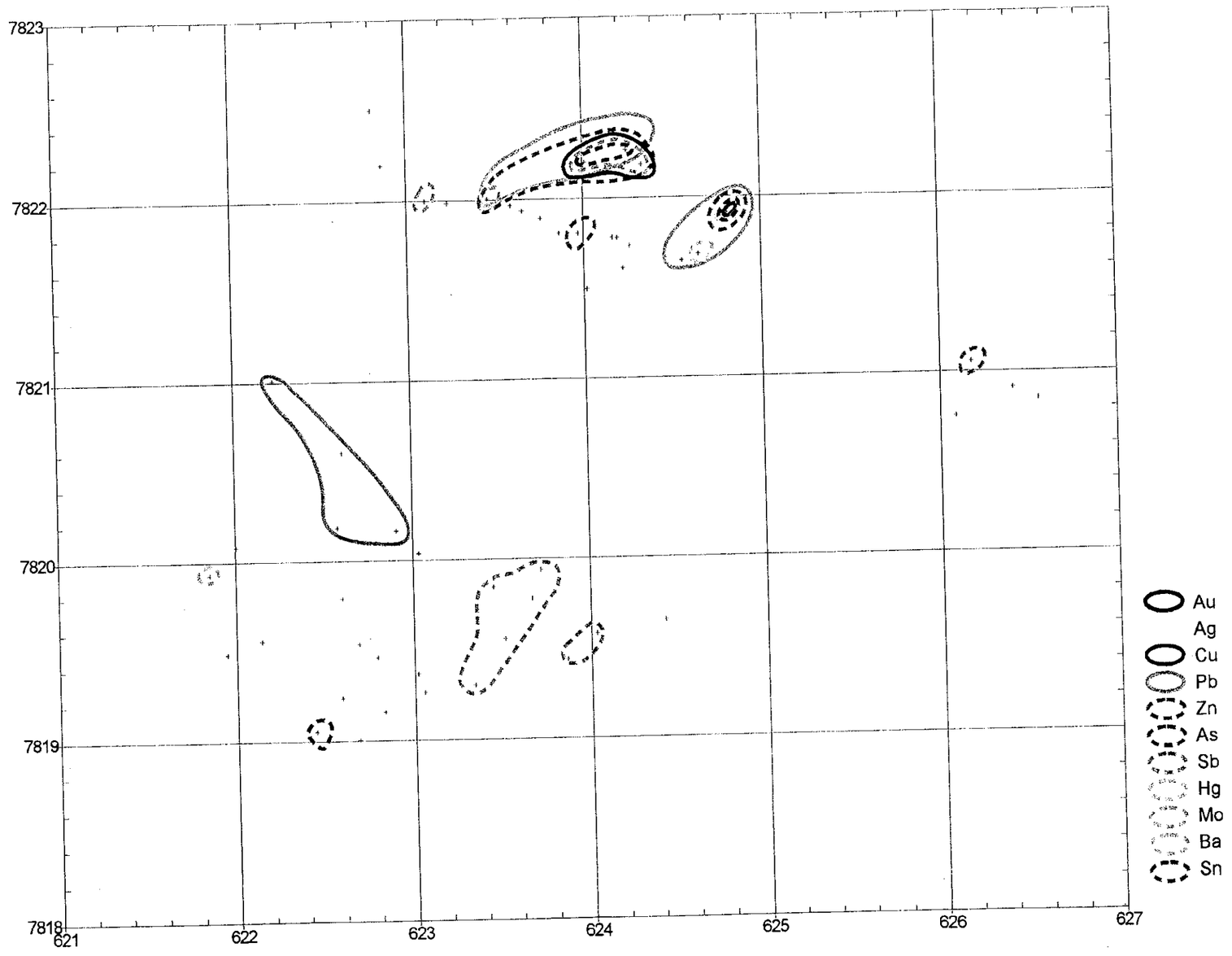


Fig.II-2-10 (10) Geochemical Anomaly Map of the Mendoza District (Chorka)

antimony are more or less concentrated and hydrothermal breccia and breccia pipe which formed along the fractures are extensively developed, possibility of existing ore deposit in deeper portion is probably high.

2-11 Panizo District

2-11-1 Vilasaca Prospect(Figs.II-2-11,II-2-11(1 to 3))

(1) Geology

The area is underlain by Ulo Lavas of late Miocene to Pliocene.

Ulo Lavas are composed of pyroclastic rocks, andesite and rhyolite lavas. Sandy tuff and tuff breccia at northern end of studied area may correspond to Murmuntani Formation of early to middle Miocene age.

Andesite is dark gray to gray and is composed of fine-grained to medium-grained biotite-hornblende andesite and pyroxene andesite.

Rhyolite is dark gray and glassy, partially involving andesite fragments of 0.5 cm to 3 cm in size.

In the area, faults, veins and fractures with the NE-SW trend are dominant.

(2) Alteration

The hydrothermal alteration zones cover about 4 km^2.

Silicification zones indicated mainly NE-SW direction, are included in argillization zone elongated NNW-SSE.

Hydrothermal breccia is ocupied topographically higher part in the south.

Alteration minerals are quartz, smectite, alunite and kaolinite.

(3) Mineralization

Pyrite dissemination is observable in only one place.

(4) Assay of geochemical samples

Thirty-four rock-chip samples were collected in this area.

The minimum, maximum and average assay values by elements (in the order of appearance) are as follows:

Au: <2ppb, 3ppb, <2ppb, Ag: <0.5ppm, <0.5ppm, <0.5ppm, Cu: 3ppm, 57ppm, 23ppm, Pb: <3ppm, 166ppm, 24ppm, Zn: 3ppm, 98ppm, 30ppm, As: <5ppm, 697ppm, 58ppm, Sb: <5ppm, 38ppm, <5ppm, Hg: <1ppm, <1ppm, <1ppm, Mo: <1ppm, 120ppm, 7ppm, Ba: 162ppm, 1,377ppm, 805ppm, Sn: <5ppm, 11ppm, <5ppm.

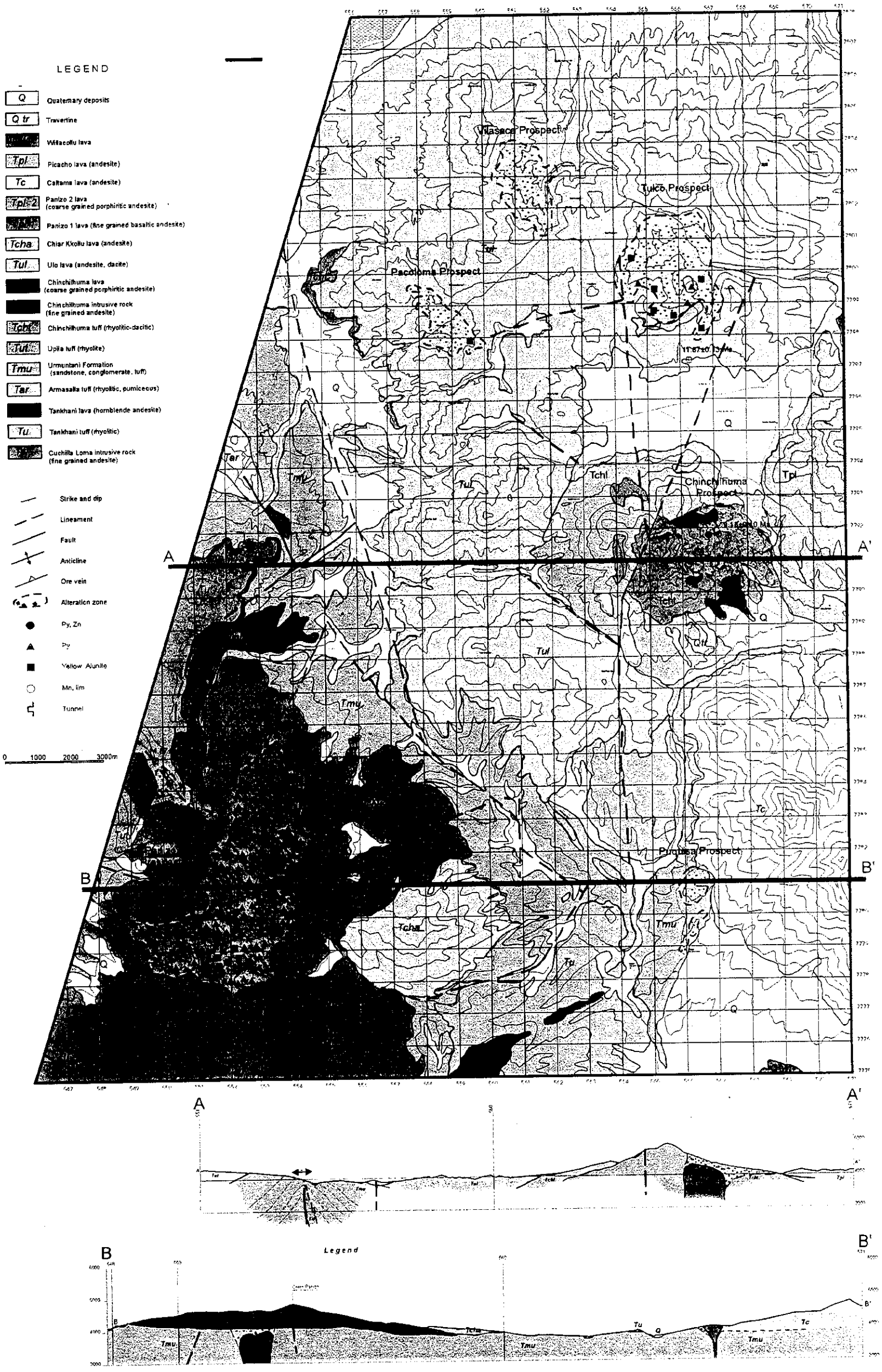


Fig. II-2-11 Geological Map of the Panizo District

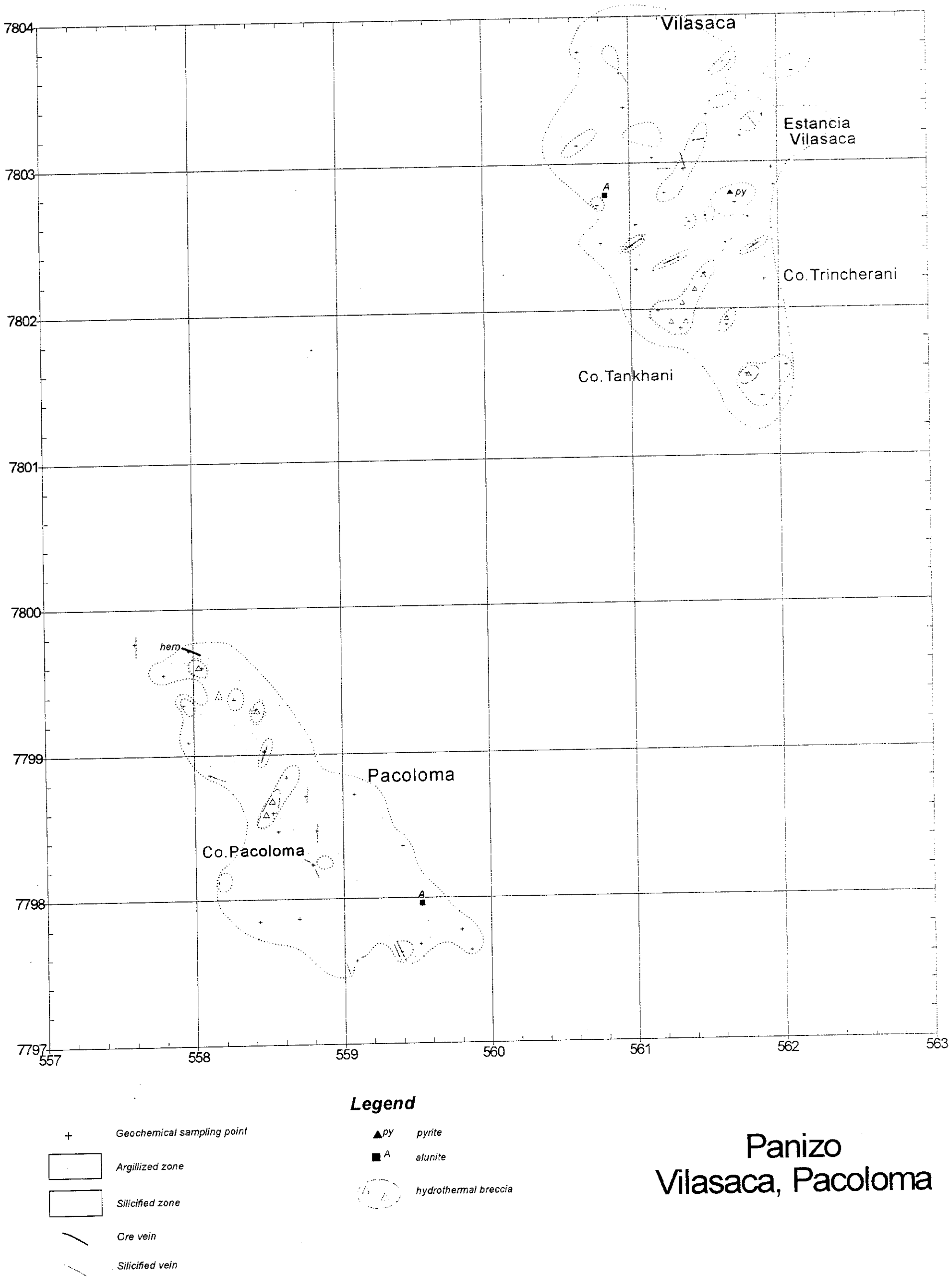


Fig.II-2-11 (1)Alteration Map of the Panizo District (Vilasaca,Pacoloma)

