host rock near the entrance is mostly sandstone on the hangingwall and black hard shall on the footwall side. The bonanza occurs where the sandstone and shale (partly calcareous) interfingers and it thins in the sandstone on the western side.

Regarding alteration, the footwall is silicified while argillization is particularly strong in the fault zone of the hangingwall. Generally shale or black calcareous rocks are altered to black clay while sandstone becomes white clay.

3-3-2 Pagar Gunung East Deposit

There are two outcrops of the East Deposit in the upstream part of Palelo River (Outcrop A and B). These outcrops are located approximately 700m (A) and 600m (B) east of the Tunnel 6 of the eastern part of the West Deposit (Fig. IV-3-12, Fig. IV-3-14).

(1) Outcrop A

At Outcrop A, trenches were cut for approximately 25m in N-S and 15m in E-W directions on both sides of the Palelo River and the ore deposit was investigated (Fig. IV-3-15). Four (①-④) beded iron sulfide bodies are observed within the mineralized zone. These have massive to banded structure. The strike of the ore bodies is approximately E-W and the dip 40°S. The widths of ore bodies ① and ② change very rapidly and the massive ore bodies change to banded and bedded form within several meters and then become thin veinlets.

The host rocks are mostly tuffaceous sandstone, siliceous rocks, and felsic rocks. They are strongly argillized and silicified near the ore deposits and it is difficult to identify the original rocks.

A fault with NE-SW trend is inferred to exist along the Palelo River. Mineralization is particularly strong and intense silicification and argillation is observed on the western side of this inferred fault. While on the eastern side, mineralization is weak and silicification and argillation are hardly observed. Assay results show that Au, Cu, Pb and Zn grades are all low.

(2) Outcrop B

At Outcrop B, trenches were cut for approximately 25m in N-S and 10m in E-W directions and the ore deposit was investigated (Fig. IV-3-16). Four (①-④) massive and banded bedded ore bodies are observed within the mineralized zone.

Ore body ① is bedded and forms the lowermost unit of the footwall of Outcrop B. Its strike is approximately N30°E and the dip 35°NW, the length at the exposure is more than 6m and the width is 0.60m-1.00m. The northern part becomes banded dissemination and iron minerals are intensely weathered to limonite. The northern end of the body is cut by a fault. The major ore minerals are pyrite, galena, and sphalerite. They are all fine-grained. The central part of the ore body consists generally of banded ore which is limonized. Zonal dissemination of copper oxide and galena is observed in the banded part. The southern part of the ore body is high-grade massive ore and the major minerals are sphalarite, galena and pyrite.

The footwall consists mainly of intensely silicified massive green rock and the hangingwall of phyllitic rock. The central to the northern part of the ore body is strongly argillized. Skarn minerals such as clinopyroxenes and epidotes are observed from the central to the southern part of the ore body.

The southern part of the body extends into a tributary of the Palelo River and the extension cannot be confimed.

Ore body ② is massive and occurs as the hangingwall branch of ore body ①. The strike is N35°W and the dip 40°S, the length at the exposure is more than 8m and the width ranges from 0.20m to 0.50m. The northern part is confirmed as an outcrop immediately below a water fall. The southern end is cut by a fault.

The ore is rich in pyrite with minor amounts of sphalerite and galena. The outcrop below the water fall consists of dissemination of sphalerite and galena in banded form and the pyrite content is low.

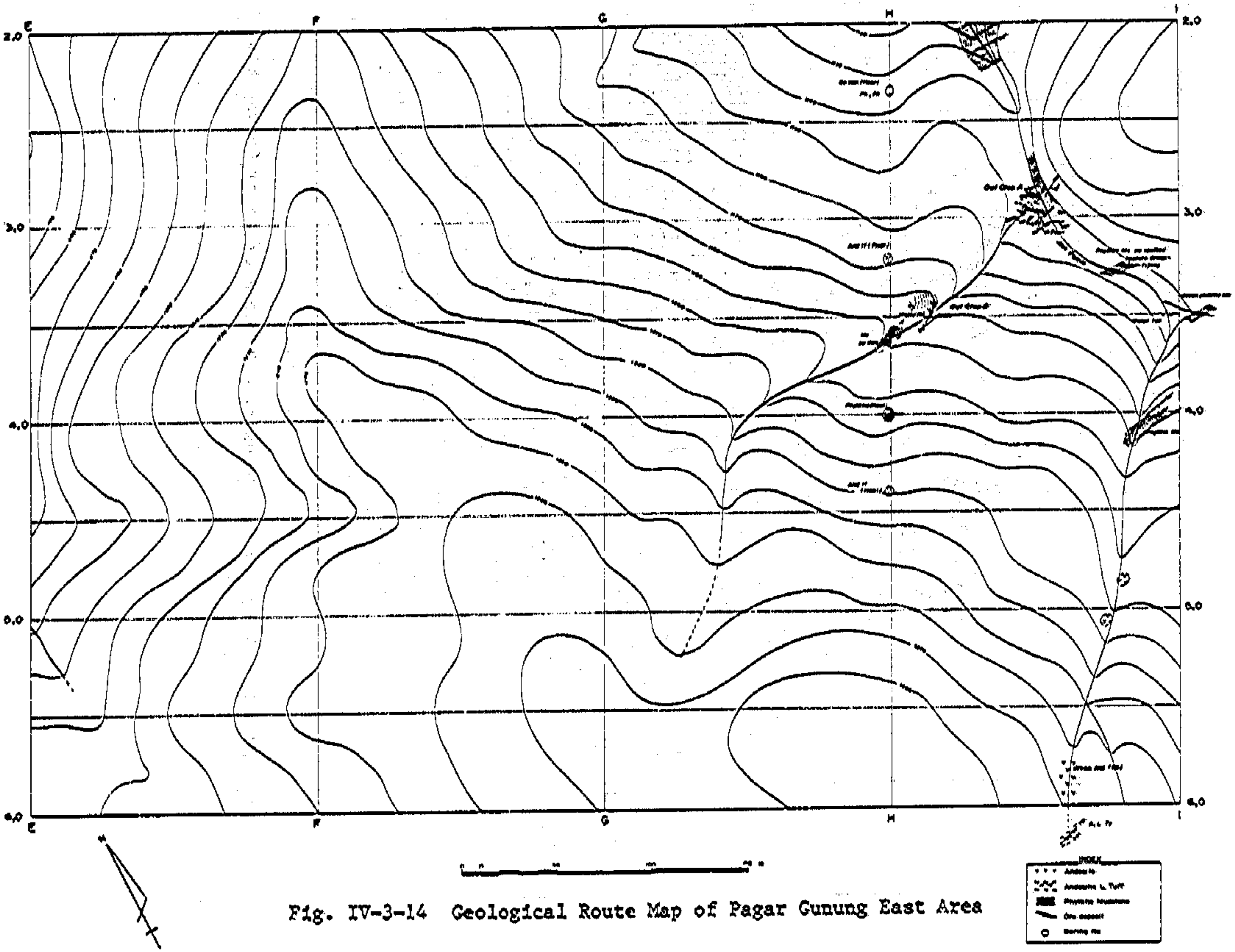
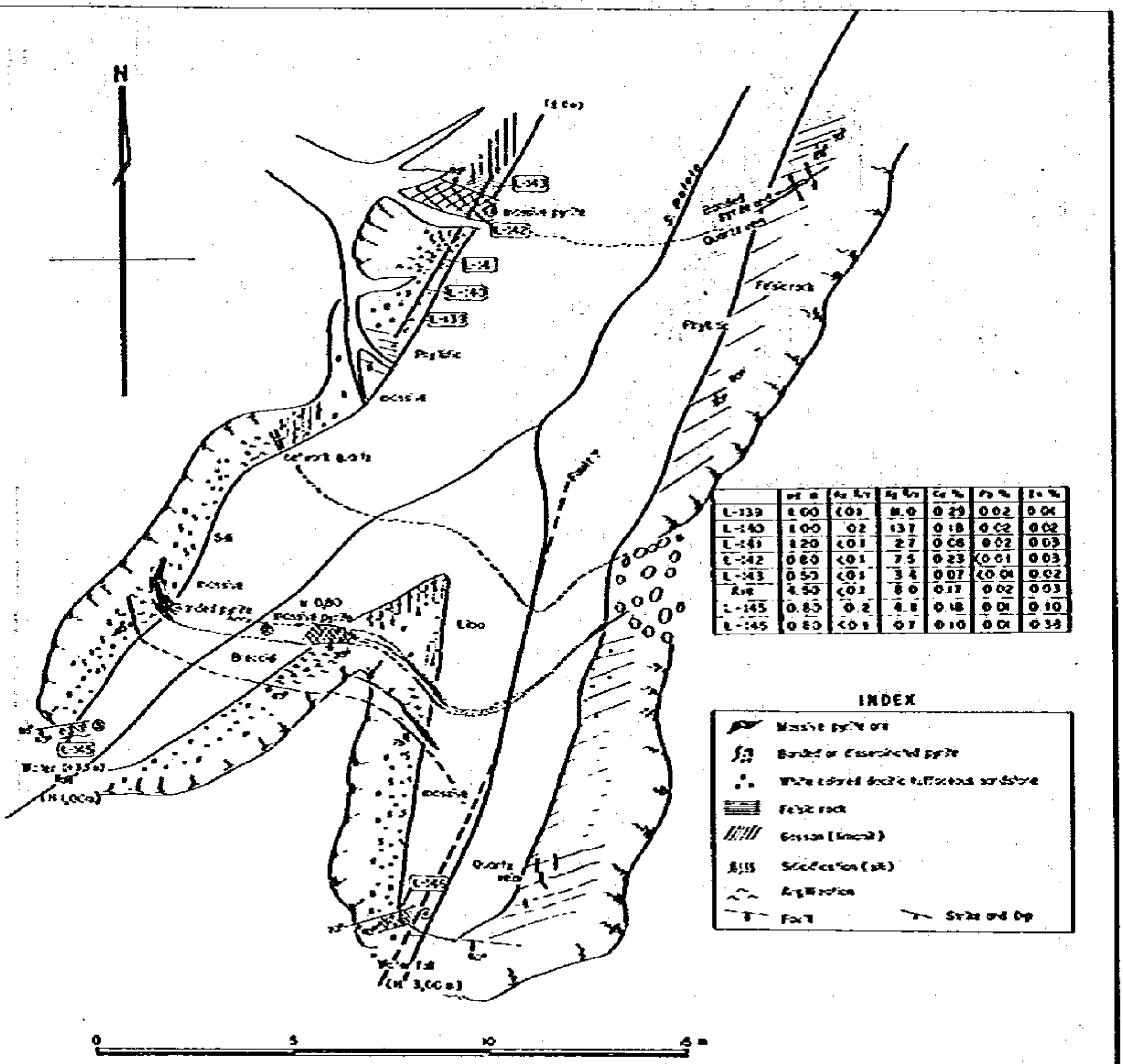


Fig. IV-3-14 Geological Route Map of Pagar Gunung East Area



	[illegible]	Au g/t	Ag g/t	Cu %	Pb %	Zn %
L-139	1.00	<0.1	11.0	0.29	0.02	0.04
L-140	1.00	0.2	13.7	0.18	0.02	0.02
L-141	1.20	<0.1	2.7	0.06	0.02	0.03
L-142	0.80	<0.1	7.5	0.23	<0.01	0.03
L-143	0.50	<0.1	3.4	0.07	<0.01	0.02
Rat	4.50	<0.1	8.0	0.17	0.02	0.03
L-145	0.85	0.2	4.8	0.18	0.01	0.10
L-145	0.80	<0.1	0.7	0.10	0.01	0.34

INDEX

- Massive pyrite ore
- Banded or disseminated pyrite
- White colored dacitic tuffaceous sandstone
- Felsic rock
- Gossan (limonite)
- Silicification (sil)
- Argillization
- Fault
- Strike and Dip

Fig. IV-3-15 Sketch of Ore Deposit, Outcrop A of Pagar Gunung East Ore Deposit

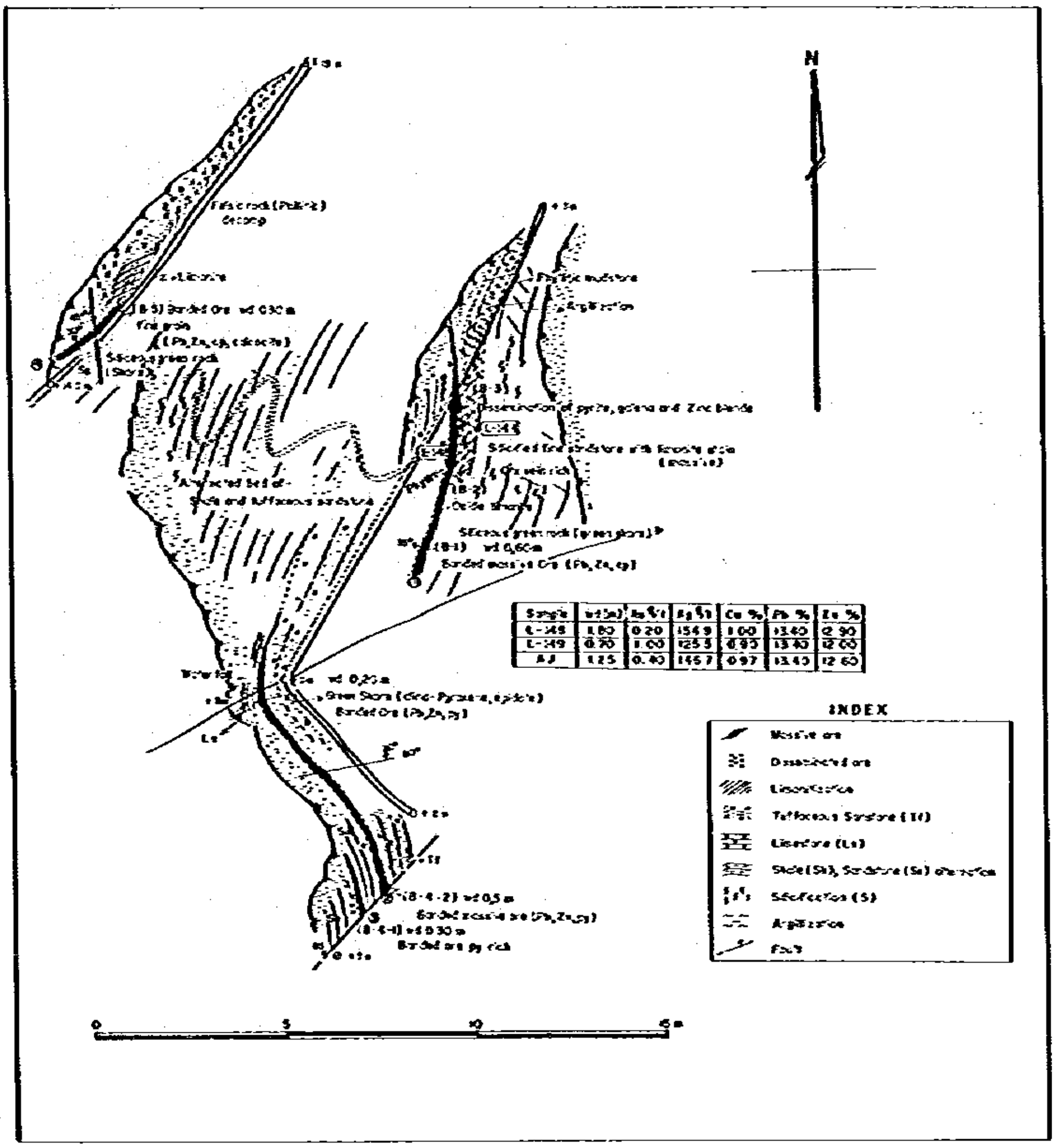
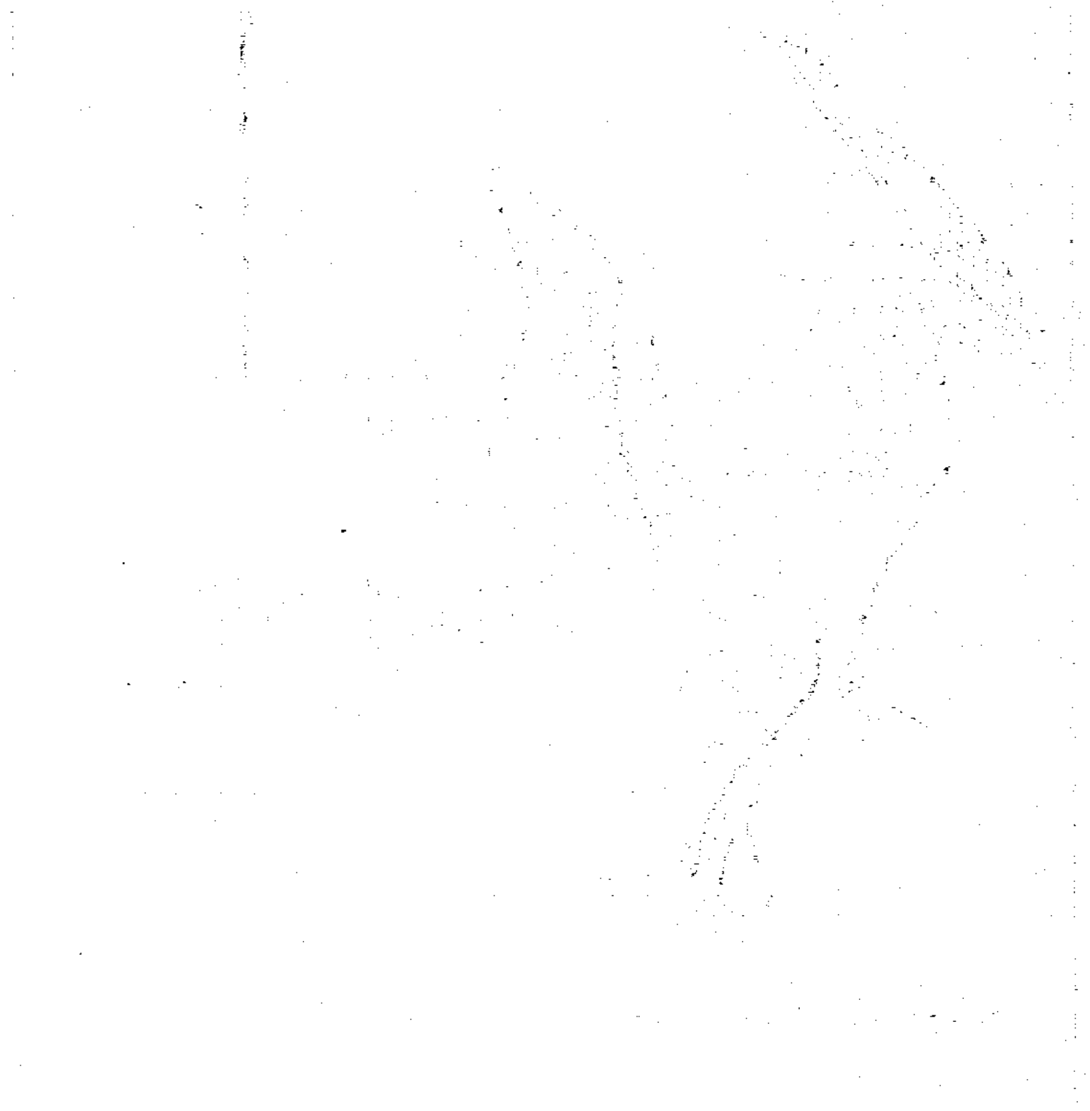


Fig. IV-3-16 Sketch of Ore Deposit, Outcrop B of Pagar Gunung East Ore Deposit



The footwall consists of tuffaceous sandstone and the hangingwall of limestone and siliceous rocks. Silicification and argillization is generally weak. The skarn minerals are abundant in the northern part of the ore body.

Ore body (3) is banded and occurs in the hangingwall of Ore body (2). The length of the outcrop is over 2m and the width 0.30m. The southern end is cut by a fault. The major ore minerals are fine-grained pyrite associated with quartz veinlets. The footwall is siliceous rocks and the hangingwall shale.

Ore body (4) is banded and has bedded form. It forms the uppermost unit of the hangingwall of Outcrop B. The strike is approximately N40°E and dip 30°N. The length of the outcrop is over 4m and the width 0.30m. The northern part of the ore body is partly disseminated by galena, but consist mostly of limonite. The central to the southern part consists of galena, sphalerite and pyrite disseminated in bands. The host rock is mostly quartz sandstone and the footwall is silicified.

The high grade Pb and Zn bodies are (1)+(2). The average grade of the outcrop of Ore body (1) is Au 0.4g/t, Ag 146.7g/t, Cu 0.97%, Pb 13.40% and Zn 12.60%. The average width of this ore body is 1.20m.

CHAPTER 4 CONSIDERATION OF THE SURVEY RESULTS

4-1 CONSIDERATION OF DRILLING RESULTS

4-1-1 Sites MJI-1, MJI-2

The geologic basement of the area consists of granodiorite and it is overlain by sedimentary rock and igneous rock (mainly quartz diorite) intruded into the sedimentary formations. The lithology of the upper part of the sedimentary rocks is mainly sandstone, shale and calcareous rocks, while that of the lower part is mainly siliceous rocks and calcareous rocks. Generally the limestone and calcareous rocks are skarnized. The major skarn minerals are epidote, clinopyroxene and calcite.

The intrusive rocks are mainly quartz diorite and have intruded as dykes and stocks from relatively shallow zones.

The major forms of mineralization are banded dissemination, replacing parts of the calcareous rocks (skarnization), sulfide veinlets associated with quartz veins, sulfide network dissemination along joints and quartz vein network.

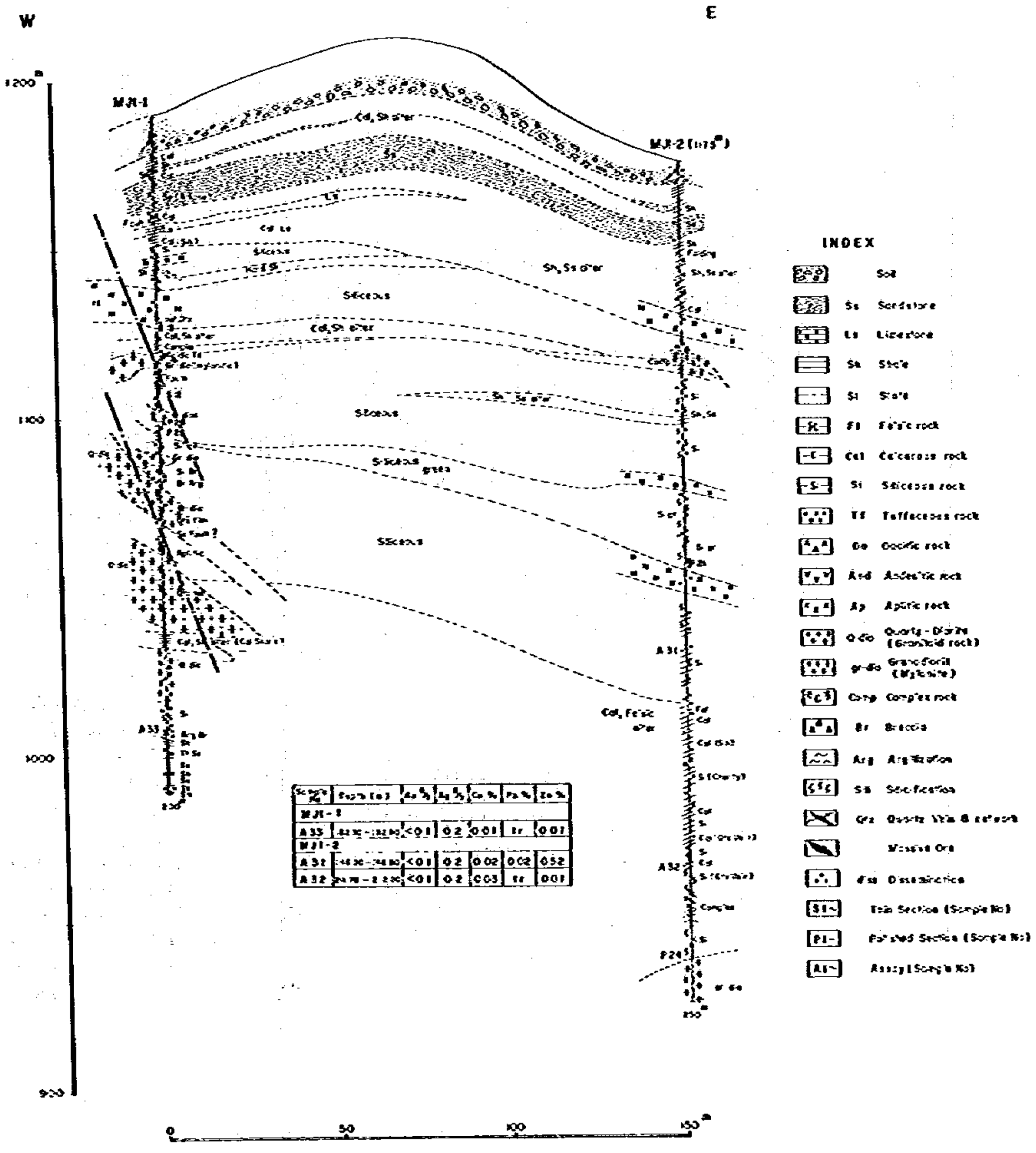
The major ore minerals are pyrite with accessory amount of pyrrhotite and magnetite.

The characteristics of the geologic structure of this area are the faults and microfolds observed near the igneous intrusion (Fig. IV-4-1).

4-1-2 Sites MJI-3, MJI-4, MJI-5

(1) Section MJI-2 - MJI-3

The geologic basement of the area consists of granodiorite which is overlain by thick sedimentary rocks. The sedimentary rocks have relatively gentle dip (40°S) and the upper part consists mainly of shale, siliceous and calcareous rocks while the lower part consists mainly of siliceous rocks and hybrid rocks. Generally the limestone and calcareous rock have suffered skarnization. The major skarn minerals are epidote, clinopyroxene and calcite.



Sample No.	Depth (m)	Au g/t	Ag g/t	Cu %	Pb %	Zn %
MJI-1						
A33	[illegible]	<0.1	0.2	0.01	tr	0.01
MJI-2						
A31	[illegible]	<0.1	0.2	0.02	0.02	0.52
A32	[illegible]	<0.1	0.2	0.03	tr	0.01

Fig. IV-4-1 Geological Profile of MJI-1 and MJI-2

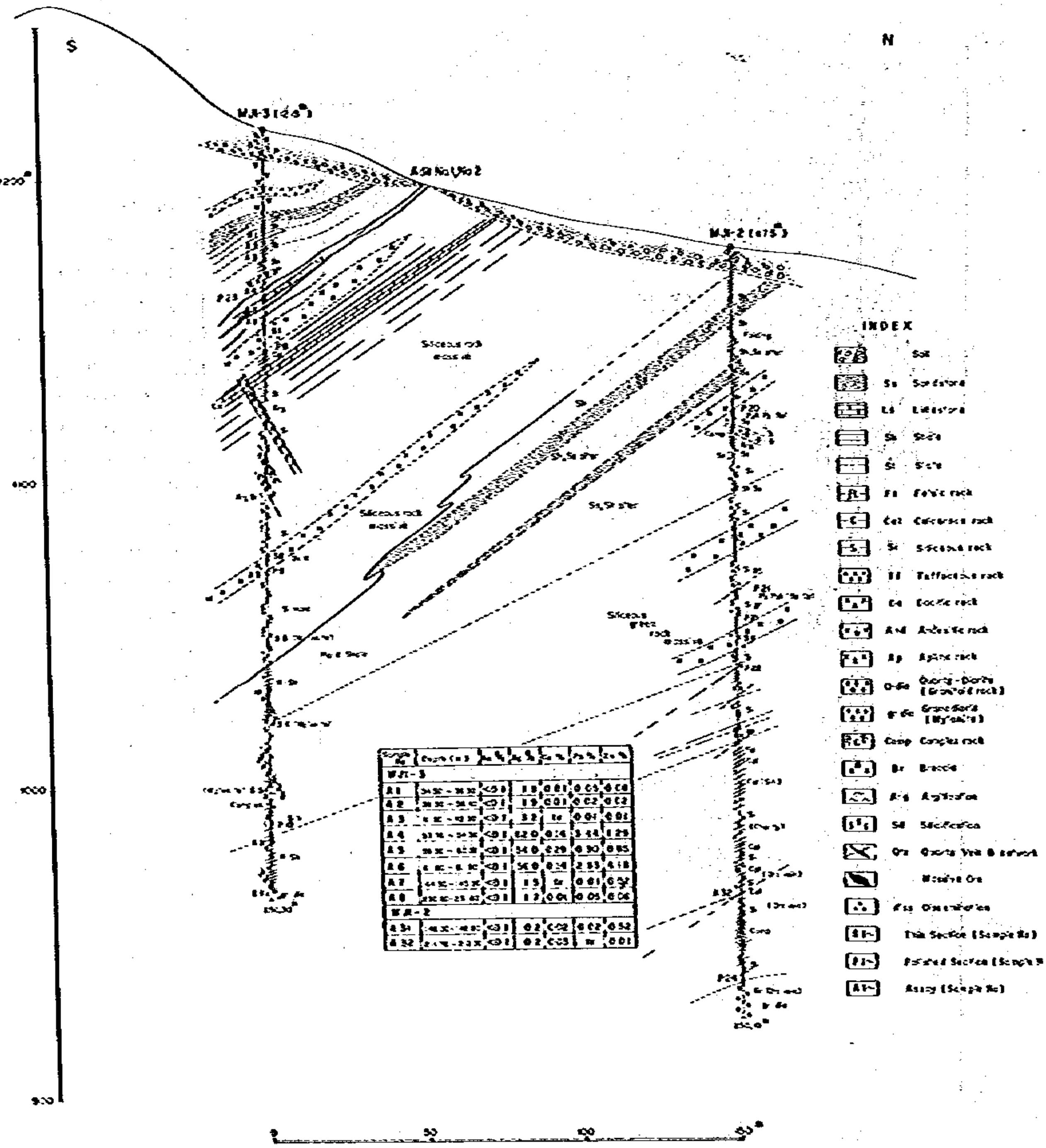


Fig. IV-4-2 Geological Profile of MJI-2 and MJI-3

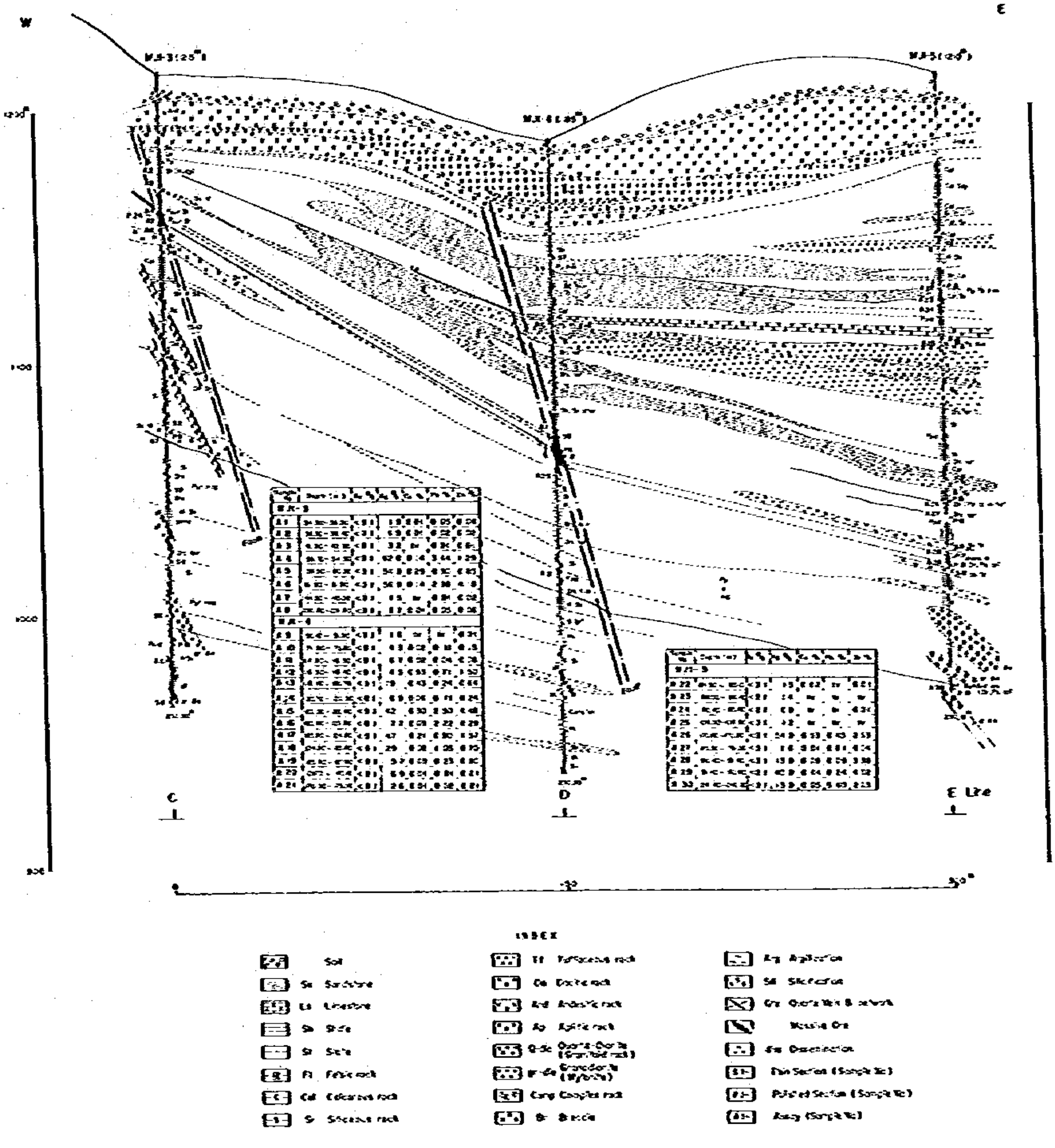


Fig. IV-4-3 Geological Profile of MJI-3, MJI-4 and MJI-5

The intrusive bodies are dacite, aplite, quartz diorite dykes and quartz diorite stocks. Dacite is not mineralized, is fresh and it could be of the latest (Tertiary) intrusive stage. Weak mineralization is generally observed in aplite and quartz diorite.

Strong mineralization is found at MJI-3, 54m and 60m depth, which corresponds to the lower part of the No. 1 and No. 2 Outcrops. It is dissemination containing brecciated massive Zn, Pb, ore. The weak mineralization occurs in various forms such as banded dissemination (skarnized) along the bedding, sulfide veinlets associated with quartz veins and sulfide dissemination along joints and fractured zones.

The faults and microfolds constitute the geologic structure of this area. Mineralization often occurs near larger faults. The major faults frequently cut through the ore deposits and microfolds (Fig. IV-4-2).

(2) Section MJI-3 - MJI-4 - MJI-5

The geologic basement of the area consists of granitic rocks which is overlain by thick sedimentary rocks. The major lithology of the upper part of the sedimentary rocks is shale, siliceous, calcareous rocks and tuff and the lower part is siliceous rocks, felsic rocks, slate and hybrid rocks. The limestone and calcareous rock in the upper horizons are strongly skarnized. The skarn minerals of the rock sample S8 from 118.50m of MJI-4 were identified microscopically. They are clinopyroxene, epidote and calcite. Garnet was not observed. The intrusive rocks are quartz diorite and splite, and weak mineralization is generally observed.

Strong mineralization is found at MJI-4, 116.50m-127.60m depth, which corresponds to the lower part of the No. 6 Outcrop. It is dissemination containing massive ore in argillized fault breccia zone and at MJI-5, near 192m and 242m depth forming a bonanza (Zn, Pb, cp) of the bedded and banded body. Weak mineralization occurs in various forms such as sulfides associated with quartz veinlets and network, sulfides along joints and fractured zones, and sulfide dissemination in silicified zones.

In this area, there are numerous faults, and microfolds are observed locally which increases from the west towards the central part. The largest fault occurs at MJI-4, 116.50m-127.60m and its width is estimated to be 5.5m-2.5m. (The western fault of No. 6 Outcrop is over 2.0m wide and the dip is 75°W. If the fault at 116.50m-127.60m has a dip of 70°, the width will be 5.5m, and if the dip is 80°, the width will be 2.5m.) The fault clay can be divided into black clay and grey - white clay. Generally, black clay is formed from mudstone and shale, while white clay is derived from siliceous and sandy tuff. Fault is abundant down to 150m depth, and microfolds are more often observed below 150m (Fig. IV-4-3).

4-1-3 Drilled ore bodies

The results of the chemical analysis of the core from each drill hole is laid out in Table IV-4-1.

The ore under No. 1 and No. 2 Outcrop at MJI-3, 53.70m-54.30m depth is 0.60m wide and has the composition of Au<0.1g/t, Ag 62g/t, Cu 0.14%, Pb 3.44%, Zn 1.29% (Sample A4) and at 59.50m-60.00m with 0.50m width has the composition of Au<0.1g/t, Ag 34g/t, Cu 0.29%, Pb 0.90% and Zn 0.85%. The ore under No. 6 Outcrop at MJI-4, 116.50m-127.60m depth is 11.10m wide (Samples A11-A19) and occurs in the mineralized zone within an argillized fault breccia zone. The grade of the ores including the brecciated massive ore at 122.00m-122.60m depth and 0.60m wide is Au<0.1g/t, Ag 42g/t, Cu 0.30%, Pb 2.50%, Zn 4.48% (Sample A 15) and at 123.90m-124.80m depth and 0.90m wide is Au<0.1g/t, Ag 47g/t, Cu 0.21%, Pb 0.80% and Zn 1.53% (Sample A 17). The major ores encountered in MJI-5 are at 190.40m-192.60m, width 2.20m, has the grade of Au<0.1g/t, Ag 27.7%, Cu 0.28%, Pb 0.17%, and Zn 3.73% (average grade of Samples A 28 and A 29) and that at 241.40m-242.20m depth, width 0.80m, has the composition of Au<0.1g/t, Ag 13g/t, Cu 0.05%, Pb 0.60% and Zn 2.03% (Sample A 30).

4-2 CORRELATION OF THE RESULTS OF THE DRILLING AND THE GEOLOGY AND THE ORE DEPOSITS

4-2-1 Pagar Gunung West Deposit

The geology of the Pagar Gunung West Deposit is described in part

II-3. Fig. IV-4-4 is a geological cross section of Fig. II- 3 - 8 with drilling sites plotted.

(1) Drilled horizons

The horizons of the drilled strata mainly correspond to the third member of the Patahajang Formation which belong to the Permian - Carboniferous system. The third member comprises sedimentary rocks and volcanic rocks and the thickness is approximately 400m.

(2) The third member of Patahajang Formation and the mineralized zone

The third member has a general dip of 40°S. The major mineralized zone inferred to exist by joining the outcrop and the subsurface mineralization confirmed by drilling also dips approximately 40°S. It is noted that the C line between the old Tunnel No. 2 and the mineralized zone confirmed by MJI-3 forms a dip of 40°, and similarly D line between the old Tunnel No. 6 and the zone confirmed by MJI-4 also forms a dip of 40°.

Fig. IV-4-5 is a schematic cross section of the area in the vicinity of the mineralized zone confirmed by drilling.

(i) Geology

The geological units of the horizons above the major mineralized zone are relatively rich in mudstone and shale at MJI-3 (western part), sandstone and shale at MJI-4 (central part) and calcareous rocks, sandstone, and tuff at MJI-5 (eastern part).

The geological units of the horizons below the major mineralized zone are in all areas siliceous rocks (in most cases silicification is strong and the original rock is difficult to determine), hybrid rocks (near the acidic intrusive bodies) and acidic rocks.

The igneous rocks are andesite, dacite and acidic rocks. The andesite and andesitic tuff near the surface is not mineralized. There is a possibility of the andesitic rocks being the uppermost unit of the third member because outcrop of these rocks are occasionally observed by surface survey. In MJI-3, andesite sheets or lava (49m-51m, 65m-76m, 123.5m-126m, 142m-149m) and dacite dykes (94.5m-98m, 109m-111m) are observed. The deeper andesite is greyish brown to dark blue, joints are well-developed and is always weakly mineralized containing pyrite. Dacite is greyish white, massive and is generally fractured and argillized. Mineralization is not observed. The acidic rocks are aplite, quartz diorite (tonalite) and granodiorite (mylonite). They form dykes and sheets and weak pyrite mineralization (pyrrhotite, magnetite) is observed.

(ii) Replacement, alteration, metamorphism

Skarn minerals are often formed near the contact between limestone, calcareous rocks and the acidic intrusive bodies as the result of contact metasomatism. Skarnization is particularly stront in MJI-1, MJI-2 and MJI-5 which is located close to the acidic intrusives.

Argillization and chloritization are the most common alteration. There are two types of argillization, ore is due to the effect of mineralization and both the hangingwall and the footwall of the mineralized zone are argillized, and the other type is due to the fracturing of the host rock by faulting. Chloritization is found near igneous intrusive bodies.

Metamorphism is often observed in the sedimentary rocks near acidic intrusive bodies. The effect of metamorphism is seen by the development of schistosity oblique to the bedding and the original rocks have changed to slates and phyllites. But characteristic metamorphic minerals cannot be observed by the unaided eyes.

(iii) Mineralized zones

The condition of the major mineralized zones confirmed by drilling is shown in Table IV-4- 3 and the relationship of old tunnels and exposures are laid out in Table IV-4- 3 .

The most promising mineralization is as follows.

(a) Old tunnels and mineralized zones

The major ore zone is inferred to continue from the east at old Tunnels No. 1, No. 2 through No. 3 and to No. 6 at the central part

Table IV-4-1 Chemical Assay Result of Ore Samples of Drilling Core

Sample No.	Drilling No.	Depth (m)	Core		Assay Result					Remarks
			Width m	Core Rec. %	Au g/t	Ag g/t	Cu %	Pb %	Zn %	
A-1	MJI-3	34.50 ~ 36.30	1.80	52	<0.1	1.9	0.01	0.05	0.08	sheared and argillaceous zone
2		36.30 ~ 38.40	2.10	52	<0.1	1.9	0.01	0.02	0.02	" "
3		41.90 ~ 42.30	0.40	100	<0.1	3.2	tr.	0.01	0.01	dissemination in argillaceous zone
4		53.70 ~ 54.30	0.60	50	<0.1	62.0	0.14	3.44	1.29	Sp, Ga, Cp ore in shear zone
5		59.50 ~ 60.00	0.50	92	<0.1	34.0	0.29	0.90	0.85	" "
6		61.80 ~ 61.90	0.10	100	<0.1	56.0	0.14	2.93	4.18	Sp, Ga, Py ore with quartz network
7		144.50 ~ 145.00	0.50	100	<0.1	1.5	tr.	0.01	0.02	Py dissemination in andesite
8		230.80 ~ 231.60	0.80	100	<0.1	1.7	0.01	0.05	0.06	dissemination in quartz vein
9	MJI-4	50.10 ~ 51.90	1.80	56	<0.1	1.6	tr.	tr.	0.01	dissemination in sheared zone
10		71.00 ~ 72.80	1.80	53	<0.1	4.3	0.02	0.11	0.15	Ga, Py dissemination in sheared zone
11		114.80 ~ 116.50	1.70	94	<0.1	6.7	0.02	0.04	0.08	
12		116.50 ~ 118.40	1.90	68	<0.1	4.5	0.93	0.71	1.50	
13		118.40 ~ 120.70	2.30	100	<0.1	19.0	0.43	0.24	0.64	dissemination zone including
14		120.70 ~ 122.00	1.30	62	<0.1	6.9	0.06	0.11	0.24	several massive ores
15		122.00 ~ 122.60	0.60	100	<0.1	42.0	0.30	2.50	4.48	
16		122.60 ~ 123.90	1.30	77	<0.1	7.7	0.03	0.22	0.29	
17		123.90 ~ 124.80	0.90	78	<0.1	47.0	0.21	0.80	1.53	
18		124.80 ~ 125.90	1.10	64	<0.1	29.0	0.08	1.05	0.70	
19		125.90 ~ 127.60	1.70	65	<0.1	5.7	0.03	0.23	0.80	
20		129.70 ~ 140.10	10.40	96	<0.1	0.9	0.01	0.01	0.01	foot wall Py dissemination zone
21		170.00 ~ 175.00	5.00	100	<0.1	2.6	0.01	0.02	0.01	Py and mag in siliceous rock
22	MJI-5	84.50 ~ 85.10	0.60	67	<0.1	1.5	0.02	tr.	0.01	
23		88.50 ~ 89.40	0.90	100	<0.1	1.4	tr.	tr.	tr.	Py dissemination in sandstone
24		92.40 ~ 94.50	2.10	71	<0.1	0.8	tr.	tr.	0.01	
25		106.00 ~ 106.80	0.80	100	<0.1	1.2	tr.	tr.	tr.	
26		170.60 ~ 170.80	0.20	100	<0.1	54.0	0.53	0.45	2.53	Ga, Sp bearing veinlets
27		175.50 ~ 176.00	0.50	100	<0.1	1.6	0.01	0.01	0.04	Py dissemination in quartz network
28		190.40 ~ 191.40	1.00	90	<0.1	13.0	0.09	0.09	3.39	dissemination in calcareous sandstone
29		191.40 ~ 192.60	1.20	100	<0.1	40.0	0.44	0.24	4.02	" "
30		241.40 ~ 242.20	0.80	100	<0.1	13.0	0.05	0.60	2.03	Py, Ga, Sp in siliceous rock
31	MJI-2	146.00 ~ 146.80	0.80	100	<0.1	0.2	0.01	tr.	0.01	dissemination in calcareous rock
32		211.70 ~ 212.20	0.50	100	<0.1	0.5	0.02	0.02	0.52	dissemination in Siliceous rock
33	MJI-1	182.30 ~ 182.90	0.60	100	<0.1	0.2	0.03	tr.	0.01	Py dissemination in quartz network

Py : Pyrite
Sp : Sphalerite
Ga : Galena
Cp : Chalcopyrite

Table IV-4-2 List of Ore Deposit Distributing in Pagar Gunung Area

Items / Ore Deposit	Ore Deposit: Altitude	Strike	Dip	Extension	Sample No.	Width m	Au g/t	Ag g/t	Cu %	Pb %	Zn %	Mode of Ore Deposit	Country Rock: Hanging Wall	Foot Wall	Remarks
Adit No.1	1,200	N25°E	30°SE	6 + m	LR42, 44	1.15	0.2	69.1	0.13	2.70	3.33	diss ore (Zn,Pb,Cp,Py)	black muddy limestone	shale (silicified)	
					LR43	0.20	0.4	147.6	4.68	15.30	17.69	mass ore (Ag,Cu,Pb,Zn)			No 1 mineralization zone
Adit No.2 (collapsed)	1,200	N45°W	35°SW	8 + m	LR39, 40	0.85	0.3		0.31	6.49	5.38	diss ore (Cp,Zn,Pb,Py)	black shale	andesite, phyllite (predominant argillization)	north fault:N80°W85°S south fault:N45°E70°SW (W 2 m)
					LR37, 38	1.55	0.3	227.2	0.61	14.02	14.63	mass ore (Ag,Cp,Zn,Pb,Py)			No 2 mineralization zone
Adit No.3	1,165	N80°W	30°S	20 + m	LR45, 46	0.10	0.2	64.8	0.29	7.90	0.84	mass ore (oxidized ore with limonite and malachite)	black shale calcareous rock	phyllite, shale (predominant argillization)	east fault:N10°E80°E (W 0.5 m) central fault:N15°E75°W (W 0.2 m) west fault:N10°-20°E 70°-85°W (W 3 m)
Adit No.5 (outcrop)	1,160	N70°W	70°S	-	LR5-1	0.40	0.2	43.1	0.1	7.76	5.16	ore of fault breccia	black shale	black phyllite (argillization)	fault:N70°W70°S (W 1 m)
Adit No.6	1,150	E - W	30°S	11 + m	LR47, 49, 50	1.00	4.5	54.2	0.13	6.87	6.03	diss ore (Au,Ag,Pb,Zn,Py)	sandstone calcareous shale	black phyllite (argillization)	east side fault: N45°W35°SE
					LR47, 52	0.90	3.6	243.6	0.16	19.07	9.92	mass ore (Au,Ag,Pb,Zn,Py)			No 3 mineralization zone
Outcrop A															
outcrop 1	1,140	E - W	30°S	10 + m	L137~143	0.50	<0.1	8.0	0.17	0.02	0.03	bedded, mass ore (Py)	phyllite	sil rock	epidotization
outcrop 2	1,145	E - W	35°S	12 + m	-	0.60	-	-	-	-	-	diss ore (Py)	tuff sandstone	sil rock	
outcrop 3	1,150	E - W	45°S	2 + m	L145	0.80	0.2	4.1	0.18	0.48	0.10	diss ore (Py)	chlorite sil rock	chlorite sil rock	silicification
outcrop 4	1,150	E - W	45°S	2 + m	L146	0.80	0.1	0.7	0.13	0.05	0.38	diss ore (Py)	chlorite sil rock	chlorite sil rock	silicification
Outcrop B															
outcrop 1	1,185	N30°E	35°NW	6 + m	L 148, 149	1.25	0.4	145.7	0.97	13.40	12.60	bedded skarn ore (Ag,Cp,Zn,Pb,Py)	phyllite	chlorite sil rock	skarn mineral: clinopyroxene epidote
outcrop 2	1,185	N35°W	60°SW	8 + m	-	0.20	-	-	-	-	-	mass ore (Zn,Pb,Cp,Py)	limestone sil rock	tuff sandstone	skarn mineral: "
outcrop 3	1,185	N35°W	60°SW	2 + m	-	0.30	-	-	-	-	-	bedded ore (Py)	shale	sil rock	silicification
outcrop 4	1,190	N40°E	30°NW	6 + m	-	0.30	-	-	-	-	-	bedded ore (Zn,Pb,Py)	quartz sandstone	sil rock	silicification

sil rock : siliceous rock
tuff sandstone : tuffaceous sandstone
diss ore : dissemination ore
mass ore : massive ore

Table IV-4-3 Summary of Ore Deposit found by the Drilling Survey

Sample No.	Drill Hole	Depth (m)	Grade						Core	Type	Country Rock	Remarks
			Wd m	Au g/t	Ag g/t	Cu %	Pb %	Zn %	recovery %			
A-4	MJI-3	53.70 ~ 54.30	0.60	<0.1	62.0	0.14	3.44	1.29	50	Sp., Ga., Cp or in shear zone	fault breccia clay zone	deep part of Adit No. I and Adit No. II outcrop (No. I mineralization zone)
A-5	"	59.50 ~ 60.00	0.50	<0.1	34.0	0.29	0.90	0.85	92	"		
A-12	MJI-4 "	116.50 ~ 118.40	1.90	<0.1	4.5	0.93	0.71	1.50	68	dissemination zone including several massive ore	fault breccia clay zone	deep part of No. 6 outcrop (No. I mineralization zone)
A-15	"	122.00 ~ 122.60	0.60	<0.1	42.0	0.30	2.50	4.48	100			
A-17	"	123.90 ~ 124.80	0.90	<0.1	47.0	0.21	0.80	1.53	78			
					average grade							
A-12 ~A-18	"	116.50 ~ 125.90	9.40	<0.1	18.2	0.35	0.61	1.05	79			
A-28	MJI-5 "	190.40 ~ 191.40	1.00	<0.1	13.0	0.09	0.09	3.34	90	dissemination zone	calcareous sandstone	No. I mineralization zone
A-29	"	191.40 ~ 192.60	1.20	<0.1	40.0	0.44	0.24	4.02	100	Bandded ore	"	
					average grade							
A-28 ~A-29	"	191.40 ~ 192.60	2.20	<0.1	27.7	0.28	0.17	3.73	95			
A-30	"	241.40 ~ 242.20	0.80	<0.1	13.0	0.05	0.60	2.03	100	pyrite rich ore	siliceous rock	No. II mineralization zone

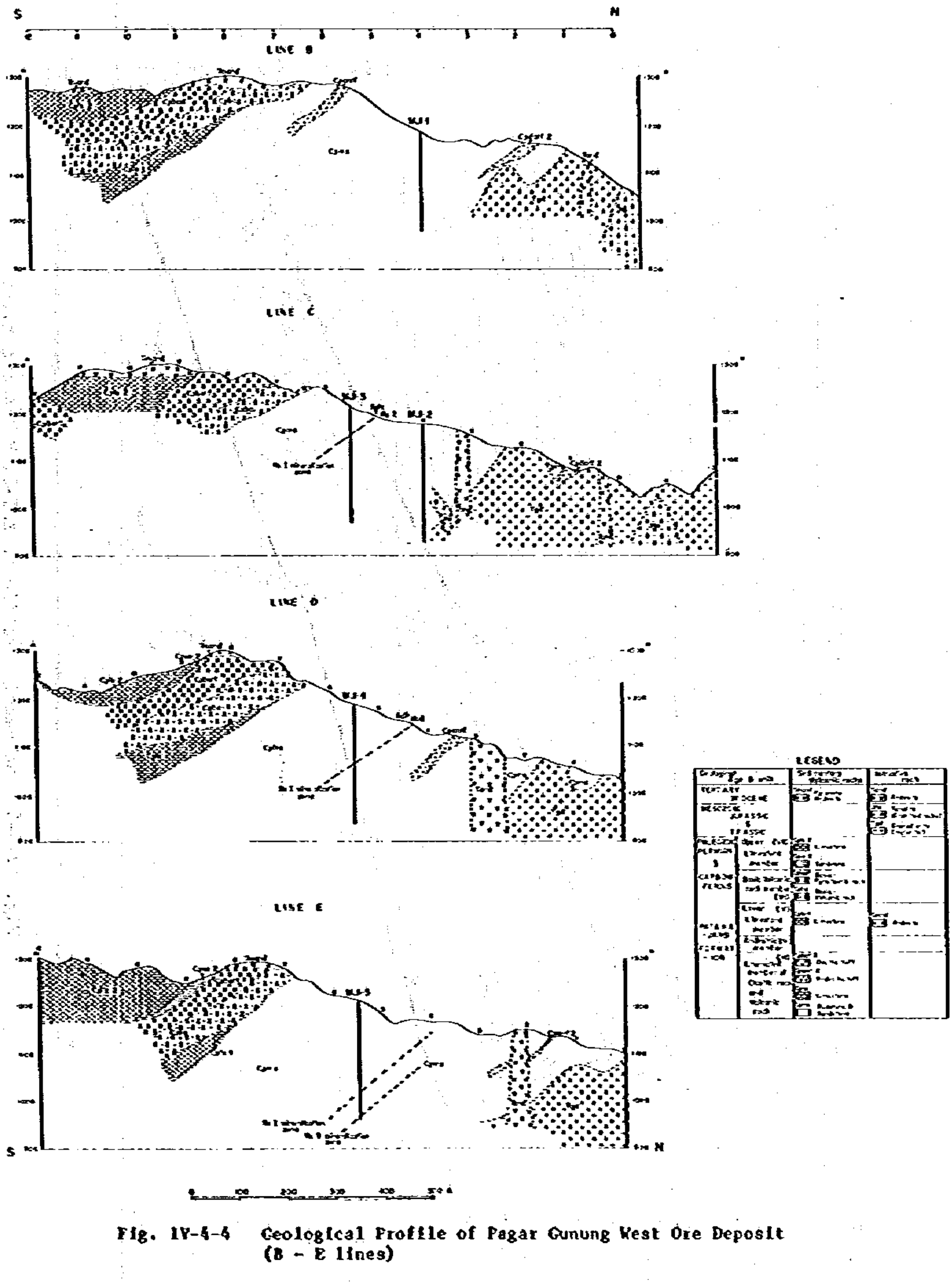


Fig. IV-4-4 Geological Profile of Pagar Gunung West Ore Deposit (B - E lines)

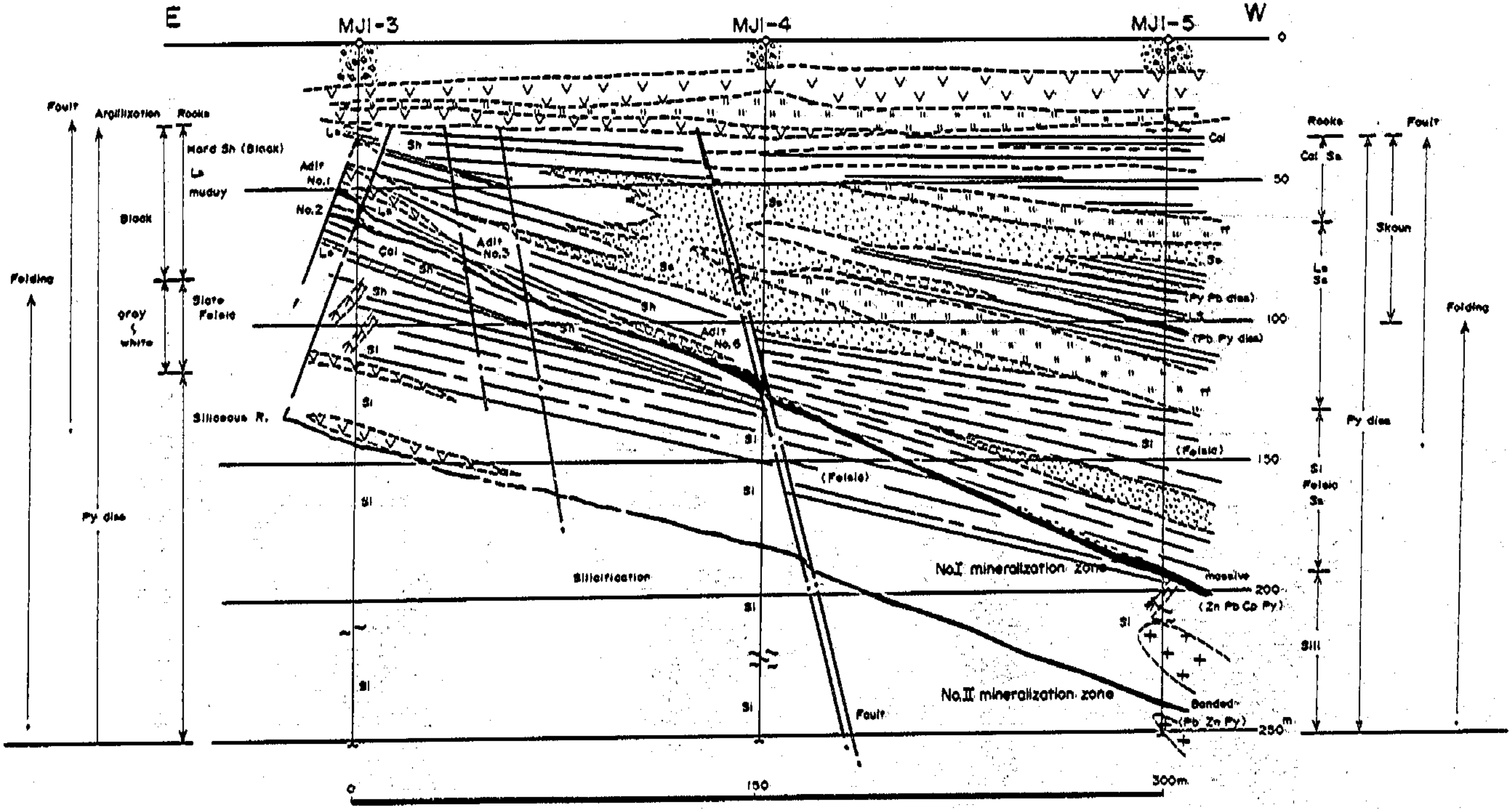


Fig. IV-4-5 Schematic Profile of MJI-3, MJI-4 and MJI-5 (confirmed ores at MJI-4, depth 16.50m-127.60m) and to the mineralized zone at MJI-5 (190.40m-192.60 depth).

The evidence for the above inferrence is the confirmation of the continuation of mineralization to Outcrop 3 from the Outcrops 1 and 2, and also the mineralization was inferred by surface survey to continue from Outcrop 3 to 6. It was also inferred that the MJI-3 mineralization (54m and 60m depth) is the lower part of the Outcrops 1 and 2.

The extrapolation of the mineralization between MJI-4 and MJI-5 was made because of the similarity of the two points, namely the host rocks (mainly calcareous/rocks and sandstone) of both points and the nature of the mineralization (Pb and Zn). The physical characteristics of the two points, however, are different, namely, the MJI-4 ore body is inferred to be a massive ore body brecciated by faulting while the MJI-5 ores form bedded and banded ore body. The formation of these different types is considered to be mainly the result of the different mechanism of ore formation. Namely, the bedded banded ore bodies have host rocks consisting mainly of sandstone intercatated with thin beds of calcareous rocks and it was metamorphosed by the acidic intrusives in the vicinity. Thus the bedding (partly schistose) is relatively clear. Whereas in the case of massive ore bodies, the host rock consists of interfingering of massive sandstone, shale and calcareous rocks. And the mechanism of the replacement of the two types are believed to be different.

(b) Mineralized zone of the footwall

This mineralized zone corresponds to the ores confirmed by MJI-5 at 241.40m-242.20m. The continuity of the zone is not clear between MJI-3 and MJI-4, but it is inferred to continue to the Pagar Gunung East Deposit Outcrop A which will be described later.

The ore body is bedded, banded and has massive form as a whole. The ores are Pb and Zn and rich in pyrite. The host rock is calcareous and has suffered chloritization.

4-2-2 Pagar Gunung East Deposit

(1) Old tunnels - mineralized zone of Outcrop B (provisionally named No. I Mineralization Zone).

In the mineralized zone of the old tunnels, the skarnization is stronger in the eastern side (MJI-5) than in the central part (MJI-4). It is also strong near the Outcrop B.

The exposed part consists of Pb, Zn ore associated with disseminated pyrite and copper oxides. The pyrite is altered to limonite. The major type of the ore body is massive - bedded and banded - disseminated. The ore shoot has massive to bedded form. The ends of the body become thin veinlets and the grade decreases. Pyrite dissemination is observed in the hangingwall and footwall of the ore body. The host rock is generally argillized and the footwall is particularly strongly argillized.

It is a sulfide body consisting mainly of Pb and Zn ores. The length of the mineralized zone is approximately 800m. The width of the mineralization changes considerably and in some places it shows echelon arrangement. The host rocks of this zone are mainly calcareous rocks, sandstone and shale.

(2) Mineralized zone of the footwall - mineralized zone of Outcrop A (provisionally named No.II Mineralization Zone)

This mineralized zone is inferred to continue from the ores confirmed by MJI-5 at the eastern side of Pagar Gunung West Ore Deposit to Outcrop A.

Outcrop A is situated in the footwall side of Outcrop B and its strike is approximately E-W, and the dip 40°S. This trend is the same as Mineralized Zone I.

The ore body generally has bedded to disseminated form.

The Outcrop A is bedded sulfide ores (mostly pyrite) and pyrite dissemination which is altered to limonite. The width of the mineralized zone changes widely.

The subsurface ores confirmed by MJI-5 is bedded slufide body rich in pyrite and sphalerite, galena and chalcopyrite are observed by the unaided eyes. Outcrop A and this subsurface body are similar in that they are both rich in pyrite. But the major difference of the two is that Pb, Zn and Cu minerals cannot be observed by the unaided eyes in the ores of the Outcrop A whereas they are observable in the ores of MJI-5. The significance of this difference is not clear, but it is inferred that the outcrop corresponds to the eastern end of the mineralized zone while the MJI-5 subsurface ores corresponds to the ore shoot of the zone. The host rocks of this mineralized zone are mainly siliceous rocks, felsic rocks and phyllite. They are strongly silicified.

4-3 THE RESULTS OF GEOCHEMICAL AND GEOPHYSICAL PROSPECTING AND DRILLING

The correlation of the results of the three types of investigation is shown in Fig. IV-4-6.

4-3-1 Geochemical Survey and Drilling Results

(1) Site MJI-3, MJI-4, MJI-5

These three sites are the geochemical anomalies; Cu 91-170ppm, Pb 120-640ppm, Zn 360-1,000ppm. The anomalous zone includes the previously mentioned old tunnels and all the drill holes confirmed interesting mineralized zones. The Mineralized Zones I and II both are inferred to be a part of this anomalous zone.

(2) Site MJI-1, MJI-2

These sites are the geochemical anomalies of more than Pb 120ppm and Zn 360ppm. This anomalous zone corresponds to the footwall of the old tunnels. The drilling showed generally weak pyrite dissemination. This weak mineralization is probably that associated with the silicification of the footwall.

4-3-2 Interpretation of SIP and Drilling Results

The anomalous zones detected by Spectral IP method are mostly distributed in the northern side of No. 7 on each line.

The anomalies are considered to be caused by three anomalous sources judging from the geological structure, patterns of anomalies, IP effects and their spectral types.

Drilling exploration was carried out in order to confirm two anomalous sources found near No. 3-No. 7 which are believed to be related with the ore deposits.

These two anomalous sources are named No.I, No.II mineralization zone from the interpretation of the results of the geological survey.

Mineralized zone I is inferred to extend continuously deeper with a southward dip. The center of the zone is near No. 5 on line C, while the Mineralized zone II lies underneath, parallel to the Zone I.

The No.I Mineralization zone corresponds to the anomalous sources which extends from the surface around No.5-No.7, Lines C, D and E downward or to the source in the deeper parts. Drilling was conducted for these sources, MJI-3, 4 and 5.

On the other hand, the No.II Mineralization zone corresponds to the anomalous source which extends from the surface near No. 4 on Lines B and C to the deeper parts. This source has particularly strong IP effect in the deeper parts. For this anomaly, two holes were drilled, MJI-1 and 2. Correlation of the results of the drilling and the IP anomalies are shown below;

Table IV-4-4 Correlation of SIP Anomary and Drilling Result

Drilling	Mineralized Zone	Mineralization	IP effect, Spectral type and the Source
MJT-1	II	Py dissemination from the surface with the center at 170 - 185m	Dug near No.4 on Line B. Strong IP anomalies greater than 30mrad were detected from n=2(150m deep) to the depths, in which n=3(200m deep) to n=5 (300m deep) are the strongest, Phase spectrum is flat or gradually increasing with frequency.
MJI-2	II	Py dissemination from the surface with the center at 130 - 165m	Dug near No. 4 on Line C. South dipping IP anomaly was detected at n=2 (150m deep) under No. 4 and the center is around 150 - 200m deep. Phase spectrum is flat or gradually increasing with frequency.
MJI-3	I	Py dissemination continue to the depth. Ore horizons are 35 - 75m and 120 - 250m	Dug between No. 5 and No. 6 on Line C. South dipping anomaly continues to the depths from the surface. Phase spectrum is decreasing with frequency. This type is seen between No. 5 and No. 6 at n=1.
MJI-4	I	The ore deposit exists in the zone of 115 - 127m in Py dissemination	Dug between No. 5 and No. 6 on Line D. Phase anomalies greater than -30mrad were detected from n=2 to the depths. The same spectrum type is seen in No.5 - No.6 on Line C.
MJI-5	I	Py dissemination from the surface. Massive ore deposits near 80 - 110m and 150 - 190m depth.	Dug between No. 5 and No. 6 on Line E. Phase anomaly bigger than -30mrad around No.5 - No.6. Phase spectrum is flat or decreasing with frequency. IP anomaly are seen at n=3 - n=4 but weak.

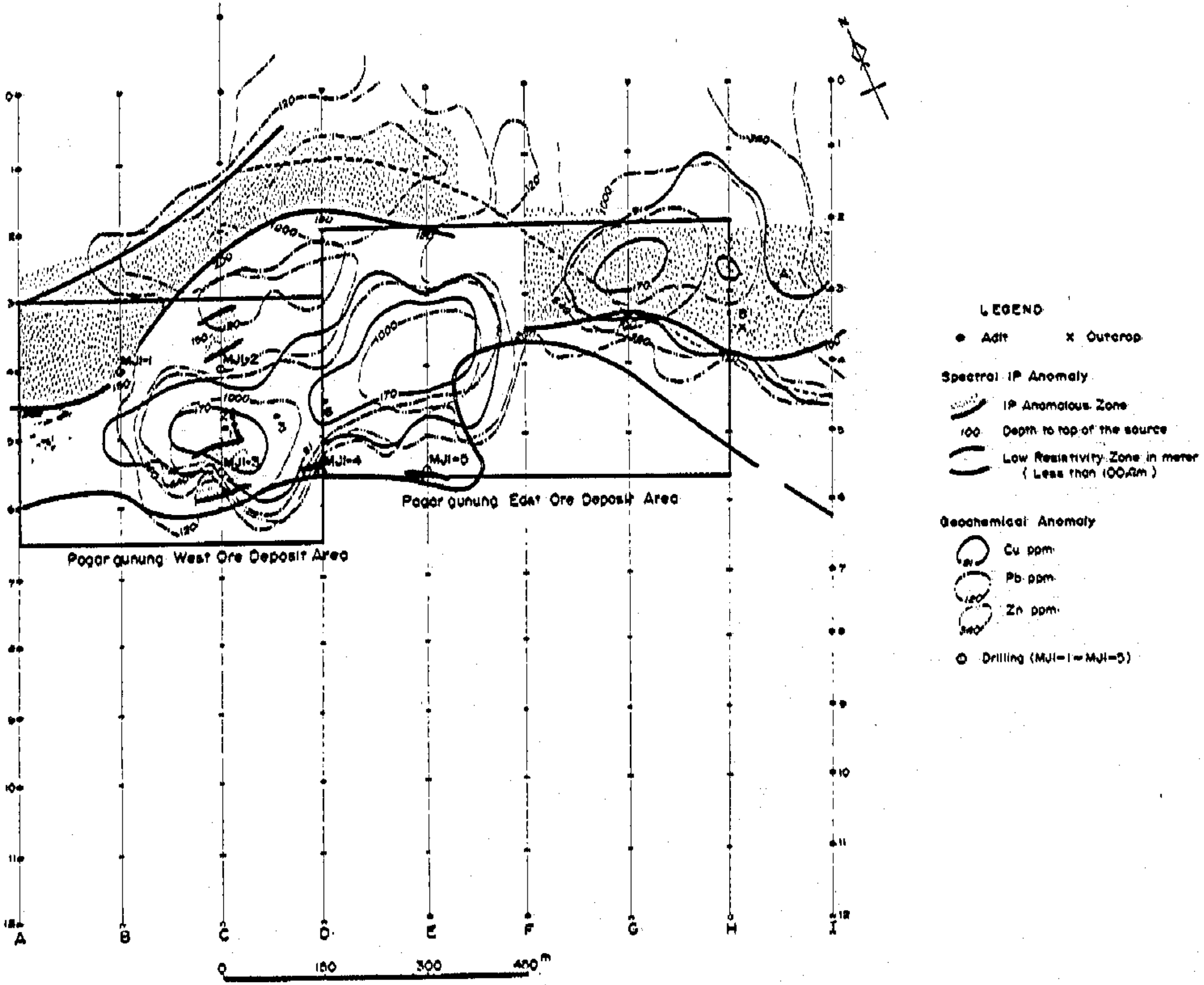


Fig. IV-4-6 Generalized Map of Geochemical, Geophysical and Drilling Surveys

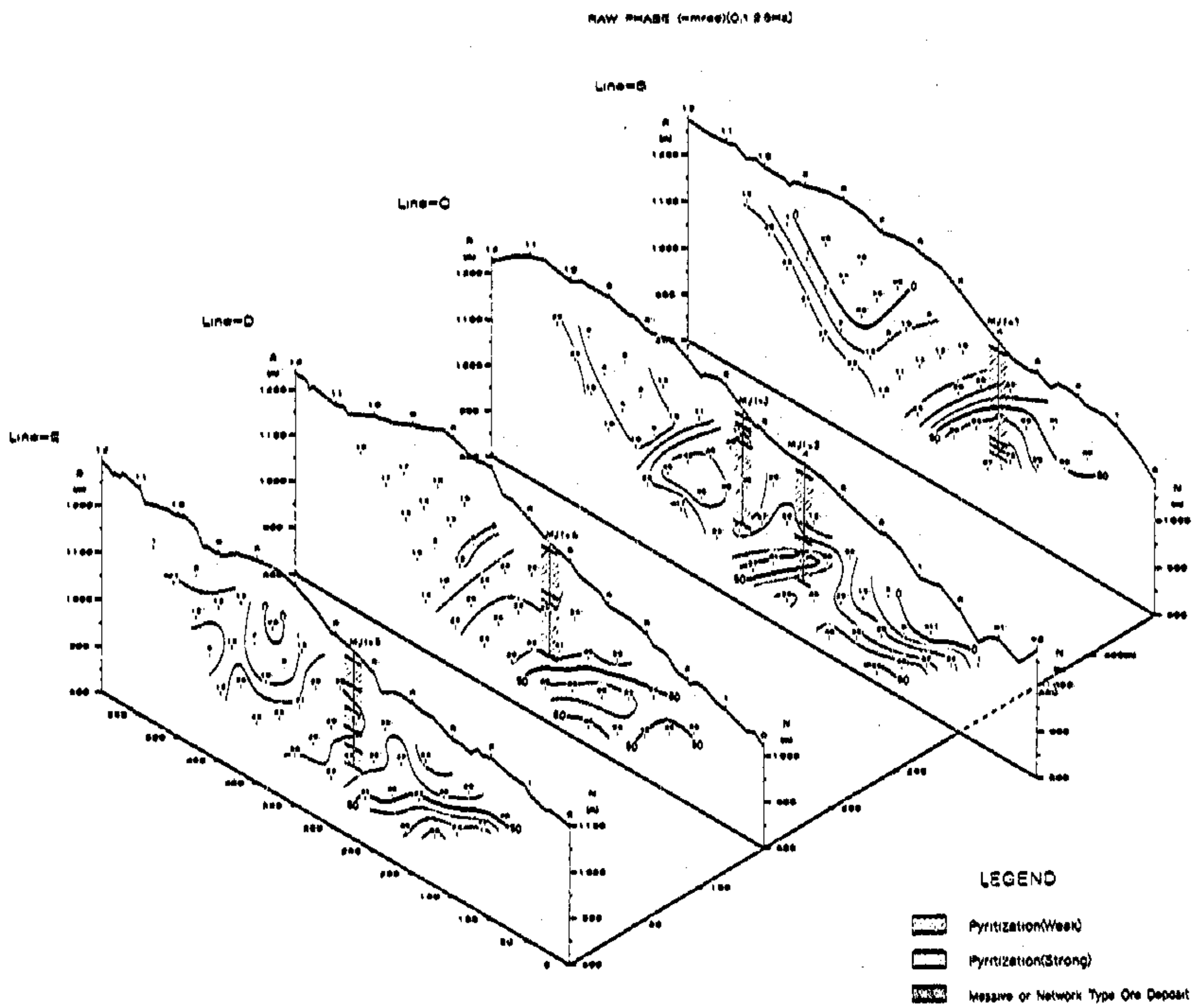


Fig. IV-4-7 Panel Diagram of SIP Anomaly and Drilling Survey Result

From the above,the following conclusions are obtained.

(1) In the No.I Mineralization Zone I, massive lead deposit containing silver occurs in a pyrite dissemination. The deposit has southward dip. The phase difference of this deposit decreases with the increase of frequency. Regarding the distributed of the deposit, it either becomes deeper to the east from rear Line C, or it may disappear further eastward.

(2) In No.II Mineralization Zone, pyrite dissemination shows remarkably strong IP effect compared to Zone I. The phase difference spectrum of this zone is flat or gradually increases with the increase of frequency. The distribution of the mineralized zone is believed to be continuous eastward and to extend to Lines H and I.

(3) It is difficult to identify the zone I from zone II from the patterns of anomalies detected on the Lines G - I. It may be attributed to the fact that the influence of the anomalous sources due to pyrite is excessively strong, or to the short distant between the two zone, or due to facts mentioned in (1).

4-4 THE GEOLOGIC STRUCTURE AND THE MINERALIZED ZONES

A panel diagram of the Papar Gunung Deposits is shown in Fig. IV-4-8.

4-4-1 The Geology of the Mineralized Zone

The Mineralized Zone I is situated approximately at the center of the third member (sedimentary and volcanic member) of the Patahajang Formation. The Mineralized Zone II is situated in the lower part of third member of the Patahajang Formation and is close to the acidic intrusives. The following description applies to both mineralized zones.

4-4-2 The Geologic Structure and the Mineralized Zones

(1) The strike and dip

The mineralized zones have a general strike of E-W and dip of 30° - 40°S. They are conformable to the host sedimentary rocks.

(2) Folding

Microfolds are frequently observed in the host rocks near the mineralized zones. In some pyrite dissemination, mineralization occurs along these microfolds and it is interpreted as both mineralization and microfolding occured simultaneously. It was pointed out from geological investigations that these microfolding is related to the formation of syncline extending in N60°W direction from Pagar Gunung through Mandagang.

(3) Faults

The major faulting of the area occurred after the ore deposits were formed. The ore bodies are frequently cut and the strike and dip of the host rocks are disturbed. There are two major fault systems, namely NE-SW system (strike N10° - 45°E, dip 70°NW-70° SE) and NW-SE system (strike N40°-80°W, dip 75°NE-45°SW). Generally, the strike of these faults is oblique or perpendicular to the ore bodies and the dip is very steep, close to vertical (Table IV-4-2).

(4) Mineralized zone

The mineralized zone is associated with calcareous rocks (limestone, pelitic limestone, siliceous rocks with calcite veins) and it occurs replacing these calcreous rocks. It occurs as massive (bedded, banded) or disseminated Ag, Pb, Zn deposits. The major ore minerals are galena, sphalerite, pyrite (pyrrhotite) and chalcopyrite and the major gangue minerals are green skarn (clinopyroxene, epidote), calcite and quarts.

The deposit was formed by contact metasomatic process in the skarnized rocks which were formed by pyrometasomatism of the calcareous members of the sedimentary rocks (third member of Patahajang Formation) near the quartz diorite stocks or dykes. Thus the deposit was formed with direct relation to the intrusion of the quartz diorite.

Pyrite veinlets and dissemination associated with quartz network and veinlets which cut through the bedding are observed in the later mineralization.

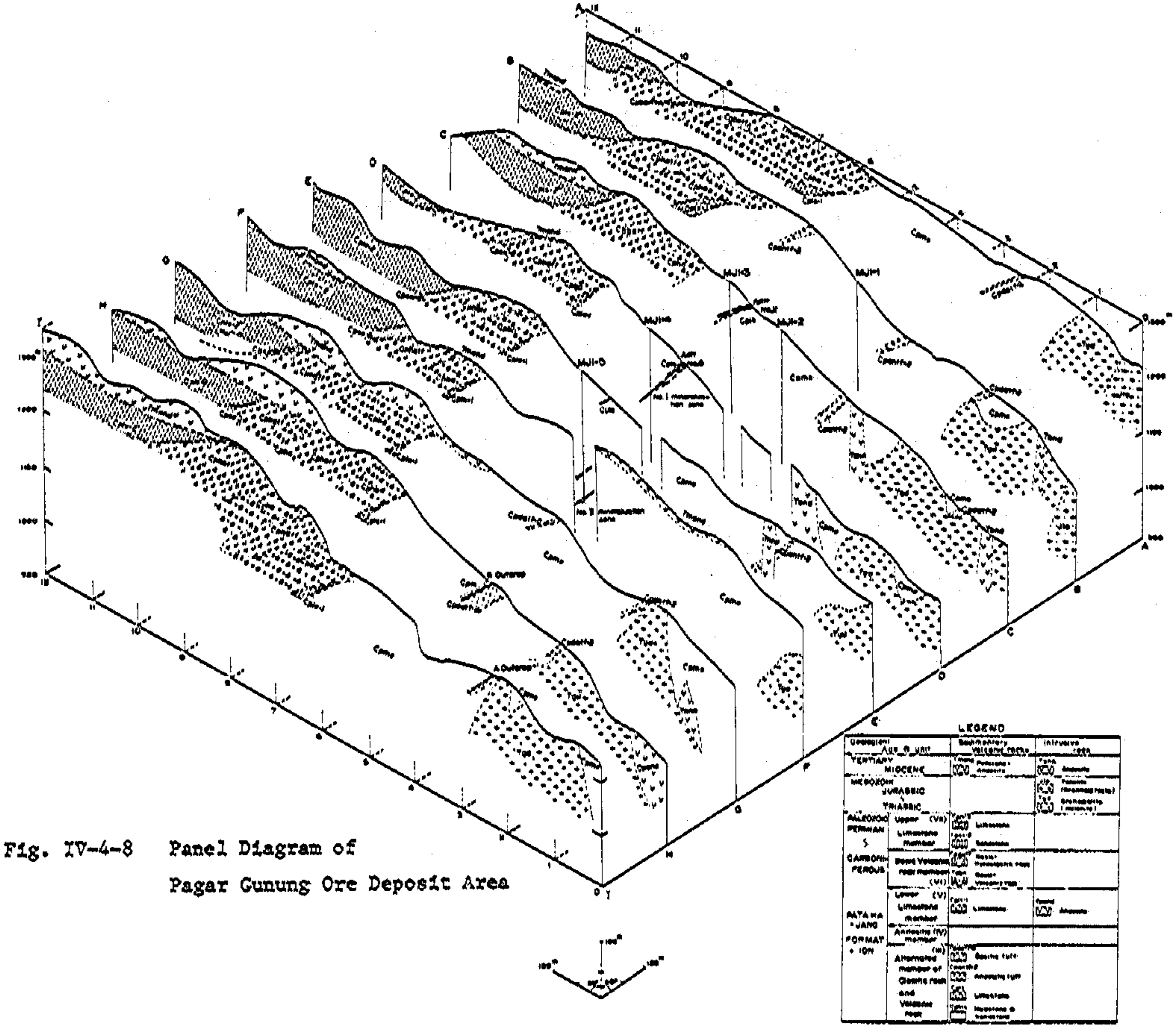


Fig. IV-4-8 Panel Diagram of Pagar Gunung Ore Deposit Area

(5) Ore shoots

The following observations are made as a result of the investigations of the old tunnels, outcrops and the drilling cores.

(i) The disturbance of strike direction

The general strike of the major mineralized zones is inferred to be E-W. The strike near the ore shoots are often disturbed (example, old Tunnel Nos. 2 and 6, Outcrop B). Those mineralized zones without disturbed strike (example, old Tunnel No. 3, Outcrop A), however, are generally weak. These disturbances of the strike direction were probably cause by tectonic movement (folding, flexing etc.) prior to the mineralization.

(ii) Host rocks

(a) The high grade parts are located near the interfingering of the sandstone and shale (paratly calcareous rocks)(example, old Tunnel No. 6).

(b) The metals seem to be more concentrated at skarns formed from relatively thin beds (example, Outcrop B, MJI-5, Mineralized Zone I 190m-193m depth, Mineralized Zone II 241m-243m) than in rocks which were skarnized extensively (examples, skarn zone at MJI-5 35m-105m) and are only weakly mineralized.

(iii) The vicinity of the major faults

The major faults are more or less perpendicular to the major mineralized zones. The high grade parts of the mineralized zones are, in many cases, cut and at times disappear by the effect of these faults. (examples, old Tunnel Nos. 2, 3, 5, 6, MJI-3 Mineralized Zone I 53m-60m depth, MJI-4 Mineralized Zone I 114m-128m depth).

The high-grade parts of the Mineralized Zone I confirmed by MJI-3 and -4 are hopefully, expected to exist near the major fault.

(iv) The form and scale of the high grade part

The shape of the high grade parts of the ore bodies varies considerably. It can be massive (examples, old Tunnel Nos. 2, 6; Mineralized Zone I of MJI-3, -4), bedded (example, Mineralized Zone I of MJI-5), banded (Mineralized Zone II of MJI-5) and in some cases several bedded and banded ore bodies occur close to each other, (example, Outcrop A, Outcrop B). The dimensions of the high grade parts are, regardless of the form, relatively small at 1m-3m wide and several meters to ten odd meters long.

In many cases the upper parts of the ore body are massive or disseminated while the lower parts of the mineralized zone (near the acidic intrusives) are bedded or disseminated.

The mineralized zones are considered to be continuous as a whole with a general trend of E-W, although the mineralized zones repeatedly changes their width, are cut by faults, and in places are arranged in echelon.

(v) Geologic structure and mineralized zone

Fig. IV-4-9 is a schematic sketch of the inferred relation between the geologic structure and mineralized zone. It is believed that the tectonic movement of the Patahajang Formation began around the time of the granodiorite intrusion during Carboniferous to Permian period. The effect of this movement to the sedimentary rocks are often observed as small and microfolds, fracturing, silicification, argillization, schistosity and other phenomena.

The effect of the tectonic movement related to the Jurassic intrusion of quartz dirorite is observed as fracturing, skarnization, silicification, argillization et cetra including mineralization. The major faults occurred after the intrusion and they cut through the main ore body.

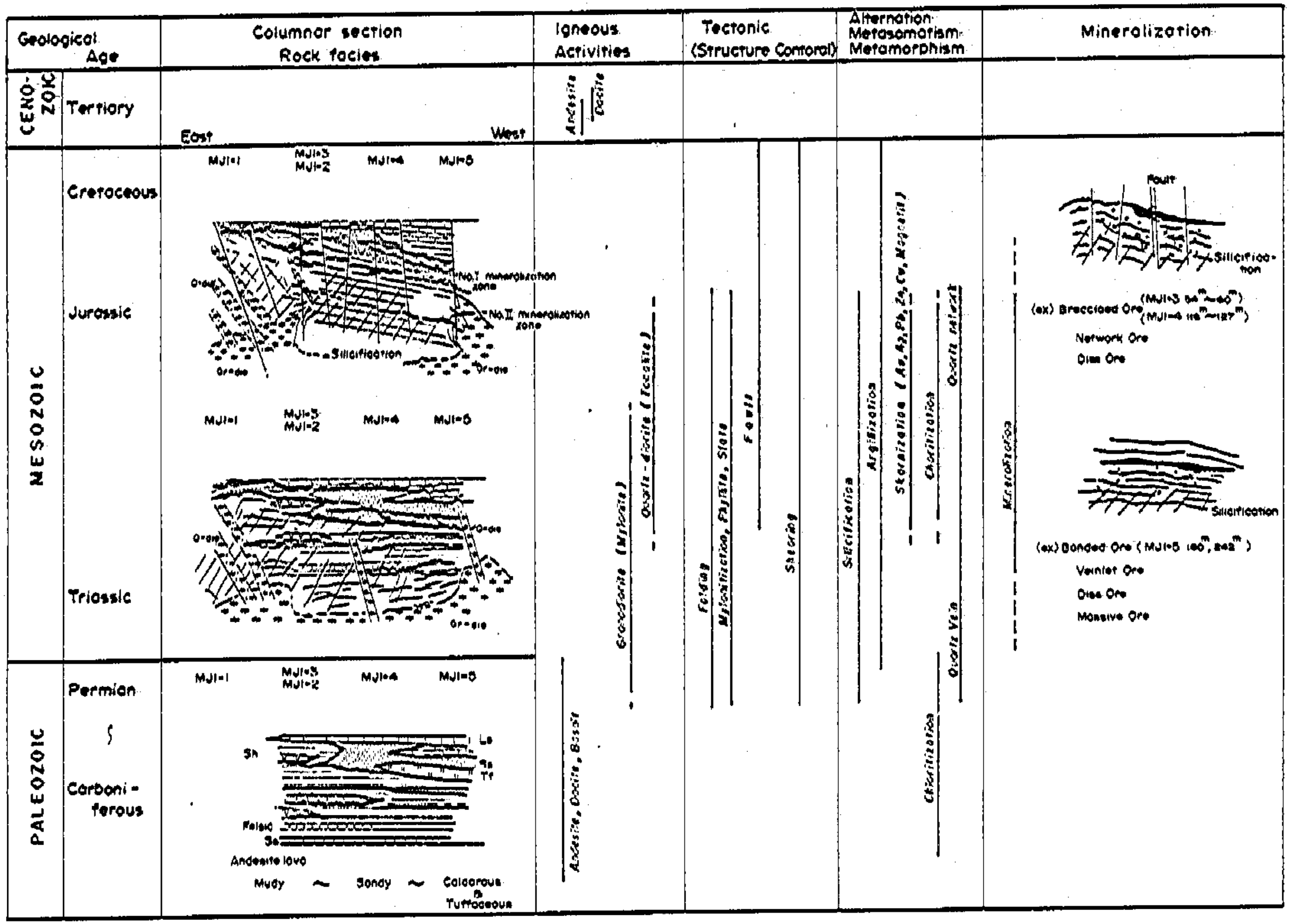


Fig. IV-4-9 Idea of Mineralization history of Pagar Gunung Ore Deposit

CHAPTER 5 CONCLUSION

As a result of execution of drilling survey on Pagar Gunung West Ore Deposit, consisting of five holes (total drilling length : 1,200 m), relationship among geology, geological structure, igneous activity and mineralization concerning the ore deposit in Pagar Gunung West Ore Deposit area has been elucidated.

The result is summarized as following.

(1) Geology in the Pagar Gunung West area consists mainly of alternated Member of clastic rock and volcanic rock, the third Member of Patahajang Formation, forming andesite and andesitic tuff in upper bed, calcareous rock, shale, sandstone and tuff in middle bed and siliceous rock, felsic rock and hybrid rock in lower bed. Andesite, dacite, quartz diorite and granodiorite occur as igneous rock, quartz diorite and granodiorite have been predominantly intruded in deep part.

(2) Mineralization can be grouped into two zones. No. I mineralization zone is embedded in the middle horizone of alternated Member of clastic and volcanic rocks, while No. II mineralization zone is embedded in the lower horizone of the Member. No mineralization occurs in andesite of the upper horizone.

(3) No. I mineralization zone is characterized by silver bearing copper-lead-zinc mineralization, and the Pagar Gunung West Ore Deposit is inferred to extend to B outcrop of Pagar Gunung East Ore Deposit. No. II mineralization zone, embedding about 50 m lower horizone than the former mineralization zone, is pyrite rich mineralization in siliceous rock and dacitic tuff.

(4) Relationship with geological structure and mineralization

(a) Strike and dip of ore deposit

Ore deposits are conformably embedded in the sedimentary rock, and they strike E - W and dip 30° to 40°.

(b) Relation between ore deposit and folding structure

Country rock neighboring ore deposit is often recognized microfolding structure, and the mineralization is associated with the folding structure. The fact suggests that forming of ore deposit could be in same stage of microfolding.

(c) Relation with mineralization and faulting

Main faults cut obliquely or vertically sedimentary rock, dipping steeply. Sedimentary rock used to disturbe its strike and dip near fault, and ore deposit occur as dragged and brocken fragments in fault zone. Under the consideration of the fact, the fault is inferred to be formed at post mineralization.

(5) Genesis of the mineralization

No. 1 mineralization zone is situating near stock or dike of quartz diorite, and is regarded pyrometasomatic ore deposit, replacing and skarnizing calcareous rock in sedimentary rock by intrusion of quartz diorite.

Table IV-4-5 Microscopic Observation of Rock Thin Section of Drilling Core

Sample No.	Drilling No.	Depth (m)	Rock Name	Phenocryst/Fragment											Ground Mass/Matrix						Secondary Mineral					
				Q	Pl	Mu	Bi	Am	Px	Maf	Ep	Ca	Fe	Other	Q	Pl	Am	Maf	Cl	Fe	Q	Se	Ch	Ep	Ca	Py
S-1	MJI-3	66.5	Sandy tuff	○						∘?			∘	Sir ∘	∘			∘	○	∘	∘	∘	∘		∘	
S-2	"	139.6	Dacitic tuff	○	∘?					?		∘	∘		○				○	∘	○	∘	∘	∘	∘	?
S-3	"	166.5	Mylonite	∘	◎					∘?			∘		◎	∘		?		∘	○	∘	∘		∘	∘
S-4	"	191.5	Mylonite	○	?					?			∘		○	?		?		∘	◎			∘	∘	∘
S-5	"	217.5	Mylonite	○	○					∘			∘		○	∘	∘			∘	○	∘			∘	∘
S-6	"	248.5	Slate	○	?	∘		∘				∘	∘											∘	∘	∘
S-7	MJI-4	49.0	Slate	∘	?	○	∘						∘	Ch? ∘								∘	∘			
S-8	"	118.5	Skarn	∘		∘			∘		○	○	∘													Py, Sp? ∘ ∘
S-9	MJI-5	186.0	Sandy tuff	∘	∘					?		∘	∘	Da, Kf ∘ ∘	∘	∘			∘	∘ Ca ∘		∘		∘	∘	
S-10	"	196.5	Sandy tuff	○	○		∘?			?				An ∘	∘	∘		?		∘	∘	∘		∘	∘	
S-11	MJI-2	126.0	Dacitic tuff		∘					∘				Da. ∘ Pu. ∘ Kf. ∘?	○	∘			○	∘	○	○	?	∘	∘	∘
S-12	MJI-1	83.8	Fine tuff	∘	∘								∘	Cl ○	∘				◎	∘ Ca ∘		∘	∘		∘	∘
S-13	"	61.8	Sandy dacitic tuff	○	∘								∘	Da ∘	∘	∘			∘	∘ Ca ○		∘	∘	○	○	∘

Regent

Q : Quartz
Pl : Plagioclase
Mu : Muscovite
Bi : Biotite
Am : Hornblende
Px : Pyroxene
Maf : Mafic Mineral
Ep : Epidote
Cp : Calcite
Fe : Iron Mineral
Cl : Clay Mineral
Se : Sericite
Ch : Chlorite
Py : Pyrite

Kf : Kali feldspar
Da : Dacite
An : Andesite
Pu : Pumice
Sp : Sphalerite
Sir : Siliceous rock

◎ : Abundant
○ : Common
∘ : Small amount

Table IV-4-6 Microscopic Observation of Ore Polished Dection of Drilling Core

Sample No.	Drilling No.	Depth (m)	Ore Mineral						Remarks
			Cp	Aga	Suh	Pyr	Py	Asp	
P-7	MJI-3	35.5	•	•	•		∘		dissemination
P-8	"	71.8	•		•	∘	○	•	dissemination
P-9	"	144.6				∘	∘		dissemination and veinlet
P-10	"	225.7	•	•		∘	∘		dissemination and veinlet
P-11	MJI-4	122.3	•	∘	◎	•	◎		network and massive
P-12	"	124.1	○	∘	○	∘	•		dissemination and partly network
P-13	MJI-5	84.5	•		•		∘		dissemination and veinlet
P-14	"	106.3	•			•	○		veinlet and partly dissemination
P-15	"	170.6	•	∘	○		∘		veinlet, and fine dissemination
P-16	"	175.7	•				∘	∘	dissemination and partly veinlet
P-17	"	190.6	∘	•	•	∘	∘		veinlet and dissemination
P-18	"	192.4	∘	∘	◎	◎	○	•	coarse massive
P-19	"	241.6	∘	•	∘		◎		massive (slightly banded)
P-20	MJI-2	53.7			•	∘	∘	•	dissemination
P-21	"	112.5	•		•	∘	○		dissemination and partly veinlet
P-22	"	139.5	•			∘	○		dissemination
P-23	MJI-3	54.0	∘	∘	∘		◎	○	massive ore
P-24	MJI-2	226.0	•			○	○		pyrite in silicified epidote skarn
P-25	MJI-1	93.0	•	•	∘	•	∘		dissemination in silicified epidote skarn
P-26	"	91.1	•			•	◎		massive ore

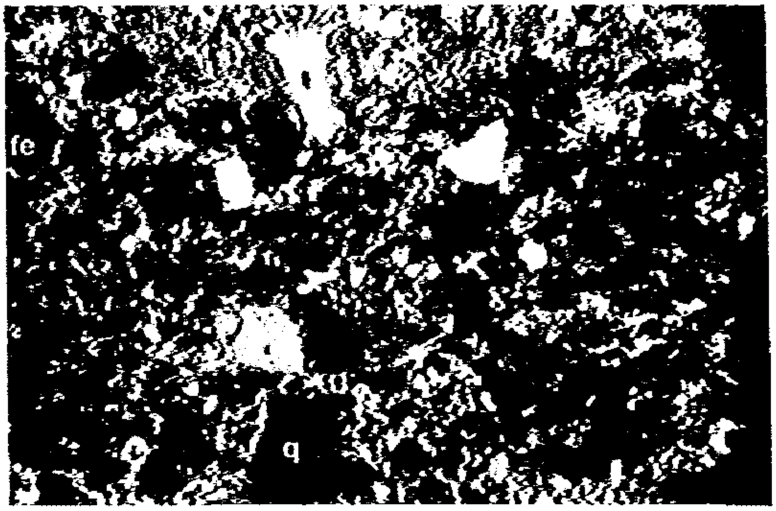
Cp : Chalcopyrite
Ca : Calena
Sph : Sphalerite
Pyr : Pyrrhotite
Py : Pyrite

◎ : Abundant
○ : Common
∘ : Small amount
• : Rare

Fig IV-4-10 Microscopic Photograph of Rock Thin Section and Ore Polished section of Drilling Core

Abbreviation

q	:	Quartz
pl	:	Plagioclase
se	:	Sericite
ca	:	calsite
ep	:	epidote
fe	:	Ferric mineral
clay	:	Clay
rfda	:	Rock fragment (Dacite)
py	:	Pyrite
cp	:	Chalcopyrite
sp	:	Sphalerite
ga	:	Galena
po	:	Pyrrhotite
asp	:	Arsenopyrite



Sample No. : S-1
Drill Hole : MJI-3
Depth : 66.50 M
Rock Name : Sandy tuff

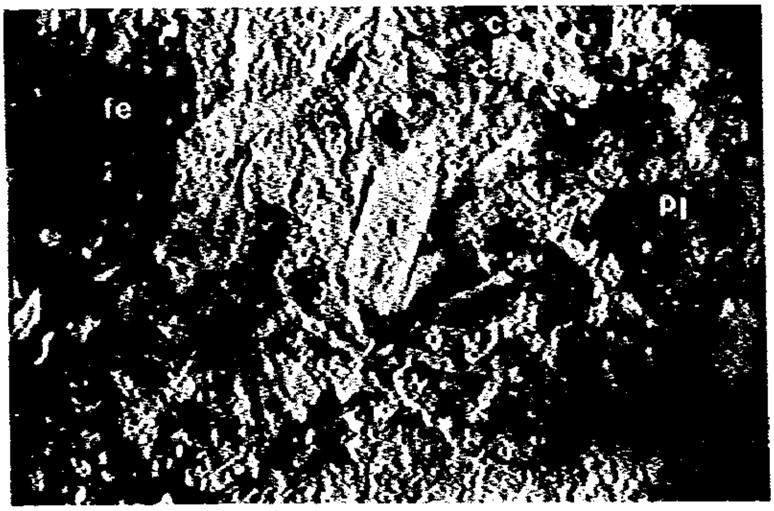
cross polars

0 0.5 mm

Sample No. : S-2
Drill Hole : MJI-3
Depth : 139.60 M
Rock Name : Dacitic tuff

cross polars

0 0.5 mm



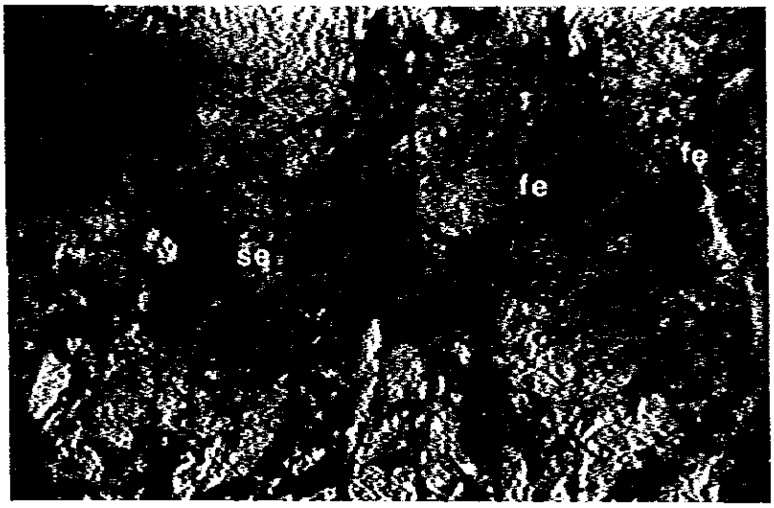
Sample No. : S-3
Drill Hole : MJI-3
Depth : 166.50 M
Rock Name : Mylonite

only lower polar

0 0.5 mm

Sample No. : S-4
Drill Hole : MJI-3
Depth : 191.50 M
Rock Name : Mylonite

only lower polar
0 0.5 mm

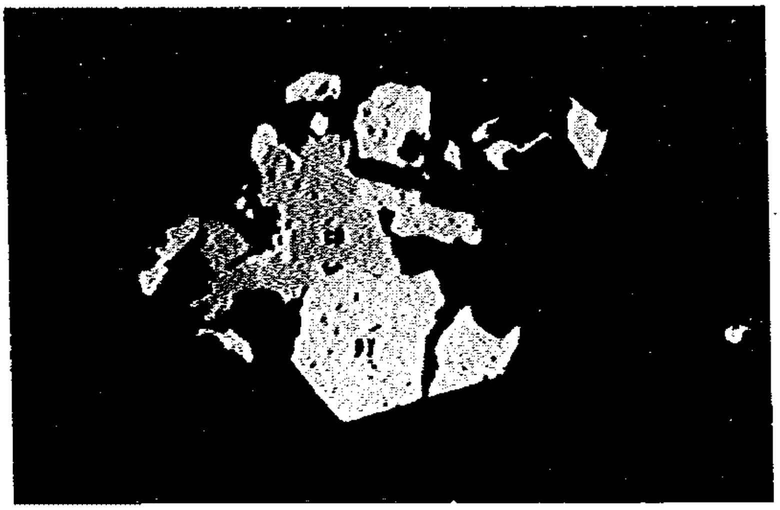


Sample No. : S-5
Drill Hole : MJI-3
Depth : 217.50 M
Rock Name : Mylonite

only lower polar
0 0.5 mm

Sample No. : S-6
Drill Hole : MJI-3
Depth : 248.50 M
Rock Name : Slate

only lower polar
0 0.5 mm

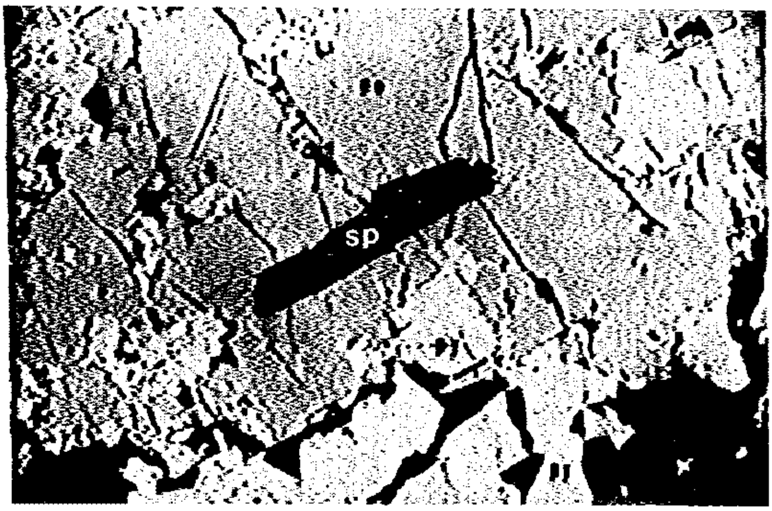


Sample No. : S-7
Drill Hole : MJI-3
Depth : 33.5 M
Ore Name : Disseminated pyrite chalcopyrite ore

0 0.2 mm

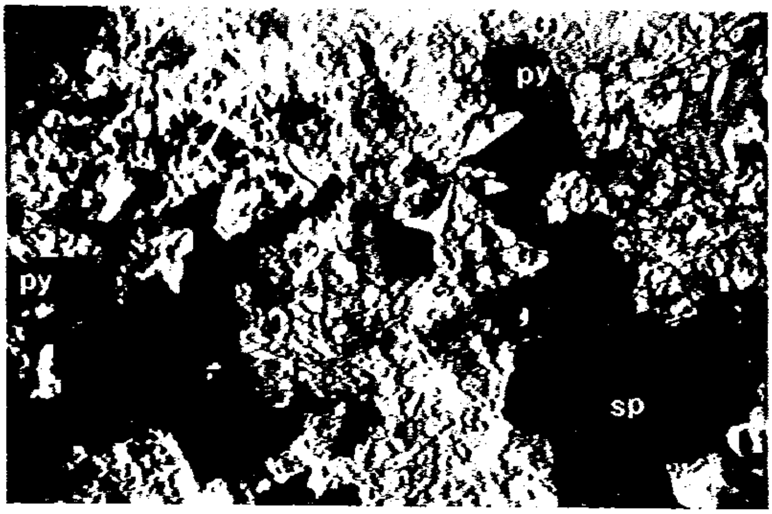
Sample No. : S-11
Drill Hole : MJI-4
Depth : 122.30 M
Ore Name : Massive chalocpyrite pyrite sphalerite ore

0 0.2 mm



Sample No. : S-11
Drill Hole : MJI-4
Depth : 122.30 M
Ore Name : Massive pyrrhotite pyrite sphalerite ore

0 0.2 mm



Sample No. : S-8
Drill Hole : MJI-4
Depth : 118.50 M
Rock Name : Skarn minerals

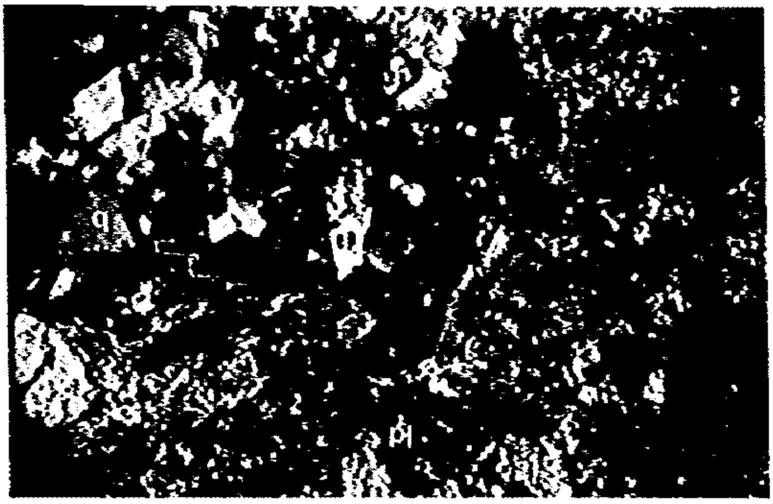
only lower polar

0 0.5 mm

Sample No. : S-10
Drill Hole : MJI-5
Depth : 126.00 M
Rock Name : Sandy tuff

cross polars

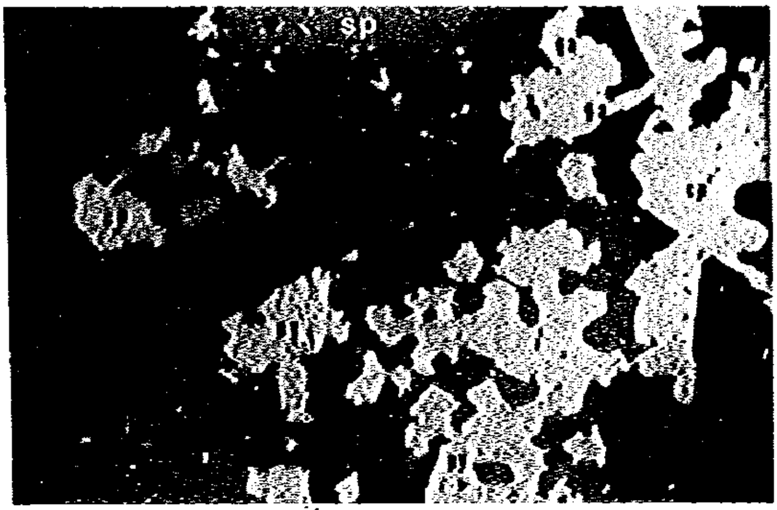
0 0.5 mm



Sample No. : S-11
Drill Hole : MJI-2
Depth : 126.00 M
Rock Name : Dacitic tuff

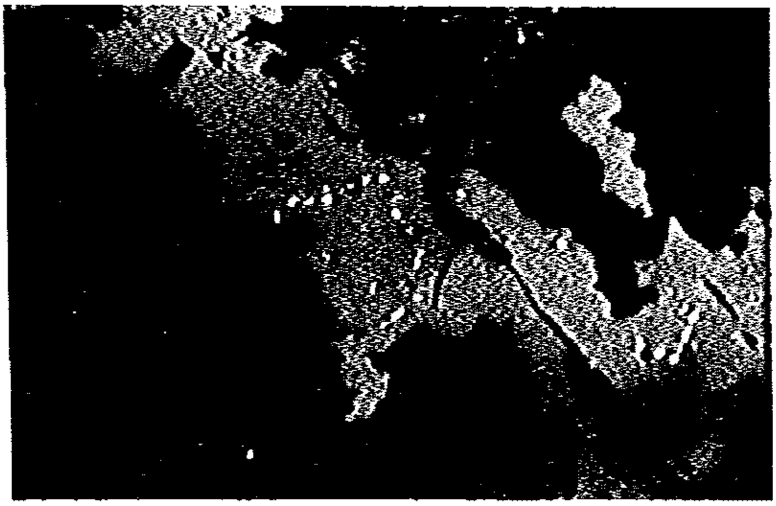
only lower polar

0 0.5 mm



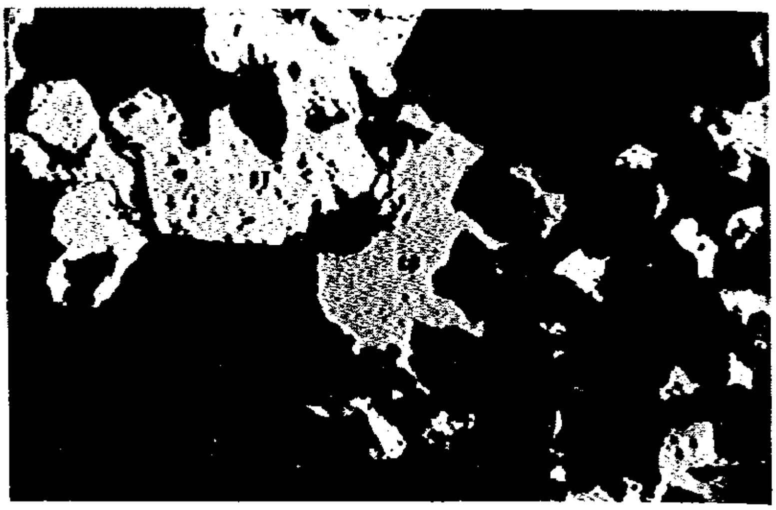
Sample No. : S-12
Drill Hole : MJI-4
Depth : 124.10 M
Ore Name : Massive pyrite chalcopyrite galena sphalerite ore

0 0.2 mm



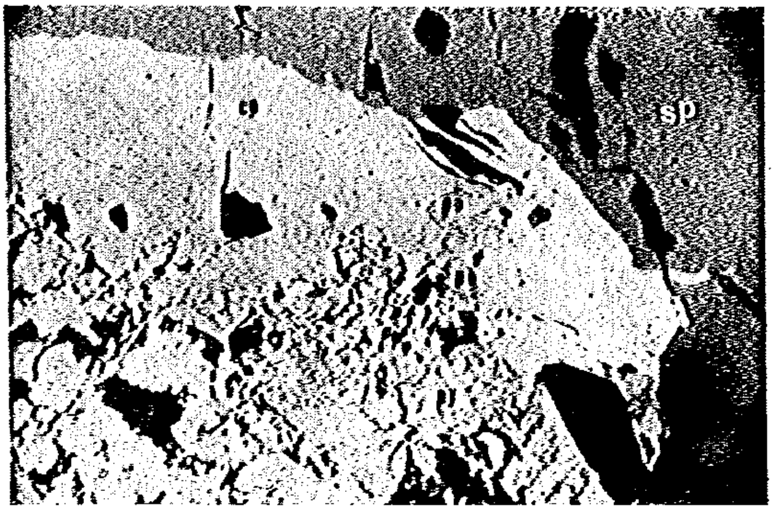
Sample No. : S-15
Drill Hole : MJI-5
Depth : 170.60 M
Ore Name : Disseminated chalocpyrite sphalerite ore (Exsolution of sphalerite and chalcopyrite)

0 0.2 mm



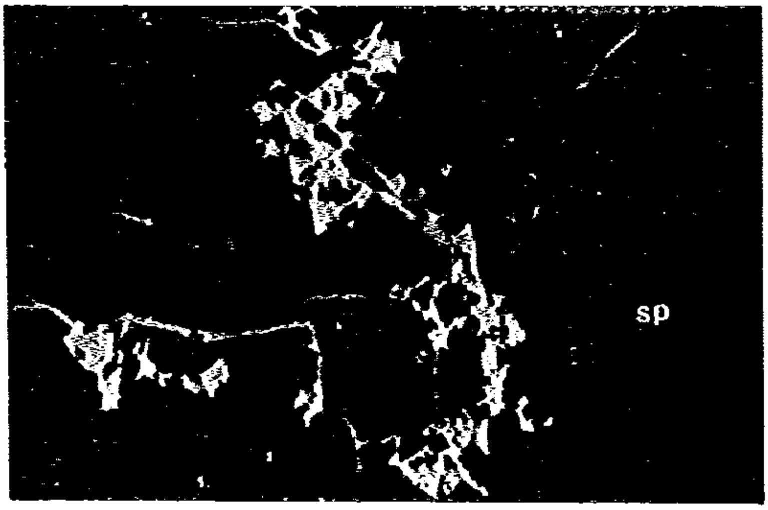
Sample No. : S-17
Drill Hole : MJI-5
Depth : 190.60 M
Ore Name : Disseminated pyrite chalcopyrite ore

0 0.2 mm



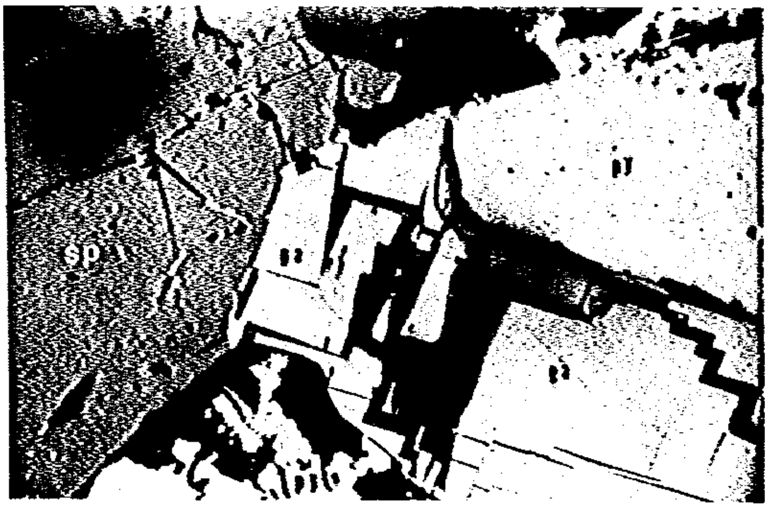
Sample No. : S-18
Drill Hole : MJI-5
Depth : 192.40 M
Ore Name : Massive
Pyrrhotite pyrite chalcopyrite sphalerite ore

0 0.2 mm



Sample No. : S-18
Drill Hole : MJI-5
Depth : 192.40 M
Ore Name : Massive ore
Exsolution of chalocpyrite and sphalerite

0 0.2 mm

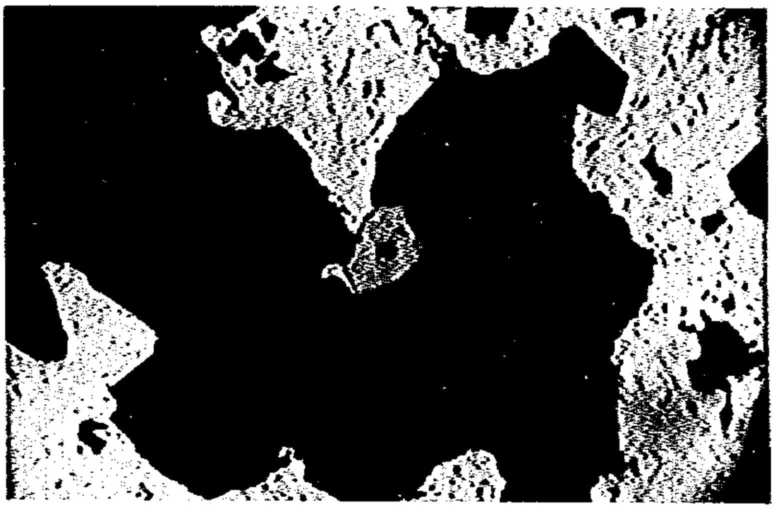


Sample No. : S-18
Drill Hole : MJI-5
Depth : 192.40 M
Ore Name : Massive ore
galena, pyrite, sphalerite and chalcopyrite

0 0.2 mm

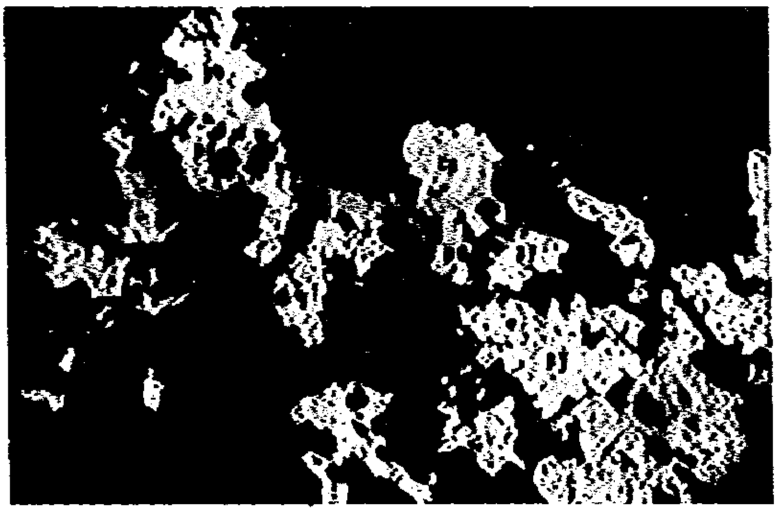
Sample No. : S-19
Drill Hole : MJI-5
Depth : 241.60 M
Ore Name : Bandded ore
Pyrite, small amount
of spharelite and galena

0 0.2 mm



Sample No. : S-21
Drill Hole : MJI-2
Depth : 112.50 M
Ore Name : Disseminated
ore, Pyrite and
chalcopyrite

0 0.2 mm

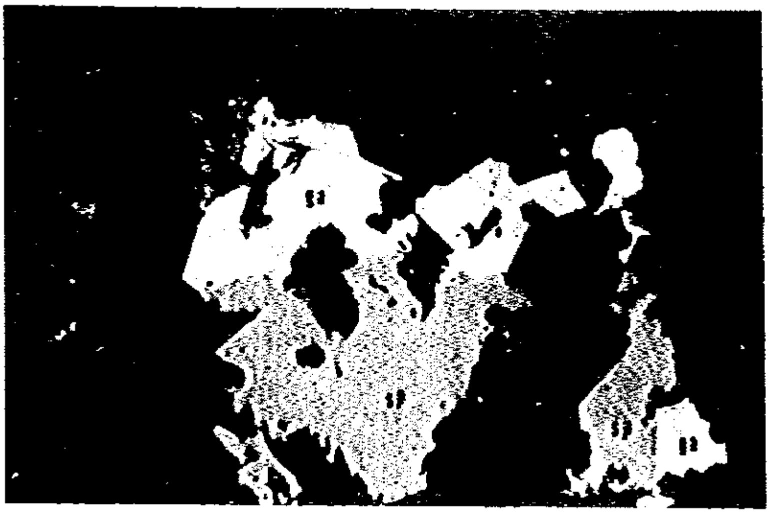


Sample No. : S-22
Drill Hole : MJI-2
Depth : 139.50 M
Ore Name : Dissemination
ore, pyrrhotite, pyrite
and chalcopyrite

0 0.2 mm

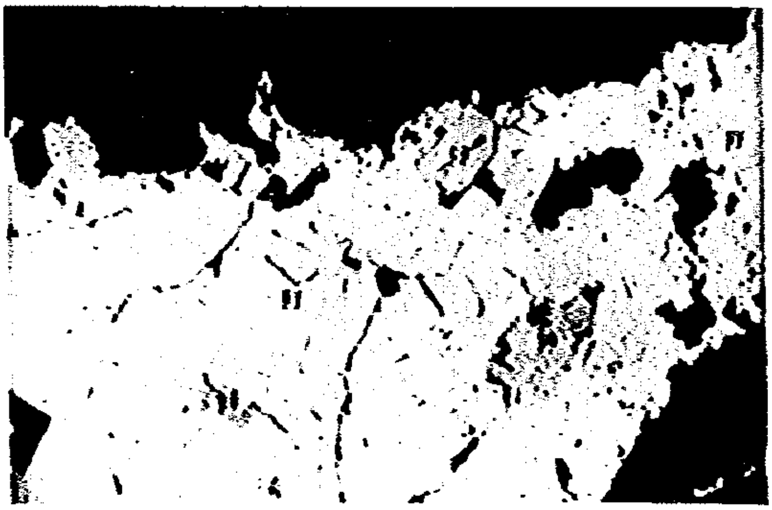
Sample No. : S-23
Drill Hole : MJI-3
Depth : 54.00 M
Ore Name : Massive arsenopyrite pyrite ore (contained a small amount of chalcopyrite, galena, sphalerite, exsolution of chalcopyrite in sphalerite)

0 0.2 mm



Sample No. : S-25
Drill Hole : MJI-1
Depth : 93.00 M
Ore Name : Dissemination ore of pyrite and sphalerite

0 0.2 mm



Sample No. : S-26
Drill Hole : MJI-1
Depth : 91.10 M
Ore Name : Massive pyrite ore (included a small amount of pyrrhotite and chalcopyrite)

0 0.2 mm

PART V

CONCLUSION AND RECOMMENDATION FOR THE THIRD PHASE

1. CONCLUSION

This year's survey were carried out as detail survey or preliminary detailed survey in three Areas which were selected as promising Areas through first phase reconnaissance survey, namely Hatapang Area (upper-stream area of A. Hatapang, 6 km^2), Muara Sipongi Area A (Bt. Pionggu Area, 8 km^2) and Muara Sipongi Area B (Pagar Gunung - Patahajang Area, 30 km^2) by means of geological, geochemical and geophysical surveys. The following is a summary and conclusion of the results of the survey.

1-1 Hatapang Area

Geological survey and geochemical survey of soil were conducted at north marginal part of Hatapang Granite stock, which was judged as most prospective area of tin-tungsten mineralization in Hatapang Area through the first phase survey.

Geochemical survey of soil taken at 70 m interval along eleven survey lines (400 m spacing and total length of 16.5 km) indicates that anomalous area above 1,700 ppm of florine, 85 ppm of tin is distributed along with boundary zone of Hatapang Granite stock and Hatapang Formation (hornfels) at A. Mabar. The anomalous area is extensively distributed at area of 800 m extension by 200 m ~ 300 m wide. Inside Hatapang Granite, back ground (mean value) value of tin, tungsten and florine at northwest part (A. Mabat and A. Sosopan) has a tendency to be higher than the value at southeast part (A. Hatapang). It could be caused by the difference of distribution frequency of fine-grained granite dikes and quartz veins bringing mineralization into both parts.

From the result of the first phase survey, fine-grained granite dike and quartz vein intruded into coarse-grained granite stock are regarded as tin-tungsten bearing granite and quartz vein, because much tin contents as minor element in fine-grained granite. However no tin-tungsten ore bearing quartz vein and prominent greisen alteration part have been discovered in spite of distribution of geochemical anomalous area and many fine-grained granite dikes and quartz veins.

1-2 Muara Sipongi Area A

Area of A. Tabur, A. Simpang Manganpo and A. Muara Botung up to 900 m above sea level is underlaid by meta-andesite of Muara Botung Formation, and gold bearing copper-(lead-zinc) ore veins filled into fissures of N 5° - 40° W strike in the meta andesite, while at Mountain area, especially at Bt. Pionggu, above 900 m sea level, limestone stratum of Patahajang Formation conformably overlies meta andesite stratum, and gold bearing copper skarn ore deposits are embedded in the limestone. By electron microscopic analysis it was detected that the calcic skarn consisted of clinopyroxene (Di $_{85.5}$ Hd $_{14.5}$) and garnet (Gr $_{69}$ Ad $_{31}$) which are usually associated with copper or iron skarn ore deposit.

These skarn ore deposits were formed by replacement of limestone along the fissure system in the same manner as fissure filling ore vein in meta andesite. It seems that both ore deposits were produced along the fissure which was caused by tectonics through Cretaceous quartz diorite intrusion.

From the result of geochemical survey of soil which were collected at rate of 10 samples per km^2, anomalous area of 600 km in diameter showing by values over 34 ppb of gold, 0.16 ppm of silver, 169 ppm of copper, 15 ppm of lead and 132 ppm of zinc was founded to be distributed at Bt. Pionggu limestone area. However no prominent anomalous areas are found in the other part, and it is supposed that mineralization of the Area are mostly narrow and small scale ore veins.

1-3 Muara Sipongi Area B

1-3-1 Geological Survey

Pagar Gunung ore deposit consists of Pagar Gunung West ore deposit extending 200 m with E-W strike and Pagar Gunung East ore deposit as an outcrop. They are massive or disseminated silver bearing copper-lead-zinc skarn ore deposit and are embedded in thin intertrappean limestone layer of Alternative Member of Clastic Rock and Volcanic Rock, Patahajang Formation. The ore deposits are accompanied with pyrite, pyrrhotite, chalcopyrite, galene and sphalerite as ore minerals and clinopyroxene (Di $_{55}$ Hd $_{35}$ Jo $_{10}$) and epidote, calcite, siderite as calcic skarn.

The ore deposits contain Ag (100 g/t - 150 g/t), Pb (10% - 15%) and Zn (10% - 17%) in massive part ranging from 0.10 m to 1.80 m in width, and Ag (40 g/t - 85 g/t), Pb (2.5% - 10%) and Zn (2% - 9%) in disseminated part ranging from 0.4 m to 2.00 m in width. Outcrop of Adit No. 6 of Pagar Gunung West ore deposit which is the best outcrop of the ore deposit shows the mean content of Au 1.6 g/t, Ag 85 g/t, Cu 0.14%, Pb 6.00% and zinc 5.5% in 2.90 m width combining massive and disseminated parts.

In the east part of the survey area, Barute outcrop disseminating sphalerite and containing malachite and limonite of secondary oxide mineral were found at A. Barute, tributary of A. Pungkut. Patahajang alteration area with silicification, argillization and pyritization is also distributed, close to Barute outcrop, along A. Pungkut.

1-3-2 Geochemical Survey

Geochemical survey was performed by collecting soil at 50 m interval points along geophysical surveyed lines in the Pagar Gunung area and additionally in the ratio of 7 samples per a km^2 in the outside area of geophysical survey.

Anomalous area overlapped by anomalous value of path-finder elements, namely over Au 85 ppb, Ag 3.2 ppm, Cu 170 ppm, Pb 650 ppm and zinc 1,000 ppm, indicates and coincides with outcrops distribution of Pagar Gunung West and East ore deposits. These anomalous zones extend 500 m at West ore deposit and 200 m at East ore deposit.

Another anomalous area distributing from Barute outcrop-Patahajang alteration area from upper-stream of A. Mandagang is extended 3 km by 1 km wide and is overlapped by anomalous value exceeding Au 45 ppb, Ag 2 ppm, Cu 200 ppm, Pb 300 ppm and zinc 630 ppm. It is comparable to Pagar Gunung anomalous area.

1-3-3 Geophysical Survey (Spectral IP method)

Spectral IP method was adopted to know the subsurface extent of the deposit and distribution of the mineralization in Pagar Gunung mineralized zone.

There were a total of 9 survey lines of 1.2 km at a line spacing of 150 m with the ore deposit as its center.

The data acquisition was made by Dipole-Dipole configuration with electrode spacing a=100 m and electrode separation factor n=1 to 5.

Following group of anomalies were detected in this survey.

(1) Anomaly zone spreading in No. 5 to No. 6 of lines C, D and E.
(2) Anomaly zone spreading in No. 2 to No. 4 of lines A to E.
(3) Anomaly zone north of No. 3 of lines F to I.

Anomaly (1) is related with Pagar Gunung West ore deposit showing V shaped phase spectrum.

This anomaly is eminent at around the outcrop of No. 5 of line C and the same patterns are recognized in No. 5 to No. 6 of lines D and E, which suggest that the source is southerly dipping at the depth of 100 m.

Anomaly (2) consists of the phase of more than -30 milliradian with a spectrum of almost flat pattern in the low frequency range and with a slight high value in the range of more than 8 Hz.

This anomaly pattern are seen only in the contact zone of granodiorite and sandstone-mudstone, and judging from the anomaly pattern and their continuity, those anomalies are interpreted to be due to disseminated pyrite mineralization.

Anomaly (3) is related with Pagar Gunung East ore deposit and their phase and PFE look like that of anomaly (2), but apparent resistivity detected here show less than 100 Ω-m. Moreover, a maximum PFE of 9.3% was observed at the depth of No. 3 of line H. In the easternmost line I, typical PFE anomaly were detected, which suggest that this anomaly may further extend and develop toward east.

1-3-4 Drilling Survey

Drilling survey consisting five holes (total drilling length:1,200 m) carried out to aim at exploration of deep and eastward extention of Pager Gunung West ore deposit. Through this survey, following results are obtained.

(1) Mineralizations found by these drilling are embedded in middle and lower beds of third Member (Alternated Member of Clastic Rock and Volcanic Rock) of

Patahajang Formation. Upper bed of the Member, consisting of andesite and andesitic pyroclastic rock has no mineralization. The middle bed consists of alternation bed of calcareous rock, shale, sandstone and phroclastic rock, while the lower bed consists of siliceous rock, felsic rock and hybrid rock, Igneous rock are andesite, dacite, quartz diorite and granodiorite, and in the deep part, quartz diorite and granodiorite dominate.

(2) Drilling survey revealed following result and confirmed deep extention of Pagar Gunung West ore deposit.

depth (m)	vd(m)	c.r.(%)	Au g/t	Ag g/t	Cu %	Pb %	Zn %
MJI-3 (deep part of Pagar Gunung Adit No. 1 and 2)							
53.70 - 54.30	0.60	50	0.1	62.0	0.14	3.44	1.29
59.40 - 60.00	0.50	92	0.1	34.0	0.29	0.90	0.85
MJI-4 (deep part of Pagar Gunung Adit No.6)							
116.50 - 125.90	9.40	79	0.1	18.2	0.35	0.61	1.05
MJI-5 (east extention of Pagar Gunung West ore diposit)							
190.40 - 192.60	2.20	95	0.1	27.7	0.28	0.17	3.73

Additionaly following mineralization shows extention of Outcrop A of Pagar Gunung East ore diposit.

depth (m)	vd(m)	c.r.(%)	Au g/t	Ag g/t	Cu %	Pb %	Zn %
MJI-5							
241.40 - 242.20	0.80		0.1	13.0	0.05	0.60	2.03

(c.r. : core recovery)

(3) Above mentioned mineralization zones of MJI-3 and MJI-4 are mainly disseminating ore containing partly brecciated massive ore in fault zone. As their core recoveries are very low, it is supposed that the assay results show somewhat low grade in comparison with real ore value. Upper minaralization zone of MJI-5 is bedded and dissemination ore of silver bearing copper-lead-zinc, while the lower mineralization zone is pyrite rich stratiform or disseminating ore diposit.

(4) Thus Pagar Gunung ore diposit can be grouped into two mineralization zones, namely No.I mineralization zone and No. II mineralization zone. The former is inferred to connect with West ore diposit (old adits), mineralization caught by MJI-3 and MJI-4 and outcrop B of East ore diposit. The latter is supposed to continue from the lower mineralization of MJI-5 to outcrop A of East ore diposit.

2. RECOMMENDATION FOR THE THIRD PHASE

Through complehensive investigation of the second phase surveys, consisting of geological, geochemical, geophysical and especially drilling survey, execution of drilling survey is recommendable for third phase program to explore deep extention of Pagar Gunung West and East ore diposit, and emplacement of ore deposit between Pagar Gunung West and East ore deposit.

REFERENCE

Geological and Geochemical Surveys

Aoki K. (1978); Petrology of Upper Mantle, Igneous Rock and its Genesis, Chikyu Kagaku (Geoscience) Vol. 3 41 - 86 (Iwanami Shoten) (in Japanese)

Aramaki S. et al (1972); Chemical Composition of Japanese Granites, Part 2 Variation Trends and Average Composition. Jour. Gel. Soc. of Japan Vol. 78, No. 1, p. 39 - 49

Aramaki S. (1978); Origin of Felsic Magma Igneous and its Genesis Chikyu Kagaku (Geoscience) Vol. 3 138 - 150 (Iwanami Shoten) (in Japanese)

Bemmelen R. W. (1970); Geology of Indonesia 2 vols. Martinus Mijinhoff The Hague (2nd ed.)

Ben-Avraham, Z. (1978); The Evolution of Marginal Basin and Adjacent Shelves in East and South Asia. Tectonophysics 45, p. 269 - 288

Cameron N. R. et al (1980); The Geological Evolution of Northern Sumatra Ninth Indonesian Petroleum Association Convention

Clark M. C. G. et al (1982); Geological Map of the Pematangsiantar Quadrangle Sumatra (1/250,000) Geological Research and Development Center, Indonesia

Clark M. C. G. & Surjono (1982); Primary Tungsten Occurrences in Sumatra and Indonesian Tin Islands Bull. Directorate of Mineral Resaurces Indonesia No. 5 bul. Vol. 1

Finaudi M.T. and Burt D.M. (1982); Introduction-Terminology, Classification and Composition of Skarn Deposits (A Special Issue Devoted to Skarn Deposits) Econ. Geol. vol. 77 No. 4, 745 - 754

Geochemical Study Group (1975); Hand Book of Geochemical Exploration (in Japanese) Mining and Metallurgical Institute of Japan

Haan W. De (1921); Herinneringen aan mijnbouwkundig exploratiewerk in het Zuiden der Residentie Tapanoeli. Geol. Mijinb. Gen., Mijinb. Serie, Vol. I 1912-1921, 229-296.

Hamilton W. (1978); Tectonic Map of the Indonesian Region United States Geological Survey

Hamilton W. (1979); Tectonics of the Indonesia Region USGS Prof. Rep. 1078

Hoskins K. F. G. (1979); Tin Distribution Patterns Geol. Soc. Malaysia, Bull Vol. 11 Dec. 1 - 70

Hutchison C.S. (1973); Tectonic Evolution of Sundaland: A Phanerozoic Synthesis Geol. Soc. Malaysia, Bulletin 6, July, p. 61 - 86

Ishihara S. (1977); The Magnetite-series and Ilmenite-series Granitic Rocks
Mining Geology 27, No. 145, p. 293 - 305

Ishihara S. et al (1979); The Magnetite-series and Ilmenite-series Granitoids and Their Bearing of Tin Mineralization Particularly of the Malay Peninsular region
Geol. Soc. Malaysia Bull. Vol. 11, Dec. 103 - 110

Ishihara S. et al (1980); Granites and Sn-W Deposits of Peninsular Thailand
Mining Geology Special Issue No.

IUGS (1973); Plutonic Rocks, Classification and Nomenclature Recommended by IUGS, Subcommission on the Systematics of Igneous Rocks
Geotimes Oct. 1973

Katili J.A. (1967); On the Occurrence of Large Transcurrent Fault in Sumatra, Indonesia
Jour. of Geoscience, Osaka City University Vol. 10 Art 1 - 1 5 - 17

Katili J.A. (1969); Permian Volcanism and its Relation to the Tectonic Development of Sumatra
Bull. Volcanologique XXXIII-2, p. 530 - 540

Katili J.A. (1970); Naplet Structure and Transcurrent Faults in Sumatra, Bull. National Institute of Geology and Mining Bandung vol. 3 no. 1 11 - 28

Katili J.A. (1973); Geochronology of West Indonesia and its Implication on Late Tectonics
Tectonopysics 19, p. 195 - 212

Katili J.A. (1973); Plate Tectonics and its Significance in the Search Mineral Deposits in Western Indonesia
CCOP Technical Bulletin Vol. 7

Katili J.A. and Hartono, H. M. S. (1979); Van Bemmelen Contributions to the Growth of Geotectonics and the Present State of Earth-Science Research in Indonesia
Geologie Mijinbouw Vol. 58 (2), p. 107 - 116

Katili J.A. (1981); Geology of South Asia with Particular Reference to the South China Sea
Bull. of the Geological Research and Development Center of Indonesia No. 4, March 1981, p. 1 - 12

Klompe H.F., Katili J.A., Johannas and Soekendar (1961); Late Paleozoic Volcanic Activity in The Sunda Land Area
Pacific Sci. Cong. 9th Bangkok 1975 Proc. v 12 204-216

Mitchell A. H. G. (1979); Rift-Subduction-and Collision-Related Tin Belts
Geol. Soc. Malaysia, Bull. Vol. 11, Dec. p. 81 - 102

OMRDC (1971); Summary Report on the Survey of Sumatra No. 5 Block (unpublished)

Page B. G. N. (1981); The Serpentinites of Northern Sumatra
Bull. Directorate of Mineral Resources Indonesia No. 3 Vol. 1 103 - 113

Prime H. N. A. et al (1975); Isotope Geochronology in the Indonesian Tin Belt
Geol. Mijinbouw 54, p. 61 - 70

Rock N. M. S., A. Djunuddin and et al (1980); Geology of the Natal Teluk Dalam (Part) Quadrangles
DMR/ICS Northern Sumatra Project (unpublished)

Rock N. M. S., Djunuddin A. and et al (1983); Geological Map of the Lubuksikaping Quadrangle, Sumatra
Geological Research and Development Center, Indonesia

Rocksalagora W. and Djumhani (1971); Metallic Mineral Deposits of Indonesia
XII Pacific Science Congress

Silitonga P. H., Kastowo (1975); Geological Map of Solok Quadrangle, Sumatra
Direktorat Geologi, Indonesia

Takahashi M. and et al (1980); Magnetite Series/Ilmenite Series vs I-Type/S-Type Granitoids
Mining Geology Special Issue No. 8

Taylor D. and Hutchison C. C. (1978); Pattern of Mineralization in South Asia. Their Relationship to Broad Scale Geological Features and the Relevance of Plate Tectonics Concepts to their Understanding.
Eleventh Commonwealth Mining and Metallurgical Congress

Tsusue A. and Ishihara, S. (1974); The Iron-Titanium Oxide in the Granitic Rocks of Southwest Japan
Mining Geology, Vol. 24, p. 13 - 30

Geophysical Survey

J.S. Summer (1976); Principles of Induced Polarization for Geophysical Exploration

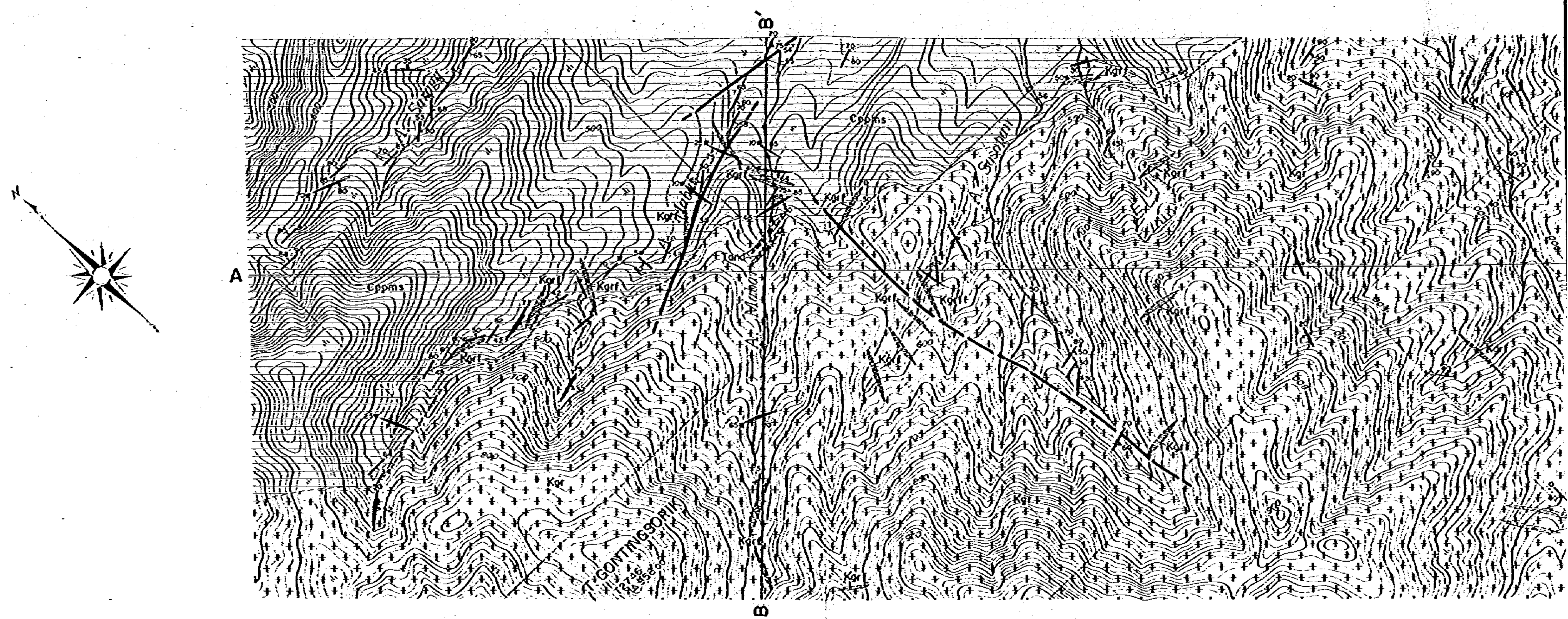
Kaku H. (1966); On the Coupling Effect in the Induced Poralization Method
Butsuri Tanko, 19 (405)

Wait J. R. (1958); Discussions on a Theoretical Study of Induced Electrical Polarization, Geophysics, 23

Hallof P. C. (1964, 1967); A Comparison of the Various Parameter Employed in the Variable Frequency Induced Polarization Method

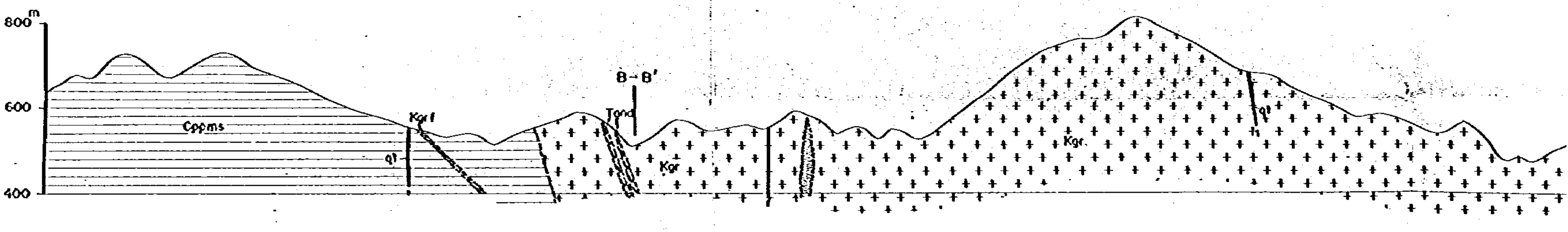
Pelton W.H., Ward S.H., Hallof P.G., Sill W.R. and Nelson P.H. (1977); Mineral Discrimination and Removal of Induced Coupling with Multi-frequency IP, Metal Mining Agency of Japan, 1980 - 1982
Report on Research and Development Survey for Mineral Resources - Spectral IP

E. Ruswandi, et al (1981); Report of IP, SP and Magnetic survey in Pagar Gunung area.



PROFILE

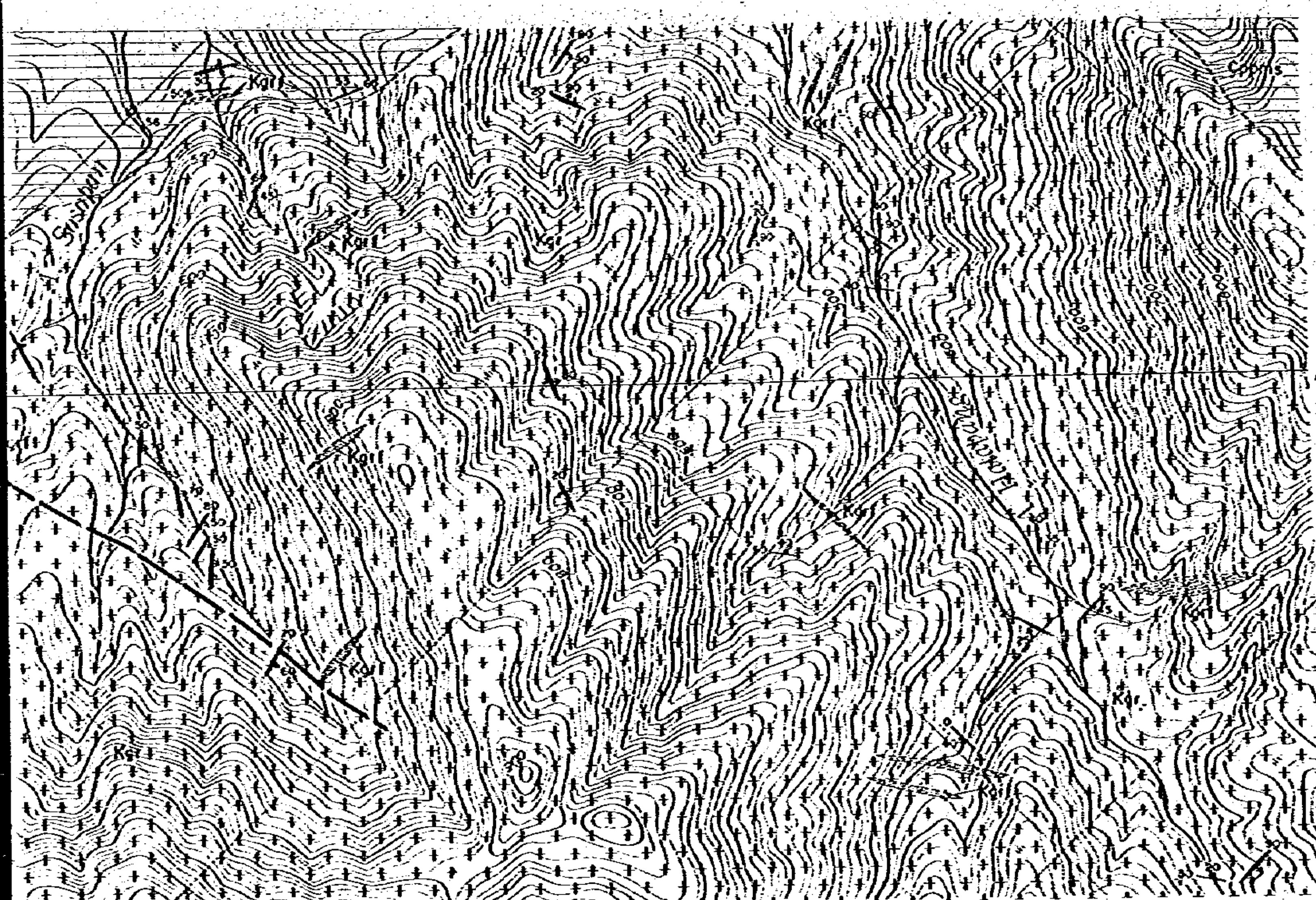
A — A'



LEGEND

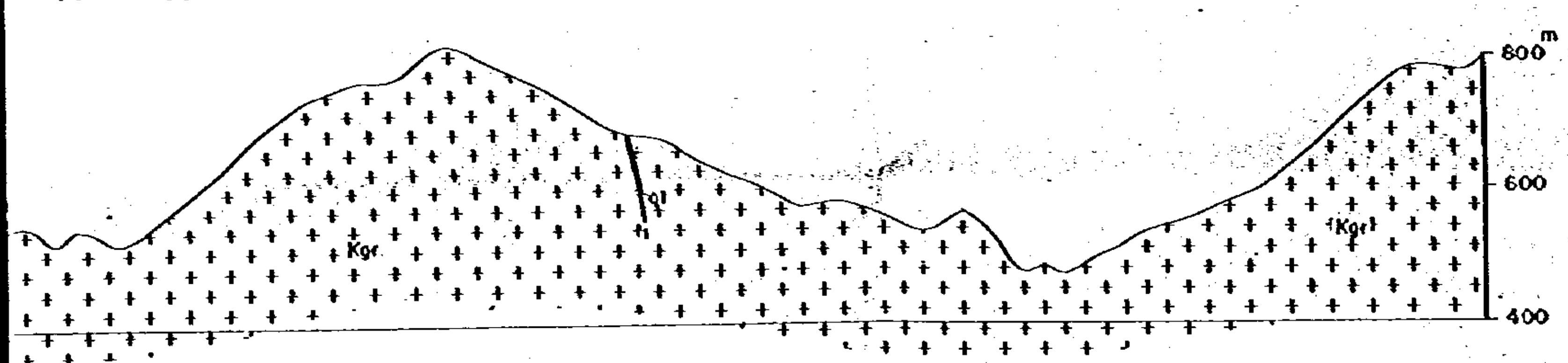
Geological Age	Geological Unit	Sedimentary Rock	Igneous

B — B'



PROFILE

A — A'



LEGEND

PL. II-1-1

METAL MINING AGENCY OF JAPAN

JAPAN INTERNATIONAL COOPERATION AGENCY

—

DIRECTORATE OF MINERAL RESOURCES

DIRECTORATE GENERAL OF MINES

MINISTRY OF MINES AND ENERGY

REPUBLIC OF INDONESIA

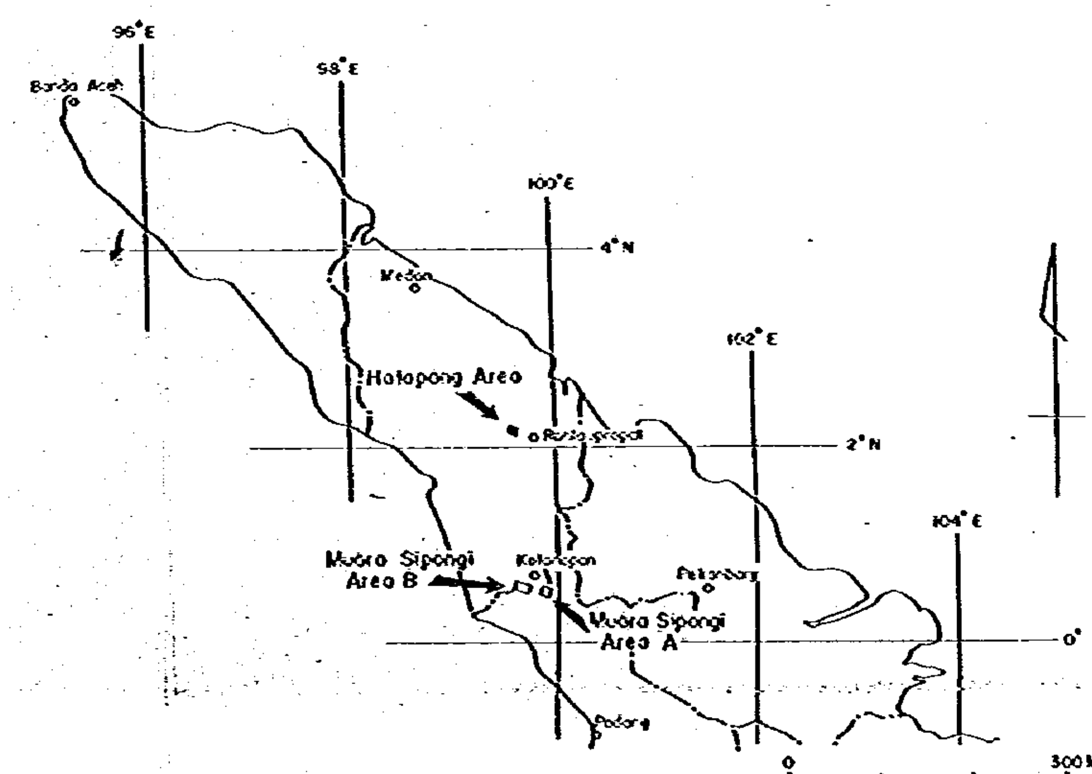
MINERAL EXPLORATION IN NORTHERN SUMATRA

REPUBLIC OF INDONESIA

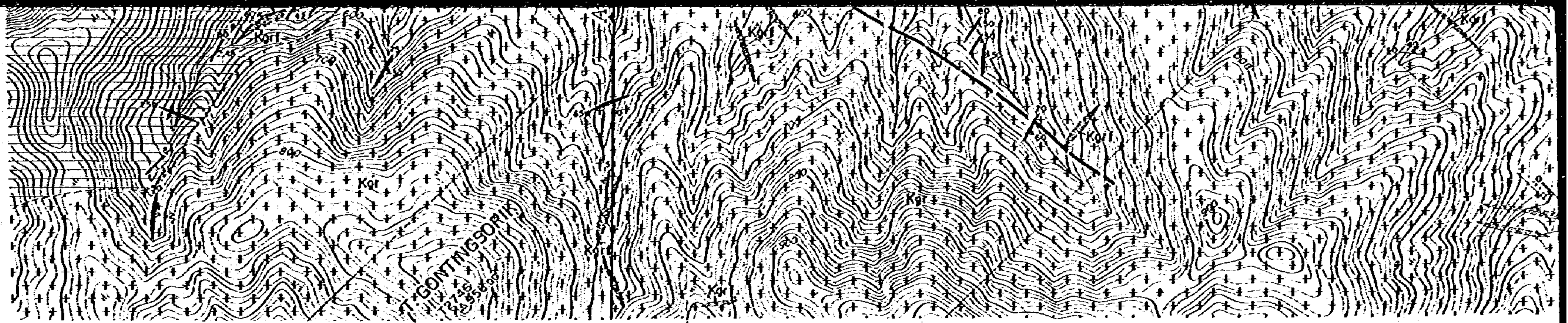
GEOLOGICAL MAP AND GEOLOGICAL PROFILE OF HATAPANG AREA

Scale 1:10,000

0 100 200 300 400 500m

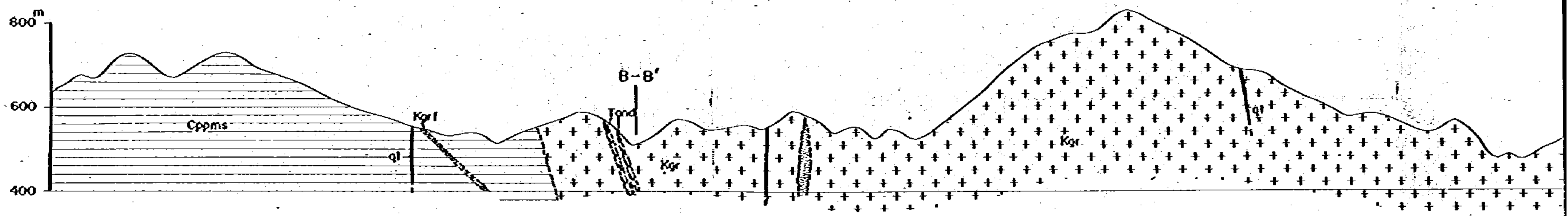


February 1984

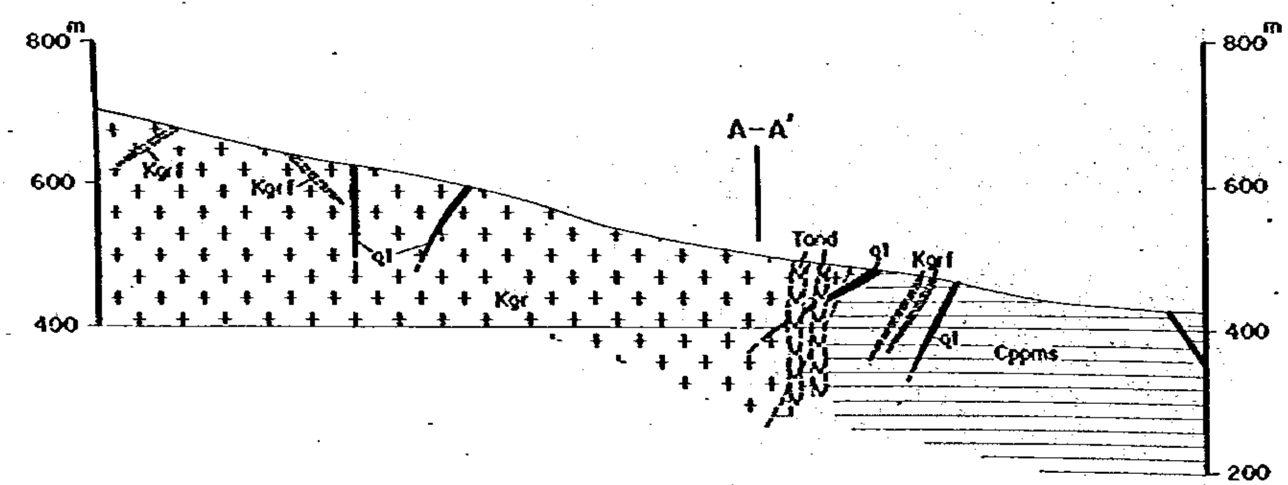


PROFILE

A — A'



B — B'



LEGEND

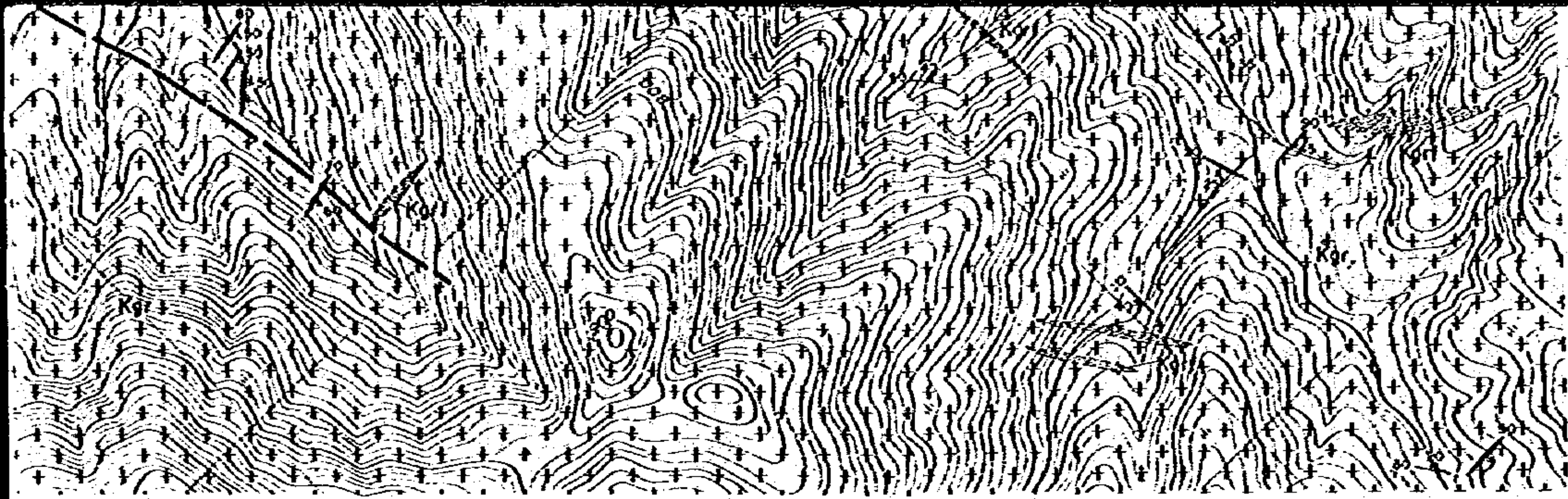
Geological Age		Geological Unit	Sedimentary Rock	Igneous R
CENOZOIC	QUATERNARY		al Alluvium	
	TERTIARY			Tand And
MESOZOIC	CRETACEOUS			Kgrf Ho (Fi Kgr Ho (Cc
PALEOZOIC	PERM.~CARB.		Cppms Pebble Mudstone (Hornfels)	

Dip and strike

Joint

Quartz veine (qt)

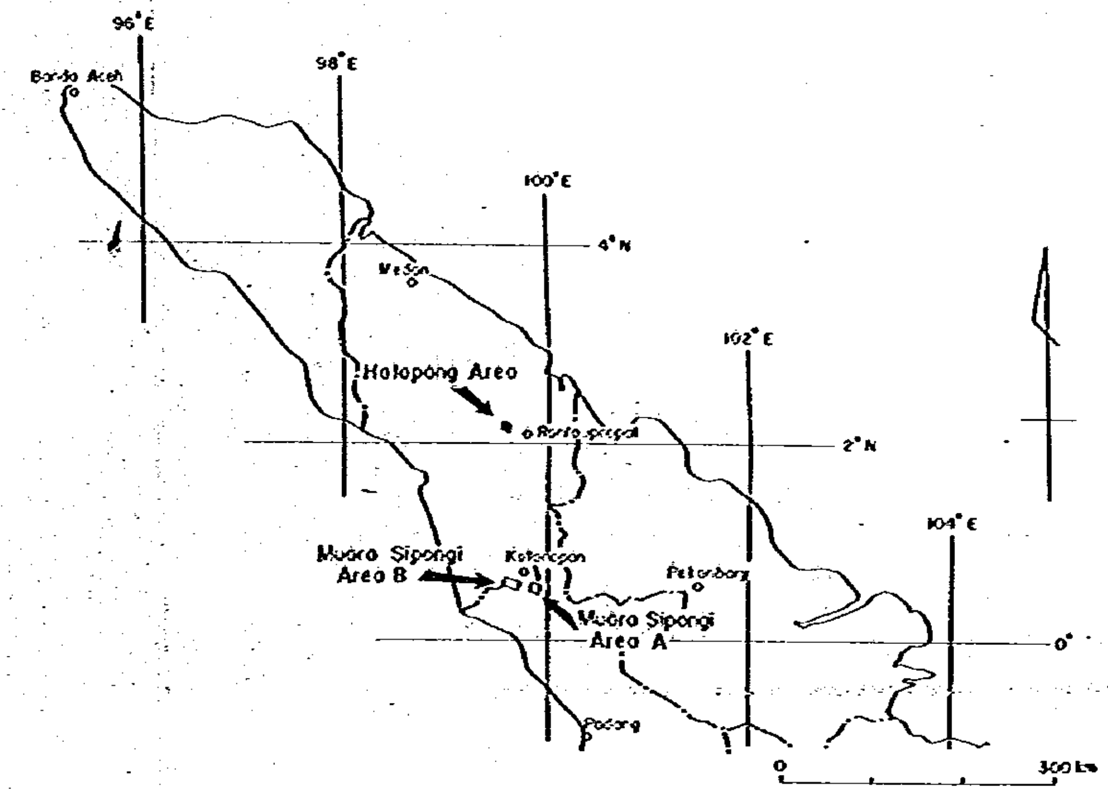
Fault confirmed



GEOLOGICAL MAP AND GEOLOGICAL PROFILE OF HATAPANG AREA

Scale 1:10,000

0 100 200 300 400 500 m



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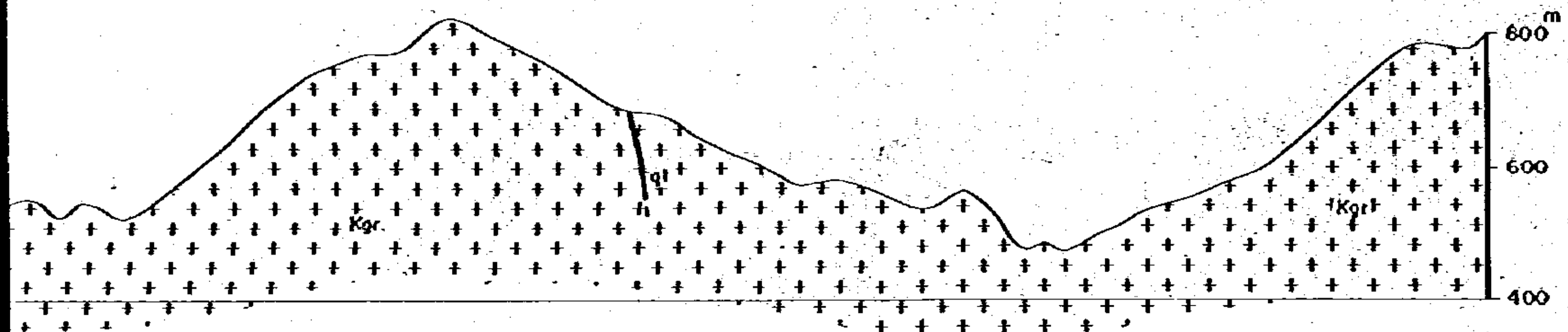
PROFILE A — A'



LEGEND

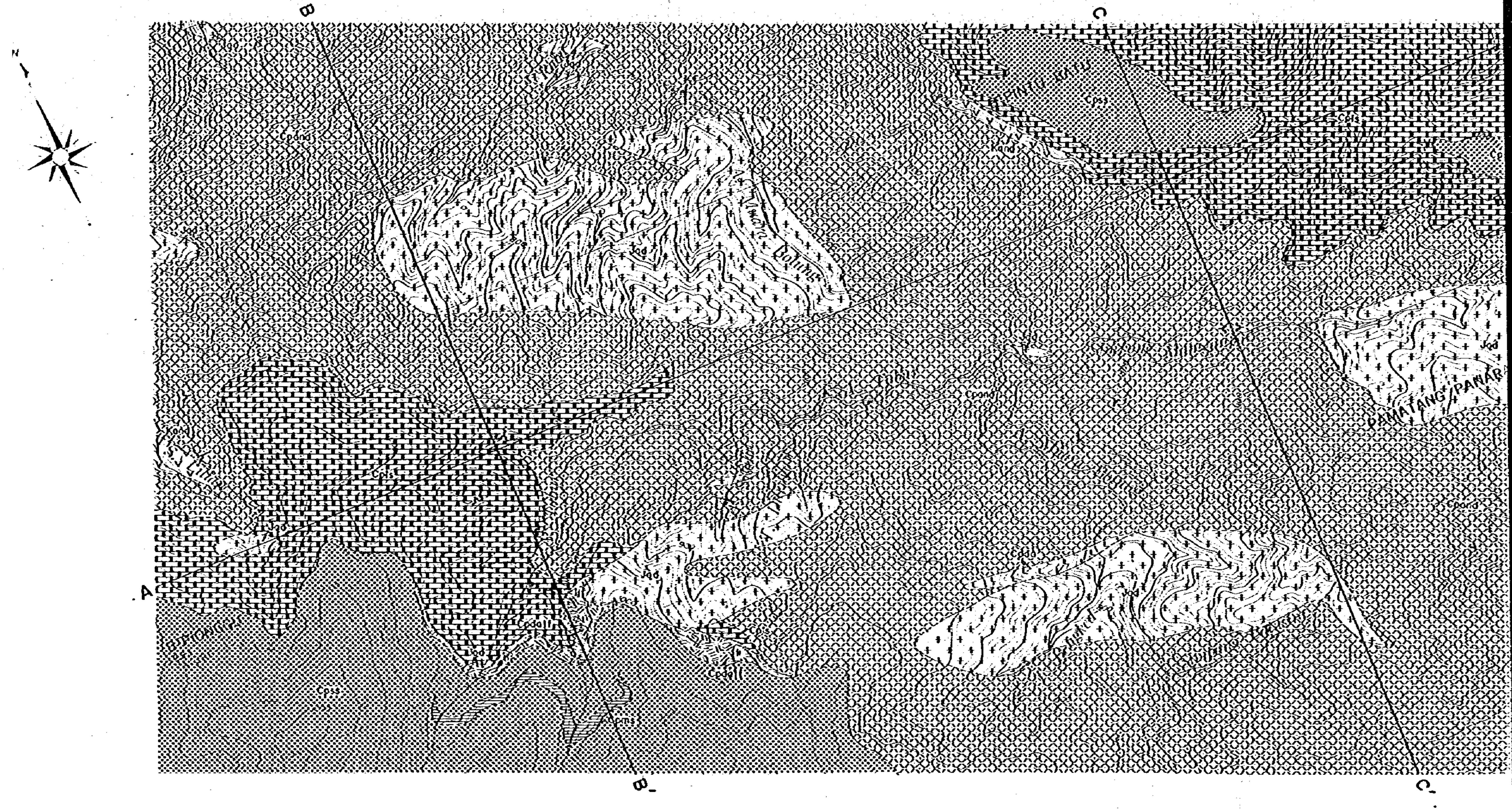
Geological Age		Geological Unit	Sedimentary Rock	Igneous Rock
CENOZOIC	QUATERNARY		qt Alluvium	
CENOZOIC	TERTIARY			Tand Andesite dyke
MESOZOIC	CRETACEOUS			Kgr1 Hatapang Granite (Fine grain) Kgr Hatapang Granite (Coarse grain)
PALEOZOIC	PERM-CARB.		Cppm Pebble Mudstone (Hornfels)	

Dip and strike

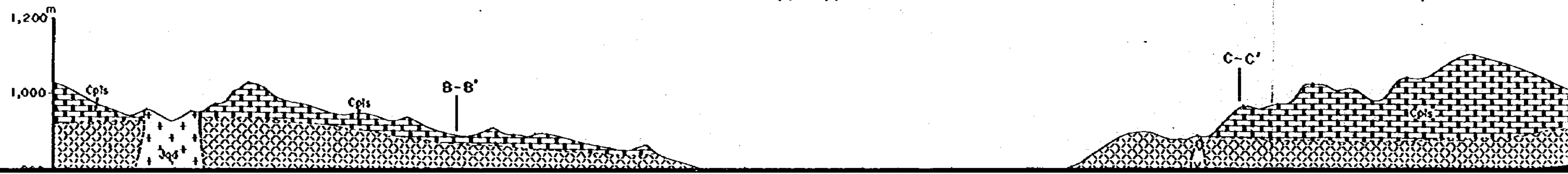
Joint

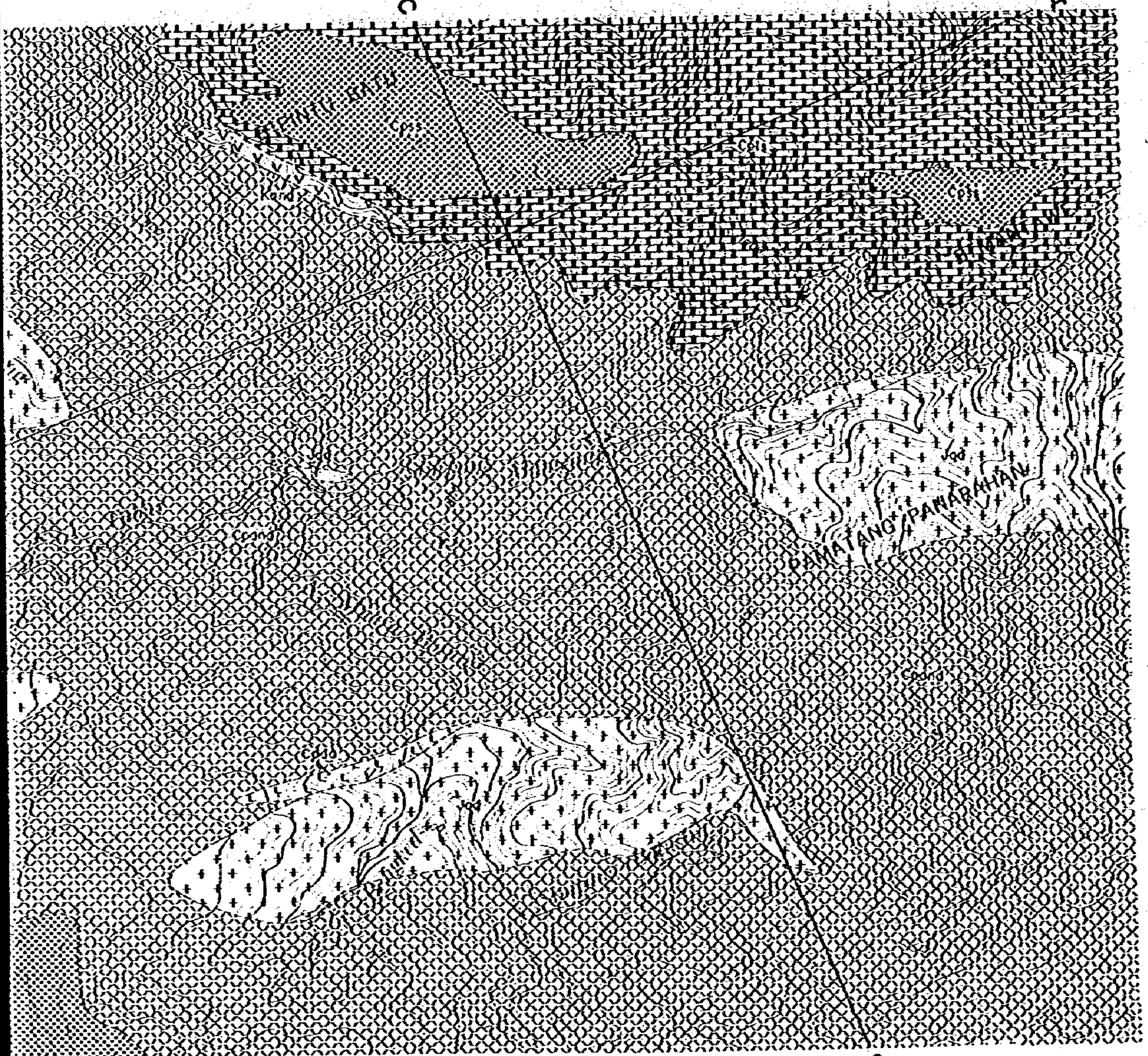
Quartz veine (qt)

Fault confirmed


B
C
A
B'
C'
PAMATANG
Jqd
Cpls
Cpss

PROFILE
A – A'


1,200m
1,000
Cpls
Cpls
B-B'
C-C'
Cpls
Jqd



PL.II-2-1

METAL MINING AGENCY OF JAPAN
JAPAN INTERNATIONAL COOPERATION AGENCY

—

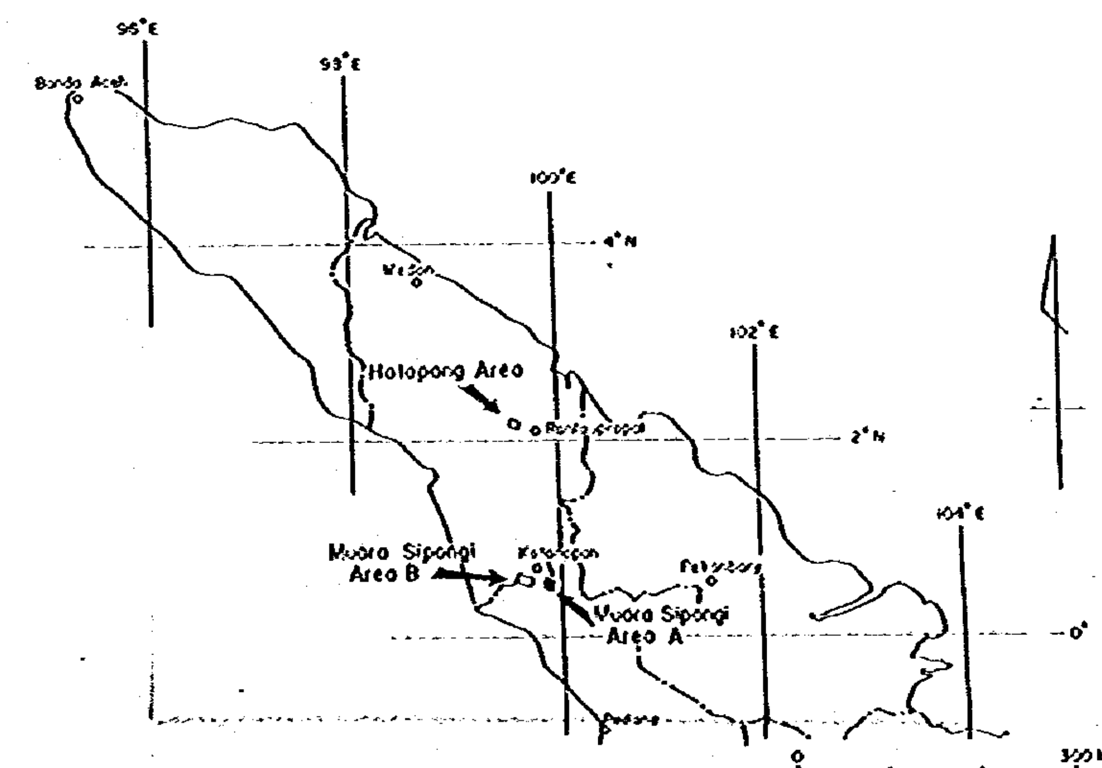
DIRECTORATE OF MINERAL RESOURCES
DIRECTORATE GENERAL OF MINES
MINISTRY OF MINES AND ENERGY
REPUBLIC OF INDONESIA

MINERAL EXPLORATION IN NORTHERN SUMATRA
REPUBLIC OF INDONESIA

GEOLOGICAL MAP AND GEOLOGICAL PROFILE OF MUARA SIPONGI AREA A

Scale 1:10,000

0 100 200 300 400 500m



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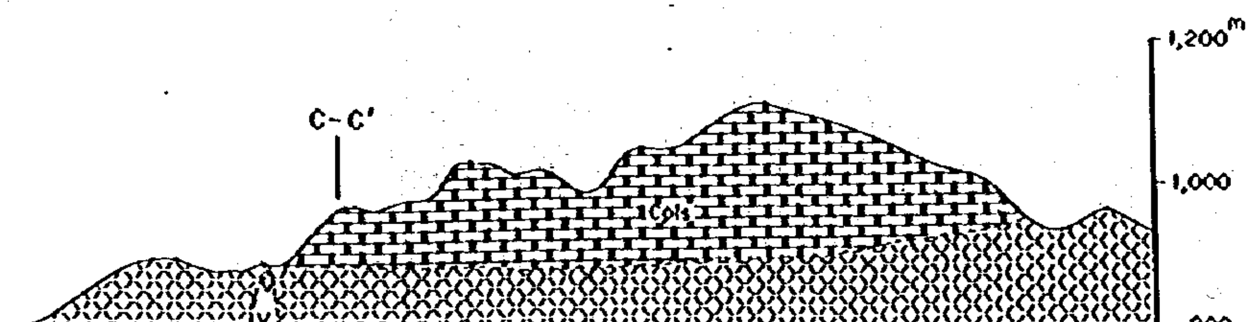
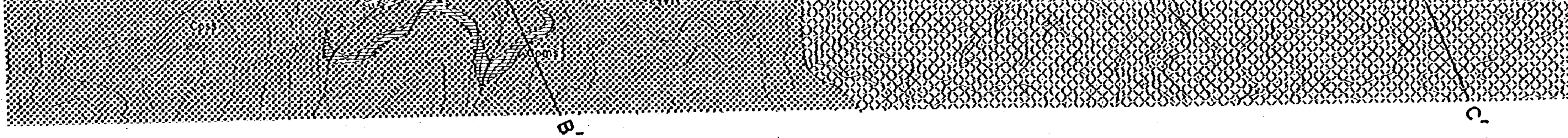
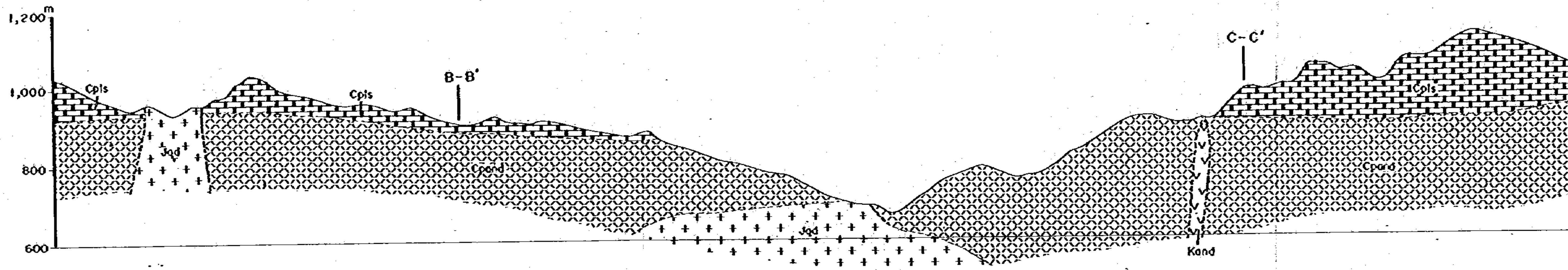
OFILE
– A′





PROFILE

A – A'

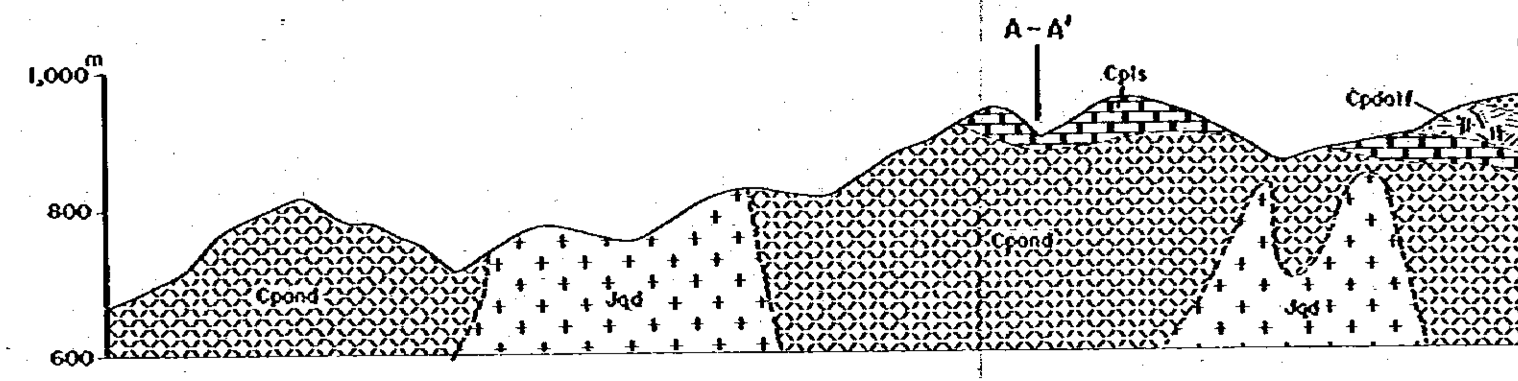


LEGEND

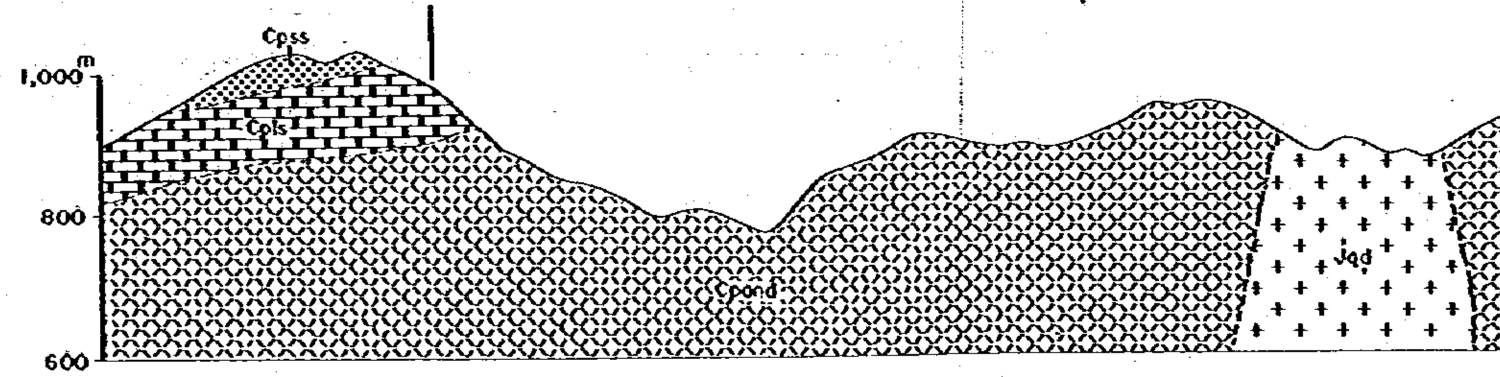
Geological Age		Geological Unit	Sedimentary & Volcanic rocks	Intrusive and dyke rocks
CENOZOIC	Quaternary			
CENOZOIC	Tertiary			
MESOZOIC	Jurassic ~ Cretaceous			Kond Andesite Jqd Quartz Diorite (Muara Sipongi)
PALEOZOIC	Permian ~ Carboniferous	Palahajong Formation	Cpdatf Dacitic tuff Cpss Sandstone Cpms Mudstone Cpls Limestone	Cpda Dacite
PALEOZOIC	Permian ~ Carboniferous	Muara Batung Formation	Cpand Andesite	

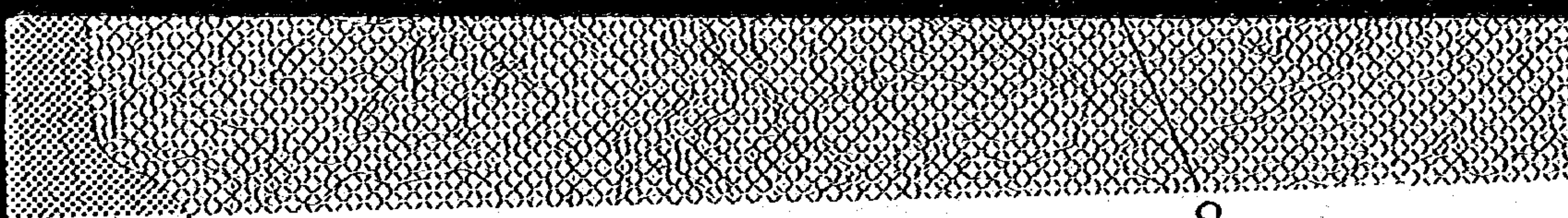
Quart vein   Old adit

B – B'

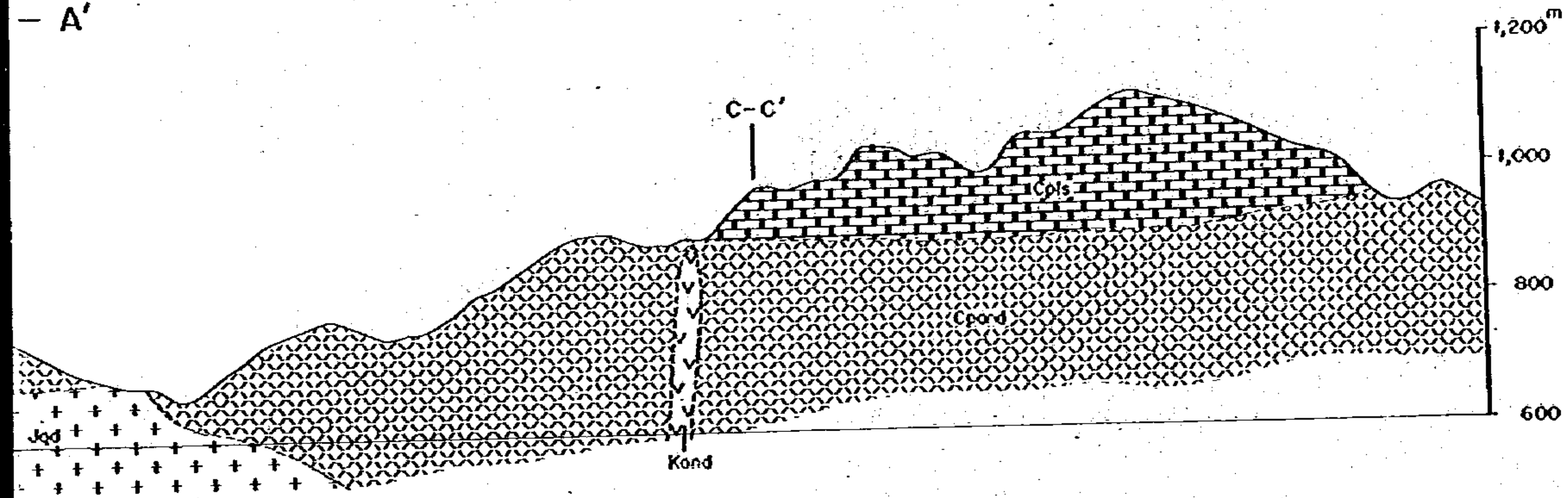


C – C'

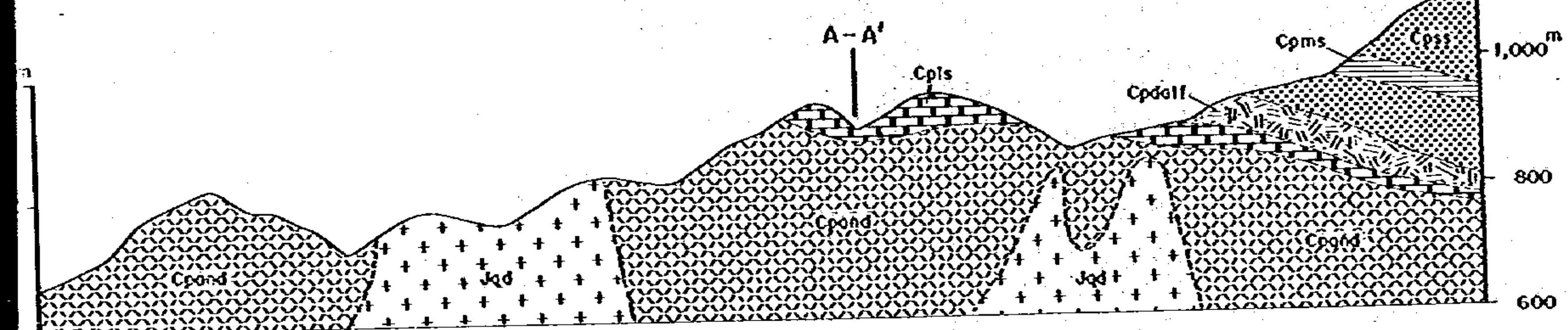




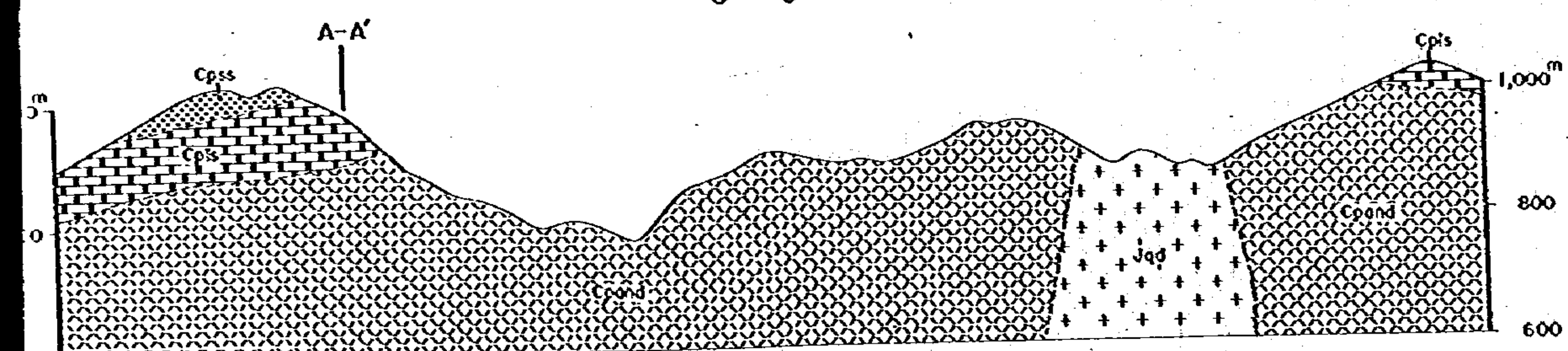
)FILE
– A'

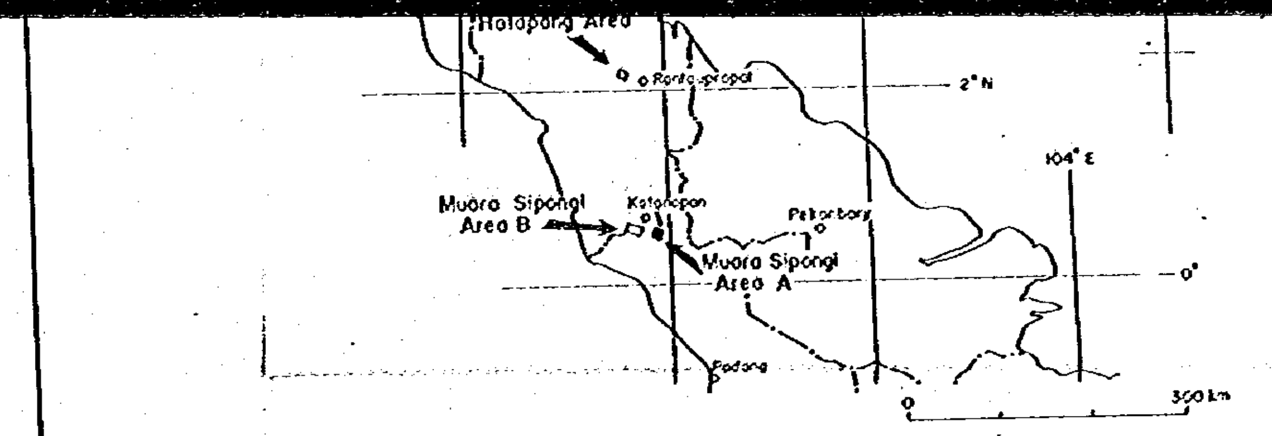


B – B'



C – C'





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