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JAPAN INTERNATIONAL COOPERATION AGENCY
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PREFACE

The Government of Japan, in response to the request of the Government of the Republic of Peru, decided to conduct a geological survey for mineral exploration in central part of Cordillera Oriental of Peru, and commissioned its implementation to the Japan International Cooperation Agency.

The Agency, taking into consideration of the importance of technical nature of the survey work, in turn sought the Metal Mining Agency of Japan for its cooperation to accomplish the task within a period of four years.

This year was for the first phase survey, and as for this current year, a Geological-Geochemical survey team was formed consisting of sixteen (16) members headed by Mr. Shigeaki Yoshikawa, Mitsui Kinzoku Engineering Service Co., Ltd., and sent to the Republic of Peru on May 25, 1976. The Team stayed there for one hundred fifty-five (156) days from May 25, 1976 to October 23, 1976. During the period of its stay, the team, in close collaboration with the Government of the Republic of Peru and its various authorities, was able complete survey works on schedule.

This report submitted hereby summarizes the results of the Geological-Geochemical Semidetailed survey performed for the first and second-phase survey in a southern half of the area.

We wish to take this opportunity to express our heartfelt gratitude to the Government of the Republic of Peru and the other authorities concerned for their kind cooperation and support extended to the Japanese survey team.

February 1977

Shinsaku Hogen
President
Japan International Cooperation Agency

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President
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SUMMARY

This geological survey was carried out as part of a preliminary survey for mineral exploration in the central region of the Republic of Peru. The purpose of this survey was

(1) to estublish the stratigraphy of the bedded lead-zinc deposits which are expected to be emplaced in the Pucara Group,

(2) to extract igneous rocks which have an active part in the formation of mineral deposits, and

(3) to extract areas with greater possibilities of ore-bearing through geochemical survey by field analysis to deliniate the area of precise survey.

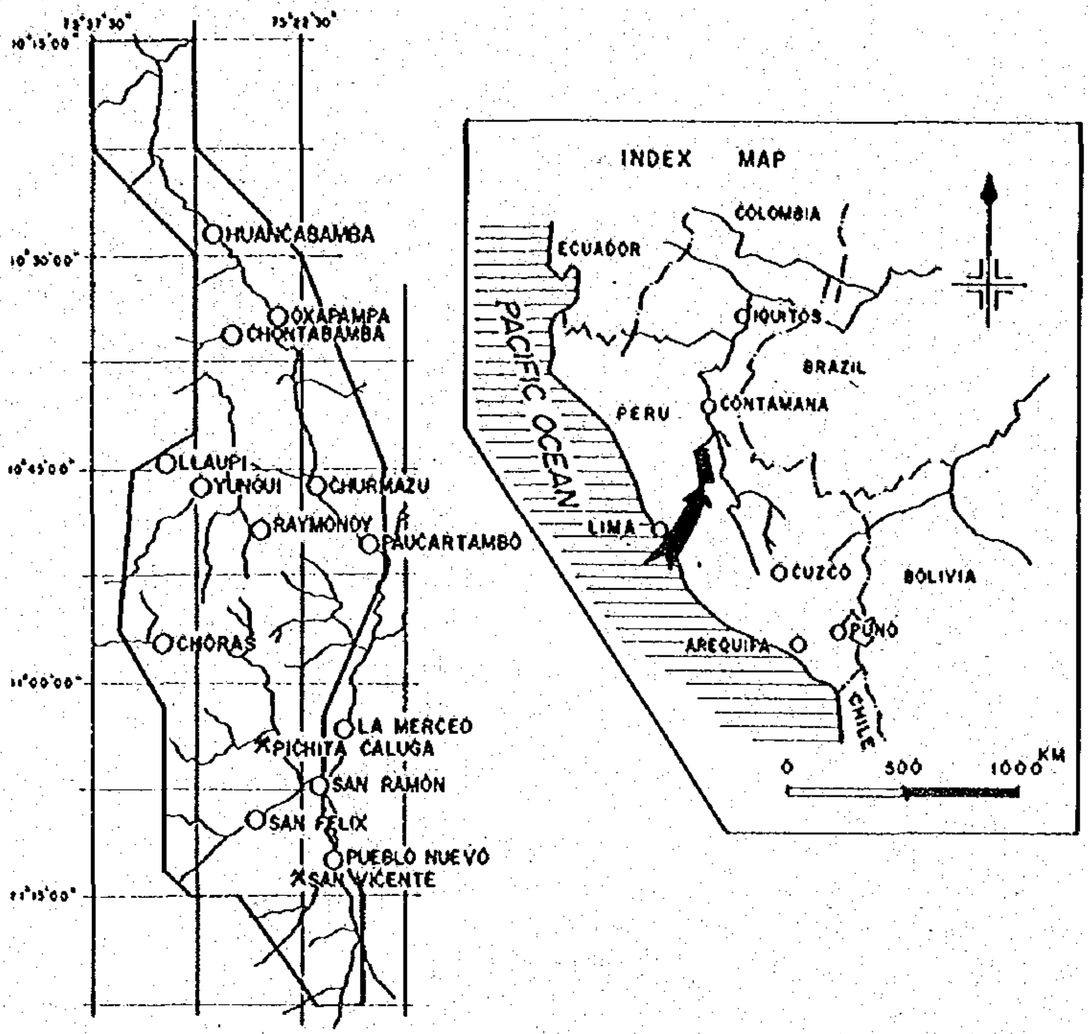
The field operation was carried out from May to August 1976, followed by laboratory works which lasted until February 1977.

The formation of bedded lead-zinc deposits expected to be emplaced in the Pucara Group is closely related to dolomite layers. That is, the bedded lead-zinc deposits have their structural origin in the dolomite layers. The black and white bands (so-called zebra structure) are partially developed in the dolomite layers and the lead-zinc deposits are concentrated in the portion where the white bands graduate into the black bands. The dolomite layer may be divided largely into four horizons. The dolomite of the lowest hogizon, in which the San Vicente deposits are embedded, continuously extends to the south of Oxapampa, and even the existence of mineral deposits has been confirmed in Tambo Maria.

The igneous rocks which have an active part in mineralization include acidic igneous rocks (Oxapampa intrusives) which are considered to be of late Cretaceous-early Tertiary intrusion, and monzonite (Onda intrusives) of Miocene intrusion. The former is responsible for lead dissemination in the host rock and the latter forms a skarn. However, no mineral indications

which might be the object of mining operation have been discovered to date.

In the geochemical survey, the three districts, namely, Chorobamba district, Oxapampa-Rio Purrayo district and Pichita Caluga district, with a total area of 250 km^2 were extracted by field analysis (abbreviated analysis for zinc by DITHIZONE method) as anomalous zones. The anomalous zones revealed by atomic-absorption analysis also show a similar distribution. There is no question about the accuracy of field analysis.



LIMA

308km 7h → SAN RAMON

318km 7.3h → LA MERCED

395km 9.8h → OXAPAMPA

422km 10.8h → HUANCABAMBA

SAN RAMON

7km 0.5h → SAN VICENTE

Fig. 1 LOCATION MAP OF THE SUVEYED AREA

Chapter I Outline of Survey

1-1 Purpose of Survey

1-1-1 Summary of Previous Surveys

The geological and geochemical reconnaissance, in an area of 10,000 km^2 has revealed the following.

(1) Sedimentary rocks were intermittently deposited from Devonian period of Palaeozoic era to Tertiary period of Cenozoic era. However, the deposition was interrupted in the following three periods because of orogenic movement.

a. From Permian period of Palaeozoic era to Triassic period of Mesozoic era.

b. During Jurassic period of Mesozoic era.

c. During early Tertiary period of Cenozoic era.

(2) Igneous rocks can be classified largely into the following.

a. Granite and granodiorite intruded from Permian period of Paleozoic era to Triassic period of Mesozoic era.

b. Porphyritic diorite and granodiorite intruded during Jurassic period of Mesozoic era.

c. The Paleogene intrusive and effusive rocks.

d. The Tertiary volcanic rocks.

(3) Metamorphic rocks, consisting mainly of schists and gneisses, intercalate serpentine and granitic rocks.

(4) Folding structures in the direction of NNW-SSE are developed, and the thrust faults of the same direction and fractures of WNW-ESE and NNE-SSW systems, which are correlated with the lateral compression of the direction of ENE-WSW which formed these thrust faults, are also developed.

(5) The main metallic ore deposits and mineral indications in the surveyed

area are as follows.

a. Bedded lead-zinc deposits in the Pucara Group.

b. Nickel-cobalt deposits accompanying the ultrabasic rocks in the metamorphic formation.

c. Copper-zinc-lead deposits replacing carbonate rocks in the Pucara Group.

d. Copper-zinc-lead deposits in the granitic rocks and metamorphic rocks.

e. Indications of copper mineralization developed around the Paleogene porphyries.

(6) The geochemical survey shows that the zinc (referred to as Zn hereinafter) anomalies are almost confined to the distribution of the Pucara Group and almost conform to the distribution of dolomite or dolomitic limestone.

(7) In the San Vicente deposits, the filling temperature of liquid inclusions in the host rocks of ore deposits has been determined to be 70^{o}-150^{o}C and an X - ray diffraction test has revealed non-existence of alteration minerals which might be related to mineralization.

(8) Therefore, the emplacement of bedded zinc-lead deposits of so-called Mississippi valley type are anticipated in the Pucara Group.

1-1-2 Purpose of Survey

This survey was aimed at clarifying the following on the basis of the findings of the previous surveys.

1) To determine the stratigraphy of bedded lead-zinc deposits which are expected to be emplaced in the Pucara Group.

2) To extract igneous rocks which have an active part in the formation of mineral deposits.

3) To extract areas for the future precise survey through comprehensive analysis of field data obtained during the geochemical survey.

1-2 Field Operations

1-2-1 Survey Area (cf. Fig-1)

The range of field survey covers approximately 2,500 km^2 surrounded by the following 20 points.

(S10°15'00", W75°37'30"),		(S10°15'00", W75°30'00"),
(S10°22'30", W75°30'00"),		(S10°30'00", W75°22'30"),
(S10°45'00", W75°16'30"),		(S10°52'30", W75°16'30"),
(S11°02'30", W75°21'00"),		(S11°11'00", W75°21'00"),
(S11°15'00", W75°18'20"),		(S11°22'30", W75°18'20"),
(S11°22'30", W75°21'30"),		(S11°15'00", W75°27'00"),
(S11°15'00", W75°30'30"),		(S11°14'00", W75°32'20"),
(S11°02'00", W75°32'20"),		(S11°56'15", W75°35'30"),
(S10°45'00", W75°34'30"),		(S10°42'30", W75°30'00"),
(S10°30'00", W75°30'00"),	and	(S10°22'30", W75°37'30").

The range of field survey is shown is Fig-1.

1-2-2 Period and Method of Survey

The survey team remained in the site for 81 days from May 25 to August 13, 1976, during which the field reconnassance covered a period of 61 days from May 31 to July 30, 1976.

(1) Geological Survey

The six Japanese members were divided into six groups and the counterpart members were assigned to the area of geological importance upon necessity, to ensure the completeness of survey and data collection. The published maps of scale 1 : 25,000 were used as topographic maps in the south area and maps of scale 1 : 25,000, which had been prepared from aerial photos as part of the project, were used in the north area. All of the survey routes which could be accessed on foot were covered and even the clearing work was performed in the area where geological data was lacking. A total of 265 rock samples were collected for analysis which were to be carried out following the geological survey.

a.	Samples for age determination	6 pcs
b.	Samples for rock analysis	10 "
c.	Samples for ore analysis	20 "
d.	Samples of polished sections of ores	20 "
e.	Samples of thin sections of rocks	59 "
f.	Samples for X-ray diffraction test	53 "
g.	Samples for X-ray microanalyzer	1 "
h.	Sample for identification of fossils	23 "
i.	Rock specimens	73 "

(2) Geochemical survey

Samples for geochemical analysis (called simply samples hereinafter) were collected along the survey route at the rate of one sample for every 300 m in the Pucara Group and one sample for every 1.5 km in other areas.

Samples were prepared for assaying in the permanent laboratory established in San Ramon through such processes as crushing, sieving and quartering after sun drying, and from 30g of sample thus prepared, 2 g was used for abbreviated analysis for Zn by DITHIZONE method for the purpose of extracting Zn anomalies for the next survey.

1-3 Analytical Study

Arrangement and analytical study of data obtained during the field reconnaissance and assay data of the rock samples took six months from August 1976 to February 1977. However, the analytical study of the results of field analysis was commenced with the completion of the geological survey and it was possible in the field to make recommendations to the second survey team on the range of precise survey.

1-4 Organization of Survey Team

Field operations and data analysis were carried out by Mitsui Kinzoku Engineering Service Co., Ltd in cooperation with the Instituto de Geologia y Mineria (INGEOMIN), the Republic of Peru. The composition of the survey team is as follows.

Leader	Shigeaki Yoshikawa	Mitsui Kinzoku Engineering Service Co., Ltd.
General supervision and liaison	Hiroshi Ushikusa	Japan International Cooperation Agency
"	Giryo Shima	Metal Mining Agency of Japan
"	Shinsei Terashima	"
Member	Hiroshi Sato	Mitsui Kinzoku Engineering Service Co., Ltd.
	Yasumasa Fukahori	"
	Nobuo Saito	"
	Hiroshi Hama	"
	Keiji Nakano	"
	Yukichi Tagami	"
	Junichi Kono	"
	Nobuyuki Goto	"
	Minoru Saito	"

Chapter 2. General Remarks

2-1 Location and Accessibility

The surveyed area belongs to the administrative division of Tarma Province, Junin Department in the south and Oxapampa Province of Pasco Department in the noth.

The distance from Lima, the capital city of Peru, to San Ramon located in the center of surveyed area is 308 km, which can be covered in about 7 hours by car. There is a regular daily flight service by light aeroplane between Lima and San Ramon and flight time is about one hour. There is a motor way running through the surveyed area from north to south, and the area is relatively convenient for transportation. In the wet season, however, the road notworks are frequently disrupted (Fig-1).

2-2 Topography

According to the physiographical classification by Bellido (1969), the surveyed area is situated exactly at the intersection of Cordillera Oriental and Cordillera Subandino, and deploys as a tectonic low land along the fault line which forms grabens and horsts in the direction of NNW-SSE. The western part of the surveyed area corresponds to the eastern foot of Cordillera Oriental, where U-shaped valleys by glacial erosion and V-shaped valleys by the subsequent erosion have been developed with the resultant steep topography. The eastern part of the area shows relatively gentle topography of old age. In the tectonic low land of the central portion, a gentle topography prevails in the south, while a steep topography with many V-shaped valleys, which is characteristic of infant stage, is prevalent in the north.

As for vegetation, the surveyed area, except the central and southern highlands, is thickly covered with wet tropical type vegetations, and forestry is the only industry in the northern part.

The climate in the area is generally wet-tropical type and wet-sub-tropical type with the difference of temperature between day and night reaching 20°C in the dry season (April-September). The maximum temperature during daytime is 30°C and the minimum temperature during night is about 10°C. Humidity is extremely high.

Chapter 3. General Geology and Geological Structures

3-1 Outline

In general, the southwestern part of the surveyed area has a distribution of the so-called Pre-Cambrian metamorphic rocks consisting mainly of granitic gneisses and green schists. With these metamorphic rocks as a basement, sedimentary rocks from Permian period of Palaeozoic era to Tertiary period of Cenozoic ear are deposited almost continously towards the northeast. In the western part of the surveyed area, igneous rocks were intruded or effused intermittently until the middle of Tertiary period, being started with the Permian intrusion of granitic rocks.

The folding structure of sedimentary rocks with a cycle of approximately 1 km has a general strike of NNN-SSE and the Pucara Group and the older formations have a folding axis dipping gently to the north, while the formations of post-Pucara Group have a folding axis dipping to the south. The most prominent direction of faults is NNW-SSE, which is almost parallel to the folding axis, but the faults of NNE-SSW and NWW-SEE systems are also prominent. Each of these faults is high-angled and forms grabens and horsts. Thrust faults are observed only in the areas of metamorphics and granitic rocks in the southwestern part.

3-2 Metamorphic Rocks

Metamorphic rocks are exposed on a small scale only in the southwestern part and the south limit of the surveyed area. Lithologically, metamorphic rocks are granitic or granodioritic gneisses and green schists. Crystalline schists are distributed only on a small scale in the direction of NNW-SSE among the gneisses which are distributed in the southwestern part of the surveyed area, but most of the metamorphic rocks are granodioritic gneisses.

3-3 Igneous Rocks

Igneous rocks may be classified into the following seven categories by geological age and lithology.

a) Granitic rocks of late Permian-middle Triassic intrusion.

b) Granitic rocks of early Cretaceous intrusion.

c) Dioritic rocks of Triassic-Cretaceous intrusion.

d) Acidic rocks of late Cretaceous-early Tertiary intrusion.

e) Acidic igneous rocks of early Palaeogene effusion.

f) Monzonitic rocks of early Neogene intrusion.

g) Pyroclastic rocks of late Tertiary effusion.

The following is a detailed description of each category of igneous rocks.

3-3-1 San Ramon Granite and Tarma Granite

The granitic rocks of late Permian-middle Triassic intrusion may be classified into two types according to the time of intrusion and the color of rocks. They are "white granite" (Tarma granite) of late Permian intrusion and "red granite" (San Ramon granite) of middle Triassic intrusion.

The "white granite" is also called Tarma granite, which is distributed mainly in the southwestern part of the surveyed area. This is a coarse-grained leucocratic rock, consisting mainly of guartz and plagioclase, with a relatively small amount of K-feldspar under microscope. It contains such mafic minerals as brown biotite and green hornblende and is accompanied by some muscovites. Accessory minerals are apatite, zircon and titanite. The age determination by K/Ar method gives the age of 244 million years (in the previous survey).

The "red granite", on the other hand, is also called San Ramon granite which is distributed mainly in the southeastern part of the surveyed area.

It appears red because of the effect of pinkish K-feldspar. Under the microscope, the San Ramon granite consists mainly of K-feldspar, quartz and plagioclase and is accompanied by biotite, a small amount of amphibole, a very small amount of zircon, opacite which is considered to have been altered from biotite, and hematite. The age determination by K/Ar method gives the age of 195 million years (in the previous survey).

In the field observation, intrusion of "red granite" into "white granite" is recognized and this phenomenon conforms to the result of age determination by K/Ar method. However, because of the fact that no accurate data sufficient enough to distinguish between these two types of granite in their distribution was obtained during this survey and that the change of their chemical compositions, which will be described later, is believed to be due to the differentiation of the same magma, they are treated as a single type of rock without distinction on the geological maps.

If both types of rocks are considered to be products of the same magmatic origin, their silica contents increase slightly towards the younger stage as shown in Appendix A-5. Under the microscope, amount of colored minerals decreases and the amount of K-feldspar increases towards the younger stage. Among the mafic minerals, the amount of amphibole decreases, while the amount of biotite increases towards the younger stage. Moreover, the hematite observed microscopically also occurs as a normative mineral. The red color appearing on the weathered surface of granitic rocks, especially the "red granite", might be the effect of this hematite.

Wall rock alteration accompanied by the intrusion of granitic rocks has not been determined.

3-3-2 Pusagno Granitic Rocks

Granitic rocks of early Cretaceous intrusion appear peachblow, a color between the colors of "white granite" and "red granite". These rocks are distributed mainly in the western part (Pusagno) extending from the east of Yaupi to Huancabamba but they are also distributed in Choras in part. These rocks have been named Pusagno granites after the type locality Pusagno. Under the microscope, these rocks consist mainly of quartz, K-feldspar, and plagioclase and are accompanied by biotite (partially altered to chlorite) and specularite. Their mineral compositions are similar to those of "red granite", but with a very little content of amphibole. No zircon has been recognized through observations of two thin sections. A graphic texture has been recognized between quartz and K-feldspar, too.

The age determination by K/Ar method gives the age of 130 ~ 125 million years (cf. Appendix A-7).

With respect to chemical compositions, these rocks have more silica contents than "red granite", with less contents of colored minerals. Although there is a considerable interval in the time of intrusion between these rocks and "red granite", both of them are believed to have been the products of igneous activity of almost the same series.

According to the norm calculation, these rocks also contain hematite as in the case of "red granite" and the existence of hematite is also recognized under the microscope. In the field, the hematite is observed in the form of specularite either as veinlet or dissemination. The specularite in veinlet occurs as an aggregate of flaky crystals of 0.012-0.051 m/m in size.

The disseminated specularite is observed in a relatively wide area and is particularly distinct in the south of Oxapampa (cf.Appendix A-3 , Sample No.K-136). The appearance of a red color on the weathered surface may have been the result of alteration of specularite to hematite.

Wall rock alterations accompanied by the intrusion of these rocks can scarcely be recognized megascopically. Different from the previously mentioned "white granite" and "red granite", the intrusion of these rocks is believed to have caused some kinds of wall rock alteration in view of dissemination of galena in the Pucara Group, and the distribution of anomalies revealed by the geochemical survey, which will be described later.

Although the petrography and approximate distribution of granitic rocks have already been mentioned in the previous section and also in this section, their precise distribution has not be clarified by the field reconnaisance of present survey. Therefore, the term "granitic rocks" should be interpreted to mean the three types of granite, namely, Tarma granite, San Ramon granite and Pusagno granite, unless otherwise specified.

3-3-3 Chanchamayo Intrusives

Chanchamayo intrusives comprise mainly diorite group. The distribution of these intrusives has a limited area and is restricted mainly to two districts. The one is the southern part (Chanchamayo) of the surveyed area centering around the San Vicente mine and the other is the northern part of the surveyed area centering around the area south of Oxapampa (these intrusives have been named the Chanchamayo intrusives after the locality Chanchamayo where they are distributed relatively on a larger scale). In general, sizes of intrusives in the southern part are larger than those in the northern part.

The diorite rock body in the southern part is composed mainly of coarse-grained diorite and is accompanied by xenoliths of ultrabasic rocks (to be described in detail later). The diorite rock body in the northern part, on the other hand, is relatively fine-grained in most cases and its xenolith is cognate hornblendite. The hornblendite shows so complete reaction to the host rock that its rim is not clear in many cases. The diorite bodies in both districts are intruded into or around granitic rocks.

The age determination by K/Ar method gives the time of intrusion of these rocks as 155 million years (determined in the previous year) to 239 million years (result in this year) in the southern part and 115 million years (cf. Appendix A-7) in the northern part. By correlation with geological age, the period of intrusion in the southern part corresponds to early Triassic ~ middle Jurassic, and the in the northern part corresponds to late Cretaceous. In can be said, therefore, that these rocks are of Jurassic ~ Cretaceous intruction. In the field observation, these rocks are intruded into granitic rocks and the Pucara Group, but their relations with younger formations are not clear.

Under the microscope, they are relatively diversified from quartz dioritic rocks consisting mainly of plagioclase and amphibole with a small amount of biotite, quartz and K-feldspar to granodioritic rocks containing the principal minerals of plagioclase, K-feldspar, quartz and biotite. As for chemical composition, the silica content (SiO_2) increases towards the younger stage (cf. H-102901 (result of the previous survey) H-013, Appendix A-5). The composition of normative feldspar changes gradually from An side to Ab side towards the younger stage (cf. Fig-2). These intrusives, therefore, may be said to be a product of differentiation from same magma despite their distribution on two parts, the southern and northern parts of the surveyed area. Moreover, the amphibole observed in these intrusives is characterized by paragenesis with magnetite. This phenomenon is frequently observed in granodiorite - quartz diorite which are considered to have formed copper - bearing magnetite deposits or magnetite deposits of metasomatic origin in southern Peru. The granodiorite group accompanied with magnetite deposits are of Jurassic - Cretaceous intrusion as in the case of these intrusives.

The ultrabasic xenolith observed in the southern part of the surveyed area is two-pyroxene peridotite, the so-called lherzolite, which is composed mainly of olivine and pyroxene and contains biotite, plagioclase and

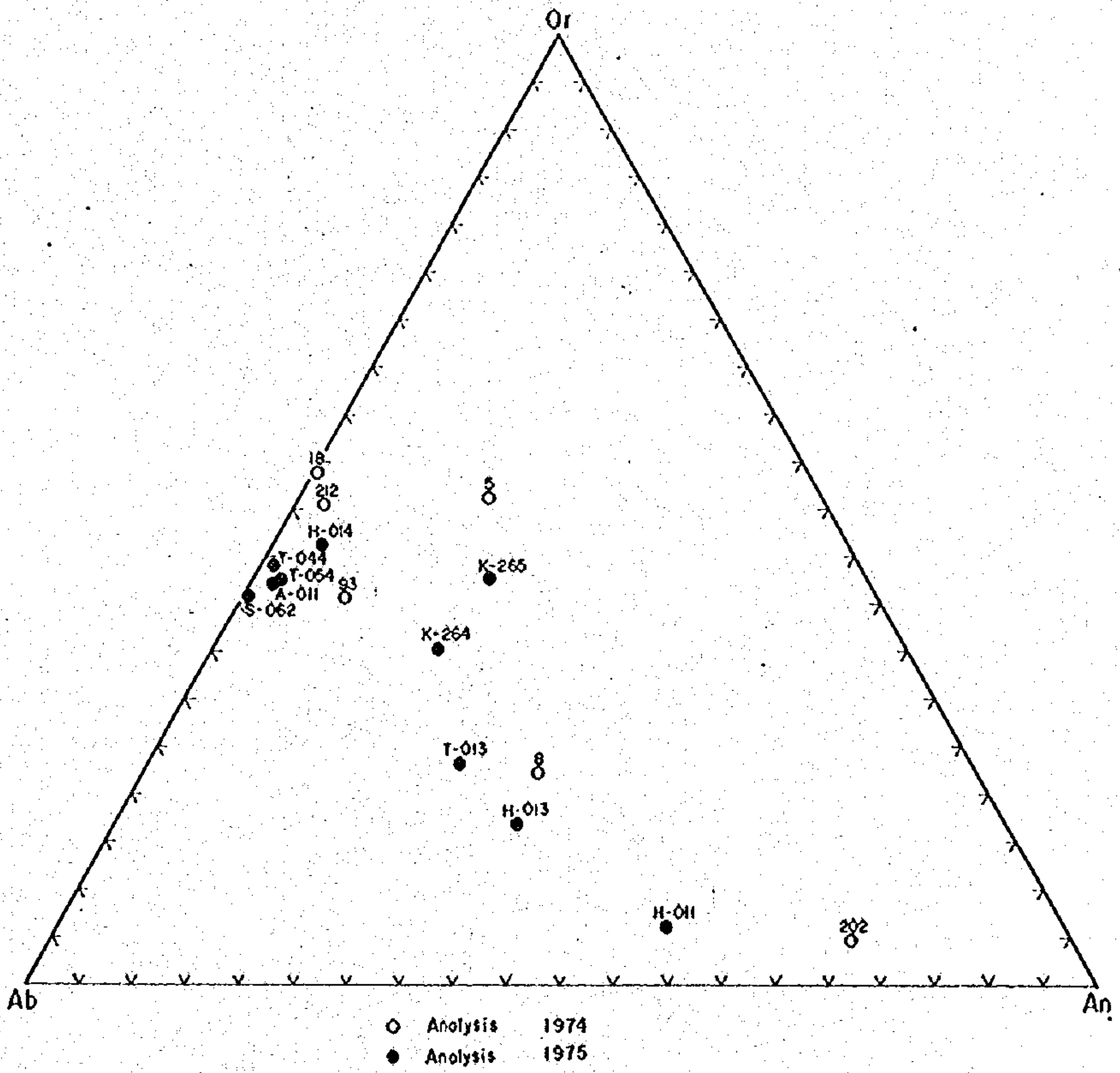


Fig2. Normative diagram of Or-Ab-An

magnetite. The olivine is mostly forsterite and is surrounded by pyroxene. The pyroxene is composed mainly of augite and bronzite and is accompanied by hypersthene. Partial alteration of pyroxene to biotite is observed. Cracks are well-developed generally and are filled with serpentine and hematite. Under the reflecting microscope, pyrite was recognized.

3-3-4 Oxapampa Intrusives

The igneous rocks which have been named the Oxapampa intrusives during this survey are acidic intrusives distributed mainly in the northern part centering around Oxapampa. Rock facies is extremely diversified and includes rhyolite, quartz porphyry, granite porphyry and monzonite porphyry. In general,the surrounding of these intrusives is influenced by hydrothermal alteration or thermal alteration, by which calcareous rocks have been altered to marble or skarn and tuffaceous rocks or muddy rocks have been altered to hornfels in part.

While the age determination by K/Ar method has not yet been made as to the time of intrusion, it seems that there is not much difference in the age between the Oxapampa intrusives and the Pusagno granite in Chorobamba as the latter is gradually changing to the former. However, the fact that these intrusives are intruded in the Oriente Group in part tells that the intrusion of these rocks was after middle Cretaceous. Also because of the fact that these rocks are covered with the Merced formation, the time of their intrusion is considered to be between middle Cretaceous and late Tertiary.

Under the microscope, each rock facies is relatively fine-grained with a porphyritic texture or a Seriate texture. Mineral composition also varies greatly with rock facies, but the characteristics of acidic rocks are observed in each case. In conclusion, the Oxapampa intrusives contains quartz, K-feldspar and a small amount of plagioclase as essential mineral components and such colored minerals as biotite and a small amount of amphibole as accessory minerals.

The previously mentioned hornfels developed under the influence of these intrusives is observed in the southeast of Oxapampa. Its original rock is probably tuffaceous shale in the Sarayaquillo formation or the Oriente Group. The field observation failed to determine the horizon of this tuffaceous shale. However, the hornfels is treated as the Oriente Group in this report in view of the fact that there is a distribution of white sandstone formation in the farther south and that there is no Sarayaquillo formation in this district.

3-3-5 Yaupi Volcanics

The Yaupi volcanics are acidic effusive rocks consisting mainly of dacitic rocks. Their distribution is limited to the northern part of the surveyed area centering around Yaupi which is in the south of Oxapampa. These rocks have been named the Yaupi volcanics after the type locality Yaupi. These volcanics are mainly pyroclastic rocks in the south section of the distribution and consist mainly of lava in the north section. The pyroclastic rock is composed of thick pyroclastic flows, and a welded tuff texture can be observed megascopically in the field.

The age determination by K/Ar method has given the age of effusion as 46 million years (cf. Appendix A-7). By geological age, it corresponds to Eocene of Palaeogene period. The dacite dike (40 million years by K/Ar age determination) in granitic rocks observed in the previous survey may be one of the dikes included in the Yaupi volcanics.

Under the microscope, the pyroclastic rock contains subangular-rounded breccias of rhyolite and dacite, with its groundmass characteristically consisting of brown colored glasses with a clear linear structure. The phenocrysts observed are mainly plagioclase and quartz, both of which are crushed and corroded. At times, these volcanics are accompanied by opacitized biotite. They also have a dissemination of hematite in many cases.

The change of chemical composition of the previosly mentioned pyroclastic sediments and dikes shows the increase of silica contents in the course of time (form 69.23% to 70.17%). The norm calculation always shows the presence of hematite in both of them.

3-3-6 Onda Intrusives

The Onda intrusives consist of small scale stocks of monzonite. The distribution is limited to the area around the Onda valley in the northeastern part of the surveyed area. The field observation shows these rocks intruded into the Oxapampa granite and Chanchamayo intrusives and also into Mesozoic sediments (Sarayaquillo, Oriente and Chonta Groups). However, these intrusives are covered with Tertiary Merced formations. The age of these intrusives determined by K/Ar method is 22-25 million years (late Miocene of Neogene Period, refer to Appendix A-7).

Under the microscope, these intrusives consist mainly of K-feldspar, phagioclase and amphibole and contain quartz, bronzite, biotite, epidote, zoicite, clinozoicite sphene, apatite and zircon as accessory minerals. They also contain magnetite, hematite and pyrite as opaque minerals. Very rarely, they are accompanied by a very small amount of chalopyrite and covelline.

Around these intrusives, a small dike of younger leucocratic quartz porphyrite is observed. This dike, however, has almost the same mineral composition as the Onda intrusives and is therefore included in the Onda intrusives in this report. The characteristic of porphyrite is that it contains xenolith of hornblendite. The hornblendite xenolith consists mostly of amphibole, but contains bronzite around amphibole crystals in part. It is also characteristic of this hornblendite that it is accompanied by a relatively large amount of sphene. Besides, the hornblendite is accompanied by apatite and opaque minerals.

With regard to chemical composition, these intrusives have a unique position among a series of igneous activity. That is, they have a small content of total iron (ΣFeO) and magnesia (MgO) but have a very large content of $K_2O + Na_2O$ as compared with their silica content. In norm calculation, Or appears very abundantly (cf.A-5). In other words these intrusive rocks may be said to belong to the alkali rock series, while other intrusive rocks belong to the calc-alkali rock servies in the differentiation system of rocks in the surveyed area.

With the intrusion of these rocks, the calcareous rock, the host rock, suffered with marblization or skarnization. The main skarn mineral is garnet, which is accompanied by diopside, epidote, zoicite and biotite. Judging from the association of skarn minerals, it is assumed that the intrusion of these rocks took place under high temperatures.

3-3-7 Lantorache Volcanics

The Lantorache volcanics consist of acidic pyroclastic rocks and tuffaceous sediments. Their distribution is confined to the northern part of the surveyed area centering around Lantorache in the north of Huancabamba.

The lower part of this formation has the same age as the Merced formation and consists of conglomerate layers. That is the differentiation of this formation from the Merced formation is considered to have been the result of changes in the sedimentary basin of the surveyed area in Neogene Period.

3-4 Sedimentary Rocks

Sedimentary rocks are distributed mainly in the eastern part of the surveyed area. In general, the distribution shows the change from older sedimentary rocks in the southwest to younger ones in the northeast.

stratigraphy of the surveyed area is shown in Table 1. The names of formations shown in the table are those used in the report of the previous survey except for the Lourdes formation which has been renamed to the Merced formation. The following describes the outline of these formations in ascending order.

3-4-1 Mitu Group

1) Distribution: The distribution of this group extends from the west of San Ramon to the south of San Vicente and to the east of Oxapampa in NNW-SSE direction. It is also distributed in the northwestern part of La Merced and in Churmazu on a small scale.

2) Rock facies: This group consists mainly of conglomerate, locally intercalating sandstone and lutite. The conglomerate generally has pyroclastic matrix and contains such pebbles as granitic rocks, metamorphic rocks and sedimentary rocks. This group generally shows a purplish red weathered color and is clearly distinguished from Tertiary conglomerate (Merced formation) which shows only a whitish weathered color. With regard to weathered surface, the Mitu conglomerate layer shows a smooth surface, while the Merced formation shows relieved surface by pebbles.

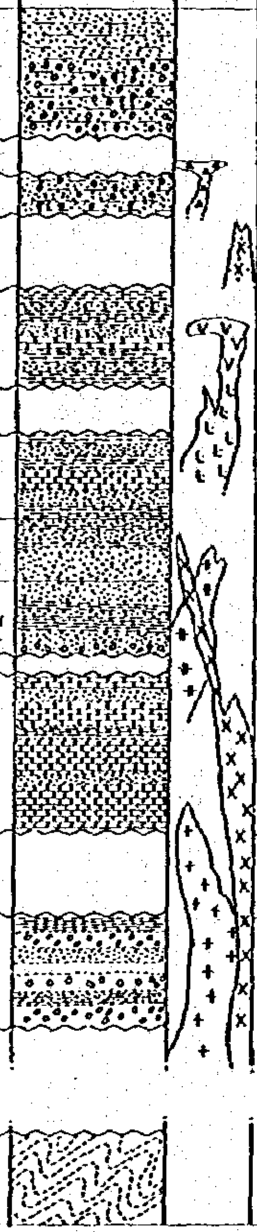
3) Thickness of formation: Approximately 1,300 m

4) Relations with lower formations: This group constitutes the basement of the surveyed area.

In the previous survey, this group was said to have a relation of clino-unconformity with the underlain Copacabana-Tarma Group.

Table 1

Generalized Geological Column of the Surveyed Area

Geological Age			Geological Units	Columnar Section	Igneous Activity	Descriptions: Sedimentary & Metamorphic	Descriptions: Igneous
Cenozoic	Quaternary	Holocene	Alluvium			Gravel sand & clay	
		Pleistocene	Diluvium				
	Tertiary	Pliocene					Lantorache volcanics: Andesitic, dacitic lava & aglomerate
		Miocene	Merced formation			Conglomerate, sandstone & mudstone	Onoa intrusives: Monzonite (22~25 m.y.)
		Oligocene	Contamana group 1,400 m			Upper part: brown shale with sandstone & mudstone Lower part: red shale, sandstone & mudstone with gray limestone	Llaupi volcanics: Rhyolite & dacite (M.Y. 46 m.y.)
		Eocene					
		Palaeocene					Oxapampa intrusives: Quartz porphyry, granite porphyry
Mesozoic	Cretaceous	Later	Chonta group 1,900 m +			Upper part: red shale with sandstone Middle part: gray limestone Lower part: red shale with sandstone & shale	
		Middle					
		Earlier	Oriente group 1,000 m +			Red to white silicious sandstone with shale & conglomerate	
	Jurassic	Later	Sarayaquillo formation 1,000 m +			Upper part: sandstone Middle part: shale & sandstone Lower part: conglomerate with shale	Pusagno granite (M.Y. 130~125 m.y.)
		Middle					
		Earlier	Pucara group 3,000 m			Gray to black limestone & gray dolomite with thin beds of shale sandstone	Chanchamayo intrusives: Diorite, granodiorite porphypy & microgranodiorite complex (Southern part: 155 239 m.y.) (Northern part: 115 m.y.)
	Triassic	Later					
		Middle					
		Earlier					
Palaeozoic	Permian	Later	Mitu group 1,300 m +			Upper part: sandstone & shale Middle part: sandstone & shale with limestone conglomerate Lower part: conglomerate with sandstone & shale	San Ramon granites & Tarma granites Eastern part: red granite with gray granodiorite Western part: gray to green granodiorite (Tarma granites: 244 m.y.) (San Ramon granites: 195 m.y.)
		Middle					
		Earlier					
Pre-Cambrian			Basal complex			Gneiss & schist with serpentinite	

LEGEND

Sedimentary Rock
- Sand
- Gravel
- Shale & phyllite
- Sandstone
- Conglomerate
- Limestone

Metamorphic Rock
- Gneiss & schist

Igneous Rock
- Volcanic breccia
- Monzonite
- Rhyolite & dacite
- Quartz porphyry & granite porphyry
- Granite

Unconformity (wavy line)
Conformity (straight line)

3-4-2 Pucara Group

1) Distribution: This group is distributed in the central part of the surveyed area extending almost in N-S direction. Similar to the Mitu Group, it has a strike of almost in NNW-SSE direction and repeated wave folding at intervals of about one kilometer.

2) Rock facies: This group consists of limestone, dolomitic limestone and dolomite, intercalating calcareous sandstone and muddy sandstone. The limestone has various colors ranging form bright gray to black color. The black limestone often contains carbonaceous materials and also shows oil indications in the north.

3) Thickness of formation: Approximately 3,000 m.

4) Relation with lower formations: This group is said to have a conformable relation with the Mitu Group according to Levia et al (1975).

3-4-3 Sarayaquillo Formation

1) Distribution: This formation is distributed mainly in the eastern part of the surveyed area in the south of Oxapampa. It is also distributed on a relatively large scale in the graben structure in Raymondi. Further, it has a distribution on a small scale in southeast of Oxapampa and on the south bank of Rio Tunqui. No distribution is observed in the area north of Oxapampa and south of Merced.

2) Rock faices: This formation has a small scale conglomerate layer at its bottom and changes to alternated layers of red sandstone comprising mainly reddish brown to reddish purple lutite and shale. The lutite in this formation intercalates gypsum beds. The formation is generally tuffaceous and lacks continuity, but is known to intercalate basalt lava. It can be assumed, therefore, that the transition from marine to terrestrial environment took place during the sedimentation of this formation.

The basalt is vesicular and contains amygdaroidal calcite.

3) Thickness of formation: Approximately 1,000 m.

4) Relations with lower formations: This formation has a relation of unconformity with the underlying Pucara Group.

3-4-4 Oriente Group

1) Distribution: This group has a relatively wide distribution extending from the west of Chorobamba to the west of La Merced.

2) Rock facies: This group consists mainly of red to white quartzose sandstone, locally intercalating red to green lutite and red to white fine-grained quartzose conglomerate. Development of a false bed for about 50 m is observed in the uprermost part of this group.

3) Thickness of formation: Approximately 1,000 m

4) Relations with lower formations: This group is conformable to the underlying Sarayaquillo formation. In Chorobamba where the Sarayaquillo formation is not present, this group overlies the Pucara Group unconformably.

3-4-5 Chonta Group

1) Distribution: This group has the largest distribution after the Pucara Group, extending from the north limit of the surveyed area to the west of San Luis.

2) Rock facies: The lowermost of this group is dacitic tuff. The lower formation consists mainly of blue lutite, middle formation mostly of limestone and upper formation mainly of red to reddish brown lutite and fine to medium grained sandstone.

3) Thickness of formation: Approximately 1,900 m

4) Relations with lower formations: This group is conformable to the underlying Oriente Group.

3-4-6 Merced Formation

1) Distribution: This formation is distributed in almost N-S direction

along the Rio Santa Cruz-Rio Chanchamayo extending from the south of Oxapampa to the south of San Ramon.

2) Rock facies: This formation is composed mainly of conglomerate, intercalating lenticular sandstone and shale. Pebbles include all types of basement rocks such as granitic and andesitic rocks, sedimentary rocks and metamorphic rocks, with the matrix of granitic sands. The weathered surface is relieved by pebbles, which makes it posible to distingrish this conglomerate clearly from the conglomerate in other formations.

3) Thickness of formation: Approximately 400 m

4) Relations with lower formations: This formation overlies Mesozoic sediments unconformably.

5) Though the geological age of this formation was determined to be from Paleocene to Oligocene in the previous survey, it has been revised to Miocene because of the fact that it overlies the Onda intrusives unconformably as described in Section 3-3-5.

3-4-7 Quarternary Sediments

The development of Quarternary sediments is extremely poor in the surveyed area where steep topography generally prevails. Main sediments are lake deposits near Oxapamapa and river terraces near San Ramon, but glacial deposits are distributed in the western mountain region and talus deposits are distributed along the major rivers, both on a small scale.

3-5 Geological Structure

3-5-1 Folding Structure

The folding structure in the surveyed area may be classified into the NNW-SSE system and the NNE-SSW system. The folding of the NNW-SSE system conforms to major structures in Central Peru and is the main structure in the surveyed area. The folding structure in the Pucara Group is

characterized by gentle synclinorium with about one kilometer distance between synclinal and anticlinal axes.
however, recumbent folds have been recognized.

With regard to the change of the direction of folding axis by district, the axis has the direction of the NNE-SSW system in the northernmost part, but the direction of the NNW-SSE system is dominant near Huancabamba. In the area south of Oxapampa, two axial directions are observed. That is, the axial direction of the NNW-SSE system is prevalent in the eastern part, while that of the NNE-SSW system is recognized in the western part. This trend is reversed in the area from Raimondi extending along Rio Oxabamba, and the axial direction of the NNW-SSE system is developed in the west and that of the NNE-SSW system is developed in the east. In the area south of Rio Oxabamba, the axial direction of the NNW-SSE system is again dominant. Diagrammatically these folding structures may be said to have their axial directions arranged in a diamond shape centering around Raimondi.

3-5-2 Faulting Structure

Three prominent directions of faulting structures, NNW-SSE system, NNE-SSW system and NWW-SEE system, are recognized in the surveyed area. As explained in the preceding section (folding structures), the axial direction of the NNW-SSE system is the main structural direction of this area and is prominently developed mainly in the northern, southern and eastern parts of the surveyed area. The faults of NNE-SSW system are located mainly in the western part of the surveyed area. On the other hand, the faults NNW-SSE system are located in the center of the diamond-shaped zone described in the preceding section (folding structures).

Each of the faults mentioned above is high-angled and most of them show the movement of a normal fault. The main stress field of the faulting in the surveyed area is compressive stress of the NEE-SWW direction, but in the previously mentioned diamond-shaped zone of the folding structure, faulting by the composite tensile force almost in the N-S direction (corresponding to NNW-SEE and NNE-SSW) seems to be prevalent. Therefore, the present dominant fault groups are considered to be the products of tectonic movements by means of the resultant force in the period following the folding. In other words, there is an indication that the stress field in the folding period was the compressive stress in the direction of NEE-SSW and that the stress field changed to the composite tensile force in the N-S direction in the later faulting period. When the geological structure of Central Peru is taken into consideration, it can be said that the surveyed area is located at the inflection point where the general strike of NW-SE changes to the direction of NNW-SSE. Therefore, the previously mentioned change of stress field should be comprehended as a split stress accompanying the change of the direction of tectonic movement.

Chapter 4. Ore Deposits and Mineral Indications

Ore deposits and mineral indications in the surveyed area may be classified roughly into two categories, both of which, however, are closely related to calcareous rocks in the Pucara Group. One is the bedded mineralization in the Pucara Group, which is the main object of this survey, and the other is the mineral indication derived by the acidic igneous rocks of Cretaceous-Tertiary intrusion.

The followings are details of each category.

4-1 Bedded Mineralization in the Pucara Group

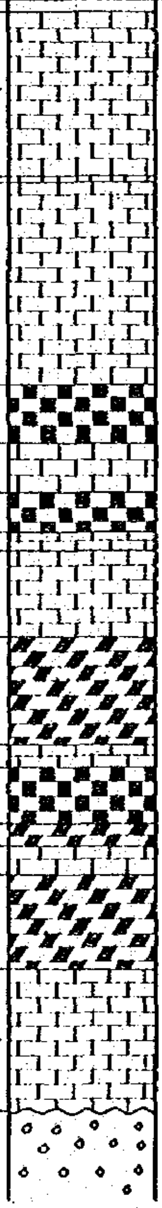
4-1-1 Stratigraphy and Structure of the Pucara Group

The Pucara Group has already been outlined in Section 3-4-2. The stratigraphy of the Pucara Group is shown in Table 2. This geological column, however, has been prepared only for the area south of Oxapampa. No comparable geological column has been prepared for the north of Oxapampa, where the distribution of the Pucara Group is intermittent. Four dolomite horizons of the Pucara Group have been confirmed in the south of Oxapampa. These dolomite horizons are of comparatively good continuity. The dolomite formation is generally accompanied by a limestone layer containing bituminous or carbonaceous materials in the upper or lower horizon.

Two horizons containing fossils have been confirmed and they generally consist of black muddy limestone. In the upper horizon, the dolomite layer is accompanied by calcareous sandstone and contain bivalves in large quantities, while in the lower horizon, it contains mainly ammonite accompanied by gastropods.

Fossils collected in the surveyed area are shown in Appendix A-8 and A-9.

The thickness of the Pucara Group in the surveyed area is approximately 3,000 m.