Panizo
Vilasaca, Pacoloma

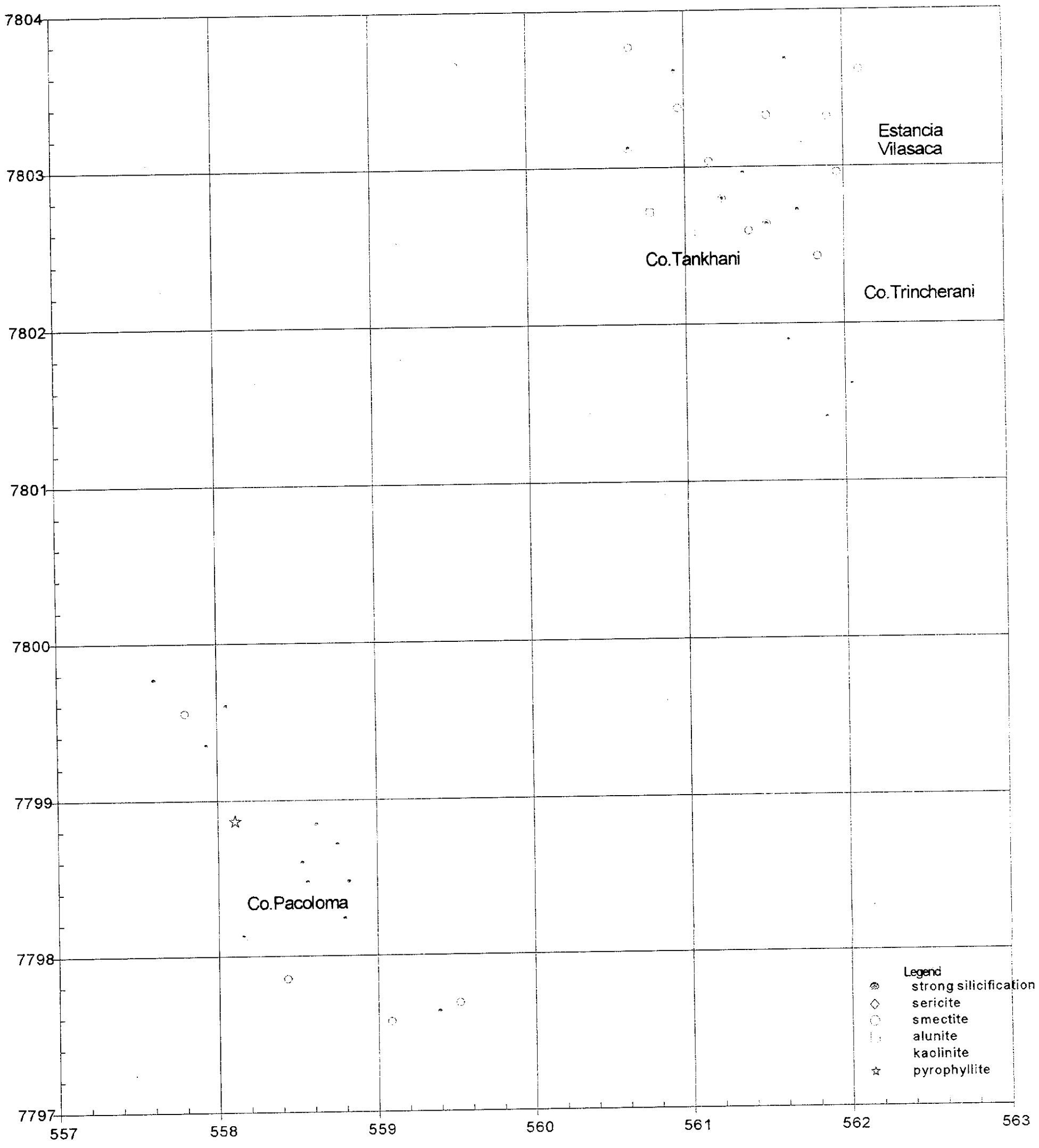


Fig.II-2-11 (2)Distribution Map of Alteration Minerals in the Panizo District (Vilasaca,Pacoloma)

Panizo
Vilasaca, Pacoloma

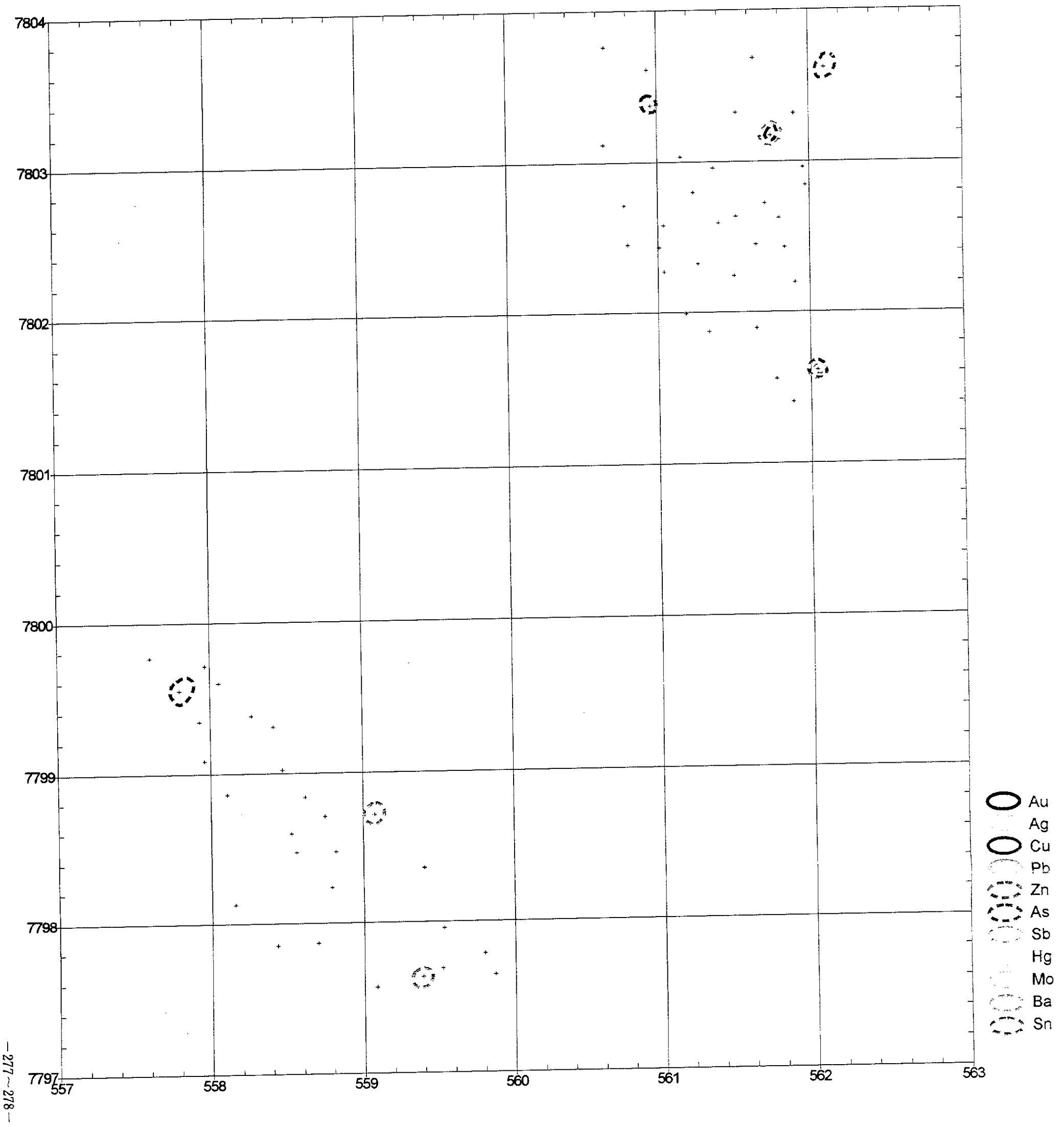


Fig.II-2-11 (3)Geochemical Anomaly Map of the Panizo District (Vilasaca,Pacoloma)

Geochemical anomalies of the respective elements are indicated in Fig. II-2-11 (3).

Au: All the samples indicate under 3 ppb and show no anomalous value.

Ag: All the samples are under the detection limit.

Cu: All the samples indicate under 57 ppm and show no anomalous value

Pb: All the samples indicate under 166 ppm and show no anomalous value.

Zn: All the samples indicate under 98 ppm and show no anomalous value.

As: Two samples indicate an anomalous value of 140 ppm or higher and exist separately.

Sb: One sample indicated an anomalous value of 38 ppm, overlaps arsenic anomaly portions.

Hg: All the samples are under the detection limit.

Mo: One sample indicates an anomalous value of 120 ppm and the others are all under 98 ppm.

Ba: All the samples indicate under 1,377 ppm and show no anomalous value.

Sn: Two samples indicate an anomalous value of 10 ppm or higher and exist separately.

(5) Considerations

An epithermal gold- silver- lead- zinc deposit (Type II) related to shallow volcanic activity is expected to occur in Vilasaca prospect assumed from the presence of tin minerals. As the geochemical anomaly is weak, the mineralization will be weak or deep-seated.

2-11-2 Pacoloma Prospect(Figs.II-2-11,II-2-11(1 to 3))

(1) Geology

The area is underlain by Ulo Lavas of late Miocene to Pliocene.

Ulo Lavas are composed of pyroclastic rocks, andesite lava.

Pyroclastic rocks ocupied center of Co.Pacoloma and is surrounded by lavas.

Based on the distribution of flow texture, the existence of intrusive rock underneath is suggested.

Andesite is dark gray to gray and is medium-grained to coase-grained biotite-pyroxene andesite.

In the area, faults, veins and fractures with the NE-SW and N-S trends are seen.

(2) Alteration

The hydrothermal alteration zones cover about 3 km^2.

Alteration zones of NW-SE elongation are seen on the hilltop of Co. Pacoloma.

Silicified veins and silicified hydrothermal breccia are included in argillization zone.

Alteration intensity is rather weak in whole area.

Alteration minerals are quartz, smectite, kaolinite, alunite and pyrophyllite.

(3) Mineralization

Only yellow alunite at southeastern part and hematite at norteastern part are observed.

(4) Assay of geochemical samples

Twenty-seven rock-chip samples were collected in this area.

The minimum, maximum and average assay values by elements (in the order of appearance) are as follows:

Au: <2ppb, 2ppb, <2ppb, Ag: <0.5ppm, <0.5ppm, <0.5ppm ppm, Cu: 5ppm, 39ppm, 18ppm, Pb: <3ppm, 66ppm, 22ppm, Zn: <2ppm, 81ppm, 25ppm, As: <5ppm, 206ppm, 37ppm, Sb: <5ppm, 15ppm, <5ppm, Hg: <1ppm, <ppm, <1ppm, Mo: <1ppm, 30ppm, 5ppm, Ba: 60ppm, 1,445ppm, 720ppm, Sn: <5ppm, 6ppm, <5ppm.

Geochemical anomalies of the respective elements are indicated in Fig. II-2-11 (3).

Au: All the samples indicate under 2 ppb and show no anomalous value.

Ag: All the samples are under the detection limit.

Cu: All the samples indicate under 39 ppm and show no anomalous value.

Pb: All the samples indicate under 66 ppm and show no anomalous value.

Zn: All the samples indicate under 81 ppm and show no anomalous value.

As: Two samples indicate an anomalous value of 140 ppm or higher and exist separately.

Sb: Two samples indicate an anomalous value of 10 ppm or higher and exist separately.

Hg: All the samples are under the detection limit.

Mo: All the samples indicate under 30 ppm and show no anomalous value.

Ba: All the samples indicate under 1,445 ppm and show no anomalous value.

Sn: One sample indicates 6 ppm and all the others are under the detection limit.

(5) Considerations

In Pacoloma prospect anomalies of arsenic and antimony are scattered and type of ore deposits is difficult to be estimated. The mineralization is also weak or deep-seated.

2-11-3 Tulco Prospect(Figs.II-2-11,II-2-11(4 to 6))

(1) Geology

The area is underlain by Murmuntani Formation of early to middle Miocene age and Ulo Lavas of late Miocene to Pliocene age.

Murmuntani Formation, composed of light gray tuffaceous sandstone and conglomerate,

crops out on the eastern and norteastern slope of Co. Tuluco.

Pyroclastic rocks of Ulo Lavas distribute at lower part and lavas, on the ridges and hilltops.

Andesite is dark gray to gray and is composed of medium-grained to coase-grained biotite-pyroxene andesite and biotite-hornblende andesite. K-Ar age dating of biotite-pyroxene andesite indicates 11.87 ± 0.13 Ma.

In the area, faults, veins and fractures with the E-W and N-S trends are dominant.

(2) Alteration

The hydrothermal alteration zones cover about 8 km^2.

Silicification zones with NE-SW, E-W and N-S elongations are involved in argillization zone of an ellipse shape with N-S direction.

Most of pyroclastic rocks have undergone hydrothermal alteration and andesites, in part.

Hydrothermal breccia bodies appear at the centre part of alteratiom zone.

Alteration minerals are quartz, smectite, alunite and kaolinite.

