granities using molded samples (6 cm x 4 cm x 2 cm), it was found to be $9-30 \times 10^{-3}$ SI and from this figure, they are classified as magnetite-series granite. With the $FeO/Fe_2O_3/TiO_2$ (mol %) ratio, they are plotted in a similar range to that for the Japanese magnetite-series granite (Tsusue, Ishitara, 1974).

1-6-2 Bt Ruruk Raru Granite

At Bt Ruruk Raru in the upper reaches of the Ranya River and Kanal River, northeast of the survey area, small intrusions of porphyritic biotite hornblende granioids are found in S. Ranya Formation. The component minerals are quartz, plagioclase, potassium feldspar and hornblende accompanied by some biotite and small amount of apatite and from the component minerals and its porphyritic appearance, the granitoid is similar to the granite accompanied by tin mineralized zone in Indonesia. On a triangular diagram of the normative minerals quartz, plagioclase and potassium feldspar based on chamical analysis, it is plotted in the range of the granite (adamellite); for this reason, it is considered to belong to the Cretaceous Hatapang granite group which is situated at the western margin of the tin mineralized zone rather than the Muara Sipongi granitioids.

1-6-3 Quartz Porphyry

Quartz porphyry dikes having plagioclase phenocrysts are distributed at Bt Dulang, east of Lumau Manis. The dikes distributed in the upper reaches of the Cubadak river (Lumau Manis village) exhibit a strike and dip of N 20° E 90°.

Table III-2 Chemical Composition of Muara Sipongi Granitoids

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
	Sample No.	AR-51	AR-55	AR-77	AR-100	BR-185	BR-192	BR-213	DR-84	ED-2	ED-3	ER-222	ER-233	ER-237	ER-208	FR-226	FR-229	FR-237	FR-243	FR-248	AR-105
		Pinyoget	S.Maliti	A.Si Bubungan	A.Cubadak	Simpang Tinggo	S.Nangaton	Tandjung Alai	Tolang	A.Tabur	S.Mangampo	Tobang	A.Simpong Kamar	Kota Tinggi	A.Si Ambok	A.Barlan	A.Simpang	A.Si Aju	B.Pungkut	A.Kaya	A.Mago
	Rock Name	Gr-dio	Gr-dio	Gr-dio	Gr-dio	Qz-dio	Qz-dio	Gr-dio	Gr-dio	Qz-dio	Qz-dio	Gr-dio	Gr-dio	Gr-dio	Gr-dio	Gr-dio	Gr-dio	Qz-dio	Dio	Gr-dio	Granite
Chemical Composition	SiO_2	55.94	60.26	58.56	65.55	58.01	53.22	64.65	70.17	47.61	56.61	58.21	62.58	63.53	70.62	62.80	62.10	50.50	43.39	67.92	66.19
	Al_2O_3	17.36	16.58	17.10	15.36	15.79	18.00	15.39	15.7	17.98	18.20	17.03	15.70	15.91	16.37	15.91	16.29	19.21	17.11	15.26	15.01
	CaO	7.06	6.23	6.51	3.80	10.45	8.60	4.51	3.03	10.35	7.21	6.80	5.10	5.10	3.15	5.00	4.52	9.43	13.97	2.32	3.13
	MgO	3.91	3.32	2.93	1.89	2.26	4.64	2.43	0.76	6.82	3.38	3.62	2.59	2.62	0.57	2.41	2.65	4.88	8.01	1.00	1.39
	Na_2O	2.91	2.95	3.69	3.81	0.31	2.50	3.28	4.23	2.46	3.64	3.03	3.84	3.19	4.50	3.56	3.82	3.26	1.60	3.34	2.65
	K_2O	1.48	1.72	1.41	2.43	0.80	1.19	2.47	2.90	0.58	0.73	1.56	2.33	2.21	1.39	2.05	1.82	0.77	0.07	2.55	4.02
	Fe_2O_3	2.80	2.27	3.78	1.82	4.98	2.74	2.06	1.30	4.06	4.17	2.63	2.71	2.22	1.13	2.17	2.48	4.15	1.57	0.90	0.99
	FeO	4.32	3.89	3.10	2.66	1.58	5.69	2.81	1.15	5.76	3.53	4.25	2.66	3.02	0.72	3.24	3.10	4.75	6.55	2.16	3.89
	MnO	0.18	0.13	0.12	0.09	0.43	0.17	0.10	0.06	0.17	0.16	0.14	0.11	0.11	0.05	0.11	0.11	0.16	0.15	0.06	0.10
	TiO_2	0.61	0.61	0.52	0.43	0.64	0.73	0.56	0.33	0.60	0.64	0.70	0.58	0.56	0.19	0.60	0.58	0.60	0.21	0.41	0.74
	P_2O_5	0.13	0.11	0.09	0.07	0.12	0.15	0.09	0.05	0.10	0.16	0.15	0.10	0.10	0.03	0.12	0.10	0.13	0.04	0.09	0.19
	Ba 0%	0.05	0.06	0.07	0.07	0.02	0.04	0.07	0.08	0.03	0.05	0.05	0.06	0.05	0.08	0.07	0.05	0.03	0.02	0.04	0.11
	LOI	2.98	1.94	2.24	1.81	4.74	2.22	1.84	0.73	3.09	1.90	2.26	1.97	1.56	1.45	1.85	2.42	2.32	3.02	3.83	1.66
	Total	99.73	100.07	100.12	99.79	100.13	99.89	100.26	100.46	99.61	100.38	100.43	100.33	100.18	100.25	99.89	100.04	100.19	95.71	99.88	100.07
	F ppm	150	210	260	340	380	230	340	280	100	150	270	260	310	280	410	320	120	70	300	640
	Cl ppm	200	100	200	100	100	100	400	100	200	100	200	100	700	100	700	200	300	<200	<400	300
C.I.P.W. Norm	q	11.44	17.20	14.02	22.22	29.06	7.48	22.26	26.73	0	12.36	13.90	17.26	21.07	31.56	19.33	18.27	1.65	0	31.33	24.75
	or	8.75	10.17	8.33	14.36	4.73	7.03	14.60	17.14	3.43	4.31	9.22	13.77	13.06	8.21	12.12	10.76	4.55	0.41	15.07	23.76
	ab	24.61	24.95	31.21	32.22	2.62	21.14	27.74	35.77	20.80	30.78	25.62	32.47	26.98	38.06	30.11	32.30	27.57	13.53	28.25	22.41
	an	29.94	26.92	25.94	17.64	39.33	31.38	19.98	14.70	36.31	31.17	28.27	18.73	22.57	15.47	21.38	21.77	35.52	39.30	10.92	14.29
	c	0	0	0	0	0	0	0	0.19	0	0	0	0	0	1.81	0	0.06	0	0	3.00	1.06
	di	3.43	2.65	4.6	0.61	9.47	5.95	1.46	0	11.56	2.83	3.64	4.73	1.68	0	2.14	0	8.37	24.11	0	0
	hy	13.02	11.48	7.04	7.24	3.69	15.94	8.07	3.09	14.99	9.34	11.98	6.08	8.70	2.03	8.33	11.56	12.73	10.32	5.93	9.84
	mag	4.06	3.29	5.48	2.64	4.64	3.97	2.99	1.88	5.88	6.04	3.81	3.93	3.22	1.64	3.15	3.59	6.01	2.28	1.30	1.43
	il	1.16	1.16	0.99	0.82	1.22	1.39	1.06	0.63	1.14	1.22	1.33	1.10	1.06	0.36	1.14	1.10	1.14	0.40	0.78	1.41
	ap	0.31	0.26	0.21	0.17	0.28	0.36	0.21	0.12	0.24	0.38	0.36	0.24	0.24	0.07	0.28	0.24	0.31	0.09	0.21	0.45
	ol	0	0	0	0	0	0	0	0	2.15	0	0	0	0	0	0	0	0	6.23	0	0
	hm	0	0	0	0	1.78	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Total	96.72	98.08	97.82	97.92	96.82	97.64	98.37	100.25	96.50	98.43	98.13	98.31	98.58	99.17	97.98	99.65	97.85	96.67	96.79	99.40
	Q+Or+ab	44.80	52.32	53.56	68.80	36.41	35.65	64.60	79.64	24.23	47.45	48.74	63.50	61.11	77.83	61.56	61.33	33.77	13.94	74.65	70.92
	D.I.	46.31	53.34	54.75	70.26	37.61	36.51	65.67	79.44	25.11	48.21	49.67	64.59	61.99	78.48	62.83	61.55	34.51	14.42	77.13	71.35
	Group age (Ma)							142±7			166±20					182±7					

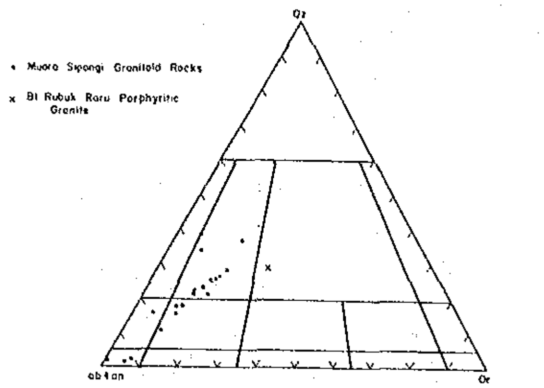


Fig. III-2 Normative Quartz-Plagioclase-Orthoclase Diagram for Muara Sipongi Granitoids

