0 – 9.00 m.

Overburden was drilled by using HQ–WL diamond bit and bentonite mud water. HQ casing was inserted at 9.00 m. when the rock facies became stable.

9.00 – 250.50 m.

Mica schist, amphibolite, carbonate rocks, graphite schist and limestone to dolomite were drilling by using NQ–WL diamond bit and bentonite mud water.

Lead and zinc ore zone was intersected at the section from 194.30 m. to 196.20 m.

NQ–WL diamond bit was replaced at 200.10 m.

2–5 Measurement of the Drill Holes

When drilling is made in the terrain of schistose rocks, the drill hole generally tends to deflect to the direction perpendicular to the schistosity plane or bedding plane.

In order to get hold deviation accurately, the measurement for deviation of the holes using the Tro Pari survey instrument was conducted. The result is shown as follows in which 23° was the maximum deviation.

The survey of azimuth was carried out at the same time, the result of which showed that the measured values did not stand for use because of the existence of pyrrhotite dissemination in amphibolite in the area and the presence of the "magnetite zone" in the hangingwall of the ore deposit.

AG–01

Depth surveyed	Deviation
50m.	7°
100	8
150	18
200	18
250	22
300	23

AG–02

Depth surveyed	Deviation
50m.	1°
100	8
150	10
200	15
250	20
300	23

AG–03

Depth surveyed	Deviation
50m.	1°
100	9
150	16
200	21
250	23

CHAPTER 3 GEOLOGY AND MINERALIZATION OF THE DRILL HOLES

(Fig. III–2–1 ~2)

3–1 AG–01

(1) Purpose : The hole AG–01 was drilled in order to make clear the anomalous zones of IP and SIP, and geologic structure in the western part of the Perau mine.

(2) Location : It was situated close to the point No.8 of G–Line of IP survey line in the western part of the Perau mine.

Distance in logitude 701.29 E

Distance in latitude 7251.10 N

Altitude 409 m.

(3) Rock facies : The hole encountered the bed rock at 0.55 m. The whole section from the top to the bottom consists of metamorphic rocks of the Açungui I formation. From 0.55 m. to 236 20 m., the rock is composed mainly of mica schist, muscovite-biotite schist, interbedded with amphibolite to amphibole schist. Mica schist often shows the rock facies of graphite-mica schist with distribution of pyrite films along the schistosity plane.

Quartz veins, segregation, are often observed cutting the schistosity.

Amphibolite or amphibole schist are interstratified harmoniously with mica schist accompanied by small amount of pyrite and pyrrhotite, rarely associated with chalcopyrite. Calcite is often present.

The section between 236.20 m. and 305.50 m. consists of limestone to dolomite, carbonate schist, which is called the "Perau horizon".

Magnetite occurs in the section between 236.20 m. and 241.00 m. within the carbonate schist, which is effectively used as a key bed of the hangingwall of the ore horizon.

Between 255.95 m. and 265.90 m., lead and zinc ore in the barite-sulphide zone was intersected.

The section between 256.90 m. 271.50 m. consists of graphite schist, and the rock is an effective key bed of the footwall of the ore horizon.

Weak mineralization of pyrite is observed along the schistosity plane.

Between 271.50 m. and 305.50 m., the main rocks are limestone to dolomite interbedded with carbonate schist.

The section between 305.50 m. and 331.15 m. is composed of alternating beds of limestone and quartzite, showing a rock facies of the transitional zone grading into the lower quartzite member.

Since the rock at the bottom of the hole is interbedded with quartzite, this rock facies

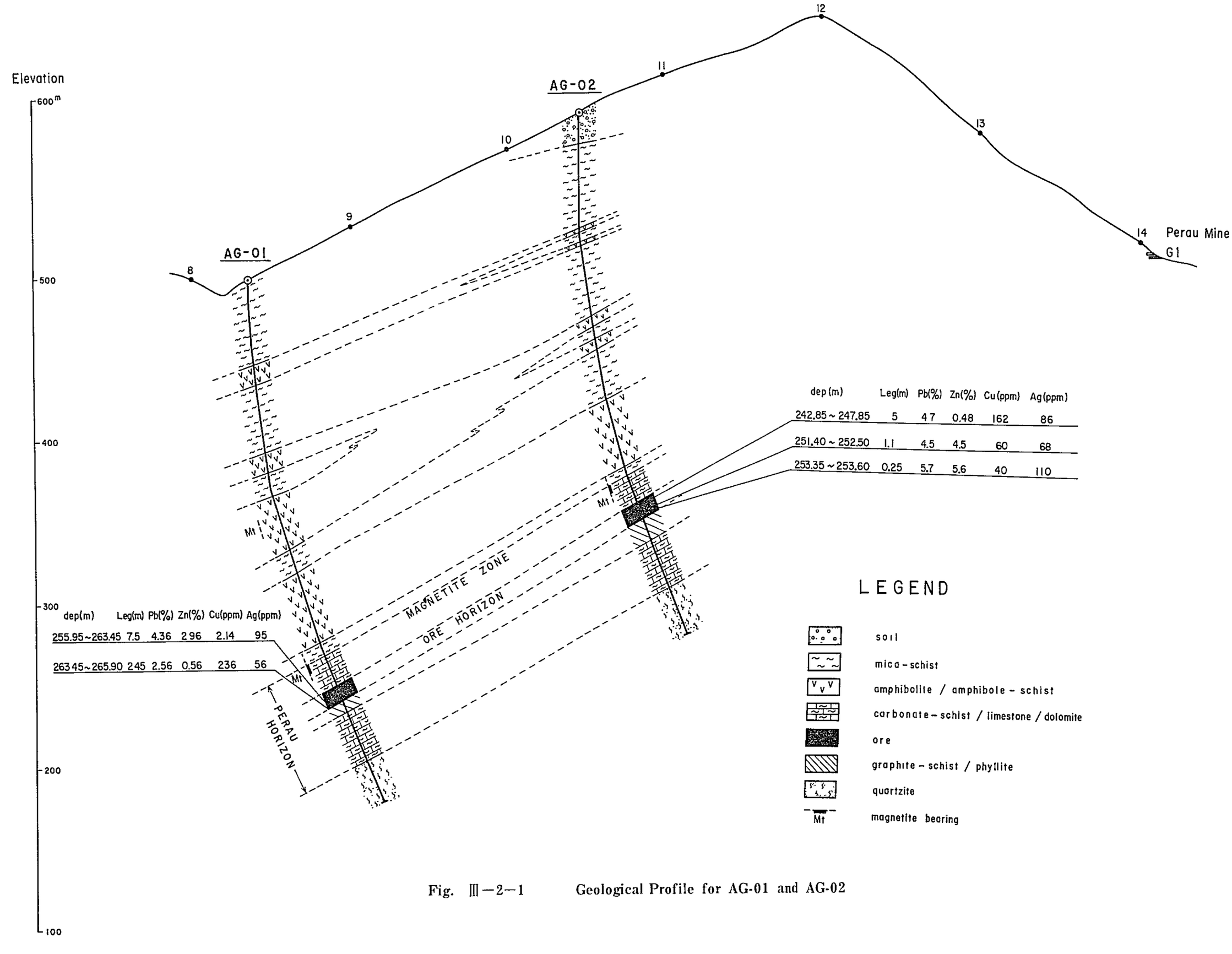


Fig. Ⅲ—2—1 Geological Profile for AG-01 and AG-02

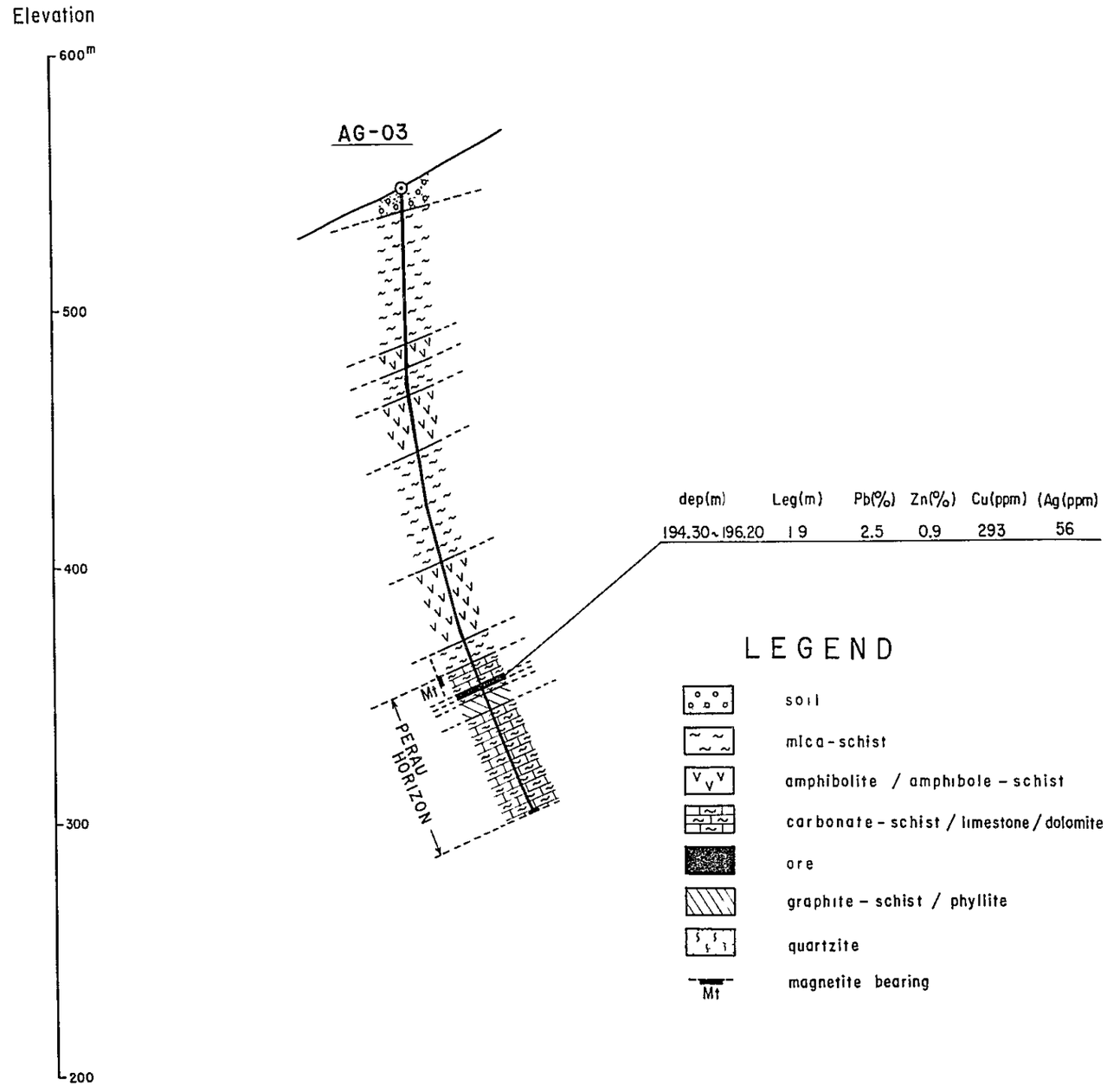


Fig. Ⅲ—2—2 Geological Profile for AG-03

can be determined stratigraphically to be the quartzite member. Therefore, the purpose of the hole has been attained.

(4) Mineralization and Assay

The result of analysis of the continuous ore samples at the ore section of the hole is as follows.

Depth (m.)	Interval (m.)	Number of sample	Pb %	Zn %	Cu ppm	Ag ppm	CaO %
255.95–263.45	7.5	8	4.36	2.96	214	95	11.36
263.45–265.90	2.45	3	2.56	0.56	236	56	12.5

MgO %	SiO_2 %	BaO %
8.91	5.62	15.20
8.85	33.06	4.44

As shown in the analytical values and the result of microscopic observation of the polished sections, the ore shows the characteristic of mineralization of the barite-sulphide mineral. The ore minerals mainly consist of galena, sphalerite and pyrite with small amount of chalco-pyrite, rarely accompanied by pyrrhotite.

In the ore section between 255.95 m. and 265.90 m., galena, sphalerite and pyrite occur in the barite zone as dissemination. It is a characteristic of this ore section that the grade of zinc is high.

In the ore section between 263.45 m. and 265.90 m., the mineral assemblage is the same as the above, but barite is very small in amount and SiO_2, cherty, increases and zinc is very low in grade. Thus it can be considered that characteristic of the ore is similar to the Perau ore deposit.

3–2 AG–02

(1) Purpose : The hole AG–02 was drilled to make clear the conditions of IP and SIP anomalies and the geologic structure as in the hole AG–01.

(2) Location : It is located about on the midway between the point of No.10 and No.11 on the G–Line of IP survey.

Distance in longitude 701.49 E

Distance in latitude 7,251.21 N

Altitude 592 m.

(3) Rock facies : Bed rock was encountered at 19.00 m. From there to 226.30 m., the rock consists mainly of mica schist interbedded with amphibolite to amphibole schist.

Mica schist is often intercalated with graphitic mica schist, in which pyrite occurs as film shape along the schistosity plane.

Quartz segregation often occurs in parallel with schistosity or forming boundinage.

The section between 226.30 m. and 298.60 m. is composed of carbonate schist, mineralized zone and graphite schist of the "Perau Horizon".

Magnetite zone is present between 228.10 m. and 231.05 m. Lead and zinc ore in the barite-sulphide zone was intersected between 242.85 m. and 252.5 m.

In the section between 256.20 m. and 267.00 m., graphite schist was encountered as key bed of the footwall of the ore deposit.

Alternating beds of limestone and quartzite were found between 298.60 m. and 330.55 m. The hole was completed because it had entered the quartzite horizon stratigraphically.

(4) Mineralization and Assay

The grades of the ore section is as follows, and the three main ore sections were encountered.