(3) Mineralization

Pyrite disseminations and yellow alunite are observable in some places.

(4) Assay of geochemical samples

Sixty-two rock-chip samples were collected in this area.

The minimum, maximum and average assay values by elements (in the order of appearance) are as follows:

Au: <2ppb, 5ppb, <2ppb, Ag: <0.5ppm, 0.5ppm, <0.5ppm, Cu: 2ppm, 88ppm, 22ppm, Pb: <3ppm, 491ppm, 43ppm, Zn: 2ppm , 120ppm, 17ppm, As: <5ppm, 1,514ppm, 100ppm, Sb: <5ppm, 116ppm, 8ppm, Hg: <1ppm, <1ppm, <1ppm, Mo: <1ppm, 53ppm, 7ppm, Ba: 66ppm, 1,792ppm, 792ppm, Sn: <5ppm, 23ppm, <5ppm.

Geochemical anomalies of the respective elements are indicated in Fig. II-2-11 (6).

Au: All the samples indicate under 5ppb and show no anomalous value.

Ag: All the samples are under the detection limit.

Cu: All the samples indicate under 88 ppm and show no anomalous value.

Pb: One sample indicated an anomalous value of 491 ppm overlaps molybdenum anomaly portions and all the otheres are under 278 ppm.

Zn: All the samples indicate under 120 ppm and show no anomalous value.

As: Ten samples indicate an anomalous value of 140ppm or higher and concentrate at lower

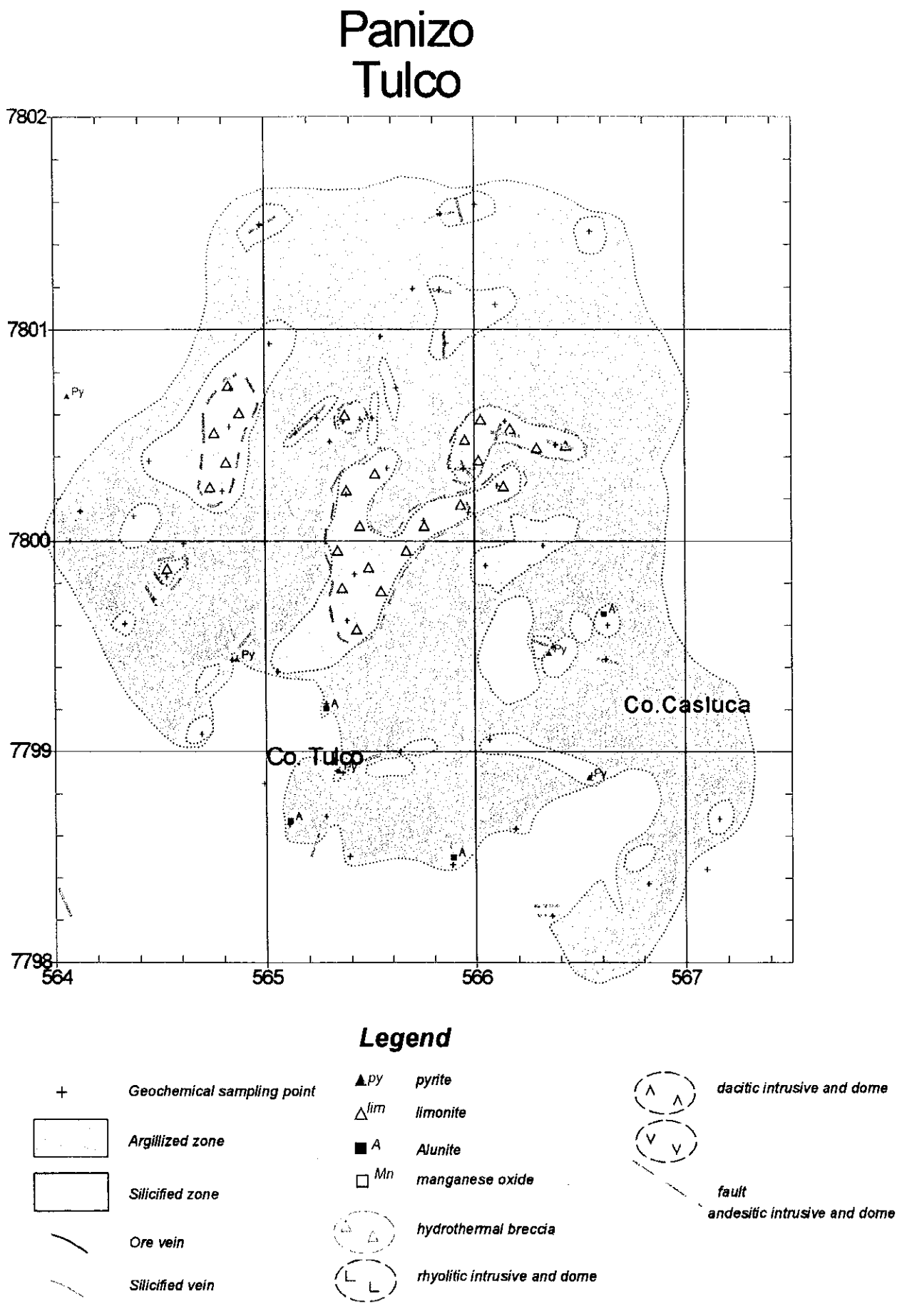


Fig.II-2-11 (4)Alteration Map of the Panizo District (Tulco)

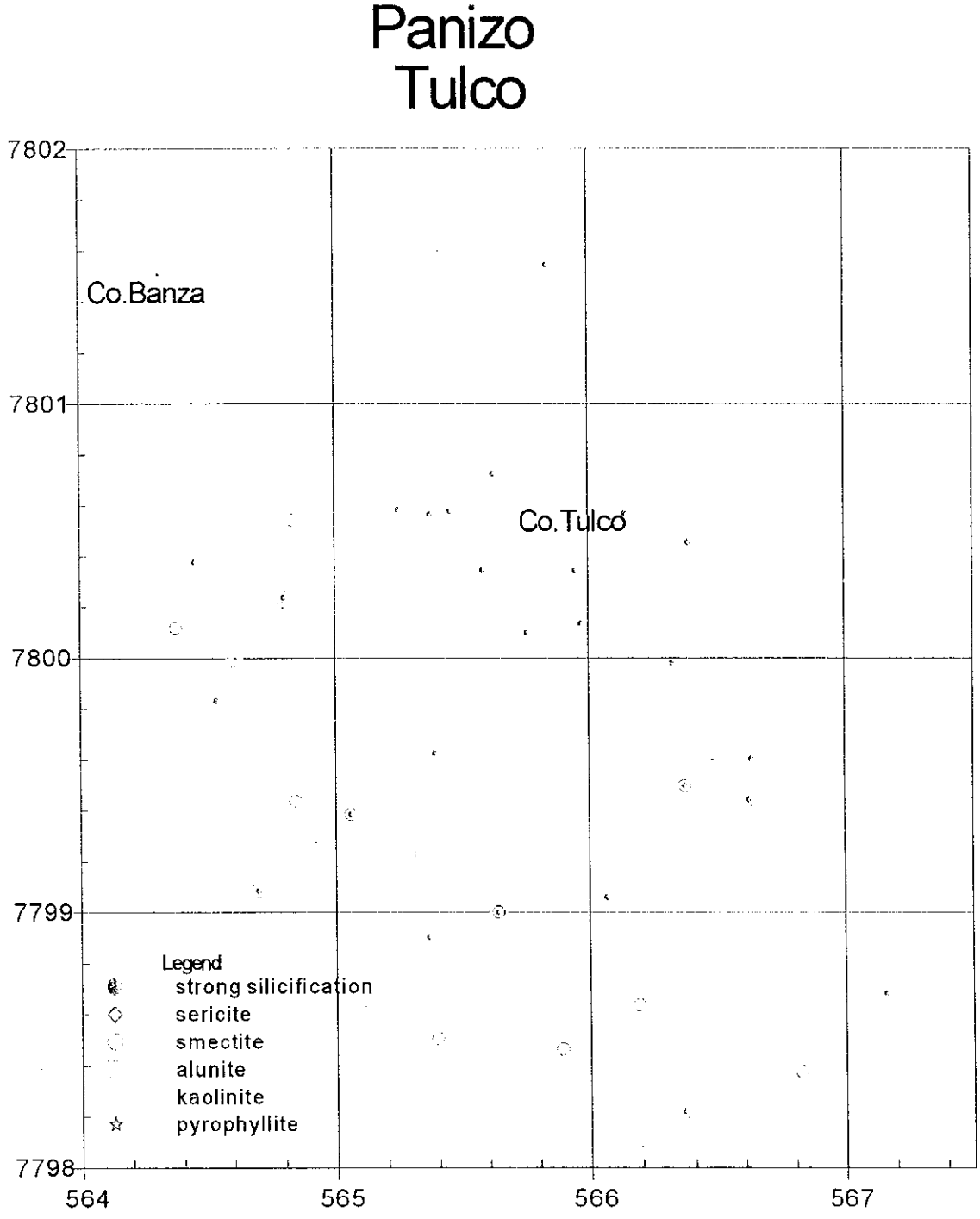


Fig.II-2-11 (5)Distribution Map of Alteration Minerals in the Panizo District (Tulco)

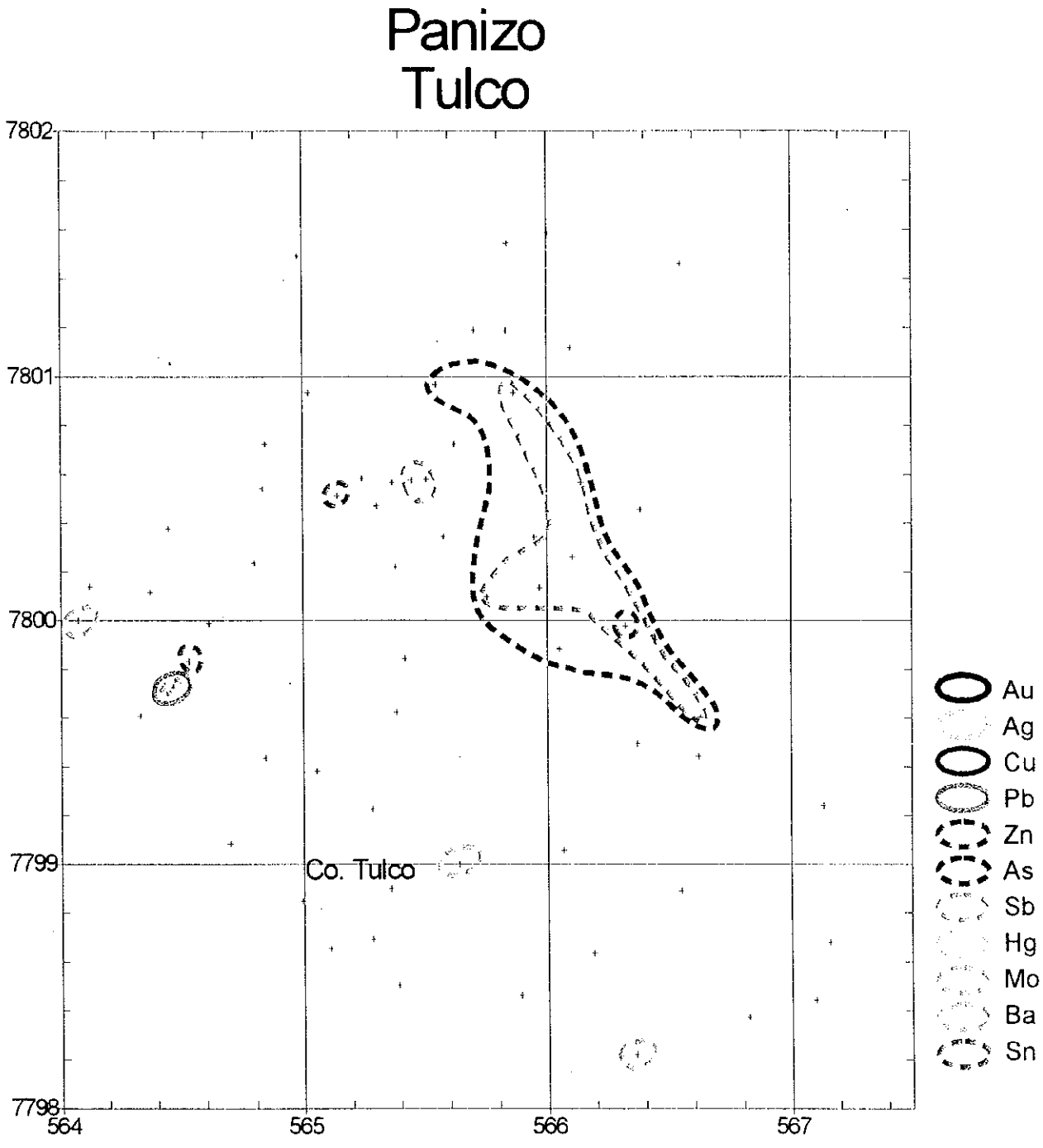


Fig.II-2-11 (6)Geochemical Anomaly Map of the Panizo District (Tulco)

part of east central area, overlapping approximately antimony anomalous portions.

Sb: Nine samples indicated an anomalous value of 10ppm or higher overlap arsenic anomaly portions.

Hg: All the samples are under the detection limit.

Mo: One sample indicated an anomalous value of 53 ppm overlaps molybdenum anomaly portions and all the otheres are under 36 ppm.

Ba: Three samples indicated an anomalous value of 1,500 ppm or higher exist separately.