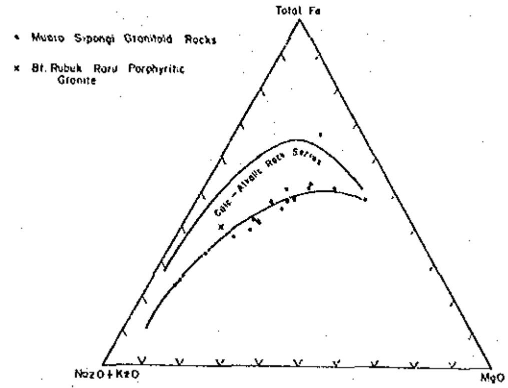


Fig. III-3 F-M-A Diagram for Muara Sipongi Granitoids

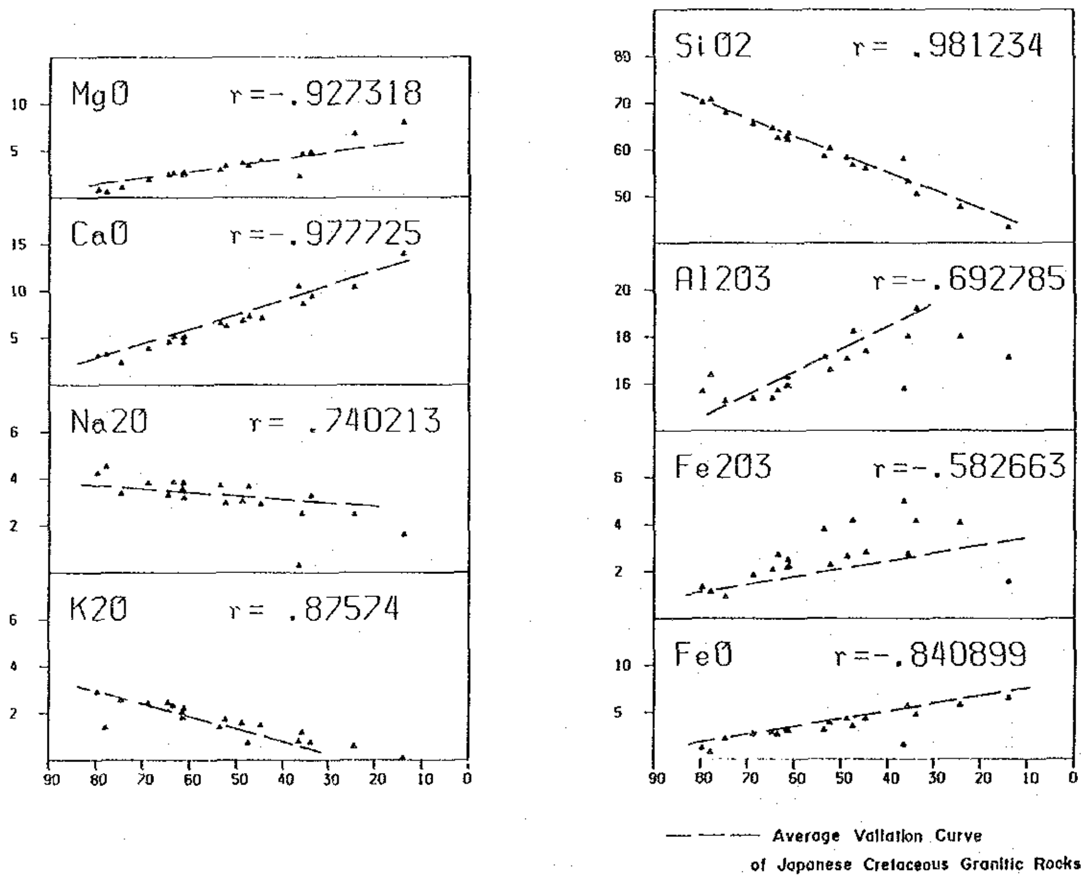


Fig. III-4 Variation Diagram of Muara Sipongi Granitoids

CHAPTER 2 GEOLOGICAL STRUCTURE

The tectonic factor which greatly controls the distribution of the individual geological units such as sedimentary rocks consisting of S. Ranya Formation, Bt Tanjang Formation and Patahajang Formation, M Botung meta-andesite Formation and Muara Sipongi granitoids distributed in the survey area is WNW – SWE directionality. This is also the direction of granitoids intrusion, large faults, folding axes and mineralization and alteration zones, and this structure is also related to the formation of fissure embedded ore deposit.

The S. Ranya formation strikes N 10° – 70° W and dips NE or SW and therefore, an anticlinal structure with NW axis is estimated.

Bt Tanjang limestone accompanying the M. Botung metaandesite has a slight WNW-ESE anticlinal structure in the neighborhood of the Subunsubun ore deposit.

The Patahajang formation distributed along the Batas-Lumau Manis road along the Cubadak River has some small WNW folds which seem to be drag folds of synclinal structure, and the same strata in the Patahajang area also has the synclinal structure with WNW-ESE axis.

The Tertiary dacitic tuff has small folds but it is a monoclinal structure gradually dipping toward the south.

Muara Sipongi granitoids and the quartz diorite and diorite stock distributed in parallel with them are extended or arranged in a WNW-ESE direction and the intrusion is along the main geological structure of this area. As the WNW-ESE faults estimated to be distributed in this area, a fault passing Pagar Gunung – Simpang Pining and a fault passing Bt Piluban are available, and the former is clear in topographical characteristic and is considered to be a branch fault of the Sumatra transcurrent fault (katili 1967, 1970).

If the geological structure of this area is summarized on the basis of these facts, the WNW-ESE directionality is the main geological structure direction of this area and the intrusion and synclinal structure of the Muara Sipongi granites are controlled by this main geological structure It is considered that the formation of fissures embedding ore deposits (NNW-SSE system of Bt Pionggn and Subun-Subun) is attributable to the intrusion of the granitoid controlled by the structural direction. Since the WNW-ESE structure is also seen in the Tertiary dacitic tuff, it seems to have continued after the sedimentation of the Tertiary pyroclastic rock.

CHAPTER 3 MINERALIZATION

3-1 OUTLINE

Muara Sipongi Area has Subun-Subun mineralized zone, Bt Pionggu mineralized zone and Pagar Gunung mineralized zone as once prospected, and Skarn zone and mineralization alteration areas such as Si Ayu and Patahajang are known.

These mineralization areas and mineralization alteration are roughly divided into the following 2 zones.

(1) Subun-Subun Mineralized Zone – Bt Pionggu Mineralized Zone – Si Ayu Skarn Zone
(gold-chalocopyrite-magnetite deposits)

(2) Pagar Gunung Mineralized Zone – Patahajang Alteration Zone
(silver, lead, zine mineralization – pyrite mineralization)

3-2 SubunSubun – Bt Pinggu Mineralized Zones – Si Ayu Skarn Zone

Both SubunSubun mineralized zone and Bt Pionggu mineralized zone are embedded in the Muara Botung meta-andesite and the Bt Tanjung limestone. The mineralized zones confirmed by the survey are listed in Table III-3 and Fig. III-5, 6, 7. Both are fissure filling chalcopyrite vein deposits containing gold, and the mineralized zone embedded in Bt Tanjung limestone becomes skarn type deposit often accompanied by clinopyroxene, garnet and magnetite. From the skarn collected in the Pit D of the Bt Pionggu deposit detailed surveyed during the second phase, clinopyroxene $Di_{85.5}$; $Hd_{13.5}$: $Jo_{1.0}$ and garnet $Gr_{86.5 \sim 69.0}$: $Ad_{13.5 \sim 31}$ were detected by the X-ray micro-analyzer. These skarn minerals are generally distributed in the copper and magnetite deposits (Finaudi 1982).

In the Punkut River, 3 km west of the bt Pionggu deposit and its tributary Si Ayu River, skarn zones accompanied by garnet and some clinopyroxene and magnetite are recognized at the contact *with the Muara Sipongi granitoids.*

In the Bt Pionggu and subun-subun mineralizations, there is a stock of quartz diorite, a member of the Muara Sipongi granioid group, and as shown in Fig. III-5, these mineralized zones seem to be vein type and skarn type deposits mineralized by the intrusion of the Muara Sipongi quartz diorite.

3-3 Pagar Gunung – Patahajang Mineralized Zones

Pagar Gunnung mineralized zone is skarn type deposit which selectively replaced and embedded the sedimentary rock of the Patahajang Formation and calcareous rock of the pyroclastic rock member and consists of silver lead zine deposits and banded pyrite deposit. Its gold grade is low and it is quite different from the Subun-Subun – Bt Pionggn mineralizaed zone. For this mineralization zone further boring survey was conducted and the detail will be described later.