Geological age	The total thickness of layers	Thickness of layers	Columnar section	Rocks facies
Jurassic	3000	450+ m		massive limestone
		20		dolomite
		550		black limestone with fossilliferous muddy limestone, well bedded
	2000	150		dolomite (in Oxapampa appear zebra in lowest part)
		140		black limestone with fossiliferous muddy limestone
		100		dolomite
		50		limestone
		240		limestone with sandstone, well bedded
		300		carbonaceous limestone
	1000	60		massive limestone
		160		dolomite (in Mesa Pata appear zebra)
		60		carbonaceous limestone
		80		massive limestone
		260		carbonaceous limestone
		400+		limestone, well bedded
	0			
Permian				Mitu group

Table 2 Geological column of Pucara group

4-1-2 Changes in Composition of Carbonate Rocks in the Pucara Group

The carbonate rocks, the main component of the Pucara Group, consist mainly of limestone, intercalating dolomite at times as mentioned previously. X-ray diffraction tests were conducted to determine the state of transformation from limestone to dolomite, with the results as shown in Figs. 4, 5, 6 and 7.

These results clearly show the transformation from limestone to dolomite, but also indicate that the dolomite in the southern part is more calcareous than that in the northern part and that the limestone in the south is more dolomitic than that in the north on the contrary. However, the zebra (banded dolomite), both in the north and south, consists of almost homogenous dolomite in its composition.

The limestone is generally accompanied by quartz and plagioclase, which are particularly abundant in carbonaceous limestone or black limestone.

4-1-3 Dolomite Formation in the Pucara Group

The Pucara Group includes four dolomite formations as mentioned previously. In these dolomite formations, a banded structure (zebra structure) and a breccia structure are observed depending on the location. The zebra structure is a striped structure of black fine-grained dolomite and white, highly crystalline, coarse-grained dolomite. Under the microscope, the difference between white dolomite and black dolomite is distinct. While the grain-size of the dolomite in a black band is about 0.1 ~ 0.2 m/m, that of the dolomite belonging to a white hand is about 0.8 m/m in the center of the band and decreases gradually towards the black band and becomes about 0.3 m/m near the fringe of the band (Appendix A-4). With regard to the color of minerals, the black dolomite appears yellowish, while the white dolomite is colorless and appears fresh. However, the difference in color is believed to be due to the difference in the content of trace components since the

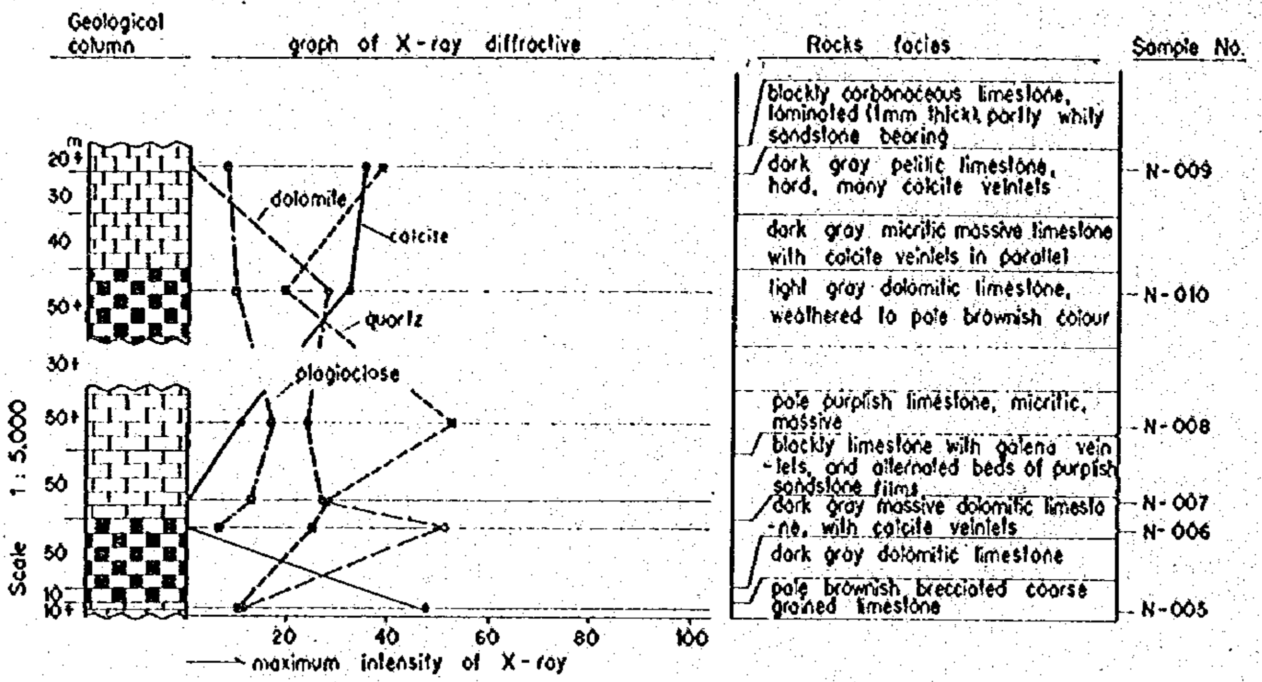


Fig. 3 Geological column and X-ray diffractive results on Tarma road

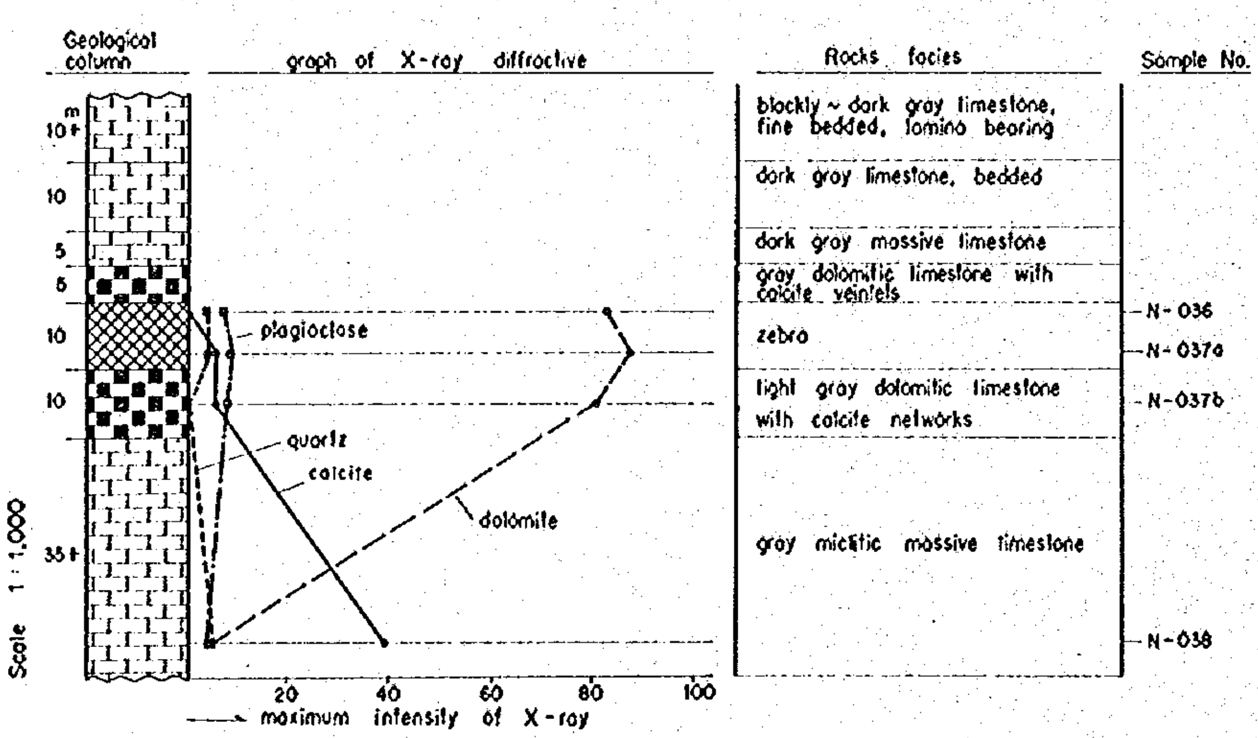


Fig. 4 Geological column and X-ray diffractive results on Pichita Caluga area

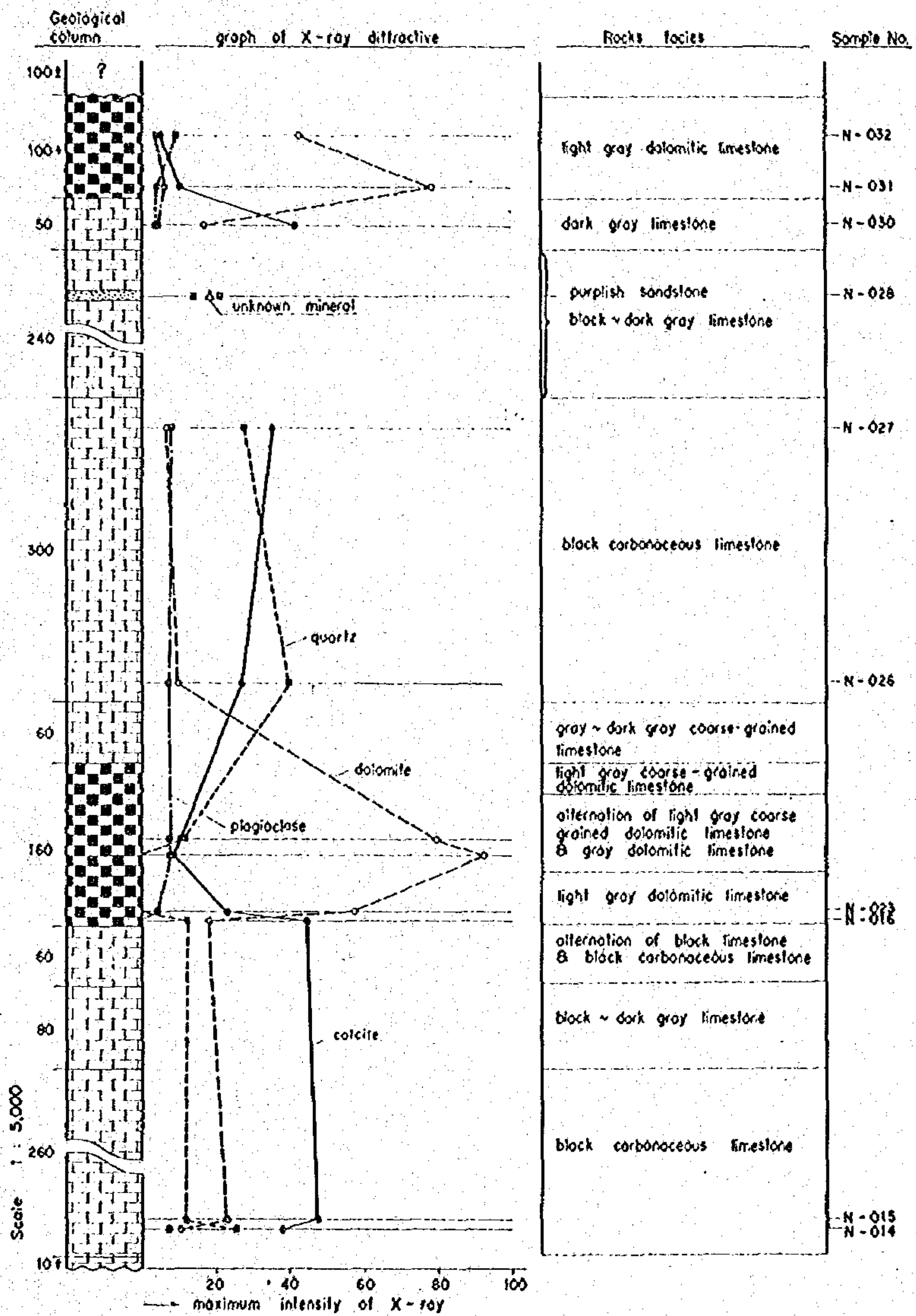


Fig. 5 Geological coloumn and X-ray diffractive results on Rio Casca

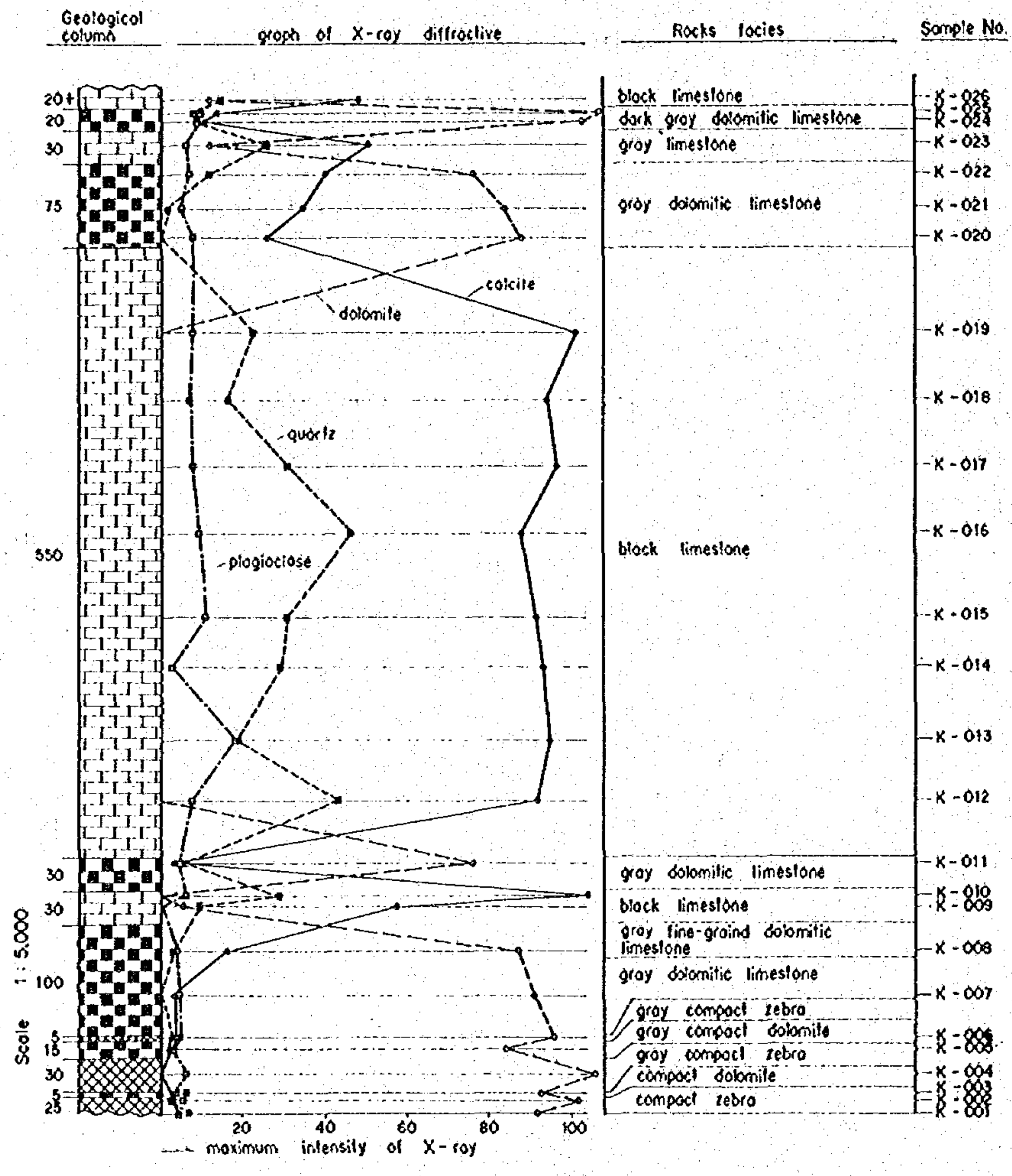


Fig. 6 Geological column and X-ray diffractive results on Oxapampa area

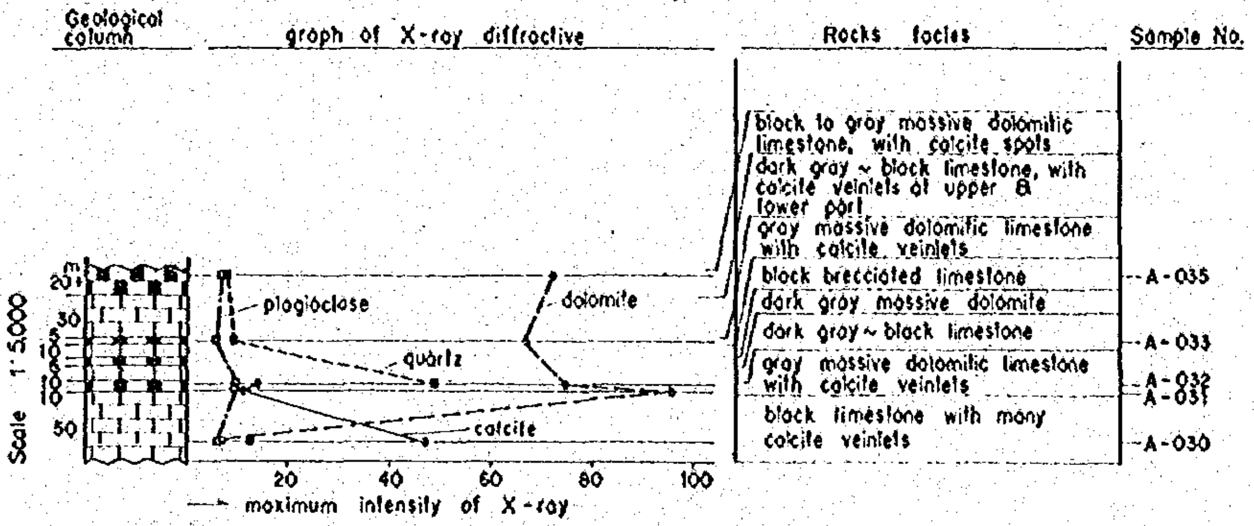


Fig. 7 Geological column and X-ray diffractive results on Pozuzo road

greater portion of the zebra structure is composed of dolomite as mentioned in the previous section.

For the crystallization temperature of dolomite in the ore deposit the filling temperature of liquid inclusions measured was $70^{\circ} \sim 150^{\circ}C$ in the previous survey. It was also reported in the previous year that the dolomite in the ore deposits had a zebra structure. While it is not known which color of dolomite was used for temperature measurement, these measured values are considered to suggest the crystallization temperature of white dolomite in view of the fact that sphalerite exists mainly in the white dolomite portion, as will be explained later, and that the dolomite in the white band generally has high-crystallinity and is coarse-grained.

4-1-4 A Study of Formation Mechanism of Zebra Structure

Inferring from the description in the previous section, it may well be said that the black dolomite is the original dolomite layer formed at the time of sedimentation and that the white dolomite is a dolomite segregated in the process of a movement associated with diagenesis or tectonic movement.

From the granular variation of the white dolomite, it may be concluded that the white dolomite was deposited in the crevices of the black dolomite. The similar phenomenon is also observed in the breccia structure. That is, the dolomite breccia is black in color, while the dolomite in the matrix is white in color. Moreover, the grain-size of the white dolomite becomes larger towards the center of matrix. Therefore, it may safely be concluded also in this case that the white dolomite was deposited after brecciation.

Then, the question is how the crevices associated with a zebra structure and breccia structure were developed. Though it was not possible during this survey to collect data sufficient enough to clarify this point, it may be interpreted that these crevices were developed in the process of a movement associated with a tectonic movement. For this interpretation, the following two factors may be pointed out.

1) Oblique intersection of white dolomite with the bedding plane is observed almost in the entire region.

2) Portions with a breccia structure are observed in part.

In the future surveys, therefore, it will be necessary

a) to collect data on the measurement of strike and dip of white dolomite which crosses diagonally the strike and dip of dolomite layers having a zebra structure to clarify the structure of white dolomite in the dolomite formation, and

b) to determine the range of distribution of dolomite layers having a zebra structure to clarify the relationship between the zebra structure and local tectonic movements, if there should be any relationship between them.

If the force field of a local tectonic movement coincides the force field of a banded structure of white dolomite, it is believed that the reasoning that the crevices produced by a tectonic movement were filled up with white dolomite will be generally accepted with a comparatively high probability. Moreover, tracing of the dolomite layer located in the area of the similar local structure may lead to the discovery of a zebra structure.

4-1-5 Bedded Mineralization Observed in the Pucara Group

The bedded mineralization in the Pucara Group is known to exist in the San Vicente district and Pichita Caluga district of the surveyed area. The state of ore emplacement in these two district is described in detail in the previous report. In the San Vicente district, in particular, a precise survey was conducted in an area of 200 km^2, the result of which has provided an important guide to the genesis of ore deposits.

During the survey for the current year, which was based on the findings of the previous survey, the existence of zinc-deposits accompanying the zebra structure in dolomite formation has finally been discovered in the Churumazu district.

The characteristic of zinc mineralization associated with the zebra structure in the San Vincente deposits is that the grain-size of sphalerite in the previously mentioned white dolomite decreases gradually towards black dolomite and the sphalerite in the center of black dolomite shows the occurrence of fine dissemination. The occurrence of ore in the mineralized zone observed during the survey for the current year, however, does not show the arrangement of occurrence observed in the San Vincente deposits, but shows a random occurrence of independent, relatively coarse-grained sphalerite centering around the boundary of white and black dolomites, with the main part concentrated rather on the side of white dolomite.

Under the microscope, the difference in sphalerite between the two districts is distinctly observed. That is, the sphalerite in the San Vicente mine is accompanied by a large quantity of minute grains of pyrite inclusions, while the sphalerite in the Churumazu mineralization district is almost free of pyrite inclusions. On the contrary, the gangue in the Churumazu district generally contains independent pyrite, while the gangue in the San Vicente deposits contains comparatively less independent pyrite. This is probably related genetically to the occurrence of lenticular body of pyrite observed in the Churumazu mineralized district.

The sphalerite in Churumazu is a product after pyrite has been differentiated. The sphalerite in the Churumazu district appears more whitish than that in the San Vicente deposits and is generally considered to have less Fe content. Kullerud (1953) suggested that under the constant pressure, the solubility of FeS in ZnS increases with the increase of temperature and that under the constant temperature, the solubility decreases with the increase of pressure. A study of sphalerite in the surveyed area as to the relation between the pressure and temperature under the assumed constant pressure shows that the San Vicente deposits were formed under relatively high temperatures and that Fe was exsolved as pyrite in the sphalerite during the cooling period after mineralization. In the Churumazu mineralization district, meanwhile, the mineralization is considered to have occurred after differentiation of pyrite from the sphalerite following the decrease of temperature. Judging from these characteristics, it must be concluded that the mineralization is of epigenetic origin, despite the restriction that the horizon of mineralization is always confined to the dolomite formation, particularly to the zebra structure of the dolomite formation. However, the application of this control,by the clarification of the origin of the zebra structure,is believed to provide an important guide to the prospecting of mineral deposits.

4-2 Mineralization by Igneous Activity

Mineralization associated with igneous activity may be classified largely into three categories. The first is the metasomatic mineralization in the calcareous rocks of the Pucara Group, the second is the postmagmatic mineralization of dissemination type without being accompanied by wall rock alteration and the third is the mineralization of so-called porphyry copper type in which igneous rocks themselves are mineralized.

4-2-1 Metasomatic Mineralization and Porphyry Copper Type Mineralization

The Santos deposits and Soledad deposits reported in the previous year may be representative of the metasomatic mineralization. During the survey for the current year, mineral indications were discovered in a completely virgin area. These are mineral indications of the skarn type associated with monzonite in the Onda valley. As mentioned in section 3-3-5, the skarn mineral is of the comparatively high temperature formation. The main type of mineral is copper, which has also been confirmed under the microscope. In most cases, copper is present in the form of chalcopyrite and often occurs as inclusions in pyrite. The grain size of mineral is as small as 0.05 x 0.03 m/m. On a very rare occasion, sphalerite can be recognized megascopically.

Although the mineralization is very weak, collection of data on igneous rocks which are responsible for mineralization may be called a success of the survey.

The porphyry copper type mineralization, which was mentioned at the beginning of this section is observed in the previously described monzonite. A detailed description of monzonite is given in section 3-3-5. Main ore minerals are magnetite and pyrite, which are accompanied by a small amount of hematite and covelline. The pyrite contains inclusion of sphalerite sometimes. The hematite is a product of alteration of magnetite and occurs only around magnetite. The covelline generally shows an irregular shape.

The mineralization, though very weak in intensity, is considered significant as it suggests the possibility of mineralization of the porphyry copper type and has provided an important guide to the clarification of the distribution of copper anomalous zones. It is interesting to know that the intrusion of monzonite is of almost the same age as the formation (mineralization) of biotite in the Michiquillay deposits.

4-2-2 Mineralization of Dissemination Type

The ignous rocks, which are responsible for postmagmatic mineralization of dissemination type, are considered, though uncertain, to be the Oxapampa intrusives and Pusagno granite, judging from the distribution of mineral indication areas and the distribution of geochemical anomalies shown in Plate S-1. The reason for this interpretation is that these mineral indication areas and geochemical anomalies are omnipresent on the side of the

Pucara Group near the Oxapampa intrusives and Pusagno granitic rocks.

It is characteristic of the mineralization that all of the mineral indications discovered are of the dissemination type formed under comparatively low temperatures consisting mainly of galena and that the Pucara Group, the intruded formation, has not been altered. The mineralization, though very weak in intensity, may be said to indicate the possibility of ore existence , though the possibility may not be great, judging from general sequence of mineral formation. However, all of these mineral indication areas show only the possibility of concealed deposits, and the establishment of a definite policy for the future prospecting will be an important question.

The characteristic of galena under the microscope is that its outer fringes are always accompanied by crystallization of hematite (cf. A-4)

Chapter 5. Geochemical Survey

5-1 Purpose and Method of Survey

The result of analytical study of the previous geochemical survey shows that the genetic field of ore deposits is confined to the Pucara Group. Therefore, the survey for the current year was aimed mainly at extracting geochemical anomalies in the Pucara Group by increasing the sampling density within this group.

The survey for the current year was carried out in two phases. In phase 1, a field reconnaisance was made to extract anomalies in the Pucara Group and in phase 2, a precise survey was carried out on the anomalies extracted in phase 1. For this purpose, an assay office was established in the surveyed area, in which abbreviated analysis was made on zinc using DITHIZONE method and up-to-date geochemical survey maps were prepared so that preliminary geochemical maps could be completed along with the progress of the geological survey.

In the meantime, analysis of the collected samples was carried out in Japan using atomic absorption method. This analysis was made on three elements, namely, copper, lead and zinc.

5-2 Field Geochemical Analysis

Field geochemical analysis was carried out in San Ramon using DITHIZONE method. The values of analysis are shown in Appendix A-11 and the results of analytical study of assays are shown in Plate 6-2.

5-2-1 Method of Analysis

For geochemical analysis, the colorimetric method using a solution of DITHIZONE carbon tetrachloride was adopted for zinc as an indicator element. This is a method of determining zinc content of any sample directly, by comparing the reaction color of sample solution with the corresponding color of the standard solutions with DITHIZONE carbon tetrachloride prepared to exhibit different grades of colors corresponding to the different known concentrations of zinc. For analysis of smaple solutions of a high zinc content, the solutions were diluted to adjust volume ratio of zinc content. Soil samples were collected from B_1 bed.

1) Procedure of Analysis

Soil samples were dried and crushed into fine powder and 80 mesh under were reduced to 2 g by quartering for use in field geochemical analysis. The remaining 30 g of samples were brought back to Japan and used for atomic absorption analysis. In the field analysis, 20 cc of 1/10 N hydrochloric acid was added to the 2 g of sample, which was then heated on the sand bath for three minutes to dissolve heavy metals. The solution was and the filtrate and the wash liquid (pure water) were added together to make 25 cc of test solutions.

To the 5 cc of sample solution measured, 2.5 cc of pure water, 2 cc of PH 5 Walpole buffer solution, 0.5 cc of 5% solution of thiosulfate of soda, as a shelter agent and finally a solution of DITHIZONE carbon tetrachloride having a per cc titer of 10γ were added, and the mixture was violently shaken for coloring and then compared with the standard reaction colors to determine the value of analysis.

In preparing standard reaction colors, the standard zinc solution was mixed with regeant used for ordinary analysis in equal quantity to make the standard reaction color identical to the color of sample solution. The standard reaction color was prepared twice a day as it tends to fade easily.

The solution of DITHIZONE carbon tetrachloride was handled in accordance with general rules and solutions of high concentration were prepared in advance and were diluted immediately before each application.

5-2-2 Review of the Results of Analytical Study

1) Extraction of anomalous value: Statistical compilation of 2,830 values of analysis was not possible in the stage of field operations for various reasons such as the restriction of time. Therefore, the boundary between the anomalous value and background was determined to be 7γ as it was a mean value in the Tambo Maria district where mineral indications of bedded zinc deposits were observed. Classification of anomalous values over 7γ was made by eye-measurement into 5 classes.

2) Results of analytical study: The results of analytical study are shown in Plate 6-2-1 through Plate 6-2-5.

3) Review of the results of analytical study: The results of analytical study were compared with geological maps prepared in the stage of field survey and the following conclusions were reached.

i) Geochemical anomalies coincide with the distribution of dolomite formations in the Pucara Group or with the zebra structure and breccia structure in the dolomite formation.

ii) Geochemical anomalies are distributed in the boundaries of acidic igneous rocks.

5-2-3 Selection of Areas for Precise Survey

Through a comprehensive study of the distribution of geochemical anomalies determined by geochemical analysis, districts with the following features have been selected.

i) Districts suitable for geological survey because of comparatively fewer topographic restrictions.

ii) Districts where clarification of geological structures may be possible through precise survey.

iii) District where the relationship between geological structures and mineralization may be clarified.

The following three districts have been selected from north and downward.

a) Chorobamba anomalous zone

b) Oxapampa - Rio Purrayo anomalous zone

c) Pichita Caluga anomalous zone

In the Chorobamba anomalous zone, an area of about 10 km^2 surrounded by four points - (S10°22'32", W75°32'34"), (S10°22'07", W75°31'51"), (S10°26'07", W75°29'43") and (S10°26'28", W75°30'26") - has been extracted as a range of precise survey.

In the Oxapampa - Rio Purrayo anomalous zone, an area of about 220 km^2 surrounded by 9 points - (S10°29'32", W75°28'46"), (S10°28'41", W75°27'00") (S10°43'46", W75°20'33"), (S10°44'11", W75°21'42"), (S10°48'42", W75°19'47"), (S10°49'28", W75°21'36"), (S10°45'08", W75°23'28"), (S10°44'48", W75°27'27") and (S10°35'04", W75°26'22") - has been extracted as a range of precise survey.

In the Pichita Caluga anomalous zone, an area of about 20 km^2 surrounded by 5 points - (S11°05'24", W75°25'16"), (S11°05'24", W75°24'10"), (S11°06'30", W75°23'37"), (S11°09'24", W75°23'37") and (S11°09'24", W75°25'16") - has been extracted as a range of precise survey.

The above three districts have a total area of 250 km^2.

5-3 Geochemical Survey Using Atomic Absorption Method

Geochemical analysis using atomic absorption method was made on 2,622 samples out of the 2,830 collected samples. The number of samples by horizon and rock type is shown in Table 3. A slight decrease in the number of smaples collected in the Pucara Group from the originally scheduled 2,000 samples was due to a slight shift of geological boundaries revealed by analysis of aerial photos.

Fig 8 CUMULATIVE FREQENCY DISTRIBUTION FOR Cu. Pb AND Zn

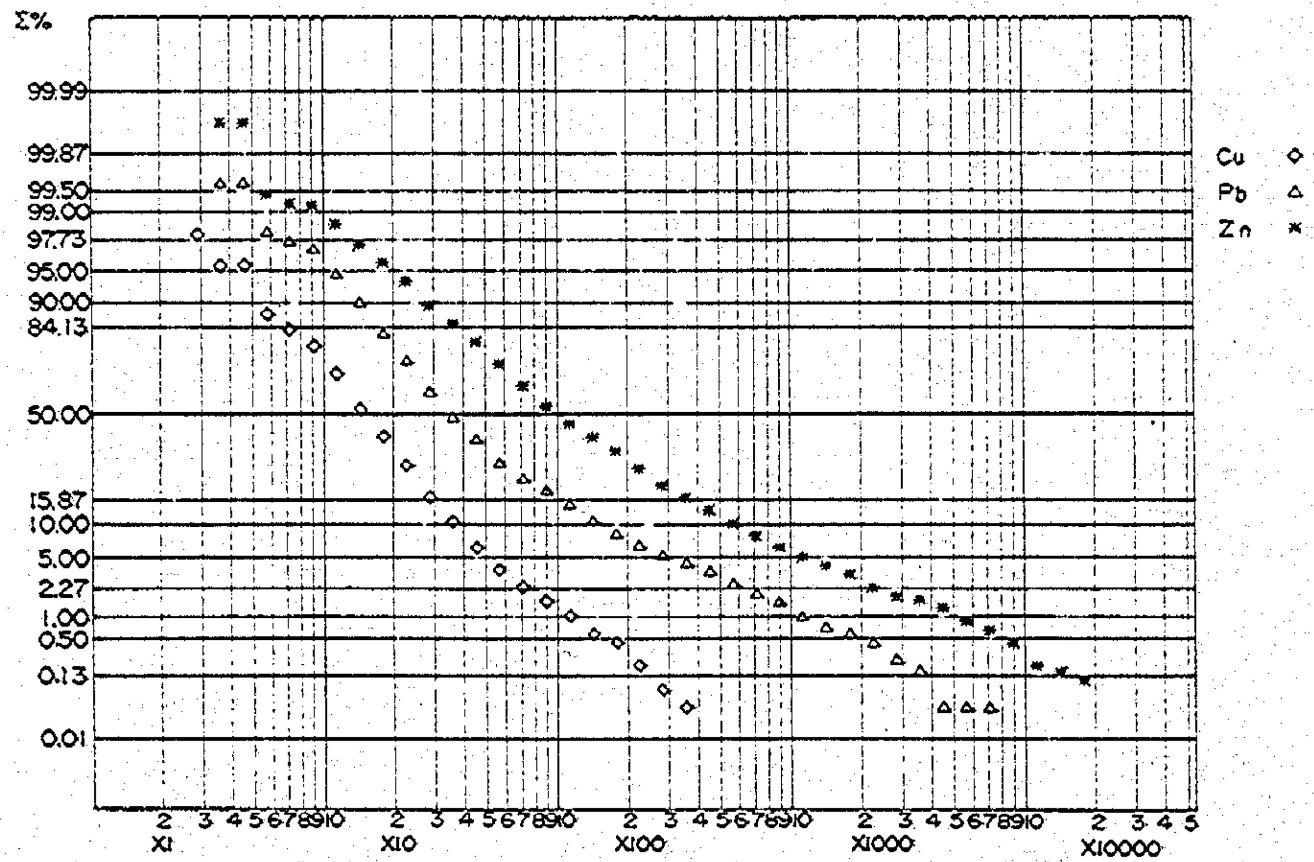


Fig 9   HISTOGRAM FOR Zn

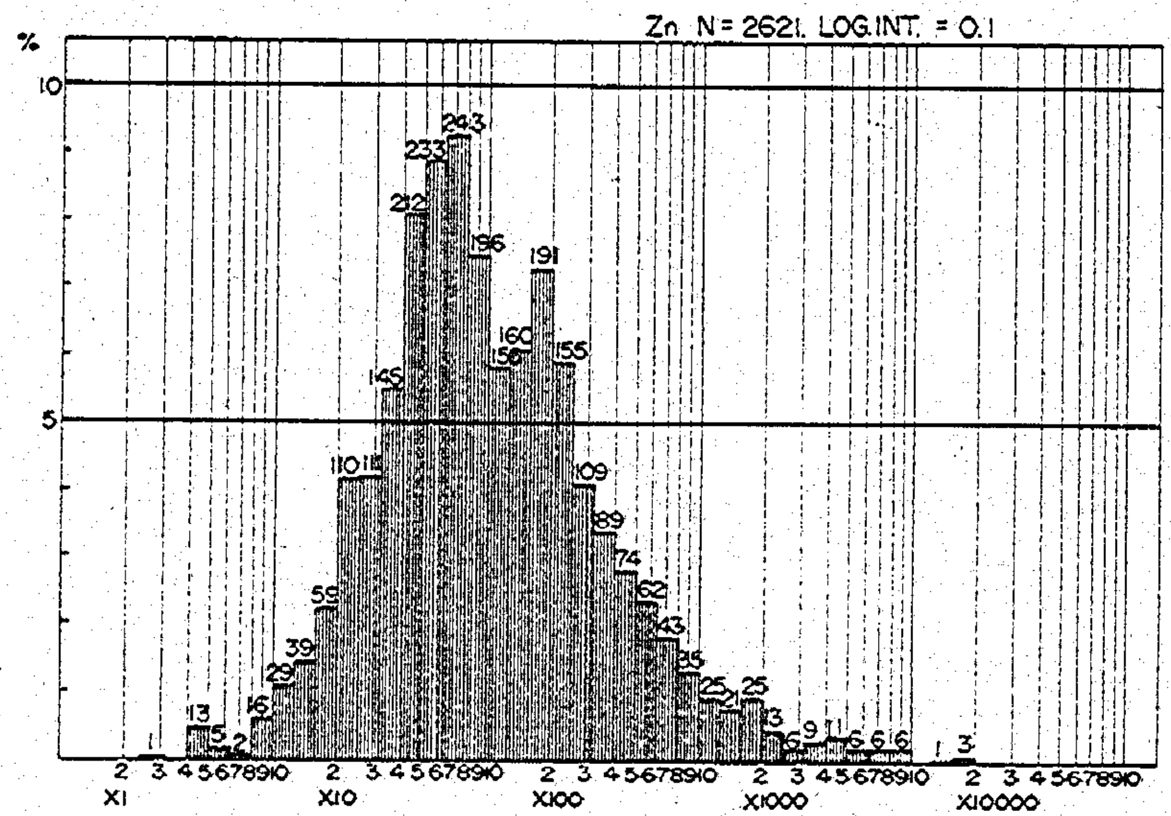


Fig 10. HISTOGRAM FOR Pb

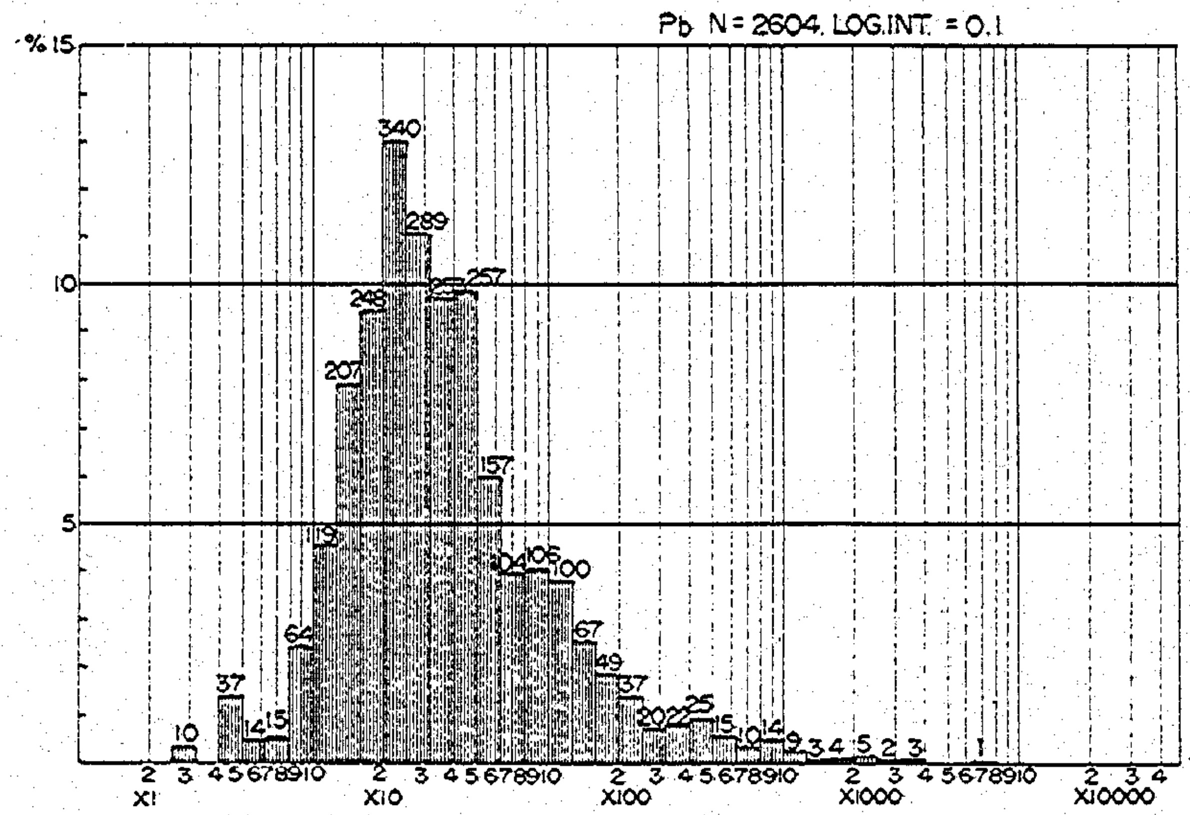
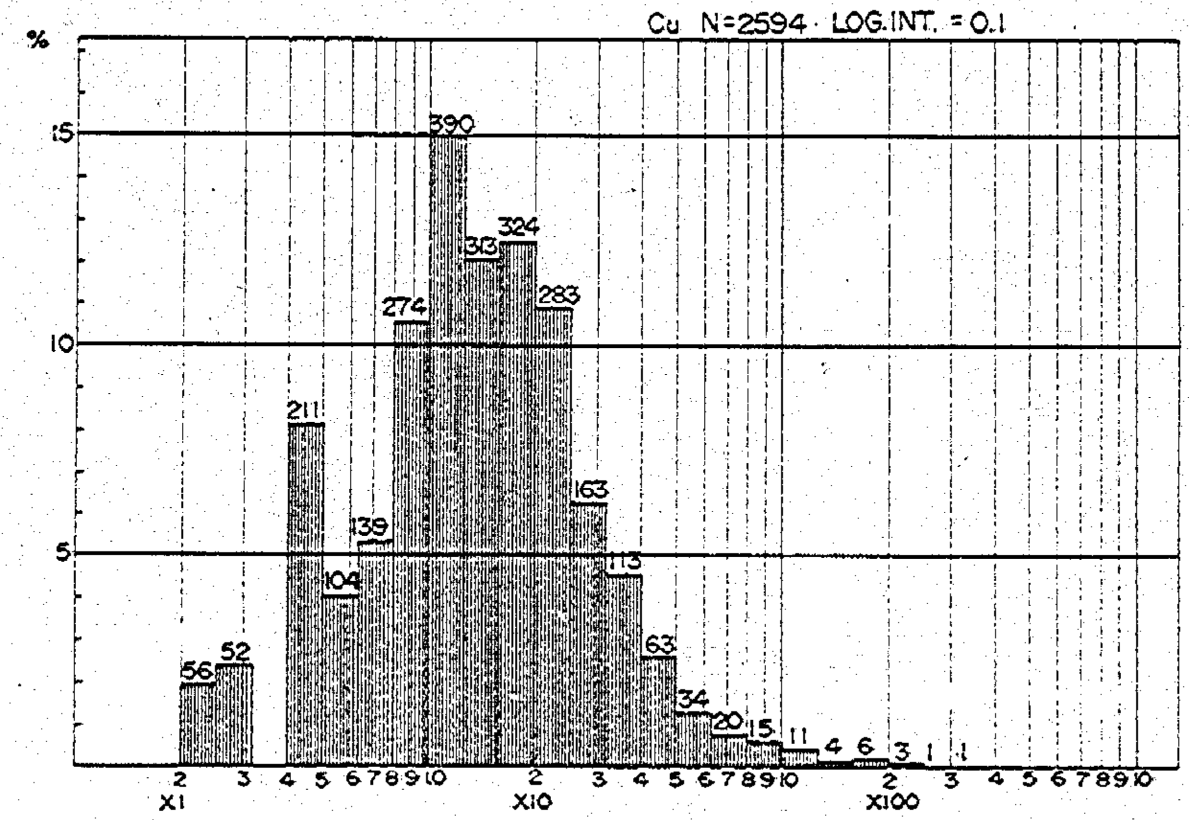


Fig 11 HISTOGRAM FOR Cu



5-3-1 Method of Geochemical Analysis and Analytical Study of Results

Geochemical analysis using atomic absorption method was made on three elements - copper, zinc and lead-according to the procedure shown in Table-4.

For statistical compilation of values of analysis, a computer (IBM 370-145) was used. A cumulative frequency distribution by normal probability of logarithmic diagram and histograms by logarithmic scale are shown in Figs. 8, 9, 10 and 11.

When the background is read as a mean value, the backgrounds of copper, lead and zinc are 13 ppm, 36 ppm and 105 ppm, respectively.

Generally, extraction of an anomalous value of 2 σ (σ is standard deviation) or more is sufficient, but the values of analysis for this area show an excess - high level pattern as evident from the cumulative frequency distribution. When the value 2 σ only is used and other values are ignored, there is a possibility of overlooking the required anomalous values. Therefore, 1 σ or over was extracted as an anomalous value. When 2 σ or over only is used as an anomalous value for zinc, for example, the zinc deposits in the zebra structure discovered in Tambo Maria cannot be extracted. Extraction is possible when the value 1 σ or over is used.

The results of analytical study on the basis of these data are shown in Plates 6-3, 6-4 and 6-5.

5-3-2 Study of the Results of Analysis

1) Geochemical anomalies for zinc

a) Geochemical anomalies for zinc are well matched to the results of field analysis. That is, the field analysis has high reliability.

b) Specially remarkable anomalous zone of zinc are as follows.

i) In and around Huancabamba

ii) In and around Oxapampa-Pusagno

iii) In and around Rio Purrayo

iv) In and around Pichita Caluga

v) In and around San Vicente

c) While all of these anomalous zones coincide with the distribution of dolomite formations, only the small scale anomalous zones are sporadically observed in the Mesa Pata - Tambo Maria district where zinc deposits associated with the zebra structure have been discovered.

d) Free-air anomalies are observed mainly in the dolomite formation near igneous rocks.

e) For geochemical analysis, therefore, it may be necessary to draw a line between the area around igneous rocks and the area remote from igneous rocks and handle statistical data separately from each other.

2) Geochemical anomalies for lead

a) Geochemical anomalies for lead are well matched to the distribution of anomalous zones of zinc and occur mainly around igneous rocks.

b) Specially remarkable anomalous zones of lead are as follows.

i) In and around Chorobamba

ii) Area between Oxapampa and Pusagno

iii) In and around Pichita Caluga

c) Anomalies in and around Chorobamba are distributed near dolomite formations and the Oxapampa intrusives.

d) Anomalies in the area between Oxapampa and Pusagno are distributed around dolomite formations, Pusagno granite and the Oxapompa intrusives.

e) Anomalous zones in and around Pichita Caluga coincide with dolomite formations.

3) Geochemical anomalies for copper

a) In general, geochemical anomalies for copper do not coincide with anomalous zones of lead and zinc.

b) Specially remarkable anomalous zones of copper are as follows.

i) Onda valley

ii) South of Pusagno

iii) In and around Pichita Caluga

iv) Chuquisunga

c) Anomalous zones in the Onda valley are well matched to the Onda intrusives.

d) Anomalous zones in the south of Pusagno coincide with the Chanchamayo intrusives.

e) Anomalous zones in Pichita Caluga coincide with the Chanchamayo intrusives and the location of the mine.

f) Anomalous zones in Chuquisunga coincide with gneiss.

Chapter 6. Conclusion

6-1 Findings of Geological Reconnaissance

1. Geology in the surveyed area shows the distribution of sedimentary rocks of post-Mesozoic in the east, igneous rocks consisting mainly of granitic rocks in the west and the Pucara Group, the object formation of this survey, in the central part extending almost in NS direction.

The Pucara Group, with a thickness of about 3,000 m, consists of calcareous rocks which prevail in almost entire horizon and contains four layers of dolomite formation.

The dolomite formation is comparatively continuous and seems to represent the orginal state of sedimantation.

2. In the dolomite formation of the Pucara Group, portions of a banded structure(zebra structure) and portions of a breccia structure, comprising white dolomite and black dolomite, are observed. The white dolomite in these structures is a segregated vein and is considered to be of epigenetic origin. These structures are sometimes accompanied by such ore minerals as sphalerite, galena and pyrite. Mineral indications have been discovered for the first time in the Tambo Maria district in addition to the known deposits of San Vicente mine and Pichita Caluga mine.

Judging from the color of sphalerite, there seems to be a difference in Fe content of sphalerite between the Tambo Maria district and the San Vicente mine, and this difference in Fe content is probably due to the difference in pyrite inclusions of sphalerite. Fe content is higher in San Vicente than in Tambo Maria.

3. Igneous rocks in the surveyed area were formed almost continously from Permian period to Neogene period, but the mineralization associated with igneous activity was the result of acid igneous activity during the

period from Cretaceous to Neogene.

i) Pusagno granite (early Cretaceous) and Oxapampa intrusives (late Cretaceous-Palaeogene) have caused very weak dissemination of lead in the Pucara Group.

ii) Onda intrusives (early Neogene) have caused very weak copper mineralization of high temperature metasomatic type in the Pucara Group, and copper mineralization in intrusives themselves is also observed.

Mineral indications of any economic value have not yet been discovered to date.

6-2 Rusult of Geochemical Survey (Analysis)

The following coclusion has been reached as a result of field analysis and geochemical analyisis using the atomic absorption method.

1) The reliability of field analysis has been proved as a result of comparision between the results of field analysis and the results of geochemical analysis of zinc using the atomic absorption method.

2) Therefore, the extraction of districts for precise survey on the basis of the results of field analysis can be said to be quite appropriate.

3) Analysis of the assay values of copper, lead and zinc determined by the atomic absorption method shows the following.

i) Lead and zinc show almost similar distribution of anomalous zones. This may be a natural consequence in view of the fact that both lead and zinc are the factor of same behavior as mentioned in the report of analysis in the previous geochemical survey.

ii) There is a slight difference in the distribution between lead-zinc anomalous zones and copper anomalous zones. Lead-zinc anomalous zones are located in the dolomite layers and on the boundary of dolomite formation of Pucara Group and acidic igneous rocks, while copper anomalous zone exists around the Chanchamayo intrusives and Onda intrusives.

6-3 Future Course of Survey

The geological reconnaisance and geochemical survey have revealed the following on mineralization in the surveyed area.

1) Zinc-lead mineralization is associated with dolomite formation in the Pucara Group, especially with zebra structures.

2) In some cases, zinc-lead mineralization is of epigenetic orgin under the influence of Pusagno granite and such acidic igneous rocks as the Oxapampa intrusives.

3) Copper mineralization indicates mineralization with skarns and in igneous rocks under the influence of the Onda intrusives.

4) The distribution of geochemical anomalies suggests the possibility that the Chanchamayo intrusives have also brought about copper mineralization.

The ore deposits which show a specially remarkable sign of mineralization at present are lead-zinc deposits accompanying the zebra structure. It is noteworthy that the horizons of ore formation are restricted to the zebra structure in the Pucara Group irrespective of the orgin of these deposits. In other words, the existence of the zebra structure as a field of ore formation suggests the possibility of determining the field of ore formation through clarification of the origin of the zebra structure.

The next important mineral indications are the lead-zinc deposits originating in acidic igneous rocks. Mineral indications which are worthy as the object mining operations have not yet been discovered to date, but the existence of many low grade ores may be sufficient to anticipate the existence of concealed deposits. As is usual with epigentic deposits, the ore shoot is considered to be under strong control of local geological structure.

Copper mineral indications with some possibilities of skarn minerals and porphyry copper deposits, though very minor in scale, have been discovered, but there is not much chance for them to develope to large scale deposits.

In view of the characteristics of mineral indications in the surveyed area mentioned so far, it is hoped that the geological structure in the surveyed area be clarified as the first importance to determine the field of mineralization in these districts. In other words, a precise geological survey should be carried out in these districts of mineral indications. It is believed that through clarification of geological structure and environments in these districts, a more definite policy will be established for prospecting of mineral deposits and a more detailed survey of mineral deposits will be realized.

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Table 3 Numbers of Samples on Each Formation

Cu ppm.	JP	CRC	CRO	TVY	TM	PTRG	TVL	JPC	PM	JS	POM	THO	TOTAL
	1659	119	109	27	132	88	8	17	41	32	13	12	2257
0 ~ 28	179	4	4	1	6	0	2	11	5	0	3	1	226
29 ~ 42	49	2	1	0	1	3	0	8	6	0	5	2	77
43 ~ 63	22	1	2	1	0	1	0	5	1	0	1	0	34
64 ~ 94	9	1	0	0	1	0	0	2	1	0	1	0	15
94 over	9	0	0	0	1	2	0	1	0	0	0	0	13
TOTAL	1927	127	116	29	141	104	10	44	54	32	23	15	2622
Pb													
0 ~ 104	1600	119	106	24	139	99	8	43	51	32	23	12	2256
105 ~ 178	147	6	3	4	0	3	2	1	1	0	0	2	169
179 ~ 304	75	1	3	1	0	0	0	0	1	0	0	1	82
305 ~ 521	47	0	2	0	1	2	0	0	0	0	0	0	52
522 ~ 891	28	0	2	0	1	0	0	0	1	0	0	0	32
891 over	30	1	0	0	0	0	0	0	0	0	0	0	31
TOTAL	1927	127	116	29	141	104	10	44	54	32	23	15	2622
Zn													
0 ~ 369	1572	122	111	28	140	99	10	43	53	32	23	15	2248
370 ~ 692	166	3	2	1	0	2	0	1	1	0	0	0	176
693 ~ 1297	86	1	2	0	1	3	0	0	0	0	0	0	93
1298 ~ 2429	53	0	1	0	0	0	0	0	0	0	0	0	54
2430 ~ 4552	26	0	0	0	0	0	0	0	0	0	0	0	26
4552 over	24	1	0	0	0	0	0	0	0	0	0	0	25
TOTAL	1927	127	116	29	141	104	10	44	54	32	23	15	2622

JP : Pucara Group CRC : Chonta Group CRO : Oriente Group

Table 4. Flow Sheets of Chemical Analysis

(Cu, Pb, Zn)

Sample (1 g) (in 100 - 300 ml conical beaker).

↓ ← $HCl + HNO_3 + H_2O$ (3:1:1, 20 ml).

↓ ← $HClO_4$ (5 ml).

Evaporation for consolidation.

↓ ← (1 + 1) HCl (8 ml).

Heating for solution.

↓

Natural cooling.

↓

Transfering in 100 ml measuring flask.

↓

Shaking.

↓

Filtration (No. 6, 9 cm).

↓

Atomic absorption.

(Laboratory in Japan)

APPENDICES

List of Appendices

A-1 LIST OF ROCK SAMPLES

ABBREVIATION OF GIOLOGICAL UNITS

SEDIMENTARY

Tm	MERCED FORMATION
Crc	CHONTA GROUP
Cro	ORIENTE GROUP
Js	SARAYAQUILLO FORMATION
Jp	PUCARA GROUP
Pm	MITU GROUP

METAMORPHIC

Pcm	GNEISS & SCHIST

IGNEOUS

Tso	ONDA INTRUSIVES
Tvl	LANTORACHE VOLCANICS
Tvy	LLAUPI VOLCANICS
Tho	OXAPAMPA INTRUSIVES
Jpc	CHANCHAMAYO INTRUSIVES
Cgp	PUSAGNO GRANITE
PTrg	SAN RAMON GRANITES $ TARMA GRANITES

SAMPLE NO.	LOCATION	GEOLOGICAL UNIT	ROCK	THIN SECTION	POLISHED SECTION	CHEMICAL ANALYSIS		X-RAY ANALYSIS	DATING	FOSSIL	NO. of FIG. & APPEN.
						ROCK	ORE				
A-030	Pozuzo Sur	Jp	Limestone					○			F-7
A-031		Jp	Dolomitic Limestone					○			F-7
A-032		Jp	Dolomite, brecciated					○			F-7
A-033		Jp	Dolomitic Limestone					○			F-7
A-034		Jp	Dolomitic Limestone	○							A-2,4
A-035		Jp	Dolomitic Limestone					○			F-7
T-034		Jp	Dolomite								
A-036	Rio Tunqui	Jp	Sandstone								
A-041a		?	Galena - float -		○		○				A-6,3
A-042		Jp	Dolomite								
A-056		Jp	Limestone								
T-024		Jpc	Andesite								
T-032		Jp	Gypsum								
T-052		Jpc	Andesite								
A-065	Rio Mallampampa	Jp	Dolomitic Limestone								
T-054		Cpg	Granite	○		○			○		A-2,4,5,7
H-601		PTrg	Gneissose Granite	○							A-2
H-602		PTrg	Gneissose Granite								
H-603	Out of the surveyed area Pueblo Mall-ampampa	PTrg	Gneissose Granite	○							A-2,4
H-605		Tho	Granite-Porphyry	○							A-2
A-044	Huancabamba	?	Conglomerate - float -								

SAMPLE NO.	LOCATION	GEOLOGICAL UNIT	ROCK	THIN SECTION	POLISHED SECTION	CHEMICAL ANALYSIS ROCK	CHEMICAL ANALYSIS ORE	X-RAY ANALYSIS	DATING	FOSSIL	NO. of FIG. & APPEN.
A-085	Oxapampa	Jp	Galena		○		○				A-5,6
A-087		Tho	Rhyolite	○							A-2
A-088		PTrg	Granite - Porphyry								
A-089		Jp	Ore	○	○		○				A-2,3,4,6
H-020		Jp	Galena		○		○				A-3
K-001		Jp	Zebra	○				○			A-2,4,6,10 F-6
K-002		Jp	Zebra	○				○			A-2,10 F-6
K-003		Jp	Zebra					○			F-6
K-004		Jp	Zebra					○			F-6
K-005		Jp	Dolomitic Limestone					○			F-6
K-006		Jp	Zebra	○				○			A-2 F-6
K-007		Jp	Dolomitic Limestone					○			F-6
K-008		Jp	Dolomitic Limestone	○				○			A-2 F-6
K-009		Jp	Limestone					○			F-6
K-010		Jp	Limestone					○			F-6
K-011		Jp	Dolomitic Limestone					○			F-6
K-012		Jp	Limestone	○				○			A-2,4 F-6
K-013		Jp	Limestone					○			F-6
K-014		Jp	Limestone					○			F-6
K-015		Jp	Limestone	○				○			A-2 F-6
K-016		Jp	Limestone					○			A-10 F-6

(3)

SAMPLE NO.	LOCATION	GEOLOGICAL UNIT	ROCK	THIN SECTION	POLISHED SECTION	CHEMICAL ANALYSIS		X-RAY ANALYSIS	DATING	FOSSIL	NO. of FIG. & APPEN.
						ROCK	ORE				
K-017	Oxapampa	Jp	Limestone					○			F-6
K-018		Jp	Limestone					○			F-6
K-019		Jp	Limestone	○				○			A-2,4 F-6
K-020		Jp	Limestone					○			A-10 F-6
K-021		Jp	Limestone	○				○			A-2 F-6
K-022		Jp	Dolomitic Limestone					○			F-6
K-023		Jp	Limestone					○			F-6
K-024		Jp	Dolomitic Limestone	○				○			A-2 F-6
K-025		Jp	Dolomitic Limestone					○			F-6
K-026		Jp	Limestone	○				○			F-6 A-2
K-078		PTrg	Quartz-Monzonite-Porphyry								
K-114		Jp	Zebra -float-								
K-117		Jp	Dolomitic Limestone								
K-129		Jp	Zebra								
K-130		Jp	Dolomite								
K-131		Jp	Limestone								
K-132		Jp	Dolomite								
K-136		Cgp	Granite, Galena-bearing -float-		○		○				A-3,4,6
K-138		Jp	Zebra, brecciated								
K-139		Jp	Zebra, brecciated								
K-143		Jp	Limestone with fossil							○	A-8,9

SAMPLE NO.	LOCATION	GEOLOGICAL UNIT	ROCK	THIN SECTION	POLISHED SECTION	CHEMICAL ANALYSIS		X-RAY ANALYSIS	DATING	FOSSIL	NO. of FIG. & APPEN.
						ROCK	ORE				
K-152	Oxapampa	Jp	Limestone with fossil							○	A-8,9
K-161		Jp	Limestone with fossil							○	A-8,9
K-163		Jp	Limestone with fossil							○	A-8,9
K-272		Jp	Zebra								
K-280		Cro	Sandstone								
K-281		Cro	Diorite								
K-282		Tso	Quartz-Porphyry	○							A-2
N-127		?	Tuff Breccia -float-	○							A-2
H-201		PTrg	Granite								
H-202		Tso	Granite-Porphyry	○							A-2
H-203		Tso	Microgranite	○							A-2,4
H-204		Tho	Quartz-porphyry	○							A-2
H-205		Tho	Quartz-Porphyry	○							A-2
H-206		Cro	Tuff Breccia	○							A-2,4
H-207		Cro	Andesitic Tuff								
K-276	Oxapampa Este	Cro	Sandstone, red, tuffaceous								
S-062	Lloupi	Tho	Microgranite	○		○					A-2,3,4
A-082	Churmazu	Crc	Sandstone								
A-083		Crc	Sandstone								
A-098a		Jp	Limestone, black, with fossil -float-							○	A-8
A-098b		Jp	Limestone, black, with fossil -float-							○	A-8

SAMPLE NO.	LOCATION	GEOLOGICAL UNIT	ROCK	THIN SECTION	POLISHED SECTION	CHEMICAL ANALYSIS		X-RAY ANALYSIS	DATING	FOSSIL	NO. of FIG. & APPEN.
						ROCK	ORE				
H-010	Churmazu	Tvy	Dacite								
H-011		Jpc	Diorite	○		○					A-2,4,5
H-012a		PTrg	Diorite								
H-012b		Jpc	Diorite with chilled-margine texture	○							A-2
H-013		Jpc	Micrograno Diorite	○		○			○		A-2,5,7
H-014		Cgp	Red Granite	○		○			○		A-2,5,7
K-202		Jp	Mudstone							○	A-8
K-207		Jp	Mudstone							○	A-8,9
K-208		Jp	Mudstone							○	A-8,9
K-213		Jp	Mudstone							○	A-8,9
K-215		Jp	Mudstone							○	A-8,9
K-223		Jp	Dolomitic Limestone	○							A-2
K-268		Jp	Limestone, black, fossiliferous							○	
N-129		Tvy	Quartz Porphyrite								
S-058b		Jp & Tvy	Fault Breccia	○							A-2
A-099	Villa Rica	Jp	Limestone, black, Pyrite bearing		○		○				A-3,6
K-239		Jp	Skarn	○							A-2,4
K-240		Tso	Microgranodiorite	○							A-2
K-242		Jp	Marble								
K-244		Jp	Skarn		○		○				A-3,4,6
K-246		Tso	Andesitic Porphyry	○							A-2

SAMPLE NO.	LOCATION	GEOLOGICAL UNIT	ROCK	THIN SECTION	POLISHED SECTION	CHEMICAL ANALYSIS ROCK	CHEMICAL ANALYSIS ORE	X-RAY ANALYSIS	DATING	FOSSIL	NO. of FIG. & APPEN.
K-249	Villa Rica	Tso	Quartz porphyry with hornblendite nodule								
K-250		Tso	Quartz porphyry with hornblendite nodule	○							A-2,4
K-263		Tho	Quartz-porphyry, Hornblende Bearing								
K-264		Tso	Monzonite Porphyry	○	○	○	○				A-2,3,4,5,6
K-265		Tso	Monzonite Porphyry	○		○			○		A-2,5,7
N-073		Jp	Zebra - float-								
S-023		Jp	Zebra								
S-024a		Jp	Zebra	○	○		○				A-2,3,6
S-024b		Jp	Gosson		○		○				A-3,6
S-025		Jp	Gosson	○	○		○				A-2,3,4,6
S-026		Jp	Pyrite Gosson		○		○				A-3,4,6
T-045	Quiulacocha	Tho	Monzonite Porphyry	○							A-2
N-052	Yungui	Jp	Dark gray Limestone								
N-091		Js	Shale, reddish, calcareous								
N-095		Jp	Zebra								
N-096		Jp	Zebra								
N-097		Jp	Zebra								
N-098		Jp	Limestone, gray								
N-099		Jp	Dolomitic Limestone								
N-100		Jp	Dolomitic Limestone								
N-102		Cro	Limestone Fossiliferous - float -							○	A-8,9

SAMPLE NO.	LOCATION	GEOLOGICAL UNIT	ROCK	THIN SECTION	POLISHED SECTION	CHEMICAL ANALYSIS ROCK	CHEMICAL ANALYSIS ORE	X-RAY ANALYSIS	DATING	FOSSIL	NO. of FIG. & APPEN.
N-104	Yungui	PTrg	Granite, pink felspar bearing								
N-105a		Jp ?	Dark gray Limestone - float -								
N-105b		Jp ?	Zebra - float -								
N-146		Jp	Galena Ore		○						A-3,4
S-020		Jp ?	Dolomite - float -								
S-049		Jp	Sandstone, gray								
T-039		Jp	Fluorite, galena-bearing		○		○				A-3,6
T-040		Cgp	Granite	○							A-2
T-042		PTrg	Diorite		○		○				A-3,6
T-043		Jp ?	Fluorite - float -								
T-044		Jpc	Agglomerate	○		○			○		A-2,4,5,7
A-025	Pte Paucartambo	Crc	Sandstone, reddish, calcareous								
N-123		Cro	Sandstone, white								
S-010b		Js	Tuff, Basaltic	○							A-2,4
S-015		Crc	Dolomite	○							A-2
N-081	Choras	Jp	Dolomite								
H-001		Jp	Gypsum	○							A-2,4
H-004		Cgp	Granite	○	○		○				A-2,3,4,6
H-002		Tho	Toctite								
H-003		Tho	Quartz Porphyry～Granite Porphyry	○							A-2
N-089	Rio Colorado		Gracial Deposit								

SAMPLE NO.	LOCATION	GEOLOGICAL UNIT	ROCK	THIN SECTION	POLISHED SECTION	CHEMICAL ANALYSIS		X-RAY ANALYSIS	DATING	FOSSIL	NO. of FIG. & APPEN.
						ROCK	ORE				
A-015	Pte Colorado	Tm	Tuff-Breccia & Sandstone								
A-017		PTrg	Red Granite								
A-020		Crc	Lutite								
A-027		Pm	Conglomerate								
N-014	Naranjal	Jp	Limestone, black					○			F-5
N-015		Jp	Limestone, dark gray					○			F-5
N-016		Jp	Limestone, dark gray					○			F-5
N-023		Jp	Dolomitic Limestone, light gray					○			F-5
N-024		Jp	Dolomitic Limestone					○			
N-025		Jp	Dolomitic Limestone					○			
N-026		Jp	Limestone, black					○			F-5
N-027		Jp	Limestone, black					○			F-5
N-028		Jp	Sandstone					○			F-5
N-030		Jp	Limestone, dark gray					○			F-5
N-031		Jp	Dolomitic Limestone					○			F-5
N-032		Jp	Dolomitic Limeston					○			F-5
N-033		Pm	Sandstone, reddish								
N-034		Pm	Conglomerate, red								
N-035		Pm	Sandstone, gray								
N-036		Jp	Zebra				○	○			A-6 F-4
N-037a		Jp	Zebra					○			F-4

SAMPLE NO.	LOCATION	GEOLOGICAL UNIT	ROCK	THIN SECTION	POLISHED SECTION	CHEMICAL ANALYSIS ROCK	CHEMICAL ANALYSIS ORE	X-RAY ANALYSIS	DATING	FOSSIL	
N-037b	Naranjal	Jp	Dolomitic Limestone					○			F-4
N-038		Jp	Limestone , gray					○			F-4
S-008		Tho	Diorite – Porphyry	○							A-2
S-009		Jcp	Andesite	○							A-2
A-011	San Ramon	PTrg	Red Granite	○		○					A-2,5
N-134	Chuquisyunga	PTrg	Quartz – Diorite								
N-136		PTrg	Granite, gneissose								
N-137		PTrg	Diorite , gneissose								
N-143		Pcm	Schist , green								
N-144		Pcm	Schist, gneissose								
N-138		PTrg	Granite , gneissose								
N-139		Pcm	White Granite , greenish								
H-021	San Felix	Jp	Ore mineral (Pb)		○		○				A-3,4,6
H-403		PTrg	Diorite & Granite contact	○							A-2,4
K-040		Pm	Conglomerate								
K-068		Jp	Zebra								
K-069		Jp	Zebra , brecciated								
N-004		PTrg	White granite	○							A-2,4
N-005		Jp	Dolomite					○			F-3
N-006		Jp	Dolomitic Limestone					○			F-3
N-007		Jp	Limestone , black					○			F-3

SAMPLE NO.	LOCATION	GEOLOGICAL UNIT	ROCK	THIN SECTION	POLISHED SECTION	CHEMICAL ANALYSIS ROCK	CHEMICAL ANALYSIS ORE	X-RAY ANALYSIS	DATING	FOSSIL	
N-008	San Felix	Jp	Limestone, purplish					○			F-3
N-009		Jp	Limestone, dark gray					○			F-3
N-010		Jp	Dolomite					○			F-3
N-141		PTrg	White Granite								
T-003		Jpc	Granodiorite	○							A-2
T-006		Jpc	Lherzolite	○	○		○				A-2,3,4,6
T-008		Jp	Quartz Vein, Green Copper-Bearing		○		○				A-4,6
T-013		Jpc	Granodiorite	○		○			○		A-2,5,7
S-019		Jp	Zebra, Sphalerite-Bearing		○						A-3,4
A-115	Monobamba	Jp	Dolomite	○							A-2,4
A-119		Jpc	Microgranodiorite	○							A-2,4

Sample No.	Location	Geological unit	Rock name	Texture	Microscopic observation S: Salic mineral M: Mafic Mineral Opaque mineral A: Accessary mineral R: remark
A-034	Pozuzo Sur	Pucara group	Limestone with nodule		R: Consists of calcite and a few quartz. Calcite in Nodule is larger than the other part.
T-034	Rio Mallampampa	Pusagno granite	Granite		S: Quartz, sericitized plagioclase, microcline and perthitic K-feldspar. M: Biotite altered to chlorite in part. O: Hamatite
H-601	Rio Mallampampa	San Ramon granite	Gneissose granite	Holocrystalline equigranular	S: Crushed, many extinct quartz, plagioclase and perthitic K-feldspar. M: Biotite R: Sericitization and silicification are remarkable.
H-603	Rio Mallampampa	Tarma granite	Gneissose granite	Holocrystalline coarse grained equigranular - porphyritic	S: Wavy extinct quartz, perthite and plagioclase. M: Epidote and biotite A: Sphene, leucoxene, wavy extinct apatite and zircon
H-605	Out of surveyed area	Oxapampa intrusives	Granite porphyry	Holocrystalline porphyritic - seriate	S: Quartz, perthitic K-feldspar and plagioclase M: Green biotite and opacitic hornblende
A-087	Oxapampa	Oxapampa intrusives	Rhyolite	Glassy porphyritic	S: Plagioclase change to sericite completely. M: Biotite is rarely. R: Groundmass is reddish brown glass. Partly shown spherulitic structure.
A-089	Oxapampa	Pucara group	Smithsonite		R: Consists of oolitic smithsonite with hematite
K-001	Oxapampa	Pucara group	Dolomite (Zebra)		R: Laminated fine grained dolomite and coarse grained dolomite. Coarse grained dolomite has grading of crystal grains.
K-002	Oxapampa	Pucara group	Brecciated dolomite		R: Consists of fine grained dolomite and breccia consists of oolitic limestone
K-006	Oxapampa	Pucara group	Dolomite		R: Consists of dolomite
K-008	Oxapampa	Pucara group	Dolomite		R: Consists of dolomite
K-012	Oxapampa	Pucara group	Bituminous limestone		R: Calcite with carbonaceous material

A-2-1 Microscopic Observations of Thin Sections

Sample No.	Location	Geological unit	Rock name	Texture	Microscopic observation S: Salic mineral M: Mafic mineral O: Opaque mineral A: Accessary mineral R: Remark
K-015	Oxapampa	Pucara group	Limestone		R: Consists of very fine grained calcite.
K-019	Oxapampa	Pucara group	Limestone		R: Consists of very fine grained calcite with fossil fragments
K-021	Oxapampa	Pucara group	Dolomitic limestone		R: Consists of dolomite with calcite.
K-026	Oxapampa	Pucara group	Limestone		R: Consists of calcite and graymental fossils
K-024	Oxapampa	Pucara group	Dolomite		R: Consists of dolomite. Dolomite is shown zoning in part.
K-282	Oxapampa	Onda intrusives	Quartz-porphyry	Holocrystalline hypocrystalline fine grained porphyrite	S: Plagioclase M: Original mafic minerals ore altered to epidote and chlorite. O: Magnetite and hematite A: Apatite and zircon
N-127	Oxapampa	Yaupi volcanics	Tuff breccia	Holocrystalline fine grained porphyritic	S: Plagioclase, sometimes prismatic M: Completely change to epidote and chlorite aggregates.
H-202	Oxapampa	Pusagno granite	Biotite bearing granite	Holocrystalline coarse grained equigranular	S: Perthite and quartz. These have micrographic texture in part.
H-203	Oxapampa	Pusagno granite	Biotite bearing granite	Holocrystalline coarse grained equigranular	S: Quartz, plagioclase and orthoclase, quartz and orthoclase are shown micrographic texture. M: A little green biotite O: Magnetite and hematite
H-204	Oxapampa	Oxapampa intrusives	Granite porphyry	Holocrystalline porphyritic	S: Corroded quartz, sericitized plagioclase with slightly zoning and perthitic K-feldspar. M: Absents R: Groundmass consists of quartz, K-feldspar, plagioclase and muscovite.
H-205	Oxapampa	Oxapampa intrusives	Quartz porphyry	Cryptocrystalline porphyritic	S: Corroded quartz. M: Absent O: Magnetite and hematite R: Groundmass consists of prismatic plagioclase and quartz.
H-206	Oxapampa	Oriente group	Tuff breccia		R: Dacitic tuff with rhyolitic breccia.

A-2-2 Microscopic observation of thin sections

Sample No.	Location	Geological unit	Rock name	Texture	Microscopic observation S: Salic mineral M: Mafic mineral O: Opaque mineral A: Accessary mineral R: Remark
S-062	Llaupi	Oxapampa intrusives	Biotite bearing granite porphyry	Holocrystalline medium grained porphyritic	S: Dirty perthite and fresh quartz are shown micrographic texture. Plagioclase sometimes shows anti-perthite texture. M: Biotite appears a little O: Magnetite and hematite A: Zircon
H-011	Churmazu	Chanchamayo intrusives	Diorite	Holocrystalline equigranular	S: Plagioclase M: Augite is surrounded by biotite and hornblende. Biotite is mainly reddish brown and partly green. Olivine is surrounded by pyroxene and sometimes hornblende. Muscovite appears very few.
H-012b	Churmazu	Chanchamayo intrusives	Micro-quartz diorite	Holocrystalline equigranular	S: Radial extinct and wavy extinct quartz and sericitized plagioclase M: Change to completely chlorite and hematite O: Lineated hematite and magnetite silicification is very strong.
H-013	Churmazu	Chanchamayo intrusives	Quartz diorite	Holocrystalline equigranular	S: Mostly sericitized plagioclase and a few quartz and K-feldspar appear few. M: Hornblende and biotite. Biotite occurs in contact with hornblende and altered to chlorite. O: Magnetite and hematite A: Sphene within hornblende
H-014	Churmazu	Pusagno granite	Granite	Holocrystalline equigranular	S: Quartz, plagioclase and K-feldspar M: Biotite altered to chlorite in part. O: Hematite
K-223	Churmazu	Pucara group	Limestone		R: Consists of two groups of calcite with hematite.
S-058b	Churmazu	Pucara group and Lloupi volcanics	Fault breccia		R: The breccia consists of rhyolite and dacitic tuff. Matrix is carbonate.
K-239	Villa Rica	Pucara group	Skarn		R: Garnet, diopside and calcite are predominant, few amounts of biotite aggregate and zoicite group appear. And rearly pyrite is observed.
K-240	Villa Rica	Onda intrusives	Hornblende-biotite monzonite	Holocrystalline medium grained equigranular	S: Perthite, plagioclase and microcline M: Hornblende and biotite O: Magnetite A: Sphene, zircon and apatite

A-2-3 Microscopic observation of thin sections

Sample No.	Location	Geological unit	Rock name	Texture	Microscopic observation S: Salic mineral M: Mafic mineral O: Opaqui mineral A: Accessary mineral R: Remark
K-246	Villa Rica	Onda intrusives	Quartz porphyry	Holocrystalline porphyritic, trachytic	S: Sericitized plagioclase M: Green biotite change to chlorite and magnetite partly A: Apatite R: Groundmass consists of prismatic plagioclase and shown trachytic texture
K-250 Xenolith	Villa Rica	Onda intrusives	Hornblendite	Holocrystalline coarse grained equigranular	S: Lacks M: Hornblende A: Euhedral sphene, apatite and rarely zircon O: Magnetite
K-264	Villa Rica	Onda intrusives	Hornblende-monzonite	Holocrystalline medium grained equigranular	S: Perthite, Plagioclase and a little quartz M: Hornblende A: Euhedral, sphene, apatite and zircon O: Magnetite hematite and anhedral pyrite
K-265	Villa Rica	Onda intrusives	Monzonite	Holocrystalline equigranular	S: K-feldspar and plagioclase and a small amount of quartz occurs interstitially. M: Hornblende O: Magnetite and pyrite S: Sphene
S-024a	Villa Rica	Pucara group	Dolomite (Zebra) with sphalerite		R: Consists of two groups of dolomite of its size with few sphalerite. Sphalerite is in large size of dolomite zone.
S-025	Villa Rica	Pucara group	Dolomite (Zebra) with sphalerite		R: Consists of two groups of dolomite of its size with sphalerite. Sphalerite is in large size of dolomite zone.
T-045	Quiulacocha	Oxapampa intrusives	Monzonite porphyry	Holocrystalline equigranular seriate	S: K-feldspar and plagioclase are sericitized. M: Hornblende and biotite change to epidote, chlorite and sericite. O: Magnetite A: Large crystal of sphene, apatite and zircon
T-040	Yungui	Pusagno granite	Granite	Holocrystalline coarse grained equigranular	S: Perthite and wavy extinct quartz are shown micrographic texture. Plagioclase has weakly zoning in the marginal parts. M: Biotite altered to green chlorite. Hornblende altered to opaque, remains its relics. O: Magnetite and hematite A: Leucoxene and zircon
T-044	Yungui	Chanchamayo	Granodiorite	Pyroclastic	S: Crushed plagioclase and corroded and crushed quartz. R: Oxidized subangular to rounded rhoyolite and dacite. Matrix is mostly composed of brownish glass.

A-2-4 Microscopic observation of thin sections

Sample No.	Location	Geological unit	Rock name	Texture	Microscopic observation S: Salic mineral M: Mafic mineral O: Opaque mineral A: Accessary mineral R: Remark
S-010b	Pte Paucartambo	Sarayaquillo formation	Basalt	Holocrystalline porphyritic	S: Absents for phenocryst. M: Altered to chlorite, Olivine remains its relics, altered to chlorite and magnetite. R: Graundmass consists of prismatic plagioclase and fine crystals of opaque. Calcitization is remarkable.
S-015	Pte Paucartambo	Chonta group	Banded limestone		R: Consists of calcite and cabonaceous materials.
H-001	Choras	Pucara group	Gypsum		R: An almostly and fine crystals of calcite.
H-004	Choras	Pusagno granite	Biotite granite porphyry	Holocrystalline medium grained equigranular	S: Elongated quartz, orthoclase and plagioclase. M: Green biotite, the most part of biotite altered to chlorite and sericite. O: Magnetite and hematite A: Leucoxene and zircon
H-003	Choras	Oxapampa intrusives	Granite porphyry	Holocrystalline porphyritic-seriate	S: Corroded angular quartz, K-feldspar and sericitized plagioclase. M: Change to chlorite and magnetite. A: Zircon
S-008	Naranjal	Oxapampa intrusives	Tonalite porphyry	Holocrystalline fine grained porphyritic	S: Sericitized plagioclase and fine grained fresh quartz. M: Green biotite and hornblende. A: Sphene
S-009	Naranjal	Chanchamayo intrusives	Andesite	Holocrystalline porphyritic-trachytic	S: Plagioclase change to sericite M: Epidotized hornblende, a great part of mafics change to chlorite and epidote. O: Magnetite
A-011	San Ramon	San Ramon granite	Granite	Holocrystalline equigranular	S: Quartz, plagioclase and K-feldspar M: Opacitized biotite with hematite.
H-403	San Felix	Tarm granite	Tarma granite	Holocrystalline equigranular	S: Wavy extinct quartz, plagioclase and K-feldspar. M: Biotite and muscovite
N-004	San Felix	Tarma granite	Tarma granite	Holocrystalline equigranular	S: Wavy extinct quartz, weakly sericitized plagioclase and K-feldspar. M: Hornblende and biotite A: Sphene, apatite and zircon

A-2-5 Microscopic observation of thin sections

Sample No.	Location	Geological unit	Rock name	Texture	Microscopic observation S: Salic mineral M: Mafic mineral O: Opaque mineral A: Accessary mineral R: Remark
T-003	San Felix	Chanchamayo intrusives	Granodiorite	Holocrystalline equigranular	S: Plagioclase is dominant. Sericitized K-feldspar and quartz. M: Hornblende partly chloritized.
T-006	San Felix	Chanchamayo intrusives	Lhorzolite	Holocrystalline coarse grained equigranular	S: Plagioclase is rare and fine grained. M: Forsterite, diopside and hypersthene are predominant and biotite is rare. Olivine and pyroxenes are crushed and these crucks filled up serpentine and hematite.
T-013	San Felix	Chanchamayo intrusives	Granodiorite	Holocrystalline equigranular	S: Sericitized plagioclase, wavy extinct quartz, perthitic K-feldspar and microcline. M: Biotite altered to chlorite completely. A: Epidote, allanite and zircon.
A-115	Monobamba	Pucara group	Dolomite with sphalerite		R: An almostly and rarely contains sphalerite.
A-129	Monobamba	Chanchamayo intrusives	Granodiorite porphyry	Holocrystalline porphyritic seriate	S: Biotite and sericitized plagioclase. M: Biotie and hornblende. Fine crystal biotite altered to chlorite, epidote and zoicite. O: Magnetite A: Sphene R: Calcitization is very remarkable.

A-2-6 Microscopic observation of thin sections

Sample No.	Location	Geological unit	Rock name	
A-041a	Rio Tunqui	Unknown (float)	Galena	Galena is predominant and in the marginal zone, occurs hematite in part. Hematite has inclusion of pyrite.
A-085	Oxapampa	Pucara group	Galena	Galena is predominant. Hematite occurs in marginal zone of galena.
A-089	Oxapampo	Pucara group	Smithsonite	Occurs in the cyclic structure of smithsonite and hematite.
N-020	Oxapampa	Pucara group	Galena	Galena is predominant and in the marginal part hematite occurs.
K-136	Oxapampa	Pusagno granite	Pusagno granite	Hematite is predominant and in part shows twinning.
S-026	Villa Rica	Pucara group	Lenticular pyrite zone in zebra	In the part of sulphide, pyrite is predominant but changes to hematite in part. In the part of gossan, hematite is predominant.
A-099	Villa Rica	Pucara group	Limestone, pyrite bearing	Pyrite change to hematite and magnetite.
K-244	Villa Rica	Pucara group	Skarn	Pyrite is predominant. Chalcopyrite occurs in pyrite for the most part.
K-264	Villa Rica	Onda intrusives	Hornblende monzonite	Magnetite and pyrite are predominant. Hematite occurs on surrounded zone of magnetite. Covelline occurs irregular and angular shape. Sphalerite occurs in pyrite for inclusion.
S-024a	Villa Rica	Pucara group	Dolomite (zebra) with sphalerite	Sphalerite is predominant and inclusion is very poor. Hematite and pyrite are observed in part.
S-024b	Villa Rica	Pucara group	Gossan	Observed hematite only. In cavity shows ring structure.
S-025	Villa Rica	Pucara group	Dolomite (zebra) with sphalerite	Sphalerite is predominant and inclusion is very poor. Pyrite occurs out of of sphalerite and changes to hematite in part.
N-146	Yunqui	Pucara group	Galena Ore	Galena is predominant and has hematite.

A-3-1 Microscopic observation of polished sections

Sample No.	Location	Geological unit	Rock name	Microscopic observation
T-039	Yungui	Pucara group	Fluorite, galena bearing	Galena has inclusions of pyrite and hematite and in the marginal zone occurs hematite and magnetite.
T-042	Yungui	San Ramon granites & Tarma granites	Diorite	Hematite shows twinning in large crystal magnetite change to hematite in marginal zone pyrite has inclusion of magnetite.
H-004	Choras	Pusagno granite	Pusagno granite	Hematite occurs as film.
M-021	San Felix	Pucara group	Limestone	Galena is predominant and has hematite rim on the marginal zone.
T-006	San Felix	Chanchamayo intrusives	Lherzolite	Magnetite occurs as large crystal, hematite occurs in serpentine lamina, pyrite occurs with magnetite.
T-008	San Felix	Pucara group	Quartz vein, copper bearing	Chalcopyrite changes to chalcocite in surrounded zone of it. Chalcocite occurs in cruck too.
S-019	San Vicente mine	Pucara group	Zebra, sphalerite bearing	Sphalerite shows grading and contains fine grained inclusion of pyrite.

A-3-2 Microscopic observation of polished sections

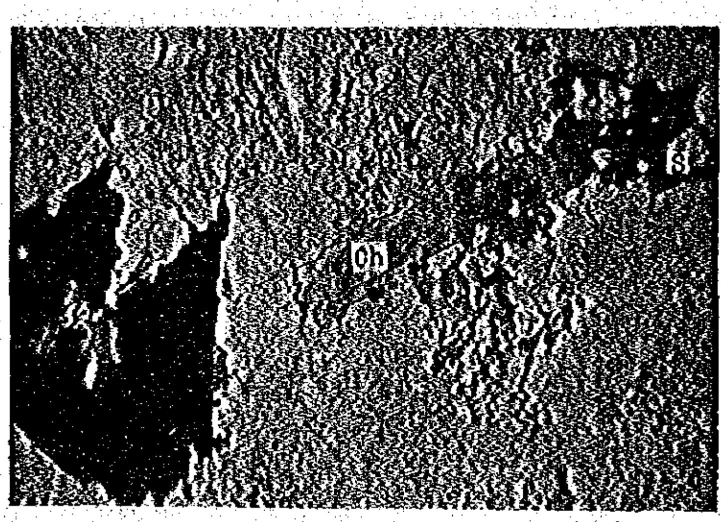
A – 4 Microphotographs

A-119

Location: Monobamba
Geological unit:
Chanchamayo intrusives

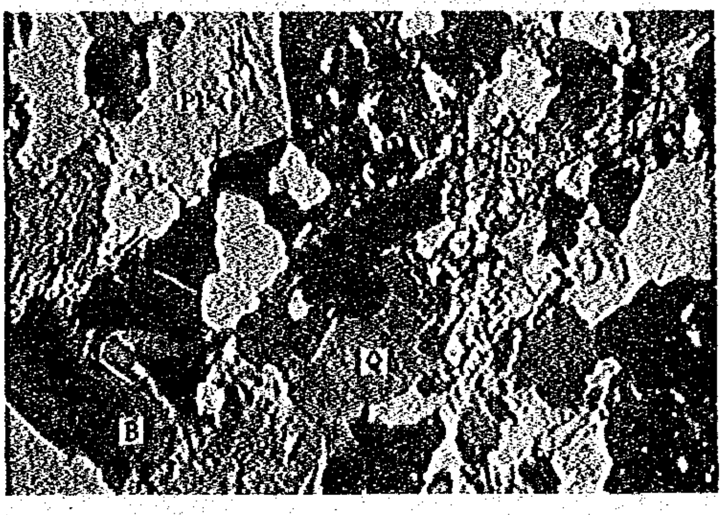
Rock name:
Granodiorite porphyry

B - Biotite
Ch - Chlorite
Ep - Epidote
S - Sphene
Pl - Plagioclase
Q - Quartz

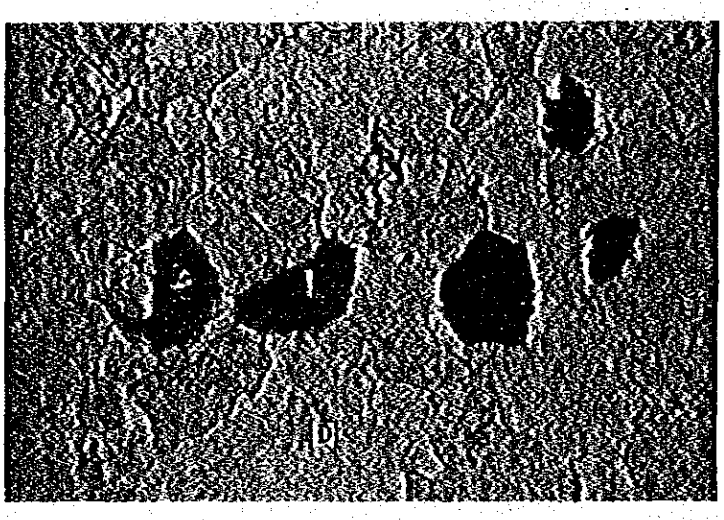


0 0.5 1mm

Microscopic observation:
Texture: Holocrystalline porphyritic-seriate
Salic minerals: Quartz and sericitized plagioclase
Mafic minerals: Biotite and hornblende. Fine crystal biotite altered to chlorite. Hornblende change to chlorite, epidote and zoicite.
Accessary minerals: Sphene
Opaque minerals: Magnetite
Calcitization is very remarkable.



Crossed nicols



0 0.5 1mm

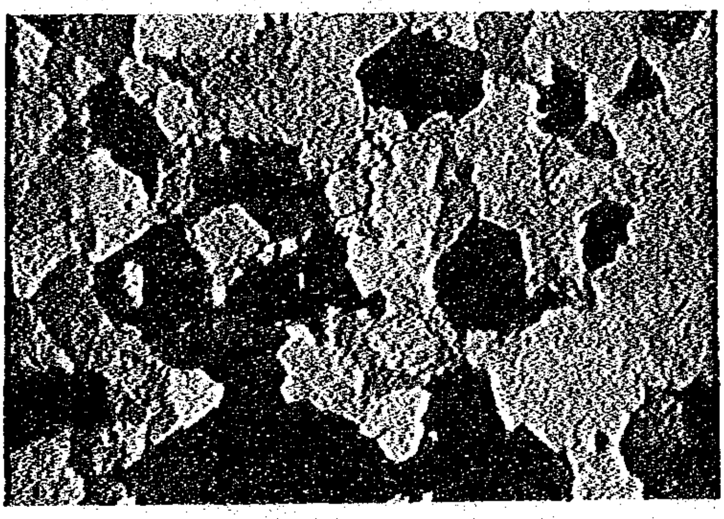
A-115

Location: Monobamba
Geological unit:
Pucara group

Rock name:
Dolomite with
sphalerite

Sp - Sphalerite
D - Dolomite

Microscopic observation:
An almostly dolomite and rarely contains sphalerite



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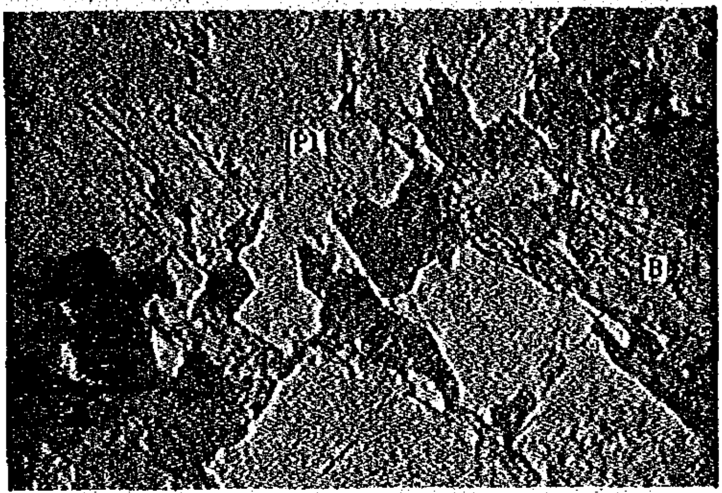


H-403

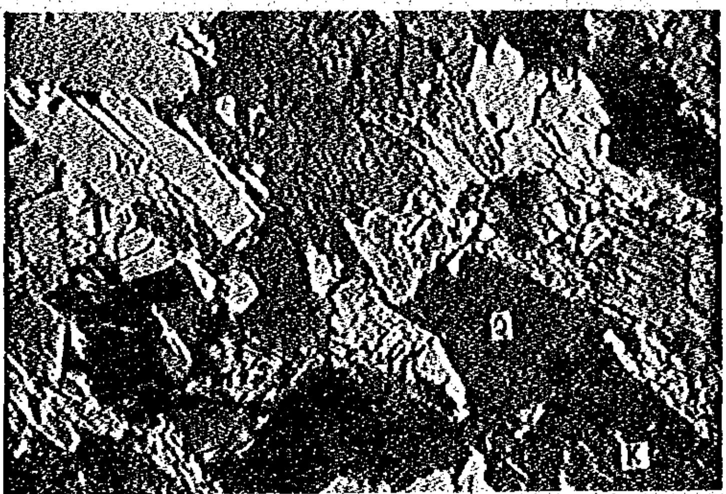
Location: San Felix
Geological unit:
Tarma granite

Rock name:
Tarma granite

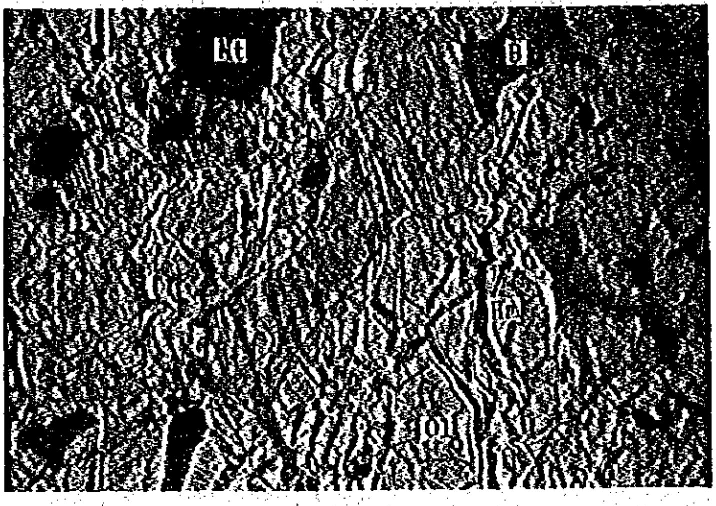
B - Biotite
MV - Muscovite
Q - Quartz
K - K-feldspar
Pl - Plagioclse

0 0.5 1mm

Microscopic observation:
Texture: Holocrystalline equigranular
Salic minerals: Wavy extinct quartz, plagioclase and K-feldspar.
Mafic minerals: Biotite and muscovite



Crossed nicols



T-006

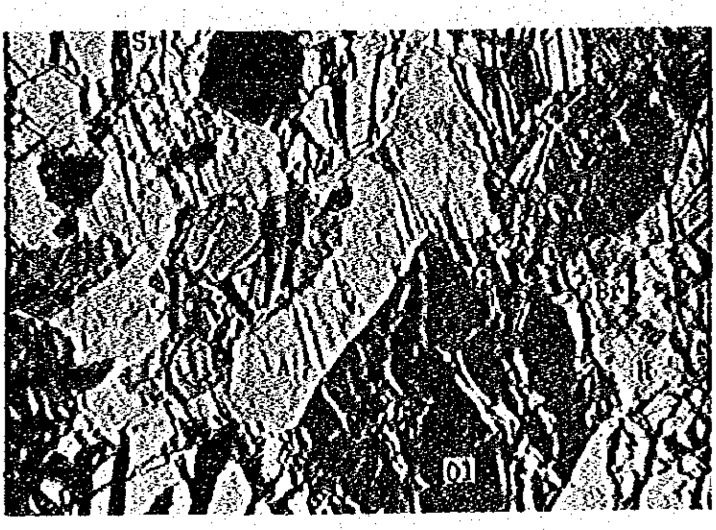
Location: San Felix
Geological Unit:
Chanchamayo intrusives

Rock name: Lhorzolite

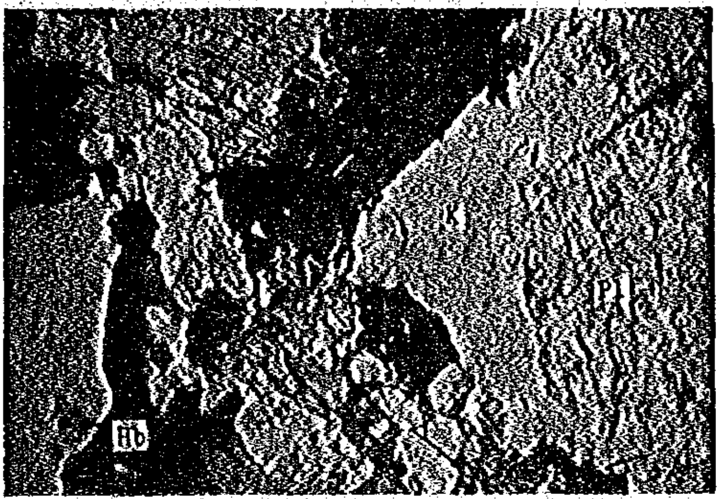
Ol - Olivine
H - Hypersthene
Br - Bronzite
A - Augite
Sr - Serpentine
Hm - Hematite
Mt - Magnetite
B - Biotite

0 0.5 1mm

Microscopic observation:
Texture: Holocrystalline coarse grained equigranular.
Salic minerals: Plagioclase is rare and fine grained.
Mafic minerals: Forsterite, diopside and hypersthene are predominant and biotite is rare. Olivine and pyroxenes are crushed and these crucks filled up serpentine and hematite.



Crossed nicols



N-004

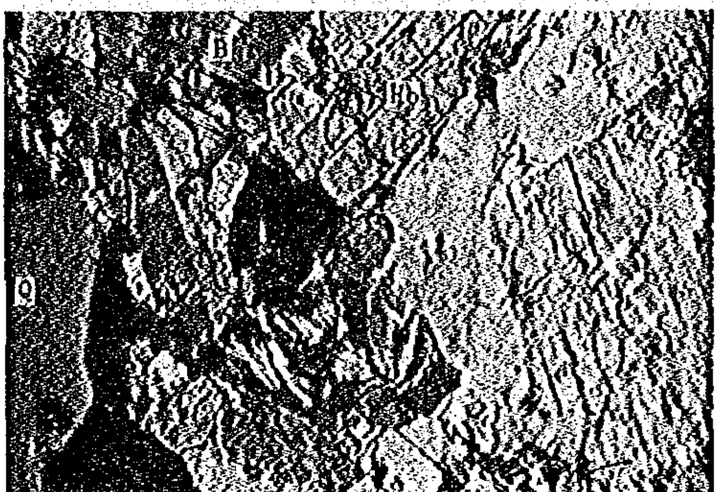
Location: San Felix
Geological unit:
Tarma granite

Rock name: Granite

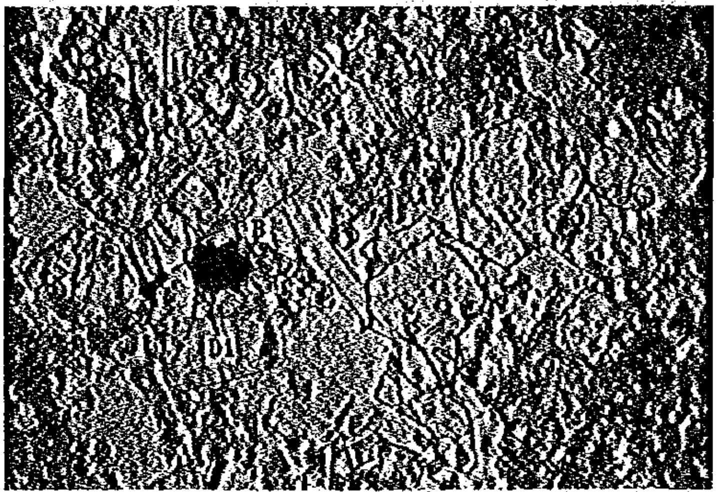
Q - Quartz
Pl - Plagioclase
K - K-feldspar
B - Biotite
Hb - Hornblende

0 0.5 1mm

Microscopic observation:
Texture: Holocrystalline equigranular
Salic minerals: Wavy extinct quartz, weakly sericitized plagioclase and k-feldspar
Mafic minerals: Hornblende and biotite
Accessary minerals: Sphene, apatite and zircon.



Crossed nicols



K-239

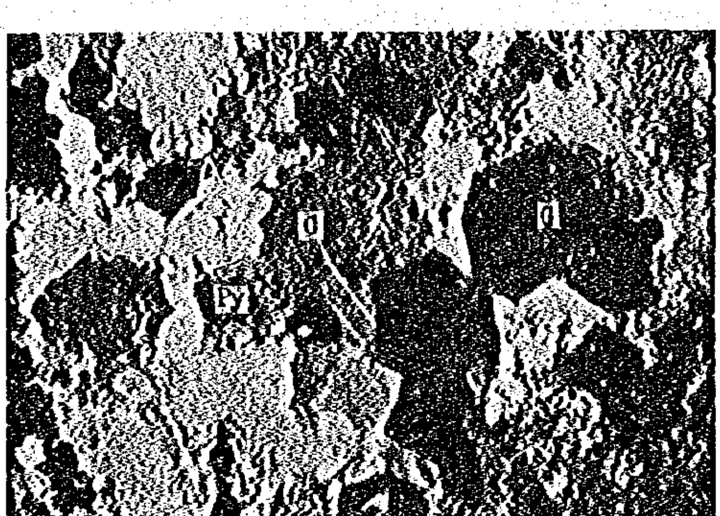
Location: Villa Rica
Geological unit:
Pucara group

Rock name: Skarn

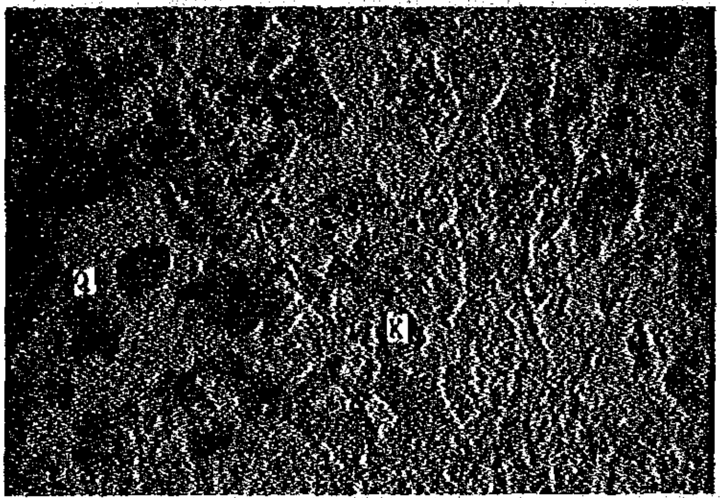
G - Garnet
Di - Diopside
C - Calcite
B - Biotite
Py - Pyrite

0 05 1mm

Microscopic observation:
Garnet, diopside and calcite and predominant, few amounts of biotite aggregate and zoicite group appear. And rearly pyrite is observed.



Crossed nicols



S-062

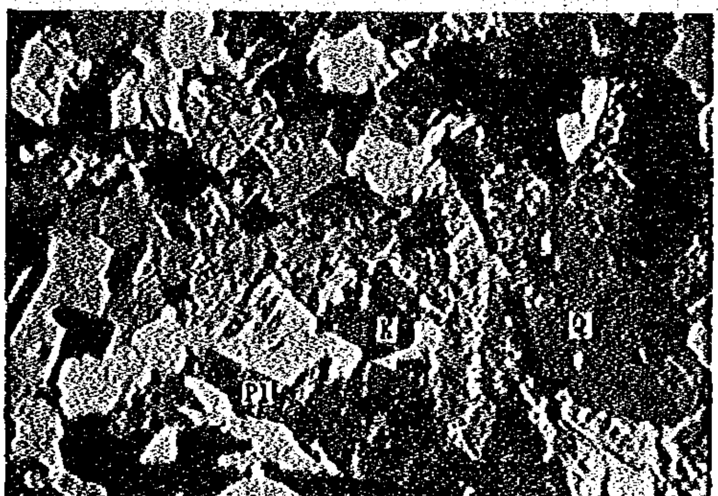
Location: Llaupi
Geological unit:
Oxapampa intrusives

Rock name: Biotite bearing granite porphyry

Q - Quartz
Pl - Plagioclase
K - K-feldspar

0 0.5 1mm

Microscopic observation:
Texture: Holocrystalline medium grained porphyritic
Salic minerals: Durty perthite and fresh quartz are shown micrographic texture. Plagioclase sometimes shows antiperthite texture.



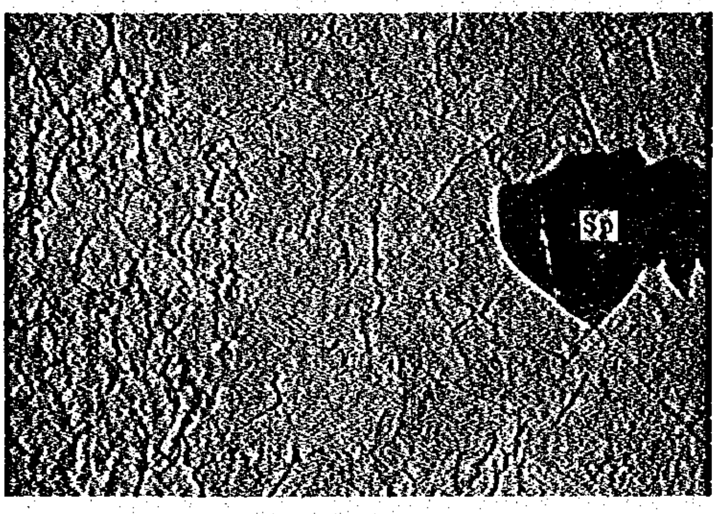
Crossed nicols

S-025

Location: Villa Rica
Geological unit:
Pucara group

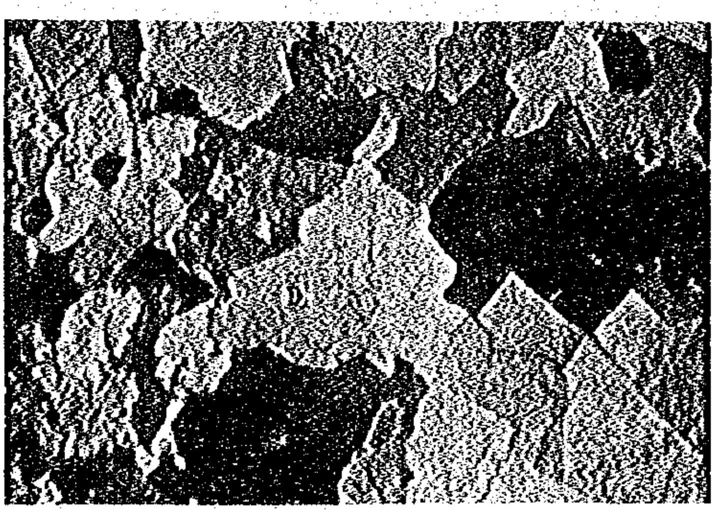
Rock name:
Dolomite (Zebra)
with Sphalerite

Sp - Sphalerite
D - Dolomite

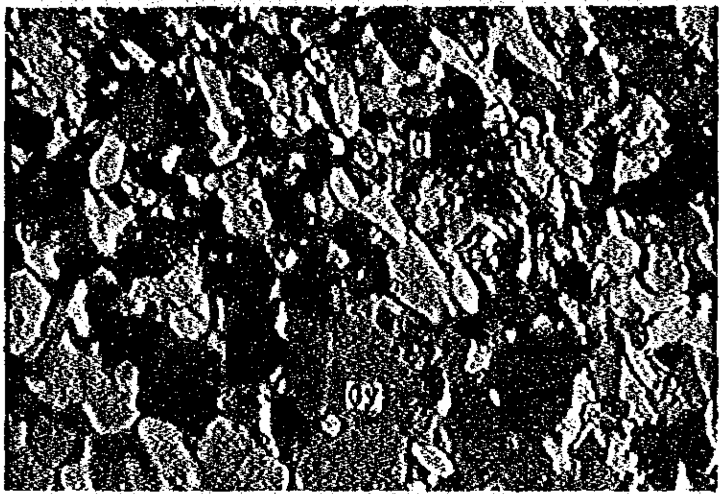


0 0.5 1mm

Microscopic observation:
Consists of two groups of dolomite of its size with sphalerite. Sphalerite is in large size of dolomite zone.



Crossed nicols



0 0.2 0.4mm

Crossed nicols

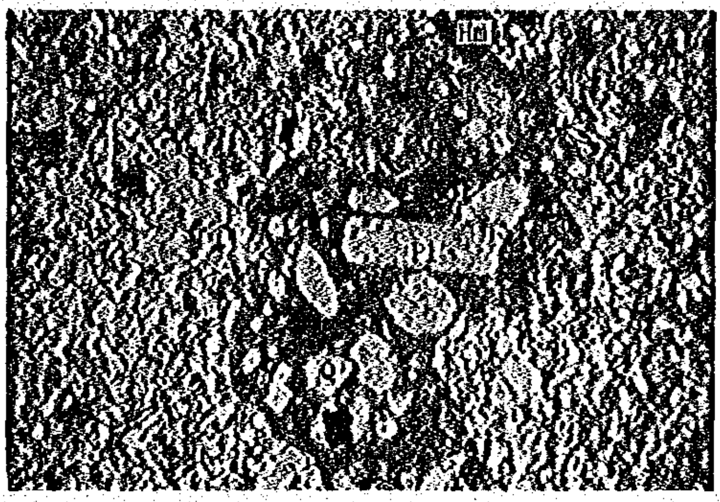
R-001

Location: Choras
Geological unit:
Pucara group

Rock name: Gypsum

Gy - Gypsum
C - Calcite

Microscopic observation:
An almostly gypsum and fine crystals of calcite



0 0.5 1mm

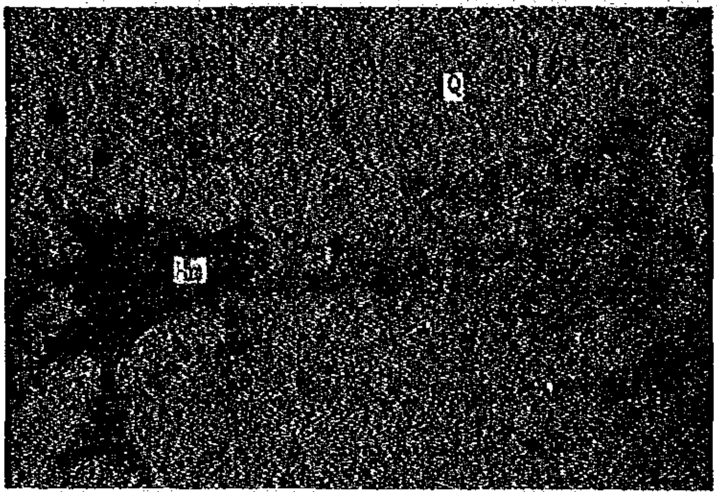
R-206

Location: Oxapampa
Geological unit:
Oriente group

Rock name: Tuff breccia

Hm - Hematite
Pl - Plagioclase
Q - Quartz

Microscopic observation:
Dacitic tuff with rhyolitic breccia



0 0.5 1mm

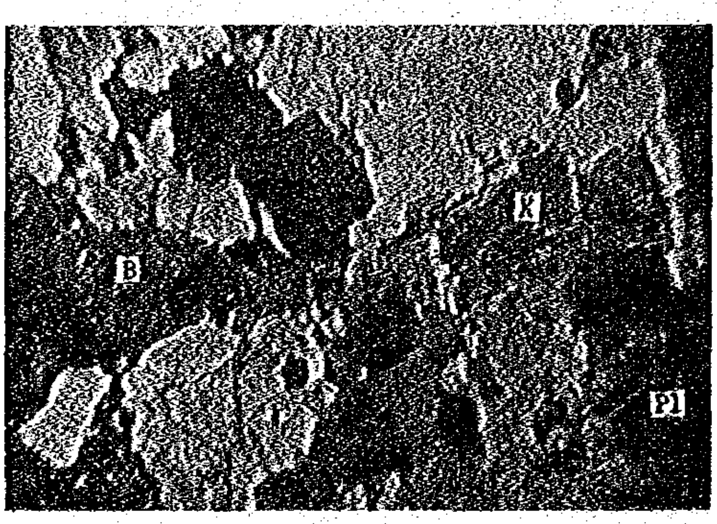
T-054

Location: Rio Mallampampa
Geological Unit:
Pusagno granite

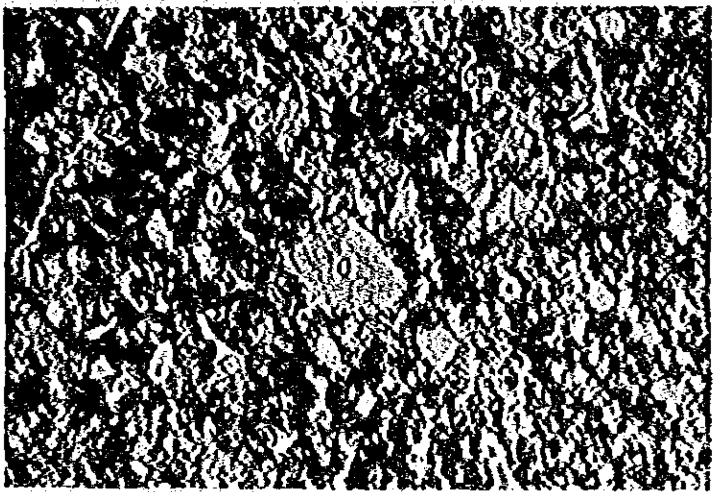
Rock name: Granite

K - K-feldspar
Q - Quartz
Pl - Plagioclase
B - Biotite
Hm - Hematite

Microscopic observation:
Texture: Holocrystalline equigranular
Salic minerals: Quartz, sericitized plagioclase, microcline and perthitic K-feldspar
Mafic minerals: Biotite altered to chlorite in part.
Opaque minerals: Hematite



Crossed nicols



0 02 0,4mm

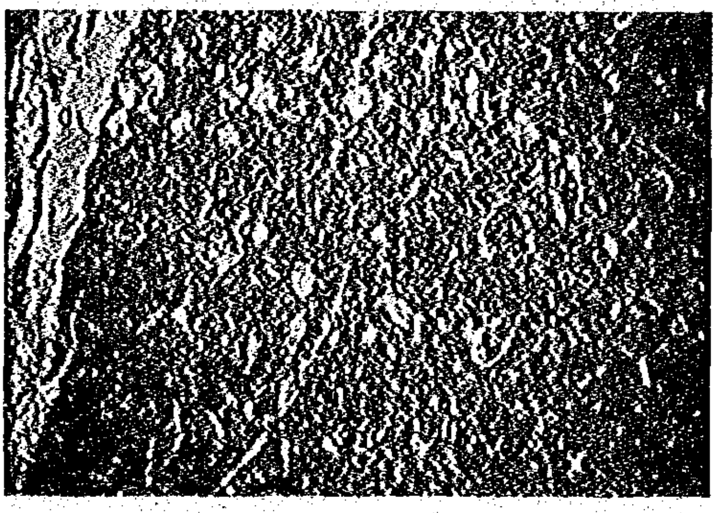
K-012

Location: Oxapampa
Geological unit:
Pucara group

Rock name:
Bituminous limestone

C - Calcite
Cm - Carbonaceous materials

Microscopic observation:
Calcite with carbonaceous material



0 02 0.4m

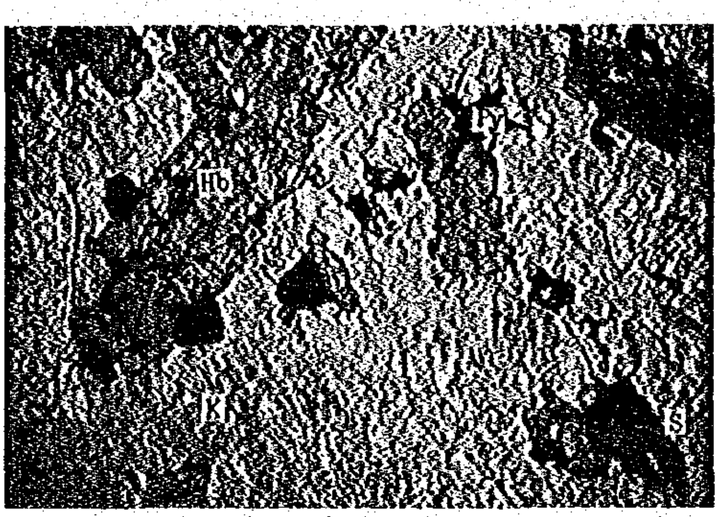
K-019

Location: Oxapampa
Geological unit:
Pucara group

Rock name: Limestone

C - Calcite

Microscopic observation
Consists of very fine grained calcite with fossil fragments



K-264

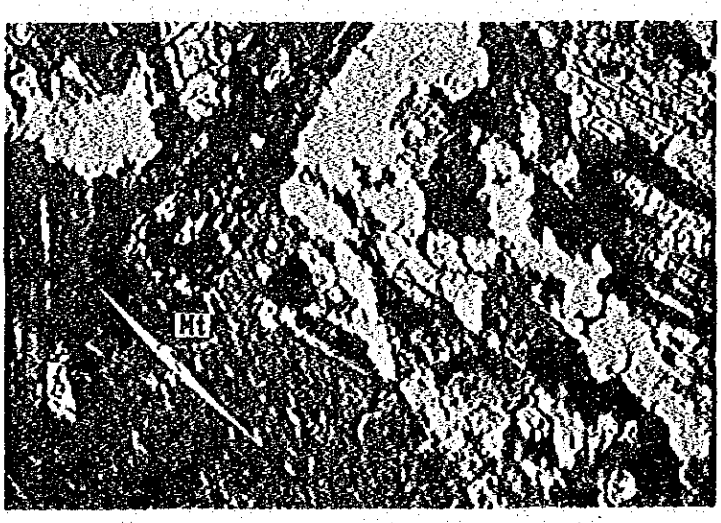
Location: Villa Rica
Geological unit:
Onda intrusives

Rock name: Hornblende-monzonite

Hb - Hornblende
K - K-feldspar
Pl - Plagioclase
Mt - Magnetite
Py - Pyrite
S - Sphene

0 0.5 1mm

Microscopic observation:
Texture: Holocrystalline medium grained equigranular
Salic minerals: Perthite, plagioclase and a little quartz
Mafic minerals: Hornblende
Accessary minerals: Euhedral sphene, apatite and zircon
Opaque minerals: Magnetite hematite and anhedral pyrite



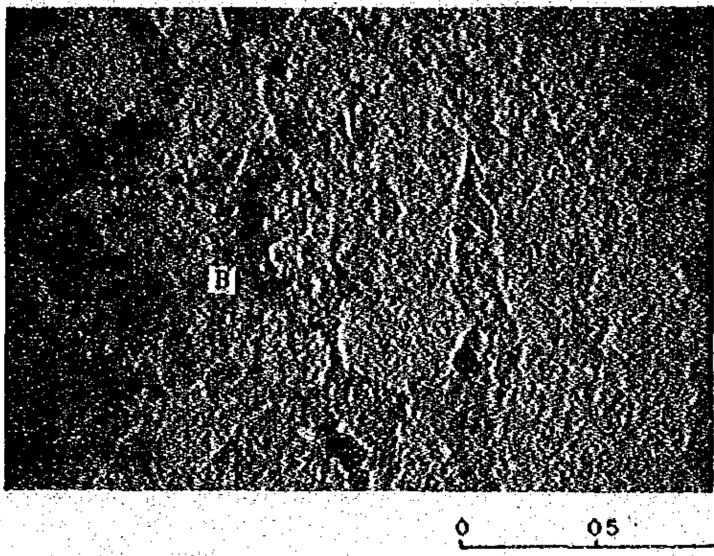
Crossed nicols

H-203

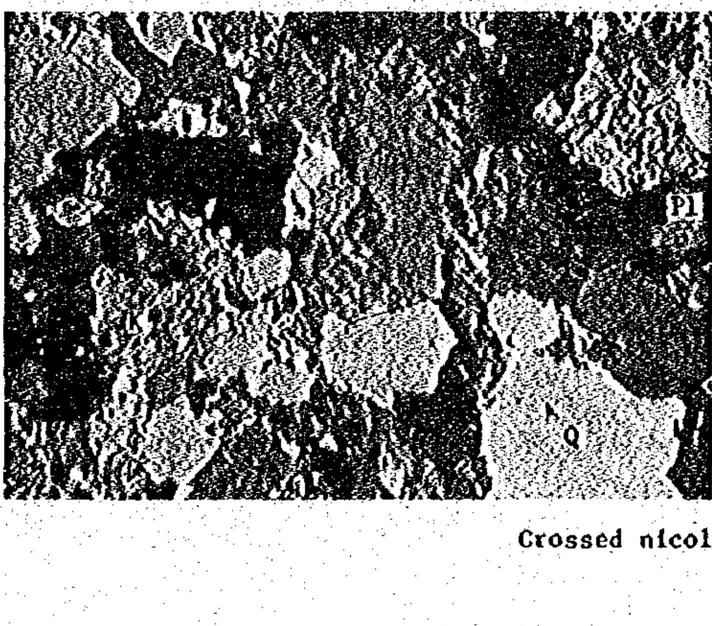
Location: Oxapampa
Geological unit: Pusagno granite

Rock name: Biotite bearing granite

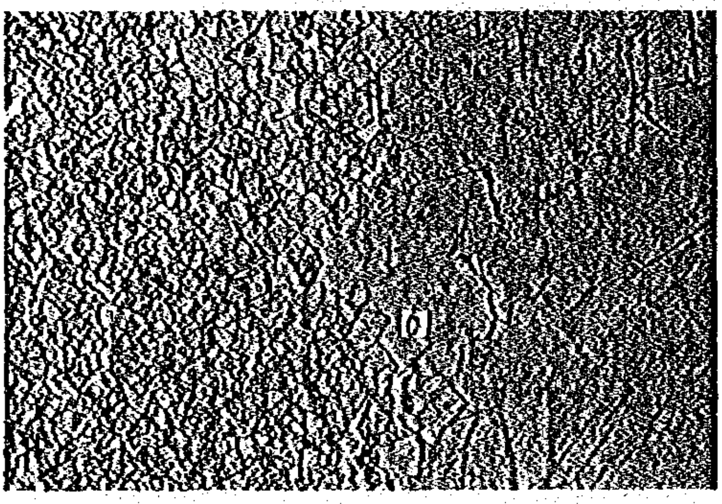
B - Biotite
Pl - Plagioclase
K - K-feldspar
Q - Quartz



Microscopic observation:
Texture: Holocrystalline coarse grained equigranular
Salic minerals: Quartz, plagioclase and orthoclase, quartz and orthoclase are shown micrographic texture
Mafic mineral: a little green biotite
Opaque minerals: Magnetite and hematite



Crossed nicols



A-034

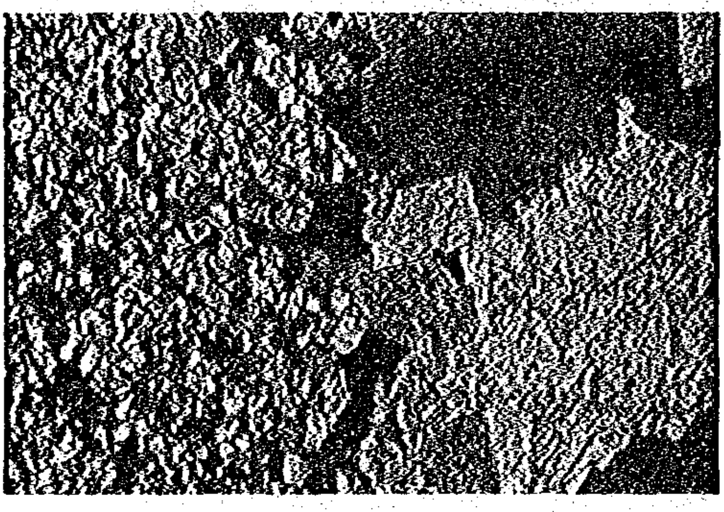
Location: Pozuzo Sur
Geological unit:
Pucara group

Rock name:
Limestone with nodule

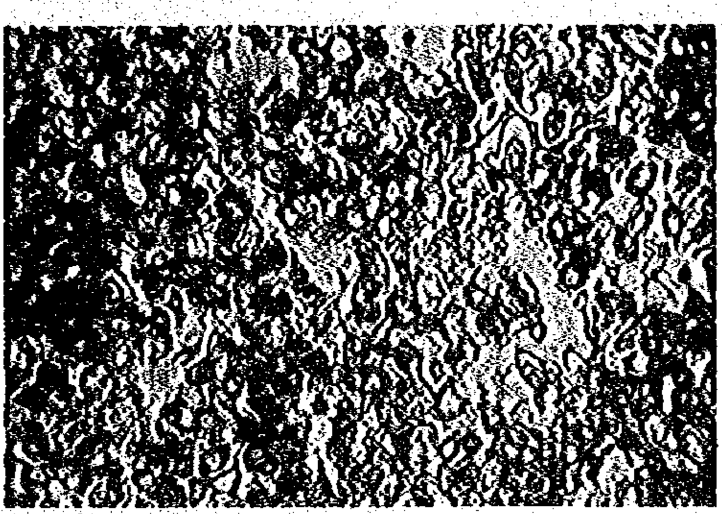
C - Calcite

0 02 0.4mm

Microscopic observation:
Consists of calcite and a few quartz.
Calcite in nodule is larger than the other part.



Crossed nicols



A-089

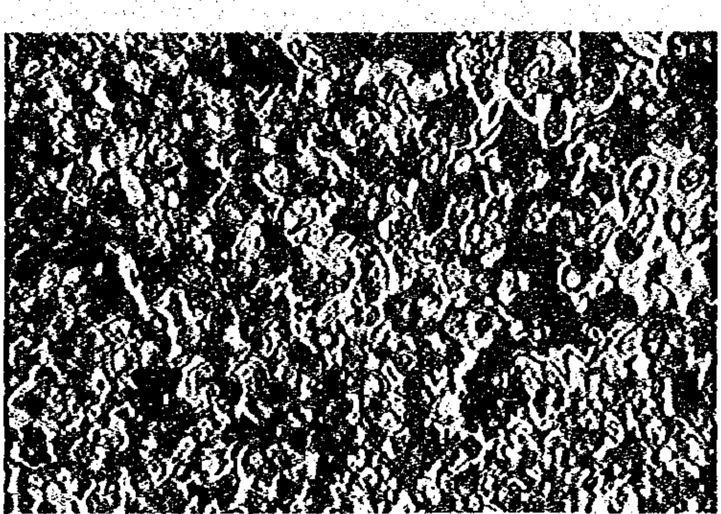
Location: Oxapampa
Geological Unit:
Pucara group

Rock name:
Smithonite

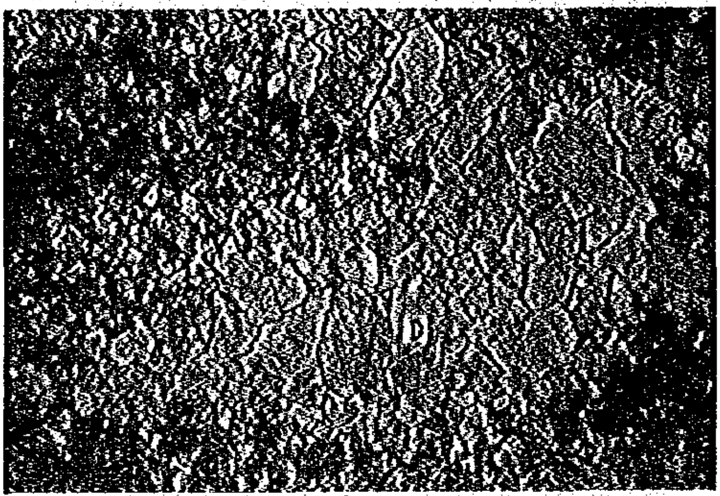
Sm - Smithonite

0 0.5 1mm

Microscopic observation:
Consists of oolitic smithonite with hematite



Crossed nicols



K-001

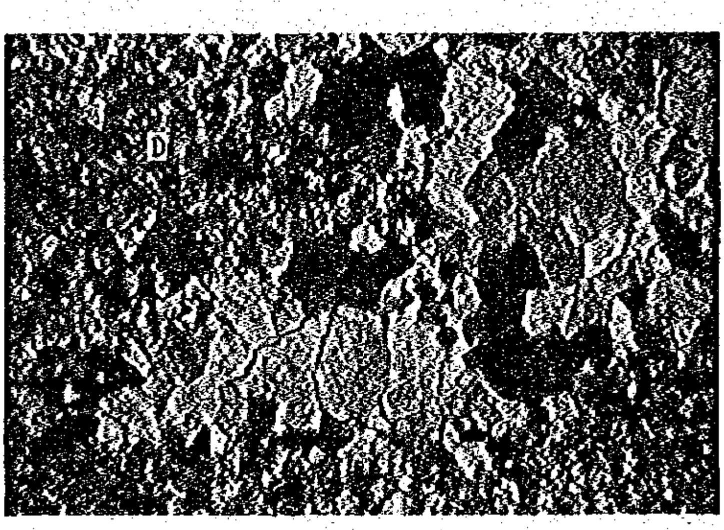
Location: Oxapampa
Geological Unit:
Pucara group

Rock name:
Dolomite (Zebra)

D - Dolomite

0 0.5 1mm

Microscopic observation:
Laminated fine grained dolomite and coarse grained dolomite. Coarse grained dolomite has grading of crystal grains.



Crossed nicols

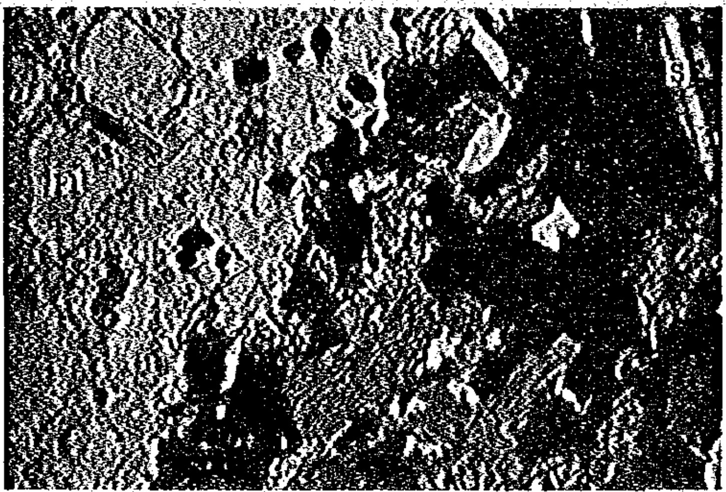
Porphyry Hornblendite

K-250 Xenolith

Location: Villa Rica
Geological unit:
Onda intrusives

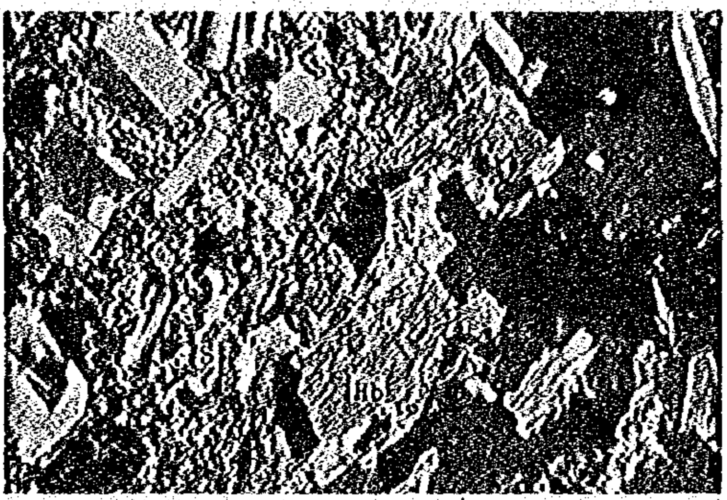
Rock name: Hornblendite

Hb - Hornblende
S - Sphene
Pl - Plagioclase

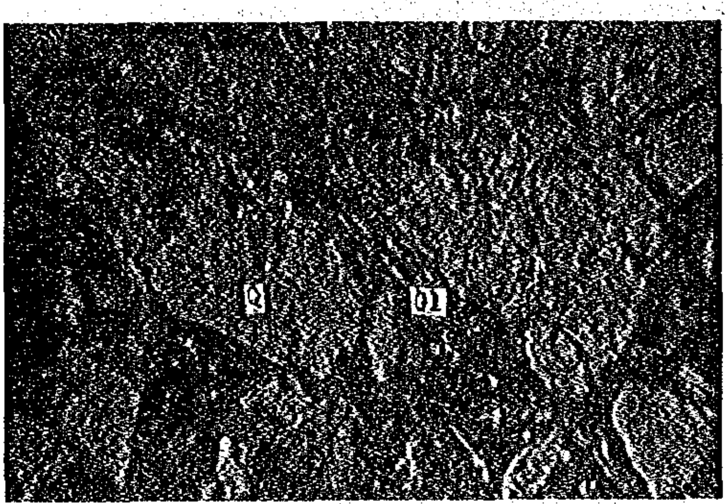


0 05 1mm

Microscopic observation
Texture: Holocrystalline coarse grained equigranular
Lacks of salic minerals
Mafic minerals: Hornblende
Accessary minerals: Euhedral sphene, apatite and
rarely zircon
Opaque minerals: Magnetite



Crossed nicols



0 0.5 1mm

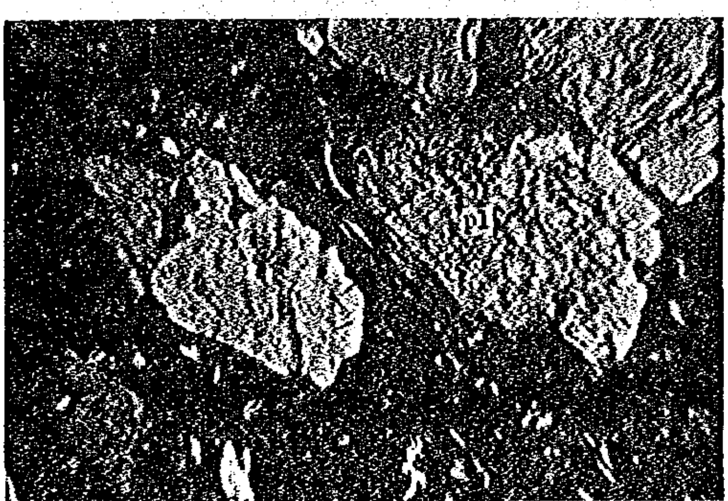
T-044

Location: Yungui
Geological Unit:
Chanchamayo intrusives

Rock name:
Granodiorite

Pl - Plagioclase
Q - Quartz
Gl - Glass

Microscopic observation:
Texture: Pyroclastic
Salic minerals: Crushed plagioclase and corroded and crushed quartz
Rock fragments: Oxidized subangular to rounded rhoyolite and dacite.
Matrix is mostly composed of brownish glass.



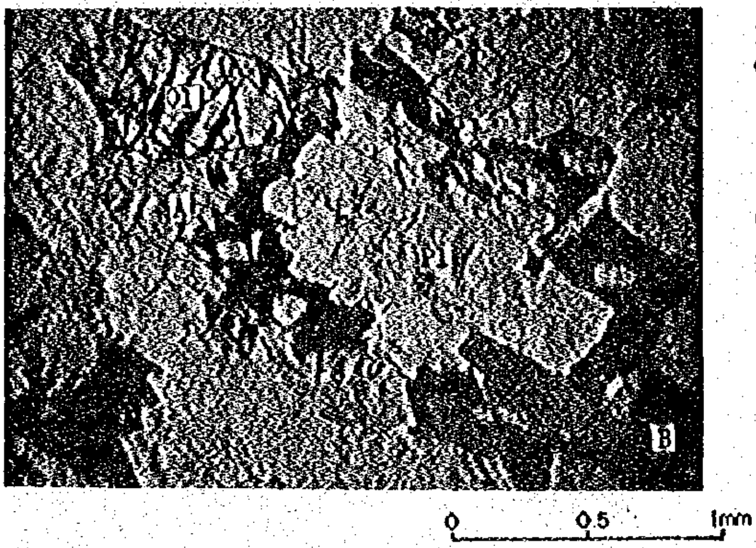
Crossed nicols

H-011

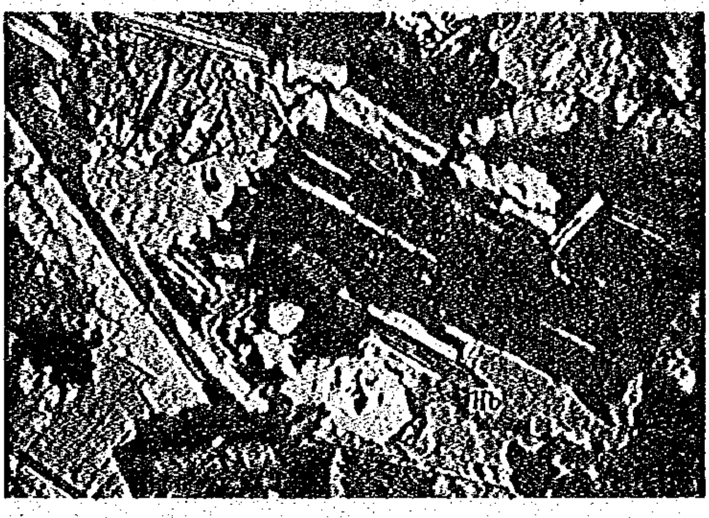
Location: Churmazu
Geological unit:
Chanchamayo intrusives

Rock name: Diorite

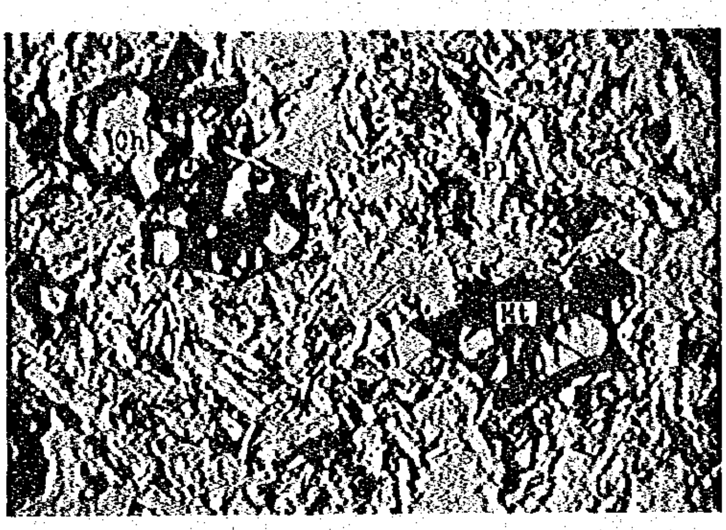
Ol - Olivine
A - Augite
Hb - Hornblende
B - Biotite
Pl - Plagioclase



Microscopic observation:
Texture: Holocrystalline equigranular
Salic minerals: Plagioclase
Mafic minerals: Augite is surrounded by biotite and hornblende. Biotite is mainly reddish brown and partly green. Olivine is surrounded by pyroxene and magnetite and sometimes hornblende. Muscovite appears very few.



Crossed nicols



S-010b

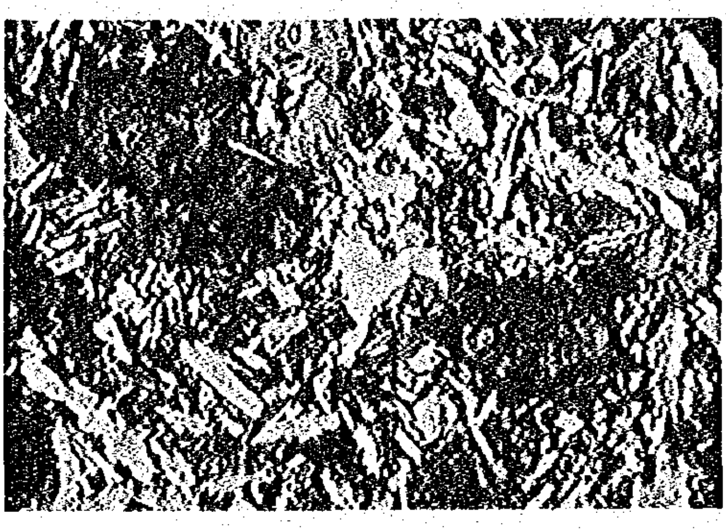
Location: Pte Paucartambo
Geological unit:
Sarayaquillo formation

Rock name: Basalt

Ch - Chlorite
C - Calcite
Pl - Plagioclase
Mt - Magnetite

0 0.5 1mm

Microscopic observation:
Texture: Holocrystalline porphyritic
Salic mineral: Absents for phenocryst
Mafic minerals: Altered to chlorite, Olivine remains its relics, altered to chlorite and magnetite.
Graundmass consists of prismatic plagioclase and fine crystals of opaque. Calcitization is remarkable.



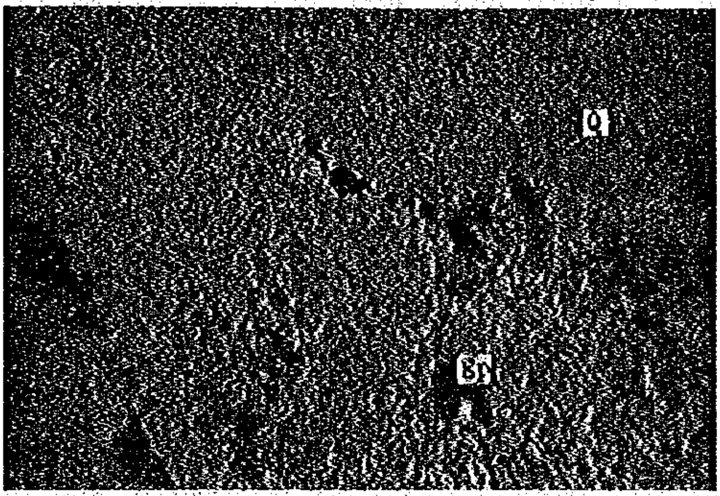
Crossed nicols

H-603

Location: Rio Mallampampa
Geological unit:
Tarma granite

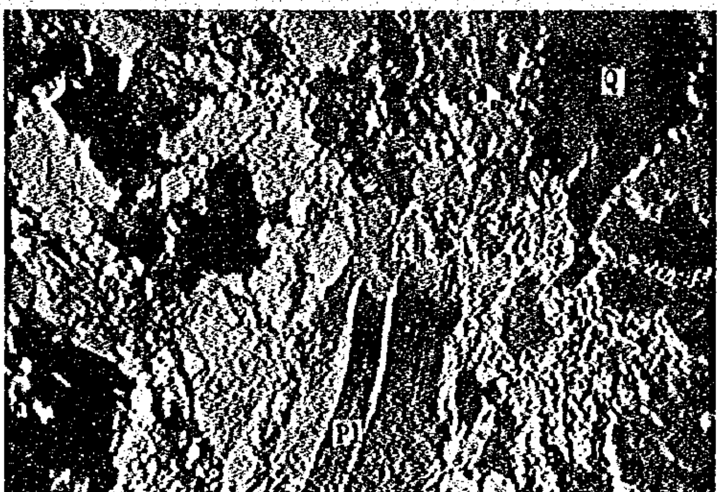
Rock name:
Gneissose granite

Ep - Epidote
Q - Quartz
Pl - Plagioclase
K - K-feldspar
S - Sphene

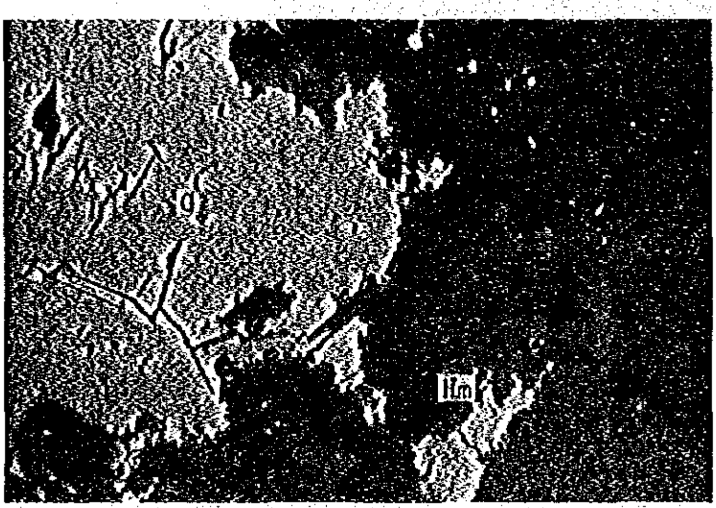


0 0.5 1mm

Microscopic observation:
Texture: Holocrystalline coarse grained equigranular-porphyritic
Salic minerals: Wavy extinct quartz, perthite and plagioclase
Mafic minerals: Epidote and biotite
Accessary minerals: Sphene, leucoxene, wavy extinct apatite and zircon



Crossed nicols



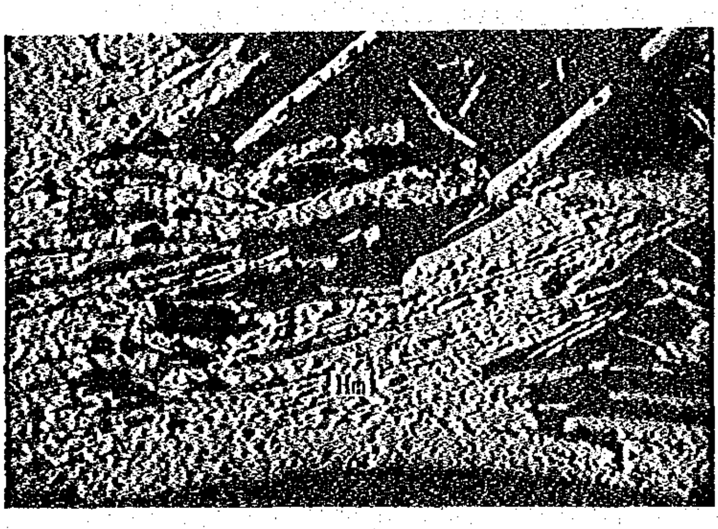
H-021

Location: San Felix
Geological Unit:
Pucara group
Rock name:
Limestone

G - Galena
Hm - Hematite

Microscopic observation:

Galena is predominant and has hematite rim on the marginal zone.



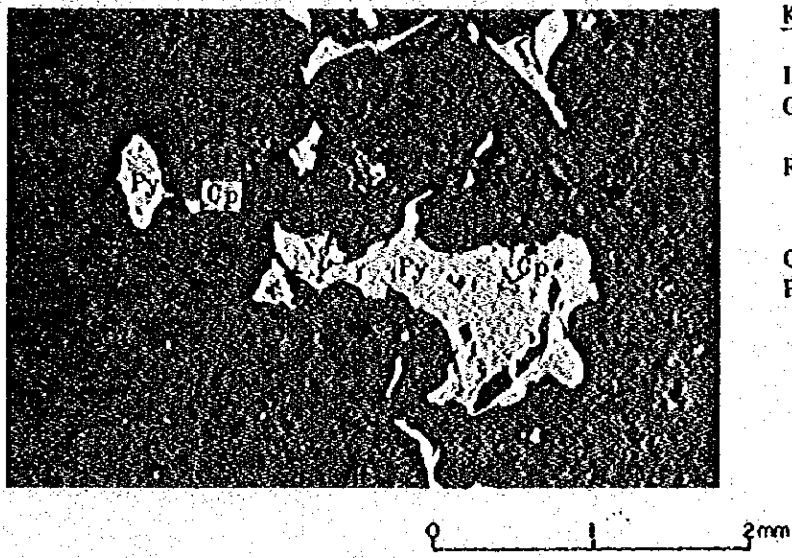
H-004

Location: Choras
Geological Unit:
Pusagno granite
Rock name:
Pusagno granite

Hm - Hematite

Microscopic observation:

Hematite occurs as film



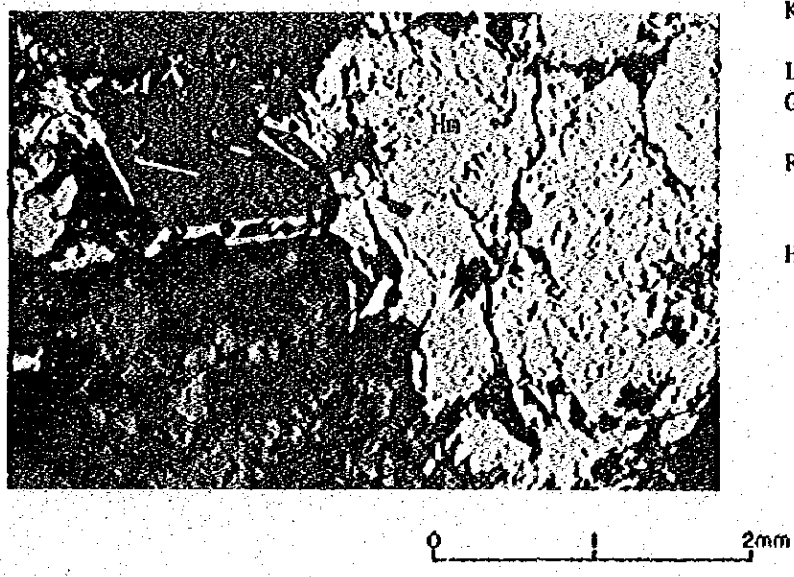
K-244

Location: Villa Rica
Geological Unit:
Pucara group
Rock name:
Skarn

Cp - Cholocopyrite
PY - Pyrite

Microscopic observation:

Pyrite is predominant. Chalcopyrite occurs in pyrite for the most part.



K-136

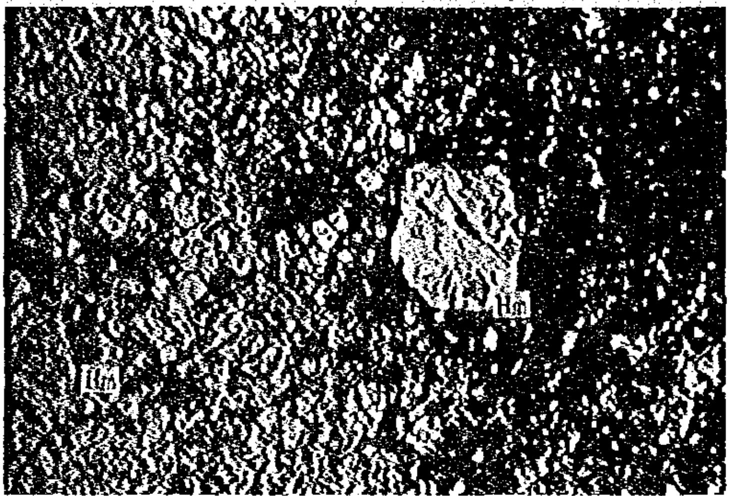
Location: Oxapampa
Geological Unit:
Pusagno granite
Rock name:
Pusagno granite

Hm - Hematite

Microscopic observation:

Hematite is predominant and in part shows twinning.

Gossan Sulphide



0 0.2 0.4mm

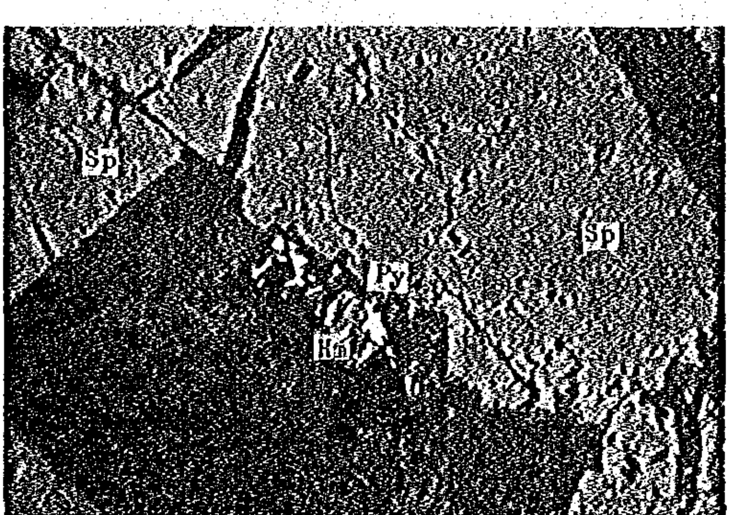
S-026

Location: Villa Rica
Geological Unit:
Pucara group
Rock name:
Lenticular pyrite zone in zebra

Hm - Hematite
Py - Pyrite

Microscopic observation:

In the part of sulphide, pyrite is predominate but changes to hematite in part. In the part of gossan, hematite is predominate.



0 0.2 0.4mm

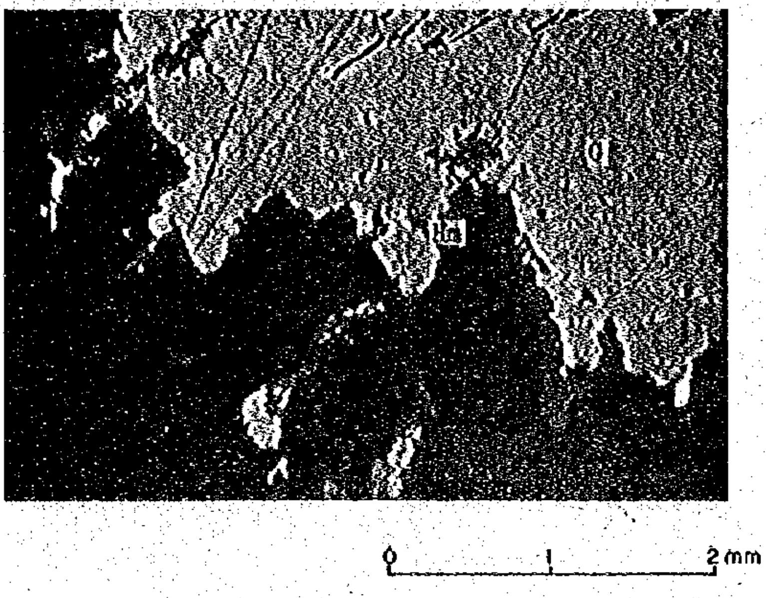
S-025

Location: Villa Rica
Geological Unit:
Pucara group
Rock name
Zebra ore

Sp - Sphalerite
Hm - Hematite
Py - Pyrite

Microscopic observation:

Sphalerite is predominant and inclusion is very poor. Pyrite occurs out of sphalerite and changes to hematite in part.



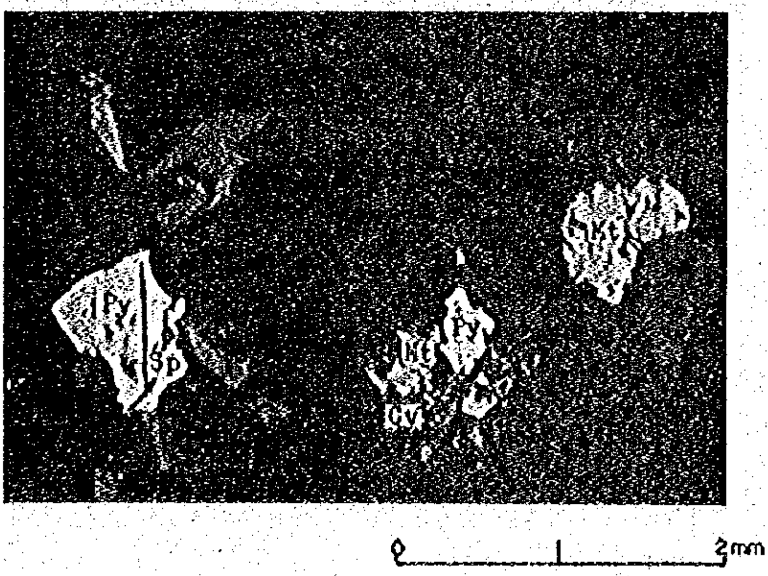
N-146

Location: Yungui
Geological Unit:
Pucara group
Rock name:
Galena ore

G - Galena
Hm - Hematite

Microscopic observation:

Galena is predominant and has hematite rim.



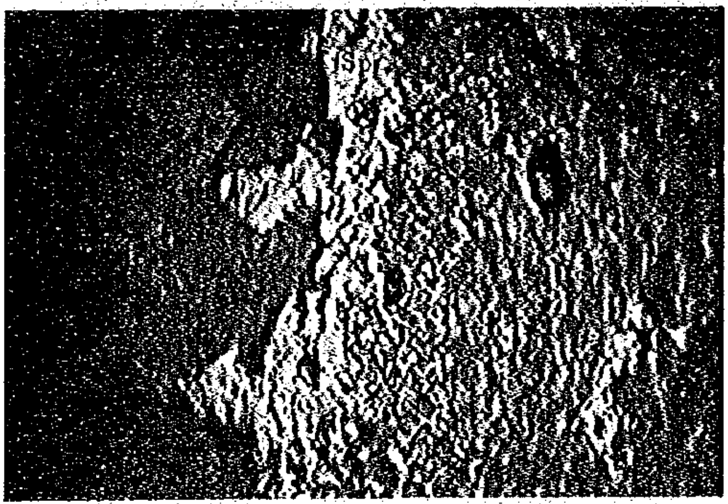
K-264

Location: Villa Rica
Geological Unit:
Oxapampa intrusives
Rock name:
Monzonite

Cv - Covelline
Py - Pyrite
Mt - Magnetite
Sp - Sphalerite

Microscopic observation:

Magnetite and pyrite are predominant. Hematite occurs on surrounded zone of magnetite. Covelline occurs irregular and angular shape. Sphalerite occurs in pyrite for inclusion.



0 1 2mm

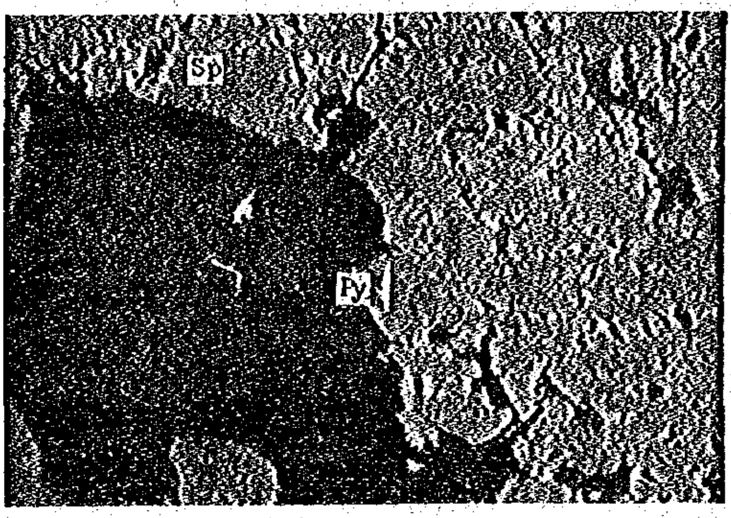
S-019

Location: San Vicente mine
Geological Unit: Pucara group
Rock name: Zebra, sphalerite bearing

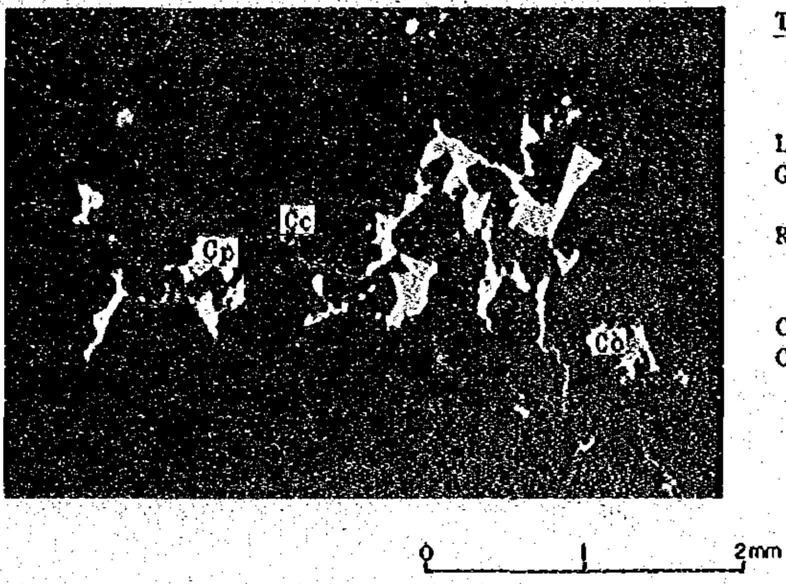
Sp - Sphalerite
Py - Pyrite

Microscopic observation:

Sphalerite shows grading and contains fine grained inclusion of pyrite.



0 0.2 0.4mm



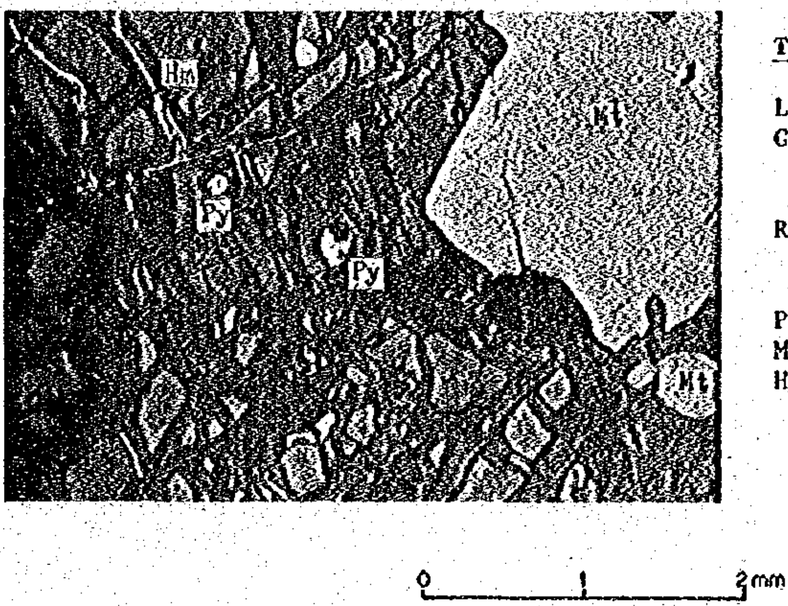
T-008

Location: San Felix
Geological Unit:
Pucara group
Rock name:
Sheared zone

Cp - Chalcopyrite
Cc - Chalocite

Microscopic observation:

Chalcopyrite changes to chalcocite in surrounded zone of it. Chalcocite occurs in cruck too.



T-006

Location: San Felix
Geological Unit:
Chanchamayo intrusives
Rock name:
Lherzolite

Py - Pyrite
Mt - Magnetite
Hm - Hematite

Microscopic observation:

Magnetite occurs as large crystal, hematite occurs in serpentine lamina, pyrite occurs with magnetite.

	S-062	A-011	T-054	H-014	T-044	T-013	K-264	K-265	H-013	H-011
SiO_2	78.80	75.20	74.18	63.95	69.23	61.83	58.20	56.02	52.40	49.70
TiO_2	0.13	0.2o	0.23	0.28	0.48	0.82	0.56	0.54	0.71	1.25
Al_2O_3	11.90	13.10	13.94	13.34	15.12	16.64	19.30	20.95	18.13	16.60
Fe_2O_3	0.84	1.95	0.91	1.44	2.42	2.00	2.40	1.69	2.21	1.80
FeO	0.20	0.30	0.21	0.31	0.36	3.48	1.70	1.55	4.62	5.60
MnO	tr	tr	0.01	0.02	0.09	0.10	0.14	0.16	0.15	0.11
MgO	0.04	0.06	0.16	0.52	0.56	2.59	0.76	0.76	6.32	7.30
CaO	0.04	0.20	0.33	0.66	0.26	3.62	4.50	4.55	7.40	12.80
Na_2O	3.84	3.90	4.33	3.42	4.36	3.39	4.38	4.56	3.85	2.49
K_2O	3.85	4.22	4.80	4.60	4.99	2.36	5.12	6.08	1.97	0.54
P_2O_5	0.01	0.02	0.02	0.06	0.13	0.16	0.15	0.15	0.20	0.16
$H_2O(+)$	0.30	0.60	0.45	9.80	1.02	2.65	1.80	2.00	2.31	0.80
$H_2O(-)$	0.44	0.32	0.17	0.25	0.50	0.22	1.66	0.78	0.21	0.70
Total	100.39	100.08	99.74	99.65	99.52	99.96	100.67	99.79	100.48	99.85
Q	41.50	35.68	29.61	34.23	23.84	20.00	3.30			
or	22.82	25.04	28.38	27.27	29.49	13.19	30.05	36.17	11.69	3.34
ab	32.51	33.03	36.70	28.84	36.70	28.84	37.22	30.41	32.51	20.97
or	0.28	1.11	1.67	3.34	0.56	17.24	17.80	18.64	26.42	32.54
ne								4.54		
c	1.33	1.73	0.92	1.54	2.34	2.14				
Salic Total	98.44	96.59	97.28	95.21	92.93	82.13	88.39	89.76	70.62	56.83
di-wo							1.51	1.28	3.95	12.54
di-en							1.08	0.84	2.68	8.39
di-fs							0.30	0.35	0.96	3.23
hy-en	0.10	0.20	0.40	1.30	1.41	6.73	0.83		5.20	6.06
hy-fs						3.43	0.23		1.87	2.33
fo								0.75	5.52	2.61
fa								0.34	2.19	1.11
ap					0.34	0.34	0.34	0.34	0.34	0.34
il	0.30	0.46	0.46	0.61	0.91	1.52	1.06	1.06	1.37	2.43
mt	0.23	0.23				3.01	3.47	2.55	3.24	2.55
hm	0.64	1.76	0.96	1.44	2.40					
Femic Total	1.27	2.65	1.82	3.35	5.06	15.03	8.82	7.51	27.32	41.53
S. I.	0.5	0.6	1.6	5.1	4.5	19.6	5.4	5.3	33.7	41.6

A - 5 Chemical analyses of igneous rocks .

Sample No.	Location	Cu %	Pb %	Zn %	Ag g/t	
H - 004	Choras	0.04	nd	0.01	0.7	Specularite networks in Tarma granite
H - 020	Oxapampa	0.05	83.8	0.01	15.0	San Roque mine; fissure filling vein, not confirmed.
H - 021	San Felix	0.04	1.7	0.01	0.4	Galena scattered in limestone of Pucara group.
T - 006	San Felix	0.14	0.94	0.02	1.7	Ultra mafic rock with magnetite and hematite.
T - 008	San Felix	1.90	nd	0.13	0.8	Pyrite with green copper and chalcopyrite in sheared zone.
T - 039	Yunqui	0.05	1.5	0.01	1.7	Quartz and fluorite vein with galena
T - 042	Yunqui	0.03	nd	0.01	0.6	Dioritic dyke rock with magnetite, hematite and pyrite
K - 001	Oxapampa	0.04	0.01	0.01	0.1	Zebra of Pucara group
K - 136	Oxapampa	0.16	0.01	0.03	0.9	Specularite scattered in Tarma granite.
K - 244	Villa Rica	0.06	0.01	0.01	1.0	Contact metasomatic rock skarn with pyrite and chalcopyrite in Pucara group by Onda intrusives. (monozonite)
K - 264	Villa Rica	0.08	0.01	0.03	0.9	Oxapampa intrusives (monozonite porphyry) with pyrite and chalcopyrite
A - 041a	Rio Tunqui	0.03	0.01	3.5	12.0	Calcite networks with galena and sphalerite in limestone of Pucara group (float)
A - 085	Oxapampa	0.04	0.65	0.20	2.4	Scattered galena in limestone of Pucara Group (float)
A - 089	Oxapampa	0.04	0.64	43.0	11.0	Gossan with smithsonite in Pucara Group
A - 099	Villa Rica	0.03	0.02	0.02	0.4	Black muddy limestone of Pucara group with pyrite
S - 024a	Villa Rica	0.03	0.01	10.0	4.7	Zebra ore of Pucara group
S - 024b	Villa Rica	0.41	0.03	0.10	4.8	Gossan in zebra of Pucara group
S - 025	Villa Rica	0.07	0.02	15.3	10.0	Zebra ore of Pucara Group
S - 026	Villa Rica	0.09	0.04	0.02	5.4	Lenticular pyrite zone in zebra of Pucara group
N - 036	Naranjal	0.03	0.01	nd	0.8	Zebra of Pucara group

A - 6 Chemical analyses of ore samples

S -

Sample No.	Mineral	Sample wt.(g)	K%	$^{40}Ar^{R}$ / ^{40}K	air (%) contamination	Age m.y.
T-044	whole rock	0.9861	3.79	0.002723	27.02	46
H-014	whole rock	1.0119	3.92	0.007521	9.53	125
K-265	whole rock	1.0052	4.67	0.001274	45.85	22
K-265	whole rock	1.0568	4.67	0.001477	34.05	25
T-054	whole rock	1.0392	3.94	0.007853	18.26	130
H-013	whole rock	0.9908	1.76	0.006953	28.58	115
T-013	whole rock	1.0010	1.71	0.014869	15.96	239

$^{40}Ar^{R}$: radiogenic argon, $= 0.585 \times 10^{-10} yr^{-1}$,

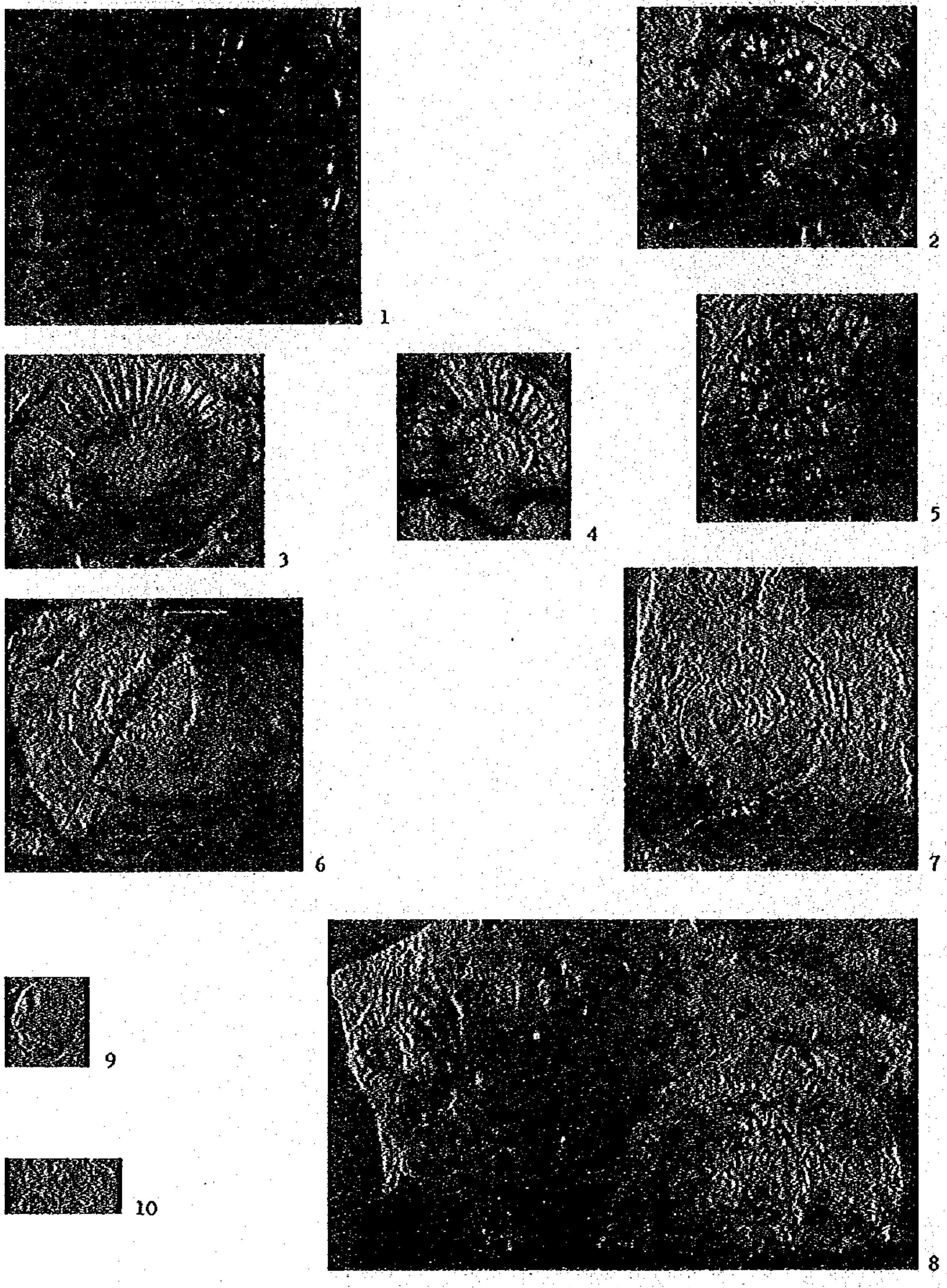
$= 4.72 \times 10^{-10} yr^{-1}$, ^{40}K K $= 1.19 \times 10^{-2}$ atom.%

A - 7 Radiometric age of Igneous rocks

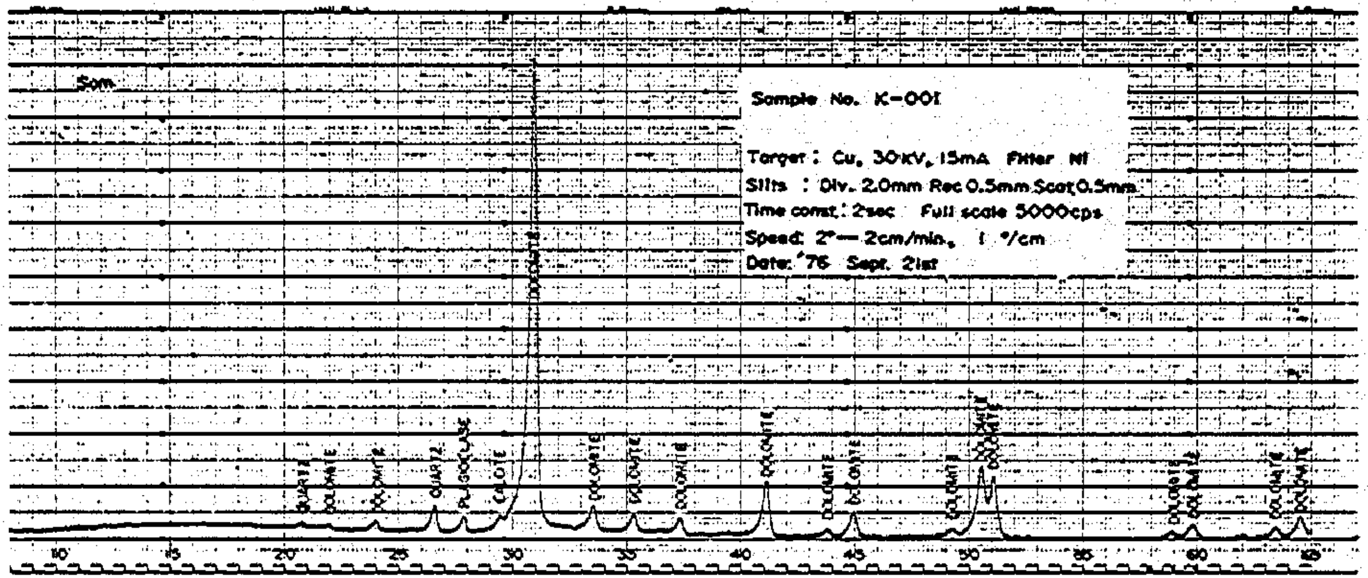
All figures are in natural size.

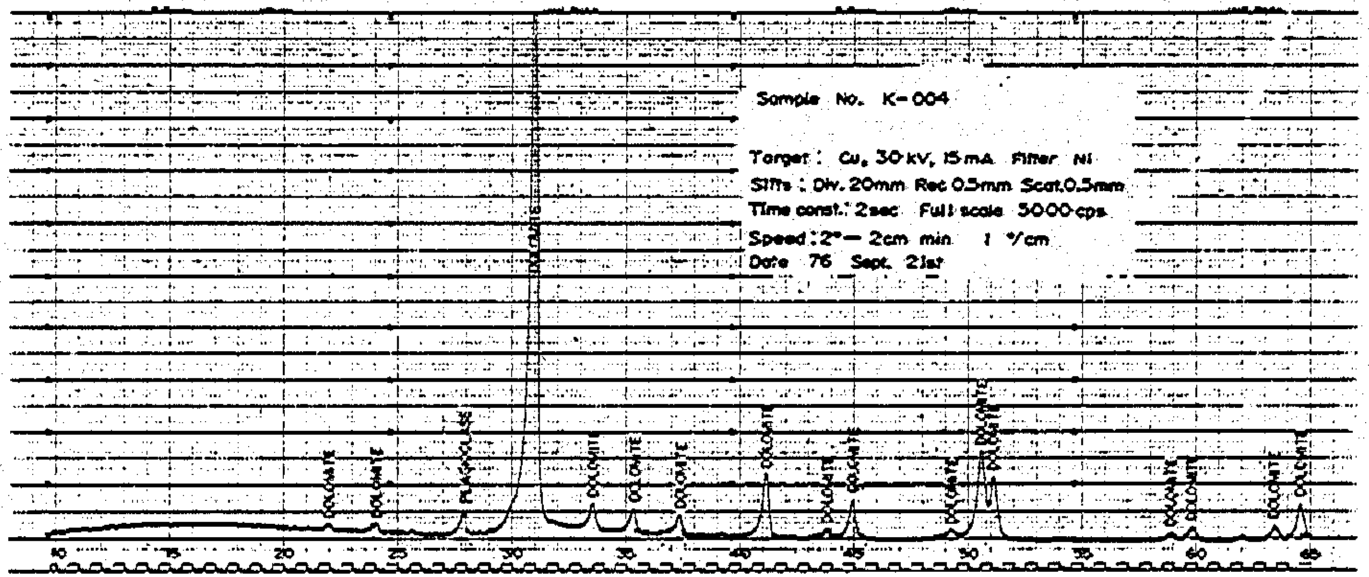
	Name of Fossil	Sample No.	Geological Age	Remarks
Ammonite				
No. 1	_Arnioceras_ sp.	K215	Lower Sinemurian.	
No. 2	_Arnioceras_ sp.	K213	Lower Sinemurian.	
No. 3	_Arnioceras_ sp.	K208	Lower Sinemurian.	
No. 4	_Arnioceras_ sp.	K207	Lower Sinemurian.	
No. 5	_Arnioceras_ sp.	K215	Lower Sinemurian.	
No. 6	_Psiloceras_ sp.	K143	Hettangian.	
No. 7	_Psiloceras_ sp.	K161	Hettangian.	
No. 8	_Psiloceras_ sp.	K143	Hettangian.	Young whorls in upper left corner and adult whorl in lower right corner.
No. 9	Unknown bivalve ?	K163	Age unknown.	
No. 10	_Lima_ like bivalve.	N102	Age unknown.	
Gastropoda				
No. 11	Gen.et sp. indet.	K202		
Foraminifera				
No. 12	Gen. et sp. indet.	K268		

A-8 List of Fossils

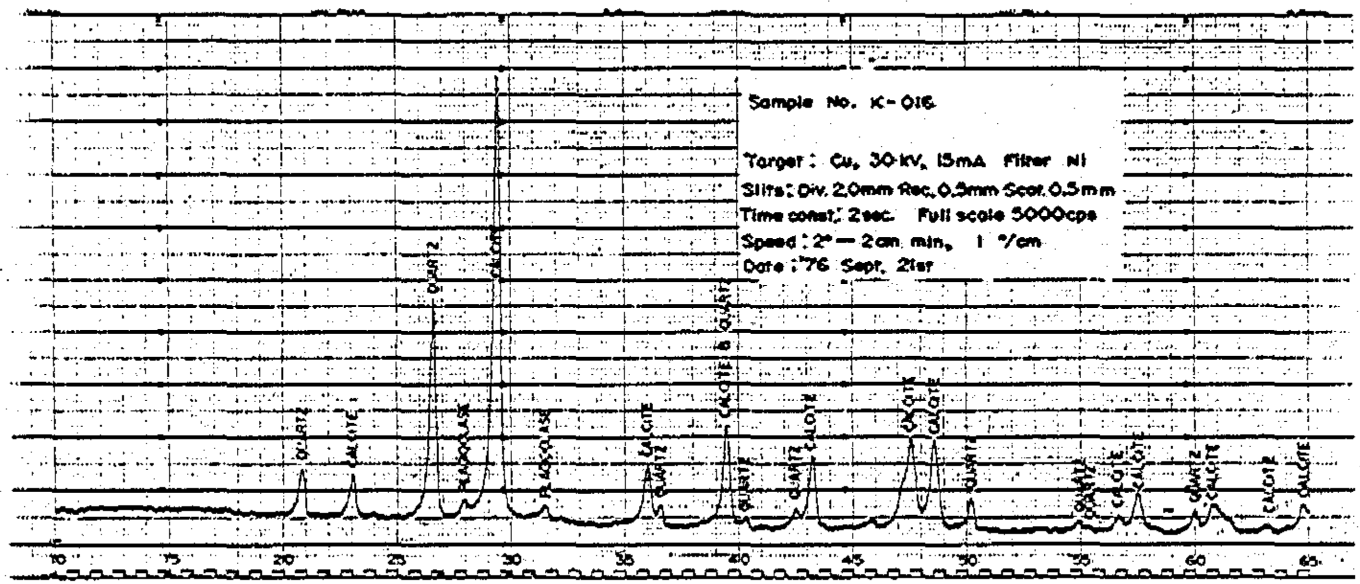


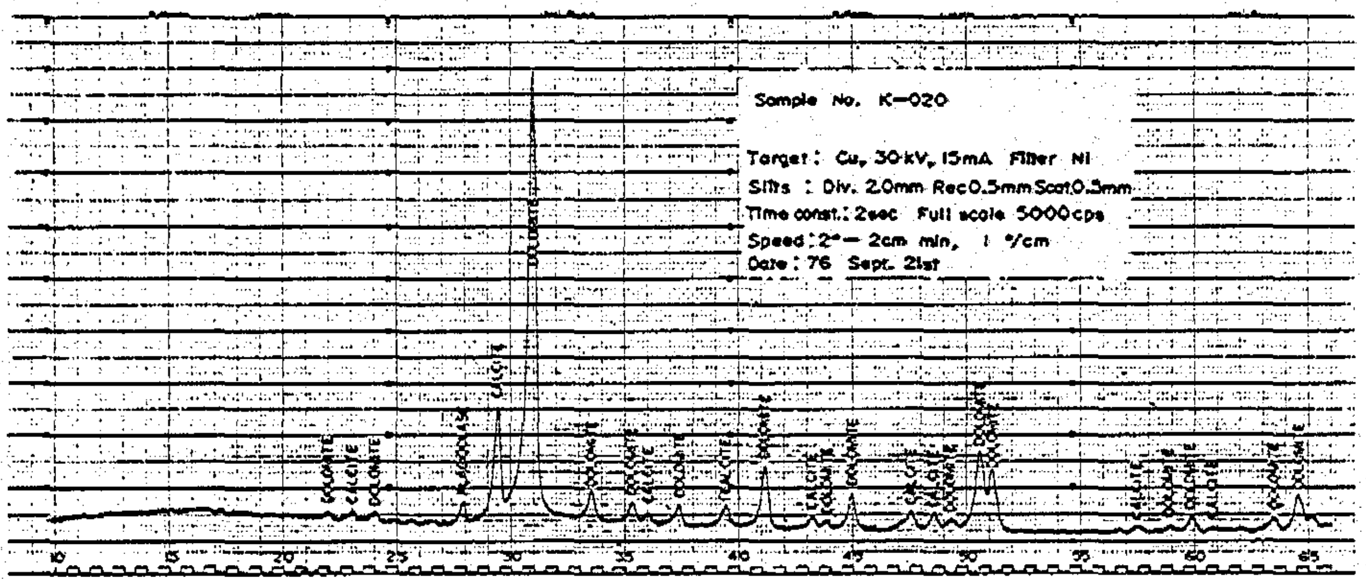
A - 9 Photographs of Fossils





A-10-1 Charts of X-ray diffractive analysis





A-10-2 Charts of X-ray diffractive analysis

A −11 List of Geochemical Analyses

SAMPLE NO.	GEOLOGICAL UNIT	SOIL	ATOMIC ABSORPTION METHOD			DITHIZON	LOCATION
			Cu	Pb	Zn	Zn	
			ppm	ppm	ppm	γ	
TA61506	JP	S	20	128	243	2	Pozuzo Sur
TA61507	JP	S	26	186	148	1	
TA61801	JP	S	19	33	275	98	Río Tunqui
TA61802	JP	S	20	41	96	15	
TA61803	JP	S	11	30	48	6	
TA61804	JP	S	24	43	97	7	
TA61805	JP	S	16	19	88	11	
TA61806	JP	S	10	30	55	10	
TA61807	JP	S	4	27	27	5	
TA61808	JP	S	14	43	252	19	
TA61809	JP	S	2	22	94	5	
TA61810	JP	S	7	43	255	12	
TA61811	CRC	S	15	46	238	2	
TA61812	CRC	S	4	30	35	2	
TA61601	JP	S	15	52	98	1	
TA61602	JP	S	14	57	493	15	
TA61603	CRC	S	10	65	312	10	
TA61605	JP	S	11	35	176	35	
TA61606	JP	S	7	27	65	8	
TA61607	JP	S	14	33	96	13	
TA61608	JP	S	11	57	210	12	
TA61609	JP	S	7	41	230	2	
TA61610	JP	S	12	30	77	2	
TA61611	CRC	S	3	8	22	2	
TA61612	CRC	S	6	125	188	1	
TA61613	CRC	S	14	43	83	1	
TA61614	CRC	S	15	30	56	1	
TA61615	CRC	S	13	30	156	40	
TA61616	CRC	S	13	35	84	6	
TA62401	JP	S	22	8	15	4	
TA62402	JP	S	31	5	57	6	
TA62403	JP	S	18	21	161	6	
TA62404	JP	S	17	45	57	4	
TA62405	JP	S	12	35	72	4	

SAMPLE NO.	GEOLOGICAL UNIT	SOIL	ATOMIC ABSORPTION METHOD			DITHIZON	LOCATION
			Cu	Pb	Zn	Zn	
			ppm	ppm	ppm	γ	
TA62406	JP	S	2	43	73	4	Río Tunquí
TA62407	JP	S	22	396	1,096	48	
TA62408	JP	S	20	181	1,124	12	
TA62409	JP	S	14	80	347	4	
TA62410	JP	S	21	51	371	15	
TA62301	JP	S	10	68	172	4	
TA62302	JP	S	5	89	252	3	
TA62303	JP	S	17	54	328	2	
TA62304	JP	S	14	86	95	4	
TA62305	JP	S	10	54	55	3	
TA62306	JP	S	12	30	56	4	
TA62307	JP	S	12	35	35	2	
TA62308	JP	S	15	57	89	2	
TA62309	JP	S	16	100	72	5	
TA62310	JP	S	9	46	84	3	
TA62311	JP	S	23	16	67	2	
TA62312	CRC	S	23	38	267	5	
TA62313	CRC	S	118	0	16	10	
TA62314	CRC	S	32	16	79	3	
TA62315	CRC	S	6	16	20	3	
TA62316	CRC	S	22	22	68	4	
TA62317	CRC	S	18	24	70	5	
TA61508	JP	S	8	74	159	6	
TA62001	JP	S	10	41	86	3	
TA62002	JP	S	15	81	528	2	
TA62003	JP	S	51	146	1,367	8	
TA62004	JP	S	18	73	342	2	
TA62005	CRC	S	18	35	86	10	
TA62006	CRC	S	10	59	330	13	
TA62007	CRC	S	17	57	169	7	
TA62008	CRC	S	8	30	60	2	
TA62009	JP	S	16	35	174	1	
TA62010	JP	S	12	73	364	2	
TK71801	CRC	S	13	45	54	2	
TT61601	JP	S	23	97	520	2	

SAMPLE NO.	GEOLOGICAL UNIT	SOIL	ATOMIC ABSORPTION METHOD			DITHIZON	LOCATION
			Cu	Pb	Zn	Zn	
			ppm	ppm	ppm	γ	
TT61602	JP	S	8	57	328	7	Río Tunquí
TT61603	JP	S	6	38	82	3	
TT61604	JP	S	8	46	166	1	
TT61605	JP	S	14	66	273	1	
TT61606	CRO	S	8	84	184	10	
TT61607	CRO	S	9	66	172	7	
TT61608	CRO	S	20	48	242	10	
TT61609	JP	S	18	23	31	5	
TT61610	JP	S	28	8	8	4	
TT61611	JP	S	5	8	20	2	
TT61612	JP	S	10	27	143	10	
TT61613	JP	S	10	88	111	18	
TT61614	CRO	s	23	19	50	5	
TT61615	JP	S	6	17	27	2	
TT61616	JP	S	38	154	696	12	
TT61617	CRO	S	23	40	115	10	
TT61618	CRO	S	45	198	436	9	
TT61619	CRO	S	10	108	232	48	
TT61620	CRO	S	10	46	143	5	
TT61621	CRO	S	7	352	146	7	
TT61622	CRO	S	7	42	44	2	
TT61801	CRC	S	15	24	76	4	
TT61802	CRC	S	11	18	76	2	
TT61803	CRC	S	13	20	76	6	
TT61804	CRC	S	8	22	56	2	
TT61805	CRC	S	14	28	80	7	
TT61806	CRC	S	11	18	76	1	
TT61807	CRC	S	12	17	80	8	
TT61808	JP	S	11	28	124	2	
TT61809	CRC	S	13	18	68	2	
TT61810	CRC	S	16	24	76	2	
TT61811	CRC	S	14	34	52	2	
TT61812	JP	S	12	101	224	2	
TT61813	JP	S	15	150	820	2	
TT61814	JP	S	10	112	500	2	

SAMPLE NO.	GEOLOGICAL UNIT	SOIL	ATOMIC ABSORPTION METHOD			DITHIZON	LOCATION
			Cu	Pb	Zn	Zn	
			ppm	ppm	ppm	γ	
TT61815	JP	S	11	58	120	2	Rio Tunqui
TT62105	JP	S	31	245	456	2	
TT62106	JP	S	40	194	182	3	
TT62107	JP	S	24	40	55	3	
TT62108	JP	S	14	42	182	1	
TT62109	THO	S	19	31	163	11	
TT62110	THO	S	59	54	94	1	
TT62111	THO	S	17	229	212	2	
TT62112	THO	S	14	45	68	1	
TT62113	JP	S	16	89	94	10	
TT62205	JP	S	8	99	40	3	
TT62006	JP	S	12	97	63	5	
TT62007	JP	S	12	43	91	2	
TT62208	JP	S	12	34	72	2	
TT62209	JP	S	7	30	54	2	
TT62210	JP	S	8	34	30	2	
TT62211	JP	S	7	36	42	2	
TT62212	JP	S	5	30	30	2	
TT62213	JP	S	6	30	44	2	
TT62214	JP	S	6	28	33	2	
TT62215	JP	S	4	30	21	2	
TT62216	JP	S	7	26	40	2	
TT62217	JP	S	13	52	149	2	
TT62218	JP	S	12	50	139	3	
TT62219	JP	S	7	45	95	2	
TT62220	JP	S	20	43	107	3	
TT62221	JP	S	13	39	79	5	
TT71501	CRC	S	16	25	49	2	
TT71502	CRC	S	14	6	41	12	
TT71503	JP	S	5	19	22	2	
TT71504	JP	S	8	25	70	4	
TT71505	JP	S	10	25	98	5	
TT71506	JP	S	9	24	44	4	
TT71507	JP	S	6	49	8	2	
TT71508	JP	S	11	36	137	13	

SAMPLE NO.	GEOLOGICAL UNIT	SOIL	ATOMIC ABSORPTION METHOD			DITHIZON	LOCATION
			Cu	Pb	Zn	Zn	
			ppm	ppm	ppm	γ	
TT71509	JP	S	16	36	193	17	Rio Tunqui
TT71601	JP	S	26	25	182	3	
TT71602	JP	S	28	13	23	6	
TT71603	JP	S	20	4	62	35	
TT71604	JP	S	18	13	84	10	
TT71605	JP	S	10	22	26	2	
TT71606	JP	S	11	19	62	3	
TT71607	JP	S	22	13	130	8	
TT71608	JP	S	22	10	10	6	
TT71609	JP	S	20	25	62	4	
TT71701	CRC	S	4	0	3	6	
TT71801	CRC	S	11	22	49	3	
TT71802	CRC	S	12	28	56	3	
TT71803	CRC	S	12	38	43	2	
TA61706	CRO	S	4	82	381	2	Rio Mallampampa
TA61707	JP	S	10	13	78	5	
TA61708	JP	S	9	3	29	6	
TA61709	JP	S	26	82	223	120	
TA61710	JP	S	57	62	246	15	
TA61711	JP	S	27	82	226	15	
TA61712	JP	S	19	13	26	5	
TA61713	JP	S	70	191	279	5	
TA61715	CRO	S	3	13	19	5	
TA61716	JP	S	8	16	40	2	
TA61717	JP	S	12	27	44	7	
TA61718	JP	S	4	48	160	2	
TA61719	JP	S	20	29	80	7	
TA61720	JP	S	9	45	84	2	
TA61901	CRO	S	6	43	61	4	
TA61902	JP	S	9	52	158	3	
TA61903	JP	S	15	125	334	16	
TA61904	JP	S	5	24	60	4	
TA61905	JP	S	25	66	1,295	11	
TA61906	JP	S	56	16	60	8	

SAMPLE NO.	GEOLOGICAL UNIT	SOIL	ATOMIC ABSORPTION METHOD			DITHIZON	LOCATION
			Cu	Pb	Zn	Zn	
			ppm	ppm	ppm	γ	
TA61907	JP	S	6	8	297	5	Río Mallampampa
TA61908	JP	S	10	24	226	8	
TA61909	JP	S	12	82	434	48	
TA61910	JP	S	9	202	403	10	
TA61911	JP	S	3	29	34	7	
TA61912	JP	S	11	85	386	10	
TA61913	JP	S	24	48	339	40	
TA61914	JP	S	6	29	65	4	
TA61915	JP	S	9	29	236	8	
TA61916	JP	S	4	82	196	7	
TA61917	JP	S	9	59	154	8	
TA61918	JP	S	20	53	168	8	
TA62011	JP	S	11	57	66	9	
TA62012	JP	S	16	84	185	7	
TA62013	JP	S	12	230	812	43	
TA62014	JP	S	5	289	650	10	
TA62015	JP	S	12	303	948	81	
TA62016	JP	S	21	59	282	10	
TA62101	JP	S	11	295	1,363	60	
TA62102	JP	S	4	149	554	58	
TA62103	CRO	S	5	184	1,754	14	
TA62104	CRO	S	10	278	1,050	69	
TA62105	CRO	S	5	14	22	6	
TA62106	CRO	S	19	32	66	3	
TA62107	CRO	S	18	27	45	3	
TA62108	CRO	S	17	32	58	4	
TA62109	CRO	S	16	22	63	4	
TA62110	CRO	S	35	46	76	5	
TA62111	CRO	S	8	16	39	7	
TA62112	CRO	S	11	22	39	3	
TA62113	CRO	S	9	5	43	7	
TA62114	CRO	S	6	19	33	3	
TA62115	CRO	S	18	19	33	3	
TA62116	CRO	S	4	8	18	3	
TA62117	CRO	S	1	0	15	3	

SAMPLE NO.	GEOLOGICAL UNIT	SOIL	ATOMIC ABSORPTION METHOD			DITHIZON	LOCATION
			Cu	Pb	Zn	Zn	
			ppm	ppm	ppm	γ	
TA62118	JP	S	2	8	12	3	Río Mallampampa
TA62119	JP	S	39	135	200	7	
TA62120	JP	S	29	81	86	6	
TA62201	CRO	S	4	35	37	3	
TA62202	JP	S	7	90	262	11	
TA62203	JP	S	26	187	92	9	
TA62204	JP	S	15	54	68	7	
TA62205	JP	S	17	30	27	6	
TA62206	JP	S	12	114	89	7	
TA62207	JP	S	12	87	71	5	
TA62208	JP	S	17	84	304	23	
TA62209	JP	S	5	54	285	7	
TA62210	JP	S	5	46	361	7	
TA62211	JP	S	12	76	436	3	
TA62212	JP	S	9	516	733	7	
TA62411	JP	S	31	125	326	2	
TA62412	TVL	S	15	35	74	10	
TA62413	TVL	S	41	118	159	21	
TA62414	TVL	S	14	32	68	4	
TA62415	TVL	S	19	35	71	4	
TA62416	TVL	S	7	45	154	6	
TA62417	TVL	S	9	66	69	5	
TT62101	TVL	S	30	113	121	2	
TT62102	CRO	S	20	768	284	325	
TT62103	CRO	S	14	31	98	11	
TT62104	CRO	S	15	740	1,172	4	
TT62201	JP	S	5	28	58	5	
TT62202	JP	S	4	22	28	6	
TT62203	JP	S	11	45	114	7	
TT62204	JP	S	4	24	26	6	
TT62401	JP	S	10	58	164	3	
TT62402	JP	S	19	54	156	3	
TT62403	JP	S	10	43	332	5	
TT62404	JP	S	26	41	620	12	
TT62405	JP	S	35	71	228	7	

SAMPLE NO.	GEOLOGICAL UNIT	SOIL	ATOMIC ABSORPTION METHOD			DITHIZON	LOCATION
			Cu	Pb	Zn	Zn	
			ppm	ppm	ppm	γ	
TT62406	JP	S	7	22	100	3	Río Mallampampa
TT62407	JP	S	6	73	268	5	
TT62408	JP	S	8	352	180	7	
TT62409	JP	S	9	125	700	16	
TT62410	JP	S	8	108	540	7	
TT62411	JP	S	4	30	52	5	
TT62412	JP	S	13	748	424	5	
TT62413	JP	S	5	148	440	7	
TT62414	TVL	S	8	11	88	5	
TT71901	THO	S	8	47	30	2	
TT71902	THO	S	5	36	16	2	
TT71903	THO		4	34	37	2	
TT71904	TVL	S	3	22	24	2	
TT71905	TVL	S	3	22	21	2	
TT72001	PM	S	12	27	61	3	
TT72002	CRC	S	10	23	48	3	
TT72003	CRC	S	10	13	35	6	
TA61714	CRO	S	5	19	23	3	Huancabamba
TA61919	CRO	S	40	29	57	5	
TA61920	CRO	S	17	32	62	5	
TA61921	CRO	S	16	165	89	5	
TA61922	CRO	S	34	35	79	4	
TA61923	CRO	S	20	27	44	5	
TA61924	JP	S	17	40	52	6	
TA61925	JP	S	69	40	74	3	
TA61926	JP	S	6	21	23	5	
TA61927	JP	S	23	43	76	2	
TA61928	JP	S	38	106	700	65	
TA61701	PM	S	48	27	74	7	
TA61702	PM	S	34	29	70	5	
TA61703	CRC	S	10	32	36	7	
TA61704	CRO	S	80	32	140	6	
TA61705	CRO	S	18	43	77	5	
TA62501	CRO	S	11	8	37	5	

SAMPLE NO.	GEOLOGICAL UNIT	SOIL	ATOMIC ABSORPTION METHOD			DITHIZON	LOCATION
			Cu	Pb	Zn	Zn	
			ppm	ppm	ppm	γ	
TA62502	CRO	S	5	5	14	3	Huancabamba
TA62503	CRO	S	8	8	42	6	
TA62504	CRO	S	15	5	20	6	
TA62505	JP	S	13	24	369	4	
TA62506	CRO	S	9	11	25	7	
TA62507	CRO	S	7	5	18	6	
TA62508	CRC	S	17	19	45	7	
TA62509	CRC	S	19	24	76	11	
TA62510	CRC	S	15	16	35	7	
TA62511	CRC	S	10	8	25	6	
TA62512	CRC	S	8	22	25	6	
TT61701	JP	S	10	23	80	6	
TT61702	JP	S	26	43	246	2	
TT61703	JP	S	12	49	264	7	
TT61704	JP	S	12	23	58	5	
TT61705	JP	S	11	23	38	5	
TT61706	JP	S	4	14	13	4	
TT61707	JP	S	22	18	46	7	
TT61708	JP	S	14	17	46	10	
TT61709	JP	S	11	23	49	10	
TT61710	JP	S	16	17	60	6	
TT61711	JP	S	9	15	38	6	
TT61712	JP	S	5	17	22	3	
TT61713	JP	S	15	18	27	3	
TT61714	JP	S	22	34	153	17	
TT61715	JP	S	7	15	43	2	
TT61716	JP	S	22	14	72	5	
TT61901	CRC	S	3	16	35	3	
TT61902	CRC	S	9	16	58	8	
TT61903	CRO	S	12	22	66	7	
TT61904	CRO	S	16	21	67	7	
TT61905	CRO	S	11	24	72	7	
TT61906	CRO	S	14	19	74	5	
TT61907	CRO	S	16	24	82	11	
TT61908	CRO	S	12	30	72	2	

SAMPLE NO.	GEOLOGICAL UNIT	SOIL	ATOMIC ABSORPTION METHOD			DITHIZON	LOCATION
			Cu	Pb	Zn	Zn	
			ppm	ppm	ppm	γ	
TT61909	CRO	S	17	19	65	3	Huancabamba
TT61910	CRO	S	19	25	75	7	
TT61911	CRO	S	12	22	63	6	
TT61912	CRO	S	6	18	94	6	
TT61913	CRO	S	2	4	26	5	
TT61914	CRO	S	12	22	53	6	
TT61915	CRO	S	3	13	26	5	
TT61916	CRO	S	6	22	50	6	
TT62001	JP	S	10	31	60	2	
TT62002	JP	S	8	31	68	1	
TT62003	CRO	S	10	19	33	3	
TT62004	CRO	S	12	19	37	5	
TT62005	JP	S	18	25	51	17	
TT62006	JP	S	18	106	852	28	
TT62007	JP	S	3	6	37	6	
TT62008	JP	S	7	6	28	6	
TT62009	JP	S	8	12	118	7	
TT62010	JP	S	14	31	51	1	
TT62011	JP	S	14	31	49	1	
TT62012	JP	S	7	25	21	3	
TT62013	JP	S	10	31	122	2	
TT62014	JP	S	14	19	114	12	
TT62015	JP	S	7	12	23	6	
TT62501	CRC	S	11	24	42	6	
TT62502	CRC	S	17	28	70	9	
TT62503	CRC	S	16	28	82	6	
TT62504	CRC	S	18	34	121	4	
TT72101	PTRG	S	3	36	111	4	
TT72102	PTRG	S	6	24	79	10	
TT72103	PTRG	S	5	28	48	2	
TT72104	CRO	S	10	15	53	2	
TT72105	CRO	S	24	24	77	4	
TT2106	CRO	S	24	19	92	2	
TA70501	JP	S	22	149	965	15	Oxapampa

SAMPLE NO.	GEOLOGICAL UNIT	SOIL	ATOMIC ABSORPTION METHOD			DITHIZON	LOCATION
			Cu	Pb	Zn	Zn	
			ppm	ppm	ppm	γ	
TA70502	JP	S	7	205	308	5	Oxapampa
TA70503	JP	S	5	449	868	16	
TA70504	JP	S	49	3,800	9,951	69	
TA70505	JP	S	58	2,625	8,411	1,725	
TA70506	JP	S	27	883	1,530	10	
TA70507	JP	S	47	1,178	5,721	1,875	
TA70508	JP	S	10	69	335	9	
TA70509	JP	S	11	50	188	7	
TA70510	CRC	S	5	5	16	4	
TA70511	JP	S	3	0	15	3	
TA70512	JP	S	8	3	19	6	
TA70513	JP	S	3	29	65	4	
TA70514	JP	S	46	160	349	11	
TA70515	JP	S	36	351	5,452	563	
TA70516	JP	S	7	237	585	8	
TA70517	JP	S	30	168	519	9	
TA70518	JP	S	46	120	729	15	
TA70519	JP	S	44	82	437	4	
TA70520	JP	S	39	128	551	2	
TA70601	JP	S	14	11	64	9	
TA70602	JP	S	5	19	31	7	
TA70603	JP	S	9	38	24	5	
TA70604	JP	S	45	44	52	3	
TA70605	JP	S	32	112	54	5	
TA72101	JP	S	15	85	725	15	
TA72102	JP	S	19	48	484	41	
TA72103	JP	S	15	198	661	12	
TA72104	JP	S	16	40	551	41	
TA72105	JP	S	10	74	589	12	
TA72106	JP	S	12	140	751	225	
TA72107	JP	S	30	27	571	85	
TA72108	JP	S	21	34	404	6	
TA72109	JP	S	28	24	313	33	
TA72110	JP	S	12	5	166	35	
TA72111	JP	S	23	32	401	24	

SAMPLE NO.	GEOLOGICAL UNIT	SOIL	ATOMIC ABSORPTION METHOD			DITHIZON	LOCATION
			Cu	Pb	Zn	Zn	
			ppm	ppm	ppm	γ	
TA72112	JP	S	13	343	1,229	8	Oxapampa
TA72113	JP	S	6	343	2,309	48	
TA72114	JP	S	7	167	697	10	
TA72115	JP	S	4	66	653	7	
TA72116	JP	S	7	481	685	10	
TA72117	JP	S	7	966	964	6	
TA72118	JP	S	4	103	434	4	
TA72119	JP	S	5	217	774	5	
TA72120	JP	S	5	407	619	7	
TA72121	JP	S	6	280	627	5	
TA72122	JP	S	6	378	447	5	
TA72123	JP	S	4	53	155	2	
TA72124	JP	S	2	48	114	4	
TA72125	JP	S	6	53	169	2	
TA72126	JP	S	23	24	69	3	
TA72127	JP	S	102	26	55	2	
TA72201	JP	S	9	62	243	11	
TA72202	JP	S	18	253	1,072	15	
TA72203	JP	S	32	65	535	113	
TA72204	JP	S	9	144	450	6	
TA72205	JP	S	24	833	1,460	3	
TA72206	JP	S	30	14	243	113	
TA72207	JP	S	9	43	235	18	
TA72414	JP	S	44	5	41	7	
TA72415	JP	S	18	21	53	11	
TT72201	JP	S	12	222	2,160	10	
TT72202	JP	S	6	145	398	3	
TT72203	JP	S	12	388	184	20	
TT72204	JP	S	3	252	456	4	
TK61501	JP	S	23	120	780	56	
TK61502	JP	S	7	530	705	7	
TK61503	JP	S	46	1,290	6,700	18,750	
TK61504	JP	S	4	10	25	6	
TK61505	JP	S	21	195	770	100	
TK61506	JP	S	15	95	240	15	

SAMPLE NO.	GEOLOGICAL UNIT	SOIL	ATOMIC ABSORPTION METHOD			DITHIZON	LOCATION
			Cu	Pb	Zn	Zn	
			ppm	ppm	ppm	γ	
TK61507	JP	S	19	245	590	12	Oxapampa
TK61508	JP	S	16	70	525	11	
TK61509	JP	S	11	155	835	11	
TK61510	JP	S	13	200	1,060	10	
TK61511	JP	S	9	160	660	7	
TK61512	JP	S	11	550	3,650	12	
TK61513	JP	S	5	15	40	2	
TK61514	JP	S	3	25	48	2	
TK61515	JP	S	7	25	31	2	
TK61516	JP	S	18	55	63	2	
TK61517	JP	S	15	100	75	3	
TK61518	JP	S	20	140	200	2	
TK61519	JP	S	23	140	200	2	
TK61520	JP	S	28	40	215	1	
TK61521	JP	S	21	30	160	2	
TK61522	JP	S	21	35	390	10	
TK61523	JP	S	36	40	365	20	
TK61524	JP	S	26	60	895	44	
TK61525	JP	S	8	160	790	35	
TK61526	JP	S	9	180	1,615	15	
TK61527	JP	S	43	95	300	10	
TK61528	JP	S	13	30	600	106	
TK61529	JP	S	18	200	870	66	
TK61530	JP	S	35	45	155	20	
TK61601	JP	S	16	845	650	7	
TK61602	JP	S	20	985	7,650	1,300	
TK61603	PTRG	S	11	90	185	14	
TK61604	PTRG	S	11	25	75	3	
TK61605	PTRG	S	9	30	63	6	
TK61606	PTRG	S	9	100	270	8	
TK61607	PTRG	S	12	90	170	4	
TK61608	PTRG	S	16	110	250	6	
TK61609	PTRG	S	12	125	305	14	
TK61610	PTRG	S	12	75	180	8	
TK61611	PTRG	S	20	500	850	10	

SAMPLE NO.	GEOLOGICAL UNIT	SOIL	ATOMIC ABSORPTION METHOD			DITHIZON	LOCATION
			Cu	Pb	Zn	Zn	
			ppm	ppm	ppm	γ	
TK61612	PTRG	S	6	410	835	7	Oxapampa
TK61613	JP	S	8	780	200	5	
TK61614	JP	S	5	340	430	6	
TK61615	JP	S	20	535	870	17	
TK61616	JP	S	9	670	745	17	
TK61617	JP	S	26	380	2,900	20	
TK61618	JP	S	20	200	4,200	89	
TK61619	JP	S	34	290	8,050	275	
TK61620	JP	S	13	195	4,400	48	
TK61621	JP	S	27	525	8,500	350	
TK61622	JP	S	83	3,400	15,000	2,375	
TK61623	JP	S	18	425	1,690	73	
TK61624	JP	S	13	290	660	35	
TK61625	JP	S	14	510	560	48	
TK61626	PTRG	S	13	175	265	10	
TK61627	PTRG	S	23	60	90	13	
TK61628	JP	S	30	6,900	5,750	125	
TK61629	JP	S	11	1,130	1,485	338	
TK61630	JP	S	15	145	170	7	
TK61631	JP	S	16	180	405	20	
TK61632	JP	S	33	700	4,100	188	
TK61701	JP	S	103	2,225	7,800	1,200	
TK61702	JP	S	12	225	465	15	
TK61703	JP	S	15	298	755	20	
TK61704	JP	S	122	2,805	720	15	
TK61705	JP	S	6	55	42	2	
TK61706	JP	S	13	98	215	78	
TK61707	JP	S	25	235	785	100	
TK61708	JP	S	15	780	2,400	85	
TK61709	JP	S	31	1,430	1,550	74	
TK61710	JP	S	20	403	725	15	
TK61712	JP	S	35	710	1,850	150	
TK61713	JP	S	4	38	115	24	
TK61714	JP	S	4	48	58	10	
TK61715	JP	S	14	478	1,950	16	

SAMPLE NO.	GEOLOGICAL UNIT	SOIL	ATOMIC ABSORPTION METHOD			DITHIZON	LOCATION
			Cu	Pb	Zn	Zn	
			ppm	ppm	ppm	γ	
TK61716	JP	S	16	98	1,350	15	Oxapampa
TK61717	JP	S	27	393	2,400	100	
TK61718	JP	S	14	63	105	12	
TK61801	JP	S	16	145	325	6	
TK61802	JP	S	39	590	1,750	118	
TK61803	JP	S	58	2,050	8,600	950	
TK61804	JP	S	54	970	3,800	225	
TK61805	JP	S	58	1,360	16,750	2,375	
TK61806	JP	S	12	860	2,100	475	
TK61807	JP	S	23	810	1,800	12	
TK61808	JP	S	27	1,860	4,800	98	
TK61810	JP	S	29	80	55	1	
TK61813	JP	S	2	25	15	3	
TK61816	JP	S	30	50	230	15	
TK61817	JP	S	27	35	58	7	
TK61818	J		7	10	30	3	
TK61820	JP	S	16	35	183	19	
TK61901	JP	S	17	45	38	11	
TK61902	JP	S	22	45	33	10	
TK61903	JP	S	9	20	13	6	
TK61905	JP	S	23	70	28	7	
TK61906	JP	S	22	70	30	13	
TK61907	JP	S	9	45	28	2	
TK61908	JP	S	19	60	90	11	
TK61910	JP	S	4	35	50	8	
TK61911	JP	S	22	50	38	9	
TK61912	JP	S	38	110	110	2	
TK61914	CRO	S	4	10	40	6	
TK61915	JP	S	4	20	50	4	
TK61917	JP	S	9	10	35	10	
TK61918	JP	S	11	20	38	5	
TK61919	JP	S	9	15	90	9	
TK61920	JP	S	9	50	23	3	
TK62101	JP	S	8	50	18	2	
TK62103	JP	S	5	23	20	5	

SAMPLE NO.	GEOLOGICAL UNIT	SOIL	ATOMIC ABSORPTION METHOD			DITHIZON	LOCATION
			Cu	Pb	Zn	Zn	
			ppm	ppm	ppm	γ	
TK62104	JP	S	22	78	325	20	Oxapampa
TK62105	CRO	S	27	50	105	5	
TK62110	JP	S	13	53	105	5	
TK62112	JP	S	12	43	140	8	
TK62115	JP	S	32	105	67	1	
TK62117	JP	S	19	43	255	2	
TK62118	JP	S	4	10	72	6	
TK62119	JP	S	3	23	102	10	
TK62120	JP	S	7	23	170	16	
TK62121	JP	S	5	38	185	12	
TK62123	JP	S	6	18	18	5	
TK62124	JP	S	33	113	355	24	
TK62125	JP	S	12	18	175	5	
TK62126	JP	S	32	93	275	8	
TK62127	JP	S	10	15	29	8	
TK62201	JP	S	135	525	16,500	250	
TK62202	JP	S	17	635	2,650	188	
TK62203	JP	S	26	910	3,250	81	
TK62204	JP	S	7	205	1,425	35	
TK62205	JP	S	22	80	400	18	
TK62207	JP	S	9	70	118	7	
TK62209	JP	S	17	65	38	7	
TK62211	CRO	S	7	25	25	6	
TK62212	CRO	S	13	25	28	6	
TK62213	CRO	S	9	10	23	7	
TK62214	JP	S	2	10	10	16	
TK62216	JP	S	9	75	153	10	
TK62217	JP	S	15	35	40	3	
TK62220	JP	S	22	85	180	11	
TK62222	JP	S	7	30	35	5	
TK62223	CRO	S	15	30	83	6	
TK62225	JP	S	4	10	8	6	
TK62226	CRO	S	4	10	8	4	
TK62228	JP	S	4	5	8	5	
TK62230	CRO	S	22	30	13	7	

SAMPLE NO.	GEOLOGICAL UNIT	SOIL	ATOMIC ABSORPTION METHOD			DITHIZON	LOCATION
			Cu	Pb	Zn	Zn	
			ppm	ppm	ppm	γ	
TK62231	CRO	S	22	120	300	11	Oxapampa
TK62301	THO	S	2	105	50	4	
TK62303	JP	S	23	65	88	4	
TK62305	JP	S	2	20	23	4	
TK62307	JP	S	2	25	20	6	
TK62310	JP	S	4	30	25	7	
TK62311	JP	S	88	190	880	85	
TK62313	JP	S	2	10	5	5	
TK62316	JP	S	32	1,900	2,050	16	
TK62317	JP	S	19	90	180	3	
TK62319	JP	S	34	130	75	3	
TK62320	JP	S	29	25	270	20	
TK62321	JP	S	29	20	363	12	
TK62322	JP	S	19	30	268	18	
TK62323	JP	S	10	15	178	9	
TK62324	JP	S	19	45	345	8	
TK62325	JP	S	15	85	460	15	
TK62326	JP	S	4	100	660	12	
TK62327	JP	S	15	180	1,300	20	
TK62328	JP	S	10	375	910	48	
TK62329	JP	S	10	115	390	3	
TK62330	JP	S	17	175	740	40	
TK62401	JP	S	37	620	3,550	16	
TK62408	JP	S	19	43	150	3	
TK62410	JP	S	12	60	105	12	
TK62412	JP	S	11	35	53	7	
TK62413	JP	S	53	43	250	11	
TK62414	JP	S	12	108	1,600	16	
TK62415	JP	S	22	55	630	10	
TK62416	JP	S	14	55	53	2	
TK62417	JP	S	29	133	830	48	
TK62418	JP	S	15	63	105	2	
TK62419	JP	S	29	28	300	10	
TK62420	JP	S	17	48	58	2	
TK62421	JP	S	22	105	1,005	9	

SAMPLE NO.	GEOLOGICAL UNIT	SOIL	ATOMIC ABSORPTION METHOD			DITHIZON	LOCATION
			Cu	Pb	Zn	Zn	
			ppm	ppm	ppm	γ	
TK62422	JP	S	4	26	395	11	Oxapampa
TK62423	JP	S	19	15	1,650	8	
TK62424	JP	S	30	45	160	4	
TK62426	JP	S	16	23	355	22	
TK62427	JP	S	19	58	180	3	
TK62429	JP	S	21	70	200	4	
TK62501	JP	S	25	2,100	5,850	250	
TK62502	JP	S	218	3,800	8,650	2,375	
TK62503	JP	S	10	158	605	81	
TK62504	JP	S	10	120	525	14	
TK62505	JP	S	135	500	2,250	475	
TK62506	JP	S	89	2,230	6,300	1,700	
TK62507	JP	S	20	355	2,250	375	
TK62508	JP	S	41	143	1,700	450	
TK62509	JP	S	14	85	190	11	
TK62510	JP	S	21	200	625	50	
TK62511	JP	S	15	208	620	17	
TK62512	JP	S	15	520	990	15	
TK62513	JP	S	9	445	1,900	7	
TK62514	JP	S	11	130	1,230	17	
TK62515	JP	S	10	215	1,045	16	
TK62516	JP	S	22	245	1,635	60	
TK62517	JP	S	39	113	980	8	
TK62518	JP	S	8	55	160	48	
TK62519	JP	S	22	55	470	14	
TK62520	JP	S	10	135	1,560	12	
TK62521	JP	S	20	438	1,980	44	
TK62522	JP	S	23	63	1,030	38	
TK62523	JP	S	25	30	375	61	
TK62524	JP	S	13	20	290	9	
TK62525	JP	S	16	55	1,045	17	
TK62526	JP	S	31	40	615	5	
TK62527	JP	S	31	55	550	35	
TK62528	JP	S	23	20	285	22	
TK62529	JP	S	31	45	235	16	

SAMPLE NO.	GEOLOGICAL UNIT	SOIL	ATOMIC ABSORPTION METHOD			DITHIZON	LOCATION
			Cu	Pb	Zn	Zn	
			ppm	ppm	ppm	γ	
TK62530	JP	S	23	55	815	90	Oxapampa
TK62531	JP	S	29	60	340	12	
TK62532	JP	S	31	65	250	10	
TK62533	JP	S	22	30	160	7	
TK62534	JP	S	20	23	300	10	
TK62535	JP	S	33	70	660	73	
TK62536	JP	S	20	63	590	35	
TK62537	JP	S	25	40	215	7	
TK62538	JP	S	23	70	425	15	
TK62539	JP	S	23	150	1,005	188	
TK62540	JP	S	28	23	255	12	
TK70201	JP	S	16	30	93	10	
TK70210	JP	S	16	35	151	8	
TK70211	JP	S	8	15	20	7	
TK70212	JP	S	14	85	125	7	
TK70319	JP	S	4	5	15	6	
TK70320	JP	S	8	20	65	7	
TK70321	JP	S	12	35	93	4	
TK70322	JP	S	6	20	55	6	
TK70323	JP	S	6	25	78	5	
TK70324	JP	S	12	40	25	2	
TK70325	JP	S	4	15	5	2	
TK70327	JP	S	2	10	8	6	
TK70328	JP	S	2	10	5	3	
TK70330	JP	S	1	10	5	3	
TK70333	JP	S	1	10	5	2	
TK70334	JP	S	2	10	5	3	
TK70335	JP	S	1	5	5	2	
TK70336	JP	S	23	50	330	7	
TK70342	JP	S	21	100	88	4	
TK70343	JP	S	25	85	50	3	
TK70344	JP	S	27	55	160	39	
TK70345	JP	S	10	100	200	10	
TK70601	JP	S	19	20	75	4	
TK70602	JP	S	17	115	353	8	

SAMPLE NO.	GEOLOGICAL UNIT	SOIL	ATOMIC ABSORPTION METHOD			DITHIZON	LOCATION
			Cu	Pb	Zn	Zn	
			ppm	ppm	ppm	γ	
TK70605	JP	S	8	80	85	2	Oxapampa
TK70606	JP	S	12	265	730	15	
TK70607	JP	S	23	15	160	17	
TK70608	JP	S	21	30	140	10	
TK70609	JP	S	16	15	135	8	
TK70610	JP	S	17	15	138	10	
TK70611	JP	S	17	25	100	4	
TK70612	JP	S	15	15	98	10	
TK70613	JP	S	11	18	133	5	
TK70615	JP	S	20	58	133	7	
TK70618	JP	S	11	73	20	2	
TK70619	JP	S	11	18	73	4	
TK70701	JP	S	13	50	33	4	
TK70702	JP	S	10	50	25	3	
TK70704	JP	S	25	20	240	12	
TK70705	JP	S	22	20	128	8	
TK70706	JP	S	22	30	228	2	
TK70708	JP	S	34	60	195	9	
TK70709	JP	S	29	30	225	5	
TK71714	PTRG	S	23	35	70	6	
TK71715	JP	S	103	73	165	10	
TK71716	JP	S	11	28	475	5	
TK71717	JP	S	18	50	615	2	
TK71718	JP	S	14	88	1,600	138	
TK71719	JP	S	10	213	2,000	53	
TK71720	JP	S	6	493	6,400	288	
TK71721	JP	S	6	163	6,150	1,125	
TK71722	JP	S	10	320	4,050	475	
TK71802	CRO	S	20	45	160	7	
TK71803	CRO	S	5	425	320	10	
TK71804	CRO	S	5	10	23	5	
TK71930	JP	S	21	25	235	19	
TK71931	JP	S	30	40	165	29	
TK71931	JP	S	23	25	265	29	
TK71932	JP	S	20	30	265	22	

SAMPLE NO.	GEOLOGICAL UNIT	SOIL	ATOMIC ABSORPTION METHOD			DITHIZON	LOCATION
			Cu	Pb	Zn	Zn	
			ppm	ppm	ppm	γ	
TK71933	JP	S	33	48	580	15	Oxapampa
TK71934	JP	S	23	30	355	60	
TK71935	JP	S	13	25	200	3	
TK71936	JP	S	11	38	425	5	
TK71937	JP	S	15	163	1,450	388	
TK71938	JP	S	16	188	2,350	288	
TK71939	JP	S	20	408	6,900	1,123	
TK71940	JP	S	21	390	4,300	150	
TK71941	JP	S	19	98	745	100	
TK72001	JP	S	9	360	4,100	400	
TK72004	JP	S	9	330	3,700	413	
TK72005	JP	S	13	240	3,550	2	
TK72006	JP	S	31	25	285	14	
TK72007	JP	S	20	15	240	7	
TK72008	JP	S	13	155	955	88	
TK72009	JP	S	11	45	340	6	
TK72010	JP	S	14	75	530	13	
TK72011	JP	S	37	35	430	29	
TK72012	JP	S	13	90	575	8	
TK72013	JP	S	16	170	990	8	
TK72014	JP	S	16	35	535	36	
TK72015	JP	S	16	80	515	18	
TK72016	JP	S	31	30	415	33	
TK72017	JP	S	25	20	343	9	
TK72018	JP	S	9	90	333	6	
TK72019	JP	S	9	55	585	10	
TK72020	JP	S	5	100	570	9	
TK72021	JP	S	4	305	1,900	19	
TK72022	JP	S	10	1,230	3,200	475	
TK72023	JP	S	16	555	1,800	2	
TH70201	JP	S	28	30	190	12	
TH70202	JP	S	17	25	250	7	
TH70203	JP	S	21	33	203	6	
TH70204	JP	S	15	83	1,050	48	
TH70205	JP	S	6	383	3,025	110	

SAMPLE NO.	GEOLOGICAL UNIT	SOIL	ATOMIC ABSORPTION METHOD			DITHIZON	LOCATION
			Cu	Pb	Zn	Zn	
			ppm	ppm	ppm	γ	
TH70206	JP	S	20	415	1,290	8	Oxapampa
TH70207	JP	S	12	85	760	60	
TH70208	JP	S	15	193	1,310	288	
TH70209	JP	S	27	100	740	238	
TH70210	JP	S	19	73	325	21	
TH70211	JP	S	21	33	230	7	
TH70212	JP	S	26	23	300	16	
TH70213	JP	S	19	73	358	9	
TH70214	JP	S	16	53	395	16	
TH70215	JP	S	12	475	1,840	40	
TH70216	JP	S	10	110	935	21	
TH70217	JP	S	29	60	560	115	
TH70218	JP	S	21	38	365	13	
TK72201	PM	S	2	5	15	3	Oxapampa Este
TK72202	CRO	S	2	8	9	3	
TK72203	CRO	S	5	5	15	2	
TK72204	CRO	S	3	8	16	3	
TT70801	TVY	S	6	24	65	8	Llaupi
TA70101	JP	S	1	825	1,003	18	Churmazu
TA70102	JP	S	0	38	300	10	
TA70103	JP	S	4	139	434	10	
TA70104	JP	S	16	14	251	16	
TA70105	JP	S	16	41	228	10	
TA70106	JP	S	9	164	1,986	15	
TA70107	JP	S	25	1,096	4,113	44	
TA70108	JP	S	9	486	878	8	
TA70109	JP	S	8	156	548	9	
TA70110	JP	S	51	38	513	175	
TA70111	JP	S	28	399	2,004	19	
TA70112	JP	S	18	189	282	4	
TA70113	JP	S	25	79	163	3	
TA70114	JP	S	6	68	208	4	

SAMPLE NO.	GEOLOGICAL UNIT	SOIL	ATOMIC ABSORPTION METHOD			DITHIZON	LOCATION
			Cu	Pb	Zn	Zn	
			ppm	ppm	ppm	γ	
TA70115	JP	S	16	186	425	10	Churmazu
TA70116	JP	S	17	251	1,755	9	
TA70117	JP	S	9	172	332	8	
TA70118	JP	S	9	167	269	3	
TA70119	JP	S	1	3	15	7	
TA70120	JP	S	175	19	69	4	
TA70201	JP	S	3	29	28	3	
TA70202	JP	S	8	32	309	14	
TA70203	JP	S	8	37	257	4	
TA70204	JP	S	16	11	288	5	
TA70205	JP	S	45	27	439	10	
TA70206	JP	S	13	8	189	11	
TA70207	JP	S	11	11	231	15	
TA70208	JP	S	31	19	243	3	
TA70209	JP	S	2	9	32	5	
TA70210	JP	S	33	197	239	4	
TA70211	JP	S	36	21	442	15	
TA70212	JP	S	21	16	395	10	
TA70213	JP	S	16	21	288	20	
TA70214	JP	S	13	13	93	5	
TA70215	JP	S	20	35	179	4	
TA70216	JP	S	11	45	68	5	
TA70301	JP	S	10	24	47	4	
TA70302	CRC	S	6	8	28	3	
TA70303	CRC	S	2	11	32	4	
TA70304	CRC	S	22	34	330	9	
TA70305	CRC	S	7	119	337	10	
TA70306	CRC	S	8	32	27	8	
TA70307	CRC	S	91	26	134	5	
TA70308	CRC	S	12	19	41	3	
TA70309	CRC	S	40	1,616	4,577	475	
TA70310	CRC	S	5	135	840	76	
TA70311	CRC	S	13	32	153	5	
TA70606	JP	S	6	16	30	6	
TA70607	JP	S	10	60	81	4	

SAMPLE NO.	GEOLOGICAL UNIT	SOIL	ATOMIC ABSORPTION METHOD			DITHIZON	LOCATION
			Cu	Pb	Zn	Zn	
			ppm	ppm	ppm	γ	
TA70608	JP	S	13	41	58	5	Churmazu
TA70609	JP	S	10	36	27	2	
TA70610	JP	S	8	33	38	8	
TA70611	JP	S	12	36	58	3	
TA70612	JP	S	26	30	155	44	
TA70613	JP	S	3	30	13	8	
TA70614	JP	S	18	52	37	4	
TA70615	JP	S	6	27	29	6	
TA70616	JP	S	17	77	66	2	
TA70617	JP	S	21	33	32	7	
TA70618	JP	S	15	27	24	3	
TA70619	JP	S	76	107	50	5	
TA70620	JP	S	35	96	43	5	
TA70621	JP	S	9	36	24	2	
TA70622	JP	S	24	85	51	2	
TA70701	JP	S	15	59	33	2	
TA70702	JP	S	30	89	65	4	
TA70703	JP	S	16	54	32	2	
TA70704	JP	S	35	32	22	2	
TA70705	JP	S	10	41	27	2	
TA70706	JP	S	17	86	33	2	
TA70707	JP	S	7	30	29	2	
TA70708	JP	S	8	49	27	2	
TA70709	JP	S	14	54	32	2	
TA70710	JP	S	11	51	26	2	
TA70711	JP	S	10	43	24	2	
TA70712	JP	S	14	62	50	5	
TA70713	JP	S	21	38	85	24	
TA70714	JP	S	16	59	76	10	
TA70715	JP	S	28	59	200	6	
TA70716	JP	S	18	41	94	2	
TA70717	JP	S	16	24	68	7	
TA70718	JP	S	23	16	185	2	
TA70719	JP	S	69	14	293	8	
TA70720	JP	S	19	22	81	7	

SAMPLE NO.	GEOLOGICAL UNIT	SOIL	ATOMIC ABSORPTION METHOD			DITHIZON	LOCATION
			Cu	Pb	Zn	Zn	
			ppm	ppm	ppm	γ	
TA70721	JP	S	20	5	177	6	Churmazu
TA70722	JP	S	19	27	68	2	
TA70723	JP	S	25	24	77	9	
TA70724	JP	S	11	14	62	5	
TA70725	JP	S	18	32	202	10	
TA70801	JP	S	25	130	155	5	
TA70802	JP	S	10	0	55	3	
TA70803	JP	S	26	13	272	10	
TA70804	JP	S	33	21	322	6	
TA70805	JP	S	22	51	141	6	
TA70806	JP	S	28	59	157	4	
TA70807	JP	S	12	5	157	10	
TA70808	JP	S	37	24	416	7	
TA70907	JP	S	48	177	510	12	
TA70908	JP	S	10	21	145	9	
TA70909	JP	S	17	48	374	20	
TA70910	JP	S	13	32	121	5	
TA70911	JP	S	17	24	197	8	
TA70912	JP	S	5	11	42	3	
TA70913	JP	S	15	34	115	2	
TA70914	JP	S	7	58	63	2	
TA70915	JP	S	42	25	48	2	
TA70916	JP	S	16	82	34	2	
TA70917	JP	S	14	41	24	2	
TA70918	JP	S	15	55	37	2	
TA70919	JP	S	16	25	53	3	
TA70920	JP	S	14	41	57	2	
TA70921	JP	S	16	41	61	5	
TA70922	JP	S	8	5	26	6	
TA70923	JP	S	5	41	41	3	
TA71501	JP	S	39	27	269	5	
TA71502	JP	S	8	16	50	5	
TA71503	JP	S	15	194	364	14	
TA71504	JP	S	11	11	274	14	
TA71505	JP	S	17	16	243	7	

SAMPLE NO.	GEOLOGICAL UNIT	SOIL	ATOMIC ABSORPTION METHOD			DITHIZON	LOCATION
			Cu	Pb	Zn	Zn	
			ppm	ppm	ppm	γ	
TA71506	JP	S	10	19	262	4	Churmazu
TA71507	JP	S	7	11	251	3	
TA71508	JP	S	11	16	231	8	
TA71509	JP	S	53	27	353	2	
TA71510	JP	S	8	14	81	3	
TA71511	JP	S	9	16	261	10	
TA71512	JP	S	13	11	84	16	
TA71513	JP	S	15	123	317	6	
TA71514	JP	S	24	52	254	15	
TA71515	JP	S	14	107	400	15	
TA71516	JP	S	14	25	296	5	
TA71517	JP	S	3	8	68	6	
TA71518	JP	S	16	33	431	7	
TA71519	JP	S	4	31	548	7	
TA71520	JP	S	2	5	81	5	
TA71521	JP	S	11	41	422	17	
TA71522	JP	S	12	22	547	25	
TA71523	JP	S	5	14	185	6	
TA71524	JP	S	3	19	296	3	
TA71525	JP	S	31	5	74	3	
TA71526	JP	S	6	3	29	2	
TA71527	JP	S	2	8	10	4	
TA71528	JP	S	12	14	34	7	
TA71529	JP	S	0	0	5	2	
TA71530	JP	S	4	11	54	6	
TA71531	JP	S	10	16	228	5	
TA71601	JPC	S	41	56	173	6	
TA71602	JPC	S	54	16	48	6	
TA71603	PTRG	S	37	72	56	3	
TA71604	PTRG	S	38	53	55	8	
TA71605	PTRG	S	51	101	166	3	
TA71606	PTRG	S	13	16	36	3	
TA71607	PTRG	S	14	8	30	3	
TA71608	PTRG	S	21	16	25	7	
TA71609	JP	S	16	32	82	5	