Sn: Three samples indicated an anomalous value of 10 ppm or higher exist separately.

(5) Considerations

An epithermal gold- silver - lead- zinc deposit (Type II) related to shallow volcanic activity is expected to occur in Tulco prospect from the presence of tin. There is a possibility of existing ore deposits in the area where geochemical anomalies of arsenic and antimony are overlapped. But as there is no other geochemical anomaly, the mineralization will be deep if it exists.

2-11-4 Chinchilhuma Prospect(Figs.II-2-11,II-2-11(7 to 9))

(1) Geology

The area is underlain by Chinchilhuma volcanic rocks of middle to late Miocene age.

Rhyolitic to dacitic pyroclastic rocks distribute From the mountaintop to the eastern and southeastern slope and the rest, andesite.

In the area, faults, veins and fractures with the NE-SW trend prevail and N-S trend is also obserbable.

(2) Alteration

The hydrothermal alteration zones cover about 5 km^2.

Silicification and argillization are observed and vein-like to lenticular silicified portions are included in broad argillization zone.

Alteration minerals are sericite and smectite.

K-Ar age dating of sericitized tuff indicates 9.18 ± 0.10 Ma.

(3) Mineralization

Exploration work start since colonial periods and the geological-geochemical survey and IP survey have been done in 1995 by canadian cooperation (CIDA: Canadian International Ddevelopement Agency).

Many traces of exploration works are left and both tunnels of San Salvador and Aguilani

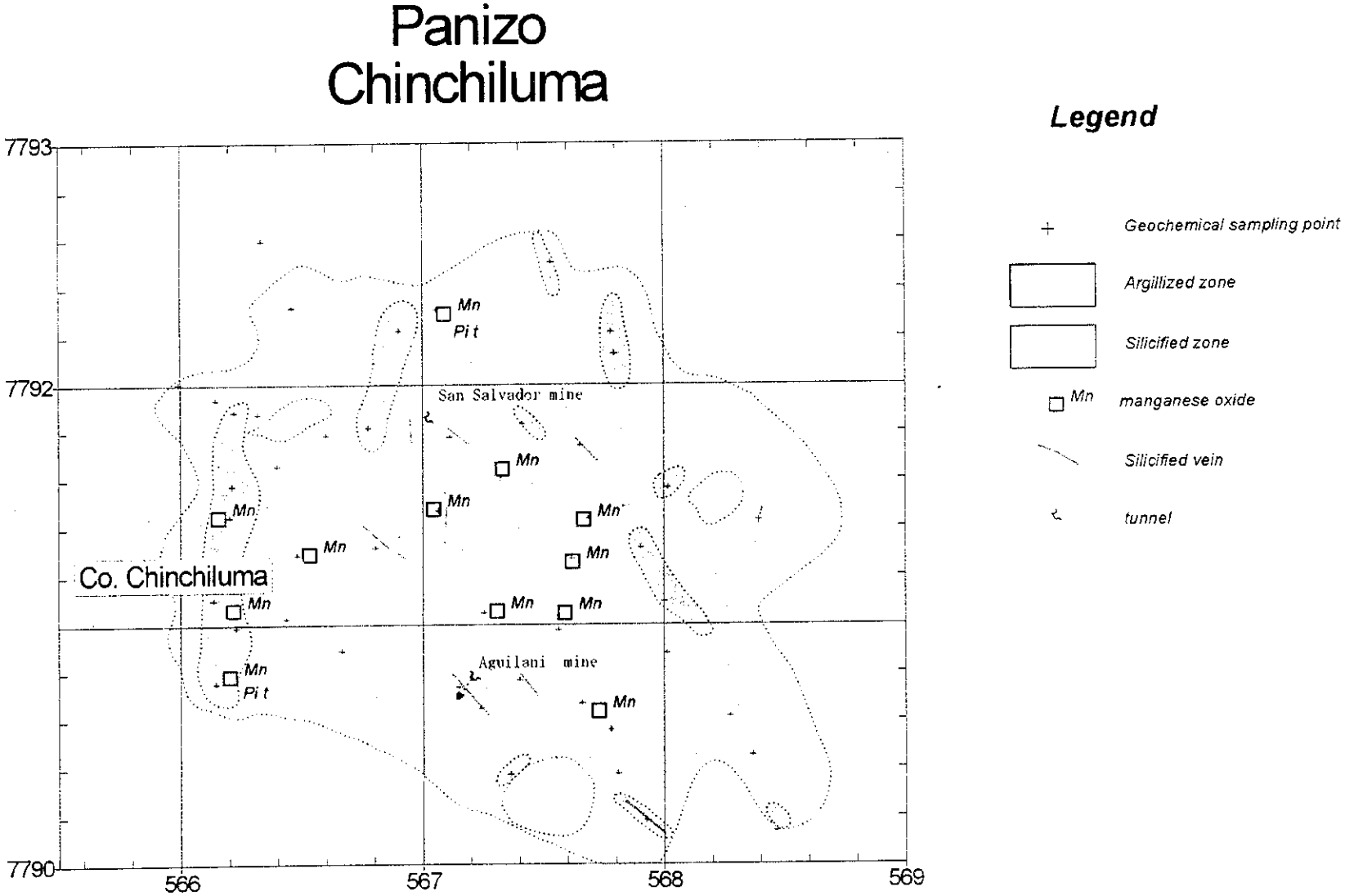


Fig.II-2-11 (7)Alteration Map of the Panizo District (Chinchilhuma)

Panizo - Chinchilhuma

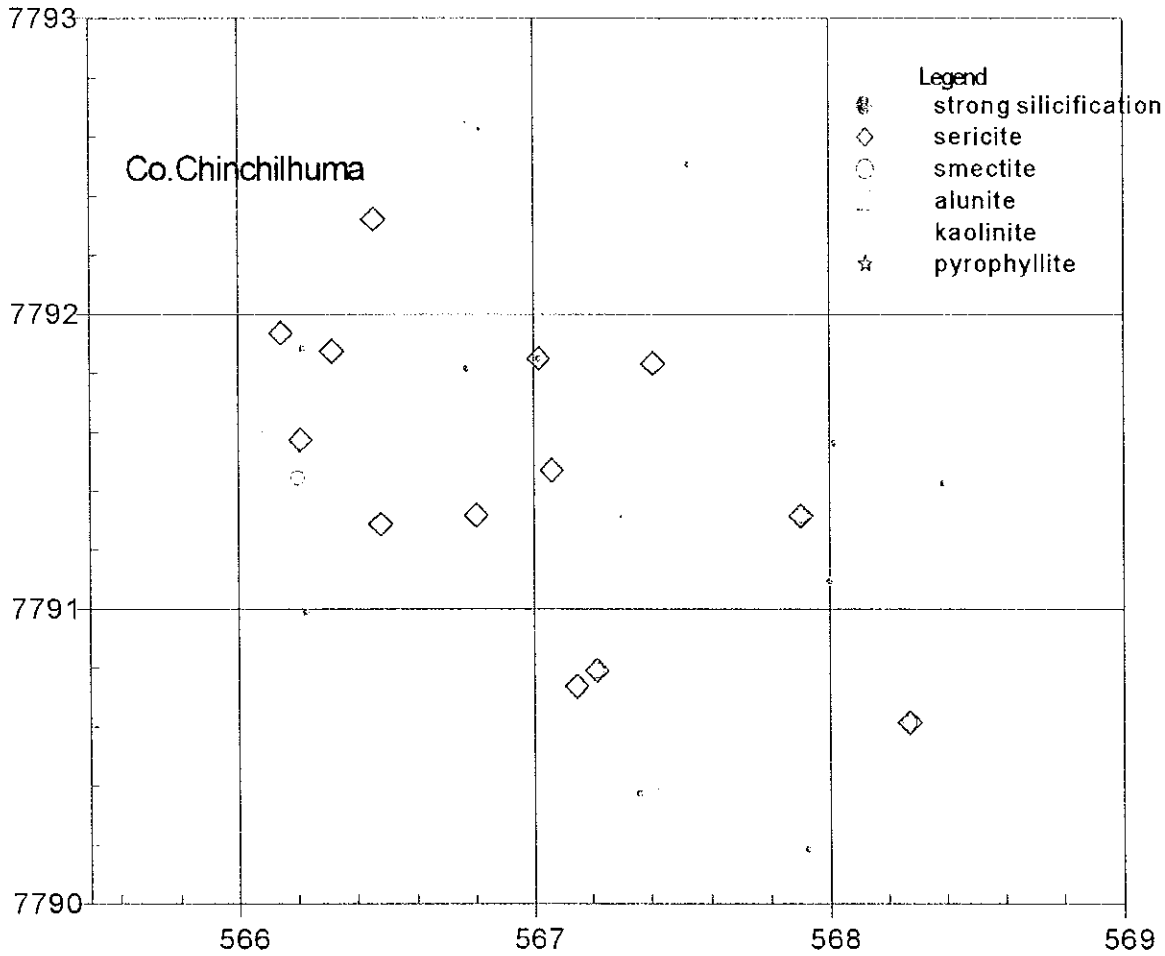


Fig.II-2-11 (8)Distribution Map of Alteration Minerals in the Panizo District (Chinchilhuma)

Mines have been mapped (PL-24 and PL-25).

Manganese oxide minerals are scattered at many places.

The San Salvador tunnel is driven about 100m by cross cut, then about 20m by drift.

Small veins of galena and sphalerite with 1 cm to 5 cm in width are involved in the brecciated clay veins up to 3 m in width. Three clay veins show strike of N-S to N20E, dip of 45 to 70W.

Five ore samples collected from the drift indicate Au: 0.23% to 1.31 g/t, Ag: 79.8g/t to 209.5g/t, Cu: 0.04% to 0.54%, Pb: 3.8% to 11.7%, Zn: 0.4% to 6.38%.

Besides galena, sphalerite and pyrite, trace to medium amounts of chalcopyrite and tetrahedrite are observed under the microscope (No.5488, No.5489, No.5490, No. 5491 and No.5492).

The Aguilani tunnel is driven about 50m by cross cut, then about 30m by drift.

The brecciated clay veins with 1 cm to 30 cm in width exist, but no sulfide minerals are seen.

Five ore samples collected from the drift and waste dump at entrance indicate Au: 0.03% to 1.20 g/t, Ag: 29.8 g/t to 678 g/t, Cu: 0.01% to 4.73%, Pb: 0.14% to 10.7%, Zn: 0.05% to 1.08%.

Sphalerite, chalcopyrite and pyrite are acompanied by trace to little amounts of galena, covellite, tetrahedrite and tennantite under the microscope (No.5495, No.5496 and No.5497).

Polybasite and electrum are also observed (No.549).

In order to study thermal properties of mineralization and chemical properties of ore-forming fluid, homogenization temperature and freezing temperature of fluid inclusions of four samples were measured. The measurements are shown in Table II-2-7.

Table II-2-7 Homogenization Temperature and Freezing Temperature (Chinchilhuma Mine)

Sample No.	Mineral	Homogenization Temperature			Freezing Temperature			
		Inc. No.	Range (°C)	Ave (°C)	Inc. No.	Range (°C)	Ave (°C)	Salinity (wt%)
5489	sph	13	208 ~ 247	232	10	-1.3 ~ -1.2	-1.3	2.2
5490	sph	11	234 ~ 299	255	10	-2.4 ~ -0.9	-1.9	3.2
5491	sph	10	216 ~ 252	243	10	-1.9 ~ -1.1	-1.3	2.2
5497	sph	10	260 ~ 270	264	10	-2.2 ~ -1.6	-1.9	3.2
Average			208 ~ 299	249		-2.4 ~ -0.9	-1.6	2.7

All the four samples measured are sphalerite, whose homogenization temperatures ranged from 208°C to 299°C, and average temperature was 249°C.

The freezing temperatures ranged from -2.4°C to -0.9°C, and average temperature was -1.6°C.

The salinity (NaCl equivalent) that was calculated from these values was 2.7 wt.% in average.

(4) Assay of geochemical samples

Fourty-eight rock-chip samples were collected in this area.

The minimum, maximum and average assay values by elements (in the order of appearance) are as follows:

Au: <2ppb, 466ppb, 29ppb. , Ag: <0.5ppm, 268ppm, 27.3ppm, Cu: 2ppm, 1,546ppm, 115ppm, Pb: 15ppm, 76,700ppm, 3,442ppm, Zn: 59ppm , 3,247ppm, 570ppm, As: 8ppm, 296ppm, 70ppm, Sb: <5ppm, 128ppm, 18ppm, Hg: <1ppm, 5.6ppm, <1ppm, Mo: <1ppm, 45ppm, 4ppm, Ba: 328ppm, 3,283ppm, 1,315ppm, Sn: <5ppm, 7ppm, <5ppm.

Geochemical anomalies of the respective elements are indicated in Fig. II-2-11 (9).

Au: Six samples indicate an anomalous value of 70 ppm or higher and five of them overlap silver anomaly portions.

Ag: Ten samples indicated an anomalous value of 30 ppm or higher are scattered whole area.

Cu: Seven samples indicate an anomalous value of 90 ppm or higher and three of them overlap both gold and silver anomaly portions.

Pb: Twenty-five samples indicate an anomalous value of 400 ppm or higher and anomalous portions distribute widespreadly.

Zn: Twenty-six samples indicate an anomalous value of 140 ppm or higher and anomalous portions distribute widespreadly.

As: Three samples indicated an anomalous value of 140 ppm or higher overlap gold or silver anomaly portions.