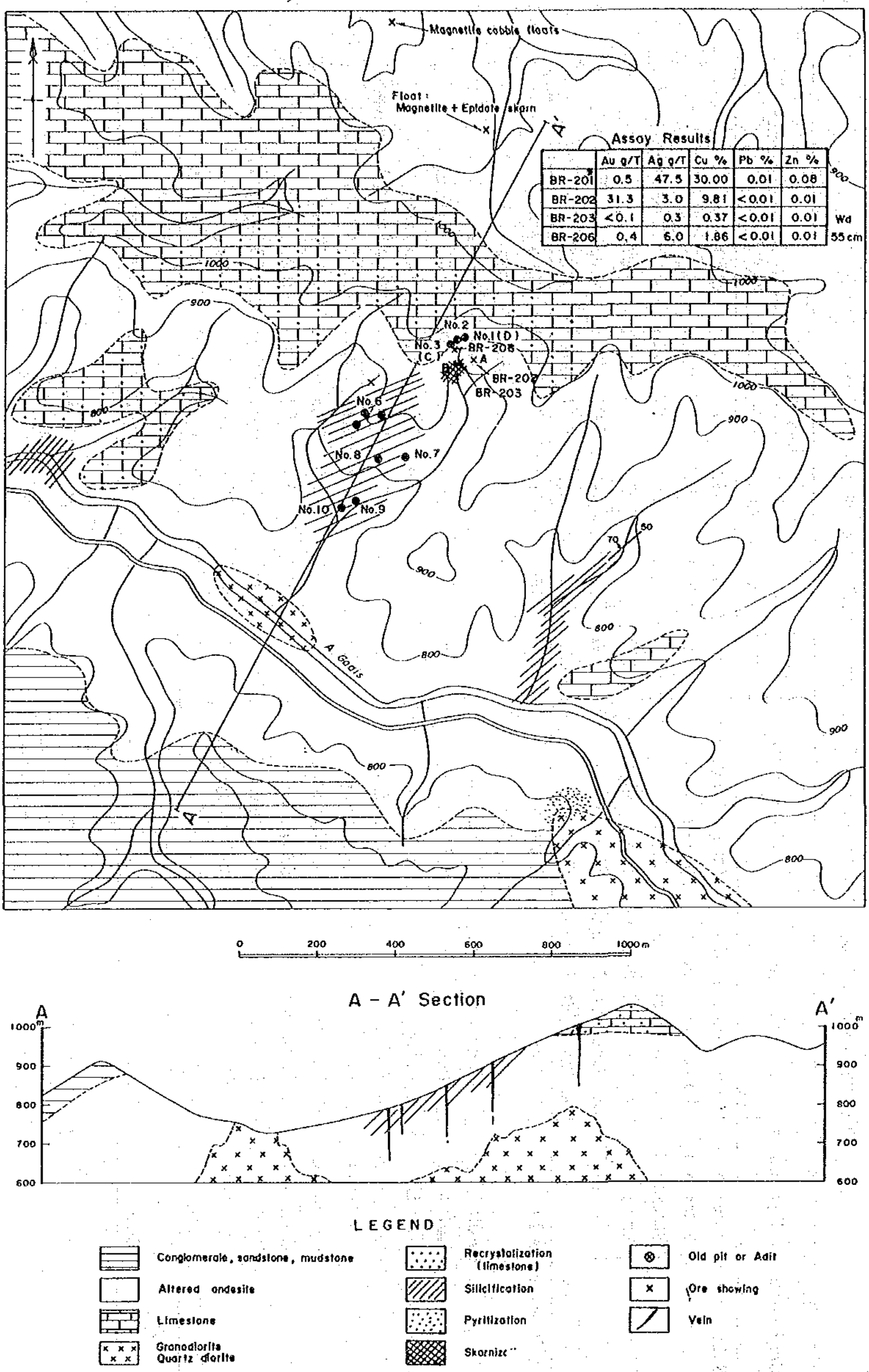
Table III-3 Chemical Assay Result of Ores of Subunsubun-Bt.Pionggu and SiAyu Mineralization Areas

Ore Deposit	Adit/outcrop	Location	Mode of Ore	Width (cm)	Element					Remarks
					Au g/t	Ag g/t	Cu %	Pb %	Zn %	
Subunsubon	Outcrop A	Top of subunsubun	Chalcopyride ore	Chip	31.3	3.0	9.81	<0.01	0.01	
	Outcrop B	Top of subunsubun	Magnetite	Chip	<0.1	0.3	0.37	<0.01	0.01	
	Outcrop C	Top of subunsubun	Skarn	Chip	0.4	6.0	1.87	0.01	0.01	mag, hema
	Adit C	A. Tabur (Bt. Pionggu)	Green copper	200	0.5	5.5	0.17	<0.01	0.01	
		A. Tabur (Bt. Pionggu)	Skarn vein	10	0.1	4.8	0.01	<0.01	0.01	
		A. Tabur (Bt. Pionggu)	Skarn	boulder	2.7	2.7	0.11	<0.01	0.01	
Bt. Pionggu	Adit G	A. Tabur	Boulder		11.3	148.1	11.20	<0.01	0.04	mal
		A. Tabur	Boulder		10.5	44.6	4.68	<0.01	0.06	mal
	Adit I	A. Simpang Manganpo	Quartz vein	10	<0.1	1.4	0.21	<0.01	0.02	
	Adit K	A. Benkel	Silicification	10	1.4	14.4	2.48	0.01	0.01	mal, azu
	Adit L	A. Lilian	Boulder		2.7	16.4	2.56	0.01	0.05	mal
	Outcrop A	A. Silelet	Quartz vein	25	0.1	2.1	0.09	0.11	0.04	py, gal, sph (cp)
	Outcrop B	A. Durigan	Quartz vein	20	3.6	2.1	0.11	0.01	0.01	
	Outcrop C	A. Botung	Silicification		0.6	20.6	2.15	<0.01	0.02	mal
	Outcrop D	A. Tumbalang	Silicification		<0.1	0.7	0.02	<0.01	0.01	
	Boulder	A. Botung	Waste ore		0.1	3.4	6.41	<0.01	0.02	cov, mal
	(Adit A)	A. Tabur	Massive pyrite ore	50	35.4	19.4	0.04	0.01	0.03	
	(Adit B)	A. Tabur	Massive ore	12	1.2	13.9	0.38	0.13	15.30	sph, py
Si Ayu	Outcrop	A. Sindungung	Skarn		0.4	1.6	0.35	0.01	0.31	mag
	Outcrop	A. Punkut	Skarn		0.2	1.2	0.02	0.02	0.04	mag

cp: chalcopyrite
gal: galena
sph: sphalerite

py: pyrite
cov: covelline
mal: malachite

azu: azurite
mag: magnetite
hema: hematite



Assay Results

	Au g/T	Ag g/T	Cu %	Pb %	Zn %
BR-201*	0.5	47.5	30.00	0.01	0.08
BR-202	31.3	3.0	9.81	<0.01	0.01
BR-203	<0.1	0.3	0.37	<0.01	0.01
BR-206	0.4	6.0	1.86	<0.01	0.01

Fig. III-5 Map of Subun-subun Mineralizaed Zone

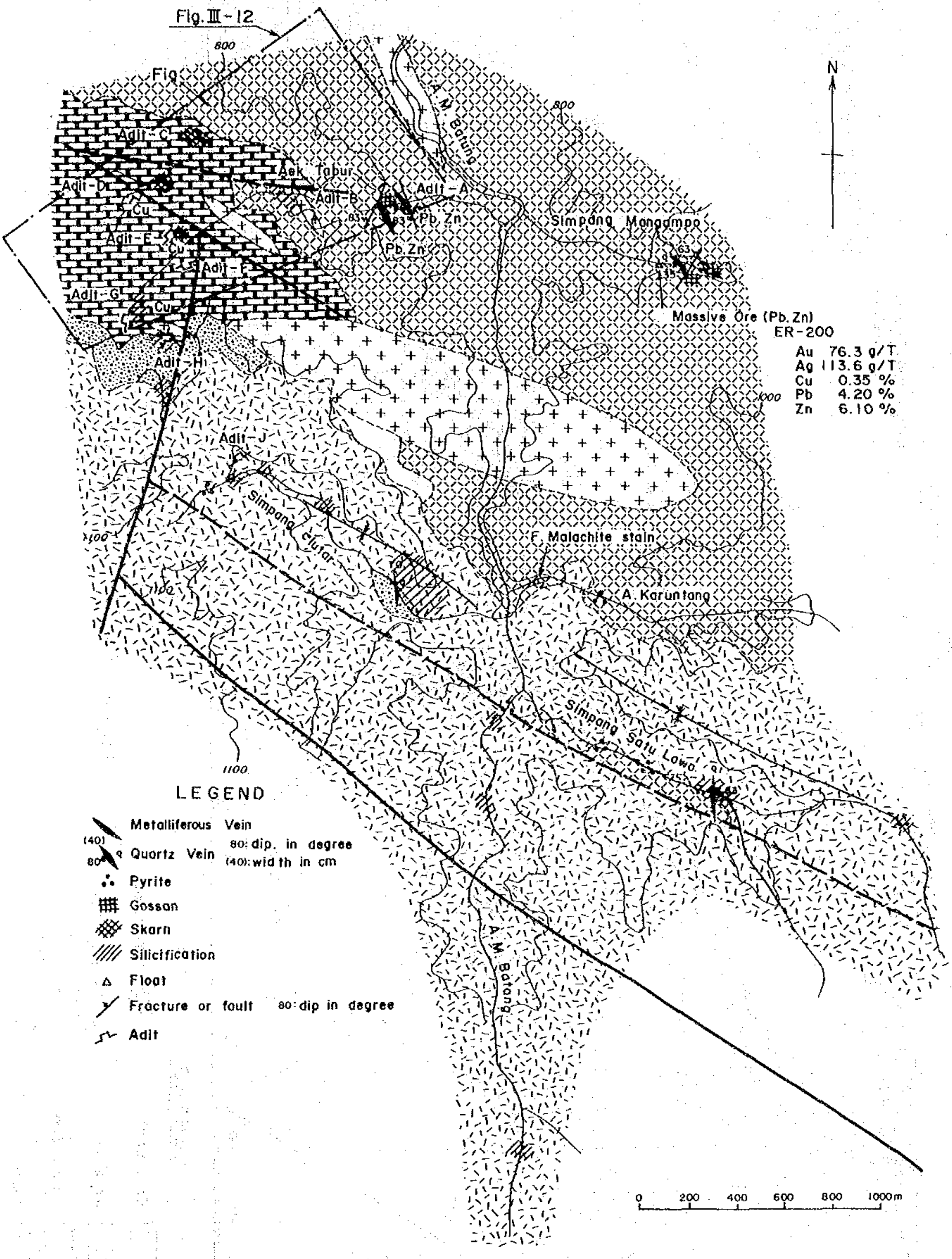


Fig. III-6 Map of Bt.Pionggu Mineralizaed Zone

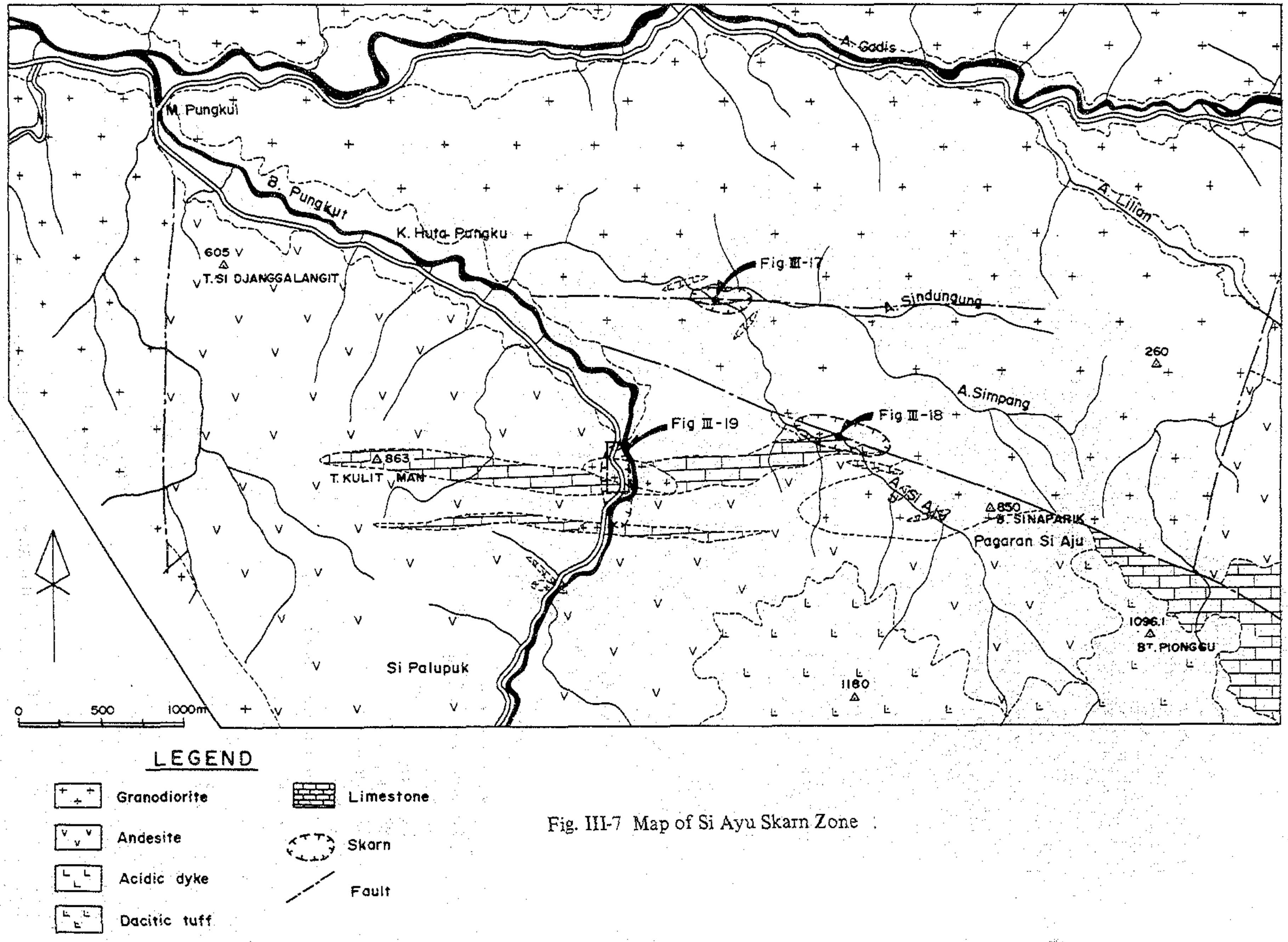


Fig. III-7 Map of Si Ayu Skarn Zone

CHAPTER 4 GEOCHEMICAL SURVEY (STREAM SEDIMENT)

4-1 Sampling

Sampling was made at the rate of 2 samples per km of the river survey route from main rivers in the survey area (400 km^2) and the number of samples collected was 500 piecies.

4-2 Path-Finder Elements

Since the survey area has been involved the intrusion of granitoids in addition to the gold-silver-lead zone deposits (vein type and skarn type), 7 components including gold, silver, copper, lead, zinc, arsenic and molybdenum were analyzed taking into consideration the possibility of emplacement of the porphyry copper deposit.

4-3 Data Processing

(1) Correlation among Components

Table III-4 Correlative Coefficiency of Geochemical Path-finder Elements (Au, Ag, Pb, Zn, Cu, As, Mo) through Geochemical Survey

	Ag	Cu	Pb	Zn	Mo	As
Au ppb	0.1828	0.2896	0.0203	0.0893	0.0774	0.2999
Ag ppm		0.2340	0.5458	0.6260	0.1581	0.4262
Cu ppm			0.6940	0.3738	0.2282	0.4513
Pb ppm				0.5984	0.1515	0.4807
Zn ppm					0.2274	0.4747
Mo ppm						0.3231

(Population 500)

Correlation was recognized in silver-lead, silver-zinc, silver-arsenic, arsenic-lead and arsenic-zinc, and gold has some correlation with copper and arsenic, but other elements, silver-copper, gold-lead, gold-zinc and gold-arsenic have no correlation and molybdenum has no correlation with other elements. (Fig. III-4)

As already mentioned, this survey area has 2 types of mineralization, i.e. gold-copper deposit and silver lead zinc deposit, and these correlations seem to reflect the difference of the deposit type.

Table III-5 Anomarous Value of Path-finder Elements (Au, Ag, Cu, Pb, Zn, As, Mo) through Geochemical Survey in Muara Sipongi Area

	Max.	Min.	Mean, M	S.D.	M + S.D.	M + 2 x S.D.
Au ppb	3.160	<5	8	0.8102	53	344
Ag ppm	5.6	0.1		0.2381	6.2	0.4
Cu ppm	735	1	28	0.4119	72	187
Pb ppm	1,200	1	9	0.5335	31	108
Zn ppm	3,900	13	96	0.2965	139	374
Mo ppm	25	1	1	0.1988	2	3
As ppm	244	2	14	0.3957	34	85

(Population 500)

(2) Anomalous Areas

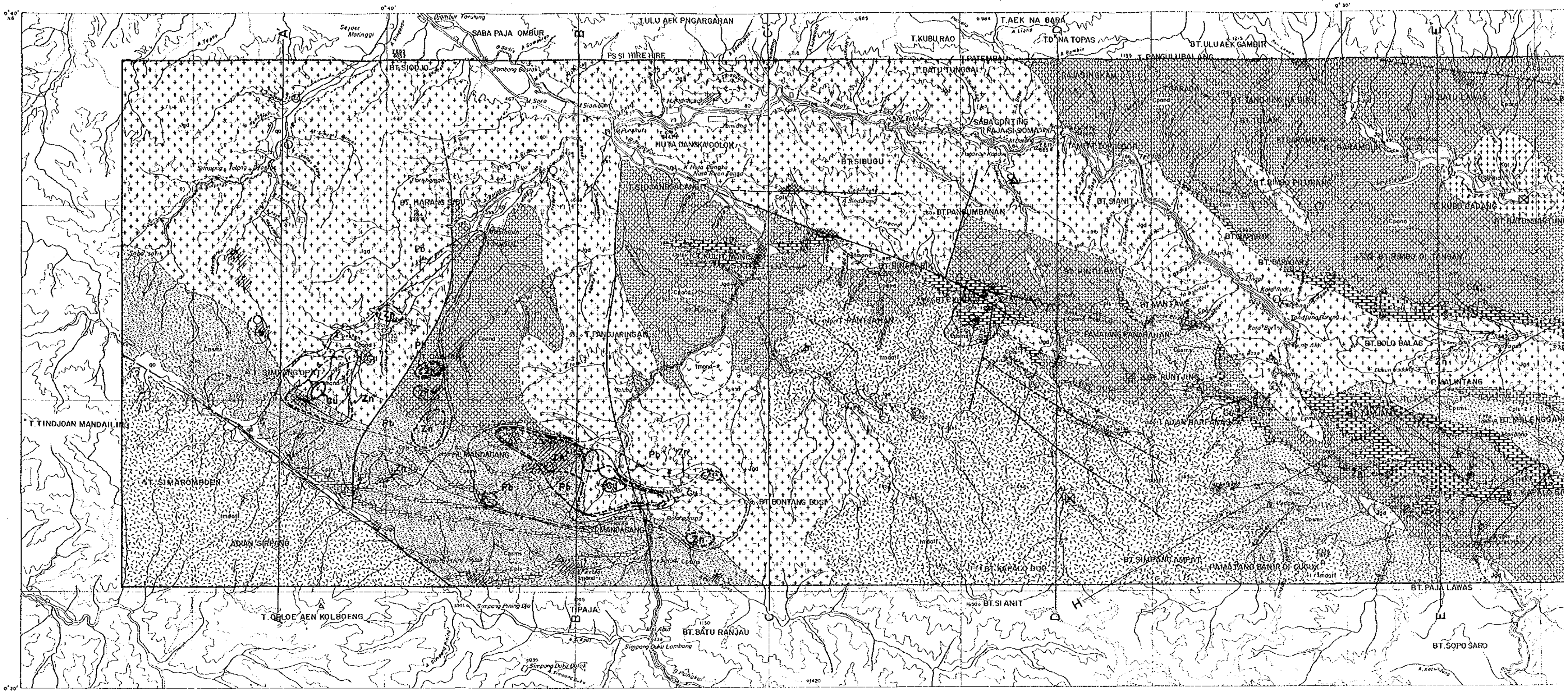
Through the statistical processing, the mean value (M), standard deviation (S.D.), threshold value (I) (M + S.D.) and threshold value II (M = 2 x S.D.) were sought. (Table III-5) The threshold value (I) (M + S.D.) was made Grade 2 anomalous value and threshold (II) (M + 2 x S.D.) Grade 1 anomalous value.

These anomalous areas correspond to the known mineralized areas as follows (Fig. III-8).

(a) Pagar Gunung Mineralized Zone – Patahajang Alteration Zone
Copper-lead-zinc-silver-arsenic overlap and extend 6 km.

(b) Subun-subun – Bt Pionggu Mineralization Zones
copper and gold anomalous areas are recognized in each mineralized zone and especially the gold is widely distributed over both mineralized zones.

As described above, the silver, lead, zinc and arsenic correspond well to the silver lead zinc-skarn type Pagar Gunung – Patahajang mineralized zone, and gold and copper to the gold-copper vein – skarn type Subunsubun – Bt Pionggu mineralized zones.



LEGEND

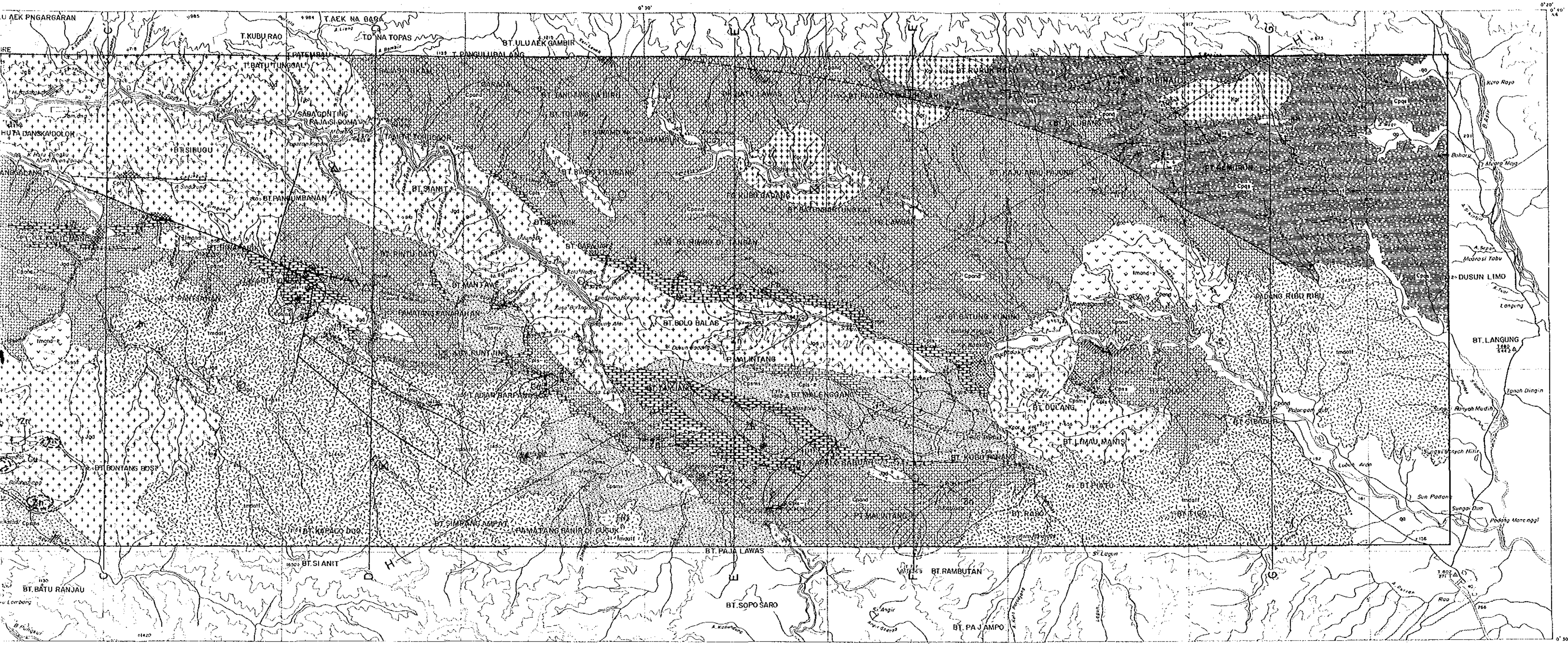
Geological Age		Geological unit	Sedimentary Rocks	Volcanic Rocks	Intrusive Rocks
CENOZOIC	QUATERNARY		Qa Alluvium		
	TERTIARY			Tmdatf BT. Pacncehan Dacitic tuff	Tmand-2 Andesite Tmand-1 Andesite
MESOZOIC	CRETACEOUS ~ JURASSIC				Kgr BT. Ruruk Roru Granite Kpor Plagio Quartz Porphyry Jgd Muara Sipongi Granodiorite
PALEOZOIC	PERMIAN ~ CARBONIFEROUS	Patahajan Formation	Cpls-2 Limestone Cpsms Clastic Rock	Cpand M. Batang Andesite and Pyroclastic Rocks	
		BT. Tanjang Formation	Cpls-1 Limestone Cpss Sandstone		
		S. Ranya Formation	Cpqs Quartz Sandstone		

- Dip and structure
- Joint
- Fault confirmed
- Fault inferred
- Anticlinal axis
- Synclinal axis
- Folding axis

- Pyrite disseminated zone
- Silicified zone
- Skarn alteration
- Metalliferous vein, Ore bed
- Malachite stain

Element	Geochemical Ano[...] Anomaly area M + σ	M + 2σ	M[...]
Cu			
Pb			
Zn			

Fig. III-8 Distribution of Geochemical Anomaly Areas in Muara Sipongi



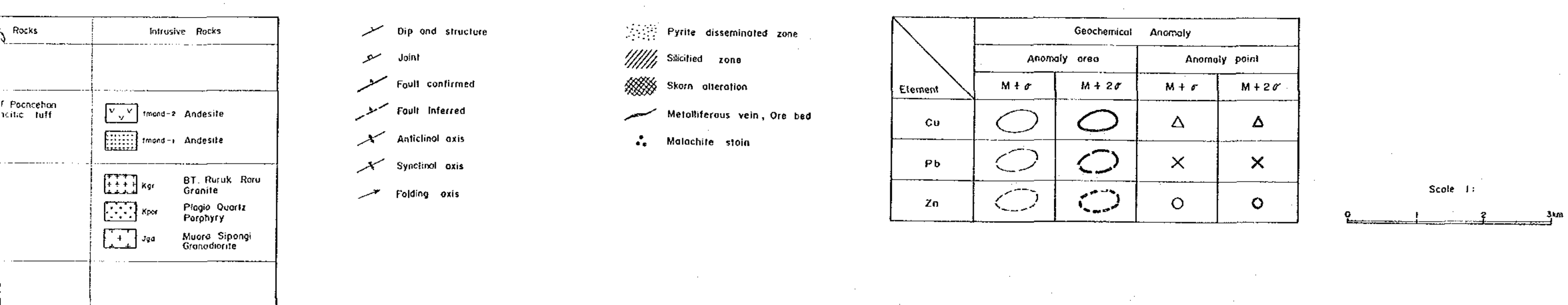
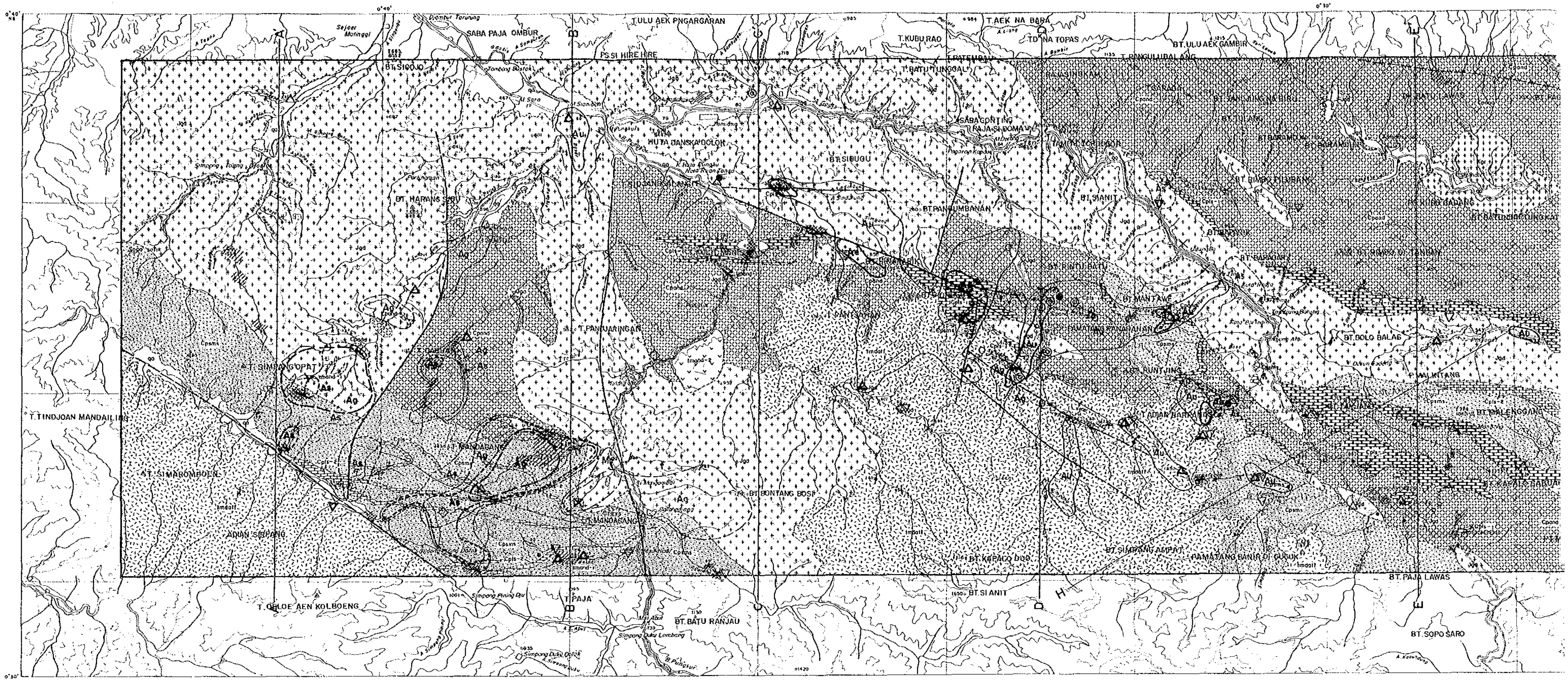
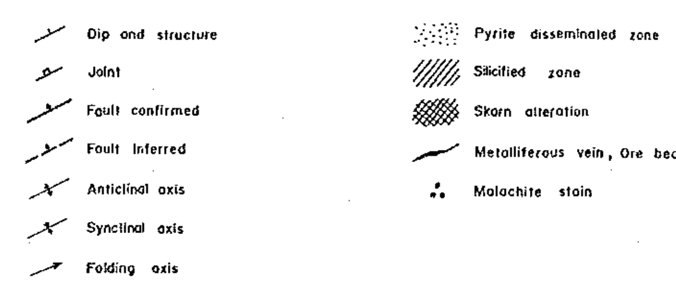


Fig. III-8 Distribution of Geochemical Anomaly Areas in Muara Sipongi Area (A)



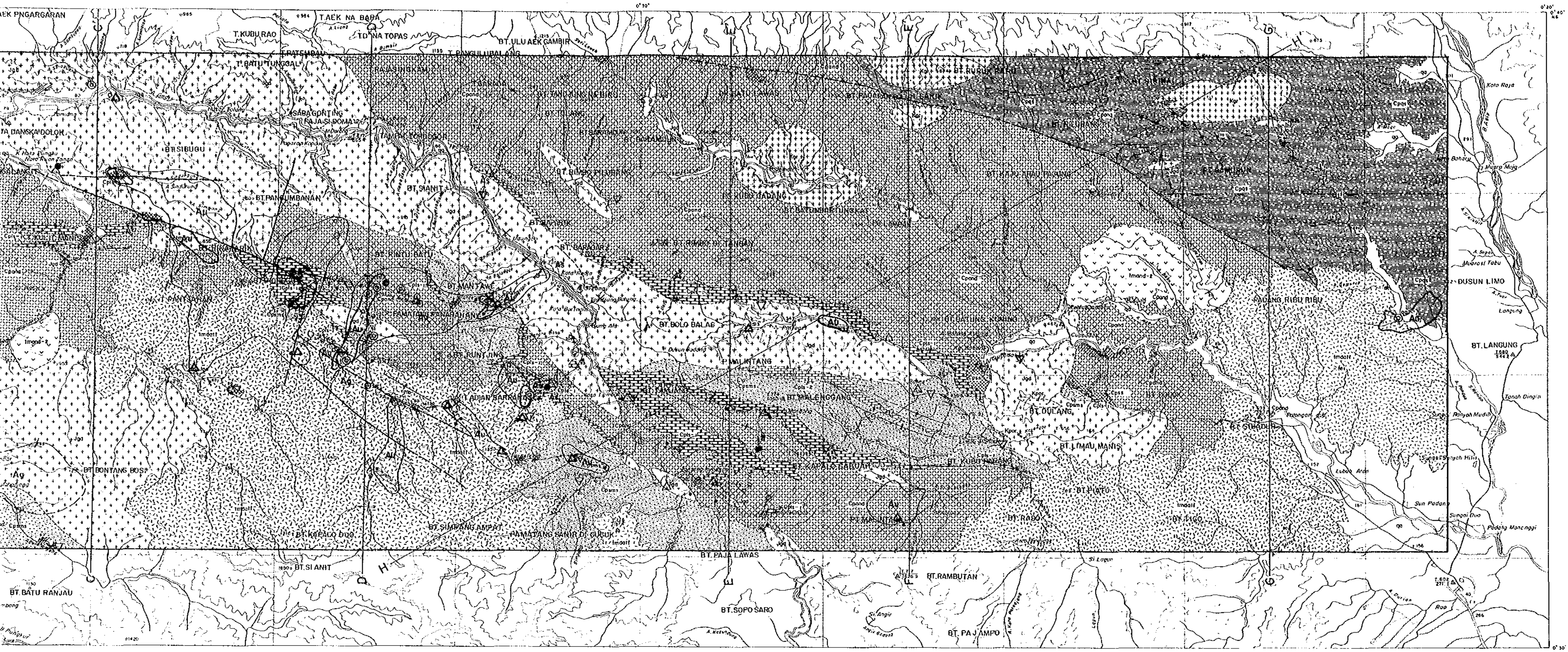
LEGEND

Geological Age		Geological unit	Sedimentary Rocks	Volcanic Rocks	Intrusive Rocks
CENOZOIC	QUATERNARY		qa Alluvium		
	TERTIARY			Tmdatf BT. Pocncehan Dacitic tuff	Tmand-2 Andesite Tmand-1 Andesite
MESOZOIC	CRETACEOUS ~ JURASSIC				Kgr BT. Ruruk Roru Granite Kpor Plagio Quartz Porphyry Jgd Muara Sipongi Granodiorite
PALEOZOIC	PERMIAN ~ CARBONIFEROUS	Patahajan Formation	Cpls-2 Limestone Cpsms Clastic Rock		
		BT. Tanjong Formation	Cpls-1 Limestone Cpss Sandstone	Cpand M. Batong Andesite and Pyroclastic Rocks	
		S. Ranya Formation	Cpqs Quartz Sandstone		



	Geochemical Anomaly		
	Anomaly Area		Anom
	M + σ	M + 2σ	M + σ
Au	(solid ellipse)	(solid ellipse)	△
Ag	(dashed ellipse)	(dashed ellipse)	×
Mo	(dash-dot ellipse)	(dash-dot ellipse)	◇
As	(dashed ellipse)	(dotted ellipse)	▽

Fig. III-8 Distribution of Geochemical Anomaly Areas in Muara Sipongi Area (B)



...cks	Intrusive Rocks
...cncehan ... tuff	tmond-2 Andesite tmond-1 Andesite
	Kgr BT. Ruruk Raru Granite Kpor Plagio Quartz Porphyry Jgd Muara Sipongi Granodiorite
...ng Andesite ...yroclastic Rocks	

- Dip and structure
- Joint
- Fault confirmed
- Fault inferred
- Anticlinal axis
- Synclinal axis
- Folding axis

- Pyrite disseminated zone
- Silicified zone
- Skarn alteration
- Metalliferous vein, Ore bed
- Malachite stain

	Geochemical Anomaly				Pannig Result				
	Anomaly Area		Anomaly point		Number of Gold				
	M + σ	M + 2σ	M + σ	M + 2σ	1~3 pcs	4~6 pcs	7~10 pcs	11~32 pcs	33~ pcs
Au	○	○	△	▲	•	∘	○	◎	●
Ag	◌	◌	×	✕					
Mo	◌	◌	◇	◆					
As	◌	◌	▽	▼					

0 1 2 3km

Fig. III-8 Distribution of Geochemical Anomaly Areas in Muara Sipongi Area (B)

CHAPTER 5 PLACER GOLD SURVEY

5-1 Survey Method

Stream sediment samples were collected at the same sampling points as the geochemical survey and the content of placer gold was investigated by panning. The number of samples collected was 527. The survey was made by panning 40ℓ (2 plastic buckets) of stream sediment and counting the contained placer gold grains.

5-2 Analysis and Results

The collected samples were divided into five classes; 1 – 3 grains of gold, 4 – 6 grains, 7 – 10 grains, 11 – 32 grains and over 33 grains, then plotted on a map of the area to seek the anomalous areas. The largest number of placer gold grains was 75 piecies from Simpang Mangampo River of Bt. Pionggu.

The placer gold is concentratedly distributed in the following areas which are gold-copper mineralized zone areas.

(a) Bt Pionggu mineralized zone and its southern area
(b) Subunsubun mineralized zone area and Si gerunggung River region

The Pagar Gunung – Patahajang silver lead zinc deposit zones have almost no distribution of gold grains.

As a result of assay by the X-ray micro-analyzer, 3 of 4 placer gold grains showed a very high content of gold as 99.0% – 99.7%.

PART IV

MUARA SIPONGI AREA B

CHAPTER 1 GEOLOGY

1-1 Outline of Geology

The Patahajang Formation and Muara Botung Formation (the Permian the Carboniferous) distributed in this were further divided into the following 7 members in the 2nd-year survey.

Member	Formation
Upper limestone Member	Patahajang Formation
Basic volcanic rock Member	
Lower limestone Member	
Upper andesite Member	
Sedimentary rock and pyroclastic rock Member	
Dacite Member	
Lower andesite Member	Muara Botung Formation

At the northern margin of this survey area, mylonite (muscovite granodiorite) is widely distributed, and tonalite and quartz diorite stocks or dikes have intruded in it.

The muscovite granodiorite and tuffs Pyroclastic rock have undergone the mylonitization to become mylonite or cataclasite-like rock and the argillaceous rock was changed into semischist (slate or phyllite) with schistosity. (Fig. IV-1)

1-2 Geology

1-2-1 Muara Botung Formation

It is distributed as the lowest Member (Lower andesite Member) in this survey area. It is made of massive, dark green andesite and its rock facies is similar to that of the Muara Botung Formation.

1-2-2 Patahajang Formation

(1) Dacite Member

It consists of lapilli tuff accompanied by massive lava dacite.

(2) *Sedimentary and pyroclastic rock Member*

Pagar Gunung deposit area is the alternation of strata of black shale (slate), sandstone, dacitic tuff and andesitic tuff.

Since the Pagar Genung deposit is embedded a drilling survey was conducted and the lithology was further clarified and the detail will be described later.

(3) Upper Andesite Member

It is distributed from the Simpang Pining village to the upper reaches of the Karlan river. The upper bed and lower bed are interfingered.

(4) Lower Limestone Member

It is widely distributed from Pagar Gunung to Mandagan mountain. It is white massive limestone, recrystallized and made coarse-grained. It intercalates sandstone at some places at the boundary with the upper basic volcanic rock.

(5) Basic Volcanic Rock Member

It is distributed in the Pagar Gunung mountain. The lithology is basalt, basaltic tuff. Very basic rock which could be called pyroxenite because it mostly consists of an aggregation of pyloxene. Between this Member and the upper limestone Member, sandstone and shale are sometimes intercalated.

(6) Upper Limestone Member

Crystal limestone distributed over the basic volcanic rock member at the top of the Pagar Gunung mountain.

1-2-3 Tertiary Andesite

It is distributed unconformably overlying the Patahajang Formation from the Simpang Opat mountain to the top of the Mandagang mountain. It is two pyrozene andesite.

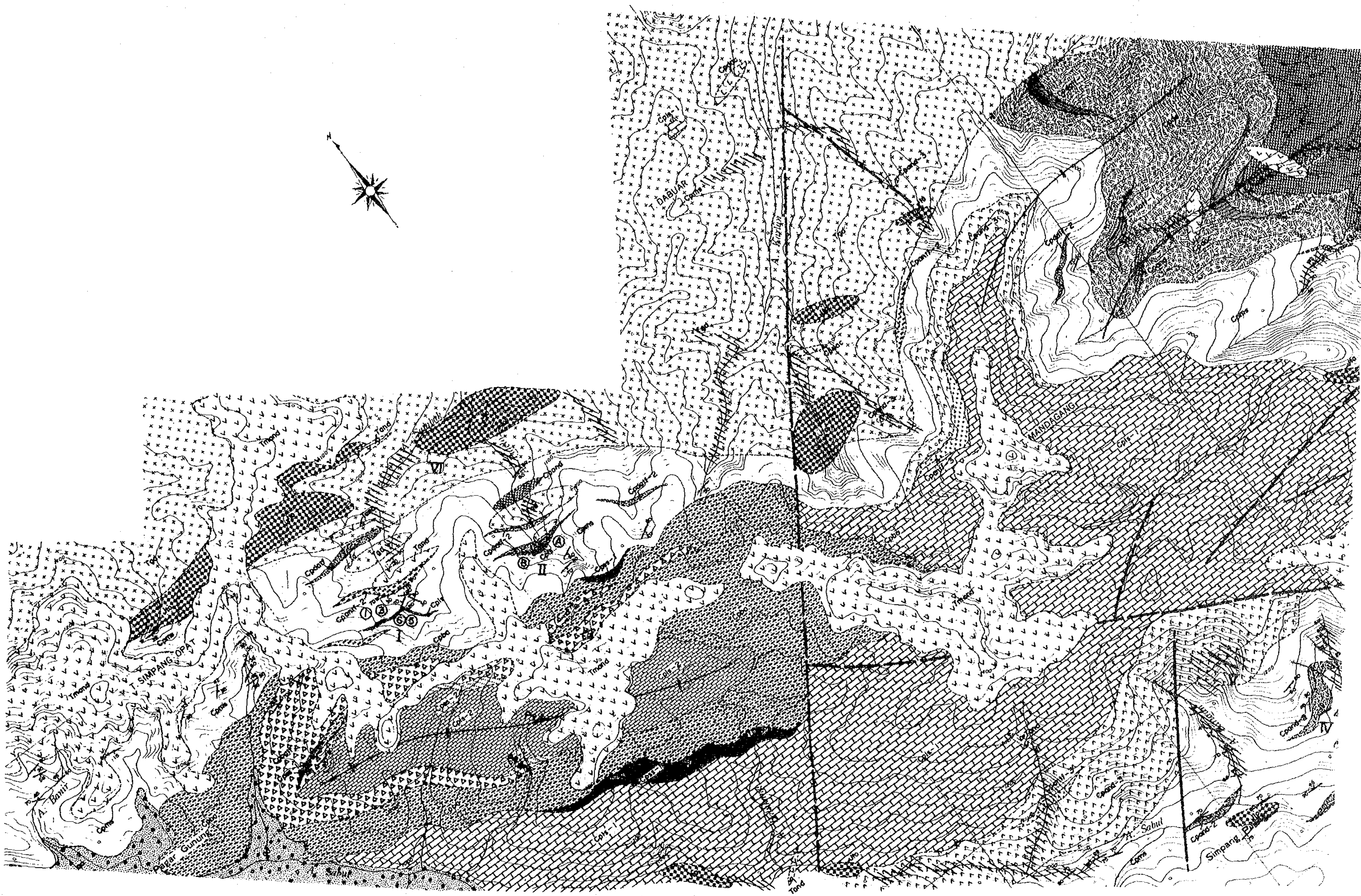
1-2-4 Intrusive Rock

(1) Mylonite (Muscovite Granodiorite)

The muscovite granodiorite distributed in the northern part of this area has the banded texture and has undergone mylonitization to become mylonite. It is considered to be an older intrusive rock than the Muara Sipongi granitoid (Jurassic intrusion by K-Ar age determination). Silicification extensively occurrs and pyrite dissemination is generally recognized.

(2) Quartz Diorite

In this survey area, the quartz diorite, a member of the Muara Sipongi granitoids has intruded as stock or dike in the Patahajang Formation.



T. DABUAR
T. SIMPANG OPAT
MANDAGANG
A. Banir
A. Sabul

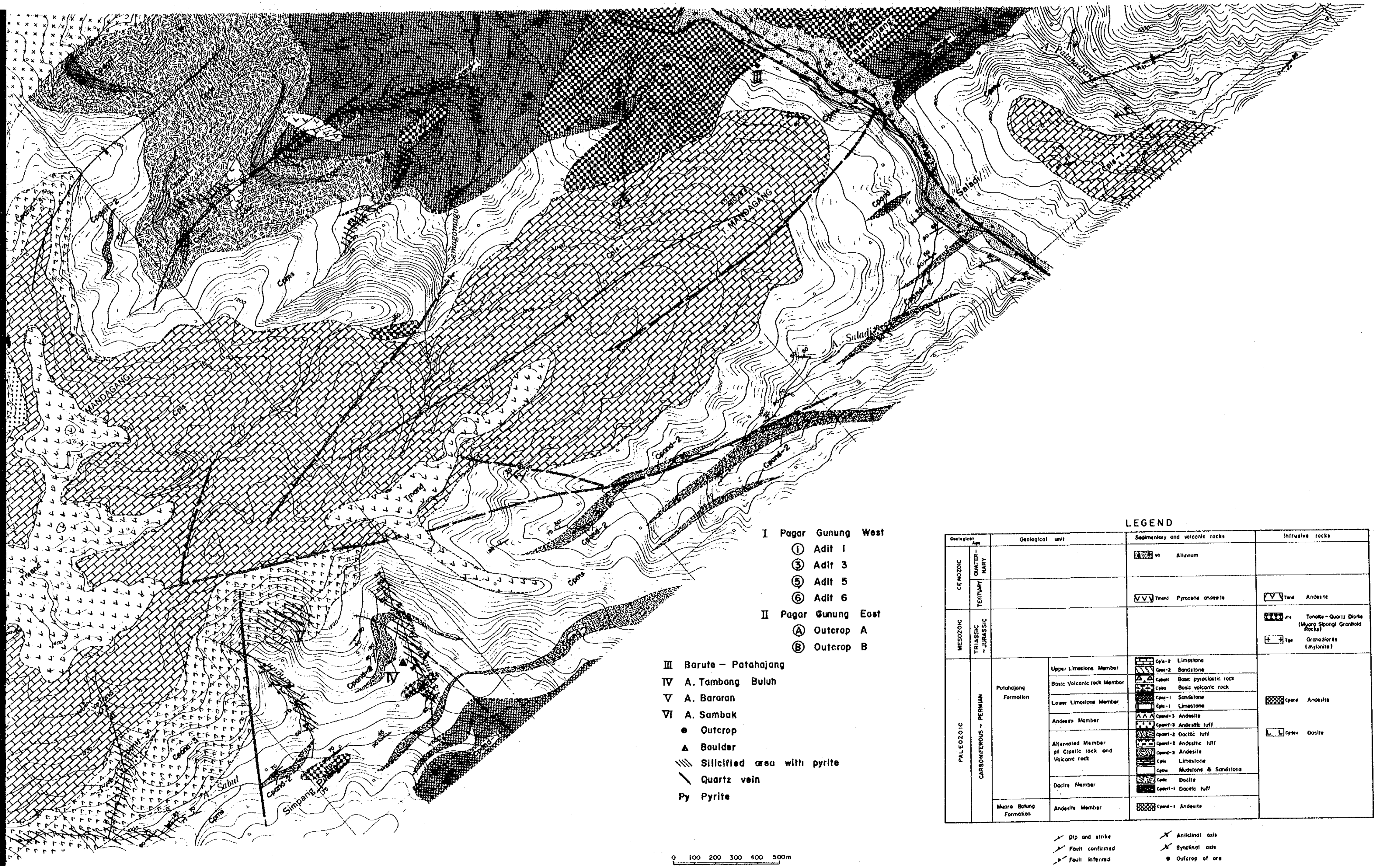
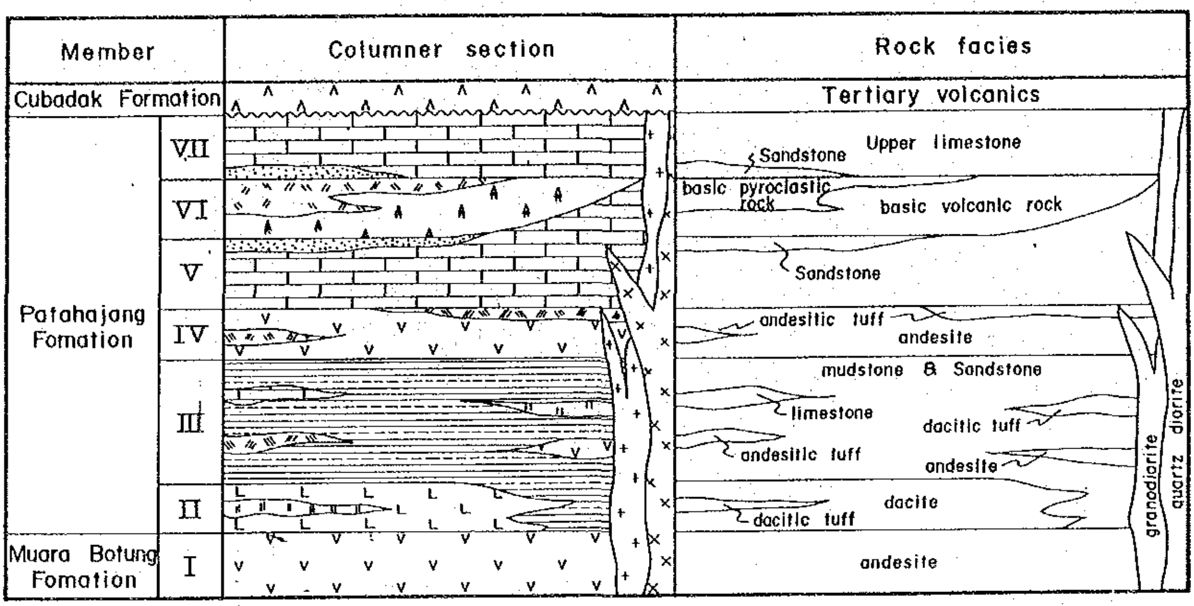


Fig. IV-1 Geological and Mineralization Map of Muara Sipongi Area B (Pagar Gunung-Patahajang)



Patahajang Formation	VII	Upper Limestone Member
	VI	Basic Volcanic Rock Member
	V	Lower Limestone Member
	IV	Andesite Member
	III	Sedimentary Rock and Pyrocrastic Rock Member
	II	Dacite Member
M. Botung Formation	I	Andesite Member

Fig. IV-2 Gneralized Stratigraphy of Muara Sipongi Area B (Pagar Gunung-Patahajang)

CHAPTER 2 MINERALIZED ZONE

2-1 Outline

It was known in the past that the following deposits existed in the survey area and they were clarified by the second phase survey. (Fig. IV-1)

(1) Pagar Gunung silver bearing lead zinc mineralized zone
(East mineralized zone: Outcrop B and West mineralized zone)

(2) Pagar Gunung bedded – banded pyrites mineralized zone (Palelo River: Outcrop A)

(3) Barute mineralized zone (limonite gossan, sphalerite dissemination)

(4) Patahajang Alteration Zone

In addition, silicification zone is distributed from Simpang Pining, south of the survey area to the Tambang Bluh River and fine molybdenite quartz veinlet is recognized in it. Of these mineralization zones, a drilling survey was conducted for the Pagar Gunung mineralization and the deposit conditions and scale were clarified.

2-2 Pagar Gunung Mineralized Zone

(1) Pagar Gunung West Mineralization

This Mineralized zone is situated near the ridge, 1,100 m above sea level upstream of the Sambak River. It contains silver, lead and zinc and outcrops and old adits are distributed at 6 places in the range of 200 m EW.

The deposit is accompanied by skarn minerals such as epidote, clinopyroxene (hedenbergite) and calcite, and its ore minerals mainly consists of galena and sphalerite, being accompanied by pyrite, pyrrhotite and small amount of arseno Pyrite. Under the microscope the pyrite and pyrrhotite are exsoluted in the sphalerite as dots or lamellas. The adit and outcrop locations and outcrop sampling results are shown Fig. IV-1 and Table IV-1.

(2) Pagar Gunung East Mineralized Zone (Outcrop B)

It is located in the upper reaches of the Palelo river, 600 m from the Pagar Gunung west mineralized zone. It is also the silver bearing lead zinc ore deposit as in the case of the west deposit and is accompanied by skarn minerals such as clinopyroxene and epidote. The ores and skarn replaced the calcareous layer and exhibit banded arrangement. The components of the clinopyroxene are identified as ($Ci_{55.6}$, $Hd_{34.9}$, $Jo_{9.5}$) and (Di_{580}, $Hd_{30.5}$, $Jo_{11.5}$) with the X-ray microanalyzer. These components of the clinopyroxene are generally recognized in the skarn type lead and zinc deposit (Finaudi 1982).

(3) Pagar Gunung East Mineralized Zone, Outcrop A

Under the Pagar Gunung east mineralized zone outcrop B, epidote siliceous rock with the width of 15 m exists and in this siliceous rock several bedded and banded pyrite deposits (deposit width 450 cm – 80 cm) are embedded. The analysis results are shown in Table V-1 from which it is known that the content of gold, silver, copper, lead are very small grade. Under the microscope, a small amount of sphalerite and chalcopyrite are observed among the pyrite crystals.

(4) New Mineralized Zone Outcrop

This deposit was discovered during preparation of the drilling site at MJI-6 drilling point, 50 m upstream the Palelo river from the outcrop A. The deposit is gossan changed into limonite (width 80 cm, strike N 90° E dip 40° S) and is accompanied by oxide copper ore such as malachite. Near the gossan, pyrite-galena-sphalerite ore boulders were discovered.

To sum up, the deposits distributed in Pagar Gunung consists of the following 3 mineralization zone horizons.

(a) New mineralized zone (lead-zinc deposit)
(b) Lead-zinc skarn type deposit (Pagar Gunung east and west mineralized zone)
(c) Banded pyrites mineralized zone (embedded in siliceous rock)

2-3 Barute Outcrop

The outcrop is located in the Barute River region, a tributary of the Punkut River (6 km east from Pagar Gunung). The outcrop is the gossan of limonite and the scale is 3 m x 10 m and partially green copper stains such as malachite and sphalerite and pyrite dissemination are recognized. Under the microscope, a fine exsolution dots of chalcopyrite is recognized in the sphalerite. The rock is skarn-like and chlorite, epidote and calcite exist. The grab sampling analysis of the primary ore reveals that it is rich in zinc at 3.65% and 7.94% whereas the copper is 0.21% and 0.29% and lead 0.02% and 0.90%. The country rock for the deposit is Patahajang Formation Sedimentary rock and Pyroclastic rock Member, like the Pagar Gunung deposit.

Table IV-1 Chemical Assay Result of Ores, Pagar Gunung Mineralized Area

	Ore Deposit	Altitude (m)	Strike	Dip	Extention (m)	Sample No.	Wd(m)	Au g/t	Ag g/t	Cu %	Pb %	Zn %	Mode of Ore Deposit	Country Rock		Remarks
														Hanging Wall	Foot Wall	
West Mineralized zone	Adit No. 1	1,200	N25°E	30°SE	6 + α	KR42, 44	1.15	0.2	40.1	0.17	2.70	3.33	diss ore (Zn,Pb,Cp,Py)	black mudy limestone	shale (silicified)	
						KR43	0.20	0.4	147.4	0.68	15.30	17.60	mass ore (Ag,Cu,Pb,Zn)			Mineralized zone I
	Adit No. 2 (collapsed)	*1,200*	*N45°W*	*35°SW*	*8 + α*	*KR39, 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°W45°S south fault: N45°E70°NW (Wd 2 m)
						KR37, 38	1.85	0.3	127.2	0.61	14.02	14.63	mass ore (Ag,Cp,Zn,Pb, Py)			Mineralized zone I
	Adit No. 3	1,185	N80°W	30°S	20 + α	KR45, 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 (Wd 0.5 m) central fault: N15°E75°W (Wd 0.2 m) west fault: N10°-20°E 70°-80°W (Wd 3 m)
	Adit No. 5 (outcrop)	1,160	N70°W	70°S		KR5-4	0.40	0.2	89.1	0.1	7.76	5.14	ore of fault breccia	black shale	black phyllite (argillization)	fault: N70°W70°S (Wd 1 m)
	Adit No. 6	1,150	E – W	30°S	11 + α	KR47, 49, 50	1.00	1.5	94.2	0.13	6.87	6.03	diss ore (Au,Ag,Pb,Zn, Py)	sandstone calcareous shale	black phyllite (argillization)	east side fault: N40°W75°NE
						KR47, 52	0.90	3.4	143.6	0.16	10.07	9.92	mass ore (Au,Ag,Pb,Zn, Py)			Mineralized zone I
East Mineralized zone	Outcrop A															Mineralized zone II
	outcrop 1	1,140	E – W	30°S	10 + α	L139~143	4.50	<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 + α	–	0.80	–	–	–	–	–	diss ore (Py)	tuff sandstone	sil rock	
	outcrop 3	1,150	E – W	40°S	2 + α	L145	0.80	0.2	4.1	0.18	0.01	0.10	diss ore (Py)	chlorite sil rock	chlorite sil rock	silicification
	outcrop 4	1,150	E – W	40°S	2 + α	L146	0.80	0.1	0.7	0.10	0.01	0.38	diss ore (Py)	chlorite sil rock	chlorite sil rock	silicification
	Outcrop B															*Mineralized* zone I
	outcrop 1	1,180	N30°E	35°NW	6 + α	L148, 149	1.25	0.4	146.7	0.97	13.40	12.60	bedded skarn ore (Ag,Cp, Zn,Pb,Py)	phyllite	chlorite sil rock	skarn mineral: clinopyroxene epidote
	outcrop 2	1,180	N35°W	40°SW	8 + α	–	0.20	–	–	–	–	–	mass ore (Zn,Pb,Cp,Py)	limestone sil rock	tuff sandstone	skarn mineral: clinopyroxene epidote
	outcrop 3	1,180	N35°W	40°SW	2 + α	–	0.30	–	–	–	–	–	bedded ore (Py)	shale	sil rock	silicification
	outcrop 4	1,190	N40°E	30°NW	4 + α	–	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