Depth (m.)	Interval (m.)	Numberof sample	Pb %	Zn %	Cu ppm	Ag ppm	CaO %
242.85–247.85	5	5	4.7	0.48	162	86	12.6
251.40–252.50	1.1	1	4.5	4.5	60	68	12.2
253 35–253.60	0.25	1	5.7	5.6	40	110	13.2

MgO %	SiO_2 %	BaO
6.2	9.0	20.5
7.5	4.3	17.9
6.9	7.6	12.3

This ore section shows the characterisitcs of mineralization of the barite-sulphide minerals and is considered to continue to the ore section intersected in the hole AG–01.

Ore minerals such as galena, sphalerite and pyrite dissemination occur in the barite zone.

In the section between 242.85 m. and 247.85 m., zinc is very low grade, and the ore is mainly composed of fine to medium grained galena.

In the two ore zones lower than the above mentioned, galena and sphalerite are present almost in equal amount.

3–3 AG–03

(1) Purpose : Hole AG–03 was drilled to confirm the southern extention of the mineralized zone intersected in the hole AG–01 and AG–02.

(2) Location . The collar of the hole lies midway between the G–Line and H–Line of IP survey close to the position of 10.

Distance in longitude 701.50 E

Distance in latitude 7,251.03 N

Altitude 548 m.

(3) Rock facies : The bed rock was encountered at 9.00 m. From there to 185.80 m., the rock is mainly composed of mica schist interbedded with amphibolit to amphibole schist.

Mica schist contains more intertrappean graphitic mica schist than that observed in AG–01 and AG–02, and pyrite mineralization is dominant.

The section between 185.80 m. and 250.50 m. consists of carbonate schist of the "Perau Horizon", "Magnetite zone", the ore zone and graphite schist.

"Magnetite zone" was encountered between 185.80 m. and 187.60 m.

A lead and zinc ore zone was intersected between 194.30 m. and 196.20 m. The ore zone here declined in size and mineralization compared with AG–01 and AG–02, showing a marginal part of the ore deposit. Graphite schist, the key bed of the footwall of the ore deposot was encountered between 198.25 m. and 205.05 m.

(4) Mineralization and Assay.

The assay grades of the ore section are as follows.

Depth (m.)	Interval (m.)	Number of sample	Pb %	Zn %	Cu ppm	Ag ppm	Cao %
194.30–196.20	1.9	2	2.5	0.9	293	35	8.3
				MgO %	SiO_2 %	BaO %	
				3.1	40.4	4.7	

Both lead and zinc in the ore zone are low in grade, and barite is small in amount.

The galena is concentrated showing stratiform to network shape in the hangingwall side and sphalerite is relatively abundant in the footwall side in cherty schist and carbonate schist. Barite is also observed in the part of galena concentration, showing an appearance of marginal part of barite-sulphide zone.

3–4 Discussion of Drilling Survey

The result of drilling survey of three holes carried out in the anomalous zones of IP and SIP surveys in the Perau horizon, confirmed the occurrence of the stratiform ore deposit of barite and sulphide.

The ore zone is embedded in carbonate schist of the "Perau Horizon", and "Magnetite zone" occurs in the hangingwall, while graphite schist occurs in the footwall. The magnetite zone and graphite schist are the very effective key beds in the area to know the position of the ore deposit.

As the result, it was concluded that the ore zone intersected in the three holes are the stratiform deposit embedded in the same horizon.

The assay result and the microscopic observation indicated that the mineralization of barite-sulphide zone is dominant in the AG–01 and AG–02 and declines in the AG–03.

Lead and zinc mineralization is dominant in AG–01, showing a lowering zinc grade toward the holes AG–02 and AG–03.

Beside the IP and SIP anomalies of the mineralization in the "Perau Horizon" have been detected as mentioned above, a broad distribution of on other IP anomalous zones is known extending toward the south.

It was confirmed, however, that the anomaly of the southern area is caused by graphitic mica schist and pyrite mineralization emplaced in the schist.

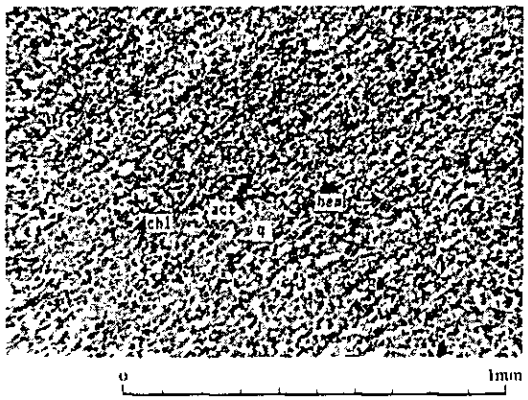
It is necessary for the area, therefore, to be explored in future to confirm the extention of the mineralized zone discovred by the drill survey of this time toward the west and the north.

APPENDICES

Photo A—1 Microphotograph of Thin Section

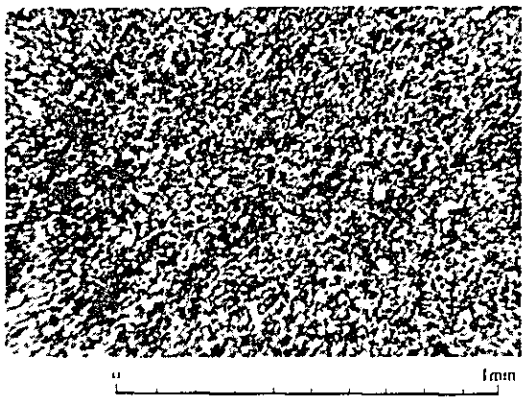
Abbreviations

q : quartz
pl : plagioclase
K–F: potash felspar
bt · biotite
mus : muscovite
hb · hornblende
chl . chlorite
cpx : clinopyroxene
act . actinolite
myr : myrmekite
diop . diopside
spn : sphane
zir · zircon
ep : epidote
hem : hematite
grp : graphite
cor . cordierite
And : andalusite
chlori : chloritoide



Sample No. : E–578
Rock name : phyllite (Açungui I F)
Location : Morro do Mouro
Texture : lepidoblastic

(only lower polar)



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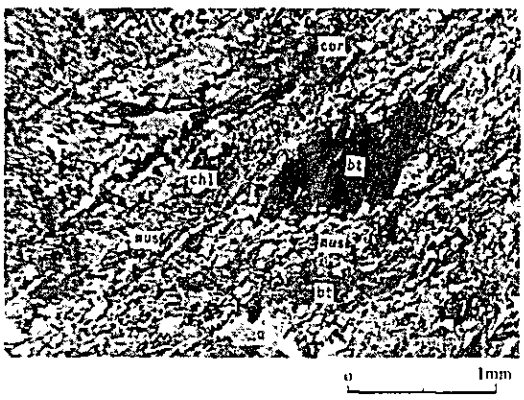
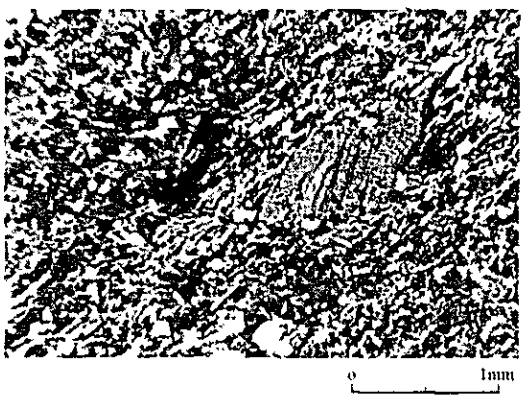


Sample No. : B-602
Rock name : chl–bt-schist (Açungui II F)
Location : Ressaca
Texture : lepidoblastic

(only lower polar)



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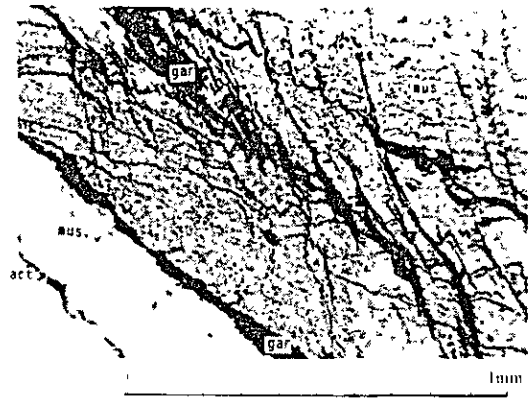
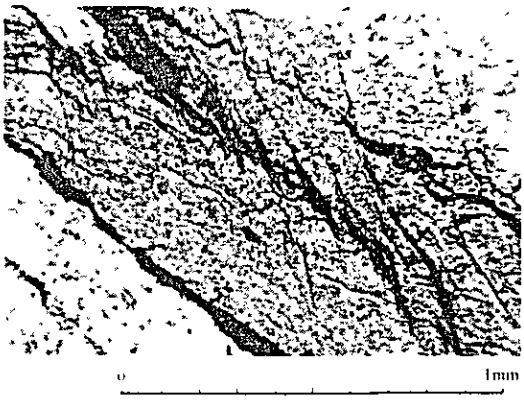


Sample No. : D–528
Rock name : meta conglomerate (Açungui II F)
Location : Iporanga
Texture : lepidoblastic

(only lower polar)



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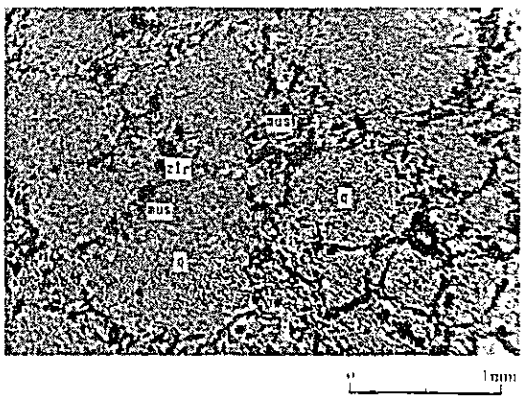
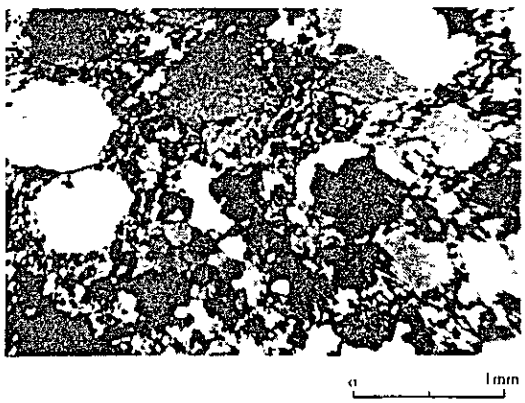


Sample No. : I–546
Rock name : meta conglomerate (Açungui III F)
Location : Betari
Texture : granoblastic

(only lower polar)



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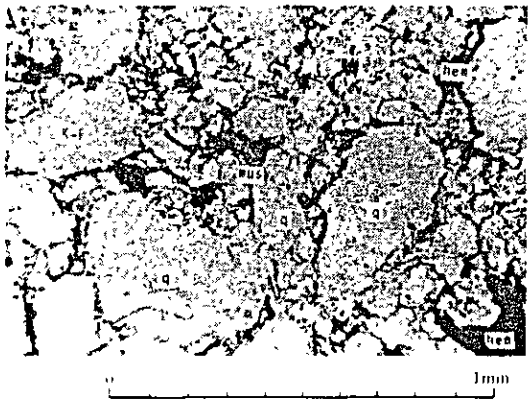
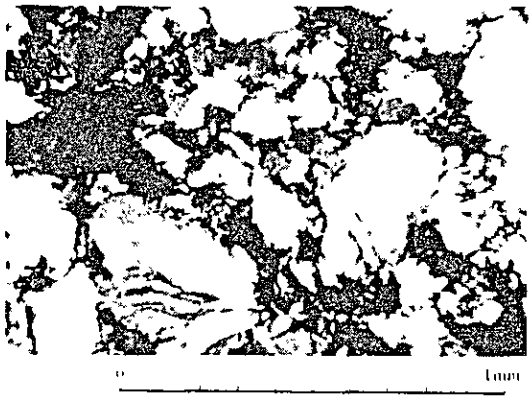


Sample No. : A–525
Rock name : meta-q-sandstone (Açungui III F)
Location : Furnas
Texture . granoblastic

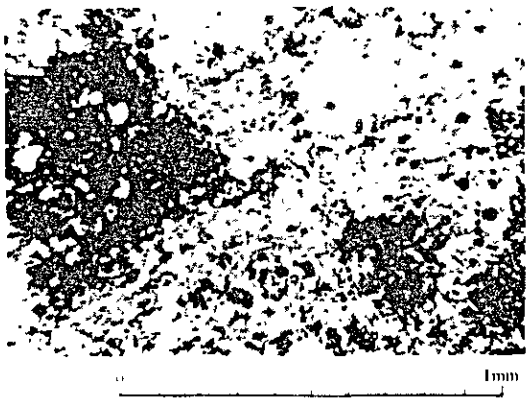
(only lower polar)



(crossed polars)

Sample No. : B–544
Rock name : metasiltstone (Açungui III F)
Location Gurutuva
Texture lepidoblastic

(only lower polar)

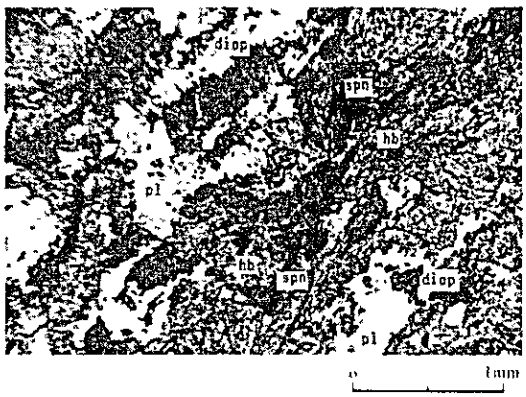


(crossed polars)