Sb: Twenty-six samples indicate an anomalous value of 140 ppm or higher and anomalous portions distribute widespreadly.

Hg: One sample indicates an anomalous value of 5.62 ppm and all the other samples are under the detection limit.

Mo: One sample indicated an anomalous value of 45ppm overlap gold, silver, lead and antimony anomaly portions.

Ba: Fourteen samples indicate an anomalous value of 1,500 ppm or higher and anomalous portions concentrate mainly at southeastern part.

Sn: One sample indicates 7 ppm and all the other samples are under the detection limit.

(5) Considerations

The ore deposits in Chinchilhuma prospect are appear to be epithermal precious metal deposit

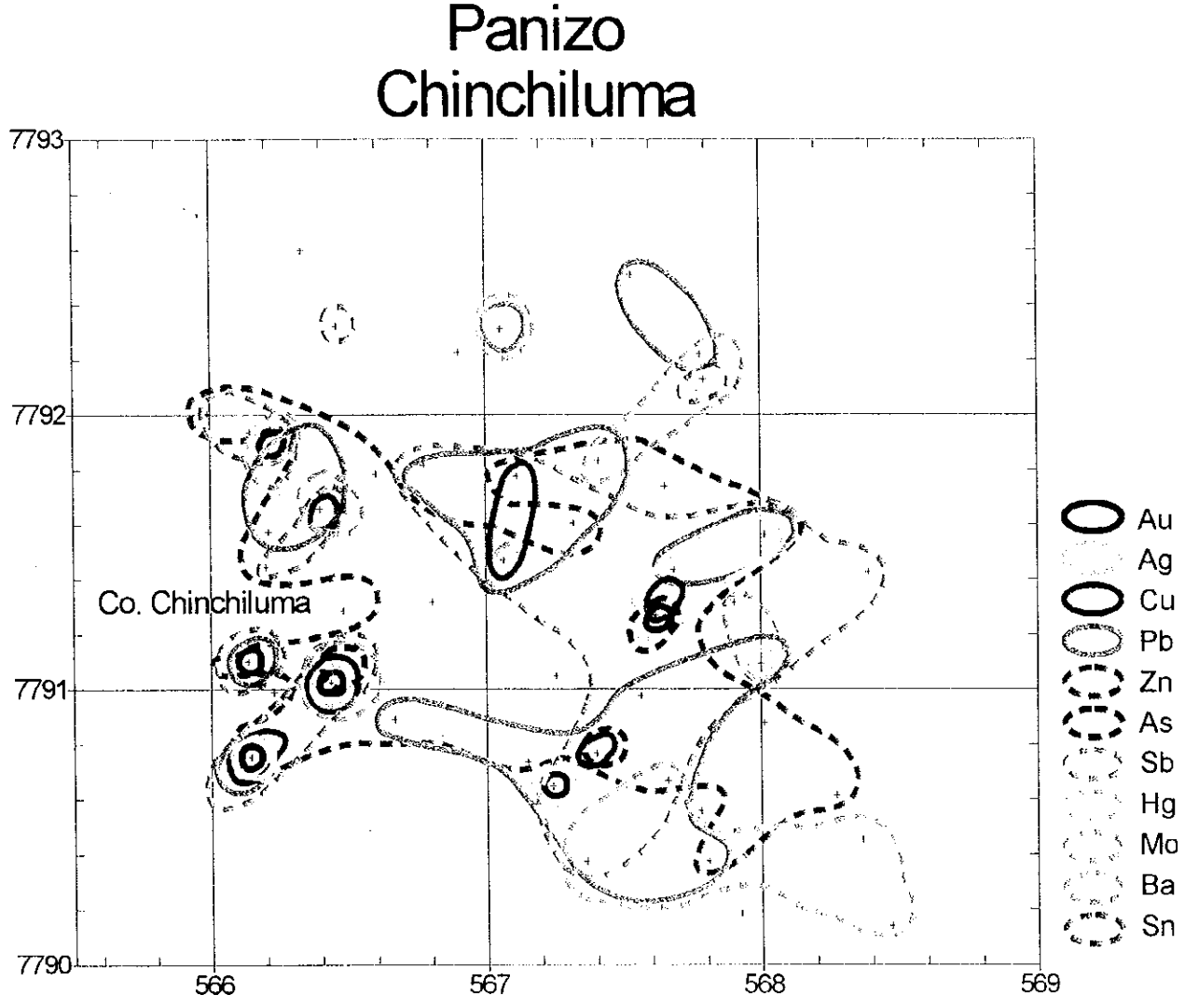


Fig.II-2-11 (9)Geochemical Anomaly Map of the Panizo District (Chinchilhuma)

(Type III) related to shallow hypabyssal intrusion as the alteration zone is neutral and tin is not recognized.

2-11-5 Puquisa Prospect(Figs.II-2-11,II-2-11(10 to 12))

(1) Geology

The Prospect is underlain by the late Miocene to Pliocene Caltama lavas. A dacite dome intrudes into the Cerro Paco Kkollu at the southwest piedmont of Co. Puquisa, causing hydrothermal alteration to itself and the surroundings.

Faults, veins and fissures in the east of the Prospect trend N-S and NE-SW.

(2) Alteration

Hydrothermal alteration zones cover approximately 1 km^2, which are divided into two sub-zones.

The northern sub-zone lies around the dome; the dome itself and its surroundings are accompanied by silicification and partial argillization, and vuggy silica is partly observable. The southern sub-zone is mainly accompanied by argillization, in which vein-like or mini-lenticular, silicified hydrothermal breccia bodies are observed. The alteration is inferred to be of Pliocene age.

Quartz, alunite and smectite are observable as the alteration minerals.

(3) Mineralization

No indications of mineralization is discerned except manganese oxide minerals observed at a locality.

(4) Assay of geochemical samples

Twenty-two rock-chip samples were collected in this area.

The minimum, maximum and average assay values by elements (in the order of appearance) are as follows:

Au: <2ppb, <2ppb, <2ppb, Ag: <0.5ppm, <0.5ppm, <0.5ppm, Cu: <2ppm, 12ppm, 6ppm, Pb: 15ppm, 78ppm, 26ppm, Zn: 11ppm, 194ppm, 39ppm, As: <5ppm, 59ppm, 15ppm, Sb: <5ppm, <5ppm, <5ppm, Hg: <1ppm, <1ppm, <1ppm, Mo: <1ppm, 6ppm, 3ppm, Ba: 511ppm, 1,971ppm, 1,099ppm, Sn: <5ppm, <5ppm, <5ppm.

Geochemical anomalies of the respective elements are indicated in Fig. II-2-11 (12).

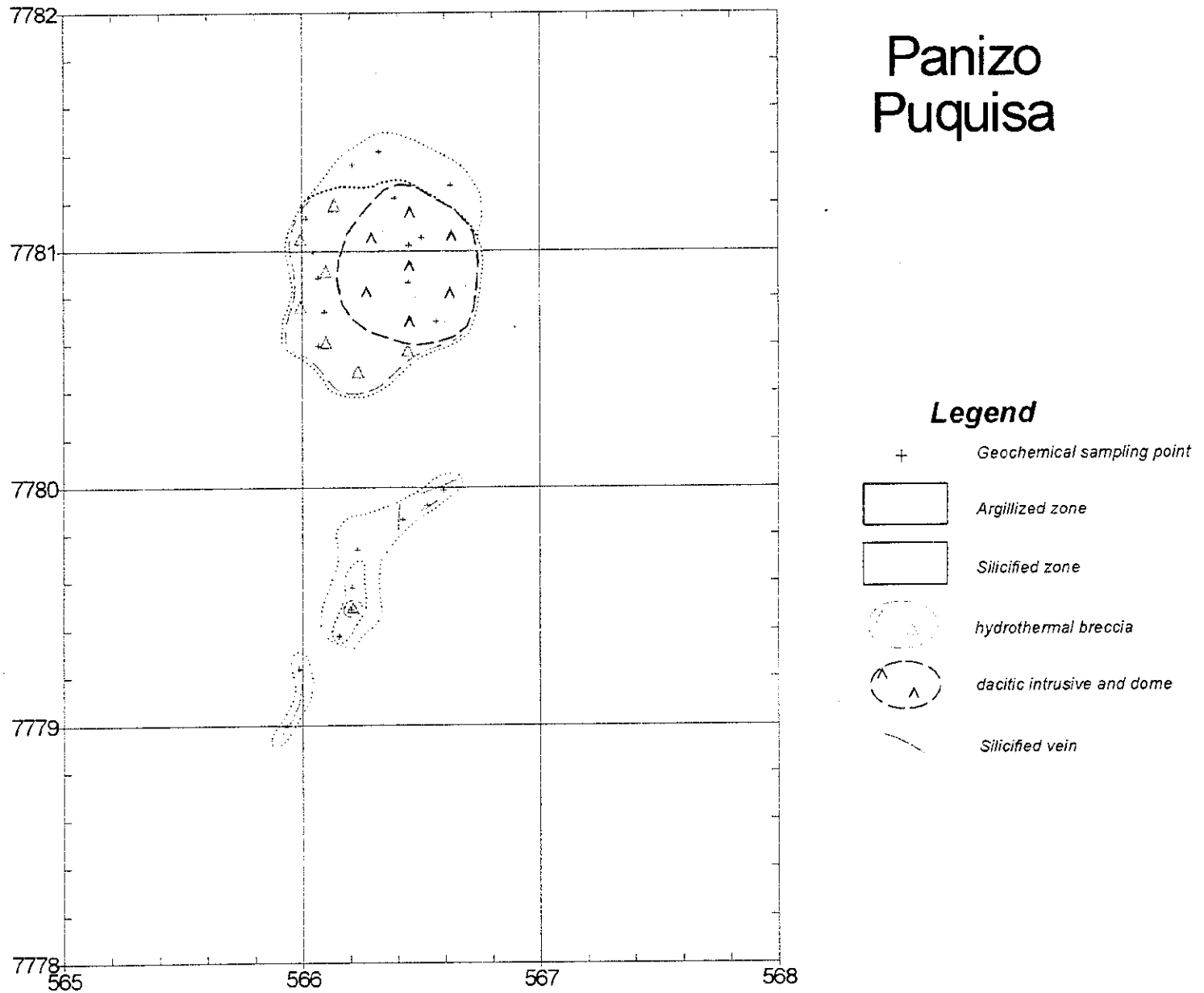


Fig.II-2-11 (10)Alteration Map of the Panizo District (Puquisa)

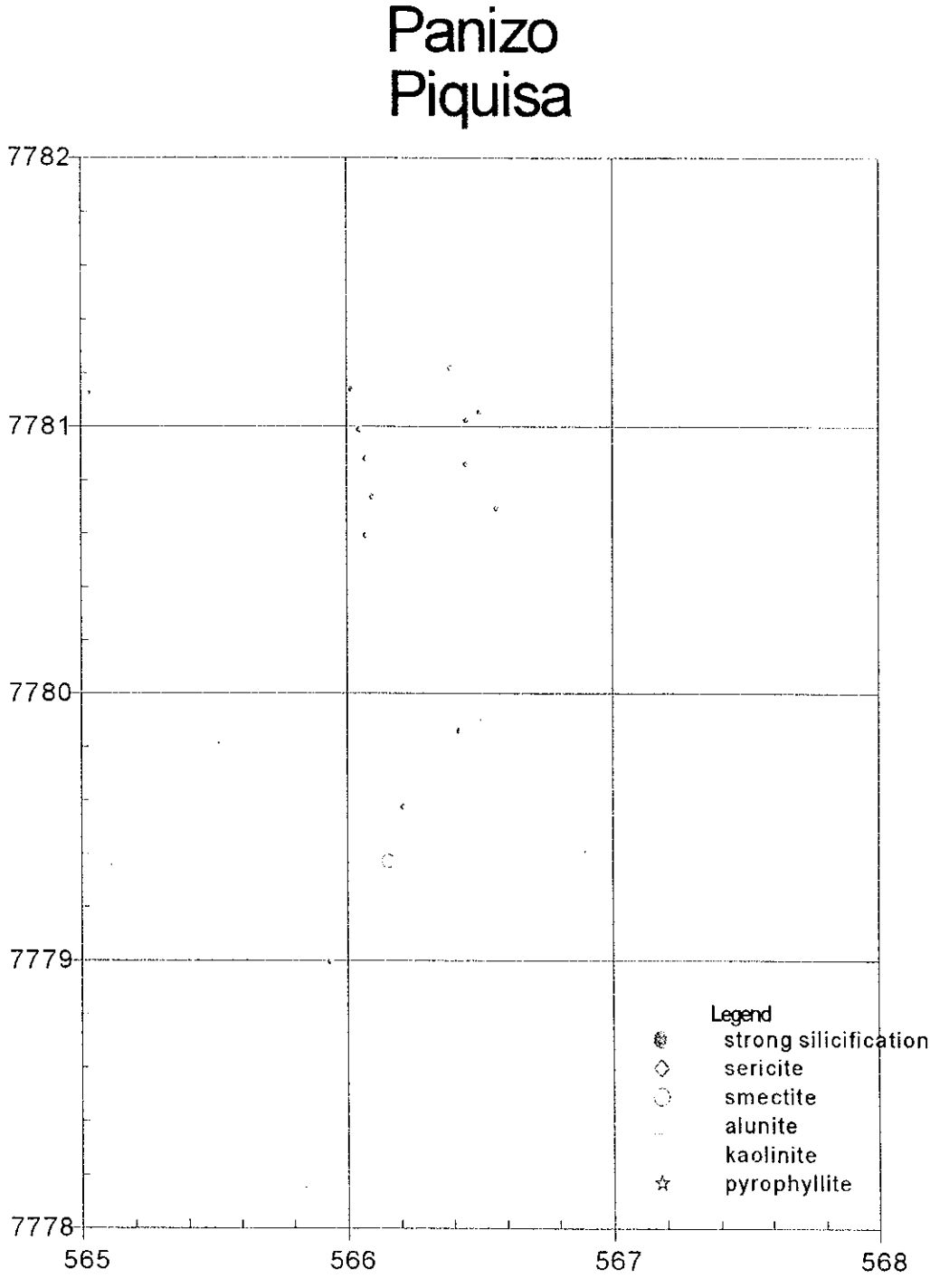


Fig.II-2-11 (11)Distribution Map of Alteration Minerals in the Panizo District (Puquisa)

