Chapter 5 Conclusions and Recommendations

5-1 Conclusions

Result of the phase I and phase II survey revealed that there is a possibility of existing the following types of ore deposit beneath the widely spread hydrothermal alteration zone in volcanics.

Type I : Bolivian type polymetalic deposits

A: rich in silver and tin

B: rich in silver, gold and copper

Type II: Epithermal gold- silver- lead- zinc deposits, related to shallow volcanic activity.

Type III: Epithermal gold- silver- lead- zinc- copper deposits, related to shallow sub-volcanic intrusion.

Type VI: Low-sulfidation epithermal gold- silver- copper deposits (quartz- alunite vein).

Type V : High-sulfidation epithermal deposits (quartz- adularia vein)

Turaquiri district

The ore deposits of Turaquiri district are epithermal barite- quartz veins associated with base metals and precious metals which occur along the east-westerly fractures formed by the development of caldera.

Based on the facts that the alteration is neutral type without tin minerals and any intrusives was not recognized in the area, the mineralization of the area has both characters of low-sulfidation epithermal deposit (Type V) and epithermal precious metal deposit (Type III).

Considering that only the mineralized veins have been mined in the previous mining operation, as the case of Tordos deposit at San Cristóbal mine, it is possible that a low grade stockwork or disseminated type deposits might have been left behind. Particularly the presence of mineralization is expected in the area where two veins are intersecting in deep underground.

Asu Asuni district

An alteration zone associated with hydrothermal breccia was found in the east of the alteration zone found in the phase I survey. No remarkable mineralization and geochemical anomaly are observed in alteration zone and if exists, the mineralization is probably weak or occurs in deeper part.

Chullcani district

As the result of phase II survey a ring-shaped hydrothermal alteration zone was found at the ridge of Loma Huarin Uma, and hydrothermal breccia (as dykes, pipes and masses) and silicified veins are distributed radially, suggesting the presence of crypto-intrusive in deep underground.

Alunite, kaolinite and pyrophyllite were identified as alteration minerals indicating that the alteration is acidic type.

Result of the geochemical survey shows that the anomalies of gold are scattered around the center of the alteration zone and the anomalies of antimony and barium are widely distributed over the alteration zone. Small anomalies of lead arsenic, molybdenum and tin are also scattered.

Based on the facts described above, the mineralization in Chullcani district is presumed to be epithermal gold- silver- lead- zinc deposit (Type II), related to shallow volcanic activity. Beside there is a possibility of existing ore deposits around the crypto-intrusives. In addition, as the presence of pyrophyllite and copper anomalies are recognized in part, there is a possibility of over-printing of mineralization by high-sulfidation epithermal deposit (type IV).

Sonia - Susana disrict

Two types of geochemical anomalies, gold- copper- lead- zinc and gold- tin- antimony-arsenic, are recognized in the area. This implies different types of mineralization have place at least in two stages. The former is the epithermal deposit related to shallow hypabyssal intrusion (Type III), and the later is the epithermal gold- silver-lead- zinc deposit related to shallow volcanic activity (Type II).

Porphyry type mineralization is expected to occur beneath the older mineralization, and epithermal precious metal deposit is expectable beneath the young mineralized zone.

COMINCO Bolivia has carried out exploration including diamond drilling of 10 holes, geochemical survey and IP survey. Comprehensive study including these data is necessary.

Calorno district

The hydrothermal alteration zone widely distributed in this district represent the upper most (outer most) zone of alteration.

Bodies of gossan distributed along Rio Agua Milago in the south east of the area which mainly consist of goethite, indicate anomaly of arsenic and antimony in its upper stream part. Hot water spout out from the ground in its vicinity. Existence of sulfide- poor epithermal deposits (Type V) may be possible in its area as the area is far away from the center of volcano.

The hydrothermal alteration zone in the north of the area is possibly formed by the highly acidic solution, which shows tin anomaly too. That suggests the mineralization of the area correspond to either sulfide- rich epithermal type (Type IV) or epithermal gold- silver- lead- zinc type (Type II).

Although the geochemical anomaly is not extensive, as the vast amount of hot water is spouting out and wide area is covered by the hydrothermal breccia existence of large deposits can be expected.

Loma Llena district

The hydrothermal alteration zone in this district represents the upper most (outer most) zone of alteration. A part of the alteration zone could have formed from highly acidic solution. Further more as there are tin anomalies, the mineralization in this district seems to be high-sulfidation type deposit (Type IV) or epithermal gold- silver- lead- zinc deposit (Type II) related to shallow volcanic activity. However as the pyrite dissemination is weak and the geochemical anomalies are not predominant, the mineralization in this area is probably weak in case it exists.

Blanca Nieves district

The mineralization in Blanca Nieves district appears to correspond to an epithermal gold-silver- lead- zinc deposit (Type II) related to shallow volcanic activity from the presence of tin. The mineralization, however, is probably weak or deep-seated in case it exists.

The fractures of northwest direction are developed in Titicayo prospect, in which manganese bearing silver mineralization was recognized. This mineralization , as similar to that Carangas prospect, appears to correspond to the epithermal precious metal deposits (Type III) although any itrusives are not yet found.

Carangas district

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. 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 anomaly is 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.

Culebra district

As the alteration of Todos Santos mine is neutral and tin anomaly is 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.

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.

Mendoza district

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.

The ore deposit of La Deseada mine is an 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 are probably connected.

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.

The mineralization of Iranuta prospect correspond to epithermal deposit (type III) related to shallow hypabyssal intrusion judged from the alteration is neutral and tin anomaly is 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 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.

Panizo district

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.

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.

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.

The ore deposits in Chinchilhuma prospect are appear to be epithermal precious metal deposit (Type III) related to shallow hypabyssal intrusion as the alteration zone is neutral and tin is not recognized.

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.

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.

Sailica district

The mineralization of Plasmar mine corresponds to an epithermal gold- silver- lead- zinc deosit (Type II) related to shallow volcanic activity that is estimated from the previous data and result of geochemical survey. And there is a possibility of overlapping of high-sulfidation gold-silver- copper mineraliztion (Type IV) from the presence of pyrophyllite and copper anomalies. As there is an extensive alteration zone and remarkable geochemical anomaly, the possibility of existing ore deposits in deep underground seems to be high.

The mineralization of Solucion mine corresponds to epithermal gold- silver- lead- zinc deposit (Type II) related to shallow volcanic activity from the previous data analysis and geochemical assay result. Judging from the mode of occurrence and size of ore deposit in underground working, and extent of geochemical anomaly and alteration, the possibility of existing a large-scale ore deposit seems to be low.

Colorado district

The mineralization in Bayos prospect seems to be weak or deep-seated if it exists, as the hydrothermal breccia is small, consisting mainly of argilization and there is non of remarkable geochemical anomaly.

The mineralization in Okhe prospect is presumed to correspond to an epithermal gold- silver- lead- zinc deposit (Type II) related to shallow volcanic activity from the presence of tin. The mineralization seems to be weak or deep-seated if it exists, as the alteration and geochemical anomalies are weak.

The mineralization in Perenal prospect correspond to an epithermal gold- silver- lead- zinc deposit (Type II) related to shallow volcanic activity presumed from the presence of lead and tin. The existence of ore deposits is expected as the silicification is strong and extend toward north-west.

The mineralization in Colorado prospect correspond to a high-sulfidation mineralization (Type IV) from the presence of pyrophyllite. It is also possible to be an epithermal gold- silver- lead- zinc deposit (Type II) though there is no tin anomaly. The mineralization appears to be weak or deep-seated if it exists, as the area is located in outer most of alteration zone and geochemical anomalies are weak.

Luxsar district

Although hydrothermal breccia is located around a dome, as the silicification is weak and there is no geochemical anomaly, the mineralization is probably weak or deep-seated.

Cachi Unu district

The mineralization of this district is presumed to be correspond to Bolivian type polymetallic silver- copper deposit (Type I B) or high-sulfidation epithermal type (Type IV). Probably the mineralization is weak or deep-seated, as the alteration and geochemical anomaly is not remarkable.

Sedilla district

The alteration is weak and only one geochemical anomaly portion of arsenic and antimony was detected in chascos prospect. The mineralization will be weak or deep-seated if it exists, as there is no hydrothermal alteration around a dome.

The mineralization in Sedilla prospect correspond to epithermal gold- silver- lead- zinc deposit (Type II) presumed from the presence of tin. Probably it is weak or deep-seated, as the alteration and geochemical anomaly are weak.

A neutral-type alteration zone is widely distributed in Eskapa prospect,and ore deposit is expected in shallow portion.

The mineralization appears to correspond to epithermal gold- silver- lead- zinc deposit (Type II) from the presence of tin and silver- lead anomalies. It is also possible the mineralization of the area correspond to upper part of porphyry type mineralization from the presence of neutral alteration.

As a summary of the results of Phase I and Phase II surveys, in the districts of Turaquiri, Sonia-Susana, Carangas, Chinchilhuma in Panizo and Eskapa in Sedilla, erosion has considerably advanced to exposed rather deeper part of mineralization, and the porphyry type gold- copper deposits are often expected at not so deeper part from surface.

In addition to the above, a possibility of existing ore deposits seems to be high in the districts of Chullcani, Calorno, La Deseada mine and Chorka in Mendoza and Plasmar mine in Sailica, as there are dome structures, intrusives and remarkable hydrothermal breccia indicating the area was subjected by intensive hydrothermal alteration.

5-2 Recommendations for the Phase III

As a result of the phase I and Phase II survey, it was revealed that the extensive hydrothermal alteration zones are distributed in the Oruro - Uyuni region and beneath of them the existence of the ore deposits of epithermal gold- silver- lead- zinc and high-sulfidation epithermal gold- silver- copper (quartz- alunite type) related to shallow volcanic activity, and the ore deposits of epithermal gold- silver- lead- zinc and low-sulfidation epithermal (quartz-alunite type) related to shallow hypabyssal intrusion is possible.

In the Cordillera Occidental, however, where erosion is not advanced and the surface is covered by young volcanics, the mineralization is not well investigated, so that an effective way of further exploration is not found yet.

In the phase III survey, it is recommended to carry out a detailed geological survey and geophysical survey for the potential area to obtain further information and then to conduct diamond drilling to prepare three dimension model (including geological structure alteration zone, resistivity and geochemical behavior) and finally to select the prospecting areas.

1) Chullcani district

It is advisable to conduct detailed geological survey to investigate mineralization and geological structure (depth and shape of intrusive rocks) for the area around gold anomaly, then electric survey (IP survey) to obtain further information on the alteration zone and mineralization by resistivity and polarization and finally diamond drilling to check and confirm the three dimension model.

2) Turaquiri district

Detailed geological survey to investigate the western extension of the known mineral vein and the presence of parallel vein, ore shoots and disseminated mineralization is firstly to be conducted. Then electric survey (IP survey) to investigate polarization (mineralization) and finally diamond drilling to confirm the three dimension model are to be carried out.

3) Panizo district (Panizo prospect)

Distribution of two gold (silver) anomalies and one copper- lead- arsenic anomaly are known by the previous survey. It is recommendable to conduct detailed geological survey for the above mentioned three anomalies to investigate characters of mineralization and extent of alteration zones. Then conduct electric survey (IP survey) to investigate deep underground geological structure and mineralization by resistivity and polarization.

4) Calorno district

Very wide hydrothermal alteration zones, through they are not so strong are distributed in this district. However as the vast amount of hot water is spouting out there is a possibility of existing high- sulfidation mineralization and low- sulfidation mineralization, it is advisable to conduct electric survey (IP survey) to obtain the deep underground geological information.

PART II PARTICULARS

Chapter 1 Survey Method

The geological and geochemical surveys at the quantities indicated in Table I-1-1 were executed in the promising areas selected as the result of the analysis of existing data and interpretationof satellite images in phase I.

For the field survey, route maps were prepared by enlarging a 1:50,000-scale topographic map. The survey route was determined in a way that the results of existing data analysis and satellite image interpretation may be reflected.

The GPS was utilized for confirming geographic positions, while positions of outcrops in mineralization zones were determined by the simple surveying when necessary.

Observation findings were recorded in the route map as accurately as possible, and outcrops of particular importance were sketched at 1:100 to 1:200 scales and photographed in color.

Rocks collected at sites as the geochemical sample media were sent to the laboratory of ASA (Alex Stewart Assayers) in Oruro for crushing, grinding and sample preparation. The prepared samples were sent to ASA, UK for assay.

Statistical processing was applied to the assay values of 803 and 2,600 geochemical rock-chip samples collected during the phase I and phase II survey each, so that accumulation frequency curves were drawn on logarithmic graph paper. The inflection points of the frequency curves were found, which are to serve as the thresholds for discriminating abnormal values from the backgrounds.

The geological survey findings were incorporated in a 1:10,000-scale map, a 1:25,000-scale map and a 1:50,000-scale map . (Figs. II-2-1 to -16)

Prepared stream sediments samples were also sent to the same laboratory and analysed the same manner.

Chapter 2 Geological and Geochemical Surveys

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

(1) Geology

The area is underlain by pyroclastic rocks such as tuff, lapilli tuff, tuff breccia (volcanic breccia) and dacite lava of late Miocene to Pliocene age.

Pyroclastic rocks are light gray, and weakly welded in part. They are dacitic and include clasts of dacite, andesite and tuff, as well as quartz, biotite and hornblende. The K-Ar age dating of the phase I sample indicate 5.51 ± 0.11 Ma.

The dominant trend of the faults, veins and fractures in the area is E-W, while those with the N-S trend are partially observed.

(2) Alteration

The hydrothermal alteration zones, though small in scale, cover about 2 km^2.

Silicification, argillization and propylization are observed.

Silicification is observed in various parts within a narrow area, extending along the veins and fractures in the E-W direction.

Argillization is seen enclosing the silicification zones. Alteration minerals such as quartz, kaolin, chlorite, sericite, smectite and alunite are observed. Smectite is abundant as a whole.

Propylization is partially observable; dacite, lapilli tuff and tuff breccia have carbonitization and chloritization.

(3) Mineralization

The Turaquiri deposit is said to had been mined since the colonial times. The ore deposit is mainly composed of silver-bearing galena-barite-quartz veins in lapilli tuff and tuff breccia.

The veins are generally in the E-W direction. The southern vein dips approximately 75°N while the northern vein dips approx. 75°S, the two veins are connected by a vein trending N70°E and dipping 70°N.

A vein, 30 cm to 3 m wide, is observed on a remaining wall rock of the old surface exploitation site. The largest exploitation site is 20 m in width and 140 m in extension.

After laboratory work in Phase I, the ore minerals such as galena, pyrite, chalcopyrite, goethite and marcasite are observed under the microscope, while the gangue minerals are generally quartz and barite, partially accompanied by siderite, chlorite, alunite and garnet.

In addition to the ore deposit, there are old mining sites on the northern slope of Cerro

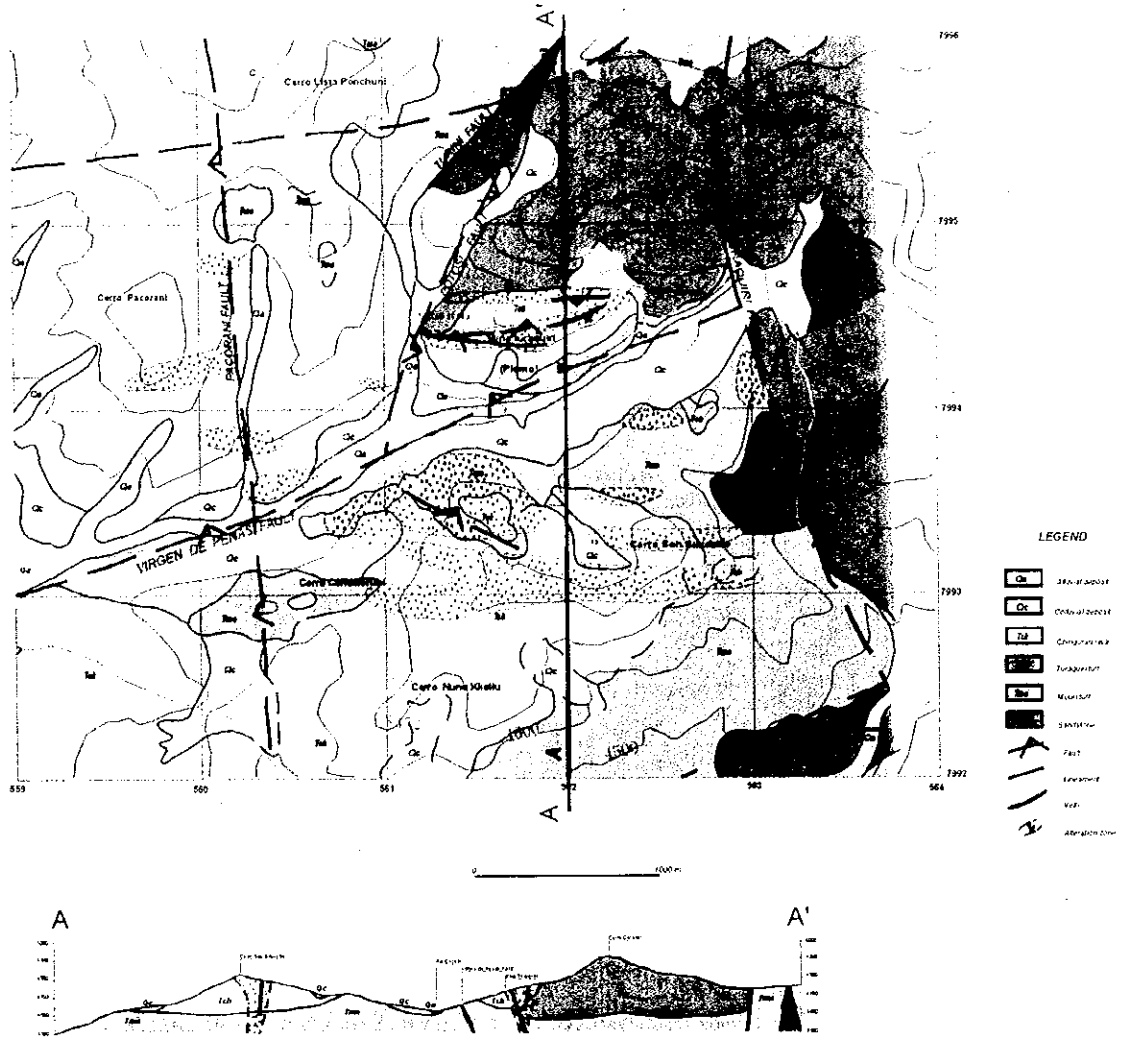


Fig. II-2-1 Geological Ma of the Turaquiri District

Turaquiri

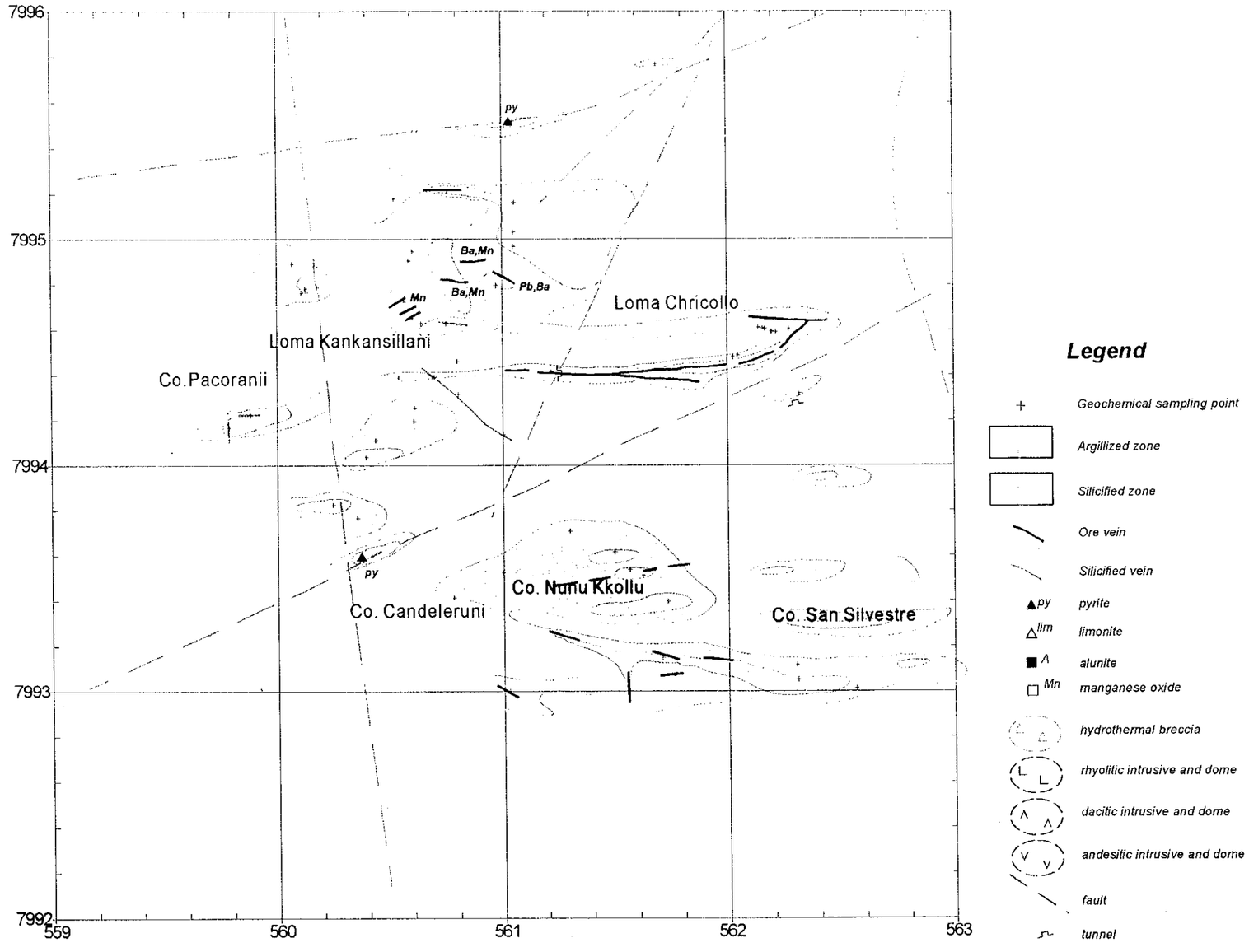


Fig.II-2-1 (1)Alteration Map of the Turaquiri District

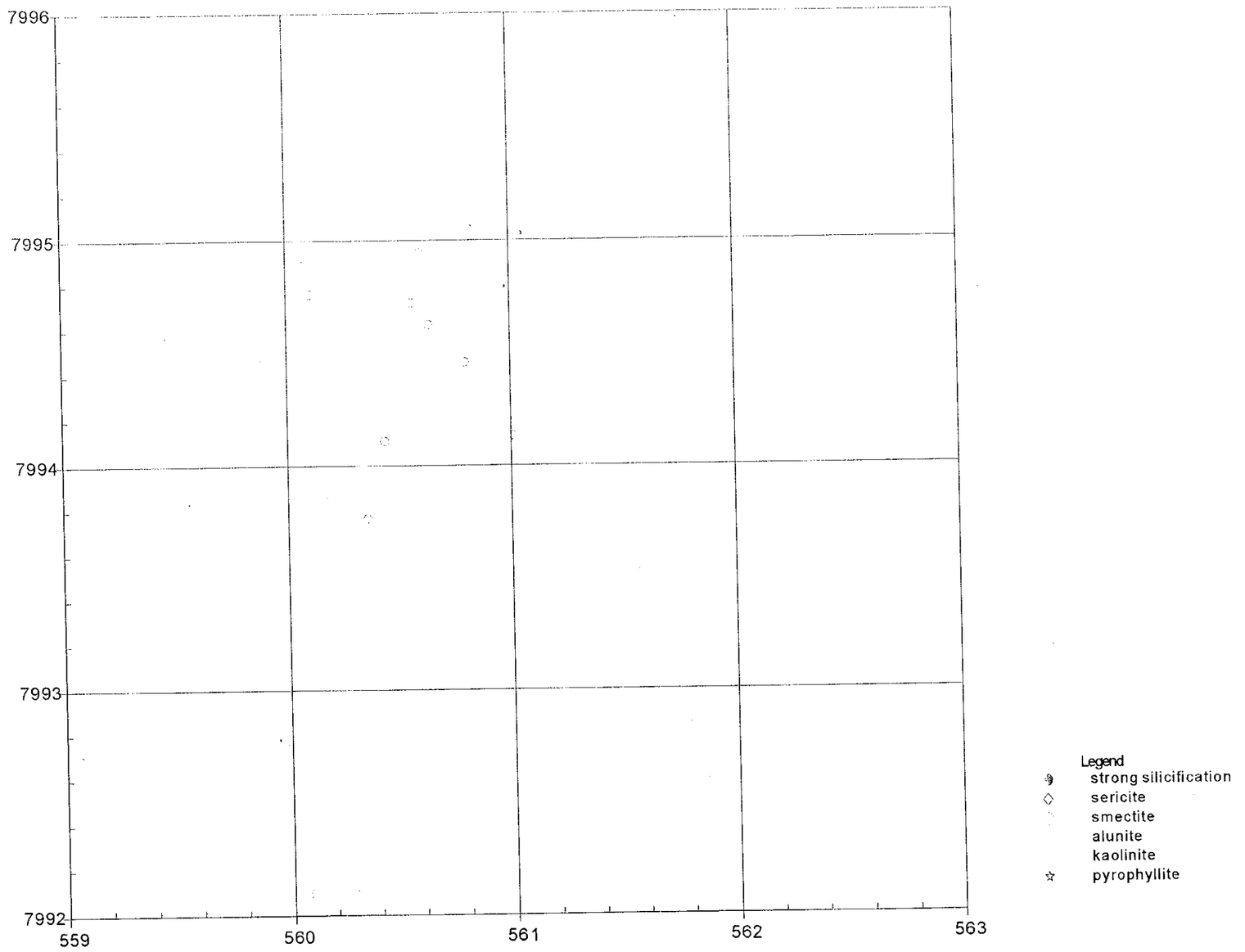


Fig.II-2-1 (2)Distribution Map of Alteration Minerals in the Turaquiri District

Candelerani-Cerro San Silvestre in the south. In the west, a lead and zinc-bearing barite-quartz vein trending E-W and a manganese oxide-barite vein trending NE-SW present on the ridge of Loma Kankansillani.

Galena acompanied by small amount of sphalerite, pyrite and chalcopyrite, in addition, manganese oxide minerals (No.5256) and cerussite (No.6173) are observed under microscope this year.

Pyrite dissemination is observed at Cerro Llista Ponchuni in the north and on the right bank of the Rio Virgen de Penas while, Cerro Llista Ponchuni, galena and hematite dissemination is observed.

(4) Assay of geochemical samples

Twenty-two rock-chip samples were collected at the area and were analysed together with forty-six samples collected in Phase I.

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

Au: <2ppb, 30ppb, <2ppb, Ag: <0.5ppm, 583ppm, 26.2ppm, Cu: <2ppm, 790ppm, 37ppm, Pb: <3ppm, 9,308ppm, 656ppm, Zn: 7ppm, 5,177ppm, 582ppm, As: <5ppm, 650ppm, 29ppm, Sb: <5ppm, 19ppm, <5ppm, Hg: 1.00ppm, <1ppm, <1ppm, Mo: <1ppm, 11ppm, 2ppm, Ba: 40ppm, 7,963ppm, 1,547ppm, Sn: <5ppm, <5ppm, <5ppm.

The geochemical anomalies of the respective elements are shown in Fig. II-2-1 (3).

Au: All the samples are under 30 ppb and show no anomaly.

Ag: The anomalous value of 30 ppm or higher concentrate at the known vein portion of the Turaquiri deposit at Loma Churicollo. In addition, anomalous values are locally obtained at the ore showings on the northern slope of Cerro Nuñu Kkollu in the south.

Cu: Anomalous portions of 90 ppm or higher are located on the surface of the Turaquiri vein portion and at the ore showings on the northern slope of Cerro Nuñu Kkollu in the south, but these are localized and not concentrated.

Pb: From the surface to the underground Turaquiri vein portions, anomalous zones of 400 ppm or higher are seen. Besides, anomalous portions are observed locally at the ore showings on the northern slope of Cerro Nuñu Kkollu in the south.

Zn: From the surface to the underground of the Turaquiri vein portions, anomalous zones of 230 ppm or higher exist. Besides, there are anomalous zones at the ore showings on the northern slope of Cerro Nuñu Kkollu in the south. Another anomalous zone is located at the western extension of the Turaquiri veins, where the presence of barite veins trending WNW is known.

Turaquiri

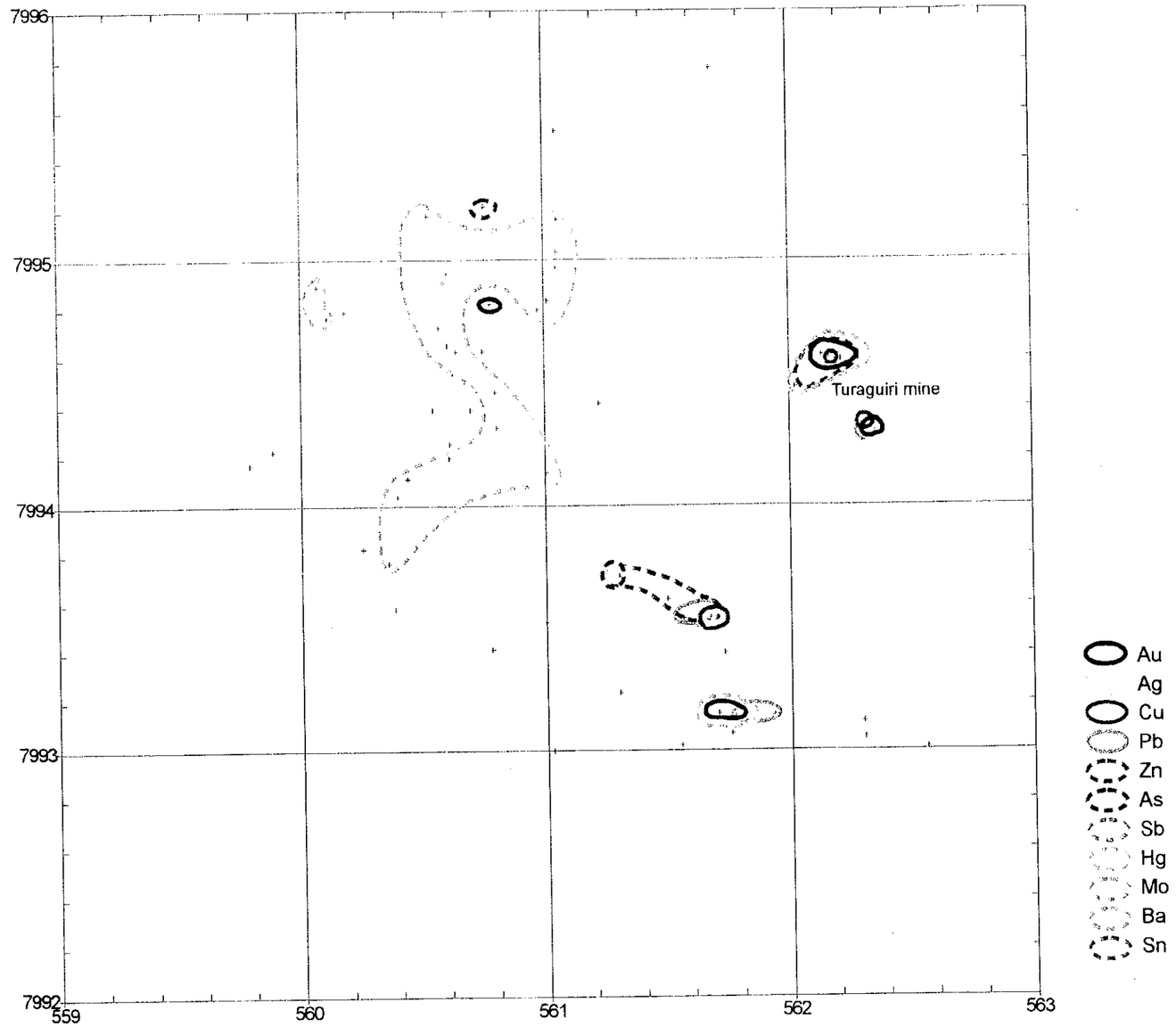


Fig.II-2-1 (3)Geochemical Anomaly Map of the Turaquiri District

As: Three spots indicate anomalies of 140 ppm or higher and are scattered separately.

Sb: Except a spot that shows 6 ppm, all the samples are under the detection limit.

Hg: All the samples are under the detection limit.

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

Ba: Anomaly zones of 1,500 ppm or higher are at the surface portion of the veins of the Turaquiri deposit and at the northern slope of Co. Nuñu Kkollu.

Sn: All the samples are under the detection limit.

(5) Considerations

The ore deposits of Turaquiri district are epithermal barite- quartz veins associated with base metals and precious metals which occur along the east-westerly fractures formed by the development of caldera.

Based on the facts that the alteration is neutral type without tin minerals and any intrusives was not recognized in the area, the mineralization of the area has both characters of low-sulfidation epithermal deposit (Type V) and epithermal precious metal deposit (Type III).

Considering that only the mineralized veins have been mined in the previous mining operation, as the case of Tordos deposit at San Cristóbal mine, it is possible that a low grade stockwork or disseminated type deposits might have been left behind. Particularly the presence of mineralization is expected in the area where two veins are intersecting in deep underground.

2-2 Asu Asuni District (Figs. II-2-2, II-2-2 (1 to 3))

(1) Geology

The area is underlain by lapilli tuff, tuff breccia (volcanic breccia), andesite and dacite of late Miocene to Pliocene age.

Lapilli tuff and tuff breccia include andesite fragments and have alteration.

Andesite is composed of two-pyroxene andesite, hornblende andesite and pyroxene-hornblende andesite. On the ridges, there remain fresh rocks saved from alteration.

Acording to the known data, andesite shows 4.1 ±1.2 Ma in K-Ar age.

The hornblende-biotite-pyroxene andesite collected from the eastern slope indicates K-Ar age of 3.27 ±0.10 Ma.

In the area, faults, veins and fractures with the E-W trend prevail, besides N-S direction.

(2) Alteration

The hydrothermal alteration zones cover about 5 km^2.

Silicification, argillization and propylization are observed.

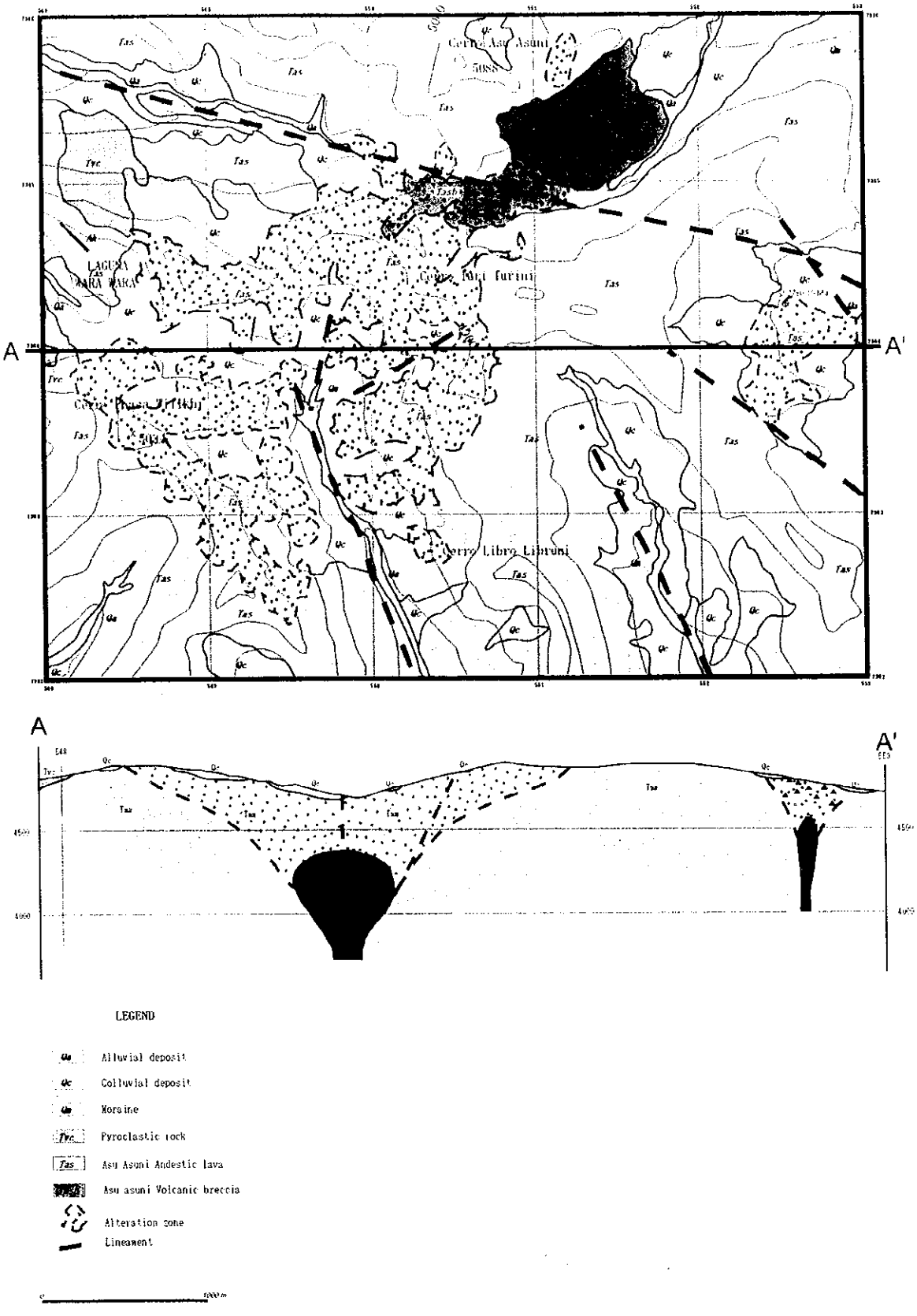


Fig. II-2-2 Geological Map of the Asu Asuni District

Asu Asuni

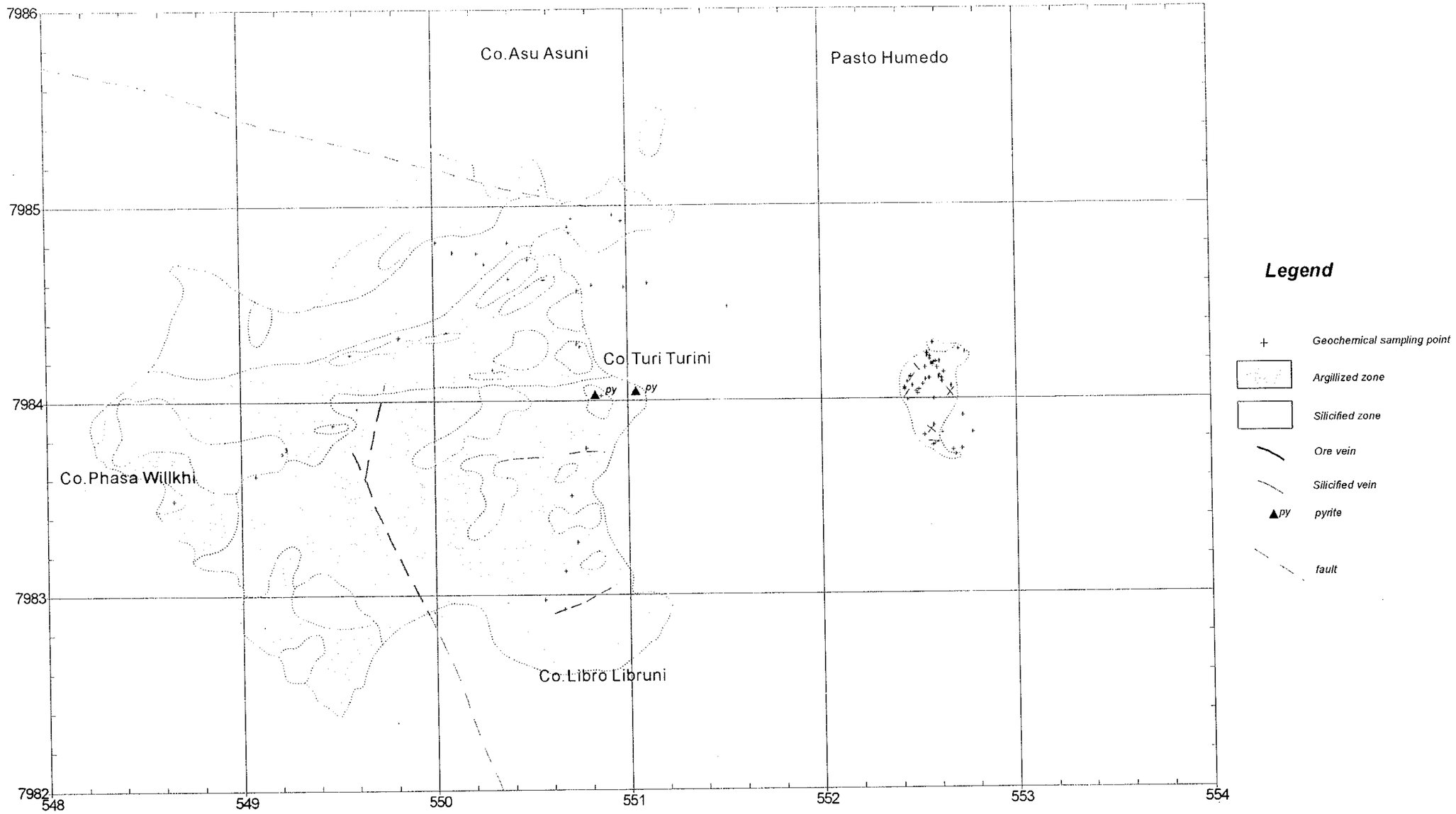


Fig.II-2-2 (1)Alteration Map of the Asu Asuni District

Asu Asuni

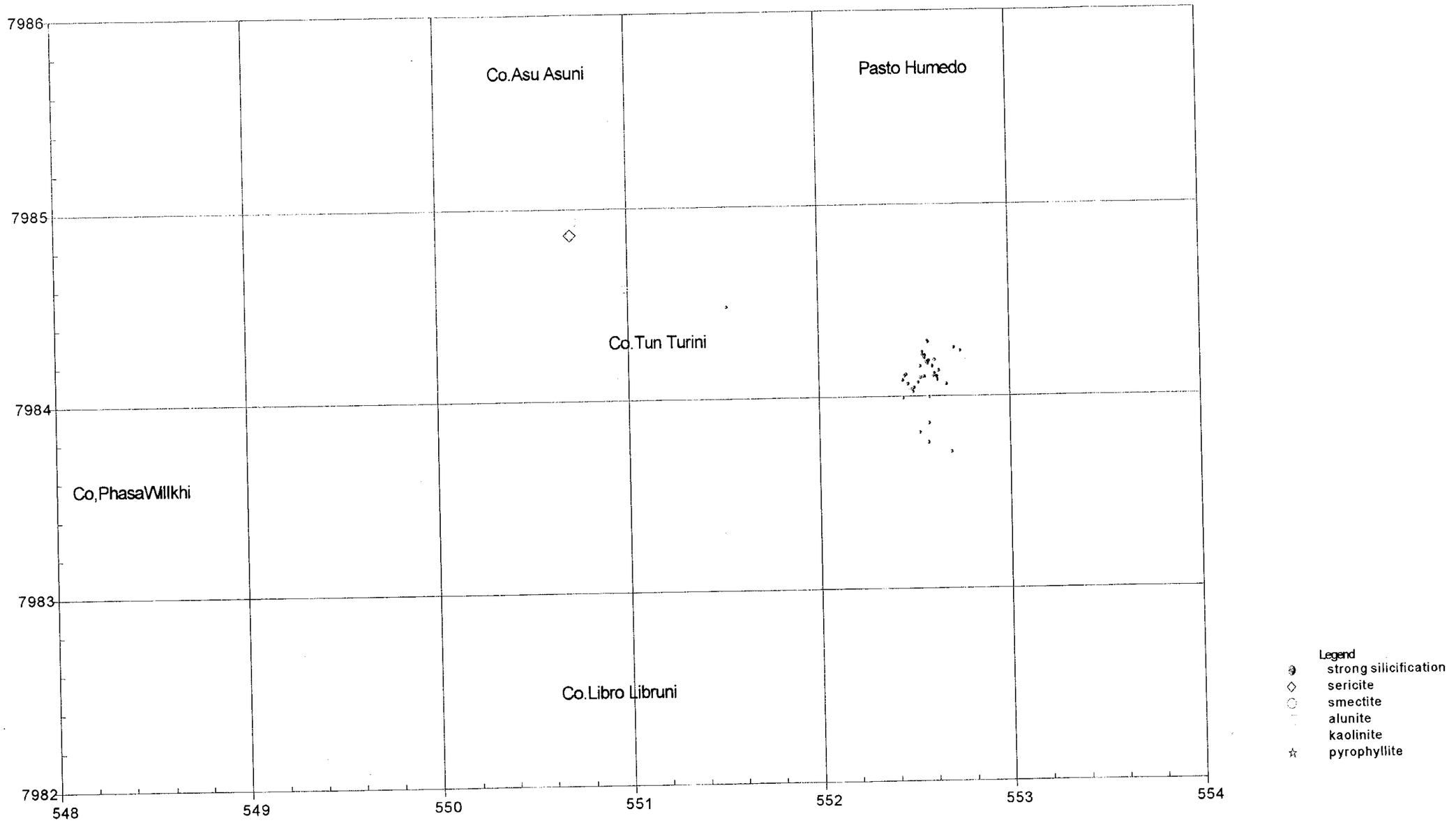


Fig.II-2-2 (2)Distribution Map of Alteration Minerals in the Asu Asuni District

The small alteration zones on the eastern slope studied in Phase II are mainly of silicification and accompanied by hydrothermal breccia.

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

(3) Mineralization

Only minor dissemination with pyrite and hematite is observable in some andesite.

Under the microscope, ore minerals such as pyrite, hematite and goethite are observed.

(4) Assay of geochemical samples

Fifty-six rock-chip samples were collected at the area and were analysed together with twenty-seven samples collected in Phase I.

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

Au: <2ppb, 3ppb, <2ppb, Ag: <0.5ppm, 1.0ppm, <0.5ppm, Cu: <2ppm, 51ppm, 10ppm,
Pb: <3ppm, 60ppm, 9ppm, Zn: <2ppm, 433ppm, 24ppm, As: <5ppm, 39ppm, <5ppm,
Sb: <5ppm, 6ppm, <5ppm, Hg:<1ppm, <1ppm, <1ppm, Mo: <1ppm, 16ppm, 4ppm,
Ba: 36ppm, 2,370ppm, 683ppm, Sn: <5ppm, <5ppm, <5ppm.

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

Au: Except a spot indicating 3 ppb, all the samples were under the detection limit.
Ag: Except a spot indicating 1 ppm, all the samples were under the detection limit.
Cu: All the samples indicate under 51 ppm and show no anomalous value.
Pb: All the samples indicate under 60 ppm and show no anomalous value.
Zn: Although an anomalous value of 433 ppm was indicated at a spot on Co. Libro Libruni, no remarkable concentration was observed.
As: All the samples indicate under 39 ppm and show no anomalous value.
Sb: All the samples indicate under 6 ppm and show no anomalous value.
Hg: All the samples are under the detection limit.
Mo: All the samples indicate under 16 ppm and show no anomalous value.
Ba: Small anomalous spots are observed at the eastern slope.
Sn: All the samples were under the detection limit.

(5) Considerations

An alteration zone associated with hydrothermal breccia was found in the east of the alteration zone studied in the phase I survey. No remarkable mineralization and geochemical anomaly are observed in alteration zone and if exist, the mineralization is probably weak or occurs in deeper part.

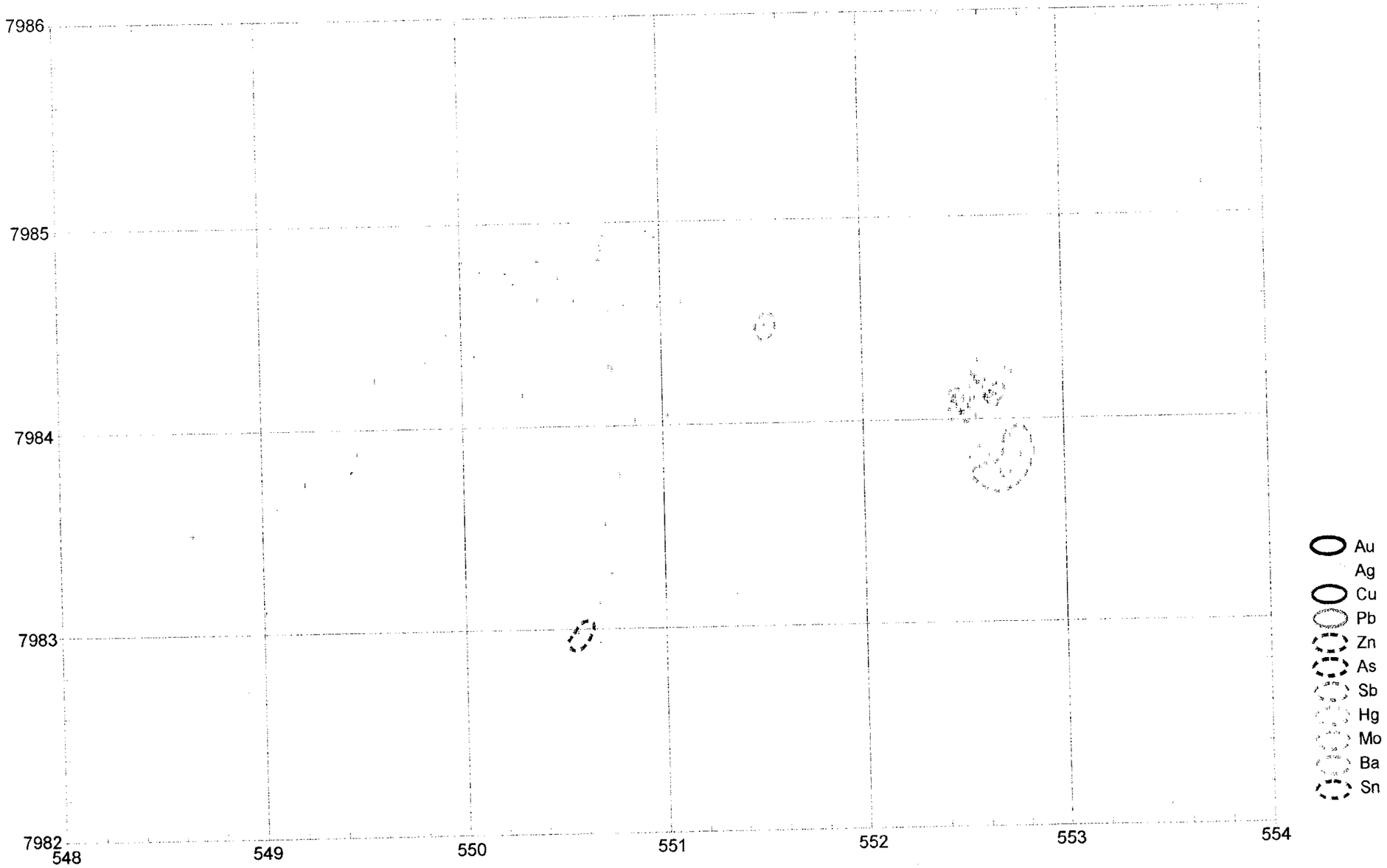


Fig.II-2-2 (3)Geochemical Anomaly Map of the Asu Asuni District

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

(1) Geology

The area is underlain by pyroclastic rocks such as lapilli tuff, tuff breccia (volcanic breccia) and andesite, basalt lavas and rhyolite intrusive rock.

Lapilli tuff and/or tuff breccia are dacitic and have undergone alteration.

Andesite is pyroxene-biotite-hornblende andesite and indicates 6.13 ± 0.12 Ma of K-AR age in Phase I.

The K-Ar age of two samples collected in Phase II show 6.14 ± 0.12 Ma (No.4977) and 5.31 ± 0.14 Ma (No.6256).

Basalt, forming a low mesa at western part in the area, contains a good deal of olivines (No.6246).

Rhyolite intrudes between andesite and basalt above mentioned, indicates K-Ar age of 1.52 ± 0.05 Ma (No.6247)

It is cleared that a presumable diatreme , noted in Phase I , is an assemblage of hydrothermal breccias and pipes.

Faults, veins and fractures show radial distributions surraunding the alteration centre between Co.Asu Asuni and Co.Nunutani.

(2) Alteration

The hydrothermal alteration zones cover about 6.5 km^2.

Silicification and argillization are observed.

Alteration zones show circular distribution centered at Co.Huarin Uma,and accompanied by hydrothermal breccias and breccia pipes.

Two alunitized samples collected in Phase II indicate K-Ar age of 5.32 ± 0.07 Ma(No.6129) and6.12 ± 0.09 Ma(No.6257).

Alteration minerals such as quartz, alunite, smectite,zeolite, sericite, kaolinite and pyrophyllite are observed, and mineral distributions are shown in Fig.II-2-3(2).

(3) Mineralization

Andesite and dacitic lapilli tuff are disseminated with pyrite.

Ore minerals such as pyrite and goethite, partly accompanied by barite, are observed under the microscope.

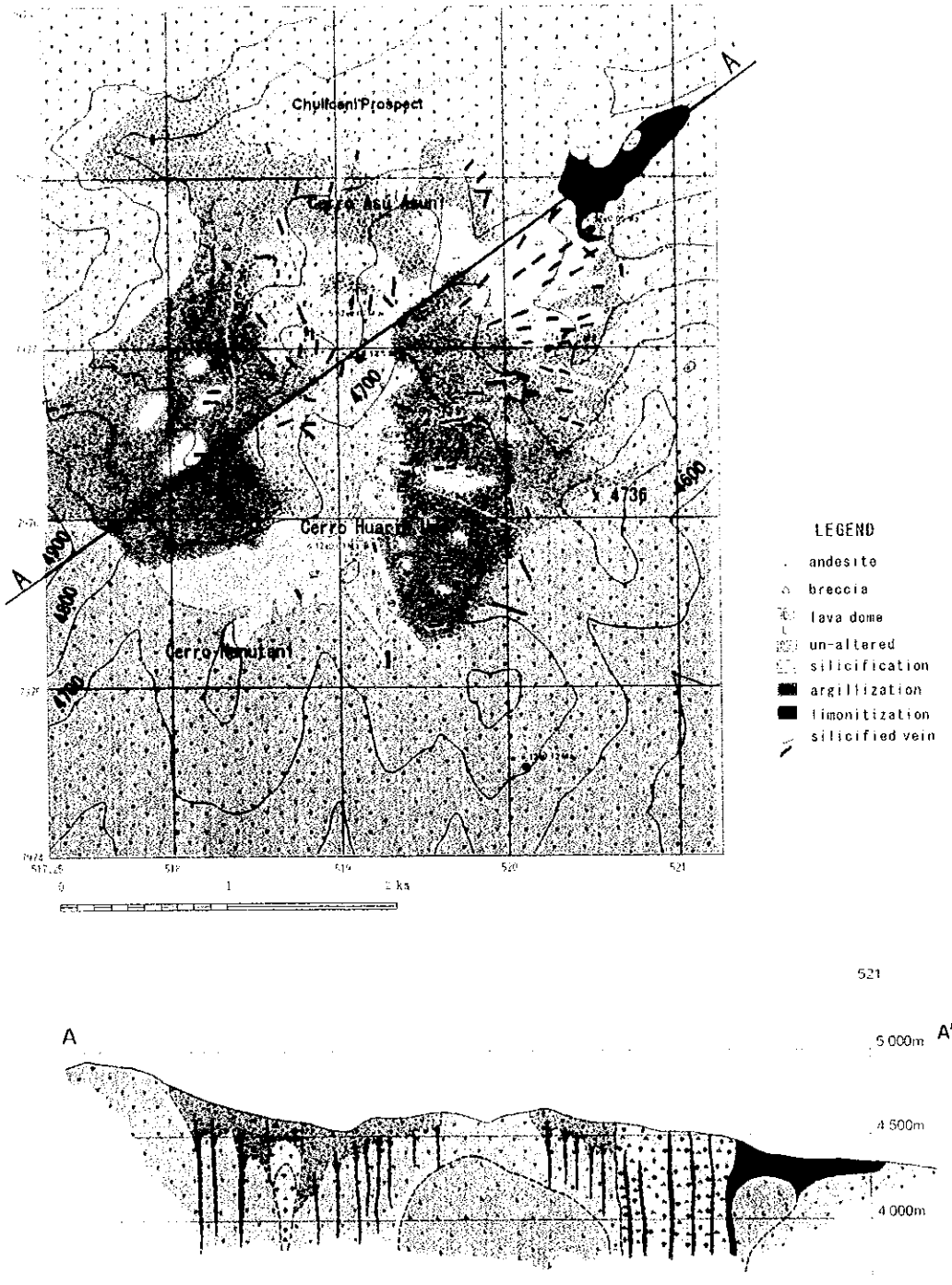


fig.II-2-3 Geological Map of the Chullcani District

Chullcani

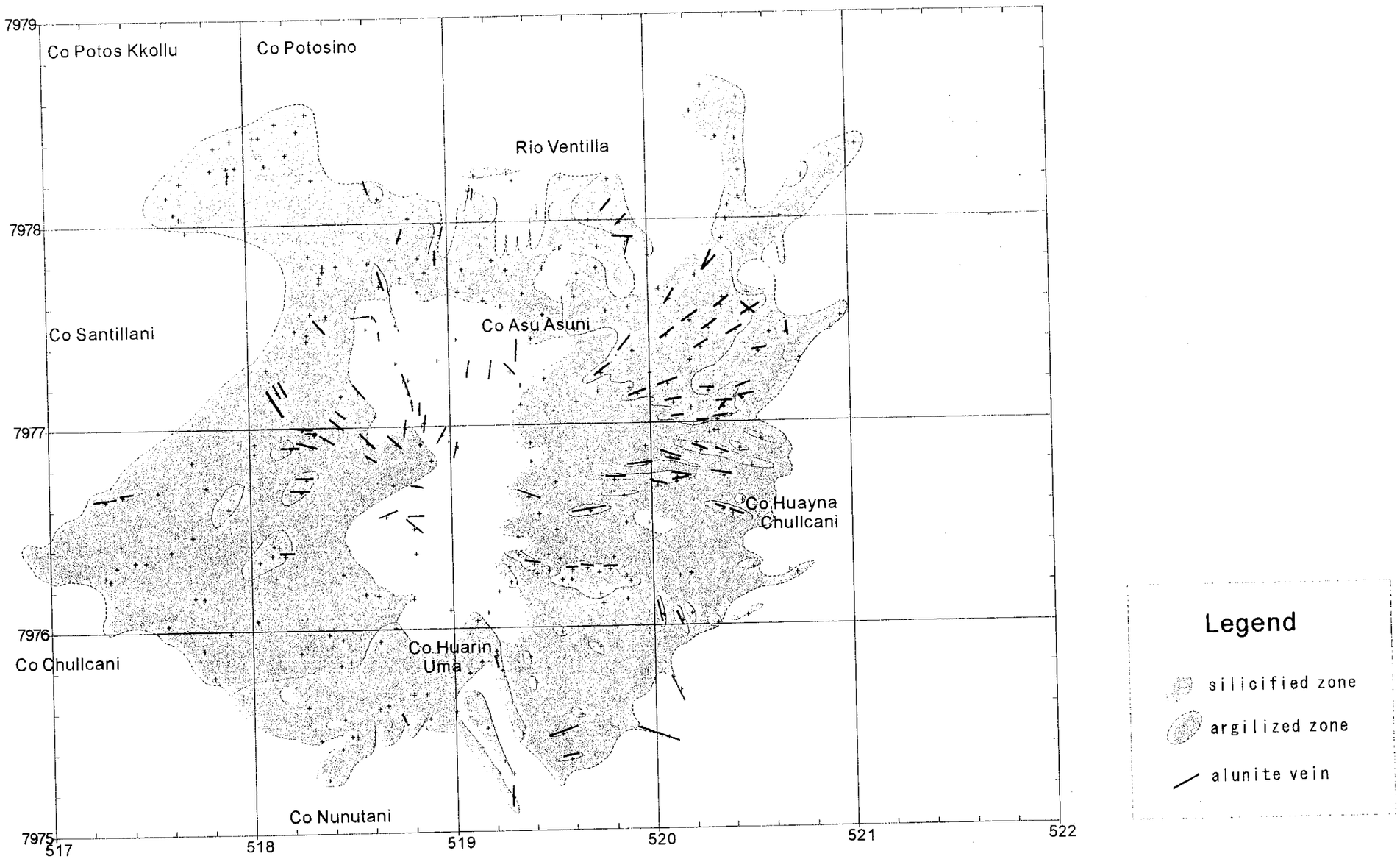


Fig.II-2-3 (1)Alteration Map of the Chullcani Distric

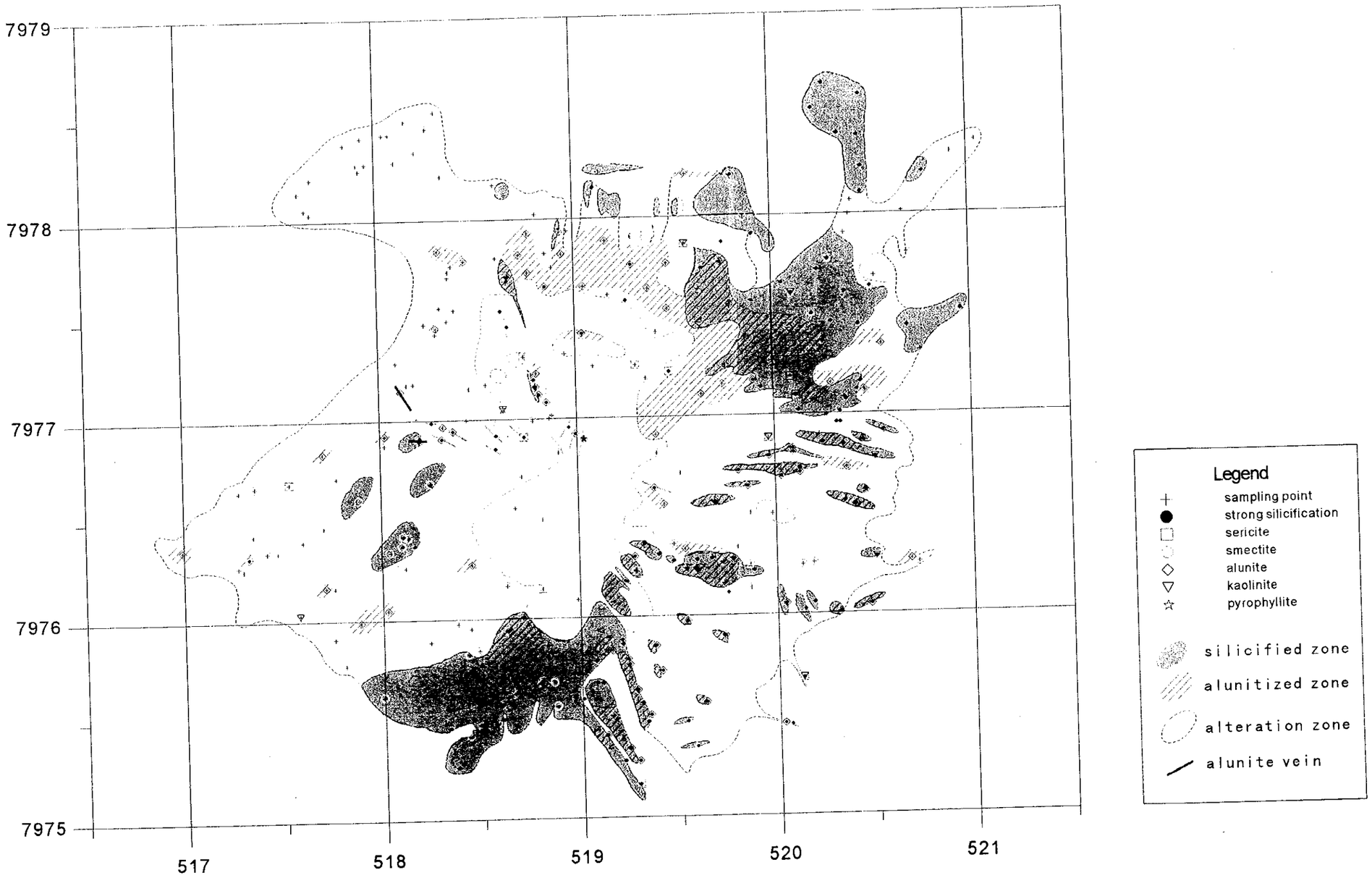


Fig.II-2-3 (2)Distribution Map of Alteration Minerals in the Chullcani District

A manganese oxide vein exists on the eastern slope adjacent to breccia pipe and is acompanied by very small amount of green copper. A inclined shaft with several meters depth remains.

(4) Assay of geochemical samples

Three hundred faive rock-chip samples were collected in this area and analysed together with twenty-eight samples collected in Phase I.

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

Au: <2ppb, 603ppb, 12ppb, Ag: <0.5ppm, 32.3ppm, 3.9ppm, Cu: <2ppm, 124ppm, 20ppm, Pb: <3ppm, 3,313ppm, 121ppm, Zn: <2ppm , 543ppm, 26ppm, As: <5ppm, 373ppm, 25ppm, Sb: <5ppm, 45ppm, 10ppm, Hg: <1ppm, <1ppm, <1ppm, Mo: <1ppm, 127ppm, 7ppm, Ba: 67ppm, 9,898ppm, 1,305ppm, Sn: <5ppm, 16ppm, 9ppm

Geochemical anomalies by the elements are indicated in Fig. II-3-3 (3).

Au: The maximum assay value reached 603 ppb, while 11 sammples indicate anomalous value of 70 ppb or higher exist at near of alteration centre.

Ag: Only one sample indicates an anomalous value.

Cu: Three samples indicate anomalous value of 90ppm or higher and locate at two spots.

Pb: Anomalous portions of 400ppm or higher are located at 11 spots and are abundant especialy at the alteration centre.

Zn: Only one sample indicates an anomalous value of 543 ppm.

As: Anomalous values of 140 ppm or higher are detected at 9 spots and are mainly distributed in the silicified zone at north-eastern portion.

Sb: Anomalous zones are shown widespreadly.

Hg: All the samples were under the detection limit.

Mo: Five samples indicate anomalous values and are distributed at around center of alteration zones.

Ba: Anomalous zones are shown widespreadly.

Sn: Seven samples indicate anomalous values and scattered separately.

(5) Considerations

As the result of phase II survey a ring-shaped hydrothermal alteration zone was found at the ridge of Loma Huarin Uma, and hydrothermal breccia (as dykes, pipes and masses) and silicified veins are distributed radially, suggesting the presence of crypto-intrusive in deep underground. Alunite, kaolinite and pyrophyllite were identified as alteration minerals indicating that the

Chullcani

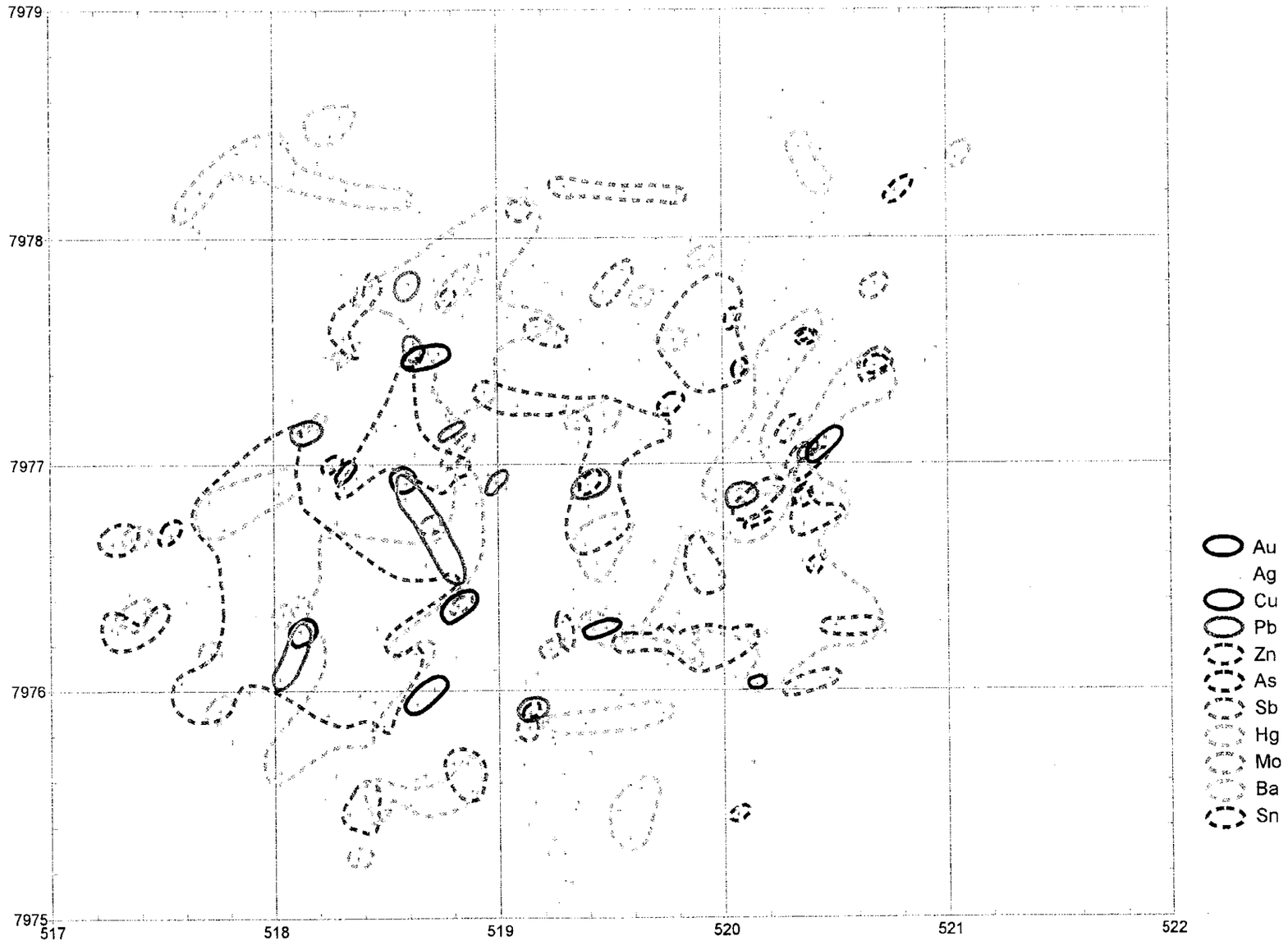


Fig.II-2-3 (3)Geochemical Anomaly Map of the Chullcani District

alteration is acidic type.

Result of the geochemical survey shows that the anomalies of gold are scattered around the center of the alteration zone and the anomalies of antimony and barium are widely distributed over the alteration zone. Small anomalies of lead arsenic, molybdenum and tin are also scattered. Based on the facts described above, the mineralization in Chullcani district is presumed to be epithermal gold- silver- lead- zinc deposit (Type II), related to shallow volcanic activity. Beside there is a possibility of existing ore deposits around the crypto-intrusives. In addition, as the presence of pyrophyllite and copper anomalies are recognized in part, there is a possibility of over-printing of mineralization by high-sulfidation epithermal deposit (type IV).

2-4 Sonia - Susana District (Figs. II-2-4, II-2-4 (1 to 3))

(1) Geology

The district is underlain by pyroclastic rocks such as tuff, lapilli tuff and tuff breccia (volcanic breccia), and andesite, dacite, rhyolite and basalt lavas of early Miocene to Pliocene, as well as dolerite as an intrusive rock.

Tuff is andesitic, dacitic and rhyolitic, widespread from the central part of the district westward. Rhyolitic tuff lies in a circle and is partially welded.

The K-Ar age dating of rhyolitic tuff indicats 17.70± 0.35 Ma.

Rhyolite is gray, having the flow structure, presumably present in a dome-like shape, approximately 1 km in diameter, centering on Cerro Entre Campanini in the north-central part of the district.

Dolerite is also observed at Co. Entre Campanani with 2m in width, E-W direction.

Faults, veins and fractures trending E-W are predominant in the eastern part of the district. In Santa Catalina Loma to the west, those trending NW-SE are somewhat dominant whilst, in the central part, the NE-SW trend is dominant. In the west, the main trend is E-W but the N-S and NW-SE trends are also observable.

(2) Alteration

The hydrothermal alteration zones cover about 12 km^2.

Silicification, argillization and propylization are observed

The argillization zone is widespread in the alteration zone, in which silicification is seen like veins or dykes. A propylization zone is insulated in the argillization zone and is seen extending rather broadly outside of the argillization zone.

Dasite at the Co.Jankho Khollu has undergone silicification and biotite turned to sericite in part.

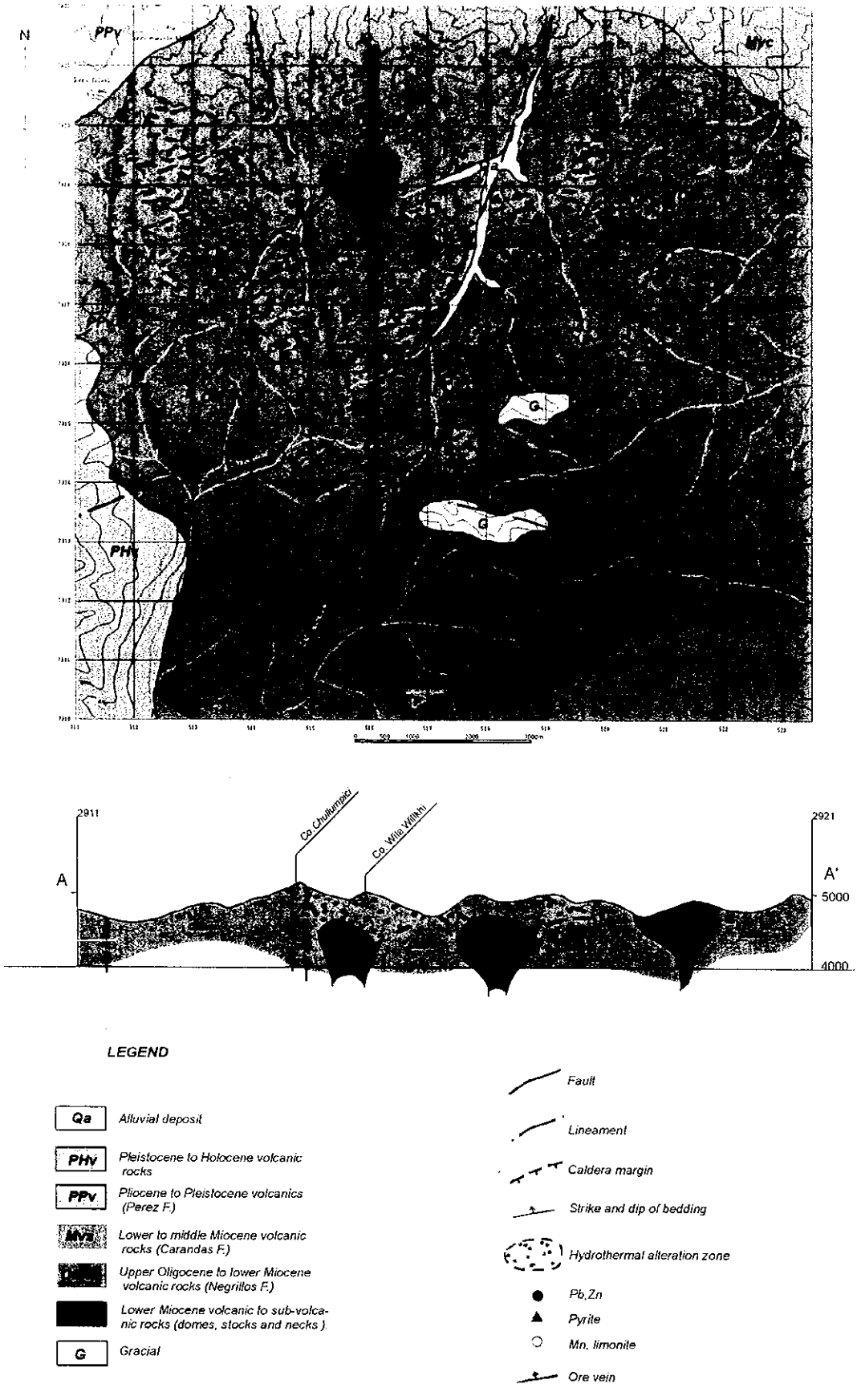
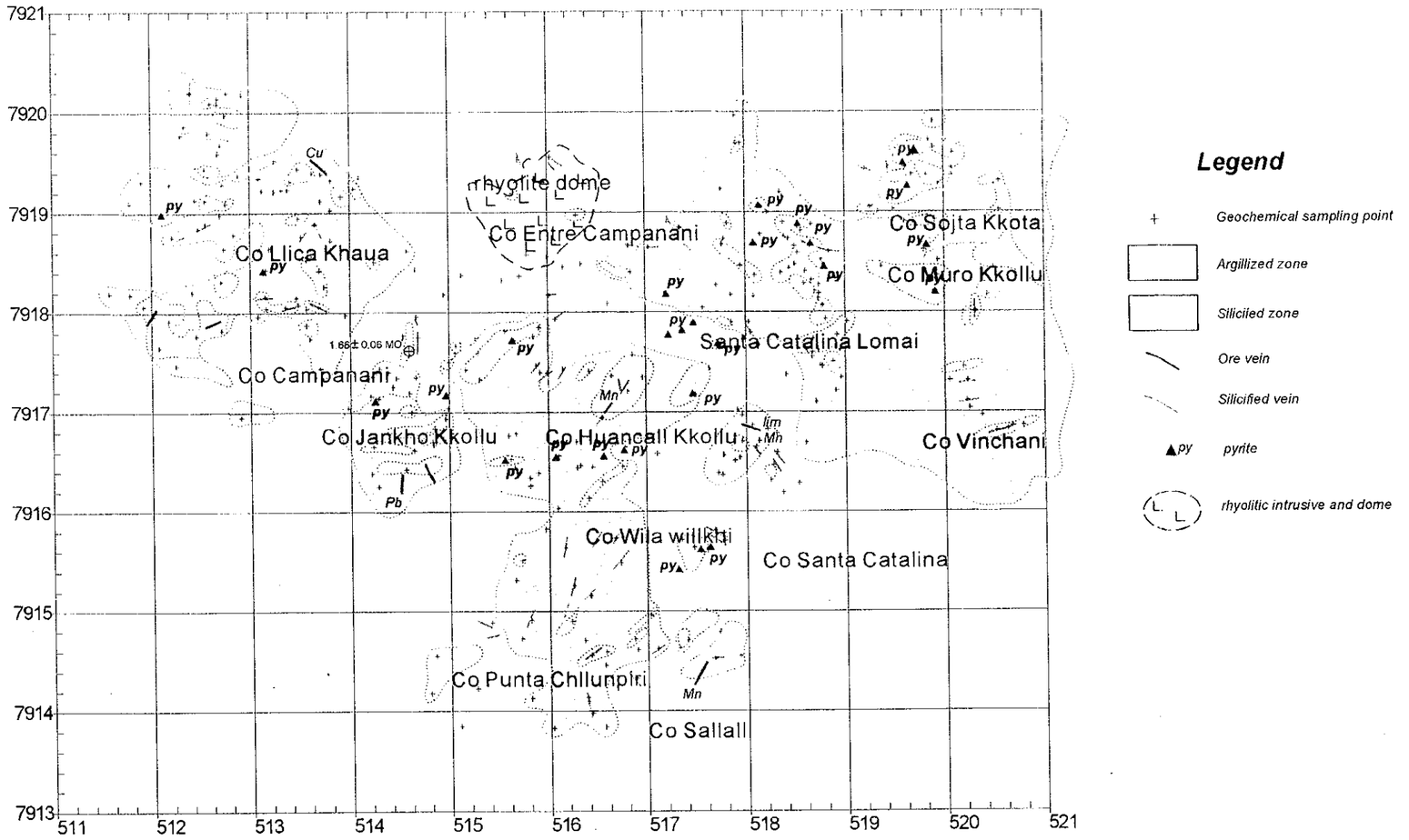


Fig. II-2-4 Geological Map of the Sonia-Susana District

Sonia Susana



Legend

- Geochemical sampling point
- Argillized zone
- Silicified zone
- Ore vein
- Silicified vein
- ▲py pyrite
- rhyolitic intrusive and dome

Fig.II-2-4 (1)Alteration Map of the Sonia-Susana District

The sample of sericitized dasite indicates the K-Ar age of 1.75± 0.10 Ma.

Alteration minerals such as sericite, quartz, smectite, kaolinite and zeolite are observed, and mineral distributions are shown in Fig.II-2-4 (2).

(3) Mineralization

Pyrite dissemination is observed at various locations, as well as vein-type mineralization accompanied by manganese oxide minerals.

On the western slope of Co.Santa Catalina, green copper dissemination is seen and under the microscope, pyrite and chalcopyrite are observed, besides molybdenite as sulfide minerals (No.5000).

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-2-1.

Table II-2-1 Homogenization Temperature and Freezing Temperature (Sonia – Susana District)

Sample No.	Mineral	Homogenization Temperature			Freezing Temperature			
		Inc. No.	Range (℃)	Ave (℃)	Inc. No.	Range (℃)	Ave (℃)	Salinity (wt%)
6234	Qz	10	200 ~ 289	236	10	-1.2 ~ -0.1	-0.8	1.4
4999	Qz	10	177 ~ 234	208	10	-0.9 ~ -0.8	-0.9	1.5
Average			177 ~ 289	222		-1.2~ -0.1	-0.9	1.5

All the two samples measured are quartz, whose homogenization temperatures ranged from 177°C to289°C, and average temperature was 222°C.

The freezing temperatures ranged from -1.2°C to -0.1°C, and average temperature was -0.9°C.

The salinity (NaCl equivalent) that was calculated from these values was 1.5 wt.% in average.

In this district, COMINCO Bolivia has carried out a drilling survey of 10 boreholes (2,000m), geochemical and IP surveys, leaving the drill sites, access roads, channel sampling sites and survey points at various places.

(4) Assay of geochemical samples

One hundred fifty-one rock-chip samples were collected in the district and were analysed together with one hundred ninety-four samples collected in Phase I.

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

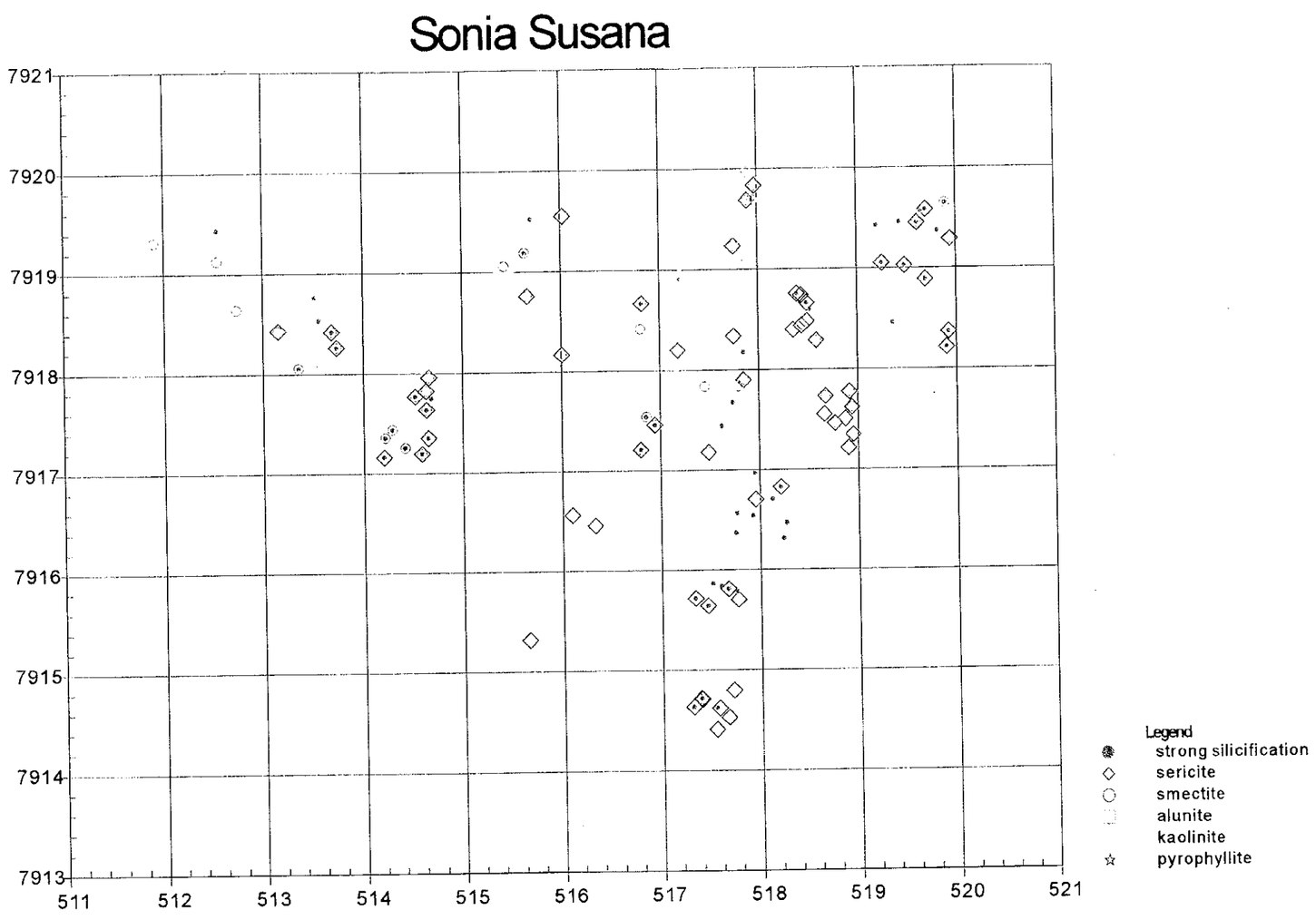


Fig.II-2-4 (2)Distribution Map of Alteration Minerals in the Sonia-Susana District

are as follows:

Au: <2ppb, 504ppb, 10ppb, Ag: <0.5ppm, 57.0ppm, 1.3ppm, Cu: <2ppm, 700ppm, 49ppm, Pb: <3ppm, 2,377ppm, 134ppm, Zn: <2ppm, 4,660ppm, 167ppm, As: <5ppm, 3,210ppm, 35ppm, Sb: <5ppm, 93ppm, <5ppm, Hg: <1ppm, 22ppm, <1ppm,Mo: <1ppm, 238ppm, 6ppm, Ba: 15ppm, 6,552ppm, 656ppm, Sn: <5ppm, 76ppm, <5ppm.

Geochemical anomalies of the respective elements are indicated in Fig. II-2-4 (3).

Au: Eight samples indicated anomalous value of 70 ppb or higher exist around at Santa Catalina Loma.

Ag: A spot at Santa Catalina Loma indicated an anomalous value of 57 ppm.

Cu: At Santa Catalina Loma, anomaly zones of 90 ppm or higher are widespread.

Pb: Anomaly zones of 400 ppm or higher are mostly at Santa Catalina Loma.

Zn: Anomaly zones of 230 ppm or higher are mostly at Santa Catalina Loma. Besides, small anomaly zones are scattered widespreadly.

As: Anomaly zones of 140 ppm or higher overlap the gold anomaly zone at Co. Entre Campanini. Besides, anomalous values are seized at five separate spots.

Sb: An anomaly zone overlaps the gold anomaly zone at Co. Entre Campanini. Besides, anomalous values are seized at eight spots.

Hg: Only one sample indicates anomalous value at north-westen part of Co. Llica Khaua.

Mo: Small-scale anomaly zones are scattered mostly around Santa Catalina Loma.

Ba: More than ten small anomaly zones are scattered in the whole district.

Sn: Anomaly zones of 10 ppm or higher overlap the gold anomaly zones at Co. Entre Campanini and Santa Catalina Loma.

Geochemical anomaly zones are observed mostly at Santa Catalina Loma.

(5) Considerations

Two types of geochemical anomalies, gold- copper- lead- zinc and gold- tin- antimony- arsenic, are recognized in the area. This implies different types of mineralization have place at least in two stages. The former is the epithermal deposit related to shallow hypabyssal intrusion (Type III), and the later is the epithermal gold- silver-lead- zinc deposit related to shallow volcanic activity (Type II).

Porphyry type mineralization is expected to occur beneath the older mineralization, and epithermal precious metal deposit is expectable beneath the young mineralized zone.

COMINCO Bolivia has carried out exploration including diamond drilling of 10 holes, geochemical survey and IP survey. Comprehensive study including these data is necessary.

Sonia Susana

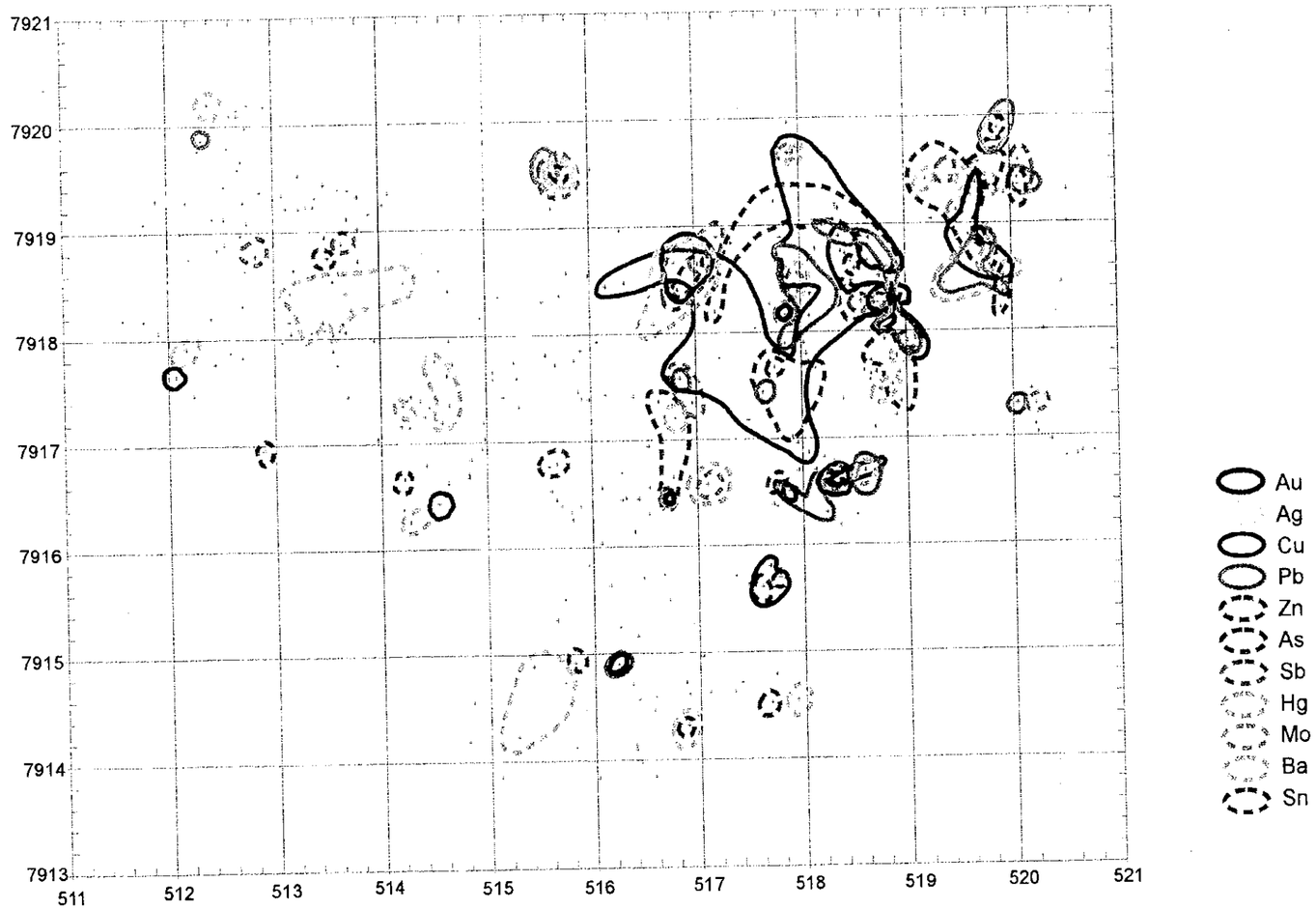


Fig.II-2-4 (3)Geochemical Anomaly Map of the Sonia-Susana District

2-5 Calorno District (Figs. II-2-5, II-2-5 (1 to 3))

(1) Geology

The district is underlain by tuff, lapilli tuff, tuff breccia (volcanic breccia), andesite and dacite of late Miocene to Pliocene age.

In general, the hilltops are covered by lavas, while pyroclastic rocks overlie the lower parts.

The K-Ar dating of andesite in Phase I indicates 9.01 ± 0.18 Ma.

At Cerro Sancarata in the northeastern part of the district, faults, veins and fractures with the N-S trend are predominant, followed by those with the NW-SE trend. In the northwestern part, the N-S trend are predominant, followed by those with the ENE- SWS. In the central part of the district, the NW-SE trend is conspicuous while the NE-SW and E-W trends are also observable.

(2) Alteration

The hydrothermal alteration zones, the biggest one of all districts, cover about 28.5 km^2.

Silicification and argillization are observed; in the broad argillization zone, vein-like silicification portions are seen.

Fresh rocks are left on the mountaintops.

Hydrothermal breccia crop out widely on the southwestern slope of Co.Huaylla Khaua and vuggy silica is observed in part.

Alteration minerals such as quartz, alunite, smectite, kaolinite, sericite and pyrophyllite are observed.

(3) Mineralization

Pyrite dissemination is seen at northwestern and southeastern parts and at central part yellow alunite are abundant near hydrothermal breccia body.

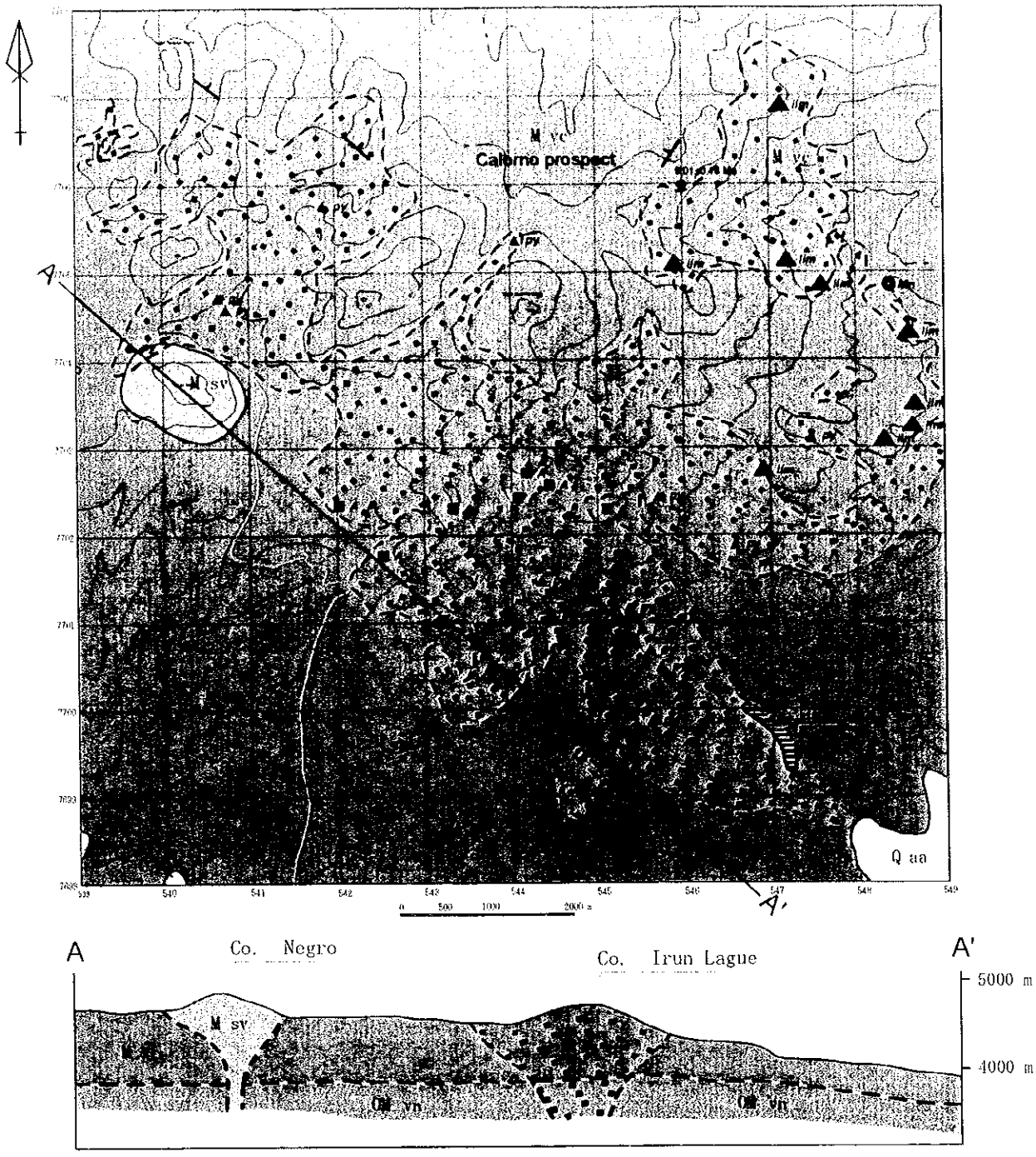
Silicified veins and quartz veins are existent but no indications of metallic ores are found.

Gossans of goethite are exposed at northwestern part and south eastern part, over about 800 m along the riverbed of the Rio Agua Milagro in the southeast.

In the gossan sample at the southern part pyrite is observed under the microscope.

(4) Assay of geochemical samples

Two hundred thirty-four rock-chip samples were collected in the district and were analysed together with three hundred forty-three samples collected in Phase I.



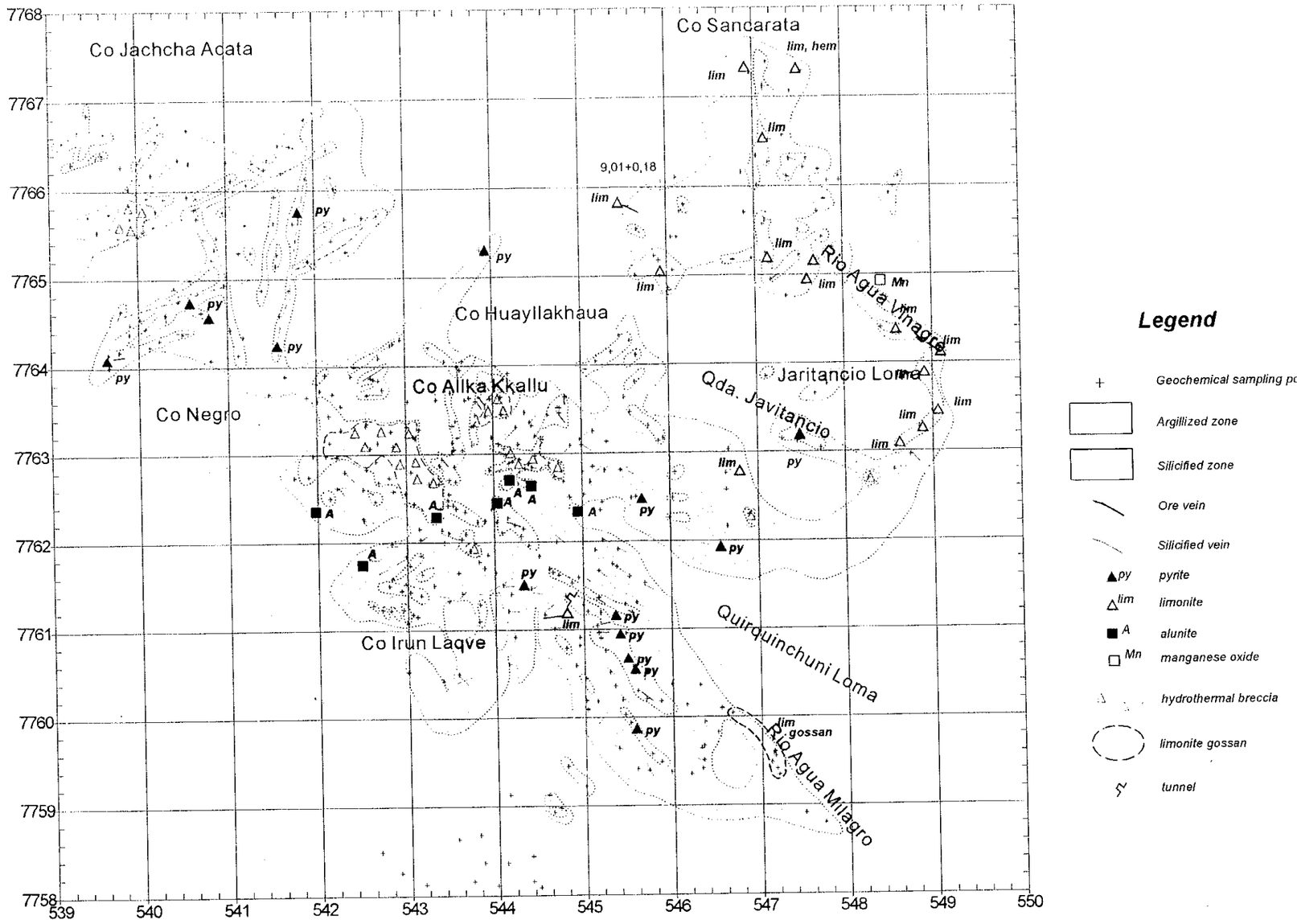
L E G E N D

Q aa	Alluvialfan deposit.
M vc	Lower to Middle Miocene Volcanic rocks (Carangas F.)
OM vn	Upper Oligocene to lower Miocene volcanic rock (Negrillos.)
M sv	Miocen sub-volcanic rock (dikes, sills, stocks.)
	Dip of lava flow.
	Hidro therinal Alteration zone.

▲ py	pyrite
■ A	yellow Alunite
▲ lim	Limonite
	tunnel
Mn	

Fig.II-2-5 Geological Map of the Calorno District

Calorno



Legend

- Geochemical sampling point
- Argillized zone
- Silicified zone
- Ore vein
- Silicified vein
- py — pyrite
- lim — limonite
- A — alunite
- Mn — manganese oxide
- hydrothermal breccia
- limonite gossan
- tunnel

Fig.II-2-5 (1)Alteration Map of the Calorno District

Calorno

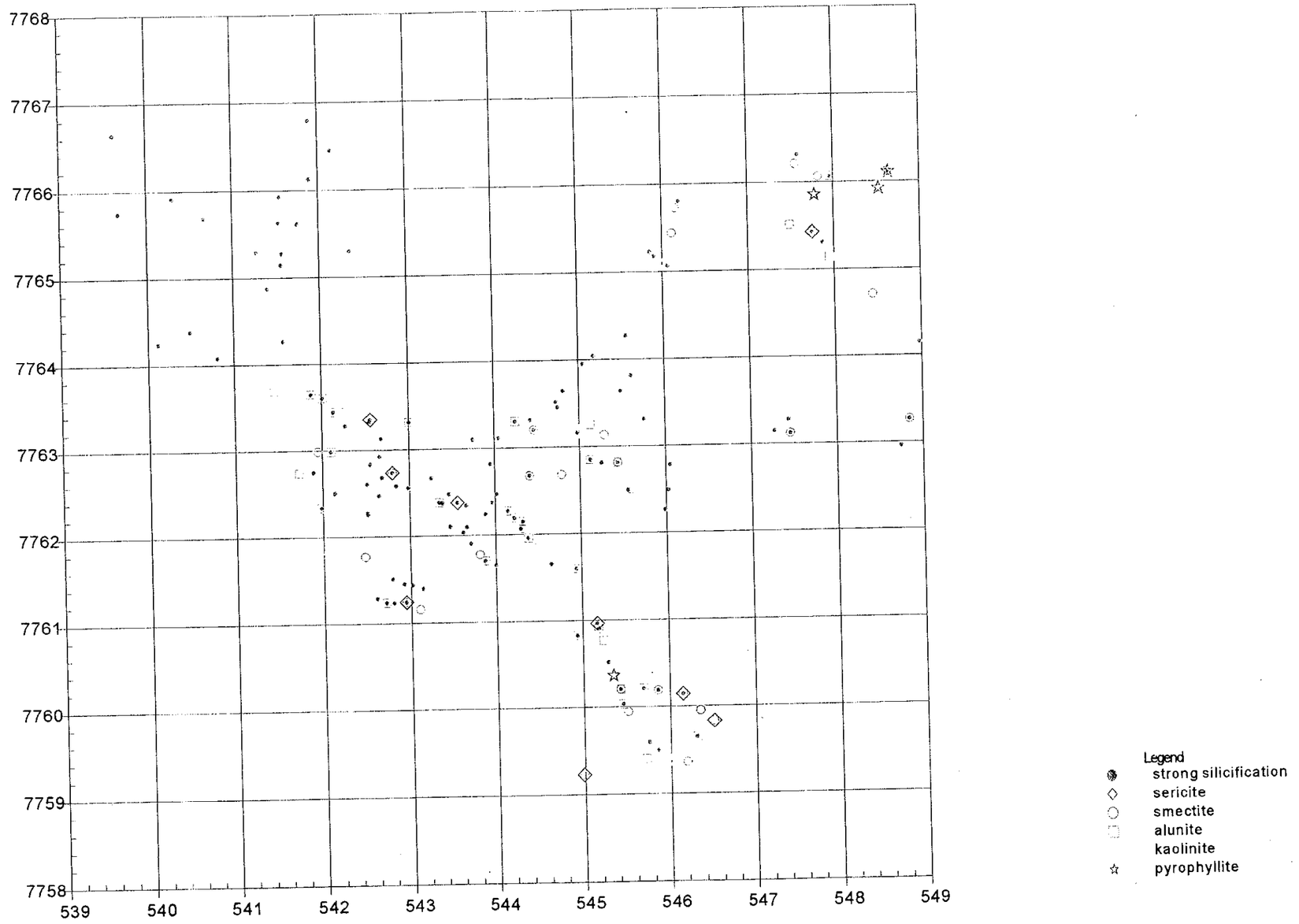


Fig.II-2-5 (2)Distribution Map of Alteration Minerals in the Calorno District

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

Au: <2ppb, 43ppb, <2ppb, Ag: <0.5ppm, 2.0ppm, <0.5ppm, Cu: <2ppm, 285ppm, 20ppm, Pb: <3ppm, 1,863ppm, 22ppm, Zn: <2ppm, 224ppm, 12ppm, As: <5ppm, 11,388ppm, 123ppm, Sb: <5ppm, 357ppm, <5ppm, Hg: <1ppm, 5.3ppm, <1ppm, Mo: <1ppm, 191ppm, 6ppm, Ba: 11ppm, 2,547ppm, 522ppm, Sn: <5ppm, 66ppm, <5ppm

Geochemical anomalies of the respective elements are shown in Fig. II-2-5 (3).

Au: All the samples indicate under 43 ppb and show no anomalous value.

Ag: All the samples indicate under 1.6ppm and show no anomalous value.

Cu: Twelve samples indicate anomalous values and are scattered widespreadly.

Pb: Five samples indicate anomalous values and are scattered widespreadly.

Zn: All the samples indicate under 224ppm and show no anomalous value.

As: While many anomalous portions are scattered at several locations, rather wider zones are found both at the south of Co.Sancarata and at the Rio Agua Milagro, corresponds to the zone of gossans mainly of goethite.

Sb: While most of the anomalous portions are scattered at several locations, rather wide zones are found at the north of Co.Negro in the northwestern part of the district.

Hg: Small-scale anomaly zones are spotted in hydrothermal breccia zone on the southwestern slope of Co.Huaylla Khaua. Rather high portions of 1-ppm to 2-ppm values are scattered in a whole area.

Mo: Six samples indicate anomalous values and are scattered widespreadly.

Ba: Small anomalous portions exist in a whole area.

Sn: Four samples indicate anomalous values and are scattered widespreadly.

Small-scale geochemical anomalies are scattered individually in a whole area.

(5) Considerations

The hydrothermal alteration zone widely distributed in this district represent the upper most (outer most) zone of alteration.

Bodies of gossan distributed along Rio Agua Milago in the south east of the area which mainly consist of goethite, indicate anomaly of arsenic and antimony in its upper stream part. Hot water spout out from the ground in its vicinity. Existence of sulfide- poor epithermal deposits (Type V) may be possible in its area as the area is far away from the center of volcano.

The hydrothermal alteration zone in the north of the area is possibly formed by the highly acidic solution, which shows tin anomaly too. That suggests the mineralization of the area

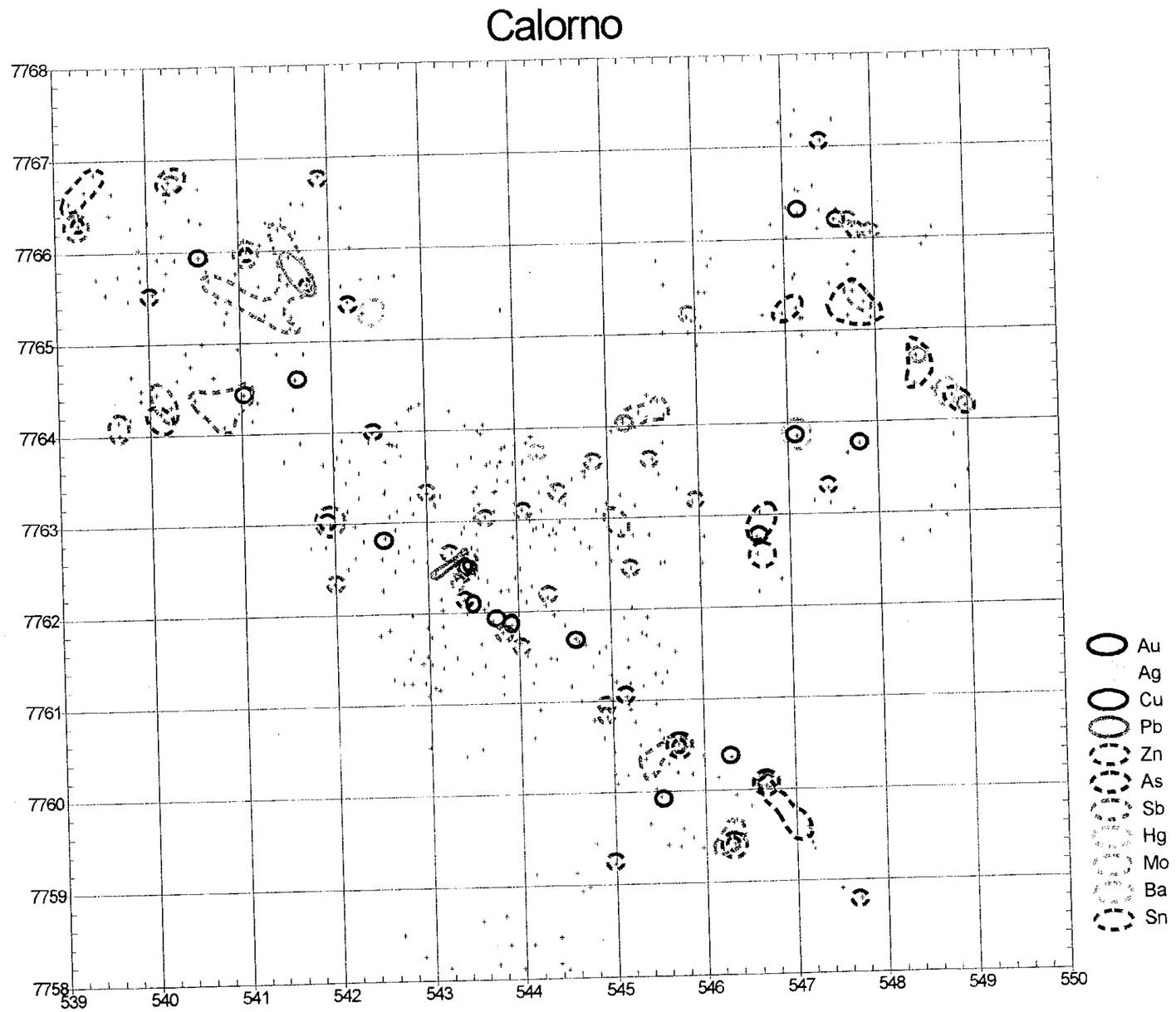


Fig.II-2-5 (3)Geochemical Anomaly Map of the Calorno District

correspond to either sulfide- rich epithermal type (Type IV) or epithermal gold- silver- lead- zinc type (Type II).

Although the geochemical anomaly is not extensive, as the vast amount of hot water is spouting out and wide area is covered by the hydrothermal breccia existence of large deposits can be expected.

2-6 Loma Llena district (Figs. II-2-6, II-2-6 (1 to 3))

(1) Geology

The district is underlain by pyroclastic rocks such as tuff, lapilli tuff and tuff breccia (volcanic breccia), as well as andesite and basalt of late Miocene to Pliocene age.

Pyroclastic rocks are locally existent.

Andesite is composed of hypersthene andesite, two-pyroxene andesite, hornblende two-pyroxene andesite, biotite two-pyroxene andesite, hornblende-augite andesite and hornblende andesite. The K-Ar dating of andesite, collected in Phase I, indicate 6.24 ± 0.12 Ma.

Basalt constitutes the bodies of Cerro Tirani, altitude 5,216 m, in the area.

The faults, veins and fractures with N-S and NE-SW trends are dominant in the area.

(2) Alteration

Hydrothermal alteration zones cover about 8 km^2.

Silicification and argillization are observed. Vein-like silicification portions are included in a broad argillization zone.

Many small-scale bodies of hydrothermal breccia are seen and have silicification.

On the hilltop, there remain fresh rocks saved from alteration.

Alteration minerals such as alunite, smectite, quartz, kaolinite, sericite, zeolite and pyrophyllite are observed.

(3) Mineralization

No marked indications of metallic minerals are found, except pyrite dissemination and veinlets observed on the northwestern slope of Cerro Khasa Unu in the north of the area.

(4) Assay of Geochemical samples

One hundred fourty-five rock-chip samples were collected in the district and were analysed together with one hundred sixty-five samples collected in Phase I.

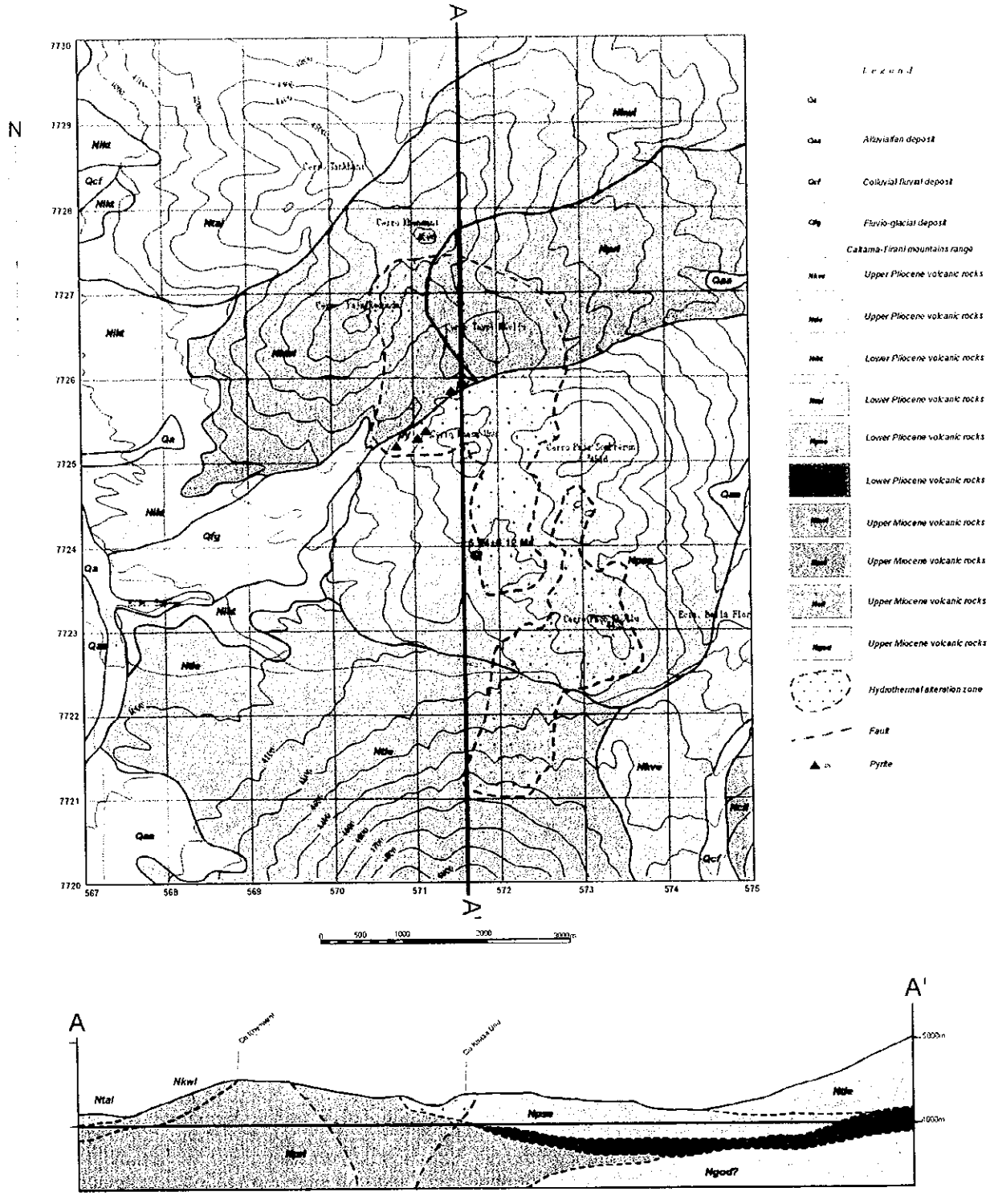


Fig.II-2-6 Geological Map of the Loma Llena District

Loma Llena

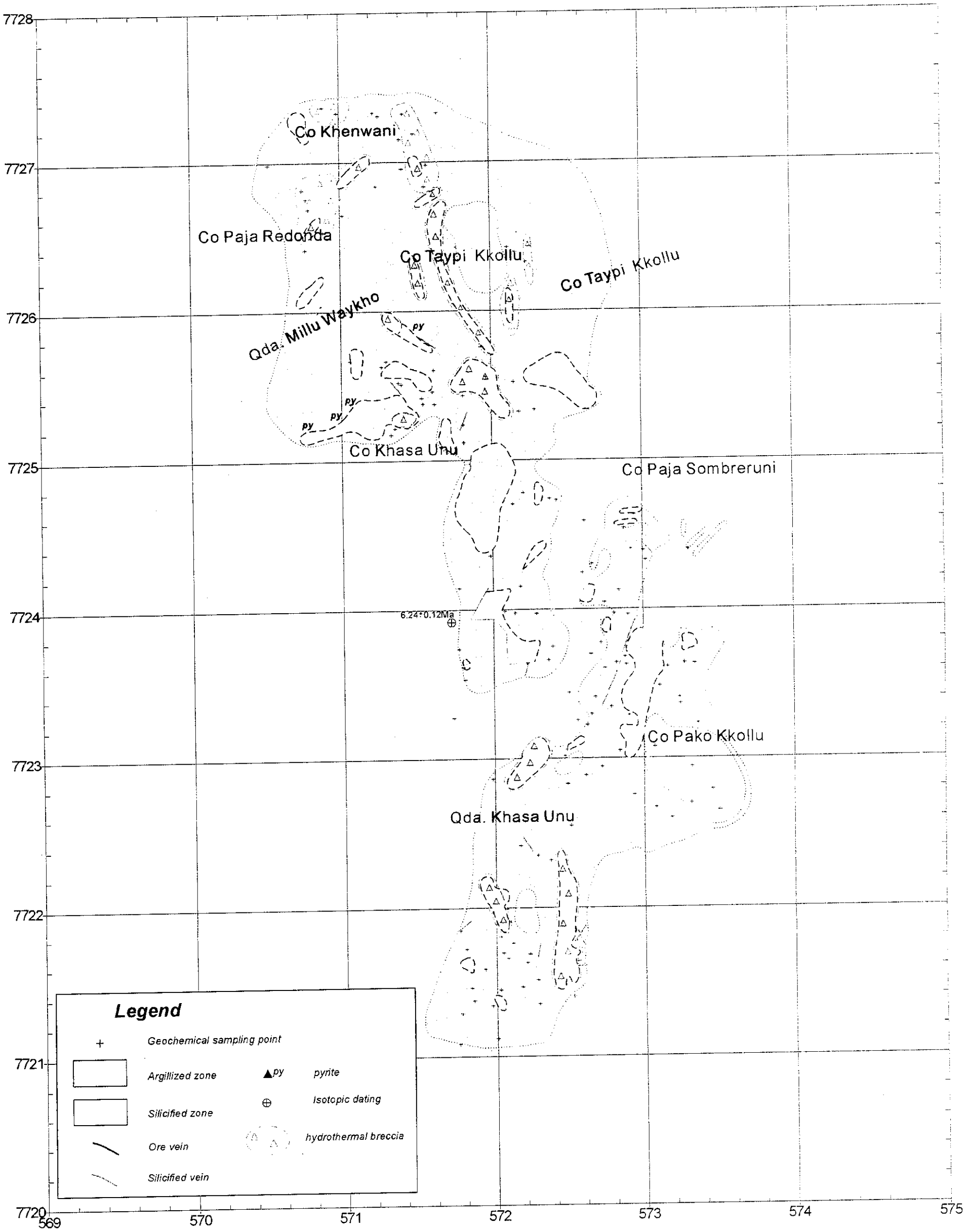


Fig.II-2-6 (1)Alteration Map of the Loma Llena District

Loma Llena

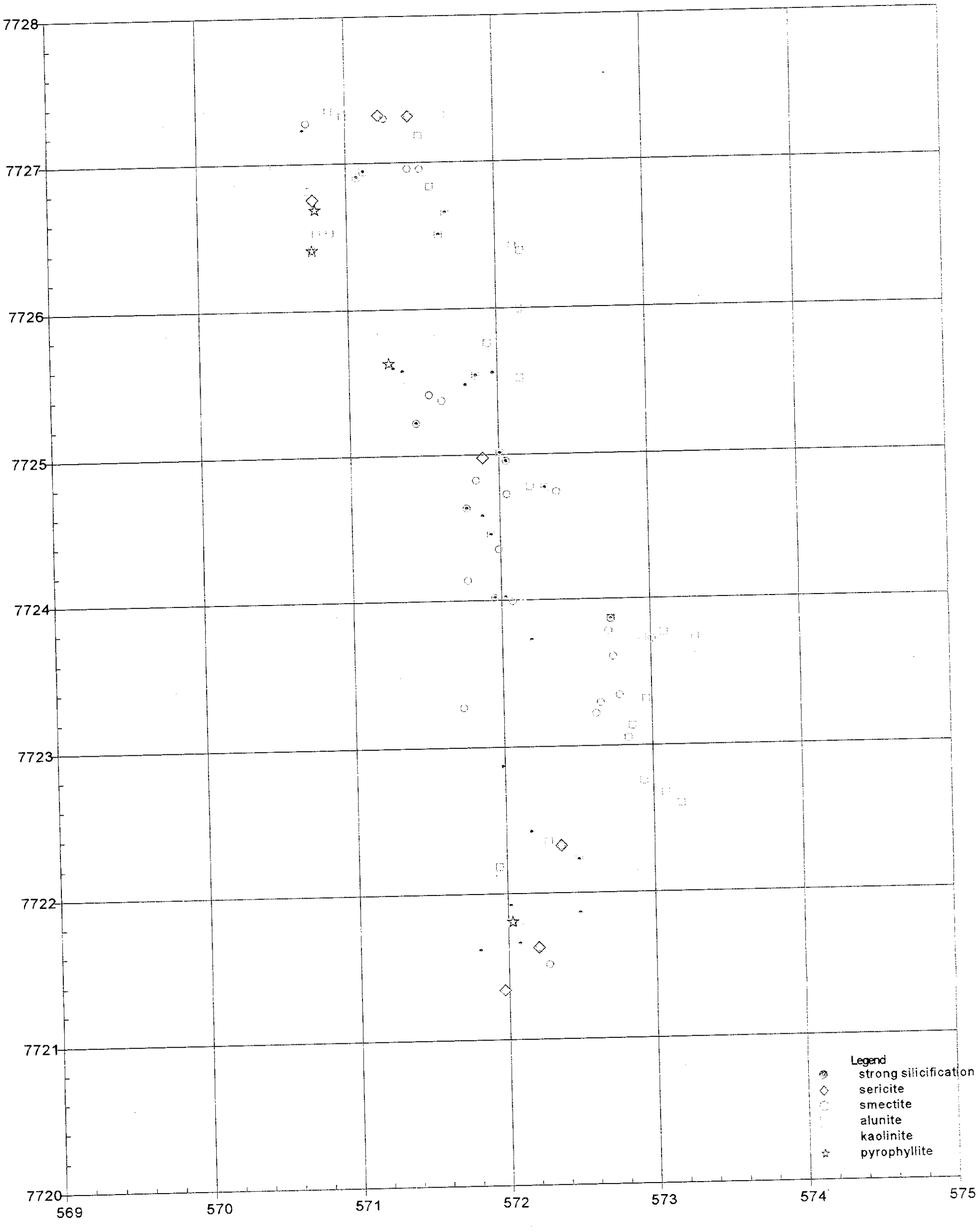


Fig.II-2-6 (2)Distribution Map of Alteration Minerals in the Loma Llena District

Loma Llena

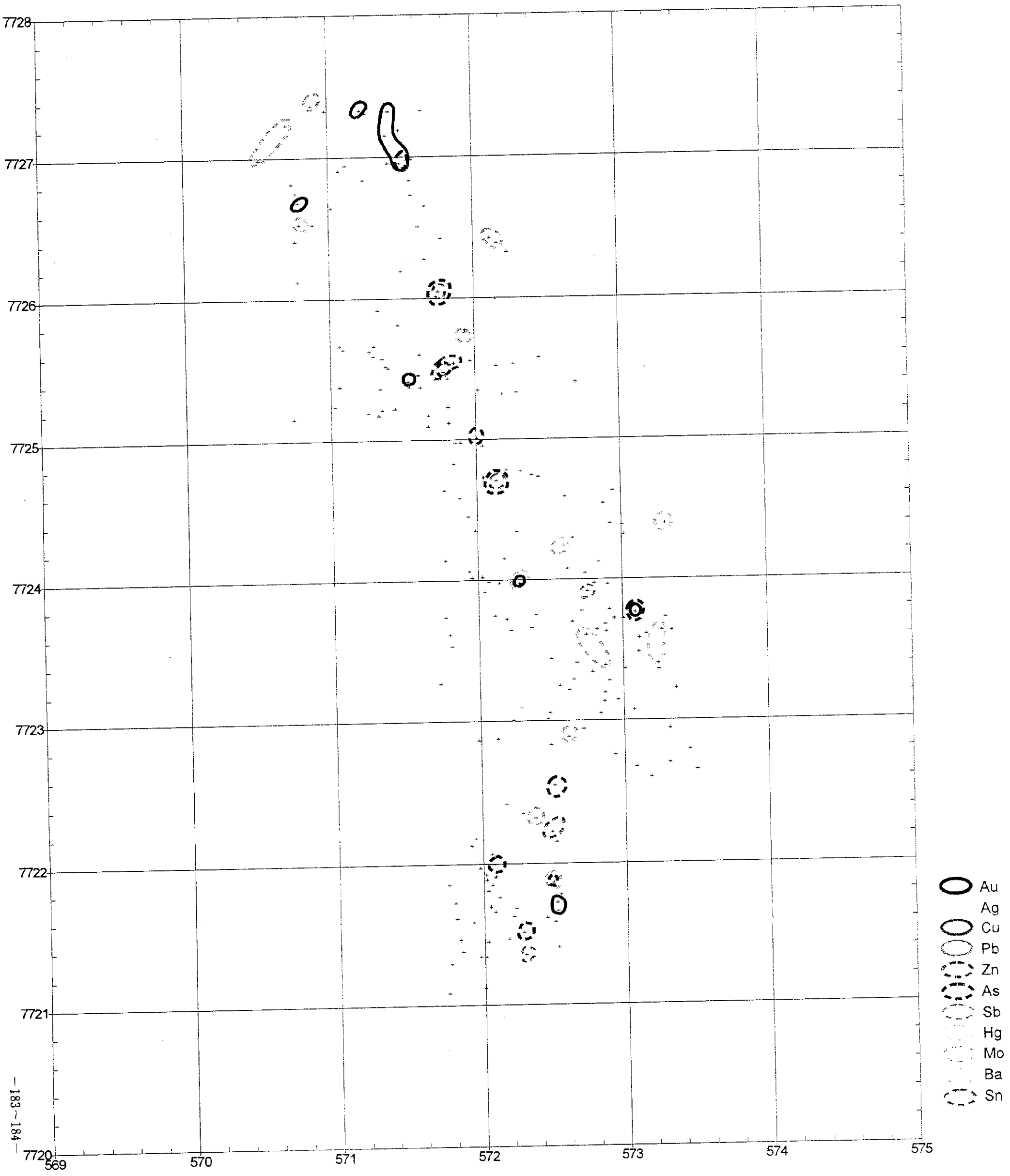


Fig.II-2-6 (3)Geochemical Anomaly Map of the Loma Llena District

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

Au: <2ppb, 11ppb, <2ppb, Ag: <0.5ppm, 0.5ppm, <0.5ppm, Cu: <2ppm, 185ppm, 26ppm, Pb: <3ppm, 177ppm, 12ppm, Zn: <2ppm, 180ppm, 23ppm, As: <5ppm, 1,111ppm, 29ppm, Sb: <5ppm, 19ppm , <5ppm, Hg: <1ppm, 5.8ppm, <1ppm, Mo: <1ppm, 86ppm, 5ppm, Ba: 12ppm, 3,825ppm, 656ppm, Sn: <5ppm, 18ppm, <5ppm

Geochemical anomalies of the respective elements are indicated in Fig. II-2-6 (3).

Au: All the samples indicate under 11ppb and show no anomalous value.

Ag: All the samples indicate under 0.5ppm and show no anomalous value.

Cu: Ten samples indicated anomalous value of 90 ppm or higher are widespread in small scale. At nort-western part, five anomalous samples are concentrate together.

Pb: All the samples indicate under 177ppm and show no anomalous value.

Zn: All the samples indicate under 180ppm and show no anomalous value

As: Eight samples indicated anomalous value of 140 ppm or higher are widespread in small scale.

Sb: Three samples indicated anomalous value of 10 ppm or higher are seen at two locations.

Hg: Only one sample indicates 5.75 ppm and found in a hydrothermal breccia in south part.

Mo: Four samples indicated anomalous value of 40 ppm or higher are widespread.

Ba: Thirteen small anomalous portions showing 1,500 ppm or higher are spotted widespreadly in whole area.

Sn: Two samples show anomalous value.

(5) Conclusions

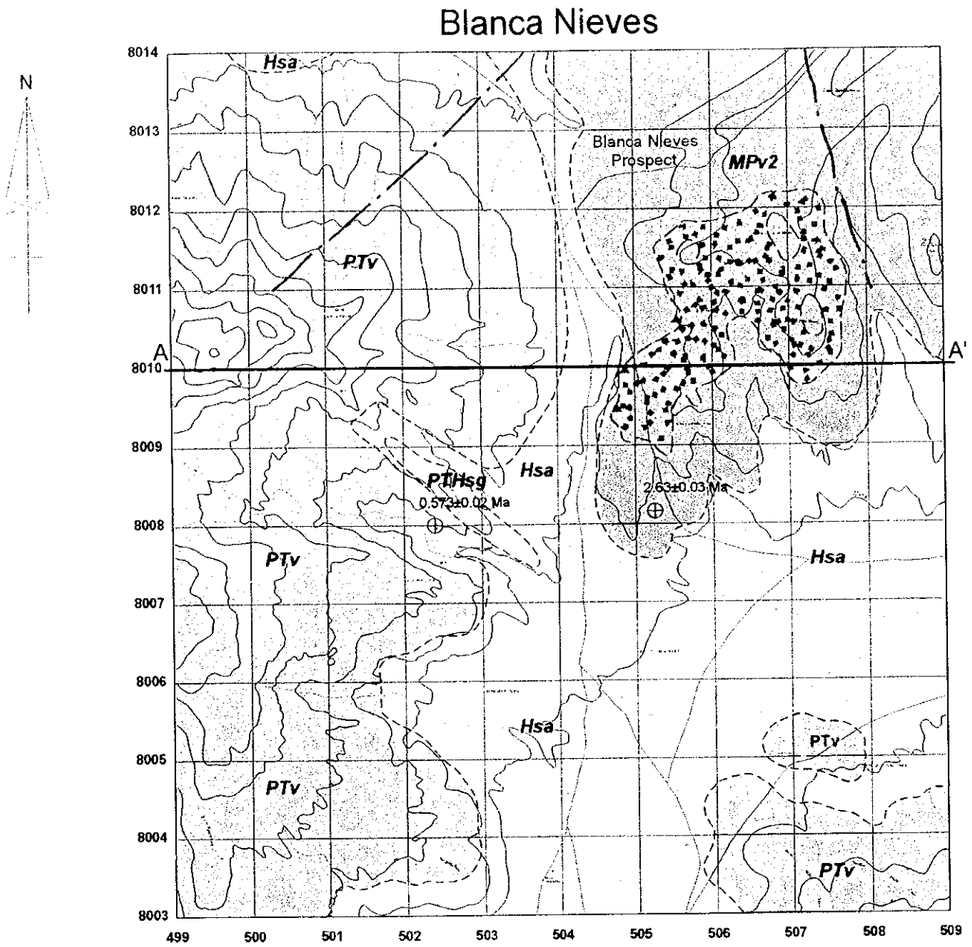
The hydrothermal alteration zone in this district represents the upper most (outer most) zone of alteration. A part of the alteration zone could have formed from highly acidic solution. Further more as there are tin anomalies, the mineralization in this district seems to be high-sulfidation type deposit (Type IV) or epithermal gold- silver- lead- zinc deposit (Type II) related to shallow volcanic activity. However as the pyrite dissemination is weak and the geochemical anomalies are not predominant, the mineralization in this area is probably weak in case it exist.