Sample No. . H–516
Rock name : gabbro
Location Faz da Cachimba
Texture : ophitic

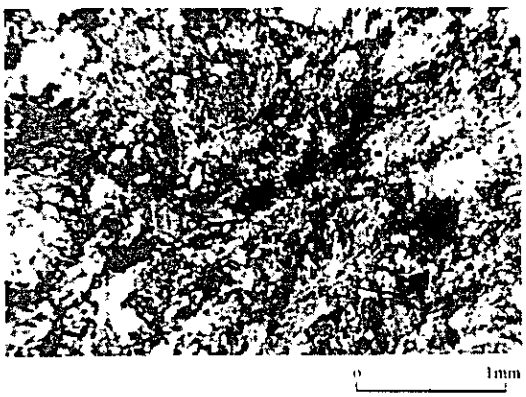
(only lower polar)

(crossed polars)



Sample No. · E–583
Rock name · meta basalt
Location . Faz Bachada Grande
Texture : subophitic

(only lower polar)



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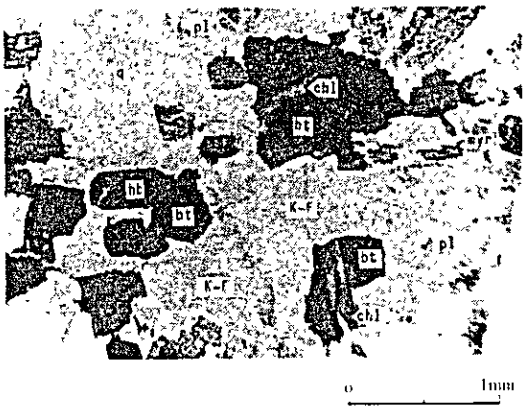
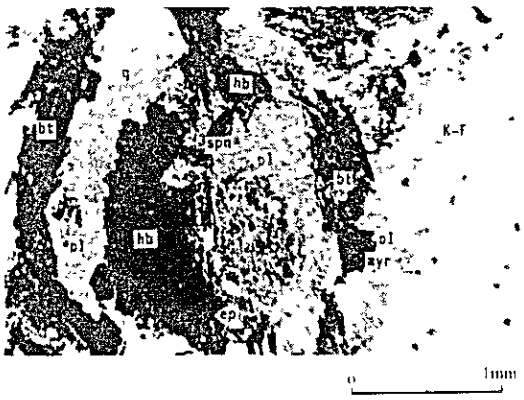


Sample No. · C–685
Rock name : granite
Location · Esprito Santo
Texture . granular

(only lower polar)

(crossed polars)



Sample No. : I–558
Rock name : granite
Location : Apiaı
Texture . granular

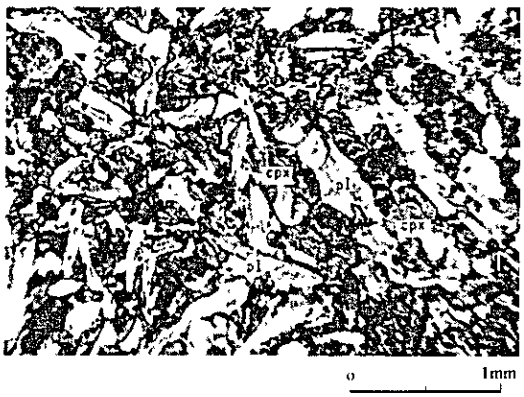
(only lower polar)

(crossed polars)

Sample No. : C–501
Rock name : gabbro
Location Faz Bachada Grande
Texture . ophitic

(only lower polar)

(crossed polars)



Sample No. : C–681
Rock name diabase
Location : Bairro da Cachimba
Texture · ophitic

(only lower polar)

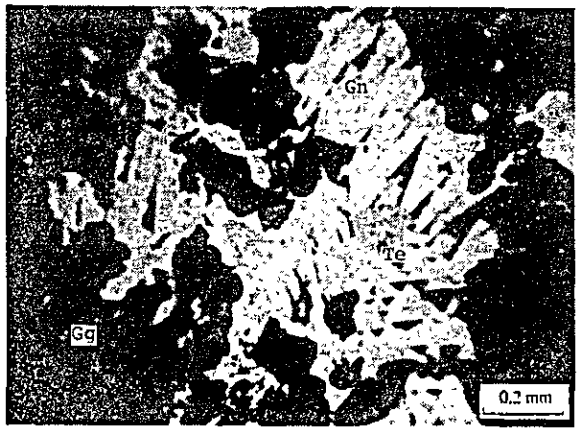
(crossed polars)

Photo A—2 Microphotograph of Polished Section

Abbreviation

Gn galena
Py : pyrite
Te : tetrahedrite
Sp . sphalerite
Cp : chalcopyrite
Po . pyrrhotite
Mt . magnetite
Hm hematite
Cr : cerussite
Ge : goethite
Cc . chalcocite
Dg : digenite

(Geological Survey)



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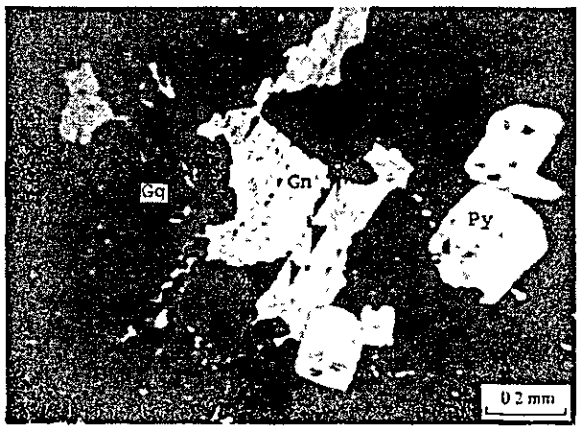
Sample No. : A–576
Location : Barrinha Mine
Ore name : Pyrite-Galena Ore



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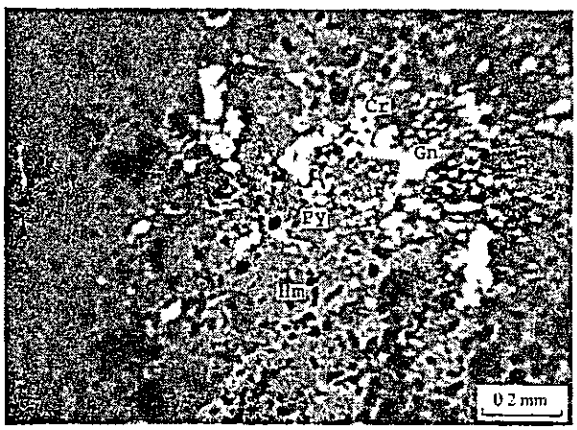
Sample No. : A–578
Location : Barrinha Mine
Ore name : Galena-Pyrite Ore



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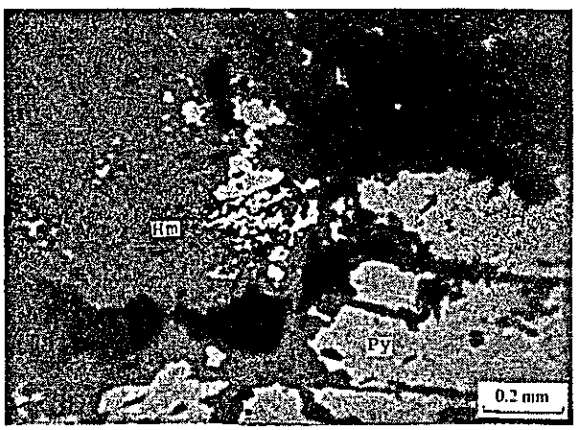
Sample No. : C–518
Location : Espirito Santo Mine
Ore name : Hematite-Galena Ore



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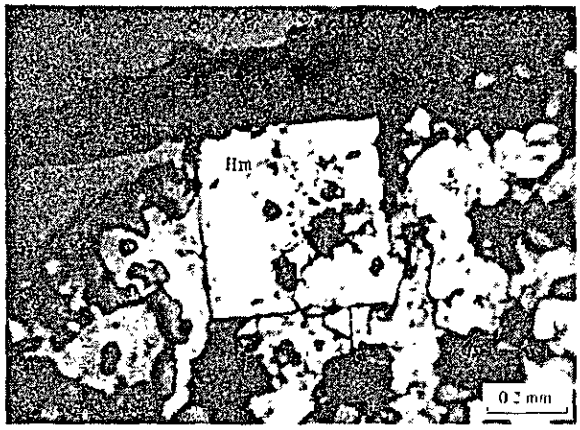
Sample No. : D–542
Location : west of Furnas
Ore name : Hematite-Pyrite Ore

(Geological Survey)



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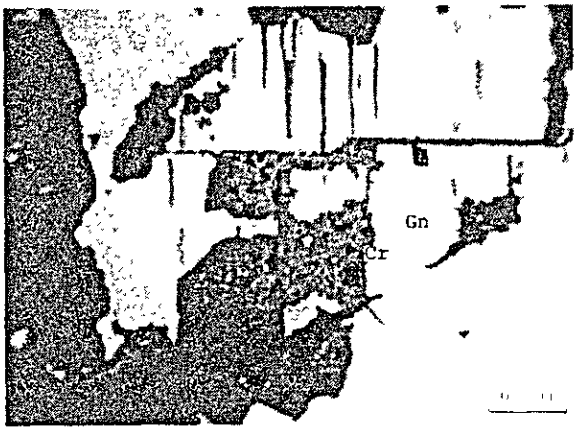
Sample No. : D–581a
Location : Lageado (Boa Ventura)
Ore name : Cerussite Ore



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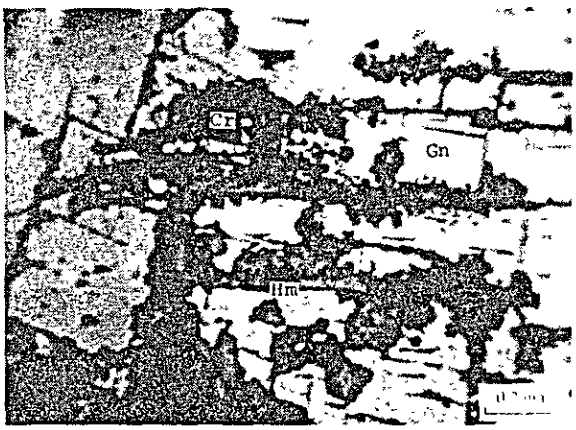
Sample No. : D–583
Location : Lageado (Boa Ventura)
Ore name : Cerussite-Galena Ore



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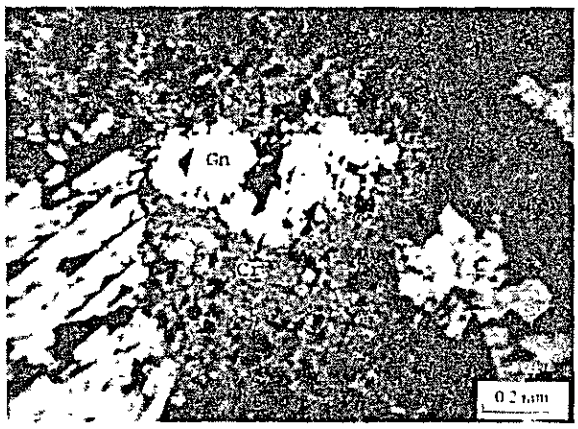
Sample No. : D–584
Location : Lageado (São Vicente)
Ore name : Galena Ore



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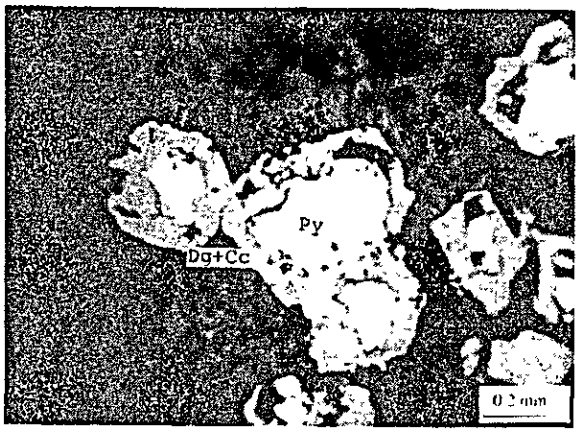
Sample No. : D–586
Location : Legeado (Jardim G2)
Ore name : Galena Ore

(Geological Survey)



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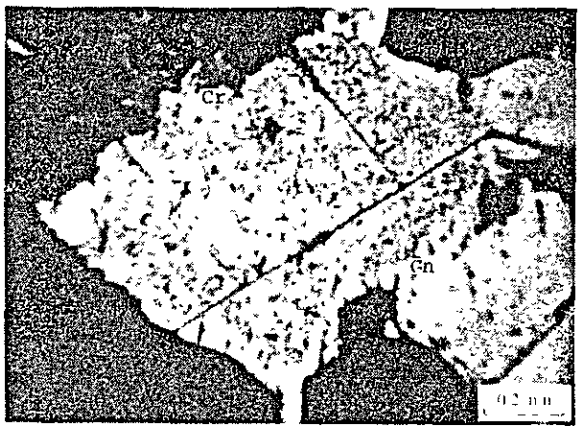
Sample No. : D–592
Location : Lageado (Copper Showing)
Ore name : Pyrite-Ore