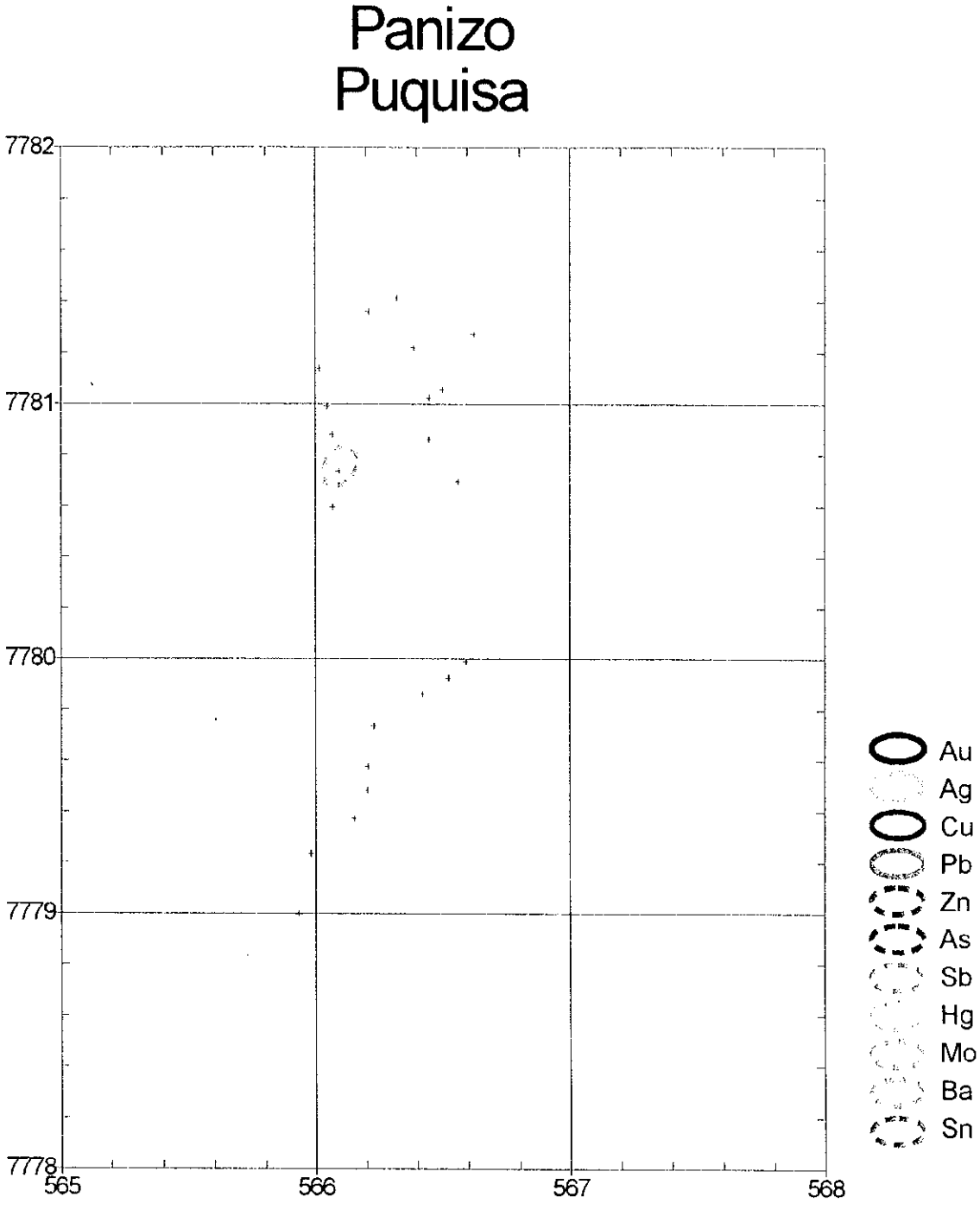


Fig.II-2-11 (12)Geochemical Anomaly Map of the Panizo District (Puquisa)

Au: All the samples are under the detection limit.

Ag: All the samples are under the detection limit.

Cu: All the samples are 12 ppm or less, showing no anomalies.

Pb: All the samples are 78 ppm or less, showing no anomalies.

Zn: All the samples are 194 ppm or less, showing no anomalies.

As: All the samples are 59 ppm or less, showing no anomalies.

Sb: All the samples are under the detection limit.

Hg: All the samples are under the detection limit.

Mo: All the samples are 6 ppm or less, showing no anomalies.

Ba: A sample shows an anomalous value of 1,500 ppm or higher.

Sn: All the samples are under the detection limit.

(5) Considerations

In Puquisa prospect, the alteration zone is small and geochemical anomalies are very weak. Therefore, mineralization type is not clear, and the mineralization will be weak or deep-seated if it exists.

2-11-6 Panizo Prospect(Figs.II-2-11,II-2-11(13 to 15))

(1) Geology

The prospect is underlain by the Upila tuffs and Panizo lavas of the middle to late Miocene age.

The Upila tuffs are rhyolitic to lithic tuff, distributed in small scale in the northwest of the Prospect, which are overlain by the Panizo lavas. In the Panizo lavas, small quantities of dark gray, fine-grained biotite andesite and coarse-grained, porphyritic hornblende-biotite andesite intercalate lapilli tuff and tuff breccia.

A hornblende-pyroxene-biotite andesite dome(?), about 100m in diameter, intrudes in the south.

The K-Ar dating of fresh Upila tuff indicates 14.87±0.19 Ma (No. 4960).

Though faults, veins and fissures in the Prospect trend mainly N-S, the NE-SW trend is increasingly dominant southward and, in the central and the southern parts, the E-W trend is predominant.

(2) Alteration

Hydrothermal alteration zones cover about 18 km^2, which lie in the E-W direction in the south while, in the central to the northern parts, lie in the S-N direction.

Silicification and argillization are observed; silicification is rather extensively distributed in

Panizo - Panizo

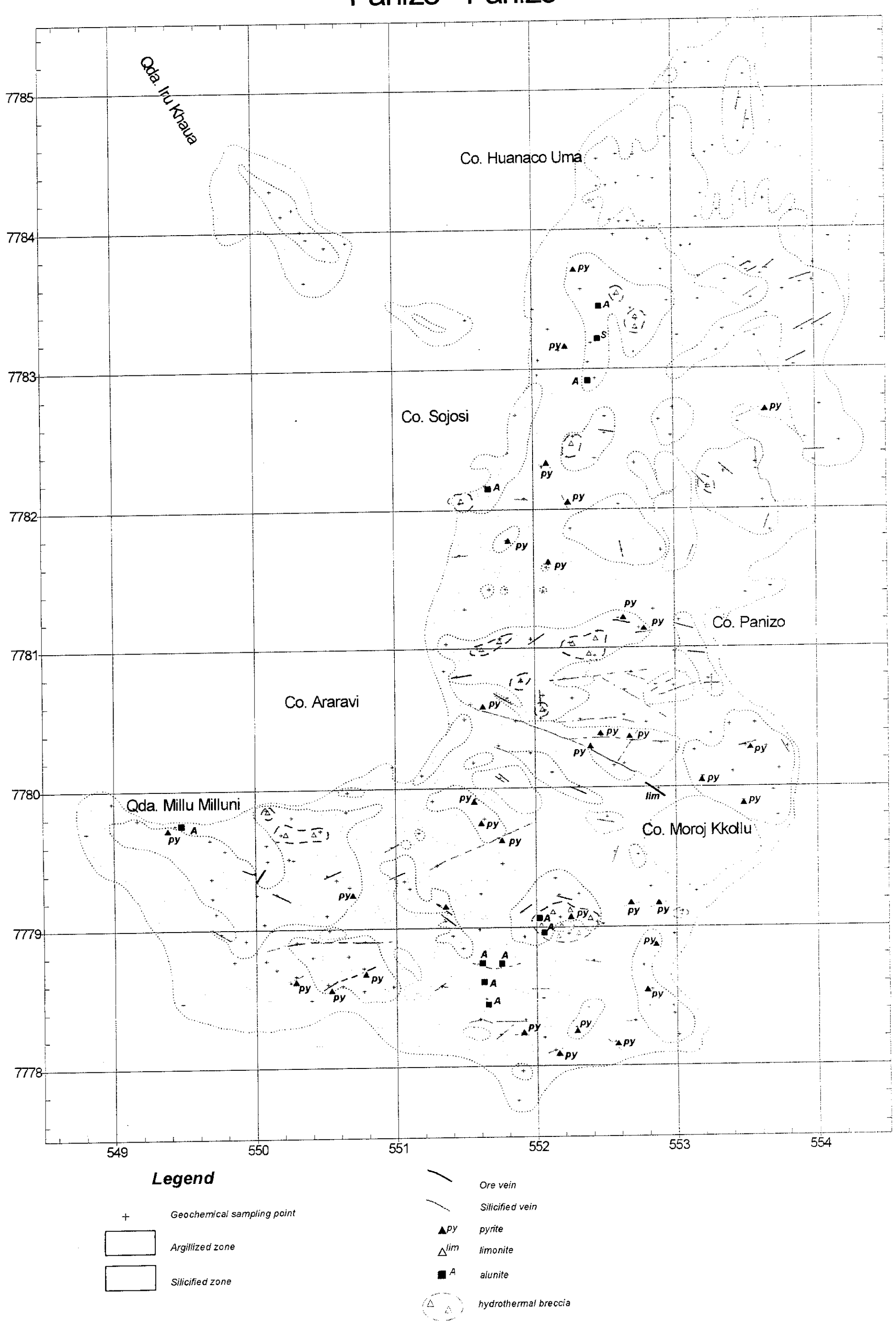


Fig.II-2-11 (13)Alteration Map of the Panizo District (Panizo)

Panizo - Panizo

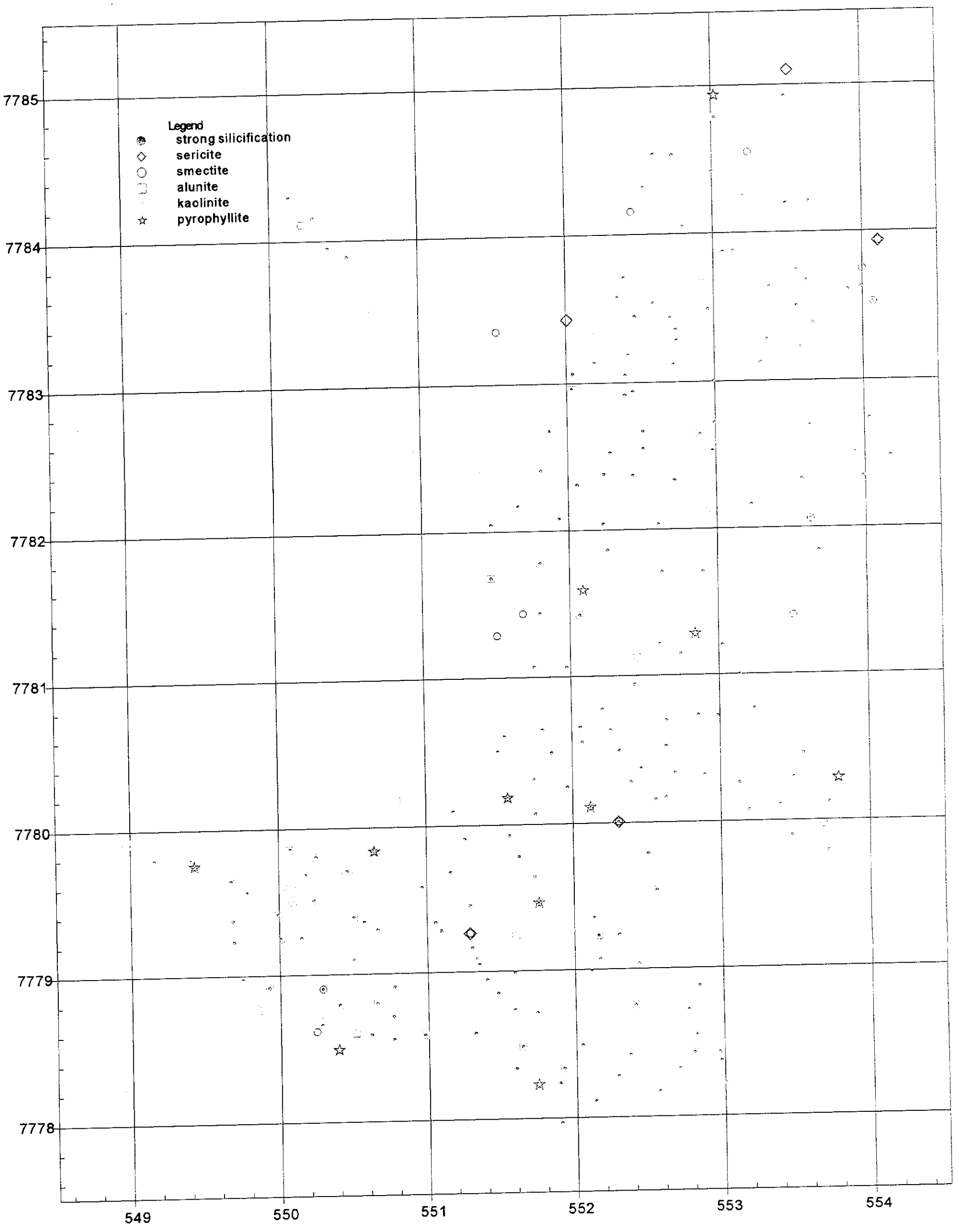


Fig.II-2-11 (14)Distribution Map of Alteration Minerals in the Panizo District (Panizo)

vein and insular forms in substantial scales.