SAMPLE NO.	GEOLOGICAL UNIT	SOIL	ATOMIC ABSORPTION METHOD			DITHIZON	LOCATION
			Cu	Pb	Zn	Zn	
			ppm	ppm	ppm	γ	
TA71610	JP	S	18	61	303	2	Churmazu
TA71611	JP	S	24	43	161	3	
TA71612	JP	S	14	40	63	5	
TA71613	JP	S	10	13	25	3	
TA71614	JP	S	9	35	61	3	
TA71615	JP	S	196	120	76	4	
TA71616	PTRG	S	21	29	153	6	
TA71617	JP	S	177	80	40	5	
TA71618	PTRG	S	10	8	20	3	
TA71619	PTRG	S	18	5	45	3	
TA71620	PTRG	S	10	0	27	6	
TA71701	JP	S	27	76	81	2	
TA71702	JP	S	49	1,222	1,288	100	
TA71703	JP	S	29	86	71	2	
TA71704	JP	S	19	22	62	2	
TA71705	JP	S	44	86	274	6	
TA71706	JP	S	15	51	52	2	
TA71707	JP	S	29	76	75	6	
TA71708	JP	S	30	62	97	11	
TA71709	JP	S	31	46	95	5	
TA71710	JP	S	33	54	208	18	
TA71711	JP	S	34	103	219	10	
TA71712	TVY	S	25	68	244	7	
TA71713	JP	S	0	0	5	2	
TA71714	JP	S	3	0	10	5	
TA71715	JP	S	5	3	13	4	
TA71716	JP	S	35	51	75	2	
TA71717	TVY	S	36	0	35	3	
TA71718	TVY	S	13	108	27	5	
TA71719	TVY	S	15	108	47	5	
TA71720	TVY	S	11	51	24	6	
TA71721	TVY	S	5	35	45	6	
TA71722	TVY	S	7	70	24	3	
TA71723	TVY	S	10	106	35	6	
TA71724	TVY	S	7	21	26	5	

SAMPLE NO.	GEOLOGICAL UNIT	SOIL	ATOMIC ABSORPTION METHOD			DITHIZON	LOCATION
			Cu	Pb	Zn	Zn	
			ppm	ppm	ppm	γ	
TA71725	TVY	S	17	29	235	6	Churmazu
TA71726	JP	S	7	5	15	4	
TA71727	JP	S	11	109	46	6	
TA71728	JP	S	11	11	23	6	
TA71729	JP	S	9	29	12	2	
TA71730	JP	S	8	51	19	2	
TA71801	JP	S	11	88	164	3	
TA71802	JP	S	12	115	190	2	
TA71803	JP	S	12	14	71	2	
TA71804	JP	S	14	137	168	2	
TA71805	JP	S	14	55	36	6	
TA71806	PTRG	S	14	43	34	6	
TA71807	JP	S	7	8	36	2	
TA71808	JPC	S	30	3	45	6	
TA71809	JPC	S	32	5	47	2	
TA71810	JP	S	16	47	75	2	
TA71811	JP	S	72	27	21	2	
TA71812	JP	S	20	146	288	9	
TA71813	JP	S	24	266	715	11	
TA71814	JP	S	16	275	438	8	
TA71815	JP	S	22	346	370	21	
TA71816	JP	S	37	220	656	53	
TA71817	JP	S	23	41	80	2	
TA71818	JP	S	23	58	87	2	
TA71819	JP	S	30	228	590	8	
TA71820	TVY	S	81	102	215	7	
TA71901	TVY	S	4	16	38	3	
TA71902	TVY	S	3	30	25	3	
TA71903	TVY	S	8	19	34	2	
TA71904	TVY	S	2	24	45	2	
TA71905	TVY	S	5	22	40	7	
TA71906	JP	S	18	144	84	16	
TA71907	JP	S	7	35	191	6	
TA71908	CRC	S	23	35	82	4	
TA71909	CRC	S	11	16	62	8	

SAMPLE NO.	GEOLOGICAL UNIT	SOIL	ATOMIC ABSORPTION METHOD			DITHIZON	LOCATION
			Cu	Pb	Zn	Zn	
			ppm	ppm	ppm	γ	
TA71910	CRC	S	60	79	663	288	Churumazu
TA71911	CRC	S	9	139	250	2	
TA71912	CRC	S	32	114	416	12	
TA71913	CRC	S	6	231	94	3	
TA71914	CRC	S	21	128	473	6	
TA71915	JP	S	7	136	323	7	
TA71916	JP	S	12	98	200	3	
TA72001	JP	S	5	8	19	2	
TA72002	CRC	S	2	0	11	2	
TA72003	CRC	S	6	8	17	7	
TA72004	CRC	S	1	0	11	2	
TA72005	JP	S	16	22	79	2	
TA72006	JP	S	42	277	3,818	125	
TA72007	TVY	S	4	166	70	3	
TA72008	JP	S	1	0	339	100	
TA72009	JP	S	11	117	72	5	
TA72010	JP	S	0	0	19	2	
TA72011	CRC	S	1	8	18	2	
TA72012	CRC	S	20	22	93	4	
TN70601	JP	S	14	30	248	2	
TN70602	JP	S	19	37	263	2	
TN70603	JP	S	15	38	231	3	
TN70604	JP	S	14	25	223	11	
TN70605	JP	S	8	19	130	5	
TN70606	JP	S	8	30	129	2	
TN70607	JP	S	10	16	113	2	
TN70608	JP	S	11	34	157	3	
TN70609	JP	S	4	12	152	13	
TN70610	JP	S	2	10	111	10	
TN70611	JP	S	7	13	99	3	
TN70612	JP	S	7	19	246	20	
TN70613	JP	S	5	18	162	9	
TN70614	JP	S	3	8	55	8	
TN70615	JP	S	5	16	118	4	
TN70616	JP	S	5	11	88	4	

SAMPLE NO.	GEOLOGICAL UNIT	SOIL	ATOMIC ABSORPTION METHOD			DITHIZON	LOCATION
			Cu	Pb	Zn	Zn	
			ppm	ppm	ppm	γ	
TN70617	JP	S	2	6	27	3	Churumazu
TN70618	JP	S	3	16	46	6	
TN70619	JP	S	2	13	97	3	
TN70620	JP	S	4	22	116	3	
TN70621	JP	S	2	18	59	10	
TN70622	JP	S	1	10	32	3	
TN70623	JP	S	1	17	20	4	
TN70624	JP	S	1	17	19	4	
TN70701	JP	S	16	18	102	5	
TN70702	JP	S	12	22	107	2	
TN70708	JP	S	25	24	361	13	
TN70709	JP	S	14	28	130	2	
TN70710	JP	S	12	22	114	2	
TN70711	JP	S	7	18	179	2	
TN70712	JP	S	11	23	129	2	
TN70713	JP	S	9	17	236	2	
TN70714	JP	S	18	29	126	2	
TN70715	JP	S	9	10	46	2	
TN70716	JP	S	10	27	112	2	
TN70717	JP	S	11	26	153	2	
TN70718	JP	S	15	23	130	2	
TN70719	JP	S	10	32	110	2	
TN70720	JP	S	8	21	148	3	
TN70721	JP	S	7	36	54	2	
TN70722	JP	S	3	25	40	3	
TN70723	JP	S	10	22	40	2	
TS61523	JP	S	12	20	65	3	
TS61524	JP	S	8	25	69	3	
TS61525	JP	S	8	28	72	3	
TS61526	JP	S	14	34	182	3	
TS61618	JP	S	5	13	49	4	
TS61619	JP	S	4	76	138	5	
TS61620	JP	S	4	10	30	2	
TS61621	JP	S	1	5	10	2	
TS61622	JP	S	3	19	85	5	

SAMPLE NO.	GEOLOGICAL UNIT	SOIL	ATOMIC ABSORPTION METHOD			DITHIZON	LOCATION
			Cu	Pb	Zn	Zn	
			ppm	ppm	ppm	γ	
TS61623	JP	S	7	19	75	3	Churumazu
TS61624	JP	S	10	29	158	5	
TS61625	JP	S	10	16	73	2	
TS61626	JP	S	17	23	129	2	
TS70701	TVY	S	18	70	417	15	
TK62403	JP	S	10	63	81	3	
TK62404	JP	S	7	15	50	5	
TK62405	JP	S	17	33	115	6	
TK62407	JP	S	28	30	66	4	
TK70101	JP	S	28	100	665	2	
TK70102	JP	S	25	130	545	2	
TK70103	JP	S	3	140	690	9	
TK70104	JP	S	23	195	1,125	2	
TK70105	JP	S	35	28	415	3	
TK70106	JP	S	16	15	410	14	
TK70107	JP	S	10	33	91	6	
TK70108	JP	S	36	23	29	5	
TK70109	JP	S	42	810	4,000	11	
TK70110	JP	S	26	885	11,300	1,500	
TK70111	JP	S	30	540	4,100	488	
TK70112	JP	S	13	430	2,500	50	
TK70113	JP	S	13	218	1,625	44	
TK70114	JP	S	13	183	1,420	18	
TK70115	JP	S	14	80	515	21	
TK70116	JP	S	2	8	77	5	
TK70202	JP	S	4	20	28	6	
TK70203	JP	S	12	55	13	5	
TK70204	JP	S	12	45	88	6	
TK70205	JP	S	20	45	78	6	
TK70206	JP	S	8	25	55	5	
TK70207	JP	S	31	30	395	7	
TK70208	JP	S	16	50	75	3	
TK70209	JP	S	20	30	160	9	
TK70301	JP	S	2	40	13	5	
TK70302	JP	S	4	75	15	2	

SAMPLE NO.	GEOLOGICAL UNIT	SOIL	ATOMIC ABSORPTION METHOD			DITHIZON	LOCATION
			Cu	Pb	Zn	Zn	
			ppm	ppm	ppm	γ	
TK70303	JP	S	11	25	85	8	Churumazu
TK70304	JP	S	7	30	30	2	
TK70305	JP	S	4	35	40	5	
TK70306	JP	S	7	25	90	3	
TK70307	JP	S	4	65	38	4	
TK70308	JP	S	7	20	15	4	
TK70309	JP	S	1	5	5	5	
TK70310	JP	S	9	60	15	5	
TK70311	JP	S	13	45	40	4	
TK70312	JP	S	15	40	98	5	
TK70313	JP	S	17	40	45	7	
TK70314	JP	S	26	45	25	6	
TK70315	JP	S	23	65	228	8	
TK70316	JP	S	24	40	115	3	
TK70317	JP	S	16	15	53	5	
TK70318	JP	S	16	15	35	4	
TK70501	JP	S	13	28	82	5	
TK70502	JP	S	11	150	1,075	2	
TK70503	JP	S	8	1,170	1,730	5	
TK70504	JP	S	5	1,100	2,450	12	
TK70505	JP	S	27	2,460	18,700	1,075	
TK70506	JP	S	4	123	570	10	
TK70507	JP	S	6	113	440	7	
TK70508	JP	S	8	540	995	7	
TK70509	JP	S	7	478	1,495	16	
TK70510	JP	S	20	1,060	2,750	49	
TK70511	JP	S	29	100	900	8	
TK70512	JP	S	20	90	780	5	
TK70513	JP	S	8	83	330	8	
TK70514	JP	S	4	68	225	5	
TK70515	JP	S	32	75	1,060	10	
TK70516	JP	S	19	45	430	6	
TK70517	JP	S	8	40	215	5	
TK70518	JP	S	74	33	650	4	
TK70519	JP	S	34	40	48	3	

SAMPLE NO.	GEOLOGICAL UNIT	SOIL	ATOMIC ABSORPTION METHOD			DITHIZON	LOCATION
			Cu	Pb	Zn	Zn	
			ppm	ppm	ppm	γ	
TK70520	JP	S	3	23	19	6	Churumazu
TK70521	JP	S	6	28	77	5	
TK70522	JP	S	31	33	315	3	
TK70523	JP	S	3	35	29	4	
TK70524	JP	S	2	25	155	3	
TK70525	JP	S	3	63	48	7	
TK70526	JP	S	8	113	480	6	
TK70710	JP	S	19	15	115	29	
TK70711	JP	S	15	20	125	9	
TK70712	JP	S	17	35	50	2	
TK70713	JP	S	19	20	58	3	
TK70714	JP	S	19	30	168	9	
TK70715	JP	S	29	135	55	7	
TK70716	JP	S	27	80	63	2	
TK70717	JP	S	22	75	40	2	
TK70719	JP	S	15	50	25	2	
TK70720	JP	S	10	70	23	3	
TK70721	JP	S	15	20	93	8	
TK71601	JP	S	2	15	35	4	
TK71602	JP	S	6	15	280	6	
TK71603	JP	S	10	30	150	6	
TK71604	JP	S	13	35	163	30	
TK71605	JP	S	13	25	113	11	
TK71606	JP	S	7	30	105	6	
TK71608	JP	S	5	35	75	9	
TK71609	JP	S	6	15	150	7	
TK71610	JP	S	16	195	125	13	
TK71611	JP	S	12	35	63	10	
TK71612	JP	S	9	30	98	9	
TK71613	JP	S	14	90	128	33	
TK71614	JP	S	4	35	185	3	
TK71615	JP	S	9	25	145	9	
TK71621	JP	S	9	90	343	11	
TK71622	JP	S	28	125	870	7	
TK71623	JP	S	34	35	333	15	

SAMPLE NO.	GEOLOGICAL UNIT	SOIL	ATOMIC ABSORPTION METHOD			DITHIZON	LOCATION
			Cu	Pb	Zn	Zn	
			ppm	ppm	ppm	γ	
TK71701	JP	S	8	900	675	9	Churumazu
TK71702	JP	S	22	143	223	5	
TK71703	JP	S	3	15	10	2	
TK71704	JP	S	14	25	65	4	
TK71705	JP	S	38	35	450	29	
TK71706	JP	S	35	43	425	10	
TK71707	JP	S	13	100	135	2	
TK71708	JP	S	12	93	865	16	
TK71709	JP	S	10	50	115	5	
TK71710	JP	S	43	35	375	6	
TH70101	JP	S	47	75	240	8	
TH70102	JP	S	12	148	450	6	
TH70103	JP	S	9	128	378	6	
TH70104	JP	S	8	105	285	7	
TH70105	JP	S	6	125	475	15	
TH70106	JP	S	5	128	425	7	
TH70107	JP	S	5	23	71	6	
TH70108	JP	S	15	60	200	14	
TH70301	PTRG	S	10	30	17	4	
TH70302	JP	S	16	275	630	2	
TH70303	JP	S	13	143	580	9	
TH70304	JP	S	9	228	1,500	3	
TH70305	JP	S	17	33	123	11	
TH70306	JP	S	21	118	980	43	
TH70307	TVY	S	7	15	65	4	
TH70308	JP	S	16	245	3,730	3	
TH70309	JP	S	13	123	675	2	
TH70310	JP	S	65	30	184	4	
TH70311	JP	S	16	33	118	11	
TH70312	JPC	S	8	88	580	6	
TH70313	JP	S	4	45	64	4	
TH70801	PTRG	S	18	44	290	40	
TH70802	JP	S	16	31	258	14	
TH70803	JP	S	15	62	234	3	
TH70804	JP	S	12	44	196	8	

SAMPLE NO.	GEOLOGICAL UNIT	SOIL	ATOMIC ABSORPTION METHOD			DITHIZON	LOCATION
			Cu	Pb	Zn	Zn	
			ppm	ppm	ppm	γ	
TH70805	JP	S	18	163	1,224	100	Churumazu
TH70806	PTRG	S	16	75	952	18	
TH70807	PTRG	S	10	50	66	2	
TH70808	PTRG	S	18	50	377	13	
TH70809	PTRG	S	10	56	17	2	
TH70810	PTRG	S	24	38	33	2	
TH70811	PTRG	S	8	31	5	2	
TH70812	PTRG	S	12	25	10	2	
TH70813	PTRG	S	28	31	101	2	
TH70814	PTRG	S	26	69	80	2	
TH70815	PTRG	S	24	62	51	2	
TH70816	PTRG	S	52	88	133	6	
TH70817	PTRG	S	39	44	27	6	
TH70818	JPC	S	6	12	19	8	
TH70819	JPC	S	28	19	33	7	
TH70820	JPC	S	40	81	116	2	
TH70821	PTRG	S	8	19	17	2	
TH70822	JP	S	18	12	48	2	
TH70901	JP	S	18	28	2,548	113	
TH70902	JP	S	5	97	388	2	
TH70903	JP	S	9	254	680	3	
TH70904	TVY	S	5	48	28	2	
TH70905	JP	S	8	64	420	7	
TH70906	JP	S	13	60	576	100	
TH70907	PTRG	S	31	86	444	2	
TH70908	PTRG	S	79	65	40	2	
TH70909	JP	S	26	95	7,000	11	
TH70910	JP	S	39	45	212	2	
TH70911	JP	S	16	47	56	2	
TH70912	JP	S	6	88	188	2	
TH70913	JP	S	9	123	188	2	
TH70914	JP	S	14	43	45	2	
TH70915	JP	S	16	33	38	6	
TH70916	JP	S	9	26	15	2	
TH70917	JP	S	8	25	19	2	

SAMPLE NO.	GEOLOGICAL UNIT	SOIL	ATOMIC ABSORPTION METHOD			DITHIZON	LOCATION
			Cu	Pb	Zn	Zn	
			ppm	ppm	ppm	γ	
TH70918	JP	S	19	36	30	2	Churumazu
TH70919	JP	S	8	23	11	2	
TH70920	JP	S	24	193	72	5	
TH70921	JP	S	18	132	68	6	
TH70922	JP	S	28	243	185	6	
TH70923	JP	S	11	30	355	4	
TH70924	JP	S	12	90	57	5	
TH70925	JP	S	17	260	45	6	
TA70809	JP	S	19	29	210	7	Villa Rica
TA70810	JP	S	27	44	208	11	
TA70811	JP	S	44	27	614	12	
TA70815	JP	S	12	32	64	2	
TA70818	JP	S	16	16	214	3	
TA70819	JP	S	34	32	306	2	
TA70822	JP	S	17	24	139	7	
TA70823	JP	S	16	43	219	5	
TA70824	JP	S	38	24	155	11	
TA70825	JP	S	50	37	267	5	
TA70827	JP	S	35	21	341	11	
TA70901	JP	S	12	32	186	7	
TA70902	JP	S	11	53	168	2	
TA70903	JP	S	25	40	262	21	
TA70904	JP	S	11	40	137	2	
TA70905	JP	S	19	34	172	2	
TA70906	JP	S	34	34	304	6	
TN61714	JP	S	5	28	25	1	
TN61801	JP	S	17	41	240	8	
TN61802	JP	S	16	30	101	12	
TN61803	JP	S	18	38	108	12	
TN61804	JP	S	26	38	255	2	
TN61805	JP	S	15	28	191	3	
TN61806	JP	S	23	35	222	2	
TN61807	JP	S	11	35	173	12	
TN61808	JP	S	10	33	96	2	

SAMPLE NO.	GEOLOGICAL UNIT	SOIL	ATOMIC ABSORPTION METHOD			DITHIZON	LOCATION
			Cu	Pb	Zn	Zn	
			ppm	ppm	ppm	γ	
TN61809	JP	S	5	32	161	12	Villa Rica
TN62002	JP	S	8	13	25	6	
TN71502	JP	S	5	20	28	2	
TN71503	JP	S	5	22	32	2	
TN71506	JP	S	4	18	13	2	
TN71811	CRO	S	12	18	26	7	
TN71812	CRO	S	6	19	42	3	
TN71813	CRC	S	5	10	21	3	
TN71901	CRO	S	1	3	6	2	
TN71902	CRO	S	5	27	25	7	
TN71903	CRO	S	1	5	21	5	
TN71904	CRO	S	2	6	11	7	
TN71905	CRO	S	7	10	22	3	
TN71906	CRC	S	4	9	14	5	
TN71907	CRO	S	13	24	35	5	
TN71908	CRO	S	1	3	5	2	
TN71909	CRC	S	3	8	17	5	
TN71910	CRO	S	1	10	12	3	
TN71911	CRC	S	1	15	26	5	
TS61801	JP	S	15	14	60	13	
TS61802	JP	S	12	26	153	3	
TS61803	JP	S	10	13	45	15	
TS61804	JP	S	16	20	54	15	
TS61805	JP	S	13	29	89	15	
TS61806	JP	S	11	46	212	1	
TS61807	JP	S	11	41	159	1	
TS61808	JP	S	6	45	445	3	
TS61809	JP	S	12	68	133	10	
TS61810	JP	S	6	41	62	1	
TS61811	JP	S	3	16	48	5	
TS61812	JP	S	15	88	65	3	
TS61813	JP	S	7	51	82	10	
TS61814	JP	S	14	137	199	1	
TS61815	JP	S	12	86	116	1	
TS61816	JP	S	13	48	110	16	

SAMPLE NO.	GEOLOGICAL UNIT	SOIL	ATOMIC ABSORPTION METHOD			DITHIZON	LOCATION
			Cu	Pb	Zn	Zn	
			ppm	ppm	ppm	γ	
TS61817	JP	S	21	28	86	15	Villa Rica
TS61818	JP	S	14	28	51	10	
TS62301	JP	S	9	18	93	19	
TS62302	JP	S	8	10	127	7	
TS62303	JP	S	3	12	12	4	
TS62304	JP	S	7	15	42	10	
TS62305	JP	S	3	21	76	5	
TS62306	JP	S	23	45	82	7	
TS62307	JP	S	13	44	103	2	
TS62308	JP	S	18	40	120	2	
TS62309	JP	S	23	93	167	4	
TS62310	JP	S	11	16	162	3	
TS62311	JP	S	34	28	273	7	
TS62312	JP	S	18	24	209	7	
TS62313	JP	S	5	17	59	4	
TS62314	JP	S	7	30	124	7	
TS62401	JP	S	12	72	51	1	
TS62402	JP	S	9	45	55	2	
TS62403	JP	S	22	77	179	11	
TS62404	JP	S	10	32	120	6	
TS62405	JP	S	10	35	208	5	
TS62406	JP	S	9	27	113	6	
TK70801	JP	S	23	70	185	2	
TK70802	JP	S	30	65	175	12	
TK70803	JP	S	47	30	57	5	
TK70804	JP	S	8	50	75	7	
TK70805	JP	S	23	55	125	2	
TK70806	JP	S	98	30	189	7	
TK70807	JP	S	31	55	215	5	
TK70808	JP	S	29	160	470	2	
TK70809	JP	S	22	60	160	13	
TK70810	JP	S	23	15	175	9	
TK70811	JP	S	183	145	330	23	
TK70812	JP	S	58	205	265	10	
TK70813	THO	S	12	75	170	8	

SAMPLE NO.	GEOLOGICAL UNIT	SOIL	ATOMIC ABSORPTION METHOD			DITHIZON	LOCATION
			Cu	Pb	Zn	Zn	
			ppm	ppm	ppm	γ	
TK70814	JP	S	88	85	300	7	Villa Rica
TK70901	JS	S	10	20	17	2	
TK70902	CRO	S	82	23	34	2	
TK70903	JP	S	17	23	43	3	
TK70905	JP	S	16	23	50	2	
TK70906	JP	S	15	13	24	3	
TK71501	TM	S	17	23	53	9	
TK71502	TM	S	25	23	69	8	
TK71503	TM	S	4	13	19	7	
TK71504	TM	S	14	10	19	5	
TK71505	CRO	S	25	28	300	10	
TK71506	THO	S	28	128	355	8	
TK71616	JP	S	20	25	58	9	
TK71617	JP	S	9	30	50	2	
TK71618	JP	S	6	15	40	6	
TK71619	JP	S	6	20	45	5	
TK71620	JP	S	6	15	50	10	
TK71901	JP	S	7	25	48	6	
TK71902	JP	S	14	55	145	11	
TK71903	JP	S	20	48	125	2	
TK71904	JP	S	15	93	280	13	
TK71905	JP	S	11	33	67	10	
TK71906	JP	S	6	103	280	9	
TK71907	JP	S	18	33	82	8	
TK71908	JP	S	30	60	145	11	
TK71909	JP	S	10	33	67	6	
TK71910	JP	S	13	28	48	3	
TK71911	JP	S	6	23	43	7	
TK71912	JP	S	8	50	110	6	
TK71913	JP	S	4	8	10	6	
TK71914	JP	S	19	38	245	10	
TK71915	JP	S	13	48	145	6	
TK71916	JP	S	7	33	77	7	
TK71917	JP	S	6	15	34	2	
TK71918	JP	S	8	25	43	4	

SAMPLE NO.	GEOLOGICAL UNIT	SOIL	ATOMIC ABSORPTION METHOD			DITHIZON	LOCATION
			Cu	Pb	Zn	Zn	
			ppm	ppm	ppm	γ	
TK71919	JP	S	10	70	255	4	Villa Rica
TK71920	JP	S	6	33	72	7	
TK71921	JP	S	10	30	120	5	
TK71922	JP	S	13	20	48	5	
TK71923	JP	S	6	20	43	5	
TK71924	JP	S	11	23	82	6	
TK71925	JP	S	18	45	355	11	
TK71926	JP	S	15	25	225	6	
TK71927	JP	S	14	33	300	10	
TK71928	JP	S	15	20	195	6	
TK71929	JP	S	15	28	90	11	
TK72101	CRC	S	21	30	39	5	
TK72102	CRC	S	21	30	89	3	
TK72103	CRC	S	11	33	80	1	
TK72104	CRO	S	15	23	73	4	
TN70501	JP	S	11	16	67	6	Cuiulacocha
TN70502	JP	S	8	14	53	2	
TN70503	JP	S	13	122	99	9	
TN70504	JP	S	6	52	43	3	
TN70803	JP	S	20	55	193	3	
TN70804	JP	S	19	58	187	6	
TS70324	JP	S	25	10	204	10	
TS70326	JP	S	20	145	223	5	
TS70502	TVY	S	5	12	18	2	
TS70503	JP	S	30	103	80	8	
TS70504	JP	S	4	17	69	5	
TS70505	JP	S	6	67	123	7	
TS70506	TVY	S	2	14	20	2	
TS70507	JP	S	16	12	21	4	
TS70508	JP	S	11	31	82	2	
TS70509	JP	S	10	22	75	8	
TS70510	JP	S	12	74	125	7	
TS70511	JP	S	7	26	89	11	
TS70512	JP	S	8	71	136	7	

SAMPLE NO.	GEOLOGICAL UNIT	SOIL	ATOMIC ABSORPTION METHOD			DITHIZON	LOCATION
			Cu	Pb	Zn	Zn	
			ppm	ppm	ppm	γ	
TS70513	JP	S	28	109	123	12	Cuiulacocha
TS70514	JP	S	10	49	64	2	
TS70515	JP	S	10	82	204	36	
TT70301	JP	S	21	39	220	2	
TT70302	JP	S	12	39	56	2	
TT70303	JP	S	30	54	214	7	
TT70304	JP	S	20	58	130	2	
TT70305	JP	S	17	39	126	2	
TT70306	JP	S	30	36	208	2	
TT70307	JP	S	16	43	118	2	
TT70308	JP	S	20	43	177	2	
TT70309	JP	S	13	24	174	10	
TT70310	JP	S	16	58	126	2	
TT70311	JP	S	17	20	56	6	
TT70312	JP	S	17	32	67	9	
TT70313	JP	S	10	50	38	2	
TT70314	JP	S	9	54	47	4	
TT70315	JP	S	20	92	50	2	
TT70316	JP	S	11	76	56	2	
TT70317	JP	S	11	43	86	2	
TT70318	JP	S	23	204	135	10	
TT70319	JP	S	17	69	62	2	
TT70320	JP	S	11	50	64	2	
TT70321	JP	S	11	39	80	2	
TT70322	JP	S	20	72	152	2	
TT70323	JP	S	11	62	182	2	
TT70513	JP	S	10	45	56	2	
TT70514	JP	S	14	74	74	2	
TT70701	TVY	S	2	21	19	3	
TT70702	TVY	S	2	18	30	4	
TT70703	TVY	S	3	18	19	3	
TN61319	JP	S	7	9	23	7	Yunqui
TN61320	JP	S	4	13	16	5	
TN61321	JP	S	10	14	20	5	

SAMPLE NO.	GEOLOGICAL UNIT	SOIL	ATOMIC ABSORPTION METHOD			DITHIZON	LOCATION
			Cu	Pb	Zn	Zn	
			ppm	ppm	ppm	γ	
TN61322	JP	S	3	13	20	7	Yunqui
TN61323	CRO	S	15	14	26	2	
TN61324	CRO	S	6	26	95	20	
TN61401	JP	S	8	34	45	1	
TN61402	JP	S	13	19	32	4	
TN61403	JP	S	10	32	42	7	
TN61404	JP	S	13	16	17	4	
TN61405	JP	S	10	13	21	2	
TN61406	JP	S	12	14	142	2	
TN61407	JP	S	21	42	808	1	
TN61408	JP	S	6	53	97	2	
TN61409	JP	S	16	35	473	143	
TN61410	JP	S	9	18	42	6	
TN61411	JP	S	16	104	326	19	
TN61412	JP	S	16	15	34	5	
TN61413	JP	S	31	74	456	22	
TN61414	JP	S	10	17	12	2	
TN61416	JP	S	22	18	14	6	
TN61417	JP	S	40	109	433	21	
TN61418	CRO	S	6	10	29	2	
TN61419	JP	S	25	23	115	12	
TN61420	JS	S	19	20	126	11	
TN61421	CRO	S	6	12	13	2	
TN61422	JS	S	3	8	11	3	
TN61423	CRC	S	4	15	35	4	
TN61425	CRC	S	11	20	36	4	
TN61427	CRC	S	3	9	31	4	
TN61429	CRO	S	4	7	13	5	
TN61431	CRO	S	12	17	13	1	
TN61503	CRO	S	17	23	12	7	
TN61505	CRC	S	55	15	36	3	
TN61506	JP	S	10	35	338	95	
TN61507	JP	S	11	23	54	3	
TN61508	JP	S	10	13	25	5	
TN61509	JP	S	8	9	15	6	

SAMPLE NO.	GEOLOGICAL UNIT	SOIL	ATOMIC ABSORPTION METHOD			DITHIZON	LOCATION
			Cu	Pb	Zn	Zn	
			ppm	ppm	ppm	γ	
TN70103	JP	S	4	18	17	8	Yunqui
TN70105	JP	S	14	55	43	4	
TN70106	JP	S	6	28	51	7	
TN70107	JP	S	7	27	53	7	
TN70108	JP	S	4	10	34	5	
TN70111	JP	S	4	22	21	5	
TN70112	JP	S	6	19	25	7	
TN70113	JP	S	7	14	17	6	
TN70114	JP	S	7	11	27	4	
TN70115	JP	S	4	8	16	7	
TN70116	JP	S	9	25	29	2	
TN70117	JP	S	9	18	21	6	
TN70118	JP	S	102	20	95	10	
TN70119	JS	S	18	16	104	8	
TN70120	JS	S	18	18	82	7	
TN70201	JP	S	11	29	64	8	
TN70202	CRC	S	7	40	61	5	
TN70204	CRC	S	9	11	25	4	
TN70301	JP	S	16	45	168	2	
TN70302	JP	S	19	40	227	40	
TN70303	JP	S	10	22	150	5	
TN70304	JP	S	4	19	106	3	
TN70305	JP	S	3	22	12	4	
TN70306	JP	S	11	41	78	4	
TN70307	JP	S	10	36	108	5	
TN70308	JP	S	18	34	134	5	
TN70309	JP	S	27	23	88	5	
TN70310	JP	S	11	18	73	6	
TN70311	JP	S	11	10	71	6	
TN70312	JP	S	15	14	109	7	
TN70313	JP	S	27	44	222	4	
TN70314	JP	S	6	12	126	8	
TN70315	JP	S	5	13	63	5	
TN70316	JP	S	5	12	17	2	
TN70317	JP	S	11	14	168	4	

SAMPLE NO.	GEOLOGICAL UNIT	SOIL	ATOMIC ABSORPTION METHOD			DITHIZON	LOCATION
			Cu	Pb	Zn	Zn	
			ppm	ppm	ppm	γ	
TN70318	JP	S	4	13	104	4	Yunqui
TN70401	JP	S	18	27	184	9	
TN70402	CRO	S	26	41	75	3	
TN70505	JP	S	8	172	98	9	
TN70506	JP	S	7	83	172	2	
TN70507	JP	S	7	31	166	3	
TN70508	JP	S	4	21	87	4	
TN70509	JP	S	7	39	286	2	
TN70510	JP	S	6	40	443	2	
TN70511	JP	S	7	35	59	2	
TN70512	JP	S	9	31	112	2	
TN70703	JP	S	16	31	174	2	
TN70704	JP	S	22	26	179	2	
TN70705	JP	S	11	17	72	2	
TN70706	JP	S	17	27	164	2	
TN70707	JP	S	17	31	272	2	
TN70801	PTRG	S	26	36	40	2	
TN70802	PM	S	22	30	36	6	
TN70807	JP	S	21	38	178	2	
TN70808	JP	S	23	38	249	13	
TN70809	JP	S	29	44	189	7	
TN70811	JP	S	29	41	189	3	
TN70812	JP	S	12	25	174	5	
TN70813	JP	S	36	38	187	5	
TN70814	JP	S	11	33	141	2	
TN70815	JP	S	6	25	187	2	
TN70818	JP	S	27	47	294	10	
TN70901	CRC	S	2	27	14	2	
TN70904	CRC	S	10	25	49	3	
TN71701	CRC	S	17	14	34	5	
TS61507	JP	S	18	26	241	3	
TS61508	JP	S	12	27	179	3	
TS61509	JP	S	9	31	113	3	
TS61510	JP	S	14	33	197	3	
TS61511	JP	S	16	33	288	3	

SAMPLE NO.	GEOLOGICAL UNIT	SOIL	ATOMIC ABSORPTION METHOD			DITHIZON	LOCATION
			Cu	Pb	Zn	Zn	
			ppm	ppm	ppm	γ	
TS61512	JP	S	5	56	82	3	Yunqui
TS61513	JP	S	8	35	77	4	
TS61514	JP	S	8	55	106	3	
TS61515	JP	S	7	18	73	4	
TS61516	JP	S	8	17	48	11	
TS61517	JP	S	3	36	23	3	
TS61518	JP	S	15	36	60	3	
TS61519	JP	S	6	31	48	2	
TS61520	JP	S	6	33	34	3	
TS61521	JP	S	4	30	24	3	
TS61522	JP	S	11	40	252	10	
TS61601	JP	S	12	25	105	2	
TS61602	JP	S	61	19	72	1	
TS61603	JP	S	7	22	33	2	
TS61604	JP	S	6	34	95	2	
TS61605	JP	S	6	42	50	1	
TS61606	JP	S	7	23	91	2	
TS61607	JP	S	5	36	38	1	
TS61608	JP	S	10	17	106	2	
TS61609	JP	S	7	40	64	1	
TS61610	JP	S	12	44	88	1	
TS61611	JP	S	13	29	36	1	
TS61612	JP	S	13	26	68	2	
TS61613	JP	S	9	28	44	2	
TS61614	JP	S	13	27	64	1	
TS61615	JP	S	9	48	66	2	
TS61616	JP	S	13	25	74	1	
TS61617	JP	S	6	25	38	2	
TS61627	JP	S	8	32	49	1	
TS61701	JP	S	58	215	472	35	
TS61702	JP	S	23	59	502	47	
TS61703	JP	S	23	9	298	7	
TS61704	JP	S	18	23	276	35	
TS61705	JP	S	13	105	468	2	
TS61706	JP	S	14	13	181	7	

SAMPLE NO.	GEOLOGICAL UNIT	SOIL	ATOMIC ABSORPTION METHOD			DITHIZON	LOCATION
			Cu	Pb	Zn	Zn	
			ppm	ppm	ppm	γ	
TS61707	JP	S	27	25	328	2	Yunqui
TS61708	JP	S	18	23	174	2	
TS61709	JP	S	28	25	355	7	
TS61710	JP	S	36	23	385	60	
TS61711	JP	S	40	34	626	53	
TS61712	JP	S	32	26	392	7	
TS62001	JP	S	8	17	55	2	
TS62002	JP	S	8	21	92	1	
TS62003	JP	S	6	15	70	2	
TS62004	JP	S	5	15	73	2	
TS62005	JP	S	4	13	158	10	
TS62006	JP	S	5	11	62	5	
TS62007	JP	S	8	20	171	3	
TS62008	JP	S	7	16	191	8	
TS62009	JP	S	9	26	184	2	
TS62010	JP	S	7	22	56	2	
TS62011	JP	S	5	13	22	2	
TS62012	JP	S	8	20	163	2	
TS62013	JP	S	8	53	169	2	
TS62014	JP	S	11	18	428	5	
TS62015	JP	S	12	40	91	2	
TS62501	JP	S	10	11	145	13	
TS62502	JP	S	11	9	129	19	
TS62503	JP	S	10	9	128	20	
TS62504	JP	S	8	10	141	7	
TS62505	JP	S	5	18	196	10	
TS62506	JP	S	6	19	187	16	
TS62507	JP	S	9	10	129	10	
TS70301	JP	S	22	15	76	8	
TS70302	JP	S	18	1	34	3	
TS70303	JP	S	34	69	117	3	
TS70304	JP	S	8	4	23	5	
TS70305	JP	S	17	21	68	3	
TS70306	JP	S	17	15	45	3	
TS70307	JP	S	34	9	34	4	

SAMPLE NO.	GEOLOGICAL UNIT	SOIL	ATOMIC ABSORPTION METHOD			DITHIZON	LOCATION
			Cu	Pb	Zn	Zn	
			ppm	ppm	ppm	γ	
TS70308	JP	S	16	4	26	3	Yunqui
TS70309	JP	S	14	65	60	3	
TS70310	JP	S	15	4	19	3	
TS70311	JP	S	20	23	79	5	
TS70312	JP	S	10	13	23	4	
TS70313	JP	S	12	65	125	4	
TS70314	JP	S	36	36	442	3	
TS70315	JP	S	22	12	196	4	
TS70316	JP	S	29	21	264	3	
TS70317	JP	S	9	12	147	4	
TS70318	JP	S	17	87	170	5	
TS70319	JP	S	35	10	128	3	
TS70320	JP	S	20	21	249	9	
TS70321	JP	S	22	15	166	4	
TS70322	JP	S	14	8	178	4	
TS70323	JP	S	16	21	144	2	
TS70325	JP	S	19	145	162	3	
TS70401	JP	S	8	32	151	2	
TS70402	JP	S	16	29	148	3	
TS70403	JP	S	17	26	122	2	
TS70404	PM	S	21	54	162	5	
TS70405	PM	S	14	38	136	5	
TS70406	JP	S	10	36	164	3	
TS70407	JP	S	10	82	228	21	
TS70408	PM	S	13	74	229	10	
TS70409	JP	S	17	12	41	3	
TS70410	PTRG	S	10	29	72	2	
TS70501	TVY	S	8	240	58	7	
TS70601	TVY	S	7	84	103	2	
TS70602	JP	S	8	46	266	5	
TS70603	JP	S	7	15	54	11	
TS72001	JP	S	16	14	20	2	
TS72002	JP	S	3	6	13	6	
TS72003	JP	S	5	18	34	4	
TS72004	JP	S	6	21	39	6	

SAMPLE NO.	GEOLOGICAL UNIT	SOIL	ATOMIC ABSORPTION METHOD			DITHIZON	LOCATION
			Cu	Pb	Zn	Zn	
			ppm	ppm	ppm	γ	
TS72005	JP	S	4	18	73	2	Yunqui
TS72006	JP	S	10	21	99	6	
TS72007	JP	S	4	6	11	5	
TS72008	JP	S	3	9	29	2	
TS72009	JP	S	1	5	8	3	
TS72010	JP	S	11	14	75	11	
TS72011	JP	S	9	16	21	4	
TS72012	JP	S	6	11	27	4	
TS72013	JP	S	9	13	41	5	
TS72014	JP	S	7	9	25	6	
TS72015	JP	S	4	12	18	2	
TS72016	JP	S	5	11	44	7	
TS72017	JP	S	5	18	102	6	
TS72018	JP	S	12	11	33	8	
TS72019	JP	S	17	10	29	5	
TS72020	JP	S	5	7	14	5	
TS72021	JP	S	8	12	90	7	
TS72101	JP	S	8	20	235	15	
TS72102	JP	S	7	14	198	44	
TS72103	JP	S	10	18	166	11	
TS72104	JP	S	9	28	110	5	
TS72105	JP	S	7	19	100	10	
TS72106	JP	S	9	15	151	13	
TS72107	JP	S	4	19	28	7	
TS72108	JP	S	9	19	100	2	
TS72109	JP	S	11	13	152	12	
TS72110	JP	S	13	15	187	17	
TS72111	JP	S	14	16	99	8	
TS72112	JP	S	8	7	119	15	
TS72113	JP	S	1	17	36	2	
TS72114	JP	S	7	15	18	4	
TS72201	JS	S	4	24	94	3	
TS72202	JS	S	13	16	85	6	
TS72203	JP	S	13	23	87	8	
TS72204	JP	S	7	18	54	5	

SAMPLE NO.	GEOLOGICAL UNIT	SOIL	ATOMIC ABSORPTION METHOD			DITHIZON	LOCATION
			Cu	Pb	Zn	Zn	
			ppm	ppm	ppm	γ	
TS72205	JP	S	8	23	34	5	Yunqui
TS72206	JP	S	7	18	48	7	
TS72207	JP	S	5	18	48	5	
TS72208	JP	S	7	10	29	5	
TS72301	JP	S	8	17	104	6	
TS72302	JP	S	19	24	284	15	
TS72303	JP	S	17	16	221	15	
TS72304	JP	S	17	21	267	48	
TS72305	JP	S	8	18	187	20	
TS72306	JP	S	7	8	21	4	
TS72307	JP	S	3	9	6	2	
TS72308	JP	S	9	16	152	14	
TS72401	JP	S	3	13	6	2	
TS72402	JP	S	6	9	37	6	
TS72403	JP	S	10	11	100	23	
TS72404	JP	S	8	13	26	5	
TS72405	JP	S	12	14	31	8	
TS72406	JP	S	3	4	9	3	
TS72501	JP	S	2	10	6	2	
TS72502	JP	S	4	4	16	3	
TS72503	JP	S	7	23	17	2	
TS72504	JP	S	10	10	17	6	
TS72505	JP	S	12	23	22	2	
TS72506	JP	S	9	17	48	7	
TS72507	JP	S	5	16	25	2	
TS72508	JP	S	7	16	36	7	
TS72509	JP	S	7	11	19	4	
TT70401	JP	S	28	47	124	2	
TT70402	PTRG	S	10	50	70	2	
TT70403	PTRG	S	20	43	118	7	
TT70404	JP	S	13	50	86	2	
TT70405	JP	S	10	321	58	2	
TT70406	JP	S	9	128	64	3	
TT70407	JP	S	9	50	41	6	
TT70408	PTRG	S	21	36	174	9	

SAMPLE NO.	GEOLOGICAL UNIT	SOIL	ATOMIC ABSORPTION METHOD			DITHIZON	LOCATION
			Cu	Pb	Zn	Zn	
			ppm	ppm	ppm	γ	
TT70409	PTRG	S	21	58	62	3	Yunqui
TT70410	PTRG	S	10	24	67	9	
tt70411	PTRG	S	13	39	88	2	
TT70412	PTRG	S	18	32	120	10	
TT70413	JP	S	10	47	117	11	
TT70414	PTRG	S	17	39	80	4	
TT70415	PM	S	50	54	37	5	
TT70416	JP	S	18	36	138	2	
TT70417	JP	S	23	76	341	2	
TT70418	JP	S	17	43	97	2	
TT70419	JP	S	26	39	76	5	
TT70420	JP	S	34	39	82	6	
TT70501	JP	S	17	37	77	12	
TT70502	JP	S	16	16	68	9	
TT70503	JP	S	14	24	126	2	
TT70504	JP	S	13	13	47	2	
TT70505	JP	S	48	18	65	2	
TT70506	JP	S	41	24	42	5	
TT70507	JP	S	15	37	132	2	
TT70508	JP	S	7	34	54	6	
TT70509	JP	S	18	354	58	2	
TT70510	JP	S	33	400	193	2	
TT70511	JP	S	12	37	77	7	
TT70512	JP	S	14	50	100	9	
TT70515	JP	S	13	58	79	2	
TT70516	JP	S	14	113	93	2	
TT70517	JP	S	24	190	151	12	
TT70601	JP	S	11	36	143	2	
TT70602	JP	S	7	58	187	2	
TT70603	JP	S	11	54	84	5	
TT70604	JP	S	18	43	248	3	
TT70605	JP	S	13	72	91	6	
TT70606	TVY	S	20	95	70	2	
TA61201	CRC	S	9	3	28	6	Pte Paucartambo

SAMPLE NO.	GEOLOGICAL UNIT	SOIL	ATOMIC ABSORPTION METHOD			DITHIZON	LOCATION
			Cu	Pb	Zn	Zn	
			ppm	ppm	ppm	γ	
TA61202	CRC	S	18	8	37	4	Pte Paucartambo
TA61203	CRC	S	19	14	38	7	
TA61204	CRC	S	17	8	39	5	
TA61205	CRC	S	12	14	42	6	
TN61102	TM	S	8	7	16	4	
TN61103	TM	S	7	15	36	3	
TN61104	TM	S	11	13	53	7	
TN61203	TM	S	9	30	75	11	
TN61204	TM	S	14	31	77	10	
TN61205	JP	S	19	25	75	5	
TN61206	TM	S	13	16	49	4	
TN61207	JP	S	9	20	77	3	
TN61208	TM	S	8	18	66	5	
TN61209	JP	S	7	13	76	13	
TN61210	JP	S	12	29	86	39	
TN61211	JP	S	7	31	69	10	
TN61301	JP	S	125	22	31	15	
TN61302	JP	S	4	26	90	3	
TN61303	JP	S	12	31	244	3	
TN61304	JP	S	7	31	136	35	
TN61305	JP	S	5	43	63	3	
TN61306	JP	S	5	45	416	19	
TN61307	JP	S	8	19	99	10	
TN61308	JP	S	12	32	63	3	
TN61309	JP	S	4	12	33	7	
TN61310	JP	S	8	20	84	4	
TN61311	JP	S	9	29	77	7	
TN61312	JP	S	5	16	52	8	
TN61313	JP	S	4	14	93	6	
TN61314	JP	S	8	16	46	6	
TN61315	JP	S	4	16	68	6	
TN61316	JP	S	11	21	26	4	
TN61317	JP	S	4	13	23	10	
TN61318	JP	S	12	21	27	2	
TN61601	JP	S	4	10	47	7	

SAMPLE NO.	GEOLOGICAL UNIT	SOIL	ATOMIC ABSORPTION METHOD			DITHIZON	LOCATION
			Cu	Pb	Zn	Zn	
			ppm	ppm	ppm	γ	
TN61602	JP	S	4	25	164	12	Pte Paucartambo
TN61603	JP	S	12	62	420	145	
TN61604	JP	S	6	69	348	80	
TN61605	JP	S	8	110	360	220	
TN61606	JP	S	14	106	1,624	313	
TN61607	JP	S	12	106	1,714	188	
TN61701	CRC	S	7	15	4	3	
TN61702	CRC	S	8	18	35	2	
TN61704	CRC	S	9	7	26	2	
TN61706	TM	S	10	14	33	7	
TN61707	CRC	S	12	8	29	5	
TN61709	JP	S	12	25	48	1	
TN61711	CRC	S	7	13	8	2	
TN61712	JP	S	3	5	7	5	
TN70905	JP	S	16	16	102	10	
TN70906	JP	S	37	38	44	3	
TN70907	JP	S	16	22	50	3	
TN71601	CRC	S	2	9	22	5	
TN71602	CRC	S	11	19	46	9	
TN71603	CRC	S	5	16	26	2	
TN71702	CRO	S	6	14	10	2	
TN71703	CRO	S	13	16	51	11	
TN71704	JP	S	12	68	1,632	50	
TN71705	JP	S	10	23	72	2	
TN71706	JP	S	9	20	45	3	
TN71707	JP	S	8	13	41	3	
TN71708	JP	S	6	13	19	6	
TN71709	JP	S	6	14	48	8	
TN71710	JP	S	6	14	44	7	
TN71711	JP	S	7	13	74	12	
TN71712	JP	S	25	21	237	2	
TN71713	JP	S	9	14	55	9	
TN71714	JP	S	6	13	38	3	
TN71715	JP	S	5	16	89	5	
TN71716	JP	S	7	11	72	12	