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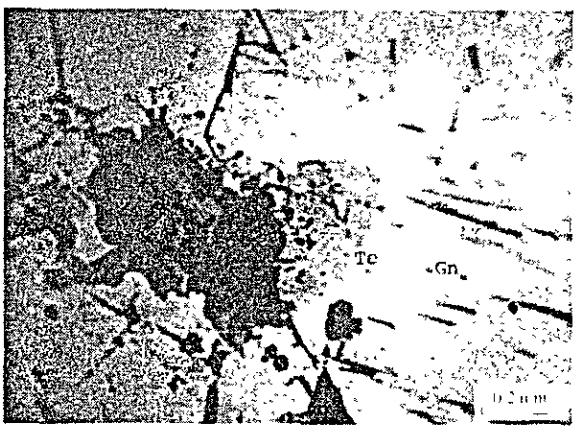
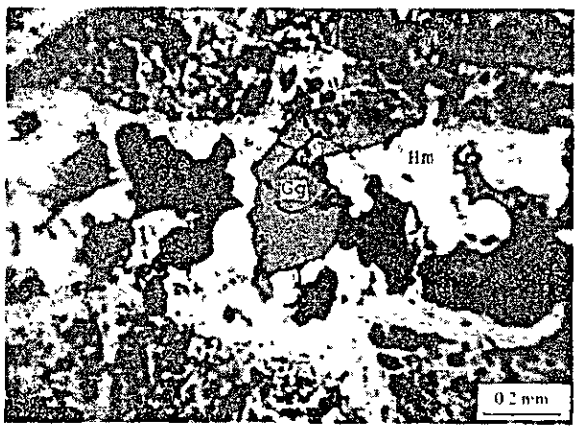
Sample No. : D–593
Location . Lageado (Copper Showing)
Ore name Galena Ore



only lower polar

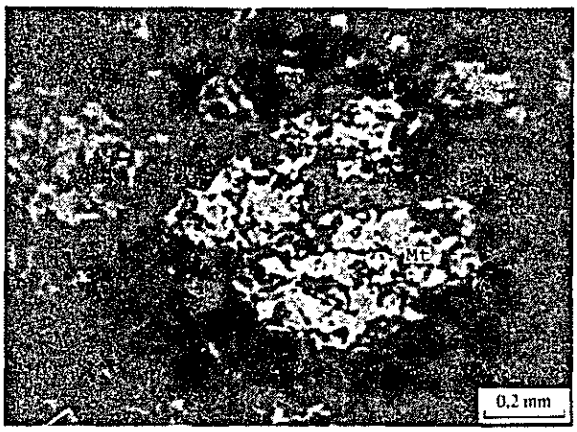
Sample No. : D–595a
Location : Serra (Jaguatiria)
Ore name · Cerussite-Galena Ore



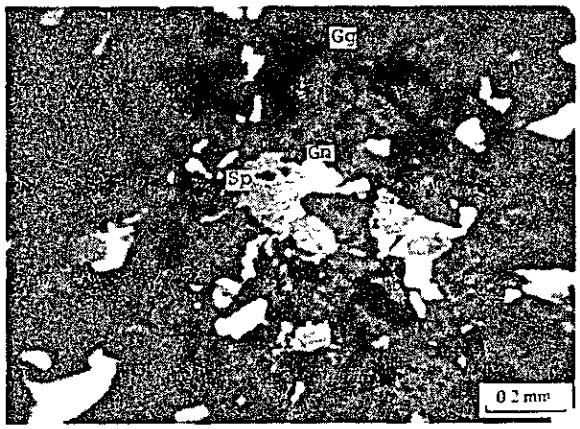
only lower polar

Sample No. : E–548
Location : Agua Suja
Ore name : Hematite Ore

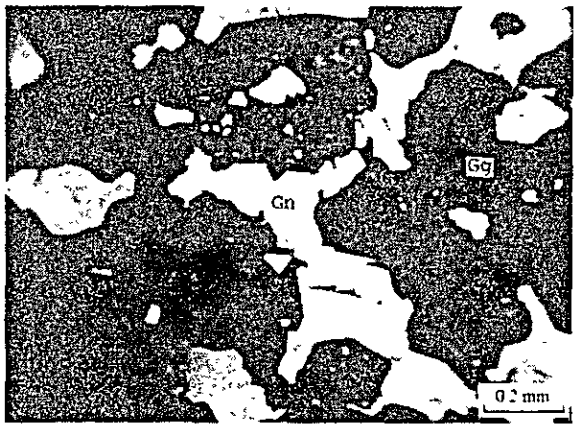
(Logging Core)



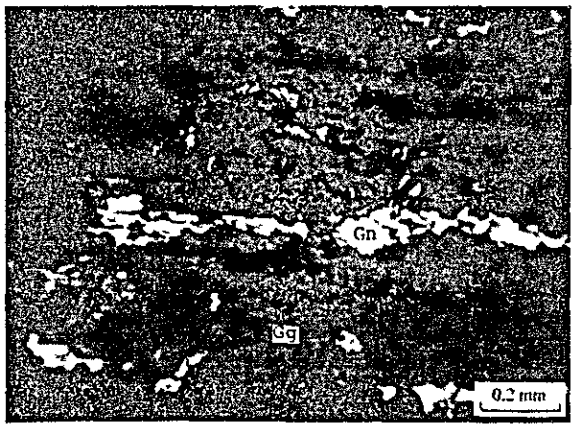
Sample No . F–627
Depth . AG–02, 228.70m
Ore name : Magnetite Ore



Sample No. F–637b
Depth AG–02, 243.70m
Ore name Pyrite-Galena Ore



Sample No. : F–640a
Depth : AG–02, 246.05m
Ore name : Galena Ore



Sample No. : F–675a
Depth : AG–03, 191.10m
Ore name Chalcopyrite-Pyrite Ore

Table A—1 List of Mines and Showings in Survey Area

No		Name of Mine & Showing	Kind of Ore	Type	Status	Location	Host Rock	Ore Deposits				Grade					Ore Mineral	Remarks
								Strike & dip	Lateral Extension	Longitudinal Extension	Average Width	Au g/t	Ag g/t	Cu %	Pb %	Zn %		
1		Braço da Pescaria	Pb	Vein	closed	Areia Branca	Açungui III I L_3 limestone	-	–	–	–	–	–	–	–	–	Gn	
2		Agua da Limeira	Pb	do	do	East of Espirito Santo	Açungui III I L_2 limestone	N40°~60°W, 30°~70°SW	1,200m	-	0 005 ~0 20 m	0 4	554.0	0.06	12.09	0.00	Gn, Cp, Py, Cc, Cv	
3		Monjolinho de Sebastião	Pb	do	do	do	Açungui III I L_3 dolomite	N40°E, 80°SI	10	–	network 0 03~0.10	0 8	204 0	0 00	7 70	0 00	Gn, Py, Cp	production several tons
4		Espirito Santo	Pb	do	do	Espirito Santo	Açungui III I L_3 limestone	N50°E, 80°NW	250	100	0 30	0.0	85 9	0.05	8.57	0 66	Gn, Hm, Cer, Py, Cv	production several hundred tons
5		Figueira	Pb	do	do	Southwest of Espirito Santo	do	N50°E, 55°NW	–	–	0 15~0 20	–	–	–	–	–	Sp, Ga, Py, Cp	production several hundred kilograms
6		Paciencia	Zn, Pb	do	do	do	do	N60°E, 50°SE	–	-	0.80~1 50	-	–	–	–	–	Gn, Sp, Py, Cp	production Galena 200kg
7		Furnas	Pb, Ag, Zn	Vein and pipe-like	operating	Furnas	do	N60°W, 80°SW N40°E, 45°NW	800	100	–	0 2	2586.0	0.11	12 60	3.82	Gn, Sp, Py, Tt, Cer	production (1981) 500T/M Pb:7%, Ag: 3,000g/T
8		Gruta de Santana	Pb	Vein	closed	East of Furnas	Açungui III F L_2 limestone	–	–	–	network 0.01~0 05	0 0	7.9	0 02	5.92	2.79	Gn, Sp	production 10 tons
9		Agua Suja	(Pb)	(Vein)	do	Northeast of Furnas	Açungui III F L_3 limestone	–	–	-	(0 02~0 04)	11.8	2.0	0 01	0.12	0.01	Hm, Gt	
10	Lageado Deposits	Occorençia de Cobre	Cu,Zn	Vein	do	Lageado	Açungui III F L_2 dolomite	N55°E, 50°SE	1.5	30	network 0 02	1.5	100.7	1.33	0.50	11 50	Gn, Cv, Py, Hm, Cer	
11		Lourenço Velho (São Lourenço)	Pb	do	do	do	Açungui III F L_2 limestone	N45°E, 75°SE	20~30	–	1.00	-	–	–	–	–	Gn, Cer	production 10 tons
12		Santana Velha	Pb	do	do	do	do	N75°E, 70°SE	5	250	0.50	–	–	–	–	–	Gn, Sp	production 1,000 tons
13		Porco ou Porco do Mato	Pb, Zn	do	do	do	do	N70°E, 70°SE	–	–	0.60~0.80	–	–	–	–	–	Gn, Sp, Py	production Gn: 2 tons
14		Mamangava	Pb	do	do	do	do	N65°E, 70°S E	500	100	0 80	0	215	0 0	11.1	0.01	Gn, Sp, Py, Cer	by JICA(1981), production several thousand tons
15		Santana Nova	Pb, Ag	do	do	do	do	N50°E, 75°SE	600	200		0.3	1874 0	0 08	12.24	0.01	Gn, Py, Cer, Cv	production several thousand tons Pb:5~50%
16		Santana F	Pb	do	do	do	do	N50°E, 60°SE	–	100+	1.00~2 00	–	–	–	–	–	Gn, Py, Cer	production Gn: 20~30 tons
17		Nova Esperança	Pb, Ag	do	do	do	do	N80°E, 70°SE	20	80+	0.50	0 5	1891.0	0.08	12 04	0.01	Gn, Cer, Py, Cp, Cv	production 40 tons Pb 40%
18		São Vicente	Pb	do	do	do	do	N50°E, 50°SE	–	50	0.60	0 5	496.0	0.08	12.04	0.22	Gn, Hm, Cer	production 40 tons
19		Coqueiro	Pb	do	do	do	do	N60°E, 80°SE	–	6+	0.20	–	–	–	–	–	Gn, Py, Cer	production 5 tons
20		Bugios	Pb	do	do	do	do	N50°E, 70°SE	–	150	0 30	–	–	–	–	–	Gn, Py	production 500 tons
21		Jardim I II	Pb, Ag	do	do	do	do	N50°~60°E, 60°SE	20	250	0.70	0.4	2150 0	0.58	12.14	0.08	Gn, Py, Hm, Cer	production 1,000 tons(I), 80 tons Pb. 50% (II)
22		São Rafael I-II-III	Pb	do	do	do	do	N70°E, 60°SE	–	150+	1.00	–	–	–	–	–	Gn, Py	by Sudelpa, production 500~1,000 tons
23		Boa Ventura	Pb	do	do	do	do	N70°E, 60°SE	5~10	80m (py-vein 1,000m)	1.00~1.50	0.1	1073.0	0.05	11 84	0.27	Gn, Py, Hm, Cer	production 85 tons
24	Serra Deposits	Macaquinho	Pb	do	do	do	do	E-W, 65°S	–	–	0.10	–	–	–	–	–	Gn, Sp, Hm, Cer	production several hundred tons
25		Jaguatirica	Pb, Zn	do	do	do	do	N50°E, 65°SE	–	50+	0.10~0 50	0.1	835.0	0 16	10.56	5.37	Gn, Cer, Sp, Py, Mt, Hm, Cv	production 80 tons
26		Sete Alqueires	Pb	do	do	do	do	N70°E, 75°SE	–	–	?	–	–	–	–	–	Gn, Hm	
27		Berta Funda I-II-III-IV	Pb	do	do	do	do	N30°E, 40°SE	–	–	0 20~0.30	–	–	–	–	–	Gn, Sp	
28		Alto do Bento (Descanso I-II)	Pb	do	do	do	do	N70°E, 70°SE	–	–	0.30~0.40	–	–	–	–	–	Gn, Sp, Py	by Sudelpa, production Gn 15 tons
29		Casa Velha	Pb	do	do	do	do	N60°E, 80°SE	–	200	0.10~0.40	tr	265	–	9.48	n.d.	Gn, Sp, Py, Hm, Cer	by Sudelpa
30		Sitio Noro	Pb	do	do	do	do	N80°E, 60°SE	–	–	0.20~0.30	–	–	–	–	–	Gn	
31		Berta do Leão	Pb, Ag	do	do	do	do	N45°E, 60°SE	–	60	0.20~0 30	0.0	1131 0	0.01	12.86	0.27	Gn, Sp, Py	
32		Santo Antonio do Pavão	Pb	do	do	Pavão	do	N60°W, 30°~80°NE	300	130+	0.15	0.0	51.9	0.00	4.29	0.06	Py, Gn	by Sudelpa, production 70 tons

Table A—2—1—1 Microscopic Observations (Thin Section) (Geological Survey)