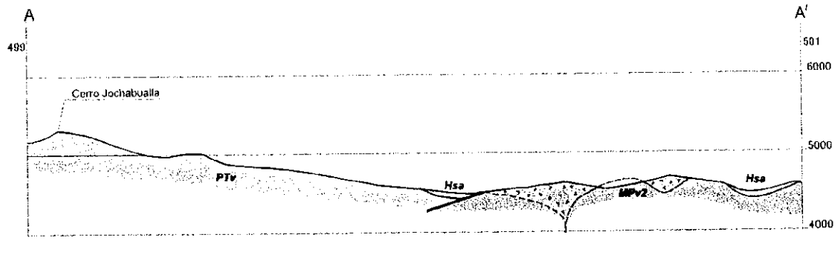
2-7 Blanca Nieves district

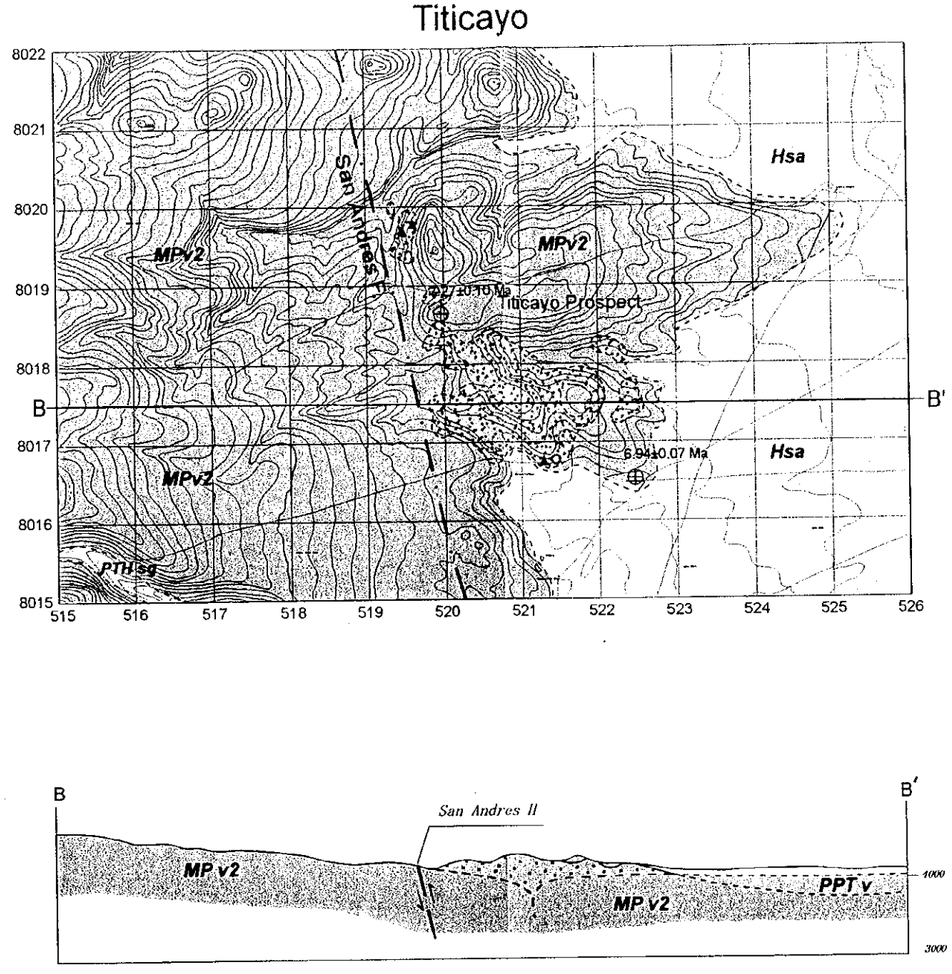
2-7-1 Blanca Nieves Prospect (Figs. II-2-7, II-2-7(1 to 3)

(1) Geology

While western part of the district is underlain by volcanic rocks of Pleistocene age, eastern







Legend

Hsa — Holocene alluvial and colluvial sedimentary deposits	Lineament / fault
PTHsg — Pleistocene to Holocene glacial sedimentary deposits	Hydrothermal alteration zone
PTv — Pleistocene volcanic rocks	Pyrite
MPv2 — Upper Miocene to Pliocene volcanic rocks andestic rhyolitic lava flow	Mn.limonite

Fig.II-2-7 Geological Mapof the Blanca Nieves District

part of the district is underlain by these of late Miocene to Pliocene age.

In the western sector, andesite and rhyolite are found. Andesite is a porphyritic biotite-hornblende pyroxene andesite and shows dark gray to light brown in colour.

The K-Ar age dating of the andesite indicates 0.57 ± 0.04 Ma (No.6254).

Dark gray rhyolite, containes biotite abundantly, is found at the right-hand side of Qda. Condoriri.

A zone, being selected by satelite image analyses, was confirmed as a small amount of supergene iron oxide caused by weathering.

In the eastern sector, andesite lava ocupies widely, besides andesite intrusives, rhyolite lava and pyroclastic rocks are locally found.

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

On the southern slope of the Co.Wila Khollu, two small fine-grained pyroxene-hornblende andesite intrusives with about 10m and 20m in diameter are located in a direction of N20E.

Also a pyroxene-hornblende andesite intrusive rock with about 100m in diameter is presumed on the southern slope of the Co.Chinchircomani, sample of which indicates the K-Ar age of 2.63 ± 0.03 Ma (No.6252).

Rhyolite is reddish brown with flow structure and acompanied by rhyolitic tuff breccia underneath. These rocks are intercalated in above andesite lavas.

The faults, veins and fractures with E-W and NE-SW trends are dominant.

(2) Alteration

The hydrothermal alteration zones cover about 5 km^2.

Silicification and argillization are observed.

Vein-like silicified zones with argillization locally are included in a broad argillization zone.

Hydrothermal breccia and hydrothermal breccia pipe are in line with NE – SW trend.

Alteration minerals such as quartz, alunite, zeolite, smectite and sericite are observed.

(3) Mineralization

Pyrite disseminations are found at three localities.

Under the microscope, good deals of titanium minerals are observed in the sample collected from breccia pipe.

In this district, owner of this mining right has carried out a drilling survey of 2 boreholes, one is vertical just at the sampling point of No.6908 in hydrothermal breccia pipe and the other is

Blanca Nieves

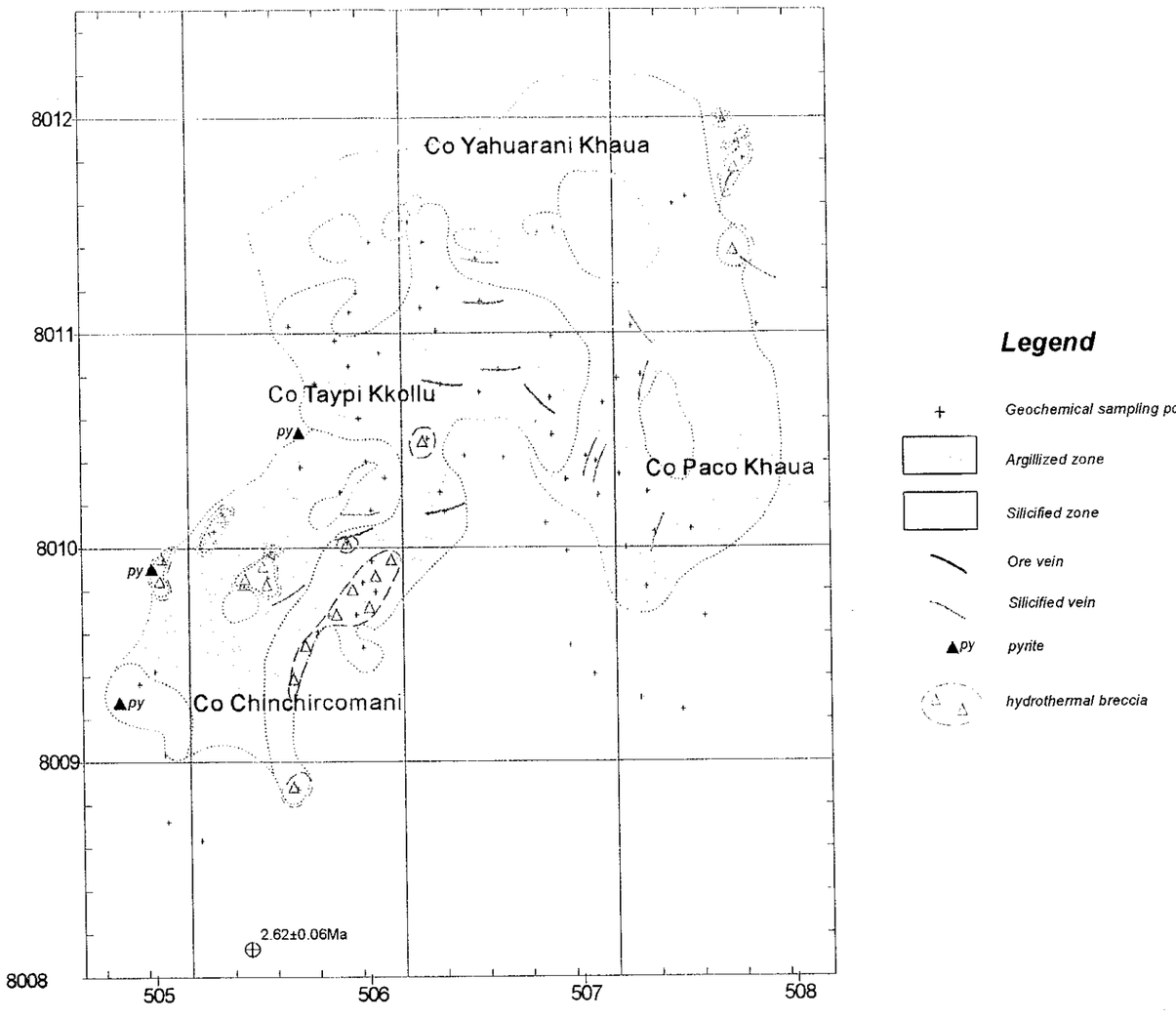


Fig.II-2-7 (1)Alteration Map of the Blanca Nieves District (Blanca Nieves)

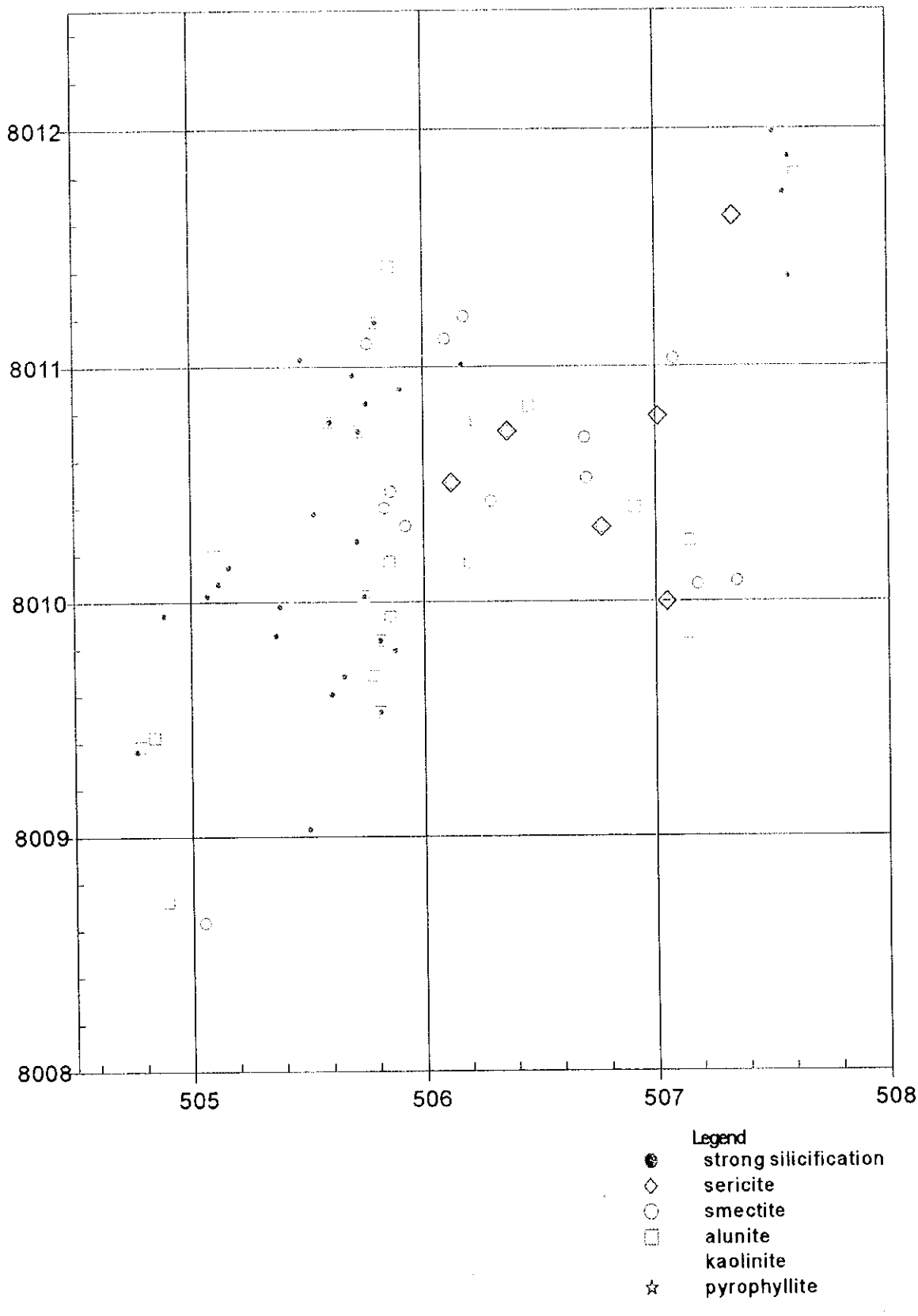


Fig.II-2-7 (2) Distribution Map of Alteration Minerals
in the Blanca Nieves District (Blanca Nieves)

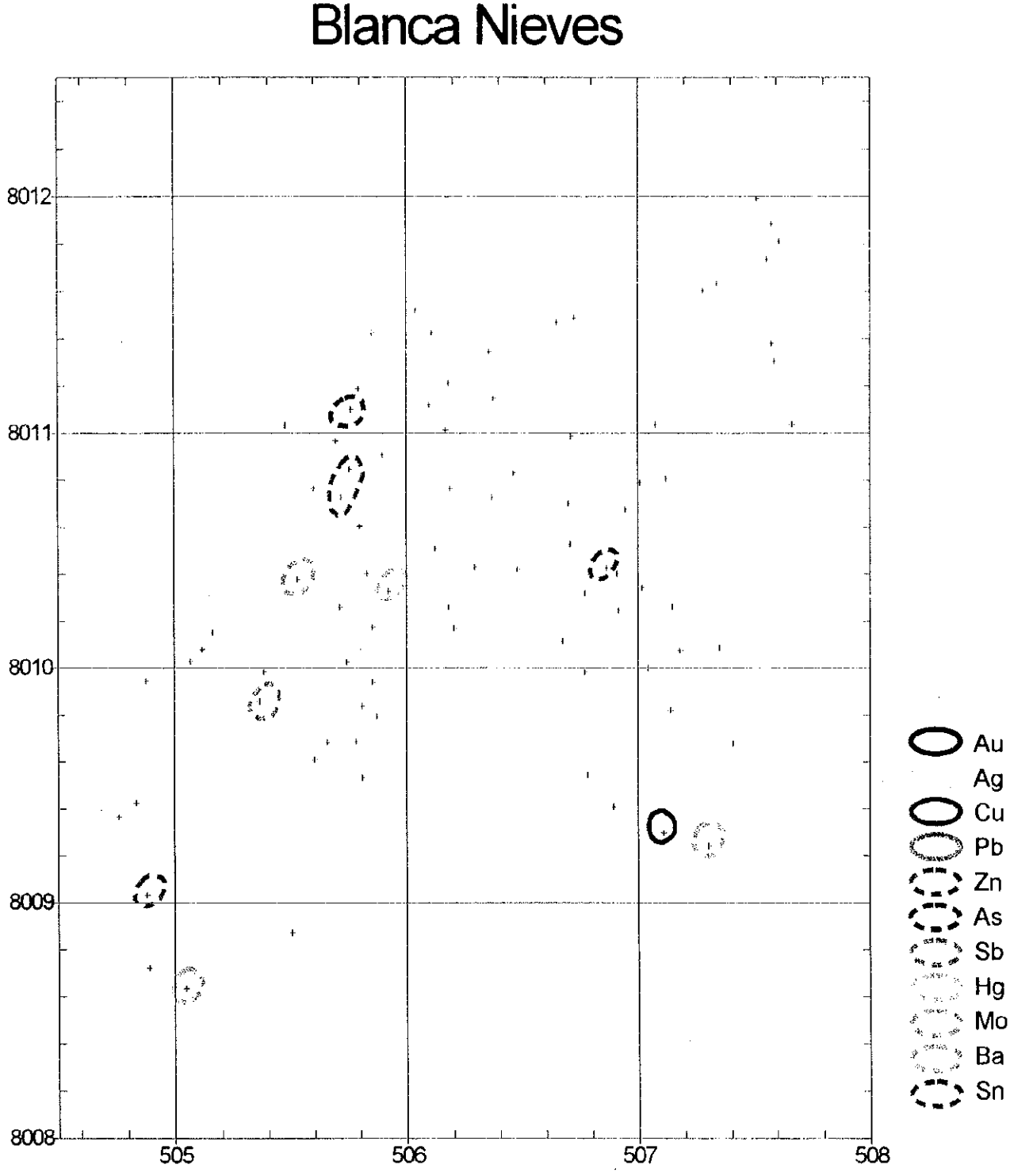


Fig.II-2-7 (3)Geochemical Anomaly Map of the Blanca Nieves District

inclined from argillized zone toward silicified zone.

(4) Assay results of Geochemical samples

Eighty-six rock-chip samples were collected in the district.

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, 94ppm, 18ppm,
Pb: 5ppm, 193ppm, 36ppm, Zn: <2ppm, 160ppm, 30ppm, As: <5ppm, 232ppm, 11ppm,
Sb: <5ppm, 5ppm, <5ppm, Hg: <1ppm, <1ppm, <1ppm, Mo: <1ppm, 72ppm, 8ppm,
Ba: 38ppm, 2,208ppm, 948ppm, Sn: <5ppm, 15ppm, <5ppm.

Geochemical anomalies of the respective elements are indicated in Fig. II-2-7 (3).

Au: All the samples indicate under 2 ppb and show no anomalous value.
Ag: All the samples are under the detection limit.
Cu: Only one sample indicates an anomalous value of 90 ppm or higher.
Pb: All the samples indicate under 193 ppm and show no anomalous value.
Zn: All the samples indicate under 160 ppm and show no anomalous value.
As: Only one sample indicates an anomalous value of 232 ppm.
Sb: All the samples indicate under 5 ppm and show no anomalous value.
Hg: All the samples are under the detection limit.
Mo: Only one sample indicates an anomalous value of 72 ppm.
Ba: Four samples indicate an anomalous value of 1,500ppm or higher and anomalous portions are locally spotted.
Sn: Four portions indicated an anomalous value of 10ppm or higher overlap the gold anomaly portions.

(5) Considerations

The mineralization in Blanca Nieves district appears to correspond to an epithermal gold-silver- lead- zinc deposit (Type II) related to shallow volcanic activity from the presence of tin. The mineralization, however, is probably weak or deep-seated in case it exist.

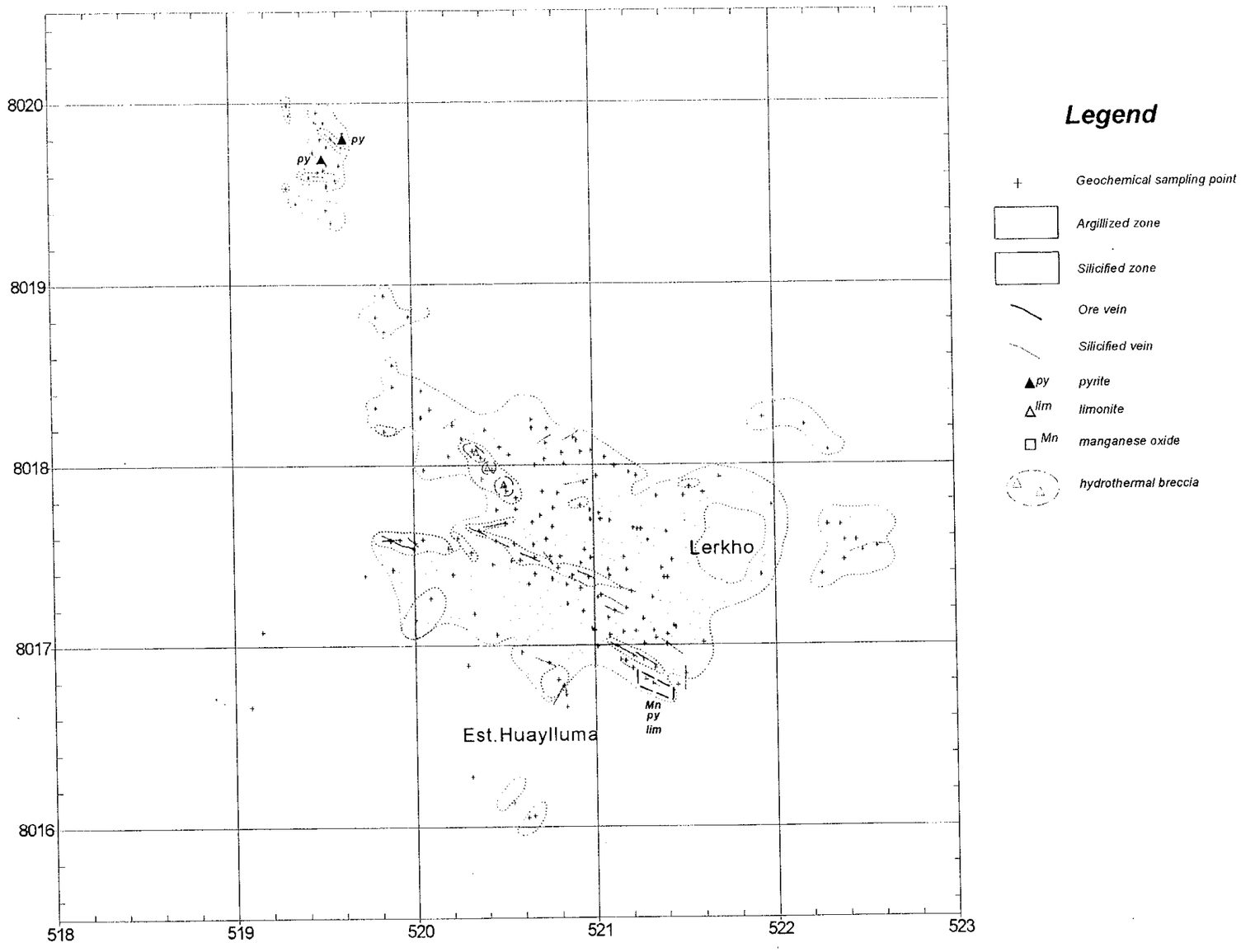
2-7-2 Titicayo Prospect (Figs. II-2-7, II-2-7(4 to 6))

(1) Geology

The district is underlain by pyroclastic rocks such as tuff, lapilli tuff and tuff breccia (volcanic breccia), as well as andesite and dacite lavas.

Pyroclastic rocks lie under andesite lava and have hydrothermal alteration.

Blanca Nieves
Titicayo



Legend

- Geochemical sampling point
- Argillized zone
- Silicified zone
- Ore vein
- Silicified vein
- ▲py pyrite
- △lim limonite
- □Mn manganese oxide
- hydrothermal breccia

Fig.II-2-7 (4)Alteration Map of the Blanca Nieves District (Titicayo)

Yunger tuffs cover all the rocks above mentioned at the village of Est.Chapu Uta.

Lavas are composed of biotite dacite, pyroxene andesite and biotite hornblende andesite. The K-Ar dating of andesite indicate 6.94 ± 0.07 Ma (No.6260) and that of tuff, 7.27 ± 0.10 Ma (No.6259).

The faults, veins and fractures with WNW-ESE trend are dominant in the area, whereas the E-W and ENE-WSW trends are also observable.

(2) Alteration

The hydrothermal alteration zones cover about 5 km^2.

Silicification and argillization are observed and vein-like and/or lenticular silicification portions are included in a broad argillization zone.

Alteration minerals such as quartz, alunite, zeolite and sericite are observed.

(3) Mineralization

Pyrite dissemination is found at three portions and gossans composed of manganese oxide and goethite show lenticular distribution with direction of NW- SE trend.

Under the microscope, pyrite disseminated sample contain no sulfide minerals except pyrite (No.6178, No.6182, No.6271 and No.7092).

Detailed geologic mapping has carried out at southern part where manganese oxide and limonite are disseminated, in the meantime seventy-six ore-chip samples are collected for chemical analysis. It has been cleared the silver-lead mineralization almost without gold.

Assay results of ore samples are Au: <2 to 3ppb, Ag: <0.5 to 220.8ppm, Cu: 4 to 62 ppm, lead: 230 to 13,282 ppm, zinc: 5 to 250ppm.

Geological and geochemical surveys have been carried out by EXPROMIN mining company, being left two trenches.

(4) Assay results of Geochemical samples

Two hundred rock-chip samples were collected in the district.

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

Au: <2ppb, 6ppb, <2ppb, Ag: <0.5ppm, 134.1ppm, 2.1ppm, Cu: 2ppm, 156ppm, 30ppm, Pb: 5ppm, 16,176ppm, 283ppm, Zn:3ppm, 260ppm, 45ppm, As: <5ppm, 1,442ppm, 25ppm, Sb: <5ppm, 27ppm, <5ppm, Hg: <1ppm, 2.0ppm, <1ppm, Mo: <1ppm, 107ppm, 2ppm, Ba: 50ppm, 6,918ppm, 1,431ppm, Sn: <5ppm, 15ppm, <5ppm.

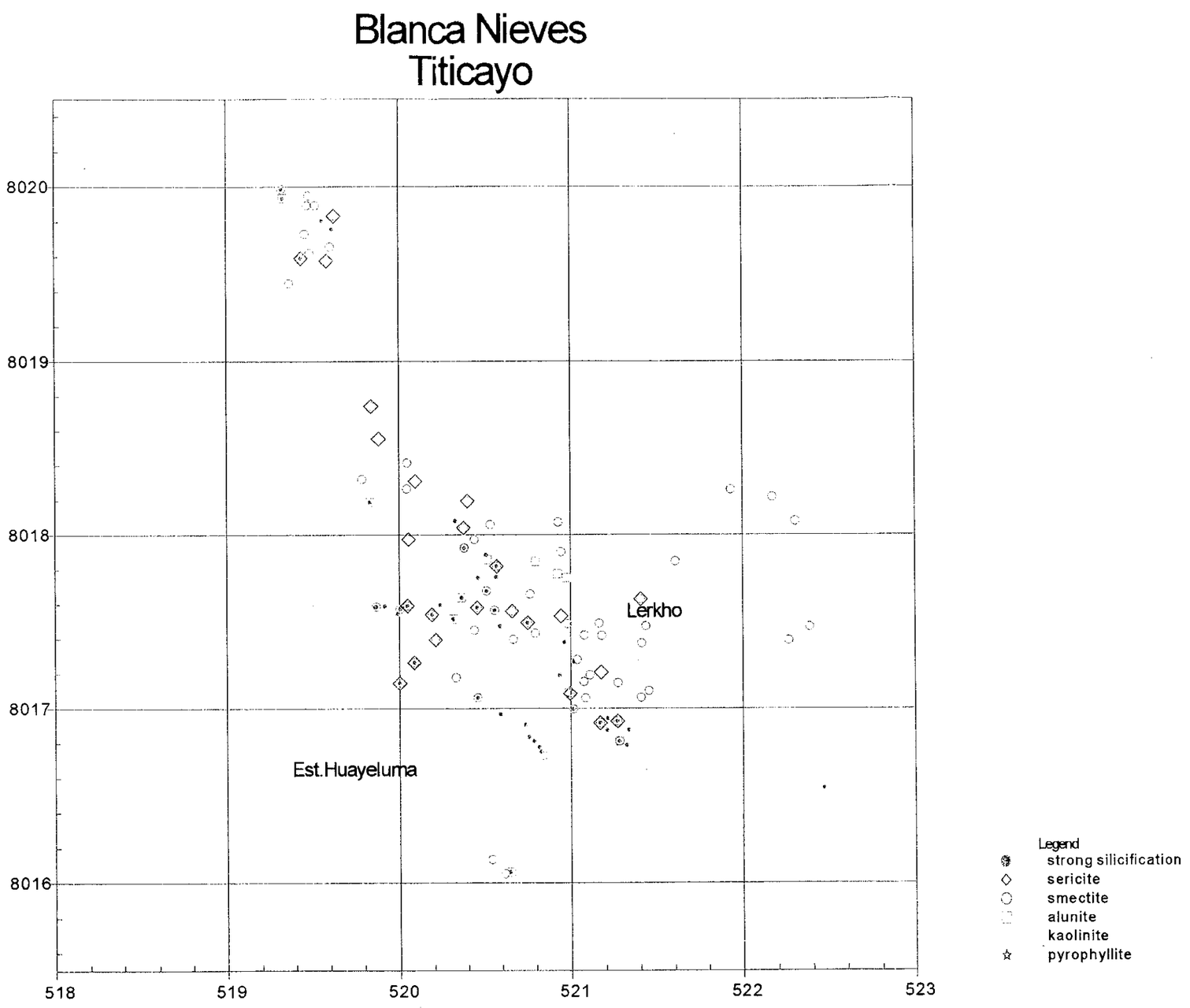


Fig.II-2-7 (5) Distribution Map of Alteration Minerals in the Blanca Nieves District (Titicayo)

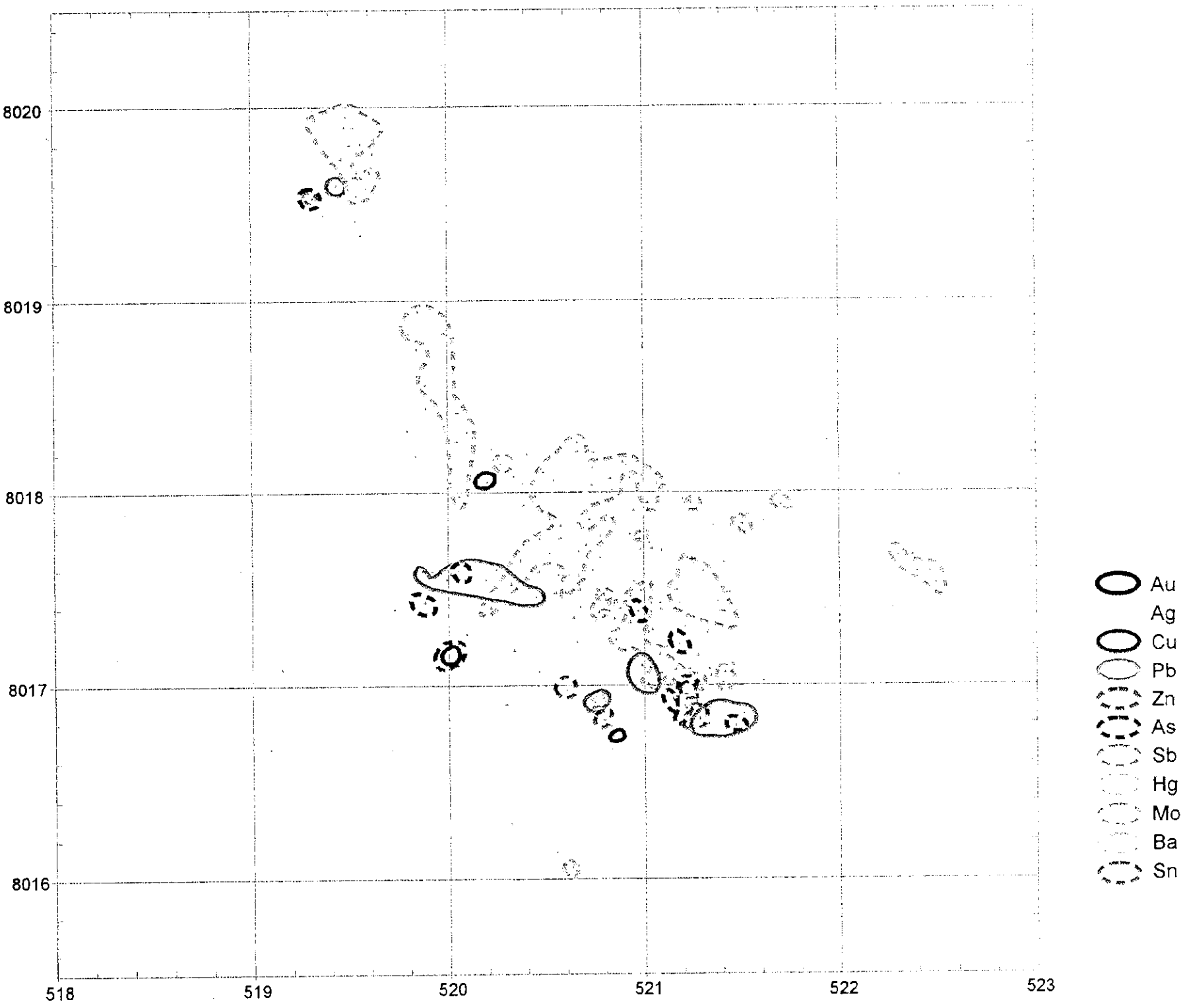


Fig.II-2-7 (6)Geochemical Anomaly Map of the Blanca Nieves District (Titicayo)

Geochemical anomalies of the respective elements are indicated in Fig. II-2-7 (6).

Au: All the samples indicate under 6 ppb and show no anomalous value.

Ag: Three samples indicated an anomalous value of 30ppm or higher overlap the manganese anomaly portions.

Cu: Three samples indicate an anomalous value of 90ppm or higher and anomalous portions are locally spotted.

Pb: Five portions indicate an anomalous value of 400ppm or higher and concentrate at southwestern part.

Zn: Two samples indicated an anomalous value of 230ppm and higher overlap manganese anomaly portions.

As: Five samples indicate an anomalous value of 140ppm or higher and anomalous portions are locally spotted.

Sb: Four samples indicate an anomalous value of 10ppm or higher and are locally spoted at northern part.

Hg: Two samples indicates an anomalous value of 2 ppm and are separeted.

Mo: Only one sample indicates an anomalous value of 107 ppm and exsists at north.

Ba: Anomaly zones are seen widespreadly.

Sn: Two portions indicate an anomalous value of 10ppm or higher at south and southwest.

Geochemical anomaly zones exist southern to southwestern part in the area.

(5) Considerations

The fractures of northwest direction are developed in Titicayo prospect, in which manganese bearing silver mineralization was recognized. This mineralization, as similar to the Carangas prospect, appears to correspond to the epithermal precious metal deposits (Type III) although any itrusives are not yet found.

2-8 Carangas District (Figs. II-2-8, II-2-8(1 to 3)

2-8-1 San Francisco Mine

(1) Geology

The area is underlain by Carangas volcanic rocks of late Oligocene to early Miocene age.

White dacitic lapilli tuff to tuff breccia, dark gray - black basalt lava, pale brown - light gray - white andesitic lapilli tuff to tuff breccia being in order from the botom to the top dip southword slightly in total.

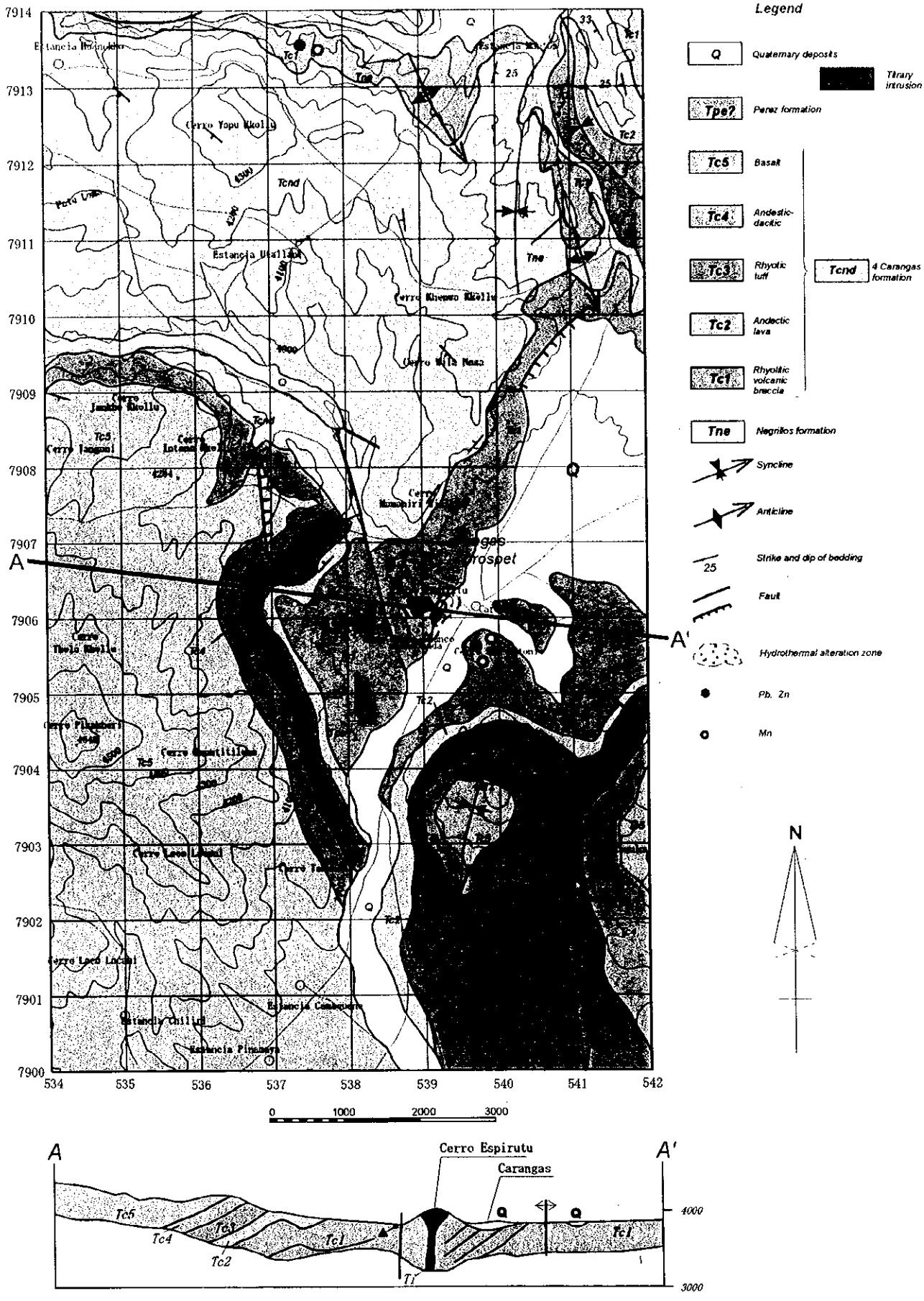
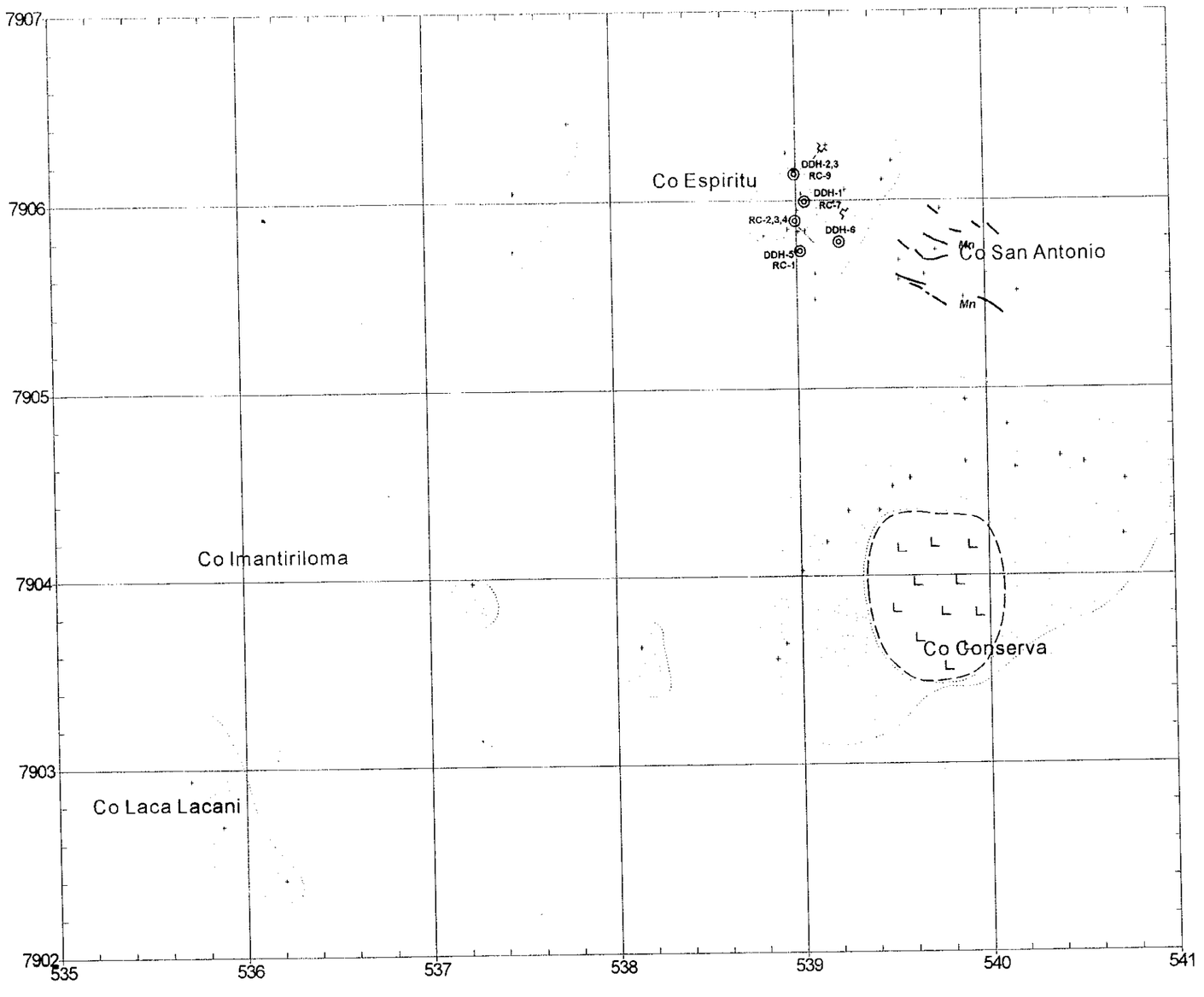
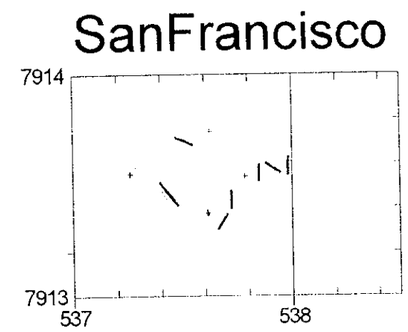


Fig. II-2-8 Geological Map of the Carangas District





Legend

- Geochemical sampling point
- Argillized zone
- Silicified zone
- Ore vein
- Silicified vein
- rhyolitic intrusive and dome
- tunnel
- drill site

Fig.II-2-8 (1)Alteration Map of the Carangas District