SAMPLE NO.	GEOLOGICAL UNIT	SOIL	ATOMIC ABSORPTION METHOD			DITHIZON	LOCATION
			Cu	Pb	Zn	Zn	
			ppm	ppm	ppm	γ	
TN71717	JP	S	4	9	144	19	Pte Paucartambo
TN71718	JP	S	3	9	41	7	
TN71719	JP	S	7	13	117	11	
TN71720	JP	S	13	15	136	10	
TN71801	CRC	S	13	15	75	24	
TN71802	CRC	S	4	12	21	4	
TN71803	CRC	S	4	12	19	9	
TN71804	CRC	S	6	15	26	7	
TN71805	CRC	S	7	18	40	6	
TN71806	CRO	S	4	19	30	3	
TN71807	CRO	S	8	13	40	5	
TN71808	CRO	S	4	19	26	5	
TN71809	CRO	S	6	30	47	7	
TN71810	CRC	S	1	7	8	4	
TN72001	CRO	S	13	13	29	6	
TN72002	CRO	S	3	11	25	7	
TN72003	CRO	S	4	7	20	5	
TN72004	CRO	S	5	21	24	3	
TN72005	CRC	S	4	7	13	8	
TN72006	CRC	S	4	16	33	7	
TN72007	CRC	S	3	19	31	8	
TN72008	CRC	S	11	21	49	5	
TN72009	CRC	S	8	15	27	2	
TS60806	CRC	S	5	13	36	6	
TS61101	CRO	S	4	9	25	2	
TS61102	TM	S	12	21	148	35	
TS61103	TM	S	18	37	229	60	
TS61104	TM	S	15	39	62	1	
TS61105	TM	S	8	14	39	10	
TS61106	TM	s	8	13	34	2	
TS61107	TM	S	3	6	12	6	
TS61201	TM	S	11	23	42	8	
TS61202	TM	S	10	12	47	7	
TS61203	TM	S	8	18	46	3	
TS61204	TM	S	9	22	52	1	

SAMPLE NO.	GEOLOGICAL UNIT	SOIL	ATOMIC ABSORPTION METHOD			DITHIZON	LOCATION
			Cu	Pb	Zn	Zn	
			ppm	ppm	ppm	γ	
TS61205	TM	S	7	27	67	3	Pte Paucartambo
TS61206	JP	S	11	18	58	6	
TS61207	JP	S	9	27	89	3	
TS61208	JP	S	7	26	72	3	
TS61209	JP	S	10	31	204	3	
TS61210	JP	S	9	41	149	3	
TS61211	JP	S	11	138	279	6	
TS61212	JP	S	7	42	122	3	
TS61213	JP	S	7	41	185	15	
TS61214	JP	S	8	36	134	12	
TS61215	JP	S	11	11	105	10	
TS61216	JP	S	7	19	65	10	
TS61217	JP	S	13	39	100	3	
TS61218	JP	S	10	67	318	113	
TS61219	JP	S	14	23	86	12	
TS61301	JP	S	3	56	515	14	
TS61302	JP	S	2	8	58	6	
TS61303	JP	S	2	6	56	6	
TS61304	JP	S	11	43	1,301	17	
TS61305	JP	S	5	17	108	10	
TS61306	JP	S	6	48	245	56	
TS61307	JP	S	6	55	226	24	
TS61308	JP	S	53	31	176	18	
TS61309	JP	S	11	17	94	16	
TS61310	JP	S	2	7	14	5	
TS61311	JP	S	5	11	43	3	
TS61312	JP	S	9	109	1,226	16	
TS61313	JP	S	7	29	179	35	
TS61314	JP	S	5	36	133	10	
TS61315	JP	S	10	35	127	19	
TS61316	JP	S	6	37	289	3	
TS61317	JP	S	7	28	93	3	
TS61318	JP	S	7	54	225	3	
TS61401	JS	S	13	6	17	7	
TS61403	JS	S	9	15	50	8	

SAMPLE NO.	GEOLOGICAL UNIT	SOIL	ATOMIC ABSORPTION METHOD			DITHIZON	LOCATION
			Cu	Pb	Zn	Zn	
			ppm	ppm	ppm	γ	
TS61406	JS	S	12	15	56	17	Pte Paucartambo
TS61408	TM	S	12	17	38	10	
TS61410	TM	S	8	15	32	2	
TS61501	JP	S	9	27	41	3	
TS61502	JP	S	10	17	61	19	
TS61503	JP	S	4	39	50	3	
TS61504	JP	S	15	49	63	3	
TS61505	JP	S	11	26	119	5	
TS61506	JP	S	5	34	101	3	
TS61901	JP	S	8	12	44	10	
TS61902	JP	S	8	14	61	10	
TS61903	JP	S	14	22	59	11	
TS61904	JP	S	5	12	27	6	
TS61905	CRC	S	7	15	49	7	
TS61906	CRC	S	11	16	65	9	
TS61907	TM	S	8	10	25	1	
TS62101	CRO	S	9	13	50	5	
TS62102	JP	S	15	15	170	113	
TS62103	JP	S	22	13	573	225	
TS62104	JP	S	7	10	32	3	
TS62105	JP	S	26	7	34	7	
TS62106	JP	S	19	14	56	7	
TS62107	JP	S	13	15	43	4	
TS62108	JP	S	8	14	16	2	
TS62109	JS	S	2	5	7	5	
TS62110	JS	S	3	7	8	3	
TS62111	JS	S	2	8	15	5	
TS62112	JS	S	7	21	55	7	
TS62113	JS	S	7	10	18	3	
TS62114	JS	S	11	12	21	5	
TS62115	JS	S	4	9	21	2	
TS62116	JS	S	6	17	45	5	
TS62201	CRC	S	3	12	28	5	
TS62202	CRC	S	5	16	41	10	
TS62203	JS	S	8	8	22	3	

SAMPLE NO.	GEOLOGICAL UNIT	SOIL	ATOMIC ABSORPTION METHOD			DITHIZON	LOCATION
			Cu	Pb	Zn	Zn	
			ppm	ppm	ppm	γ	
TS62204	CRC	S	14	12	48	2	Pte Paucartambo
TS62205	CRC	S	29	22	79	6	
TS62206	JP	S	13	17	76	2	
TS62207	JP	S	16	18	40	5	
TS62208	JS	S	3	11	57	6	
TS62209	JS	S	5	6	10	6	
TS62210	JS	S	8	6	30	2	
TN62204	JP	S	3	16	80	4	Charas
TN62205	JP	S	11	108	146	8	
TN62206	JP	S	43	47	444	2	
TN62207	JP	S	15	147	164	3	
TN62208	JP	S	5	40	92	6	
TN62209	JP	S	8	108	169	5	
TN62210	JP	S	19	116	183	6	
TN62211	JP	S	7	82	193	5	
TN62212	JP	S	8	38	154	5	
TN62213	JP	S	17	136	232	2	
TN62214	JP	S	7	121	186	8	
TN62215	JP	S	6	153	153	5	
TN62216	JP	S	8	43	124	5	
TN62217	JP	S	7	98	282	2	
TN62218	JP	S	61	140	153	2	
TN62301	PTRG	S	7	30	71	13	
TN62302	PTRG	S	13	14	21	5	
TN62303	JP	S	8	15	21	4	
TN62304	JP	S	34	14	13	6	
TN62305	JP	S	10	20	29	6	
TN62306	JP	S	8	54	121	8	
TH62306	JP	S	38	71	157	7	
TH62307	JP	S	20	62	158	5	
TH62308	JP	S	21	61	201	9	
TH62309	JP	S	43	55	132	6	
TH62310	JP	S	9	37	89	2	
TH62311	JP	S	9	37	82	3	

SAMPLE NO.	GEOLOGICAL UNIT	SOIL	ATOMIC ABSORPTION METHOD			DITHIZON	LOCATION
			Cu	Pb	Zn	Zn	
			ppm	ppm	ppm	γ	
TH62312	JP	S	35	40	102	11	
TH62313	THO	S	17	40	156	50	
TH62314	THO	S	55	71	150	30	
TH62315	JP	S	35	22	102	11	
TH62316	JP	S	15	56	104	9	
TN62201	JP	S	21	44	150	2	Rio Colorado
TN62202	JP	S	26	62	160	6	
TN62203	JP	S	6	34	252	7	
TN62219	JP	S	11	94	193	8	
TN62220	JP	S	4	51	49	9	
TN62221	JP	S	32	85	150	6	
TN62222	JP	S	25	55	221	11	
TN62223	JP	S	28	23	109	10	
TN62401	JP	S	82	30	153	8	
TN62402	JP	S	40	33	162	5	
TN62403	JP	S	20	44	176	3	
TN62404	JP	S	29	31	147	7	
TN62405	JP	S	9	31	131	3	
TN62406	JP	S	22	34	137	3	
TN62501	JP	S	14	13	164	6	
TN62502	JP	S	14	18	230	7	
TN62503	JP	S	29	18	268	10	
TN62504	JP	S	14	13	183	7	
TN62505	JP	S	17	22	198	7	
TN62506	JP	S	17	21	166	10	
TN62507	JP	S	7	37	59	2	
TN62508	JP	S	14	24	187	3	
TN62509	JP	S	19	24	222	7	
TN62510	JP	S	13	31	194	23	
TN62511	JP	S	6	64	103	6	
TN62512	JP	S	31	37	493	7	
TN62513	JP	S	16	26	122	4	
TN62514	JP	S	18	35	232	6	
TN62515	JP	S	15	30	212	35	

SAMPLE NO.	GEOLOGICAL UNIT	SOIL	ATOMIC ABSORPTION METHOD			DITHIZON	LOCATION
			Cu	Pb	Zn	Zn	
			ppm	ppm	ppm	γ	
TN62516	JP	S	15	71	238	2	Río Colorado
TN62517	JP	S	7	50	125	2	
TN62518	JP	S	31	64	235	10	
TN62519	JP	S	15	60	192	3	
TN62520	JP	S	9	24	151	6	
TN62521	JP	S	12	45	77	2	
TN62522	JP	S	18	29	147	2	
TN62601	JP	S	10	74	194	13	
TN62602	JP	S	10	45	90	4	
TN62603	JP	S	11	42	60	3	
TN62604	JP	S	16	34	232	10	
TN62605	JP	S	17	104	521	6	
TT60905	JP	S	18	19	59	8	
TT60906	JP	S	11	40	52	3	
TT60907	JP	S	14	57	101	4	
TT60908	JP	S	14	22	94	4	
TT60909	JP	S	16	10	39	3	
TT60910	JP	S	17	16	39	4	
TT61106	JP	S	19	30	77	13	
TT61107	JP	S	11	36	66	3	
TT61108	JP	S	14	49	52	15	
TT61109	JP	S	10	23	69	8	
TT61110	JP	S	10	50	92	9	
TT61111	JP	S	10	18	63	12	
TT61112	JP	S	8	14	222	18	
TT61113	JP	S	13	15	103	21	
TT61114	JP	S	8	30	35	18	
TT61115	JP	S	12	20	95	6	
TT61116	JP	S	8	20	81	3	
TT61117	JP	S	13	23	55	4	
TK60806	JS	S	11	45	110	5	
TK60807	JP	S	18	25	69	5	
TK60901	JP	S	8	25	38	3	
TK60902	JP	S	14	58	90	1	
TK60903	JP	S	5	25	38	3	

SAMPLE NO.	GEOLOGICAL UNIT	SOIL	ATOMIC ABSORPTION METHOD			DITHIZON	LOCATION
			Cu	Pb	Zn	Zn	
			ppm	ppm	ppm	γ	
TK60904	JP	S	14	30	205	30	Rio Colorado
TK60905	JP	S	15	30	90	10	
TK60906	JP	S	10	30	80	10	
TK60907	JS	S	10	30	34	7	
TK60908	JS	S	25	30	53	6	
TK60909	JP	S	15	40	80	5	
TK60910	JP	S	20	33	110	6	
TK60911	JP	S	5	30	80	6	
TK60912	JP	S	8	33	48	7	
TK60913	JP	S	5	30	505	8	
TK60914	JP	S	6	30	43	6	
TH62301	JP	S	29	49	214	9	
TH62302	JP	S	13	49	206	10	
TH62303	JP	S	46	55	176	2	
TH62304	JP	S	54	37	172	10	
TH62305	JP	S	35	98	182	4	
TH62401	JP	S	53	43	137	14	
TH62402	JP	S	78	78	175	12	
TH62403	JP	S	25	63	250	12	
TH62404	JP	S	35	230	1,120	100	
TH62405	JP	S	31	180	605	60	
TH62406	JP	S	23	60	300	8	
TH62407	JP	S	35	68	280	1	
TH62408	JP	S	38	40	178	14	
TH62409	JP	S	45	38	495	12	
TH62410	JP	S	30	28	280	11	
TH62411	JP	S	35	33	393	11	
TH62412	JP	S	16	20	193	6	
TH62413	JP	S	20	30	205	56	
TH62414	JP	S	18	30	310	53	
TH62415	JP	S	24	113	520	6	
TH62416	JP	S	21	35	330	11	
TH62417	JP	S	21	28	173	11	
TA60701	TM	S	58	27	75	13	Pte Colorado

SAMPLE NO.	GEOLOGICAL UNIT	SOIL	ATOMIC ABSORPTION METHOD			DITHIZON	LOCATION
			Cu	Pb	Zn	Zn	
			ppm	ppm	ppm	γ	
TA60702	TM	S	25	19	70	6	Pte Colorado
TA60703	TM	S	11	19	62	5	
TA60704	TM	S	11	24	47	10	
TA60705	TM	S	18	24	58	6	
TA60706	TM	S	25	35	62	2	
TA60707	TM	S	11	21	42	4	
TA60708	TM	S	14	24	41	9	
TA60709	TM	S	18	40	65	3	
TA60710	TM	S	16	29	68	11	
TA60711	TM	S	23	32	71	6	
TA60712	TM	S	13	29	53	4	
TA60713	TM	S	21	37	84	3	
TA60714	TM	S	20	35	65	3	
TA60715	TM	S	14	35	60	8	
TA60716	TM	S	20	40	68	10	
TA60717	TM	S	22	37	66	10	
TA60718	PTRG	S	15	37	51	1	
TA60719	PTRG	S	9	29	46	6	
TA60720	PTRG	S	8	8	34	3	
TA60721	PTRG	S	7	19	31	3	
TA60722	PTRG	S	10	13	42	5	
TA60801	CRC	S	16	11	40	3	
TA60802	TM	S	20	19	60	1	
TA60803	TM	S	18	32	141	14	
TA60804	TM	S	24	27	71	12	
TA60805	TM	S	8	19	50	5	
TA60806	TM	S	9	8	28	5	
TA60807	TM	S	6	11	59	10	
TA60808	TM	S	9	13	56	4	
TA60809	TM	S	15	13	64	9	
TA60810	TM	S	4	19	31	5	
TA60811	TM	S	4	8	60	5	
TA60812	TM	S	2	16	35	0	
TA60813	PTRG	S	5	11	35	1	
TA60814	PTRG	S	8	13	35	4	

SAMPLE NO.	GEOLOGICAL UNIT	SOIL	ATOMIC ABSORPTION METHOD			DITHIZON	LOCATION
			Cu	Pb	Zn	Zn	
			ppm	ppm	ppm	γ	
TA60815	PTRG	S	13	25	63	0	Pte Colorado
TA60816	PTRG	S	5	8	54	10	
TA61101	CRC	S	13	19	38	5	
TA61102	CRC	S	13	5	37	7	
TA61103	CRC	S	11	27	57	5	
TA61104	TM	S	11	22	60	4	
TN61201	TM	S	9	16	57	6	
TN61202	TM	S	14	22	63	7	
TS60801	JS	S	5	13	47	5	
TS60802	JS	S	4	14	52	8	
TS60803	JS	S	7	18	51	8	
TS60804	TM	S	3	22	47	6	
TS60805	JS	S	2	15	30	5	
TS60807	TM	S	7	13	50	8	
TS60808	TM	S	11	20	63	5	
TS60809	TM	S	10	22	68	5	
TS60810	TM	S	9	18	56	5	
TS60901	TM	S	2	6	35	8	
TT60701	TM	S	12	34	121	0	
TT60702	CRC	S	10	15	55	5	
TT60703	CRC	S	8	11	31	1	
TT60704	CRC	S	5	13	18	2	
TT60705	TM	S	9	21	55	5	
TT60706	TM	S	3	14	30	2	
TT60707	TM	S	6	20	48	0	
TT60708	TM	S	17	34	66	3	
TT60709	TM	S	5	20	58	0	
TT60710	TM	S	5	12	31	1	
TT60711	TM	S	7	16	47	0	
TT60712	TM	S	8	17	47	13	
TT60713	JP	S	2	5	11	1	
TT60714	TM	S	7	18	45	0	
TT60715	JP	S	5	14	35	3	
TT60901	JP	S	14	13	39	16	
TT60902	JP	S	15	25	94	10	

SAMPLE NO.	GEOLOGICAL UNIT	SOIL	ATOMIC ABSORPTION METHOD			DITHIZON	LOCATION
			Cu	Pb	Zn	Zn	
			ppm	ppm	ppm	γ	
TT60903	JP	S	21	40	182	35	Pte Colorado
TT60904	JP	S	14	31	33	4	
TT61001	JP	S	17	40	111	3	
TT61002	JP	S	12	45	91	4	
TT61003	JP	S	10	29	111	6	
TT61101	PM	S	6	15	32	7	
TT61102	JP	S	8	39	101	3	
TT61103	PM	S	23	69	183	3	
TT61104	PM	S	16	28	46	3	
TT61105	JP	S	17	28	66	10	
TK60701	PM	S	13	30	57	3	
TK60702	PM	S	8	30	48	5	
TK60703	JP	S	6	40	63	3	
TK60704	JP	S	21	40	72	8	
TK60705	PM	S	14	25	54	4	
TK60706	JP	S	16	25	54	3	
TK60707	TM	S	13	25	48	3	
TK60708	TM	S	17	30	60	5	
TK60709	TM	S	13	35	66	4	
TK60710	TM	S	16	30	54	3	
TK60711	TM	S	15	25	51	8	
TK60712	TM	S	12	45	100	4	
TK60713	TM	S	13	35	103	3	
TK60714	TM	S	12	30	63	3	
TK60715	TM	S	9	30	69	5	
TK60716	TM	S	13	20	78	6	
TK60717	TM	S	16	30	94	10	
TK60718	PTRG	S	12	35	75	6	
TK60719	PTRG	S	12	45	81	11	
TK60720	PTRG	S	3	30	60	0	
TK60721	PTRG	S	1	20	31	3	
TK60801	PM	S	15	70	230	4	
TK60802	JP	S	43	25	29	5	
TK60803	PM	S	18	30	63	1	
TK60804	PM	S	14	35	40	1	

SAMPLE NO.	GEOLOGICAL UNIT	SOIL	ATOMIC ABSORPTION METHOD			DITHIZON	LOCATION
			Cu	Pb	Zn	Zn	
			ppm	ppm	ppm	γ	
TK60805	PM	S	17	50	100	7	Pte Colorado
TA60301	PM	S	51	240	177	5	Naranjal
TA60302	JP	S	8	14	45	3	
TA60303	JP	S	28	167	40	1	
TA60304	PTRG	S	41	16	94	5	
TA60305	PM	S	20	5	49	3	
TA60306	PM	S	49	27	38	5	
TA60307	JP	S	29	555	559	69	
TA60308	JP	S	32	112	491	5	
TA60309	JP	S	18	111	231	9	
TA60310	JP	S	18	132	728	18	
TA60311	JP	S	6	26	30	5	
TA60312	JP	S	10	21	47	4	
TA60313	JP	S	3	37	114	8	
TA60314	JP	S	195	190	176	11	
TA60315	JP	S	289	354	558	14	
TA60401	JP	S	143	207	291	10	
TA60402	JP	S	68	436	1,110	100	
TA60403	JP	S	37	301	809	0	
TA60404	JP	S	37	82	467	38	
TA60405	JP	S	12	21	44	3	
TA60406	JP	S	30	77	140	19	
TA60408	PM	S	47	56	63	11	
TA60410	PM	S	39	51	54	14	
TA60412	JP	S	18	125	250	0	
TA60413	JP	S	7	53	50	0	
TA60414	JP	S	19	43	63	0	
TA60415	JP	S	36	82	170	1	
TA60417	JP	S	21	43	62	2	
TN60403	TM	S	107	409	181	11	
TN60405	TM	S	20	25	51	4	
TN60409	TM	S	35	19	53	0	
TN60410	TM	S	36	47	232	11	
TN60411	TM	S	39	88	302	56	

SAMPLE NO.	GEOLOGICAL UNIT	SOIL	ATOMIC ABSORPTION METHOD			DITHIZON	LOCATION
			Cu	Pb	Zn	Zn	
			ppm	ppm	ppm	γ	
TN60412	TM	S	35	74	832	1	Naranjal
TN60413	TM	S	42	85	309	44	
TN60414	TM	S	22	22	80	1	
TN60416	JP	S	9	55	55	0	
TN60417	JP	S	14	27	75	0	
TN60418	JP	S	17	30	70	0	
TN60419	JP	S	23	27	168	3	
TN60420	JP	S	13	97	185	1	
TN60421	JP	S	16	22	195	11	
TN60422	JP	S	15	14	95	11	
TN60423	JP	S	9	22	68	0	
TN60424	JP	S	11	30	58	0	
TN60425	JP	S	13	44	33	0	
TN60426	JP	S	14	36	53	0	
TN60427	JP	S	10	36	56	0	
TN60428	JP	S	9	19	268	6	
TN60429	JP	S	23	36	208	3	
TN60430	JP	S	15	11	47	7	
TN60431	JP	S	28	33	238	0	
TN60432	JP	S	13	19	78	0	
TN60433	JP	S	20	52	218	0	
TN60501	JP	S	29	41	227	0	
TN60502	JP	S	26	30	101	5	
TN60503	JP	S	16	63	309	3	
TN60504	JP	S	13	58	221	1	
TN60505	JP	S	27	41	206	0	
TN60506	JP	S	19	22	96	3	
TN60507	JP	S	36	33	345	2	
TN60508	JP	S	34	85	867	69	
TN60509	JP	S	12	458	642	11	
TN60510	JP	S	32	44	693	0	
TN60511	JP	S	24	39	242	1	
TN60512	JP	S	25	33	95	2	
TN60513	JP	S	33	36	511	4	
TN60514	JP	S	28	1,687	773	3	

SAMPLE NO.	GEOLOGICAL UNIT	SOIL	ATOMIC ABSORPTION METHOD			DITHIZON	LOCATION
			Cu	Pb	Zn	Zn	
			ppm	ppm	ppm	γ	
TN60515	JP	S	17	885	612	5	Naranjal
TN60516	JP	S	23	16	28	6	
TN60517	PM	S	30	44	206	94	
TN60701	PM	S	96	33	48	19	
TN60702	PM	S	16	70	136	8	
TN60703	PTRG	S	24	39	74	11	
TN60706	PM	S	10	17	23	5	
TN60708	PTRG	S	23	102	363	9	
TN60709	PTRG	S	11	29	53	5	
TN60712	PTRG	S	7	35	130	39	
TN60801	PM	S	73	567	260	10	
TN60803	JPC	S	26	173	73	10	
TN60805	JP	S	14	66	141	2	
TN60806	JP	S	10	131	208	1	
TN62606	JP	S	29	29	345	6	
TN62607	JP	S	16	41	227	9	
TN62608	JP	S	25	30	299	29	
TN62609	JP	S	21	14	216	18	
TN62610	JP	S	27	18	84	6	
TN62611	JP	S	5	32	52	2	
TN62612	JP	S	8	34	61	2	
TN62613	JP	S	7	30	45	2	
TN72201	JP	S	5	34	110	2	
TN72202	JP	S	8	32	85	2	
TN72203	JP	S	10	24	92	2	
TN72204	JP	S	4	16	57	3	
TN72205	JP	S	6	28	70	3	
TN72206	JP	S	13	26	56	2	
TN72207	JP	S	7	23	150	2	
TN72208	JP	S	8	27	105	3	
TN72209	JP	S	29	27	109	2	
TN72210	JP	S	6	28	15	2	
TN72211	JP	S	7	27	76	4	
TN72212	JP	S	10	19	116	11	
TN72213	JP	S	9	12	91	2	

SAMPLE NO.	GEOLOGICAL UNIT	SOIL	ATOMIC ABSORPTION METHOD			DITHIZON	LOCATION
			Cu	Pb	Zn	Zn	
			ppm	ppm	ppm	γ	
TN72408	PCM	S	3	27	11	2	Naranjal
TS60301	TM	S	14	10	40	5	
TS60304	TM	S	7	12	19	0	
TS60306	TM	S	9	28	131	8	
TS60308	TM	S	12	21	101	6	
TS60310	JP	S	14	21	93	9	
TS60312	JP	S	8	21	81	7	
TS60314	JP	S	11	7	34	0	
TS60319	JP	S	7	26	49	8	
TS60321	JP	S	10	26	34	0	
TS60322	JP	S	5	17	27	0	
TS60325	JP	S	8	21	110	25	
TS60330	TM	S	13	18	58	0	
TS60417	JP	S	14	8	16	3	
TS60418	JP	S	30	14	8	0	
TS60419	JP	S	8	15	432	14	
TS60420	JP	S	5	20	66	5	
TS60421	CRO	S	6	15	24	3	
TS60422	CRO	S	7	8	8	5	
TS60423	JS	S	17	17	24	8	
TS60424	JP	S	6	12	30	4	
TS60425	JP	S	18	18	121	11	
TS60426	JP	S	12	15	144	3	
TS60501	JS	S	5	13	29	5	
TS60502	JP	S	18	16	23	5	
TS60503	JS	S	13	7	6	6	
TS60504	JP	S	25	19	39	0	
TS60505	JP	S	8	7	10	4	
TS60506	JP	S	33	31	10	4	
TS60701	PTRG	S	13	14	42	3	
TS60702	PTRG	S	36	18	60	9	
TS60703	PTRG	S	23	13	89	11	
TS60704	PTRG	S	18	12	48	6	
TS60705	PTRG	S	146	37	54	14	
TS60706	PTRG	S	56	44	145	6	

SAMPLE NO.	GEOLOGICAL UNIT	SOIL	ATOMIC ABSORPTION METHOD			DITHIZON	LOCATION
			Cu	Pb	Zn	Zn	
			ppm	ppm	ppm	γ	
TS71501	JPC	S	24	34	82	5	Naranjal
TS71502	JPC	S	48	25	62	10	
TS71503	PTRG	S	37	31	66	11	
TT60409	THO	S	24	14	26	8	
TT60410	THO	S	6	6	52	4	
TT60412	THO	S	30	11	62	9	
TT60414	PM	S	63	30	21	2	
TK60501	JP	S	32	30	90	8	
TK60502	JP	S	94	25	19	2	
TK60503	JP	S	44	40	75	9	
TK60504	JP	S	10	15	29	3	
TK60505	JP	S	23	18	25	5	
TK60506	JP	S	3	8	27	1	
TK60507	JP	S	15	10	30	5	
TK60508	JP	S	4	13	98	4	
TK60509	JP	S	21	30	144	1	
TK60510	JP	S	16	23	39	5	San Ranmon
TK60511	JP	S	5	10	31	5	
TK60512	JP	S	11	8	26	5	
TK60513	JP	S	14	23	34	1	
TK60514	TM	S	3	15	14	3	
TK60515	TM	S	13	30	58	0	
TK60516	TM	S	14	25	78	9	
TK60517	TM	S	35	38	100	1	
TK60518	TM	S	16	18	62	6	
TK60519	TM	S	13	18	61	8	
TT60508	PM	S	12	24	64	0	
TT60509	TM	S	26	45	96	0	
TT60510	TM	S	13	22	36	0	
TT60511	JP	S	16	26	40	0	
TT60512	JP	S	13	18	82	3	
TT60513	TM	S	21	13	64	3	
TT60514	TM	S	11	20	48	11	
TT60515	CRO	S	32	20	56	5	

SAMPLE NO.	GEOLOGICAL UNIT	SOIL	ATOMIC ABSORPTION METHOD			DITHIZON	LOCATION
			Cu	Pb	Zn	Zn	
			ppm	ppm	ppm	γ	
TS60316	JP	S	9	19	66	5	San Ramon
TS60317	JP	S	11	17	36	6	
TS60318	JP	S	10	18	44	0	
TS60326	TM	S	5	16	49	4	
TS60327	TM	S	14	18	107	0	
TS60328	TM	S	7	13	38	1	
TS60329	TM	S	13	14	52	3	
TS60401	TM	S	16	26	60	0	
TS60402	TM	S	10	18	43	6	
TS60403	TM	S	9	20	35	1	
TS60404	TM	S	14	17	43	11	
TS60405	TM	S	4	14	27	5	
TS60406	TM	S	12	34	46	0	
TS60407	TM	S	22	17	30	3	
TS60408	JP	S	12	17	38	6	
TS60409	TM	S	8	12	19	5	
TS60410	JP	S	4	15	24	0	
TS60411	JP	S	18	18	40	0	
TS60412	JP	S	13	15	10	5	
TS60413	JP	S	9	18	19	0	
TS60414	JP	S	38	17	55	3	
TS60415	JP	S	17	15	38	10	
TS60416	JP	S	25	20	49	0	
TN60401	TM	S	24	22	70	6	
TN60402	TM	S	205	527	178	3	
TA60501	TM	S	12	13	32	5	
TA60502	TM	S	14	19	34	0	
TA60503	TM	S	8	13	24	0	
TA60504	TM	S	19	19	54	4	
TA60505	TM	S	16	19	47	6	
TA60506	TM	S	19	13	49	10	
TA60507	TM	S	22	19	62	4	
TA60508	TM	S	19	16	47	14	
TA60509	TM	S	22	11	42	7	
TA60510	TM	S	18	16	54	5	

SAMPLE NO.	GEOLOGICAL UNIT	SOIL	ATOMIC ABSORPTION METHOD			DITHIZON	LOCATION
			Cu	Pb	Zn	Zn	
			ppm	ppm	ppm	γ	
TA60511	TM	S	9	11	33	0	San Ramon
TA60512	TM	S	17	19	49	5	
TA60513	TM	S	23	24	62	10	
TA60514	TM	S	8	13	40	5	
TA60515	PTRG	S	20	19	66	11	
TA60516	PTRG	S	19	16	55	6	
TA60517	PTRG	S	19	19	57	3	
TA60518	PTRG	S	23	16	69	11	
TA60519	PTRG	S	19	16	59	3	
TA60520	PTRG	S	31	19	64	8	
TA60521	PTRG	S	34	21	58	11	
TA60522	TM	S	16	13	53	11	
TA60523	TM	S	12	11	53	10	
TA60524	TM	S	14	13	55	4	
TA60525	TM	S	24	24	146	5	
TA60526	TM	S	19	19	101	1	
TA60527	PTRG	S	22	26	105	6	
TN72401	PCM	S	4	15	22	4	Chuouisyunga
TN72402	PCM	S	8	22	42	6	
TN72403	PCM	S	7	14	36	2	
TN72404	PCM	S	4	18	18	2	
TN72405	PTRG	S	2	11	9	6	
TN72501	PCM	S	13	24	25	3	
TN72502	PCM	S	4	24	15	2	
TK60201	PCM	S	50	30	75	4	
TK60204	PCM	S	29	25	53	5	
TK60206	PCM	S	13	25	45	3	
TK60402	PCM	S	19	40	60	1	
TK60404	PCM	S	108	55	73	4	
TK60407	PCM	S	25	25	28	3	
TK60302	PCM	S	66	20	83	5	
TK60304	PCM	S	29	15	60	0	
TK60306	PCM	S	48	25	78	4	
TK60308	PCM	S	27	20	88	5	

SAMPLE NO.	GEOLOGICAL UNIT	SOIL	ATOMIC ABSORPTION METHOD			DITHIZON	LOCATION
			Cu	Pb	Zn	Zn	
			ppm	ppm	ppm	γ	
TA60418	JP	S	15	98	90	0	San Felix
TA60419	JP	S	20	48	65	5	
TA60420	JP	S	15	40	40	3	
TA60421	TM	S	18	13	53	11	
TN60202	PM	S	7	19	44	3	
TN60204	PTRG	S	348	28	97	8	
TN60205	PM	S	3	25	49	4	
TN60206	PM	S	11	17	33	3	
TN60208	PTRG	S	7	22	57	0	
TN60209	PTRG	S	14	27	75	9	
TN60211	PTRG	S	5	30	106	6	
TN60301	JP	S	13	27	62	3	
TN60302	JP	S	7	33	56	9	
TN60303	JP	S	18	102	299	63	
TN60304	JP	S	9	39	24	3	
TN60305	JP	S	14	39	242	0	
TN60306	JP	S	21	30	87	0	
TN60307	JPC	S	17	33	75	1	
TN60308	JPC	S	13	52	86	8	
TN60309	JP	S	21	47	161	16	
TN60310	JP	S	25	36	64	0	
TN60311	JP	S	54	25	60	4	
TN60312	JP	S	76	30	79	5	
TT61204	JP	S	7	31	33	1	
TT61205	JP	S	12	45	82	2	
TT61206	JP	S	36	104	156	1	
TT61207	JP	S	70	48	144	12	
TT61208	JP	S	54	27	117	20	
TT61209	JP	S	23	62	235	3	
TT61210	JP	S	25	54	72	3	
TT61211	JP	S	13	45	33	3	
TT72401	JP	S	15	40	108	3	
TT72402	JP	S	19	57	141	7	
TT72403	JP	S	10	137	1,124	35	
TT72404	JP	S	9	228	1,548	28	

SAMPLE NO.	GEOLOGICAL UNIT	SOIL	ATOMIC ABSORPTION METHOD			DITHIZON	LOCATION
			Cu	Pb	Zn	Zn	
			ppm	ppm	ppm	γ	
TT72405	JP	S	7	82	141	4	San Felix
TT72406	JP	S	8	38	89	3	
TT72407	JP	S	9	23	82	5	
TT72408	JP	S	13	158	338	11	
TT72409	JP	S	8	149	157	2	
TT72410	JP	S	15	122	1,000	8	
TT72411	JP	S	18	308	1,720	36	
TT72412	JP	S	18	46	1,344	7	
TT72413	JP	S	17	40	218	2	
TK61101	PM	S	17	15	20	5	
TK61102	PM	S	14	25	25	5	
TK61103	PM	S	14	30	240	10	
TK61104	JP	S	94	30	160	10	
TK61105	JP	S	5	45	90	10	
TK61106	PM	S	13	120	495	12	
TK61107	JP	S	14	455	2,800	500	
TK61108	JP	S	24	20	300	19	
TK61109	JP	S	5	15	51	3	
TK61110	JP	S	8	105	175	2	
TK61111	JP	S	16	175	1,195	39	
TK61112	JP	S	20	110	285	2	
TK61113	JP	S	20	30	81	9	
TK61114	JP	S	30	75	155	2	
TK61115	JP	S	38	25	72	12	
TK61201	JP	S	45	60	125	2	
TK61202	JP	S	41	75	345	46	
TK61203	JP	S	16	55	87	3	
TK61204	JP	S	13	50	69	5	
TK61205	JP	S	40	50	125	1	
TK61206	JP	S	10	50	34	3	
TK61207	JP	S	39	125	770	10	
TK61208	JP	S	43	65	190	5	
TK61209	JP	S	38	60	170	5	
TK61210	JP	S	9	145	345	6	
TK61211	JP	S	11	130	695	3	

SAMPLE NO.	GEOLOGICAL UNIT	SOIL	ATOMIC ABSORPTION METHOD			DITHIZON	LOCATION
			Cu	Pb	Zn	Zn	
			ppm	ppm	ppm	γ	
TK61212	JP	S	19	120	620	4	San Felix
TK61213	JP	S	65	45	130	11	
TK61214	JP	S	11	120	870	5	
TK61301	JP	S	13	85	245	3	
TK61302	JP	S	34	75	380	19	
TN60314	JPC	S	84	27	53	1	
TN72406	PTRG	S	2	13	9	3	
TN72407	PTRG	S	10	7	20	3	
TS60201	JP	S	33	28	82	6	
TS60202	JP	S	24	21	83	14	
TS60203	JP	S	39	28	95	13	
TS60204	JP	S	36	20	64	9	
TS60205	JP	S	8	20	65	3	
TS60206	JP	S	13	30	130	3	
TS60207	JP	S	11	763	501	8	
TS60208	JP	S	12	13	55	4	
TS60209	JP	S	43	28	90	5	
TT60201	PCM	S	58	31	74	8	
TT60202	PCM	S	20	19	35	6	
TT60203	PCM	S	43	19	27	4	
TT60204	PCM	S	40	25	41	6	
TT60205	PCM	S	44	31	47	6	
TT60206	PCM	S	24	12	29	3	
TT60301	JP	S	40	22	68	5	
TT60302	JP	S	40	21	62	5	
TT60303	JP	S	42	26	78	9	
TT60304	JP	S	24	22	68	7	
TT60305	JP	S	20	72	148	0	
TT60306	JP	S	22	19	348	0	
TT60307	JP	S	62	14	180	65	
TT60308	JPC	S	35	8	162	6	
TT60309	JPC	S	41	38	74	13	
TT60310	JPC	S	45	21	36	4	
TT60311	JPC	S	66	26	68	14	
TT60312	JPC	S	50	14	8	5	

SAMPLE NO.	GEOLOGICAL UNIT	SOIL	ATOMIC ABSORPTION METHOD			DITHIZON	LOCATION
			Cu	Pb	Zn	Zn	
			ppm	ppm	ppm	γ	
TT60313	JPC	S	74	14	54	5	San Felix
TT60314	JPC	S	26	15	22	0	
TT60315	JPC	S	113	28	252	19	
TT60316	JPC	S	9	19	208	10	
TT60317	JPC	S	160	44	184	14	
TT60318	JPC	S	38	22	64	5	
TT60319	JPC	S	26	15	50	5	
TT60320	JPC	S	102	24	42	6	
TT60321	JPC	S	47	22	76	3	
TT60322	JPC	S	54	26	156	5	
TT60401	JP	S	69	35	116	13	
TT60402	JP	S	232	18	139	15	
TT60403	JP	S	15	18	49	13	
TT60404	JP	S	40	37	113	13	
TT60405	PM	S	34	29	66	11	
TT60406	PM	S	6	12	38	18	
TT60407	PM	S	2	11	21	1	
TT60415	JPC	S	6	14	63	4	
TT60416	JPC	S	88	56	75	5	
TT61201	JP	S	31	65	127	5	
TT61202	JP	S	31	56	101	18	
TT61203	JP	S	23	36	82	16	
TK61303	JP	S	29	65	190	20	
TH72401	JP	S	31	78	128	2	
TH72402	JP	S	24	38	90	2	
TH72403	JP	S	22	105	165	15	
TH72404	JP	S	28	45	123	6	
TH72405	JP	S	44	80	195	3	
TH72406	JP	S	26	38	95	9	
TH72407	JPC	S	47	85	280	4	
TH72408	JPC	S	31	88	225	15	
TH72409	JPC	S	57	53	135	7	
TH72410	JPC	S	93	60	108	7	
TH72411	JPC	S	34	30	70	9	
TH72412	JPC	S	29	80	155	2	

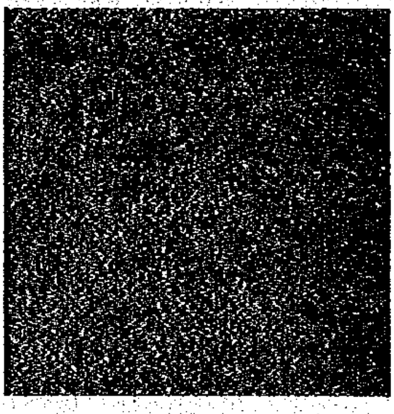
SAMPLE NO.	GEOLOGICAL UNIT	SOIL	ATOMIC ABSORPTION METHOD			DITHIZON	LOCATION
			Cu	Pb	Zn	Zn	
			ppm	ppm	ppm	γ	
TH72413	JP	S	21	145	205	7	San Felix
TH72414	JP	S	15	153	408	11	
TH72415	JP	S	12	30	38	10	
TH72416	JP	S	14	35	98	6	
TH72417	JP	S	29	148	393	11	
TH72418	JP	S	7	80	95	2	
TH72419	JP	S	28	118	265	6	
TH72420	JP	S	35	58	133	2	
TH72421	JP	S	15	43	158	5	
TH72422	JP	S	11	43	50	2	
TH72423	JP	S	24	58	123	2	
TH72424	JP	S	18	48	85	2	
TH72425	JP	S	22	60	133	3	
TH72426	JP	S	14	83	145	2	
TH72427	JP	S	7	130	145	3	
TH72428	JP	S	18	38	123	2	
TA72311	JP	S	12	3	20	6	Pueblo Nuevo
TA72312	JP	S	17	11	50	2	
TA72313	JP	S	27	52	251	3	
TA72314	JP	S	26	114	188	50	
TA72315	JP	S	17	30	97	28	
TA72316	JP	S	20	25	72	6	
TA72317	PTRG	S	22	27	87	19	
TA72401	JP	S	77	42	399	44	
TA72402	JP	S	4	0	17	6	
TA72403	JP	S	30	13	44	6	
TA72404	JP	S	21	24	59	2	
TA72405	JP	S	26	19	125	2	
TA72407	JP	S	18	24	55	7	
TT72301	PM	S	3	91	266	9	
TT72302	PM	S	14	34	122	10	
TT72303	PM	S	10	19	57	6	
TT72304	PM	S	14	30	72	3	
TT72305	PM	S	18	30	61	2	

SAMPLE NO.	GEOLOGICAL UNIT	SOIL	ATOMIC ABSORPTION METHOD			DITHIZON	LOCATION
			Cu	Pb	Zn	Zn	
			ppm	ppm	ppm	γ	
TT72306	PTRG	S	19	27	108	11	Pueblo Nuebo
TT72414	JP	S	8	23	18	2	
TT72415	JP	S	13	38	130	7	
TT72416	JP	S	11	25	112	17	
TT72417	JP	S	13	38	132	2	
TT72418	JP	S	8	42	74	6	
TT72419	JP	S	9	30	82	11	
TK72311	PM	S	5	15	37	2	
TK72401	JP	S	20	30	110	23	
TK72407	PTRG	S	10	35	95	2	
TK72408	PTRG	S	15	35	66	9	
TA72307	JP	S	28	11	67	8	Maraynioc
TA72301	JP	S	25	55	333	33	Monobanba
TA72302	JP	S	34	38	91	2	
TA72303	JP	S	9	19	70	9	
TA72304	JP	S	19	25	84	2	
TA72305	JP	S	69	16	42	7	
TA72306	JP	S	27	63	241	8	
TA72308	PM	S	16	82	227	2	
TA72309	PM	S	9	16	23	2	
TA72310	PM	S	20	16	44	6	
TA72406	JP	S	22	16	52	2	
TA72408	JPC	S	25	40	104	7	
TA72409	JPC	S	21	48	204	11	
TA72410	JPC	S	19	24	162	21	
TA72411	JPC	S	9	13	26	3	
TA72412	JPC	S	8	8	26	2	
TA72413	JP	S	5	8	17	6	
TK72301	PTRG	S	28	45	140	6	
TK72302	PTRG	S	3	20	34	3	
TK72303	PTRG	S	35	40	140	35	
TK72304	PM	S	32	60	215	14	
TK72305	JP	S	15	40	69	2	

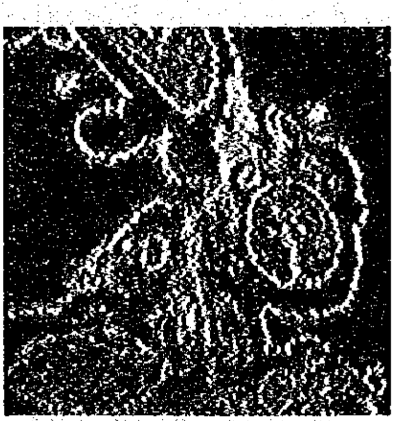
SAMPLE NO.	GEOLOGICAL UNIT	SOIL	ATOMIC ABSORPTION METHOD			DITHIZON	LOCATION
			Cu	Pb	Zn	Zn	
			ppm	ppm	ppm	γ	
TK72306	PM	S	21	45	155	6	Monobanba
TK72307	JP	S	24	30	43	8	
TK72308	JP	S	10	45	52	3	
TK72309	JP	S	13	35	78	9	
TK72310	PM	S	5	25	48	6	
TK72312	JP	S	10	15	31	6	
TK72402	JP	S	41	45	140	225	
TK72403	JPC	S	30	80	225	6	
TK72404	JP	S	30	38	115	6	
TK72405	JP	S	32	40	170	5	
TK72406	PTRG	S	25	30	100	6	
TK72501	JP	S	17	73	205	11	
TK72502	JP	S	11	18	37	3	
TK72503	JP	S	12	13	23	6	
TK72504	PM	S	13	25	79	2	
TK72505	JP	S	2	10	17	5	
TK72506	JPC	S	10	18	38	6	

absorbed election image

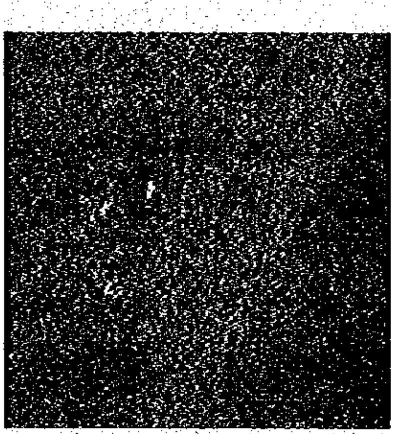
Zn X-ray image



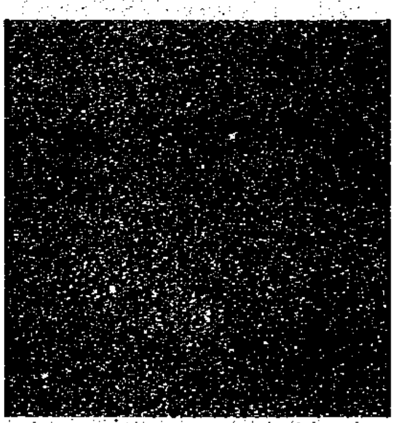
Pb X-ray image



Fe X-ray image



S X-ray image



Si X-ray image

An examinatorial result of X-ary micro-analysis

Sample No. : A-89
Accelerating voltage : 25KV
Absorbed electon current : 0.2 A
Magnification : X300

A-12 Photograph of X-ray microanalysis