Metamorphic rocks

Formation	Sample No.	Location	Rock Name	Texture	quartz	plagioclase	K-feldspar	apatite	zircon	sphene	calcite	dolomite	magnetite	hematite	sericite	graphite	tourmaline	tremolite	actinolite	chloritoid	andalusite	garnet	chlorite	staurolite	phlogopite	biotite	muscovite	epidote	zoisite	clinozoisite	anthophyllite	hornblende	clinopyroxene	Remarks
Açungui I Formation	C – 659	Bairro Maria Rosa	phyllite	lepidoblastic	•									•		○							◎				•							qtz-opq-mus vein
	C – 661	Bairro Maria Rosa	metabasalt	clastic	◎	•					◎			•	•	•							◎											
	E – 577	Morro do Mouro	phyllite	lepidoblastic	○									•		○							○				○							
	E – 578	Morro do Mouro	phyllite	lepidoblastic	○									◎									•				◎							
	G – 556	Bicas	meta conglomerate	clastic and lepidoblastic	○	•								•		○			○				•				◎							
	J – 532	Morro do Mouro	phyllite	lepidoblastic	○									•									•				◎							
	J – 555	Bairro Maria Rosa	metadiabase	subophitic		○				•									○				•					○				○		
Açungui II Formation	B – 588	Ressaca	amph sch.	nematoblastic	○	○																	•						•					
	B – 589	Ressaca	meta qtz sandstone	granoblastic	◎	○								•									•				•				◎			
	B – 602	Ressaca	chl-bt sch	lepidoblastic	○	○							•										○			○	○	•						cordierite •
	B – 603	Ressaca	ep-act sch	granoblastic	◎	•													◎									○						
	C – 653	Ribeirão Farto	meta siltstone	lepidoblastic	◎	◎	•							•		•							○				○							
	D – 528	Iporanga	meta conglomerate	lepidoblastic	◎	◎								•									○				◎							
	G – 552	Bicas	meta conglomerate	porphyroblastic and clastic	◎	◎								•	◎												•							
	G – 554	Bicas	meta conglomerate	porphyroblastic and clastic	◎	◎								•	◎											•	•							
	G – 594	Serra do Monte Negro	meta siltstone	lepidoblastic	◎	•								•									◎				•							
	I – 522	Corrego da Cotia	meta sandstone	lepidoblastic	◎	◎								•		•											◎				•			
	J – 547	Corrego Pedra de Amolar	meta arkose sandstone	clastic (partly lepidoblastic)	◎	◎	◎							•	◎	•											•							
	J – 548	Corrego Pedra de Amolar	meta conglomerate	clastic	◎	◎								•	◎	•																		
	J – 549	Corrego Pedra de Amolar	dolomite	micromosaic	•	•						◎				•																		clay mineral •
Meta Igneous Rocks	A – 525	Furnas	meta qtz sandstone	granoblastic	◎	◎							•	◎									○				○							
	B – 514	Caracol	calc sch.	granoblastic	◎	○					◎			•													•					◎		cal vein
	B – 517	Pouso Triste	calc sch	nematoblastic	◎	◎				•	•			•														○				◎		allanite •
	B – 531	Itaoca	hornfels	granoblastic and porphyroblastic	◎	◎																												tourmaline ◎
	B – 544	Gurutuva	metasiltstone	lepidoblastic	◎	◎				•										•	•		○				◎							opq ○
	B – 553	Gurutuva	mus-bt sch.	porphyroblastic	◎	•									•	•							•				◎							
	B – 611	Foqouilha	bt-ser sch.	porphyroblastic	◎	◎		•						•	◎								•											
	B – 624	Gurutuva	bt sch	nematoblastic	◎	◎				•				•																	○	○		
	C – 573	Bairro da Cachimba	meta siltstone	nematoblastic	◎	◎								•									○				○							
	C – 682	Bairro da Cachimba	meta siltstone	lepidoblastic	◎	•																	○				○							
	D – 553	Cachoeira	meta siltstone	lepidoblastic	◎	◎										•							•				◎							
	D – 558	Betari	calc schist	lepidoblastic	◎	◎					◎												•				◎							
	D – 564	Funil	meta sandstone	lepidoblastic	◎	◎		•								•	•						○				◎	•						
	D – 566	Funil	meta qtz sandstone	granoblastic	◎	•		(•)	(•)				(•)	•									•				•							
	D – 592	Lageado	brecciated dolomite	allotriomorphic and granular	◎	◎								•	•																			
	E – 513	Lambari	meta siltstone	lepidoblastic	•											•							◎				◎							
	E – 540	Serra	mus sch	lepidoblastic	◎	•							•	•									◎				◎	○						
	G – 506	Lambari	meta siltstone	lepidoblastic	◎	◎																	•				◎							
	G – 533	Serra da Onça Panda	meta sandstone	clastic	◎	◎													◎															
	I – 519	Corrego da Cotia	brecciated silicified limestone	clastic	◎	◎								•	•																			qtz veinlet
	J – 546	Betari	meta conglomerate	granoblastic	◎	◎			•					•									◎				◎							
	I – 551	Apiai	bt-mus sch.	lepidoblastic	◎	◎								•													◎	◎						
	I – 552	Apiai	mus-bt sch	lepidoblastic	◎	◎		•	•							•	•				○		•				◎	○						
	I – 555	Apiai	meta qtz sandstone	granoblastic	◎	◎		•	•														•					○	○					
	I – 556	Apiai	bt-bearing metasandstone	lepidoblastic	◎	•										•																		
	I – 565	Barrinha	meta conglomerate	clastic and lepidoblastic	◎	◎		•								•	•										○							
	B – 548	Gurutuva	gabbro	ophitic									•	•									•								•	○		
	C – 538	Faz Bachada Grande	meta basalt	subophitic						•				•									◎				○			•	○			stilpnomelane vein
	C – 631	Bairro da Cachimba	meta gabbro	ophitic	•										•				◎							•	•				○			
	D – 600	Cachoeira	meta gabbro	ophitic									•														•				○	○		stilpnomelane •
	E – 583	Faz da Cachimba	meta gabbro	ophitic						•									◎								•				○			
	G – 561	Faz da Cachimba	meta gabbro	ophitic		◎							•						•				•			•						◎		
	H – 516	Pamital	gabbro	ophitic		◎							•						•							•						◎		orthopyroxene ○

Table A—2—1—2 Microscopic Observations (Thin Section) (Geological Survey)

Igneous Rocks

Rock Group		Sample No.	Location	Rock Name	Texture	Constituent mineral: quartz	K-feldspar	plagioclase	biotite	muscovite	hornblende	augite	hypersthene	olivine	garnet	zircon	rutile	Secondary mineral: calcite	sericite	chlorite	epidote	sphene	actinolite	idingsite	serpentin	Remarks
Granite	Apiai mass	B – 508	Apiai	granite	granular	○	◎	○	•							•						•	•				partly mylonitic
		I – 558	Apiai	granite	granular	◎	○	◎	○		○					•			•	•	•	•					apatite • allanite •
	Itaoca mass	B – 623	Itaoca	granite	equigranular	○	◎	○	○		○					•			•		•	•					apatite •
	E. Santo mass	C – 685	Espirito Santo	granite	granular	○	◎	◎	○		○					•			•	•	•	•					myrmekite • apatite •
	Vardim Grande mass	G – 570	Serra de Vargem Grande	granite	equigranular	○	◎	◎	○		(•)					(•)			•			•					apatite (•)
	small mass	D – 533	Serra do João Ferreira	granite porphyry	porphyritic	○	◎	○	○																		hematite •
		G – 618	Furnas	granite	porphyritic	○	◎	○	◎		○								•	•	•	•					magnetite •
diabase dyke		C – 501	Fa$_2$ Bachada Grande	gabbro	ophitic			◎	•			◎											•				
		C – 681	Bairro da Cachimba	diabase	ophitic			◎				◎								•							magnetite ○
andesite ~ porphyrite dyke		C – 553	Espirito Santo	porphyrite	porphyritic	•		◎	○		○								•	○	•	•					apatite •
		C – 641	Ribeirão Farto	porphyrite	porphyritic			◎	•			○							•	•	•						magnetite •

Table A—2—2 Microscopic Observations (Thin Section) (Logging Core)

Formation	Sample No.	Depth (m)	Rock Name	Texture	quartz	plagioclase	K-feldspar	apatite	zircon	sphene	calcite	dolomite	magnetite	hematite	sericite	graphite	tourmaline	tremolite	actinolite	chloritoid	andalusite	garnet	chlorite	staurolite	phlogopite	biotite	muscovite	epidote	zoisite	clinozoisite	anthophyllite	hornblende	clinopyroxine	Remarks
Aqunguti 1 Formation	F— 525	AG—01 15.55	mus-bt sch	lapidoblastic	◎	○	•		•						•	•	•					○	•			○	○							
	530	64.40	act sch	nematoblastic	•	○					•							◎								•								
	537	87.90	graph-mus sch	nematoblastic	○	•										○							•			○	◎							
	544	137.20	act sch	nematoblastic		○					•								◎									•						
	548	184 00	bt-mus sch	lapidoblastic	◎	•											•									○	◎							
	560	240.20	mt-bearing calc-silicate rock	granoblastic	○	○					◎		•					◎					•		○							○		
	562	254.30	bt-carbonate sch	nematoblastic							◎		○												○							○		
	575	256.50	graph-mus sch	lepidoblastic	○	○					•		•			○										•	◎							
	578	280.50	carbonate sch	nematoblastic	○	•	•	•		•	○		•													•								
	580	292 00	limestone	granoblastic							◎							◎							○									
	583	323 15	quartzite	granoblastic	◎	○					•													•			•							
	F— 588	AG—02 52 10	bt-mus sch	granoblastic	◎	•		•			•					•	•					•					○	○						cal vein
	597	75 20	bt-mus sch	lepidoblastic	○	○										•											○	◎						
	606	113.80	bt-mus sch	lepidoblastic	◎									•	•								•	•			○	◎						
	610	128 60	bt-act sch	nematoblastic	○	○		•											◎								○		•					
	612	137.80	bt-mus sch	lepidoblastic	◎	•		•	•													•					○	◎						
	617	167.30	garnet-bt-mus sch	lepidoblastic	◎	•		•	•						•	•						○					○	◎						
	621	195.50	amphibolite	nematoblastic	○	○				•		•							•										•			◎		
	623	214.40	amphibolite	nematoblastic	•	○			•	•		•			•			○	◎				•						•			◎		
	626	225.70	bt-mus sch	lepidoblastic	◎											•					○					○	◎							
	627	228 70	bt-carbonate-mt sch	granoblastic	○	•					○	◎						○					•			○			○					
	636	240.30	tre-phlo-carbonate sch	mosaic and lepidoblastic	○	○					◎					•		◎				•			◎									
	651	260.50	graph-bt-mus sch	lepidoblastic	◎			•					•			○						•				○	○							
	654	271 75	phlo-carbonate sch	granoblastic	○	○		•			◎		•					•								○								
	659	299.20	quartzite	granoblastic	◎	•	•			•	○															○								
	662	328.10	quartzite	granoblastic	○	○					○		•					○								○								

Table A–3–1 Microscopic Observations (Polished Section)

(Geological Survey)

No	Sample No	Location	Ore Name	Galena	Sphalerite	Pyrite	Pyrrhotite	Chalcopyrite	Tetrahedrite	Chalcocite (second)	Covellite (second)	Magnetite	Hematite (second)	Cerussite	Goethite	Others
1	A 572	Panelas Mine 110 + 26mL	Galena Pyrrhotite Ore	○	●	●	○	●								
2	A 573	Panelas Mine 110 + 34mL	Galena Ore	◎		●	●	●								
3	A 574	Perau Mine G2 + 8 S	Pyrite-Cerussite Ore	●		●					●			●		
4	A 575	Perau Mine G2 + 8 N	Galena Pyrite Ore	●	●	●		●			●		●			Bor
5	A 576	Barrinha Mine	Pyrite-Galena Ore	○	●	●		●	●			●	●			
6	A 577	do	Pyrite-Galena Ore			●										
7	A 578	do	Galena Pyrite Ore	●					●							
8	A 579	do	Galena Pyrite Ore	●	●	●			●							
9	A 580	Perau Mine G2 + 8 S	Galena Pyrite Ore	●		●								●		
10	A 581	Panelas Mine 110 + 34mL	Pyrite Ore			◎		●								
11	A 582	UNIGLO	Galena Magnetite Ore	●		●		●					●			
12	B-622	Santo Antonio do Pavao Mine	Pyrite-Galena Ore	◎		○										
13	C 518	Espirito Santo Mine	Hematite-Galena Ore	○		●					●		○	●		
14	C 591	Agua da Limeira	Galena Ore	●												
15	C 592	do	Chalcopyrite Ore			●		●		●	●					Dg
16	C 596	SW of Espirito Santo Mine	Pyrite Ore			●										
17	D 542	West of Furnas	Hematite Pyrite Ore			○		●			●		●			
18	D 581a	Lageado	Cerussite-Ore										●	○	●	
19	D 581b	Boa Ventura do	Galena Ore	○									●	●		
20	D-583	do	Cerussite Galena Ore	○		●							●	○	●	
21	D 584	Lageado Sao Vicente	Galena Ore	○									●	●		
22	D 586	Lageado Jardim G2	Galena Ore			●							●	●		
23	D 588	Legeado Nova Esperança	Pyrite-Galena Ore			●		●			●			●		
24	D 590	Lageado Santana Nova G5	Pyrite-Galena Ore	○		●					●			●		
25	D 592	Lageado Copper Showing	Pyrite Ore			●							●		●	
26	D 593	do	Galena Ore	○		●					●		●	●	●	
27	D 595a	Serra Jaguatirica	Cerussite-Galena Ore		●	●						●	●	●		
28	D 595b	do	Cerussite-Galena Ore	○	●	●					●			●		
29	D 597	do	Galena Cerussite Ore	●	●	●					●			◎		
30	E 544a	Gruta de Santana	Galena Sphalerite Ore	●	●											
31	E 548	Agua Suja	Hematite Ore										◎		●	
32	E 643	Furnas Mine	Pyrite-Galena Ore	○	●	○										
33	E 644	do	Galena Ore	○	●	●			●					●		
34	E-645	do	Galena-Sphalerite Ore	◎	◎	●			●					●		
35	E 646	Diogo Lopes Mine	Cerussite-Galena Ore	○		●								●		
36	E 647	Paquetto Mine	Galena Ore	○	●	●					●			●		
37	L-648	Bueno Mine	Galena Ore	●		●		●			●			●		
38	E 649	Onça II	Galena Ore	○		●								●		
39	I 508	Serra Aberta do Leão	Galena Ore	●	●	●										
40	G 610	Barrinha Mine	Galena Ore	●												

Remarks ◎ abundant ○ common ● little • rare Dg Digenite Bor Bornite

1. A-572

Massive pyrrhotite occupies more than 30 % and disseminated galena occupies about 20 % of the area. Galena, pyrrhotite and a small amount of chalcopyrite occur with mutual boundary. No indication of the temporal difference in the deposition of them was observed microscopically. These sulfide minerals fill the interstices of carbonate and quartz grains. Pyrite grains occur rarely between pyrrhotite and chalcopyrite grains. Few sphalerite grains occur in chalcopyrite.

2. A-573

Galena occupies nearly 80 % and pyrite about 20 % of the area. Large grains of pyrite occur in galena. The shape of grain is mostly irregular and the boundary is partly coroded. A small amount of galena, pyrrhotite, and chalcopyrite occur in pyrite grains. Small grains of pyrrhotite occur sporadically in galena and the shape of them is quite irregular being coroded by galena. Sphalerite occurs also in galena as small irregular grains or with pyrrhotite grains. From the texture, galena seems to have replaced pyrite, sphalerite and pyrrhotite.

3. A-574

Pyrite and galena occupy several per cent of the area totally. A small amount of covellite, sphalerite and cerussite are observed. Galena fills the interstices of carbonate and quartz grains. Cerussite replaces galena along the boundary forming thin films. In the case of small grain, cerussite replaces almost of the galena grain leaving minute relict of galena in the cerussite aggregate. Pyrite occurs as isolated grains or with galena in carbonate gangue. Round grains of pyrite (500 μm - 1200 μm) are often found in carbonate aggregates. Covellite is observed in cerussite.

4. A-575

Pyrite occupies 10 % and galena 10 % of the area totally. Galena fills the interstices of ganuge minerals and round grains of pyrite distributed radomly in gangue. Small round grains of sphalerite occur in galena. Bornite occurs with chalcocite and covellite as veinlets and films along the boundary of chalcopyrite which contacts with galena. The assemblage also occurs in cerussite aggregates. A small amount of fine-grained covellite also occurs in cerussite. Hematite occasionally occurs along the boundary of galena.

5. A-576

Galena occupies 30 % and pyrite about 10 % of the area. Galena fills the interstices of carbonate and quartz grains, and pyrite occur as coroded euhedral grains with galena. Fine grains of sulfides disseminated in gangue, mostly of carbonate. Pyrite grains often contain fine blebs of sphalerite and galena. Few grains of magnetite are replaced by hematite along their margin. Irregular form of tetrahedrite occurs in galena. A few amount of cerussite is formed in galena.

6. A-577

Galena and pyrite occur in carbonate and quartz gangue. Galena occupies 20 % and pyrite is much less. Galena fills the interstices of gangue or disseminates finely (less than 10 μm) along the grain boundary or cleavage cracks of carbonate grains. Pyrite occurs as coroded round form in gangue isolated from or with galena.

7. A-578

Pyrite and galena occupy 20 % Of the area. Euhedral or coroded large grains of pyrite (200 μm - 800 μm) occur in carbonate. The grains include small blebs of galena, chalcopyrite and tetrahedrite. Galena fills the interstices of gangue grains, and also finely disseminated in or along the grains of carbonate. A small amount of tetrahedrite occurs in galena.

8. A-579

10 % Of galena and 10 % of pyrite disseminate in gangue. Galena fills the interstices of ganuge minerals and distributes randomly. Pyrite occurs as round grains in galena or as isolated in gangue. Sphalerite grains of irregular shape occur occasionally surrounded by galena thin film and tetrahedrite film at the outside. A trace amount of sphalerite is observed.

9. A-580

Pyrite occupies several per cent of the area. Pyrite grains of round shape (less than 1 mm) distribute in gangue minerals. Galena grains which fill the interstices of gangue minerals are replaced by cerussite partly along the rim or completely.

10. A-581

95 % of the area is occupied by pyrite. Large subangular grains of pyrite compose the most part of ore. The interstices of large pyrite grains are filled with the aggregates of small framboidal pyrite grains and irregularly shaped chalcopyrite.

11. A-582

Magnetite occupies about 40 % of the area. Sulfides including galena, pyrite and chalcopyrite, occupy only less than 10 %. Magnetite forms a band and it consists of grains ranging from 100 μm to 300 μm. The rim and cracks are partly replaced by hematite. Galena fills the interstices of gangue minerals but they show roughly the distribution along a direction. Sphalerite generally occurs with galena. Chalcopyrite occurs with pyrite and sphalerite, filling the interstices of them, but it occurs with galena with mutual boundary.

12. B-622

Pyrite is the major sulfide mineral. Galena is quite few. Large anhedral grains of pyrite occupy the most part. The size of grain ranges from 300 μm to 1000 μm. Pyrite grains contain small grains of gangue minerals as well as blebs of galena. Cracks filled with gangue minerals penetrate irregularly the pyrite grains.

13. C-518

Opaque minerals consist mostly of galena and hematite. Less amount of cerussite and minor amount of pyrite and covellite were observed. Cerussite replaces the rim of galena grains and also fills up the cleavage cracks of galena. Hematite replaces galena and pyrite grains forming fine bands or partly as aggregates of oolitic texture. Tiny relicts of galena of irregular shapes were observed everywhere in the aggregates of cerussite and hematite. A small amount of covellite occurs as small grains (less than 10 μm) in cerussite aggregates. Slightly eroded euhedral or anhedral grains of pyrite occur in galena grains, or in the aggregates of cerussite and hematite. Quartz grains also occur in the aggregates of cerussite and hematite.

14. C-591

A small amount of galena fills up the interstices of grains of gangue minerals and also occur as small aggregates having very rugged surface.

15. C-592

Chalcopyrite predominates in the sulfide minerals. Chalcopyrite fills the interstices of gangue minerals, and show very rugged surface. Few round grains of pyrite occur in chalcopyrite grains. Mixture of chalcocite and digenite replaces irregularly the chalcopyrite grains. Covellite is rarely found on the boundary of the mixture of digenite and chalcocite.

16. C-596

A small amount of pyrite (less than 1%) occurs in gangue minerals as irregularly coroded grains. Besides pyrite, no other sulfide minerals were observed.

17. D-542

Pyrite occupies nearly 50% of the area of the polished surface and hematite does about 35%. A small amount of chalcopyrite and covellite were observed. Massive aggregates of pyrite occupy the most part of sulfide minerals. Chalcopyrite fills the interstices of pyrite grains. The size of pyrite grain ranges from 100 μm to 2 mm, and chalcopyrite about 10-20 μm. Pyrite grains are partly replaced by hematite, especially along the rim of grain. Hematite occurs as flaky aggregates surrounding the massive pyrite. The size of hematite was

between 100 μm and 500 μm. Covellite occurs as small aggregates in the hematite aggregates.

18. D-581-a

Sulfides, probably galena, are completely replaced by the fine-grain aggregates of cerussite leaving quartz grains in them. Hematite pseudomorph after pyrite crystal is rarely obaserved.

19. D-581-b

Galena occupies the most part of the sample. Large grains of galena (4 mm - 6 mm) form a compact mass. Fine grains of cerussite occur along cleavage cracks or partly replacing galena. Hematite occurs with cerussite forming the center part of the cerussite veinlets along cleavage cracks.

20. D-583

Galena occupies 60 % and cerussite 30 % of the area. Mixture of hematite and geothite is leaa than 5 %. Galena grains are large (500 μm - 2 mm). Cerussite occurs along cleavage cracks or replacing galena grains. Aggregates of fine grain cerussite ocasionally contain many irregular grains of galena (less than 2 μm) as the relicts of replacement of galena by cerussite. Hematite and goethite mixtures occur in the cerussite aggregates and they also include galena relicts. Two grains of pyrite (about 100 μm) occur in galena.

21. D-584

The sample is occupied exclusively by galena. A small amount of cerussite and hematite were observed. Cerussite occurs along cleavage cracks forming veinlets which have hematite aggregates in the center.

22. D-586

Galena predominates over the other sulfide minerals. Galena is remarkably replaced by fine-grain aggregates of cerussite which include fine irregular relicts of galena, mostly along cleavage cracks. The galena grains are surrounded by the mixture of cerussite, hematite and goethite with the irregular boundary. These secondary mixtures form fine banding texture along the boundary, and sporadically contain covellite. Few pyrite grains were observed.

23. D-588

Galena occupies more than 90 % of the area. Cerussite succeeds galena but much less. A small amount of pyrite, chalcopyrite and covellite were found. Large grains of galena (1 mm - 3 mm) are scarcely replaced by cerussite, except partly on the boundary. In smaller grains of galena, cerussite occurs replacing galena and filling cleavage cracks. Eroded grains of pyrite contain few blebs of chalcopyrite and galena. A small amount of covellite occurs in cerussite aggregates. Mixture of hematite and goethite forms pseudomorph after pyrite crystal in the assemblage of cerussite, carbonate and quartz. Pyrite relicts were often observed in these hematite and goethite mixture.

24. D-590

Galena occupies about 75 % and pyrite about 25 % of the area. Galena grains are partly replaced by cerussite aggregates along the grain boundary and cleavage cracks. Pyrite grains are eroded by galena in various states. Some grains show slightly eroded euhedral shape and others show quite irregular shapes cut by cracks filled with gangue minerals. A very few amount of covellite was observed.

25. D-592

Less than 5 % of the area is occupied by pyrite. The other part is gangue. The rim of pyrite grain is strikingly replaced by the mixture of chalcocite and digenite. Larger grain consists of pyrite core and secondary envelop but smaller one is completely replaced.

26. D-593

Galena occupies the most part of sulfides. Galena fills the interstices of gangue minerals, mostly of carbonate and quartz. Galena also occurs with quartz as veinlets cutting gangue. Galena grain is often replaced by cerussite aggregates along cleavage cracks or as selvages of them. Covellite is found in the aggregate. A finely crushed pyrite grain, the interstices of which is filled with the mixture of chalcocite and digenite, is found.

27. D-595-a

The sample consists of 60 % Of galena and 30 % of cerussite. In the rest, covellite, sphalerite, pyrite and some undetermined minerals. Cerussite replaces remarkably galena grains along cleavage cracks and rims, forming fine colloform or banding texture and including fine relicts of galena, especially around the replaced galena grains. Pyrite shows slightly eroded euhedral or anhedral shapes and occurs in the cerussite aggregates or in galena with sphalerite. Covellite occurs sporadically in cerussite aggregates. Sphalerite occurs as round grains in galena. Magnetite grains partly replaced by hematite occur with cerussite in cleavage cracks of galena. Two undetermined minerals occur with cerussite. The one is brownish and the other is bluish. They occur intimately making aggregates with cerussite.

28. D-595-b

Galena occupies the area more than 80 %. Galena grains (500 um - 2 mm) are partly replaced by cerussite along cleavage cracks and boundary or as spots. Near the grain boundary, cerussite aggregates form fine bands. A small amount of covellite with the undetermined brownish mineral occur in cerussite. Larger area of galena, however, is still intact by cerussite, and contains round grains of pyrite and sphalerite, and rather irregularly shaped grains of greenish undetermined mineral (tetrahedrite?). It is inferred microscopically that galena was first replaced by fine grains of cerussite along cleavage cracks, and then they grew to connect each other forming a fine grained aggregate leaving small flakes of galena in it.

29. D-597

Galena occupies 60 % of the area. Sphalerite, pyrite, covellite and cerussite occur in a much less amount. Galena is intensively replaced by cerussite which accompanies hematite and goethite aggregates in some places. The secondary aggregates show a concentric banding in somewhere. Covellite is found in the secondary aggregates. Small round grains of pyrite and sphalerite occur scarcely in galena.

31. E-548

Aggregates of hematite and goethite. Fine-grained hematite occurs associated with goethite. Hematite forms fine mesh-like texture, filling the interstices of quartz grains and veinlets, forming concentric nodules and pseudomorph after sulfide grain. The parts of rugged surface are porous with more goethite. No sulfide minerals such as sphalerite, galena, pyrite or chalcopyrite are found.

30. E-554

Stringer of galena and sphalerite in gangue minerals. Galena and sphalerite fill up the interstices of carbonate grains distributing randomly but along a direction.

32. E-643

Galena occupies about 75 % of the area, and pyrite about 20 %. A small amount of sphalerite is found. Galena fills the interstices of pyrite and gangue grains. Some parts are almost occupied by galena. The size of galena grain ranges from 100 μm to 800 μm. Some pyrite grains are coroded by galena. Pyrite grains ranges from 50 μm to 200 μm, and generally they show a slightly coroded euhedral shapes. Pyrite grains distribute evenly forming a small aggregate consisting of several grains or separately in galena, but in gangue minerals, the distribution of pyrite grains is much denser than in galena. A single large grain of sphalerite, the size of which is about 1800 μm, is observed in galena. Several small blebs of chalcopyrite and galena are observed in it.

33. E-644

Largely galena. Large well-developed crystals of galena include some round grains of pyrite and sphalerite. Irregular patches of tetrahedrite(?) occur sporadically in galena. Some parts of galena grain are sparsely replaced by cerussite.

34. E-645

50 % of the area is occupied by galena and the rest by sphalerite. A small amount of pyrite, tetrahedrite and cerussite are found. Large grains of galena and sphalerite occupy the most part. Galena aggregates consisting of grains ranging between 500 μm and 2000 μm are roughly separated from sphalerite aggregates. Galena grains include round grains of sphalerite and pyrite, and irregular patches of tetrahedrite. Pyrite and sphalerite grains show occasionally a corosion texture but tetrahedrite contacts with galena with mutual boundary. Sphalerite grains in the aggregates are as large as 100-2000 μm, and they include many tiny grains of galena (less than 50 μm) and round grains of pyrite. Veinlets consisting of fine grains of cerussite with galena relicts penetrate the sphalerite aggregates and

they extend to galena which contacts with the sphalerite, and connects with the cleavage cracks formed in galena.