Hydrothermal breccia and breccia pipes are relatively widespread. Hydrothermal breccia is silicified and limonitized in the surroundings of the southern domes.

The K-Ar dating of sericitized Upila tuff (No. 4959) indicates 13.79±0.42 Ma (Middle Miocene age)

Quartz, alunite, zeolite, smectite, pyrophyllite and sericite are observable as the alteration minerals.

(3) Mineralization

Pyrite dissemination is observed in various parts of the area, as well as yellow-colored alunite. Limonite veins have been ascertained in several localities. At the west side of the southern dome, limonite-manganese oxide gossan is present.

(4) Assay of geochemical samples

Three hundreds two rock-chip samples were collected in this area.

The minimum, maximum and average assay values by elements (in the order of appearance) are as follows:

Au: <2ppb, 411ppb, 3ppb, Ag: <0.5ppm, 55.8ppm, <0.5ppm, Cu: <2ppm, 125ppm, 18ppm, Pb: <3ppm, 1,226ppm, 32ppm, Zn: <2ppm , 173ppm, 13ppm, As: <5ppm, 887ppm, 43ppm, Sb: <5ppm, 211ppm, 9ppm, Hg: <1ppm, 1.9ppm, <1ppm, Mo: <1ppm, 1,724 ppm, 18ppm, Ba: 22ppm, 3,931ppm, 846ppm, Sn: <5ppm, 26ppm, <5ppm.

Geochemical anomalies of the respective elements are indicated in Fig. II-2-11 (15).

Au: Two samples taken from the Cerro Huanaco Uma in the north and the Quebrada Millu Milluni show 378 ppb and 411 ppb, respectively, which overlap antimony anomalies. Gold anomalies in the south overlap those of silver, copper and arsenic, as well.

Ag: A sample taken in the south shows an anomalous value and overlaps a gold anomaly, but most samples are under the detection limit.

Cu: Four samples show anomalous values of 90 ppm or higher, three of which are spotted in the southwest of the Cerro Panizo in the central part.

Pb: A sample adjoining a gold anomaly shows an anomalous value of 400 ppm or higher. A weak anomaly zone is discerned in the southwest of the Cerro Panizo in the central part.

Zn: All the samples are under 173 ppm, showing no anomalies.

As: 11 samples show anomalous values of 140 ppm or higher, which are scattered mainly in the central and the northern parts.

Panizo - Panizo

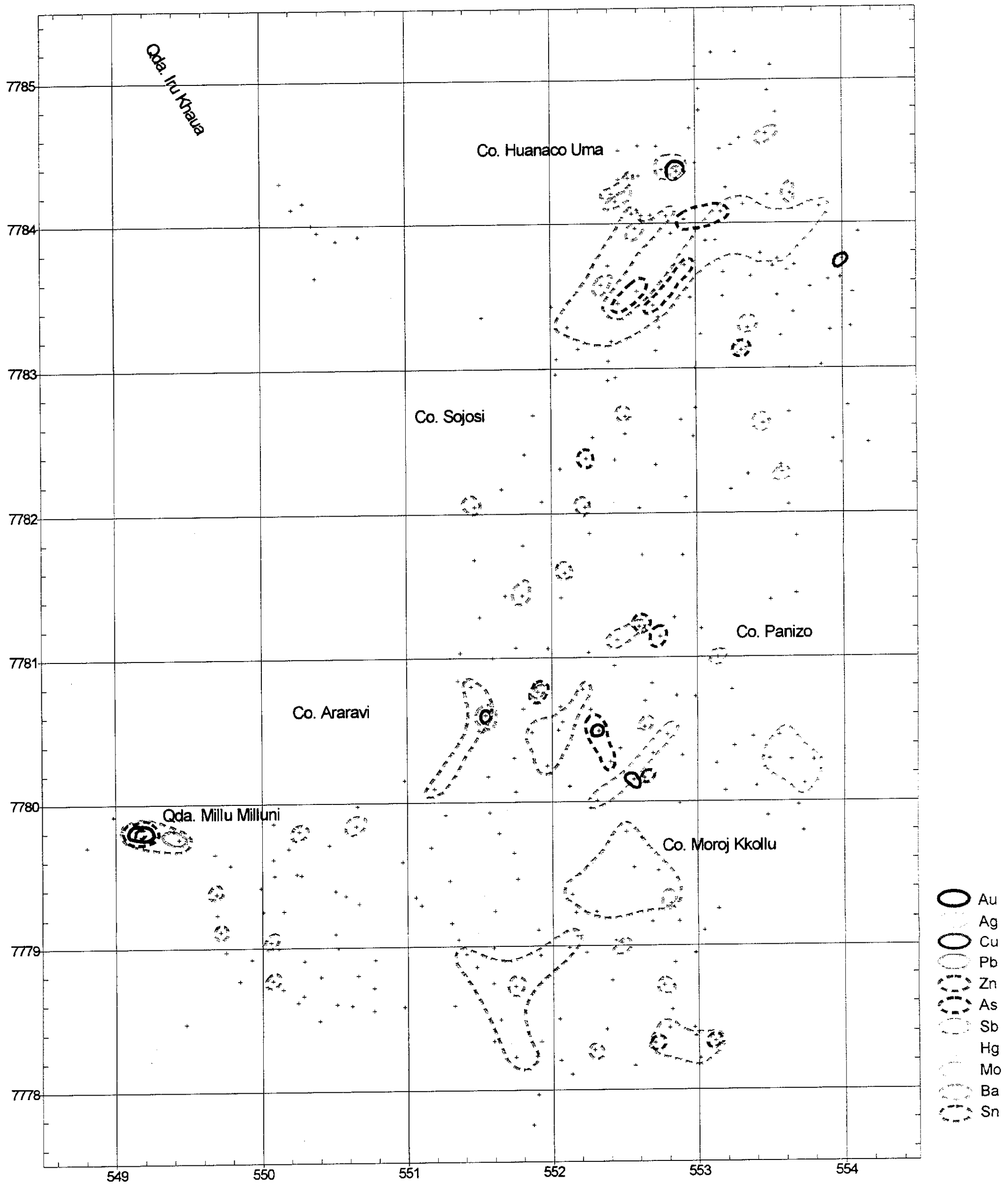


Fig.II-2-11 (15)Geochemical Anomaly Map of the Panizo District (Panizo)

Sb: Many samples show anomalous values of 10 ppm or higher, which are distributed rather extensively in the southern and northern parts.

Hg: Six samples in the central part show 1 to 2 ppm, but all the others are under the detection limit.

Mo: Eight samples from scattered localities show anomalous values of 40 ppm or higher.

Ba: Nine samples spotted mainly in the north show anomalous values of 1,500 ppm or higher.

Sn: Seven samples spotted over the area show anomalous values of 10 ppm or higher.

(5) Considerations

In Panizo prospect, There are anomalies of gold, arsenic, antimony in the northern part, anomalies of copper, arsenic, antimony, molybdenum and tin in the central part, and anomalies of gold, silver, lead, arsenic, antimony and tin in south western part. Considering the presence of tin and pyrophyllite, the mineralization of north and southwestern parts of the area will be epithermal gold- silver- lead- zinc deposit (Type II), and in the central part high-sulfidation epithermal gold-silver- copper deposit (Type IV) are expected.

In the southwestern part, as there are abundant kaolinite, mineralization of high-sulfidation epithermal deposit could be overlapped.

As the K-Ar dating of the alteration showed late of middle Miocene, erosion has been considerably advanced. Beside the geochemical anomalies are rather intense, suggesting that there is a possibility of existing ore deposits in the place not very deep from the surface.

2-12 Sailica District(Figs.II-2-12,II-2-12(1 to 3))

2-12-1 Plasmar Mine

In 1965, GEBOL - the Servicio Geológico de Bolivia elaboratd geologic maps of the mine area and , in 1971, presence of lead-silver mineralization was reported as the result of surveys executed under the GEBOL's technical assistance. In 1990, MINTEC performed exploration targetting gold and silver, details of which are unknown. In 1995, The GEBOL carried out geological and geochemical prospecting and IP survey under the German assistance.

There remain channel sampling and pitting sites at the area.

(1) Geology

The area is underlain by late Miocene to Pliocene pyroclastic rocks such as tuff, lapilli tuff, tuff breccia(volcanic tuff), as well as andesitic lavas and domes(or intrusive rocks).