35. E-646

Galena fills the interstices of carbonate grains forming irregular shapes, and it is partly replaced by cerussite. Fine grains of the undetermined brownish and bluish minerals form aggregates with hematite and goethite and occur in cerussite. Pyrite and galena relicts occur in cerussite. Coroded grains of pyrite (100-200 μm) occur sparsely in galena.

36. E-647

Galena predominates over pyrite, sphalerite and covellite. Galena occurs randomly filling the interstices of gangue minerals and the size is between 30 μm and 300 μm. Some parts of grains are slightly replaced by fine grain aggregates of cerussite. In the highly altered parts, very few galena is observed as the remnants of replacement forming very irregular shapes. Coroded grains of pyrite, ranging from 40 μm to 150 μm, occur sparsely in galena and gangue. A small amount of sphalerite also occurs in galena. Few grains of covellite are found in cerussite.

37. E-648

Sulfides occupy only about 5 % of the area. Galena fills the interstices of carbonate and quartz grains. The size ranges from 5 μm to 500 μm. Rims and smaller parts of galena grain are partly replaced by cerussite. Very few covellite occurs in cerussite. Chalcopyrite occurs in galena but very few. Several anhedral grains of pyrite, the size of which is smaller than 200 μm, occur with galena or separately in gangue.

38. E-649

Galena occupies less than 40 % of the area. Galena occurs in large grains ranging from 500 μm to 1 mm with mutual boundary. Cerussite replaces the boundary or cleavage cracks of galena, but the replacement is not intense. Pyrite grains, ranging from 40 μm to 800 μm, form aggregates in galena and gangue. The brownish and bluish undetermined minerals occur with cerussite which replace galena.

39. I-508

Galena occupies the most part. Galena occurs as mosaic aggregates of large grains of about 1-2 mm in diameter. Rounded cubic form of pyrite occurs in galena with gangue and a certain amount of sphalerite. Pyrite grains range from 10 μm to 200 μm. Cerussite and secondary minerals replace galena partly or along cleavage cracks.

40. G-610

Very few galena occurs in gangue. Galena fills the interstices of gangue minerals but very few.

Table A–3-2 Microscopic Observations (Polished Section) (Logging Core)

No.	Sample No.	Depth	Ore Name	Galena	Sphalerite	Pyrite	Chalcopyrite	Magnetite
1	F–564a	AG–01, 256.20m	Galena-Pyrite Ore	●	●	●		
2	F–567a	do. 259.10m	Galena-Sphalerite Ore	●	●	●	●	
3	F–570a	do. 262.10m	Galena-Sphalerite Ore	●	●	●	●	
4	F–627	AG–02, 228.70m	Magnetire Ore					◎
5	F–637a	do. 242.90m	Galena-Sphalerite Ore	●	●	●	●	
6	F–637b	do. 243.70m	Pyrite-Galena Ore	○	●	●	●	
7	F–640a	do. 246 05m	Galena Ore	○		●		
8	F–641a	do. 247.10m	Sphalerite-Galena Ore	○	●	●	●	
9	F–646a	do. 252.30m	Galena-Sphelerite Ore	●	○	●		
10	F–646b	do. 252 45m	Galena-Sphalerite Ore	○	○	●	●	
11	F–673a	AG–03, 190.10m	Chalcopyrite-Pyrite Ore	●	●	●	●	
12	F–675a	do 194.60m	Pyrite-Galena Ore	○		○		
13	F–675b	do. 195.30m	Galena-Sphalerite Ore	●	●	●		

Remarks ◎ abundant ○ common ● little • rare

1. F-564-a

Sulfides consisting of pyrite, galena and sphalerite, occupy less than 10 % of the area. Sulfides distribute irregularly in the interstices of gangue minerals, mostly of carbonate. Pyrite occasionally shows euhedral form but sphalerite and galena contact with mutual boundary. Grain size varies from a few μm to 600 μm in maximum of pyrite. Rounded quartz grains distribute sparsely in carbonate.

2. F-567-a

Sulfides occupy about 15 % of the area. Galena and sphalerite contact with mutual boundary and distribute in gangue randomly or making a rough distribution. They include a small amount of chalcopyrite. Pyrite occurs in euhedral forms in galena and sphalerite or in gangue separated from the other sulfides.

3. F-570-a

Sulfides, consisting of galena, sphalerite and pyrite, occupy about 10 % of the area. Galena occurs in some parts as a slender distribution of fine grains (ca. 5 μm) along the grain boundary of carbonate or cutting them. Galena also occurs as large grains (400 μm - 1 mm) filling the interstices of gangue minerals. Sphalerite occurs mostly with galena in contact with mutual boundary or included in galena grain. Pyrite grain occurs as a single grain in gangue, or included or contact with galena and sphalerite. A small amount of chalcopyrite is observed.

4. F-627

Magnetite occupies about 40 % of the area. Very irregularly shaped grains of magnetite ranging from 30 μm to 500 μm, distribute among gangue minerals. They show very irregular shapes and heavily rugged surface. No other opaque minerals were seen.

5. F-637-a

Galena and sphalerite occupy about 20 % of the area. Galena and sphalerite disseminate in the interstices of gangue minerals. Galena especially distributes finely along the grain boundary of carbonate and also fills the interstices irregularly. Chalcopyrite occurs more intimately with sphalerite than galena. Pyrite shows euhedral forms and occurs with galena and sphalerite or separately in gangue. Flaky crystals of gangue are observed in sulfide-rich zone.

6. F-637-b

Galena and pyrite occupy about 20 % of the area. Galena occurs randomly in aggregates of flaky gangue minerals and quartz grains. It ranges from 20 μm to 500 μm in size and shows irregular forms. Sphalerite is few and mostly included in galena. Pyrite occurs in large grains, the size of which is between 200 μm and 1 mm. A very small amount of chalcopyrite is observed in gangue.

7. F-640-a

Galena occupies about 30 % and pyrite about 10 % of the area. Galena fills the interstices of carbonate grains and distributes randomly. No sharp boundary is microscopically observed between the sulfide-poor zone and the sulfide-rich zone. Round or subangular grains of pyrite distribute separately or with galena in gangue minerals.

8. F-641-a

Sulfides form bands in carbonate gangue. A band consists of only galena which occurs in the interstices of carbonate forming irregularly shaped grains of 50-350 μm diameter. Galena occupies about 20 % of the area. In the second band, sphalerite forms a mosaic texture with carbonate and it includes smaller irregular patches of chalcopyrite and galena. At some boundaries between sphalerite and galena, it seems that galena is replaced by sphalerite. Two large grains are included in this zone as round shapes ranging 800 μm and 300x600 μm. In the third part, sphalerite predominates than galena or pyrite. A large grain of pyrite partly coroded occurs in carbonate with a small amount of galena and sphalerite. The diameter is about 1 mm.

9. F-646-a

Sphalerite disseminates in the interstices of quartz and carbonate gangue, occupying about 20 % of the area. Galena and sphalerite contact each other with mutual boundary, or partly galena fills the interstices of sphalerite grains. Pyrite occurs in round irregular grains ranging from 50 μm to 800 μm.

10. F-646-b

Galena and sphalerite mixture forms irregular streaks in carbonate gangue. The mixture occupies about 15 % of the area. Galena occurs in irregular forms between the gangue grains or cutting them as irregular veinlets. The grain size is between 50 μm and 600 μm. Sphalerite occurs intimately with galena, with mutual boundaries or partly replaced by galena. Pyrite occurs sparsely in gangue as fine round grains. The grains are partly coroded and range between 20 μm and 40 μm. Very few chalcopyrite is observed.

11. F-673-a

Chalcopyrite occupies about 40 % and pyrite about 30 % of the area. Large grains (larger than 4 mm) are included in the sulfide mixture. The mixture also includes large round grains of pyrite. Besides this aggregate, chalcopyrite occurs in carbonate gangue along grain boundary or cleavage cracks forming thin veinlets. It also fills the interstices of flaky crystals of gangue. In some parts, it replaces carbonate, but it does not quartz grains. Very few sphalerite and galena occur with chalcopyrite and pyrite.

12. F-675-a

Pyrite and galena evenly disseminate in carbonate gangue. They occupy about 10 % of the area. Pyrite is coroded to round shapes or includes some gangue minerals. The grain ragnes from 60 μm to 350 μm. Galena occurs in the interstices of gangue ranging from 5 to 80 μm, but mostly between 10 and 40 μm. Quartz grains range from 100 μm to 600 μm and most of them show round shapes. No distinct orientation of distribution of sulfide minerals is observed.

13. F-675-b

Slender sreaks of sulfides show distinct orientation. Irregular and rugged grains of galena, sphalerite and pyrite disseminate along the boundary of gangue, mostly of quartz grains. The size of sulfide grains is between 20 μm and 500 μm. Very few

Table A–4–1 Assay Results of Ore (Geological Survey)

No.	Sample No.	Location	Occurrence	Au (g/t)	Ag (g/t)	Cu (%)	Pb (%)	Zn (%)	No	Sample No.	Location	Occurrence	Au (g/t)	Ag (g/t)	Cu (%)	Pb (%)	Zn (%)
1	A-573	Panelas Mine 110+34 mL	Galena, Pyrrhotite	0.5	610.6	0.36	17.21	0.02	23	D-595	Serra Juguatirica	Pb oxide-Galena vein	0.0	1200.0	0.14	13.32	0.27
2	A-574	Perau Mine G2+8-S	Galena and Sphalerite in barite zone W:150	0.0	53.0	0.074	5.50	0.12	24	D-596	do.	do.	0.0	1054.0	0.08	11.53	0.92
3	A-575	do. G2+8-N	do. W:170	0.0	52.0	0.010	5.40	0.60	25	D-597	Serra Juguatirica	Pb oxide-Galena vein	0.1	835.0	0.16	10.56	5.37
4	A-576	Barrinha Mine	Galena vein	0.9	480.8	0.73	15.12	0.09	26	E-544a	Gruta de Santana	Pb-calcite network	0.0	7.9	0.02	5.92	2.79
5	B-622	Santo Antonio do Pavão Mine	Galena-Pyrite vein	0.0	51.9	0.00	4.29	0.06	27	E-544b	do.	Gossam with Pb oxide?	0.0	7.5	0.00	0.17	0.06
6	C-518	Espirito Santo Mine	Galena-Quartz vein	0.0	85.9	0.05	8.57	0.66	28	E-548	Agua Suja	do.	11.8	2.0	0.01	0.12	0.01
7	C-580	Monjolinho de Sebastião	Galena-Dolomite-Quartz vein	0.8	204.0	0.00	7.70	0.00	29	E-571	Rio Iporanga	Pb oxide vein	0.0	5.8	0.00	0.02	0.00
8	C-591	Agua da Limeira	Galena-Quartz vein	0.4	554.0	0.06	12.09	0.00	30	E-620	do.	do.	0.0	5.2	0.00	0.03	0.01
9	C-592	do.	Galena-Chalcopyrite-Quartz vein	0.0	16.8	0.11	0.14	0.00	31	E-643	Furnas Mine	Pyrite-Galena vein	0.3	1540.0	0.02	12.81	0.13
10	C-596	SW of Espirito Santo Mine	Galena(?)-Py-Quarts vein	0.0	3.2	0.01	0.15	0.00	32	E-644	do.	Sphalerite-Galena vein	0.2	2586.0	0.11	12.60	3.82
11	D-521	Lageado Santa Nova G3	Galena vein	0.8	157.0	0.05	11.58	0.18	33	E-645	do.	do.	0.0	1891.0	0.13	11.28	17.75
12	D-523	do. do. G1	Galena vein	1.1	218.0	0.04	11.28	0.29	34	E-646	Diogo Lopes Mine	Pb oxide-Galena vein	0.0	362.0	0.03	12.50	0.29
13	D-526	do. Jardim G1	Pb oxide(?)vein	0.0	1.6	0.23	0.02	0.01	35	E-647	Paqueiro Mine	Pyrite-Galena vein	0.0	183.7	0.08	12.60	0.09
14	D-542	Furnas west	Quartz-Pyrite Vein W:5	0.1	18.0	0.02	0.12	31.48	36	E-648	Bueno Mine	do.	0.3	1506.0	0.09	12.96	0.01
15	D-580	Lageado Boa Ventura	Galena vein	6.4	24.8	0.16	0.26	0.08	37	F-649	Onsa II	do.	3.6	904.0	1.04	7.40	0.03
16	D-581	do. do.	do.	0.1	1073.0	0.05	11.84	0.27	38	F-685	Perau Mine	Galena in barite zone	0.0	53.0	0.076	4.60	0.15
17	D-583	do. do.	Pb oxide ore - Galena vein	0.1	619.0	0.07	12.24	0.04	39	F-686	do.	do.	0.0	40.0	0.11	3.40	0.13
18	D-584	do. São Vicente	do.	0.5	496.0	0.08	12.04	0.22	40	F-687	do.	do.	0.0	52.0	0.01	5.3	0.90
19	D-586	do. Jardim G2	do.	0.4	2150.0	0.58	12.14	0.08	41	I-508	Serra Aberta do Leão	Galena	0.0	1131.0	0.01	12.86	0.27
20	D-588	do. Nova Esperança	do.	0.5	1891.0	0.08	12.04	0.01	42	J-506	Monjolinho de Sebastião	Limonitized rock	0.0	11.3	0.19	0.57	0.01
21	D-590	do. Santana Nova G5	Galena vein	0.3	1874.0	0.08	12.24	0.01	43	J-507	do	Sandstone with dissemination of manganese	0.0	2.9	0.02	0.61	0.03
22	D-593	do. copper showing	Chalcopyrite and Gl impregnation	1.5	100.7	1.33	0.50	11.50	44	J-574	Espirito Santo	Limonitized rock	0.0	2.2	0.16	0.16	0.16

Table A–4–2 Assay Results of Drilling Core

No.	Sample No.	Depth (m)	Width (m)	Rock Type	Pb (%)	Zn (%)	Cu (ppm)	Ag (ppm)	CaO (%)	MgO (%)	SiO2 (%)	BaO (%)
AG-01		254.95										
1	F-563	∿255.95	1.00	cab-sch	0.07	0.03	90	3	11.8	6.0	39.8	2.1
2	F-564	∿256.95	1.00	ore	2.1	3.3	120	100	7.7	6.6	8.0	26.1
3	F-565	∿257.95	1.00	ore	1.2	3.8	70	50	11.9	9.4	5.5	17.8
4	F-566	∿258.95	1.00	ore	3.3	3.5	170	110	11.9	9.4	6.7	16.1
5	F-567	∿259.95	1.00	ore	5.3	3.8	110	75	12.6	9.4	4.9	15.4
6	F-568	∿260.95	1.00	ore	8.9	2.2	290	150	8.4	6.9	3.4	27.1
7	F-569	∿261.95	1.00	ore	3.6	0.68	590	80	18.2	13.8	4.6	7.5
8	F-570	∿262.95	1.00	ore	7.5	2.6	330	130	11.2	8.6	4.0	18.1
9	F-571	∿263.45	0.50	ore	1.7	4.7	50	35	6.6	5.5	10.3	27.1
10	F-572	∿264.45	1.00	ore	0.19	0.84	280	12	14.0	9.4	23.0	10.9
11	F-573	∿265.45	1.00	ore	5.0	0.36	250	100	14.0	9.9	34.6	0.05
12	F-574	∿265.90	0.45	ore	2.3	0.41	110	60	3.4	5.3	52.3	0.05
AG-02		231.05										
13	F-629	∿232.05	1.00	cab-sch	0.02	0.01	230	1	11.8	5.8	41.9	0.45
14	F-630	∿233.05	1.00	cab-sch	0.32	0.02	1.2%	44	22.7	10.2	16.6	0.08
15	F-631	∿234.05	1.00	cab-sch	0.08	0.01	4200	13	24.4	8.5	16.6	0.37
16	F-632	∿235.05	1.00	cab-sch	0.02	0.01	960	5	24.0	12.0	14.0	0.3
17	F-633	∿236.05	1.00	cab-sch	0.01	0.04	1200	5.5	18.2	6.6	24.4	0.49
18	F-634	∿237.05	1.00	cab-sch	0.06	0.03	2000	11	17.4	7.7	31.7	0.71
19	F-635	∿237.80	0.75	cab-sch	0.01	0.01	2400	7.5	24.0	8.3	21.1	0.15
20	F-650	241.85 ∿242.85	1.00	cab-sch	0.03	0.02	75	2	12.6	7.3	38.6	0.94
21	F-637	∿243.85	1.00	ore	4.9	1.7	140	76	12.3	5.8	5.4	17.9
22	F-638	∿244.85	1.00	ore	6.3	0.32	480	98	13.2	6.6	6.3	22.3
23	F-639	∿245.85	1.00	ore	6.4	0.16	45	98	14.3	7.7	7.5	17.9
24	F-640	∿246.85	1.00	ore	6.0	0.09	70	86	11.2	5.6	10.2	22.3
25	F-641	∿247.85	1.00	ore	2.4	0.29	75	76	12.3	5.6	15.6	22.3
26	F-642	∿248.85	1.00	cab-sch	0.14	0.27	80	5.5	14.0	7.5	43.8	2.7
27	F-643	∿249.85	1.00	cab-sch	0.02	L	40	1.5	10.4	6.0	2.8	2.2
28	F-644	∿250.85	1.00	cab-sch	0.07	0.01	150	3.5	15.1	7.5	28.5	2.7
29	F-645	∿251.40	0.55	cab-sch	0.25	0.03	90	8.0	15.1	6.6	33.4	1.3
30	F-646	∿252.50	1.10	ore	6.0	4.5	60	68	12.2	7.5	4.3	17.9
31	F-647	∿253.35	0.85	cab-sch	0.21	0.09	70	7.0	11.8	6.4	17.5	13.4
32	F-648	∿253.60	0.25	ore	6.4	5.6	40	114	13.2	6.9	7.6	12.3
33	F-649	∿254.60	1.00	cab-sch	0.65	0.38	160	10	11.9	5.2	32.9	4.0
AG-03		188.30										
34	F-673	∿189.50	1.20	cab-sch	0.02	0.01	1200	3	9.7	4.8	53.0	1.6
35	F-674	∿190.70	1.20	cab-sch	0.24	0.03	880	5	17.0	6.0	39.6	0.89
36	F-675	194.30 ∿195.30	1.00	ore	3.3	0.39	350	38	9.5	3.7	35.0	8.5
37	F-676	∿196.20	0.90	ore	2.0	1.6	230	35	7.0	2.5	46.5	0.67

Table A–5 Result of Chemical Analysis of Carbonate Rocks in Survey Area

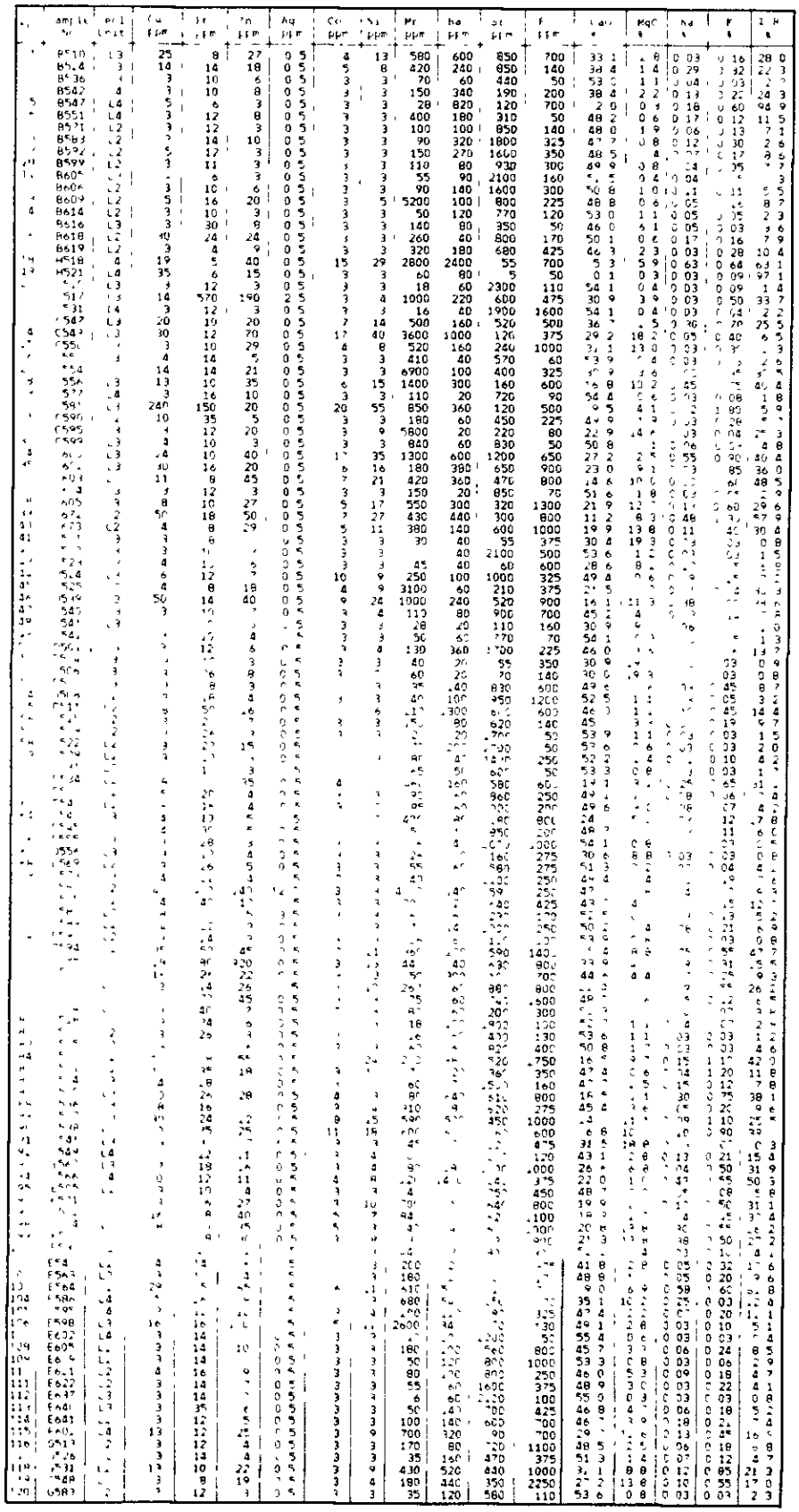


Table A–6 Result of Factor Analysis of Geochemical Date of Carbonate Rocks in Survey Area

No	Sample No.	Geol. Unit	Factor Score			
			Factor 1	Factor 2	Factor 3	Factor 4
1	B510	L3	0.784	-0.087	-0.029	0.011
2	B524	L3	0.987	-0.132	0.175	-0.844
3	B536	L3	-1.051	-0.311	-0.256	-0.943
4	B542	L4	0.936	-0.462	-0.539	-0.428
5	B547	L4	2.267	-1.144	-1.974	-1.569
6	B551	L4	0.344	-0.212	-0.340	-1.170
7	B571	L2	0.066	-0.424	0.311	-0.617
8	B583	L2	1.058	-0.276	0.978	-0.631
9	B592	L2	0.597	-0.366	0.779	-0.719
10	B599	L2	-0.242	-0.439	0.247	-0.529
11	B605	L3	-0.315	-0.664	0.682	-1.236
12	B606	L2	0.174	-0.445	0.766	-0.521
13	B609	L2	-0.021	0.448	0.312	0.023
14	B614	L2	-0.568	-0.508	0.320	-0.855
15	B616	L3	-0.990	0.213	-0.440	-0.464
16	B618	L2	0.032	0.586	-0.041	-0.829
17	B619	L2	0.382	-0.054	0.364	0.084
18	H518	L4	1.252	-0.909	-1.748	-0.319
19	H521	L4	0.480	0.392	-6.314	-2.915
20	C510	L3	-0.597	-0.435	1.065	-1.078
21	C517	L3	0.787	4.017	-0.087	0.284
22	C531	L4	-0.809	-0.527	0.990	0.140
23	C547	L3	0.818	-0.368	0.140	0.088
24	C549	L3	0.401	-0.044	-0.451	0.450
25	C550	L3	-0.336	-0.184	-0.303	1.504
26	C552	L3	-1.189	0.050	-0.174	-1.041
27	C554	L3	0.461	0.573	-0.676	-0.077
28	C556	L3	0.939	-0.299	-0.851	0.724
29	C577	L4	-1.177	0.083	[illegible]	-0.392
30	C581	L3	-0.096	0.790	-0.499	-0.098
31	C590	L2	-0.153	0.418	0.102	-0.200
32	C595	L3	-1.057	0.186	-1.535	0.881
33	C599	L3	-0.785	-0.198	-0.155	-1.192
34	C600	L3	1.176	-0.579	0.713	-1.306
35	C602	L3	1.077	-0.080	0.567	0.376
36	C603	L3	0.865	-0.394	-0.396	0.651
37	C604	L3	-1.141	[illegible]	0.045	-0.559
38	C605	L3	[illegible]	-0.369	-0.234	1.345
39	[illegible]	L2	1.441	0.065	-0.627	0.460
40	[illegible]	L2	[illegible]	[illegible]	-0.131	1.139
41	[illegible]	L3	[illegible]	[illegible]	[illegible]	0.890
42	[illegible]	L3	[illegible]	-0.640	0.869	-0.206
43	[illegible]	L3	-0.726	-0.597	-1.495	0.961
44	D524	L3	-0.147	-0.579	0.814	-0.673
45	D525	L3	[illegible]	0.263	-1.094	1.038
46	D539	L3	0.951	-0.122	-0.250	0.457
47	D540	L3	-0.107	0.365	0.382	0.584
48	D541	L3	-1.894	-0.642	-1.142	0.515
49	D542	L3	-0.985	-0.357	0.320	-1.146
50	[illegible]	L3	1.037	-0.414	0.897	-0.800
[illegible]	D504	L3	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	D506	L3	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	D507	L3	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	D508	L2	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	D511	L2	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	D515	L2	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	D519	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	D522	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	D529	L2	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	D531	L2	-1.055	[illegible]	[illegible]	[illegible]

No	Sample No.	Geol. Unit	Factor Score			
			Factor 1	Factor 2	Factor 3	Factor 4
61	D534	L2	[illegible]	0.554	-0.140	0.814
62	D537	L2	-0.265	-0.127	0.176	-0.398
63	D540	[illegible]	[illegible]	-0.169	[illegible]	-0.407
64	D543	[illegible]	[illegible]	[illegible]	[illegible]	2.190
65	D545	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
66	D555	L3	[illegible]	-0.189	[illegible]	[illegible]
67	D556	L3	[illegible]	-0.375	[illegible]	[illegible]
68	D569	L2	-0.787	-0.008	[illegible]	-0.021
69	D573	L3	0.327	-0.092	[illegible]	-0.506
70	D582	L2	0.014	[illegible]	[illegible]	[illegible]
[illegible]	D585	L2	[illegible]	[illegible]	[illegible]	[illegible]
72	D587	L2	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	D594	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
76	D598	L2	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	L2	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	L2	[illegible]	[illegible]	[illegible]	[illegible]
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[illegible]	[illegible]	[illegible]	-0.153	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1.448
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
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104	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
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106	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
107	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
108	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
109	[illegible]	[illegible]	[illegible]	-0.379	0.609	[illegible]
110	[illegible]	[illegible]	[illegible]	-0.124	0.374	[illegible]
[illegible]	[illegible]	[illegible]	-0.159	[illegible]	[illegible]	[illegible]
112	[illegible]	[illegible]	[illegible]	-0.463	[illegible]	[illegible]
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