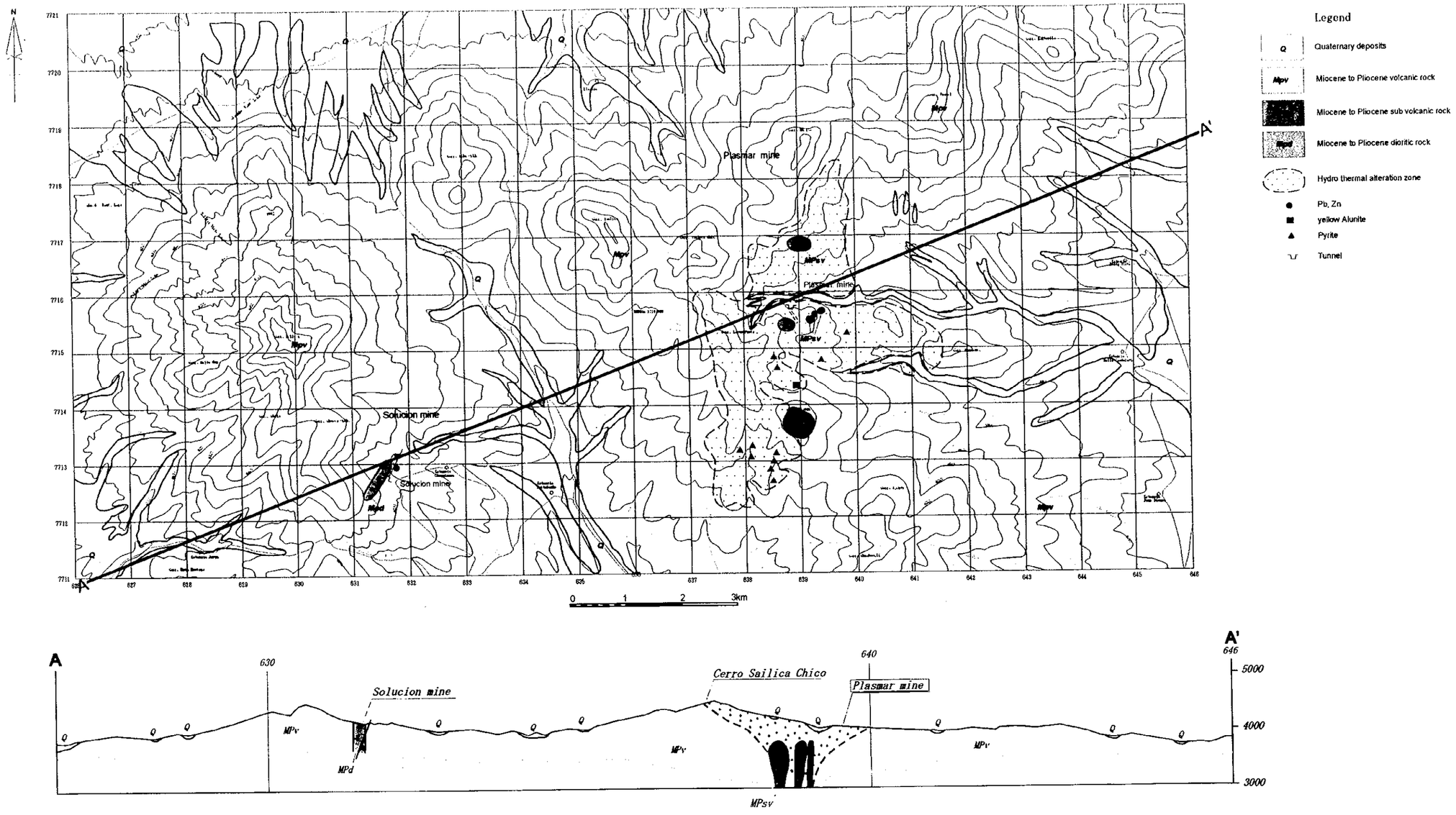


Fig. II-2-12 Geological Map of the Sailica District

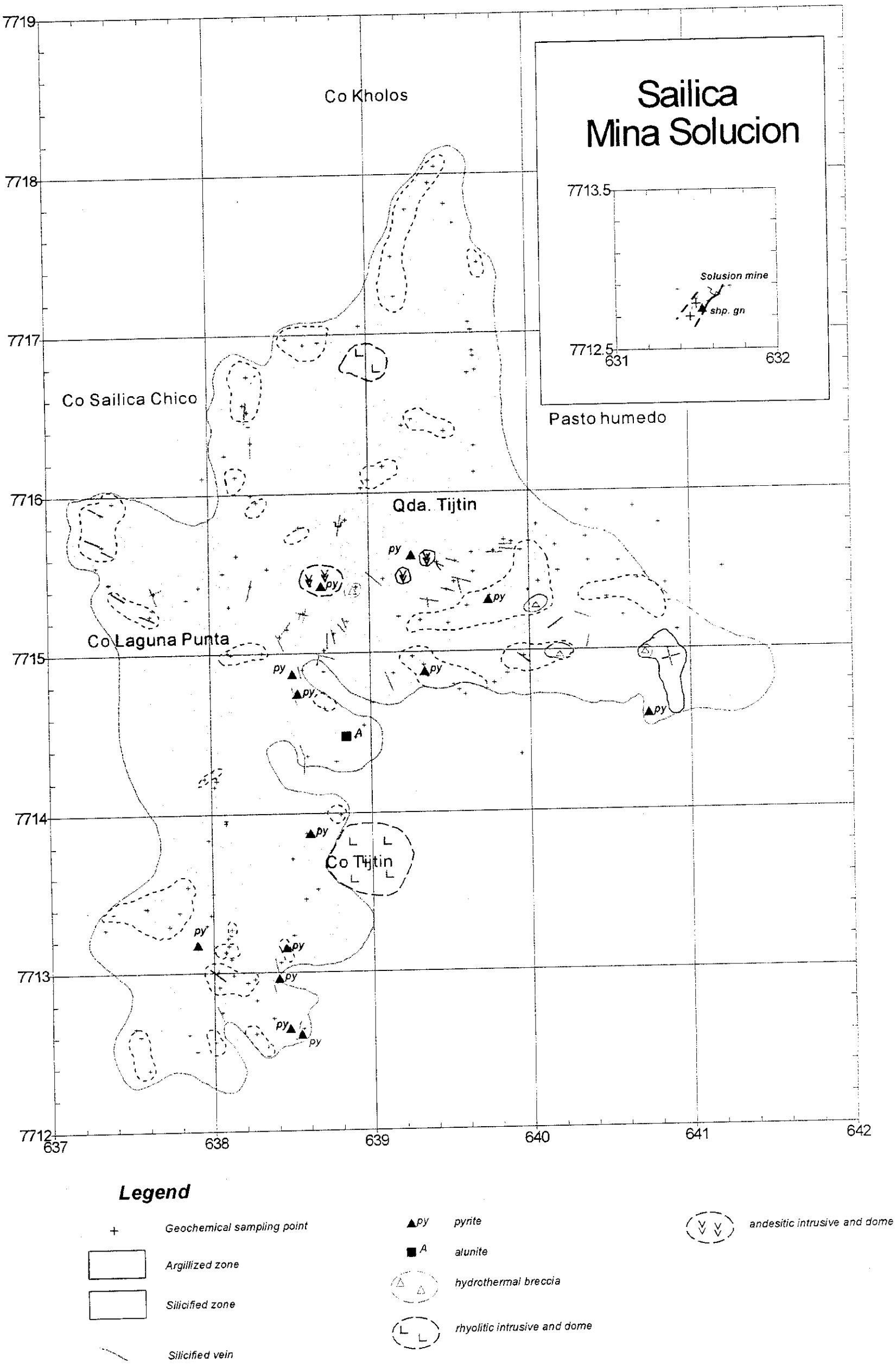


Fig.II-2-12 (1)Alteration Map of the Sailica District (Plasmar,Soluci •)

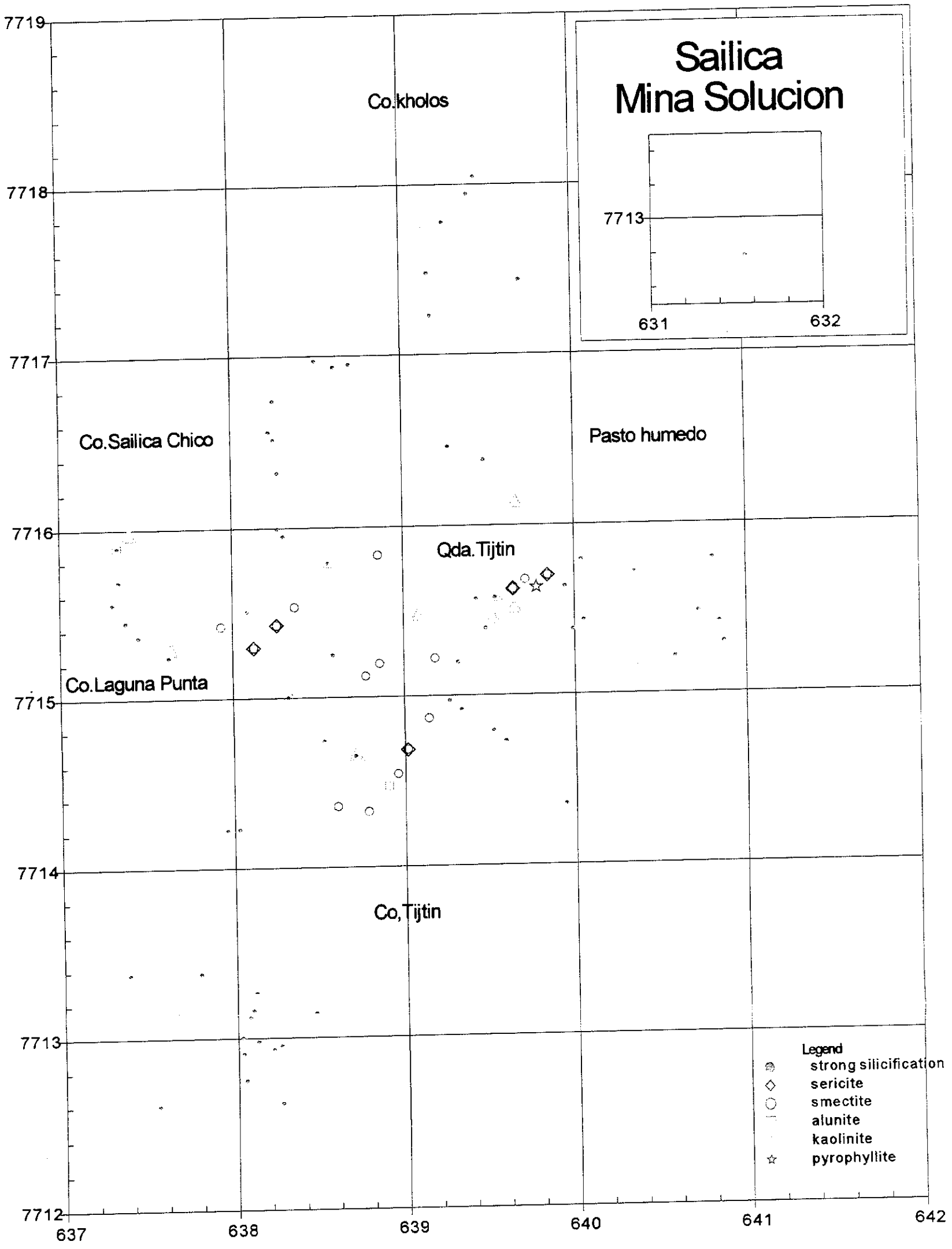


Fig.II-2-12 (2)Distribution Map of Alteration Minerals in the Sailica District (Plasmar,Solucion)

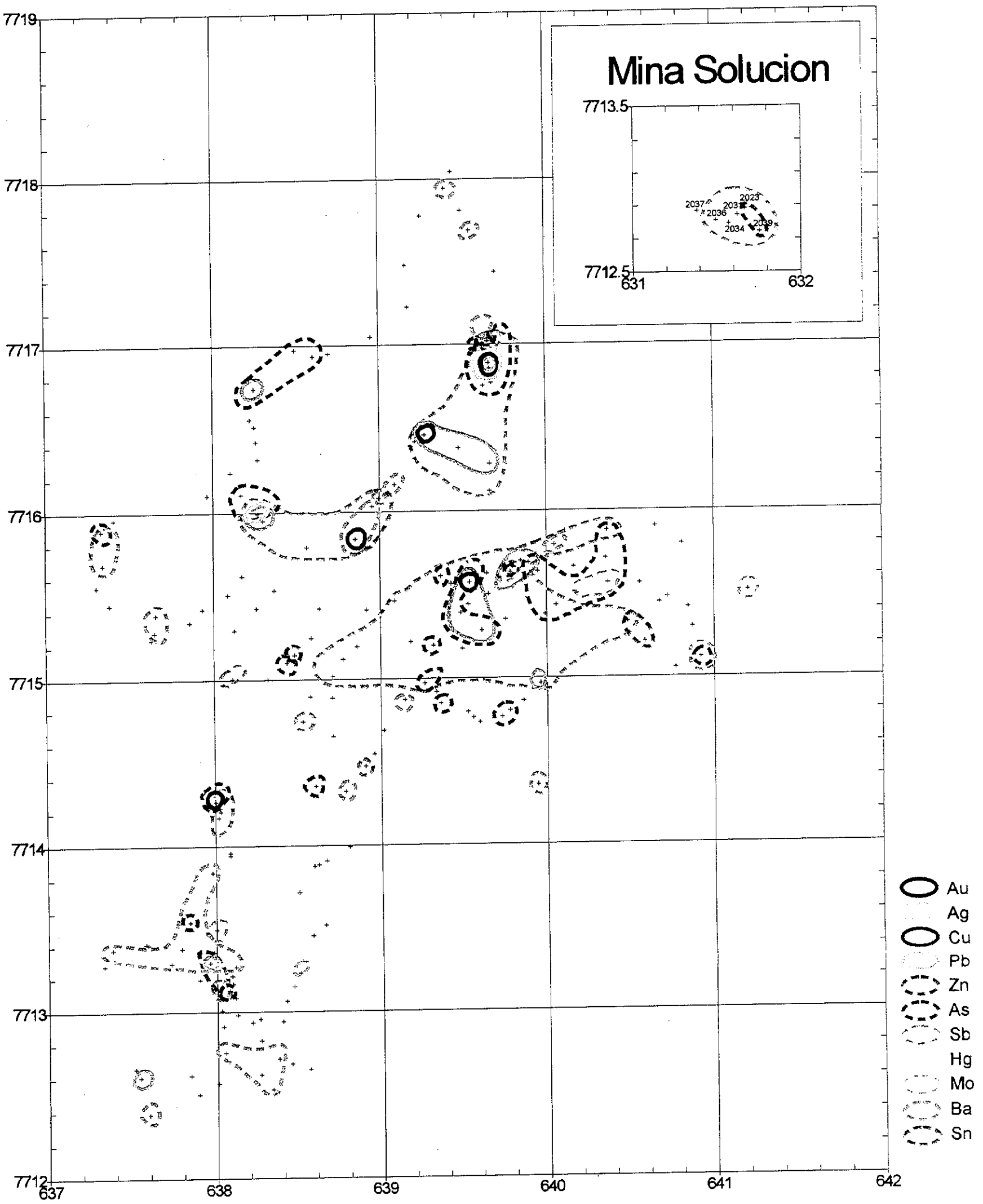


Fig.II-2-12 (3)Geochemical Anomaly Map of the Sailica District (Plasmar,Soluci •)

Generally, the underlying tuffs are covered by the overlying andesite lavas.

In the andesite lava, dark gray, medium-grained biotite andesite and biotite-hornblende andesite are observed.

The dome-like andesite is dark gray to gray-colored, fine-grained pyroxene andesite; a presumable dome of about 250 m in diameter exist to the north of the old mining site, those of 50 to 200m in diameter at four localities to the south, and another one of 500 m in diameter further south.

Faults, veins and fissures in the area trend E-W, NW-SE and NNE-SSW(N-S).

(2) Alteration

Hydrothermal alteration zones cover approximately 10.5 km^2.

Silicification and argillization are observed; small-scale silicification zones lie within extensive argillization zones, and hydrothermal breccia is partly discernible.

Quartz, smectite, kaolinite, sericite, alunite and pyrophyllite are observable as the alteration minerals.

The K-Ar dating of sericitized andesite indicates 8.23 ± 0.13 Ma. (No. 4926)

(3) Mineralization

Two drifts and a shaft of the old Plasmar Mine have been confirmed. A lower drift trending S20E is submerged, while the upper drift trending S10E is driven about 10 m in pursuit of limonite vein, 1 to 2 cm wide (PL-26).

Some 1 km west-southwest, there remains another old drift driven about 10 m toward S80. (No. 2073 point) Pyrite ores are observed in the waste at the portal. On the ridge about 1 km south-southwest, there remain a shaft striking N30W and dipping 80E for exploration of a 1.3-m wide, oxidic breccia vein, whose depth appears to exceed 10 m.

Pyrite dissemination is observed in various places, while yellow-colored alunite dissemination is also found at a locality. (No. 6734)

Microscopic observation of the pyrite dissemination indicates no other ore minerals than pyrite. (Nos. 2897 and 2900)

A barite veinlet has been ascertained at a locality. (No. 3427)

(4) Assay of geochemical samples

One hundred seventy-seven rock-chip samples were collected in this area.

The minimum, maximum and average assay values by elements (in the order of appearance) are as follows: