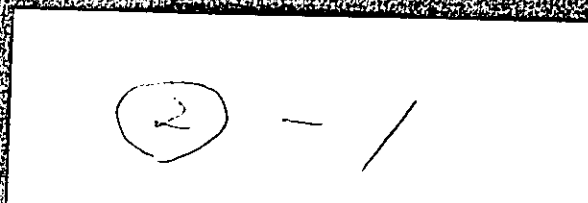


THE REPUBLIC OF INDONESIA
REPORT ON THE COOPERATIVE MINERAL EXPLORATION
OF
NORTHERN SUMATRA

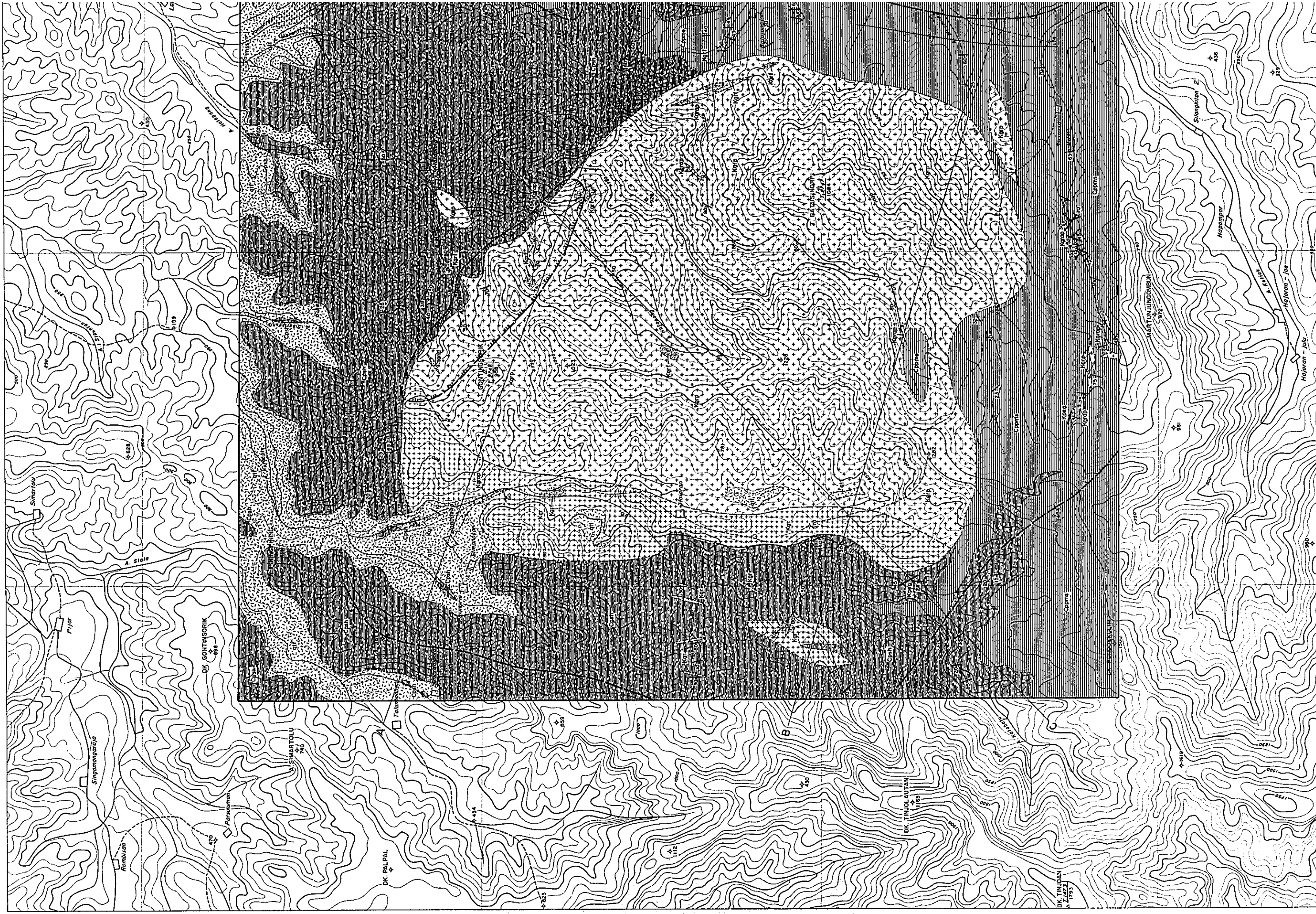
PHASE I



FEBRUARY 1983

JAPAN INTERNATIONAL COOPERATION AGENCY
METAL MINING AGENCY OF JAPAN

国際協力事業団	
受入 月日 58.9.26	108
登録No. 9151	66.1 MPN



P.L.I-1

METAL MINING AGENCY OF JAPAN
 JAPAN INTERNATIONAL
 COOPERATION AGENCY

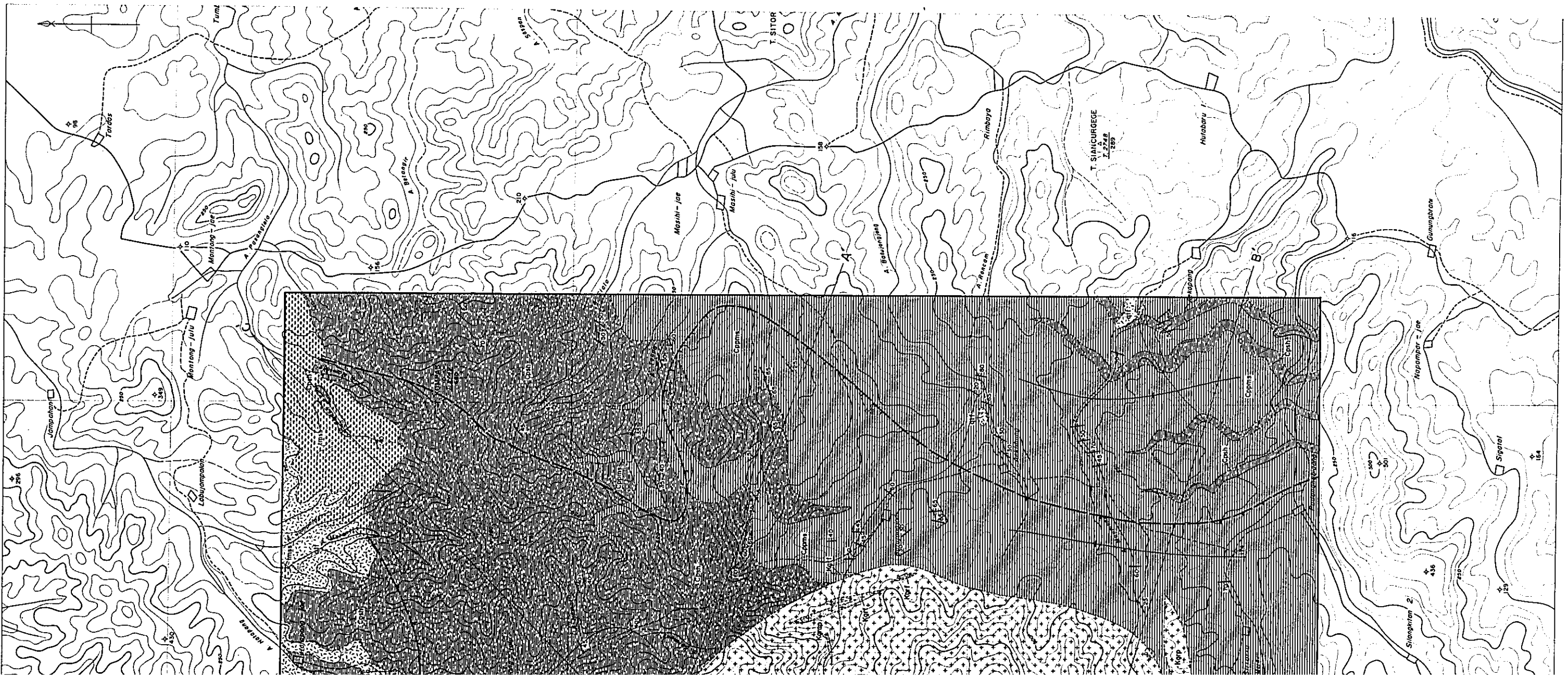
DIRECTORATE OF MINERAL
 RESOURCES
 DIRECTORATE GENERAL
 OF MINES
 MINISTRY OF MINES
 AND ENERGY
 REPUBLIC OF INDONESIA

MINERAL EXPLORATION IN NORTHERN SUMATRA
 REPUBLIC OF INDONESIA

GEOLOGICAL MAP OF HATAPANG AREA

Scale 1:25,000

February 1983



LEGEND

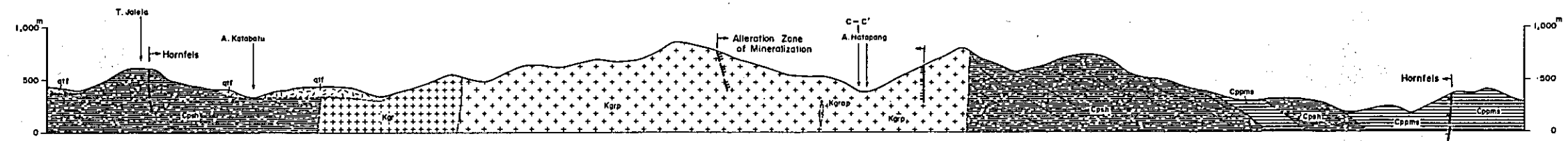
Geological Age	Geological Unit	Sedimentary Rocks	Igneous Rocks
CENOZOIC	QUATERNARY	Alluvium Toba tuff Sandstone	Andesite
	TERTIARY	Montang-jua Formation	Pegmatite Hatapang Granite (Albite) Hatapang Granite (Two-mica Granite) Hatapang Granite (Porphyrite)
MESOZOIC	CRETACEOUS		
PALEOZOIC	PERMIAN (Bakau Group)	Pebble Mudstone II (Sandstone & Mudstone) Pebble Mudstone I (Shale)	
	CARBONIFEROUS		

Dip and strike Alteration Zone of Mineralization
 Joint Hornfels Zone
 Anticlinal axis
 Synclinal axis

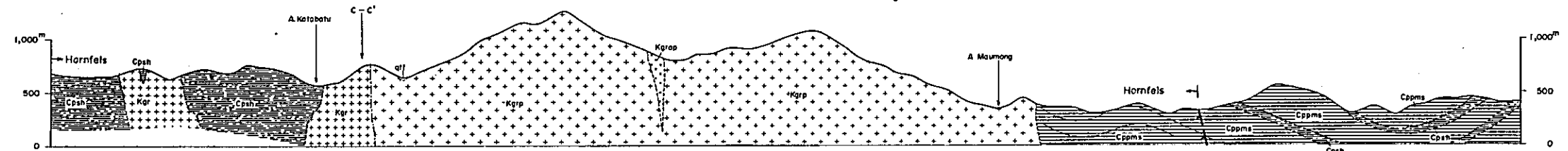
METAL MINING
 JAPAN INTERNATIONAL
 CO. LTD.
 MINERAL
 GEOLOGICAL



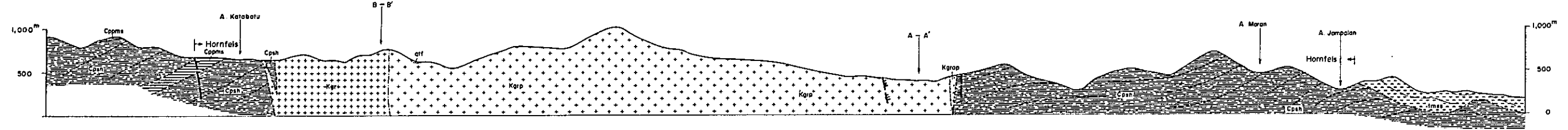
A - A'



B - B'



C - C'



Geological Age	Geological unit
CENOZOIC	QUATERNARY
	TERTIARY Mentong-Jule Formation
MESOZOIC	CRETACEOUS
PALEOZOIC	CARBONIFEROUS - PERMIAN Hatapang Formation (Baharok Group)

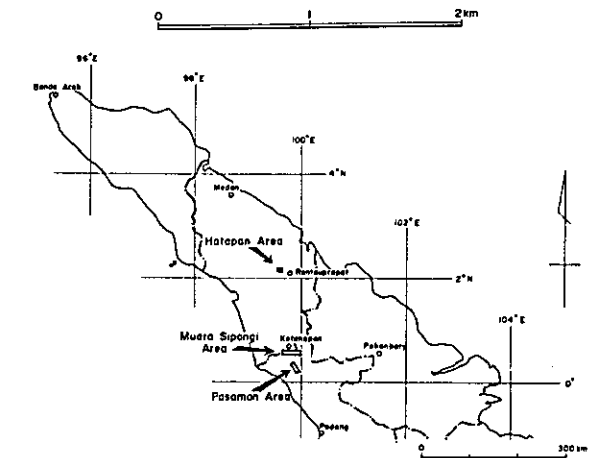
30
 1
 1
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 1

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MINERAL EXPLORATION IN NORTHERN SUMATRA
 REPUBLIC OF INDONESIA

GEOLOGICAL PROFILE OF HATAPANG AREA

Scale 1:25,000

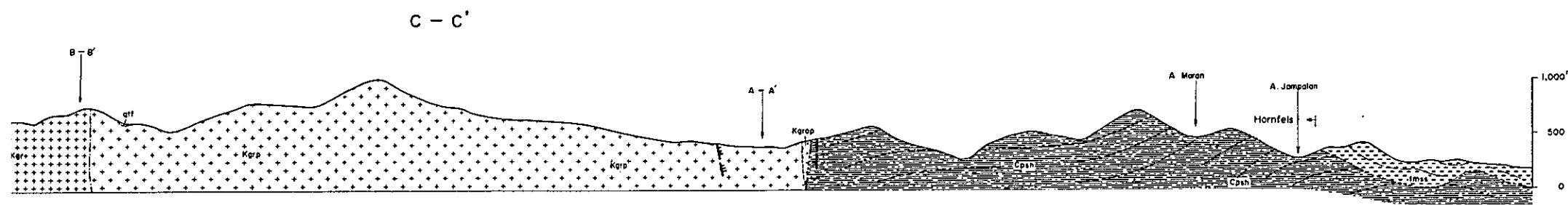
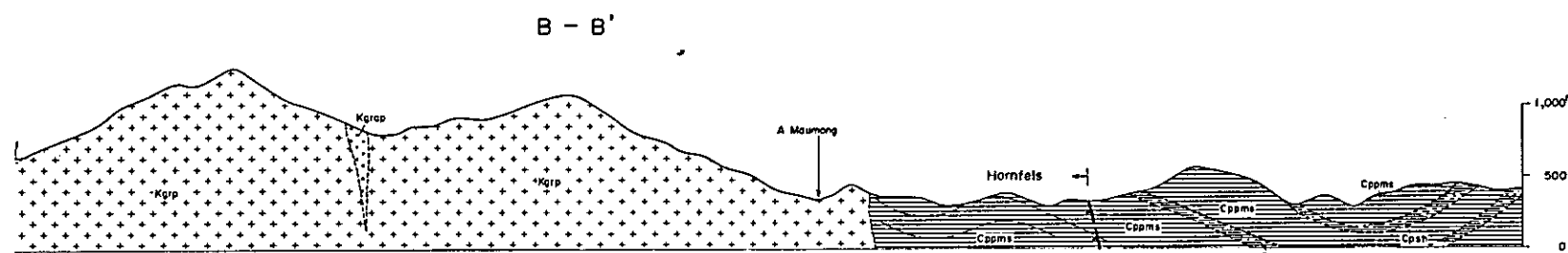
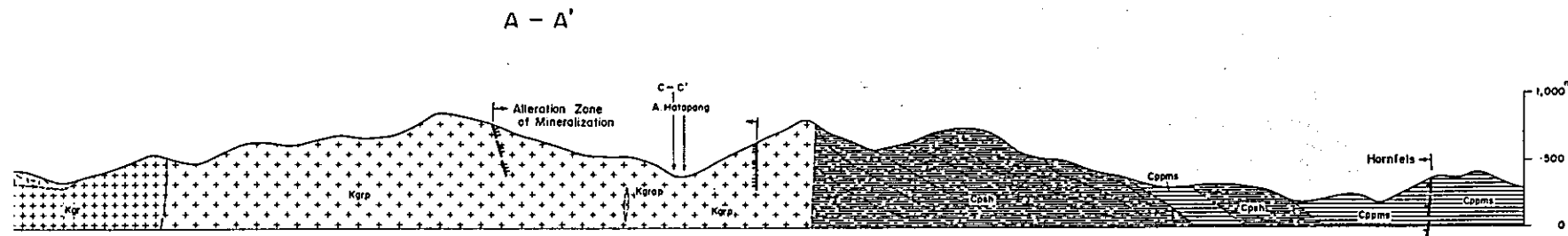


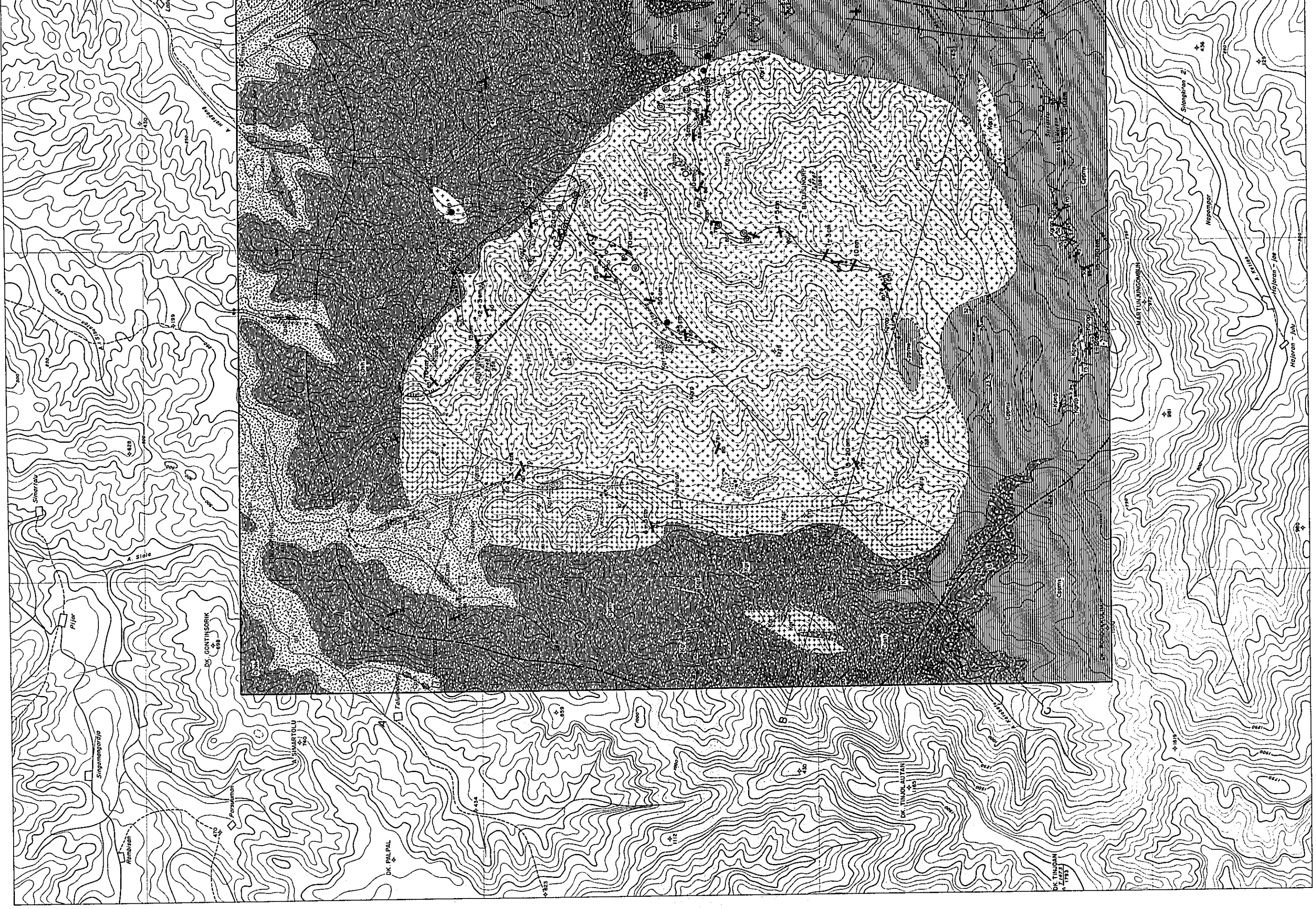
February 1983

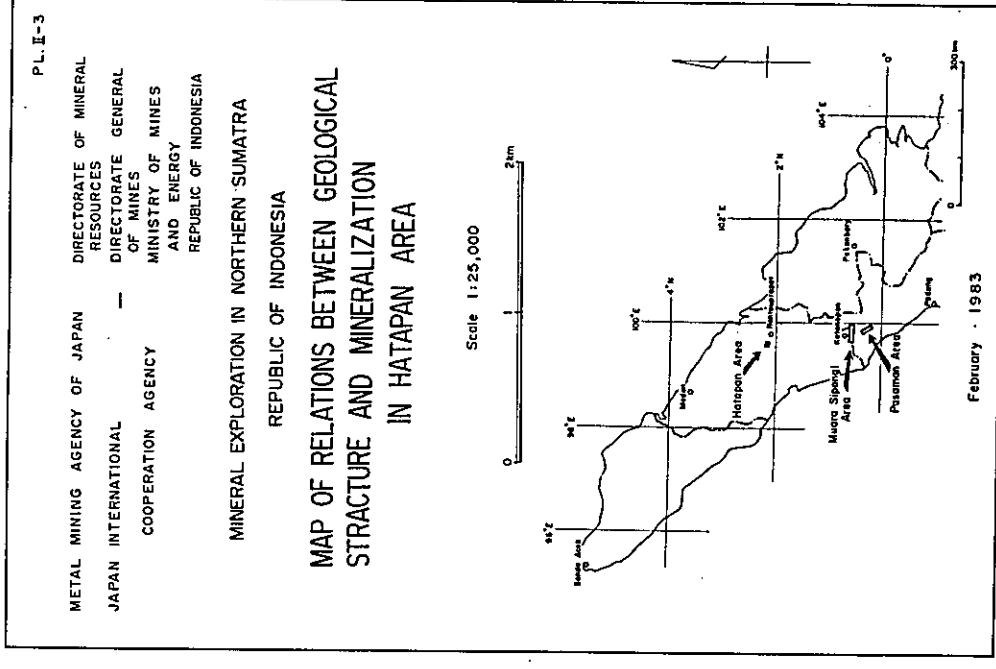
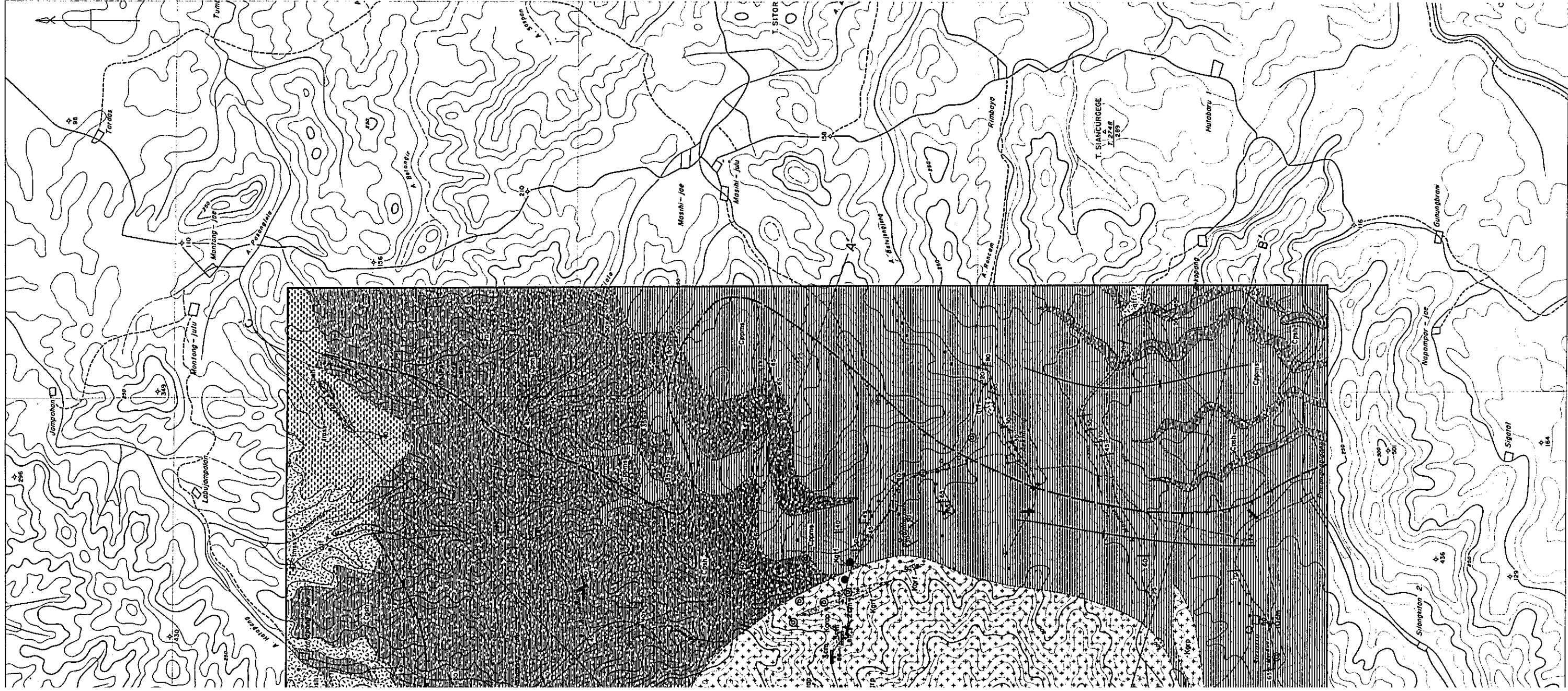
LEGEND

Geological Age	Geological unit	Sedimentary Rocks	Igneous Rocks	
CENOZOIC	QUATERNARY	aa Alluvium atf Toba tuff		
	TERTIARY	Montang-Jule Formation tms Sandstone	tad Andesite	
MESOZOIC	CRETACEOUS		Kpa Pegmatite Kgrp Hatapang Granite (Aplite) Kgrt Hatapang Granite (Two-mica Granite) Kgr Hatapang Granite Kgp Hatapang Granite (Porphyritic)	
PALEOZOIC		CARBONIFEROUS PERMIAN	Hatapang Formation (Sandstone & Mudstone) Cpms Pebble Mudstone II (Sandstone & Mudstone) Cpsh Pebble Mudstone I (Shale)	

- Dip and strike
- Joint
- Antiformal axis
- Synclinal axis
- Alteration Zone of Mineralization
- Hornfels Zone







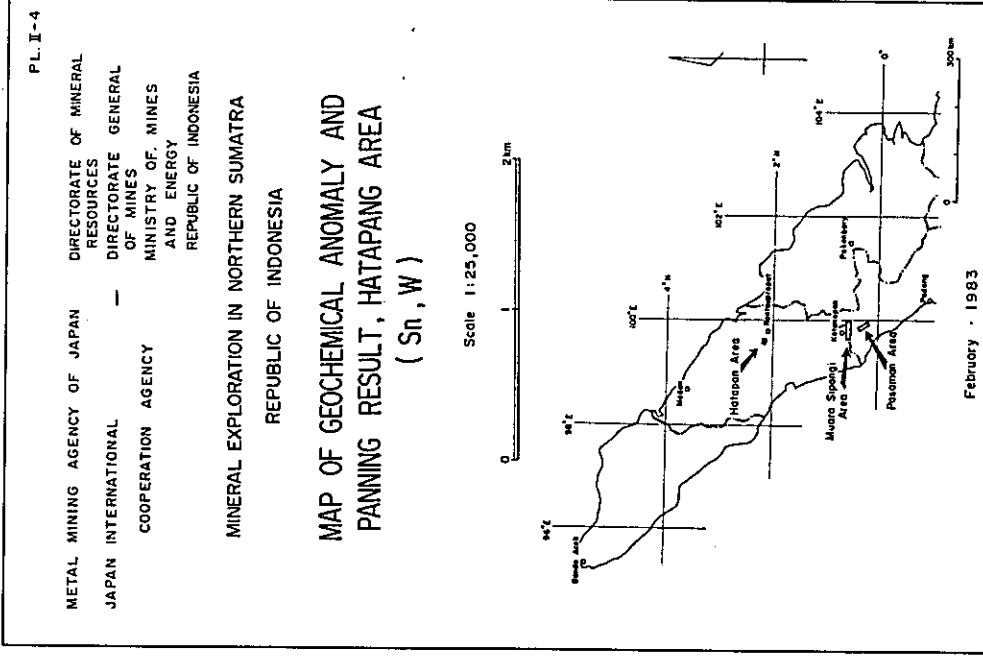
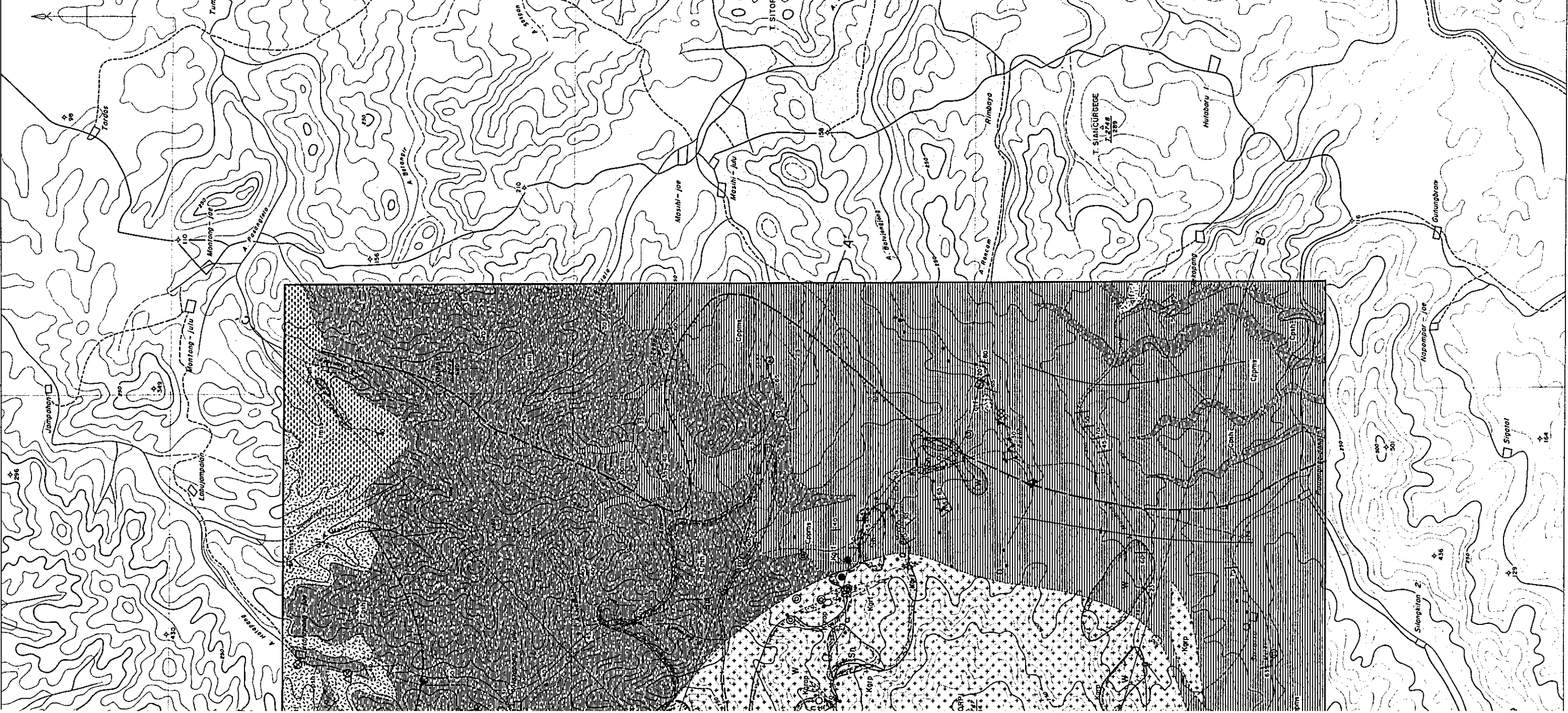
LEGEND

Geological Age	Geological unit	Sedimentary Rocks	Igneous Rocks
CEANOZOIC	QUATERNARY	Aluvium Toba tuff	
	TERTIARY	Masa Sandstone	Andesite
MESOZOIC	CRETACEOUS		Pegmatite Hatapan Granite (Albite) Hatapan Granite (Two-mica Granite) Hatapan Granite (Perphyritic)
PALEOZOIC	CARBONIFEROUS - PERMIAN	Hatapan Formation (Beharak Group)	
		Cpms Pebble Mudstone II (Sandstone & Mudstone) Cph Pebble Mudstone I (Shale)	

- Dip and strike
- Joint
- Anticlinal axis
- Synclinal axis
- Quartz vein
- Alteration Zone of Mineralization
- Hotfels Zone

Panning Result

Number (PCS)	100 - 261	261 - 731	731 - 2001	2001 - 5401	5401 - 15000
Mineral	260	730	2000	5400	15000
Cassiterite	•	o	o	o	•



LEGEND

Geological Age	Geological Unit	Sedimentary Rocks	Igneous Rocks
CENOZOIC	QUATERNARY	Alluvium Taba luff	Andesite
	TERTIARY	Mantong - Julu Formation	
MESOZOIC	CRETACEOUS		
PALEOZOIC	PERMIAN	Hatapang Formation (Babak Group)	
	CARBONIFEROUS	Pebble Mudstone II (Sandstone & Mudstone) Pebble Mudstone I (Shale)	

- Dip and strike
- Joint
- Anticlinal axis
- Synclinal axis
- Alteration Zone of Mineralization
- Hornfels Zone

Geochemical Anomaly

Element	Anomaly Area		Anomaly point
	M + f'	M + 2f'	
Sn			
W			

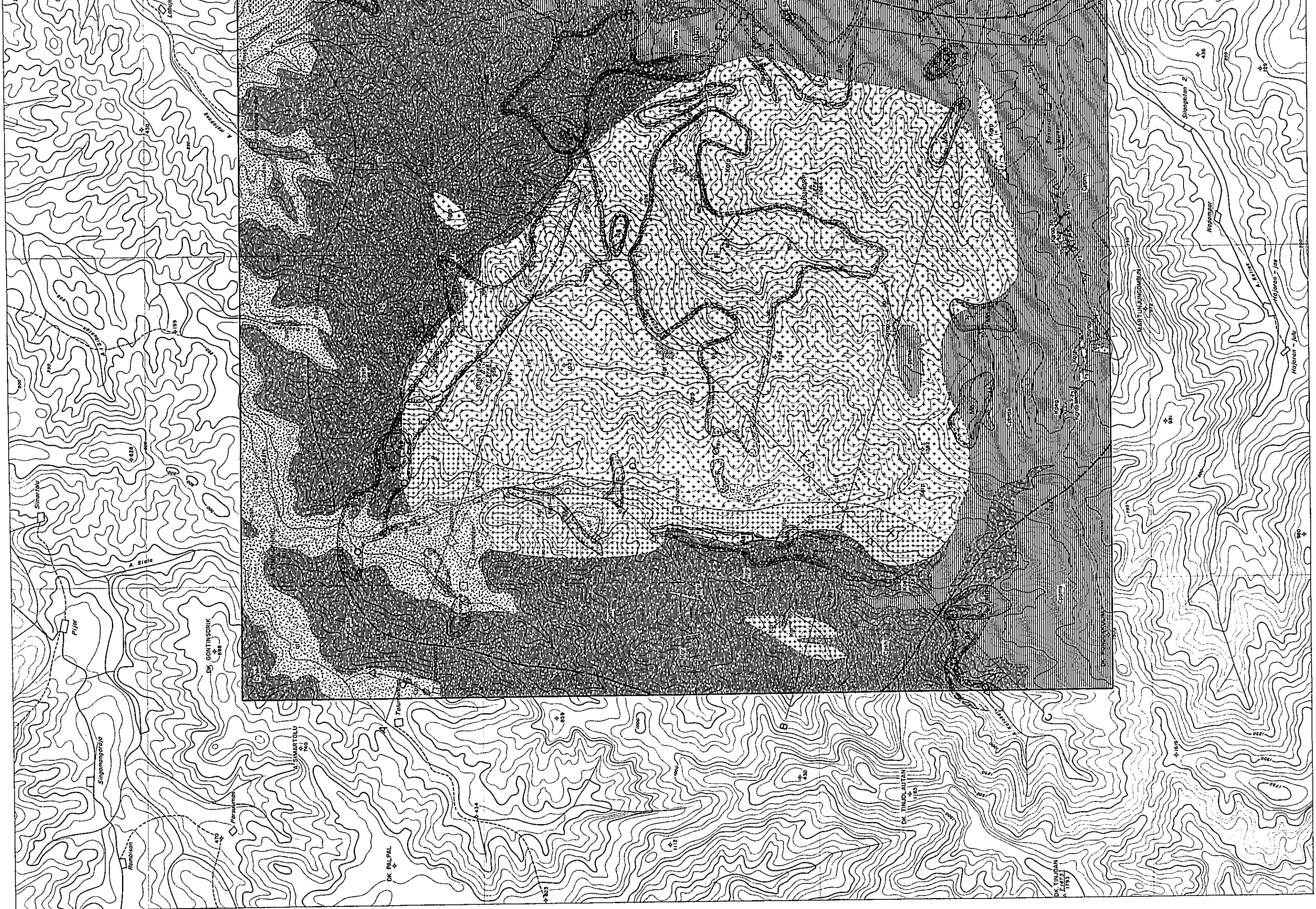
X more than two Anomaly points
 X-X single Anomaly point

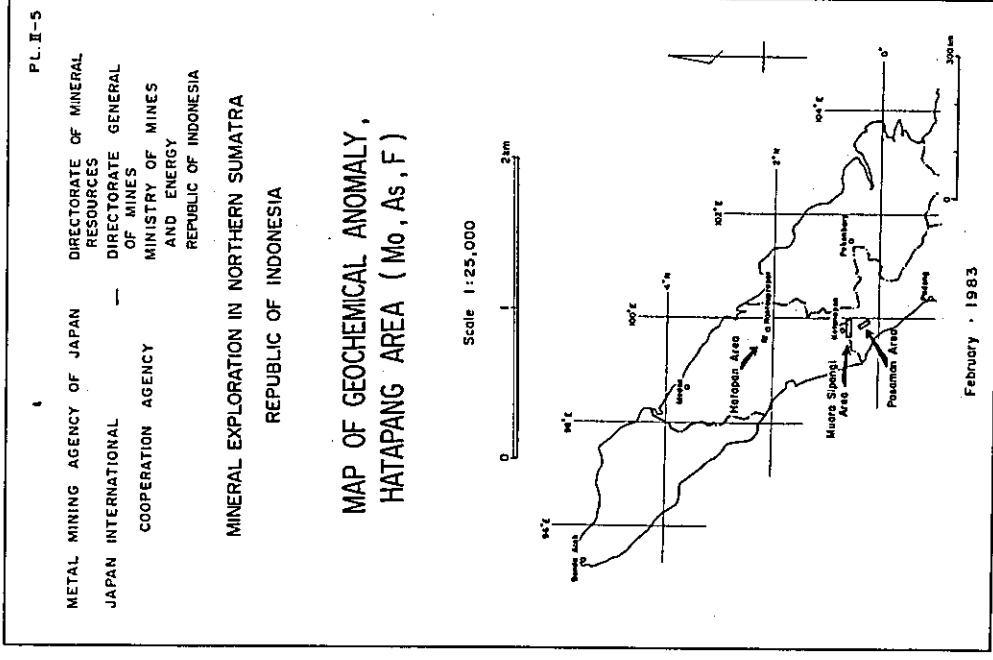
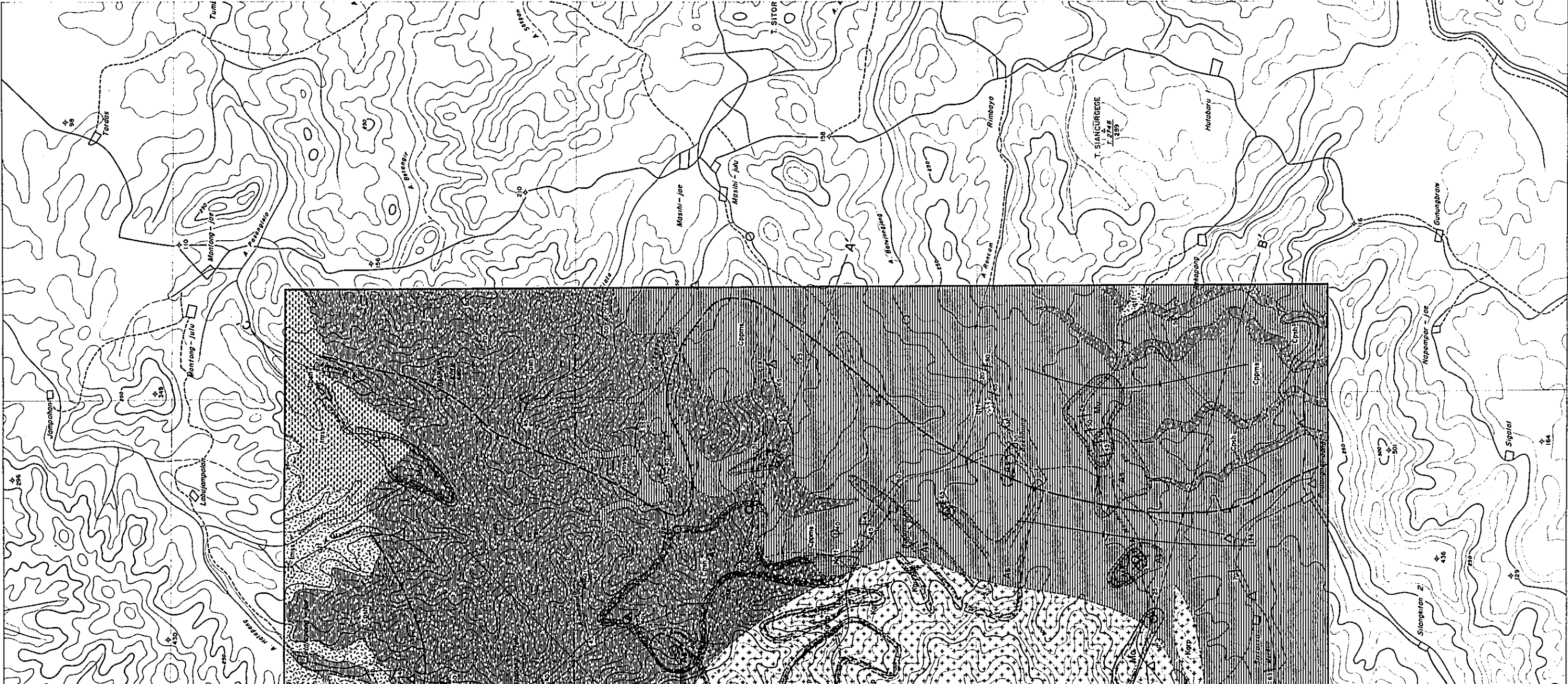
Panning Result

Number of Cassiterite	100 ~ 260 (ppm)		261 ~ 730 (ppm)		731 ~ 2000 (ppm)		2001 ~ 5400 (ppm)		5401 ~ 15000 (ppm)	
	1 ~ 9	10 ~ 50	51 ~ 100	101 ~ 200	201 ~ 500	501 ~ 1000	1001 ~ 2000	2001 ~ 5000	5001 ~ 10000	10001 ~ 15000
Sn	0	0	0	0	0	0	0	0	0	0
W										

Minor Element in Granite

	Chemical Composition				
	1 ~ 9 (ppm)	10 ~ 50 (ppm)	51 ~ 100 (ppm)	101 ~ 200 (ppm)	201 ~ 2000 (ppm)
Sn	0	0	0	0	0
W					





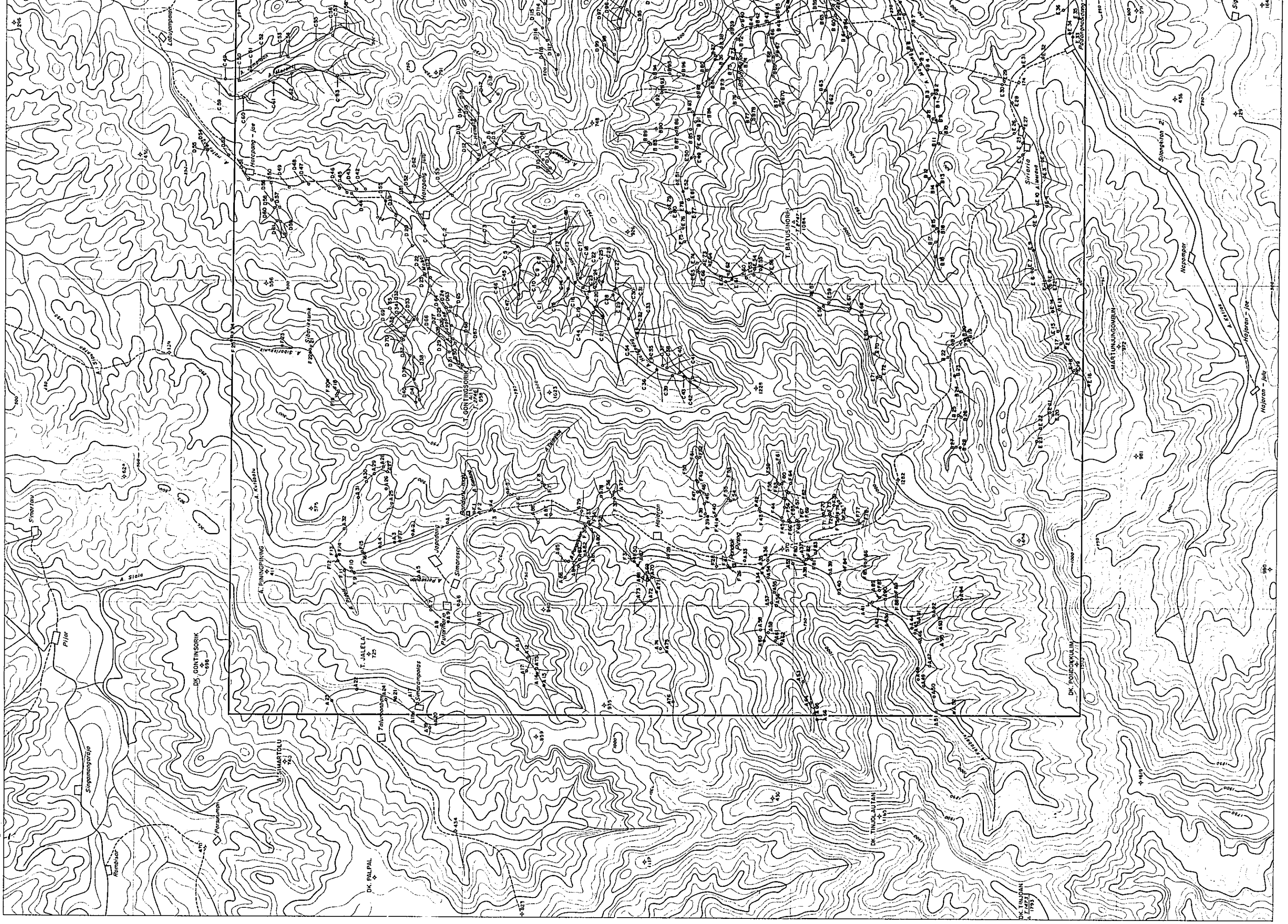
LEGEND

Geological Age	Geological Unit	Sedimentary Rocks	Igneous Rocks
CENOZOIC	QUATERNARY	Aluvium Toba tuff	Andesite
	TERTIARY	Montong-Jaru Formation	
MESOZOIC	CRETACEOUS		
PALEOZOIC	CARBONIFEROUS	Harapang Formation (Bohorak Group)	
		Cpm: Pebble Mudstone II (Sandstone & Mudstone) Csh: Pebble Mudstone I (Shale)	

- Dip and strike
- Joint
- Anclinal axis
- Synclinal axis
- Alteration Zone of Mineralization
- Harfels Zone

Element	Geochemical Anomaly	
	Anomaly area	Anomaly point
Mo	M + F	M + F
As	M + 2F	M + 2F
F	M + F	M + F

X more than two Anomaly point
XX single Anomaly point



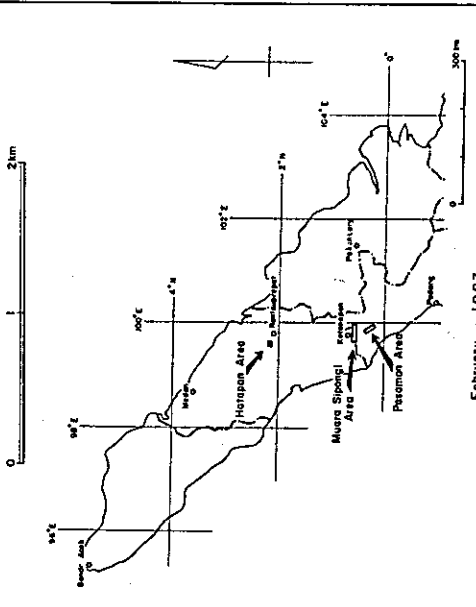
PL.II-6

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MINERAL EXPLORATION IN NORTHERN SUMATRA
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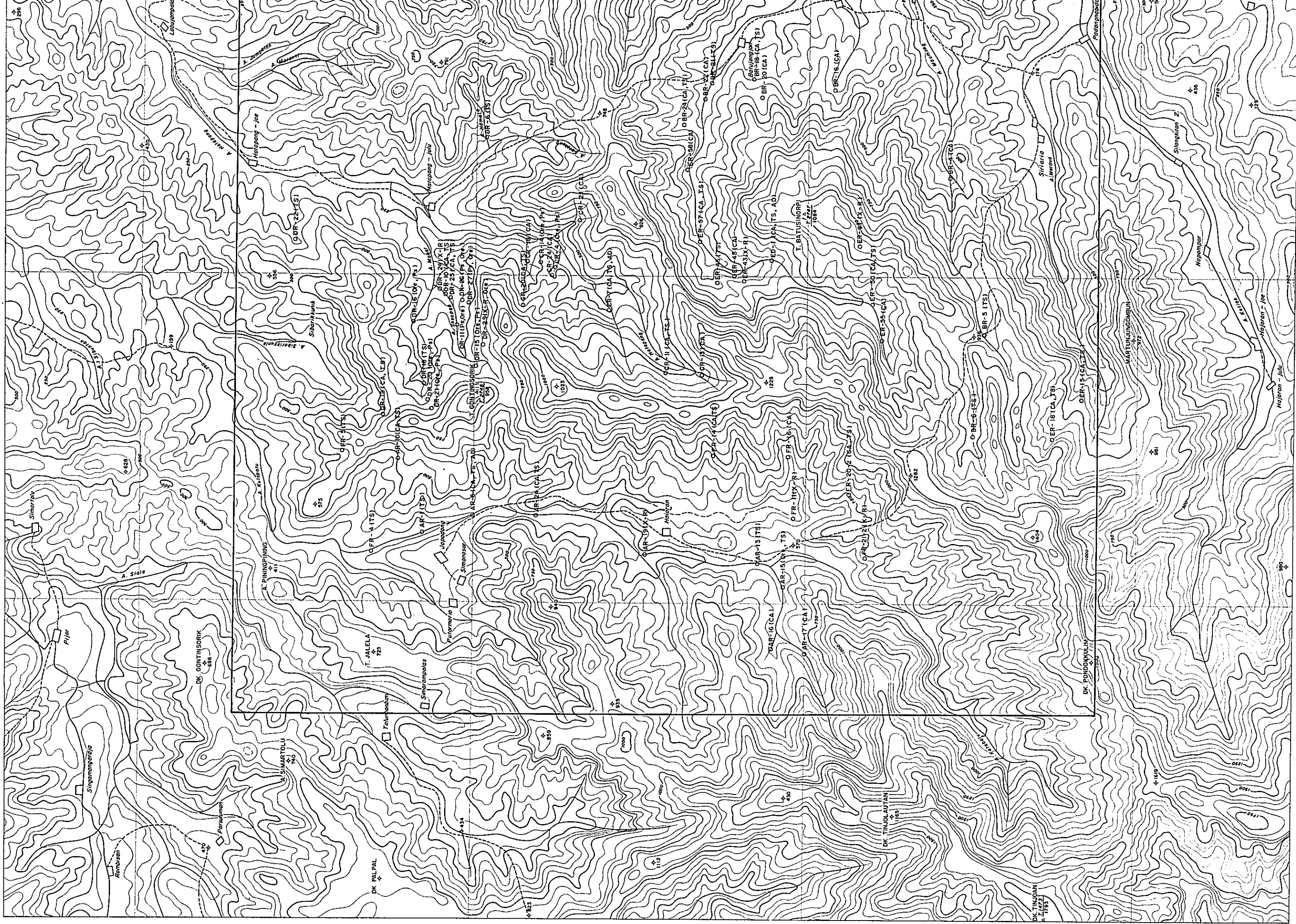
**LOCATION MAP OF GEOCHEMICAL SAMPLES
 AND PANNING SAMPLES IN HATAPANG AREA**



Scale 1:25,000

February 1983



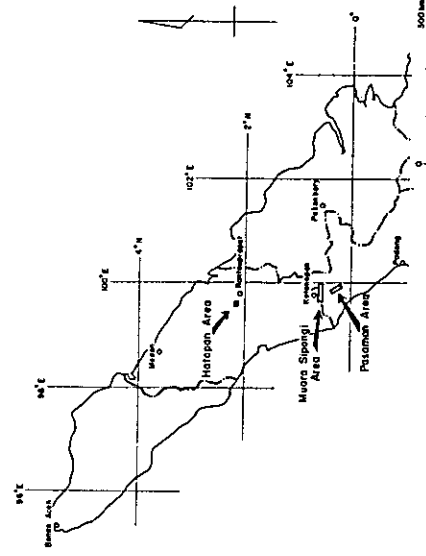
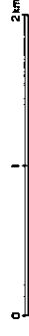


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DIRECTORATE GENERAL OF MINES
MINISTRY OF MINES AND ENERGY
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MINERAL EXPLORATION IN NORTHERN SUMATRA
REPUBLIC OF INDONESIA

LOCATION MAP OF ROCK SAMPLES TESTED
IN HATAPANG AREA

Scale 1:25,000

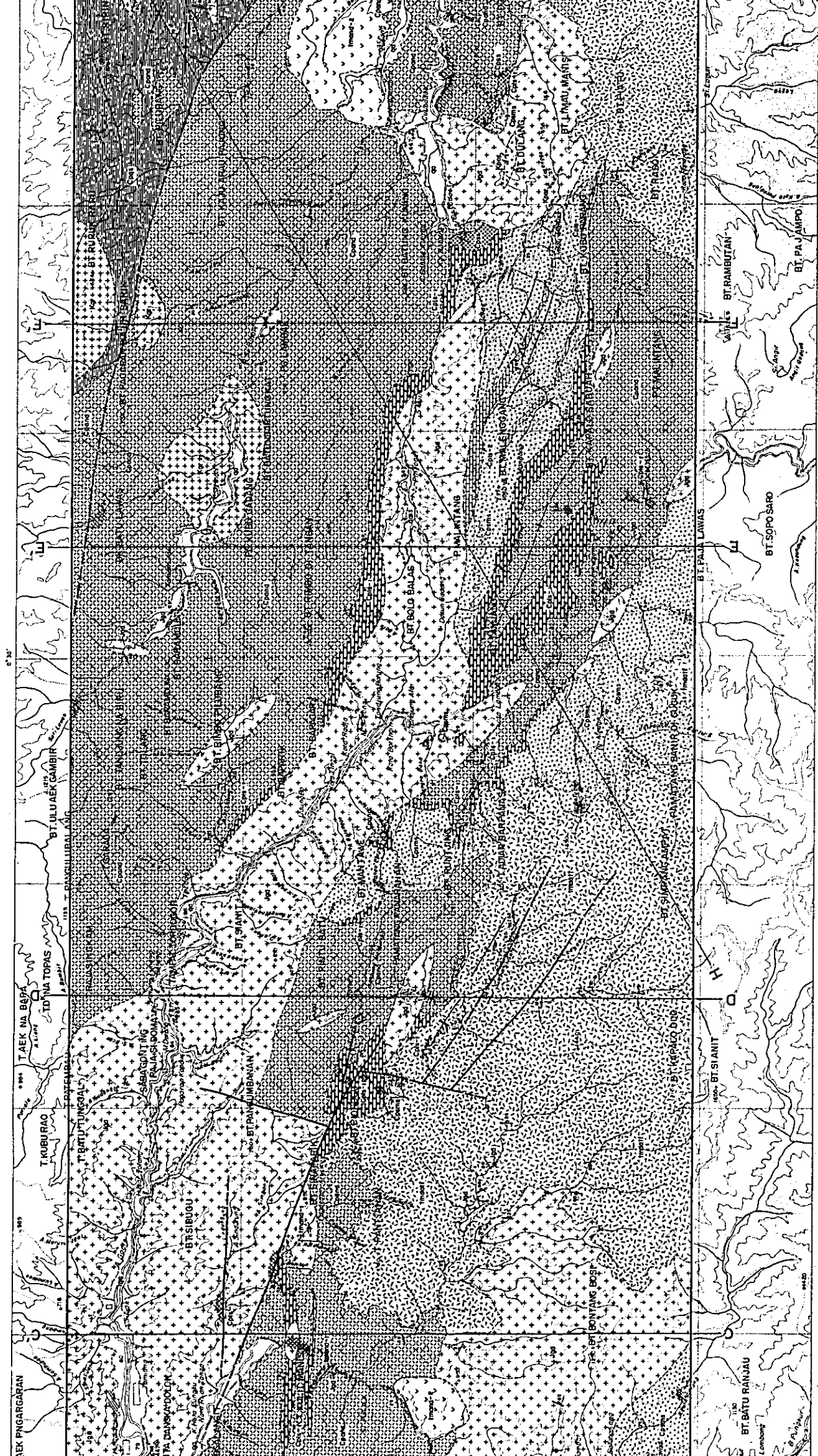


February 1983

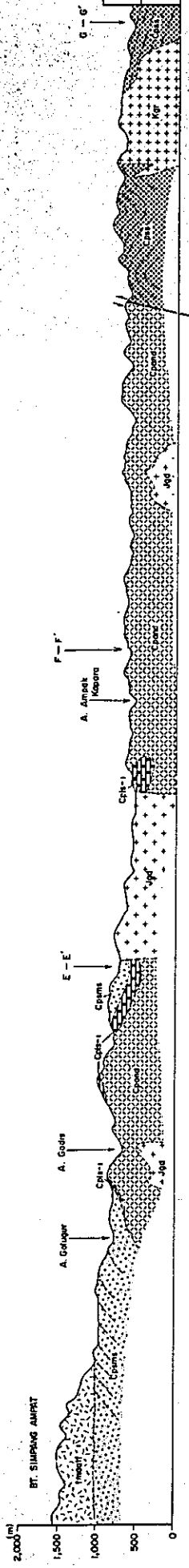
LEGEND

- AR-1 ~ FR-20 : Sample No.
- TS : Thin section
- P+ : Polished section or Polished thin section
- CA : Chemical Analysis
- Ore : Chemical Analysis (Ore)
- X-R : X-Ray Analysis
- AD : Age Dating





PROFILE
H - H'

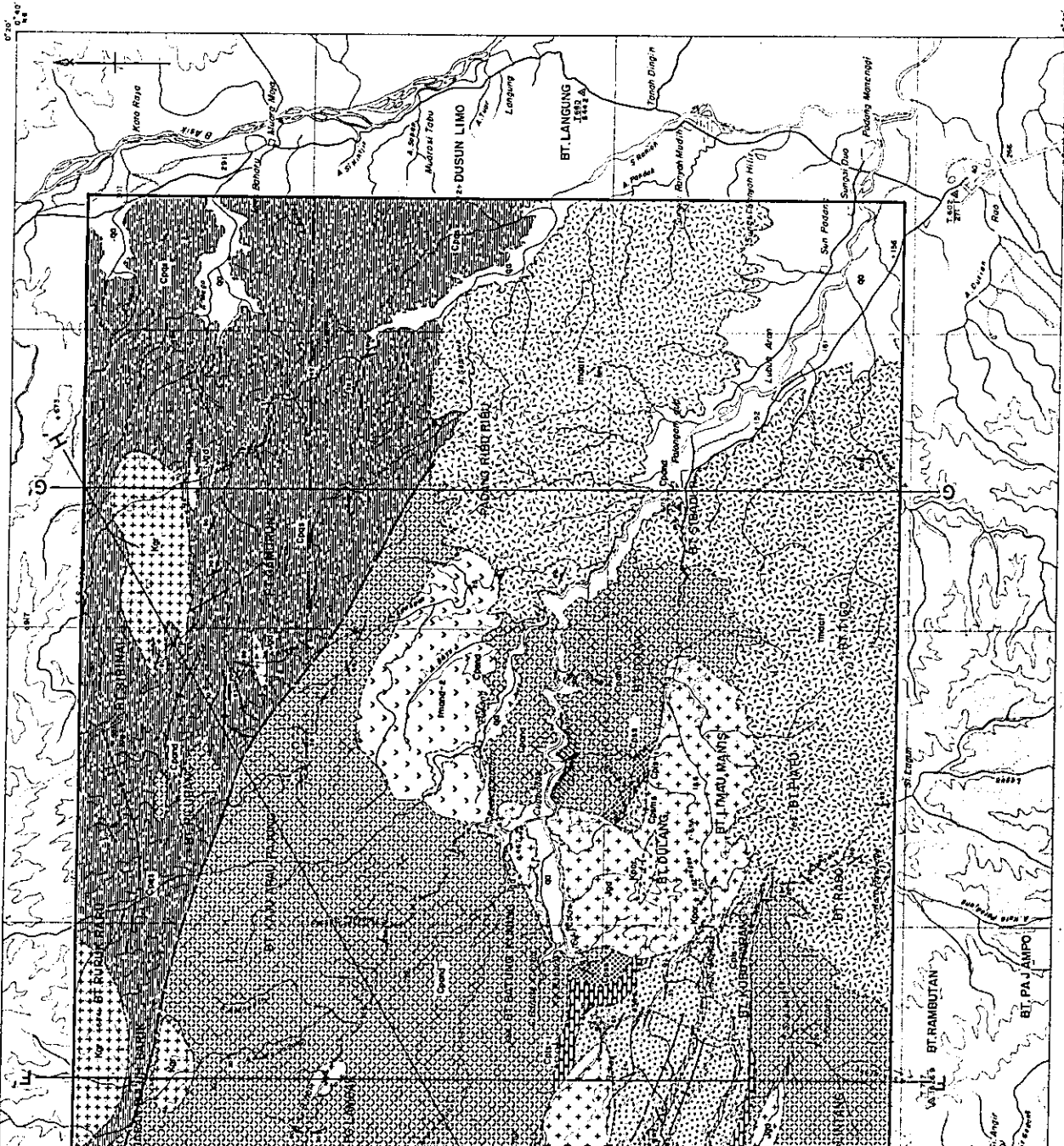


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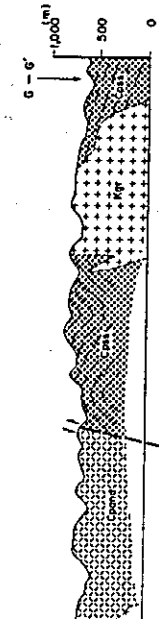
Geological Age	Geological unit	Sedimentary Rocks	Volcanic Rocks	Intrusive Rocks
CENOZOIC	QUATERNARY	ae Alluvium		
	TERTIARY		BT. Pasceban Inset Dolicite tuff	Ime-2 Andesite Ime-1 Andesite
	MESOZOIC			BT. Ruruk Ruru Granite Plogio Quartz Porphyry Muro, Sibonqi Granodiorite
PALEOZOIC	PERMIAN - CARBONIFEROUS			
	CRETACEOUS - JURASSIC	Cpk-2 Limestone Cpk-1 Limestone Cpk-3 Sandstone		
		Paibahan Formation BT. Tjongang Formation S. Ranjo Formation	Cps-2 Limestone Cps-1 Limestone Cps Sandstone Cps Quartz Sandstone	

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

- Pyrite disseminated zone
- Skarified zone
- Steam alteration
- Metalliferous vein, Ore bed
- Malachite stain



Rocks
desite
desite
Ruruk Ruru inite
ogo Quartz phyry
ara, Sipongi robonite



P.L.I-1

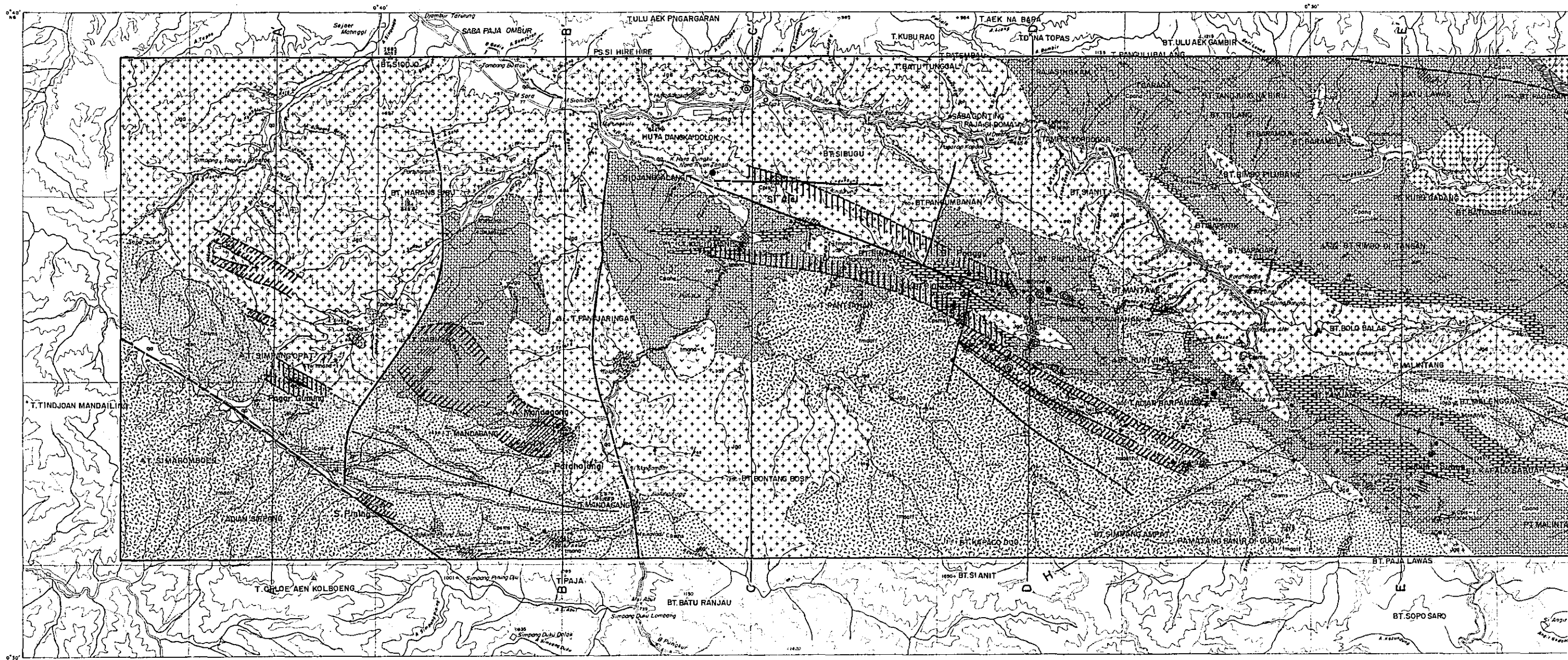
<p>METAL MINING AGENCY OF JAPAN JAPAN INTERNATIONAL COOPERATION AGENCY</p>	<p>DIRECTORATE OF MINERAL RESOURCES DIRECTORATE GENERAL OF MINES MINISTRY OF MINES AND ENERGY REPUBLIC OF INDONESIA</p>
--	---

MINERAL EXPLORATION IN NORTHERN SUMATRA
REPUBLIC OF INDONESIA

GEOLOGICAL MAP AND GOLOGICAL PROFILE OF MUARA SIPONGI AREA

Scale 1:40,000

February 1983



LEGEND

Geological Age	Geological unit	Sedimentary Rocks	Volcanic Rocks	Intrusive Rocks
CENOZOIC	QUATERNARY	aa Alluvium		
	TERTIARY		Imand-2 BT. Pocnchan Oolitic tuff	Imand-2 Andesite Imand-1 Andesite
MESOZOIC	CRETACEOUS - JURASSIC			Kgr BT. Ruruk Ruru Granite Kpor Plagi Quartz Porphyry Jgr Muara Sipongi Granodiorite
PALEOZOIC	PERMIAN - CARBONIFEROUS	Cpls-2 Limestone Cpama Clastic Rock Cpls-1 Limestone Cpas Sandstone Cpas Quartz Sandstone	Cpand M. Batang Andesite and Pyroclastic Rocks	

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

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

- Silicification zone
- Skarnization zone

Panning Result

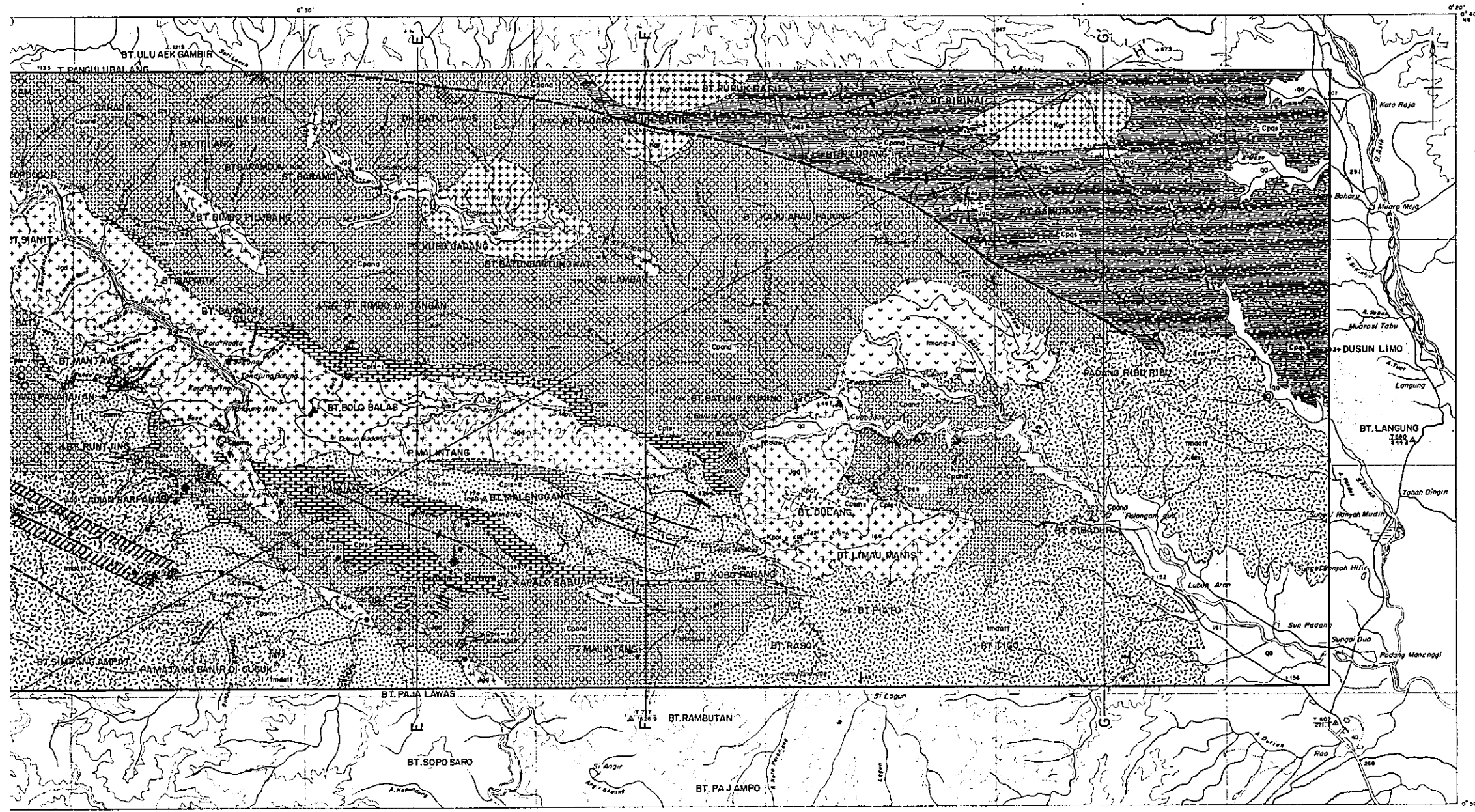
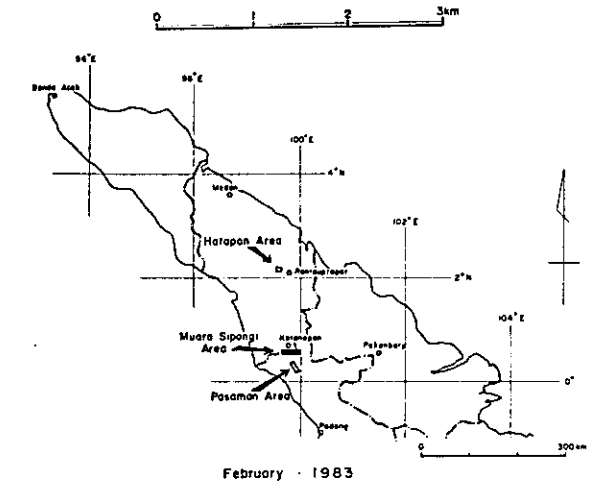
Number (PCS)
Mineral
Gold

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MINERAL EXPLORATION IN NORTHERN SUMATRA
 REPUBLIC OF INDONESIA
 MAP OF RELATIONS BETWEEN GEOLOGICAL
 STRUCTURE AND MINERALIZATION
 IN MUARA SIPONGI AREA

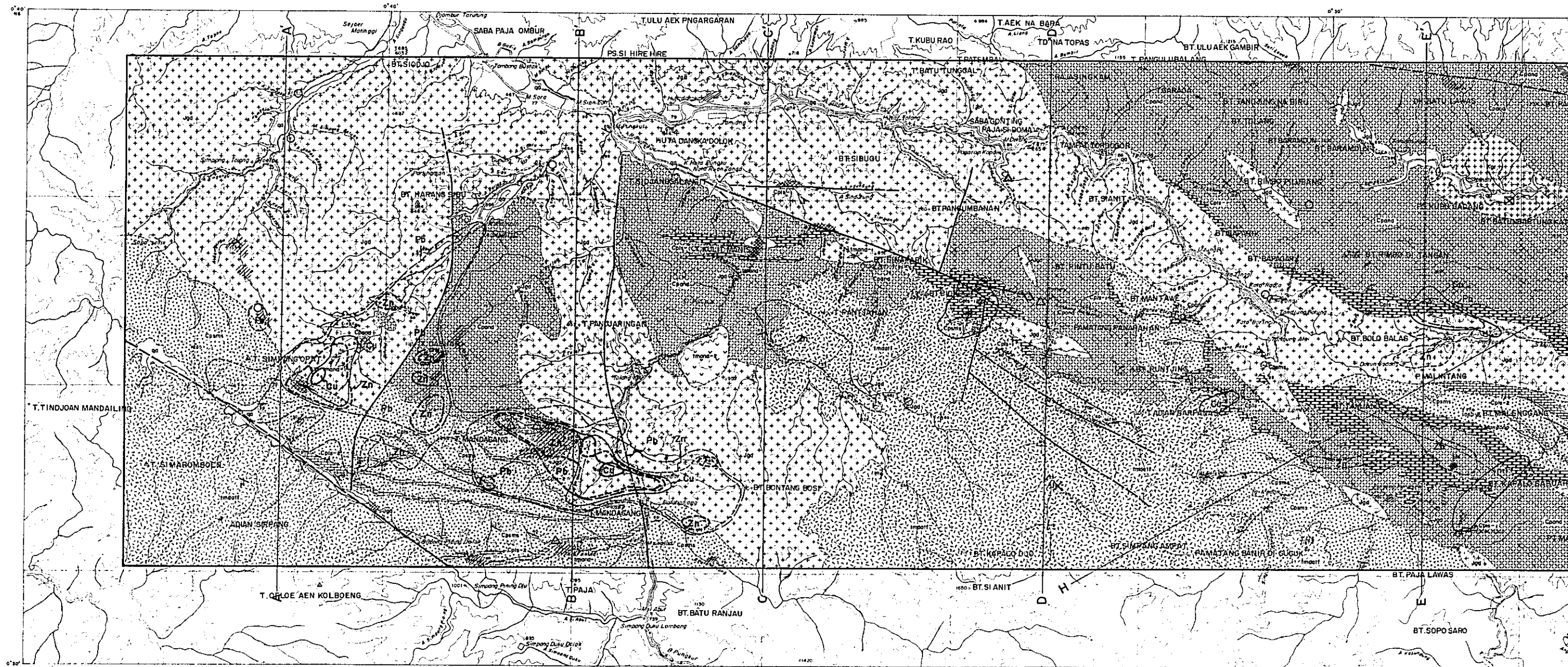
Scale 1:40,000



- Pyrite disseminated zone
- Silicified zone
- Sulfidated zone
- Skarn alteration
- Metaliferous vein, Ore bed
- Malachite stain
- Silicification zone
- Skarnization zone

Panning Result

Number (PCS)	1 ~ 3	4 ~ 6	7 ~ 10	11 ~ 32	33 ~
Mineral					
Gold	•	◦	○	⊙	●



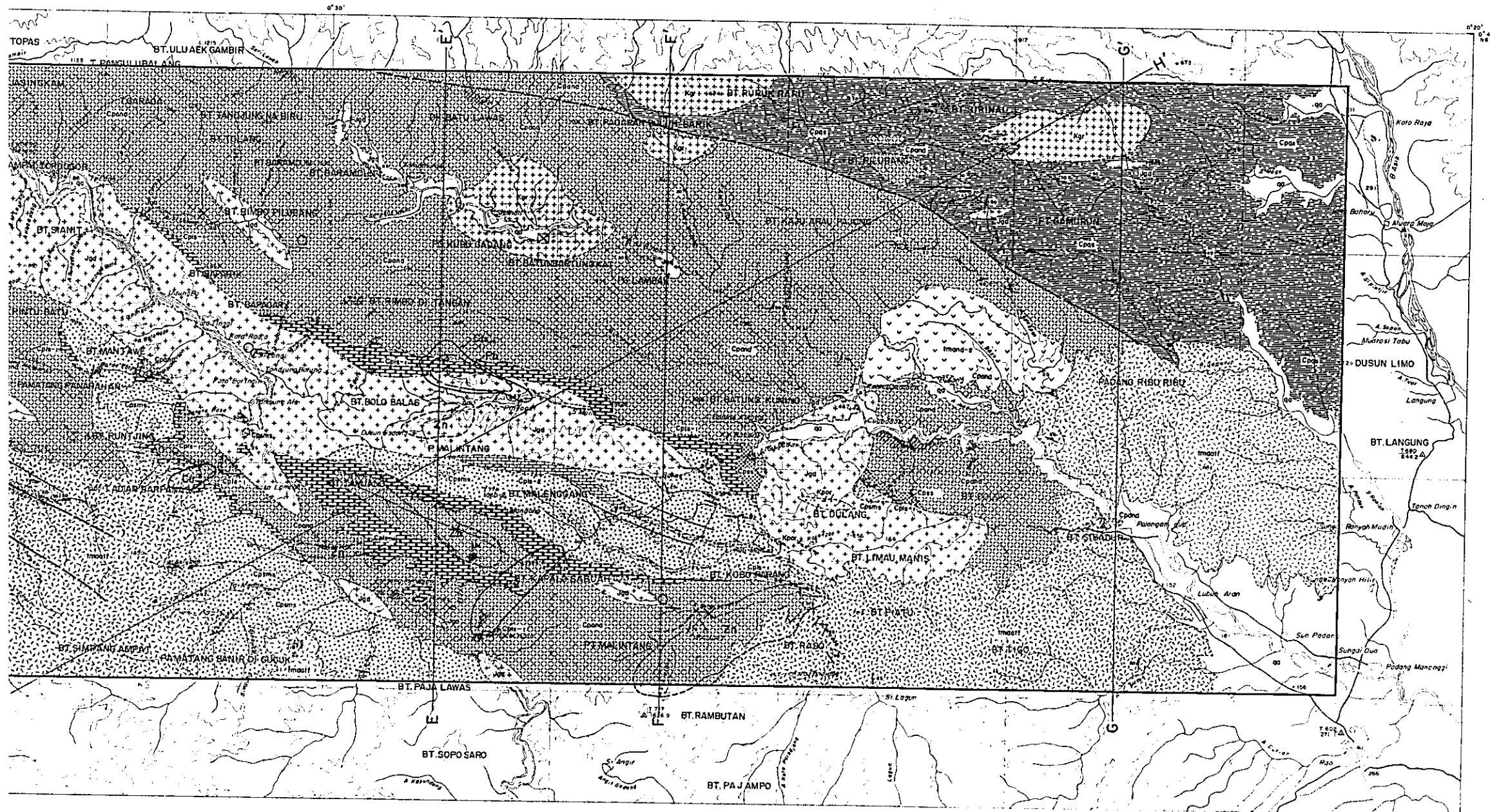
LEGEND

Geological Age		Geological unit	Sedimentary Rocks	Volcanic Rocks	Intrusive Rocks
CENOZOIC	QUATERNARY		aa Alluvium		
	TERTIARY			BT. Pancehon Dacitic tuff	Andesite Andesite
MESOZOIC	CRETACEOUS JURASSIC				BT. Ruruk Ruru Granite Plagioclase Porphyry Muara Sipongi Granodiorite
PALEOZOIC	PERMIAN CARBONIFEROUS	Patahajan Formation	Cp1s-2 Limestone Cp1sm-1 Clastic Rock		
		BT. Tanjung Formation S. Ranya Formation	Cp1s-1 Limestone Cp1ss Sandstone Cp1qs Quartz Sandstone	Cpand M. Batang Andesite and Pyroclastic 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

Element	Geochemical Anomaly		
	Anomaly area		
	M + σ	M + 2σ	M + σ
Cu			
Pb			
Zn			



PL. II-3

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MINERAL EXPLORATION IN NORTHERN SUMATRA
 REPUBLIC OF INDONESIA

MAP OF GEOCHEMICAL ANOMALY IN
 MUARA SIPONGI AREA (Cu, Pb, Zn)

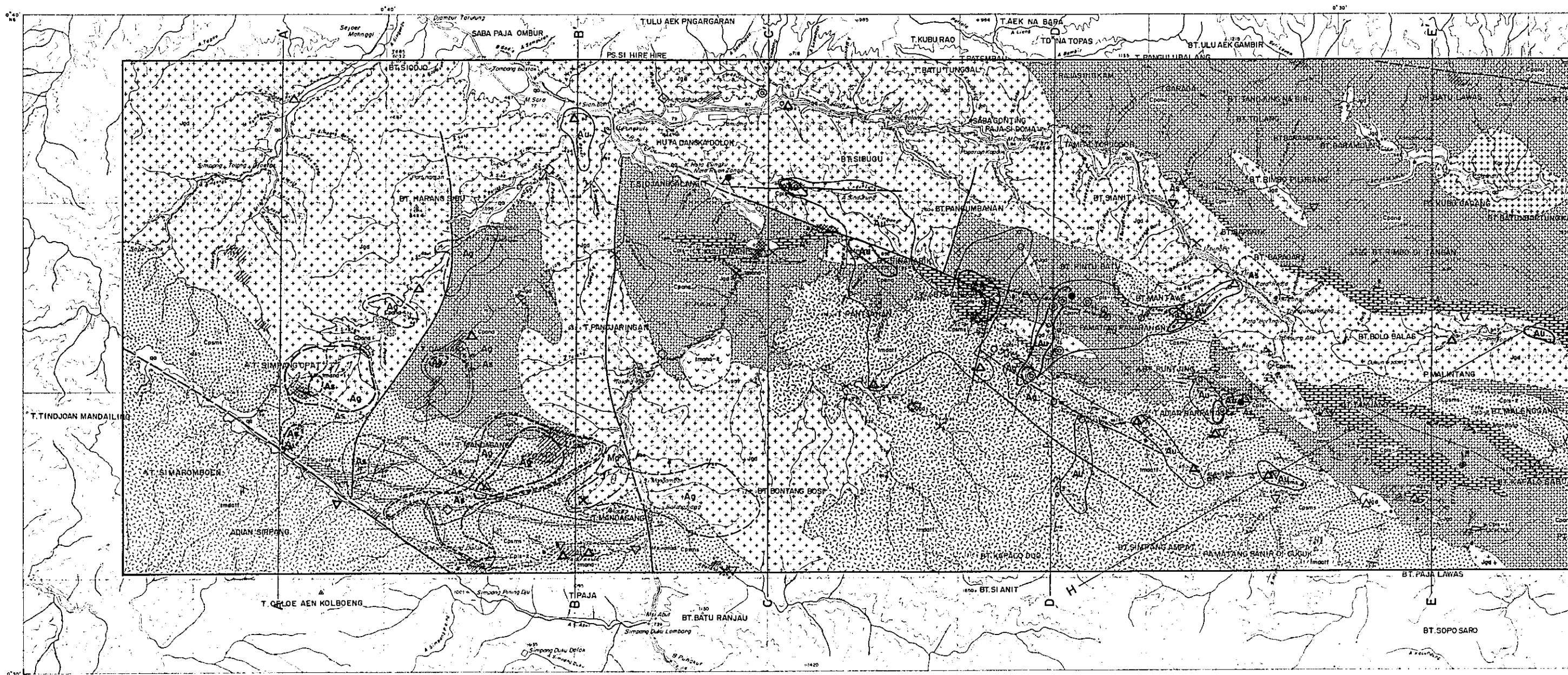
Scale 1:40,000

0 1 2 3 km

February - 1983

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

Element	Geochemical Anomaly			
	Anomaly area		Anomaly point	
	M + σ	M + 2 σ	M + σ	M + 2 σ
Cu				
Pb				
Zn				



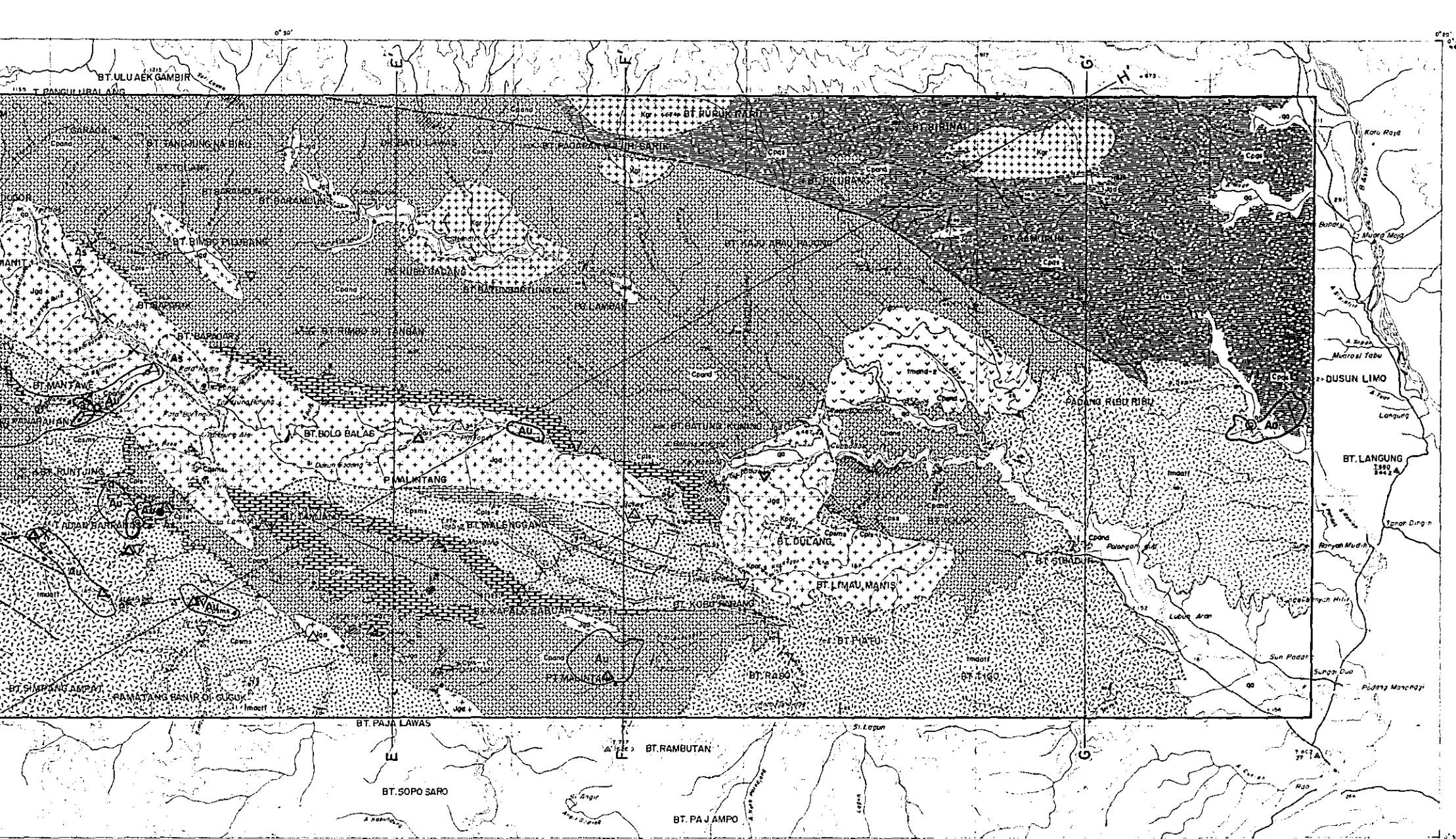
LEGEND

Geological Age	Geological unit	Sedimentary Rocks	Volcanic Rocks	Intrusive Rocks
CENOZOIC	QUATERNARY	eo Alluvium		
	TERTIARY		tsmt BT. Poacehan Dacitic tuff	imand-z Andesite imane-1 Andesite
MESOZOIC	CRETACEOUS - JURASSIC			Kgr BT. Ruruk Ruru Granite Kpor Plagio Quartz Porphyry jgd Muara Sipang Granodiorite
PALEOZOIC	PERMIAN - CARBONIFEROUS	Cpls-2 Limestone	Cpand M. Batang Andesite and Pyroclastic Rocks	
		Cpms Clastic Rock		
		Cpls-1 Limestone		
		Cps Sandstone		
		Cps 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

	Geochemical Anomaly		
	Anomaly Area		
	M + r	M + 2r	M + r
Au			
Ag			
Mo			
As			

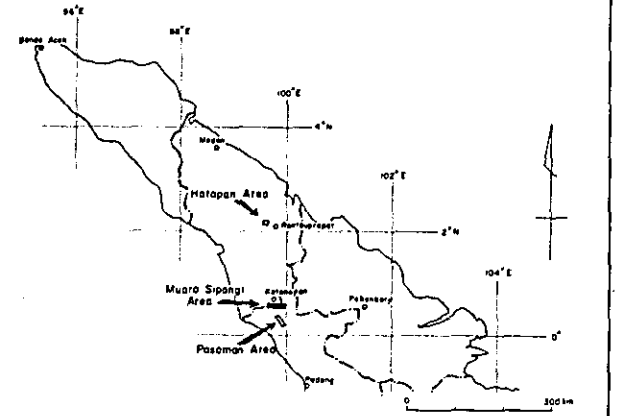


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 JAPAN INTERNATIONAL COOPERATION AGENCY
 DIRECTORATE OF MINERAL RESOURCES
 DIRECTORATE GENERAL OF MINES AND ENERGY
 REPUBLIC OF INDONESIA

MINERAL EXPLORATION IN NORTHERN SUMATRA
 REPUBLIC OF INDONESIA

MAP OF GEOCHEMICAL ANOMALY IN
 MUARA SIPONGI AREA (Au, Ag, As, Mo)

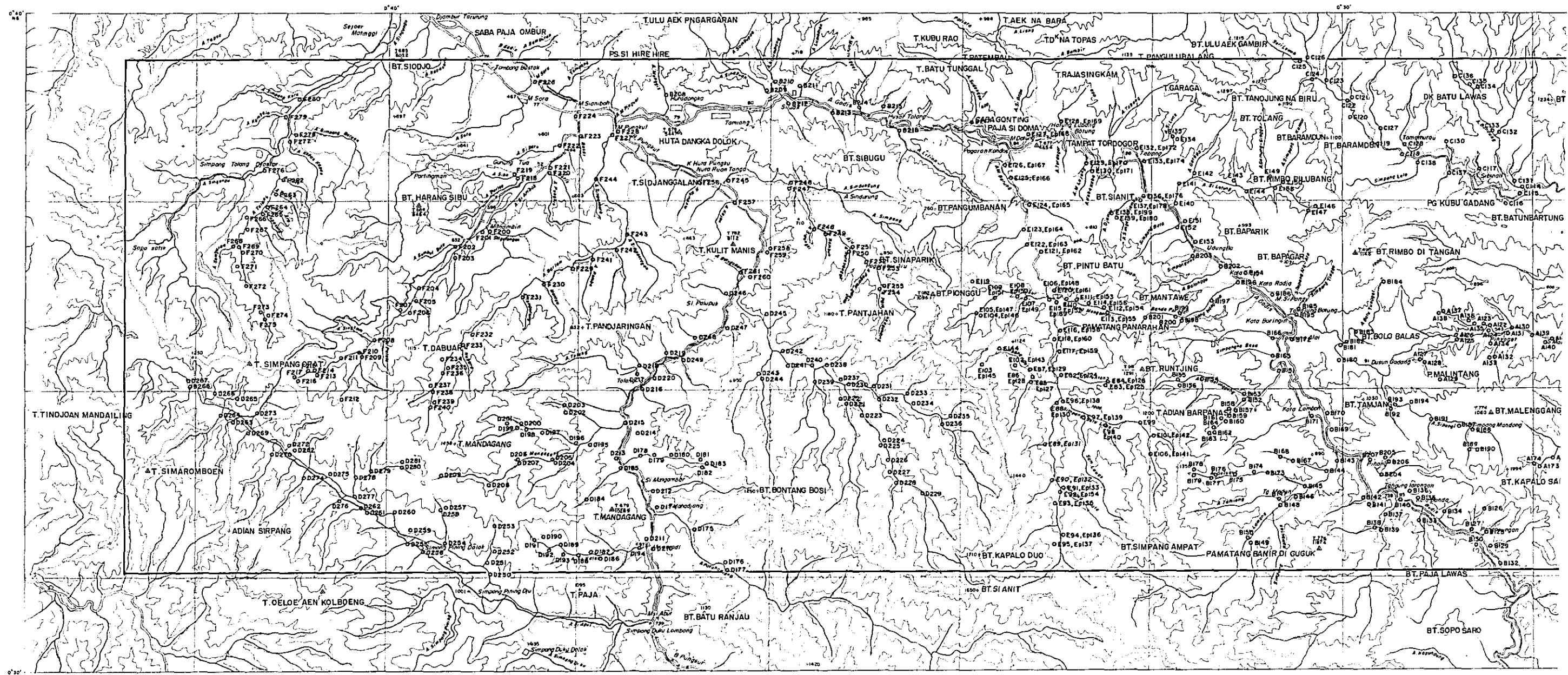
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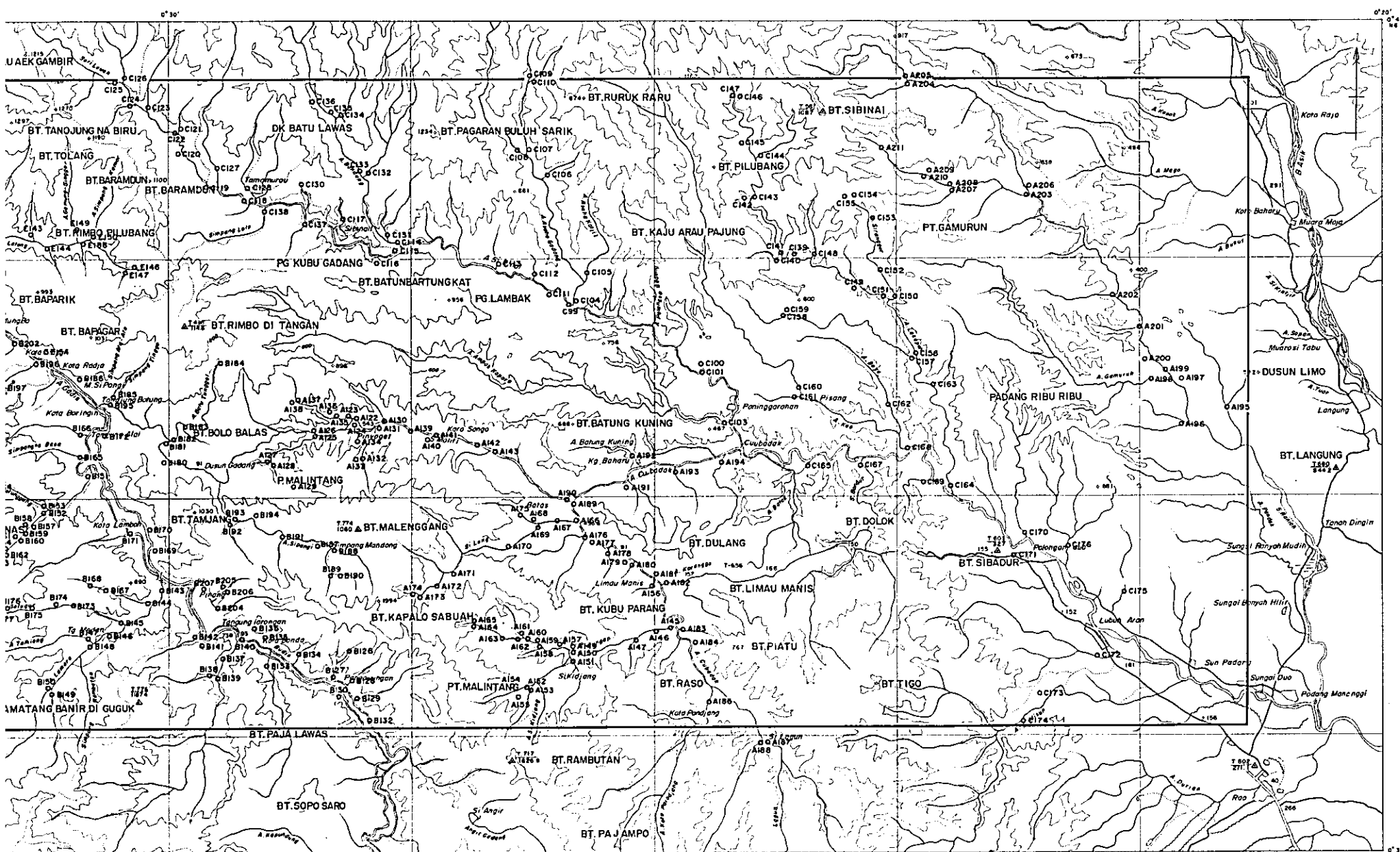


February 1983

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

	Geochemical Anomaly				Panning 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									





PL. II - 5

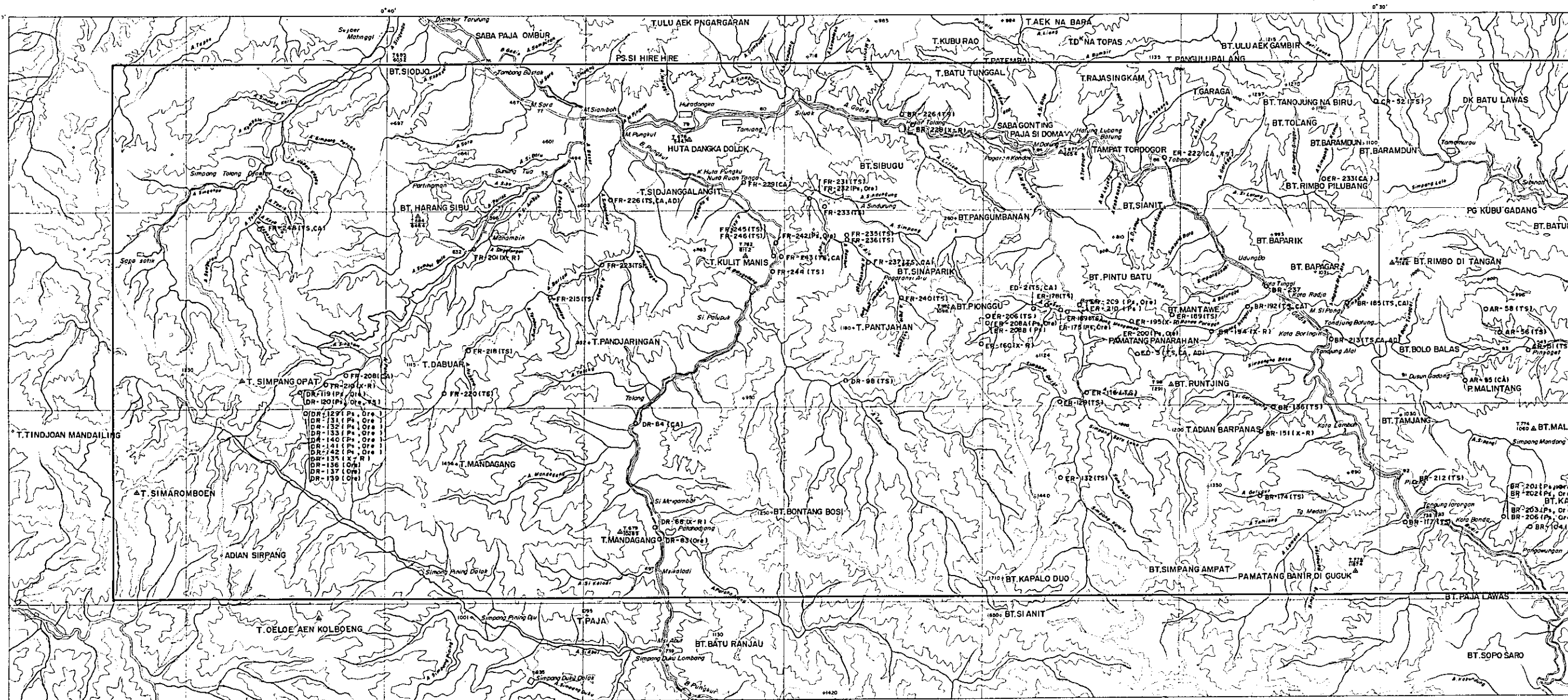
METAL MINING AGENCY OF JAPAN DIRECTORATE OF MINERAL RESOURCES
 JAPAN INTERNATIONAL COOPERATION AGENCY DIRECTORATE GENERAL OF MINES AND ENERGY
 REPUBLIC OF INDONESIA

MINERAL EXPLORATION IN NORTHERN SUMATRA
 REPUBLIC OF INDONESIA

LOCATION MAP OF GEOCHEMICAL SAMPLES
 AND PANNING SAMPLES
 IN MUARA SIPONGI AREA

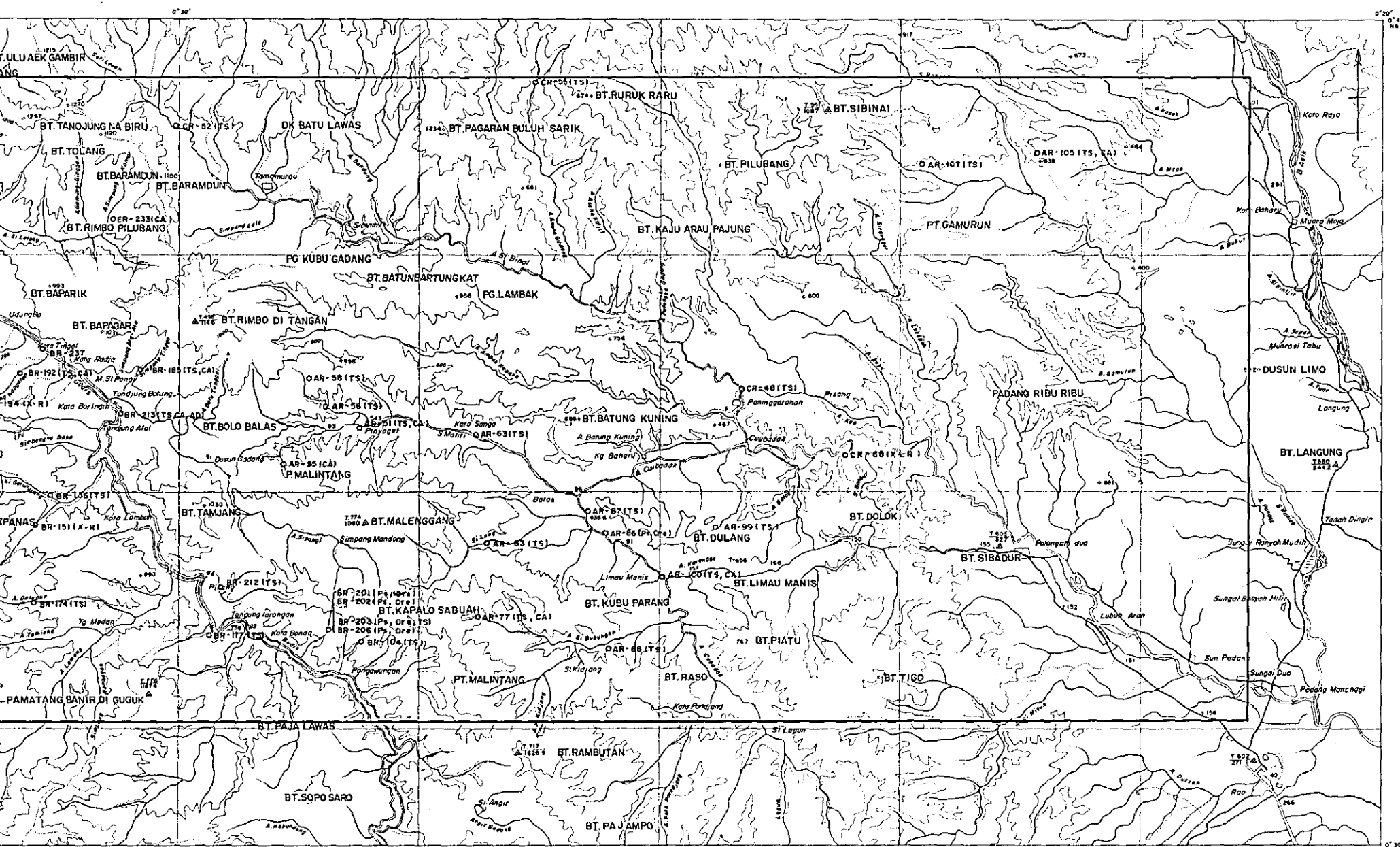
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February 1983

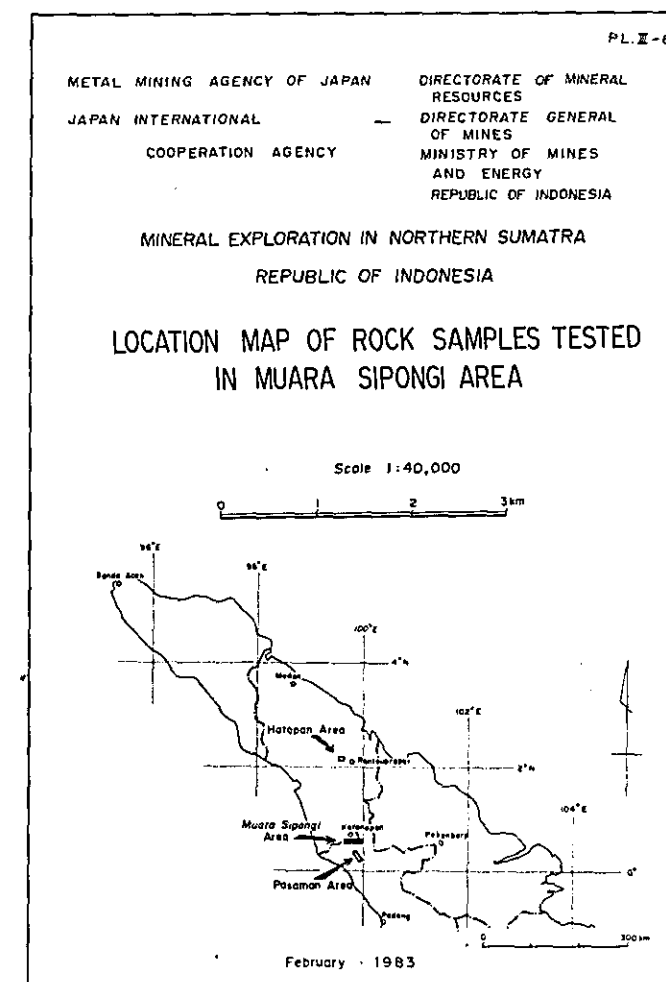


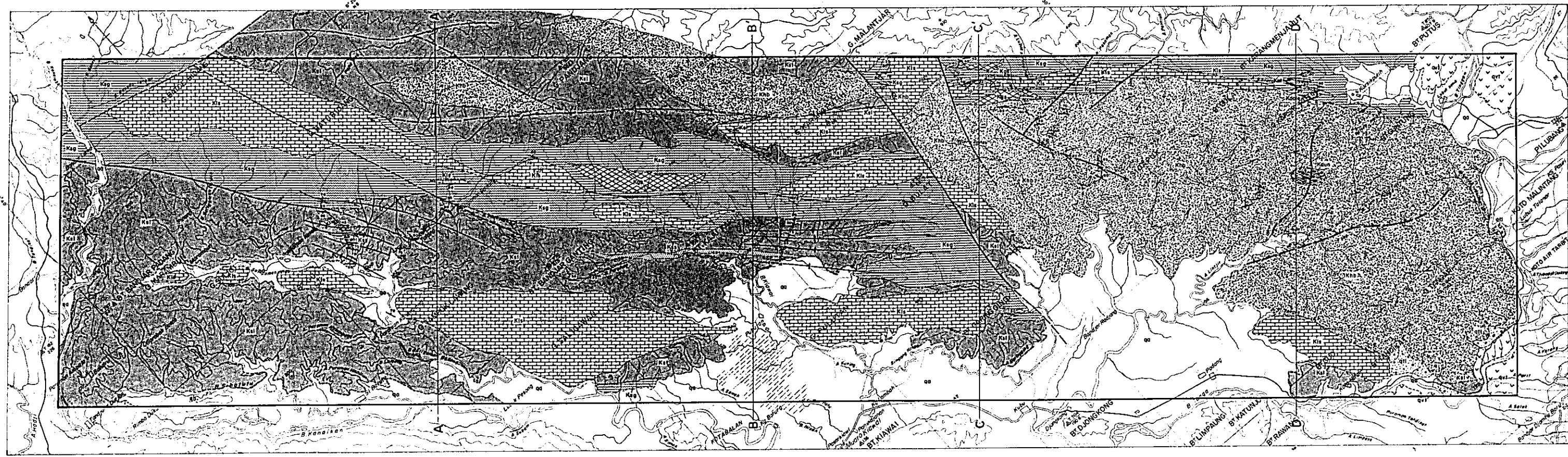
LEGEND

AR51 ~ FR252 : Sample No.	Ps : Polished section or Polished thin section	Ore : Chemical Analysis (Ore)	AD : Age Dating
TS : Thin section	CA : Chemical Analysis	X-R : X-Ray Analysis	

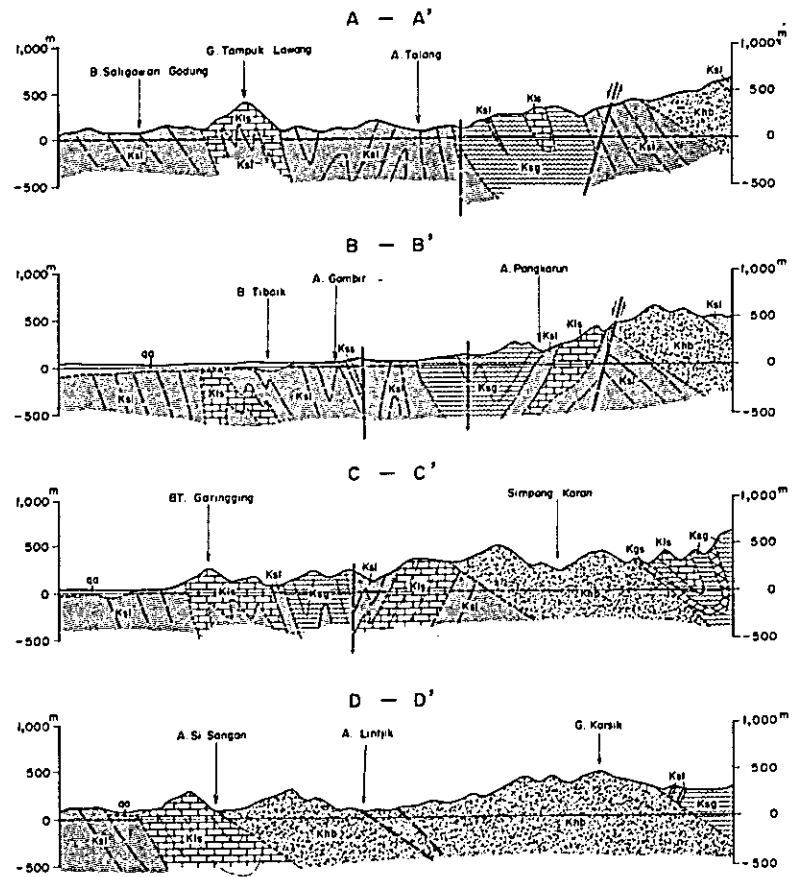


Ore : Chemical Analysis (Ore) AD : Age Dating
 X-R : X-Ray Analysis





PROFILE



LEGEND

Geological Age	Geological unit	Sedimentary, Metamorphic & volcanic Rocks	Igneous Rocks
CENOZOIC	QUATERNARY	<ul style="list-style-type: none"> aa Alluvium ali Detrital Deposit avi Andesite 	
	Talamau volcanics		
MESOZOIC	CRETACEOUS	<ul style="list-style-type: none"> Ksg Green Schist Kgr Green Rock (Andesit) Kls Limestone Kss Siliceous Schist, Sandstons Ksl Pelitic Schist, Slate 	<ul style="list-style-type: none"> Kde Dolerite Kdn Dunite Khb Harzburgite
		Woyla Formation	

- / Dip and Strike
- / Fault Confirmed
- / Joint
- / Fault Inferred and, by Photolineament
- / Foliation
- / Anticlinal Axis
- / Shear and Fault
- / Synclinal Axis
- Sheared Zone
- A—A' Section line

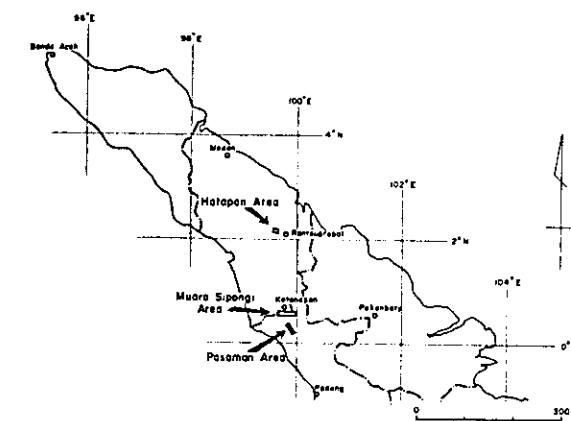
METAL MINING AGENCY OF JAPAN DIRECTORATE OF MINERAL RESOURCES
JAPAN INTERNATIONAL DIRECTORATE GENERAL OF MINES
COOPERATION AGENCY MINISTRY OF MINES AND ENERGY
REPUBLIC OF INDONESIA

MINERAL EXPLORATION IN NORTHERN SUMATRA
REPUBLIC OF INDONESIA

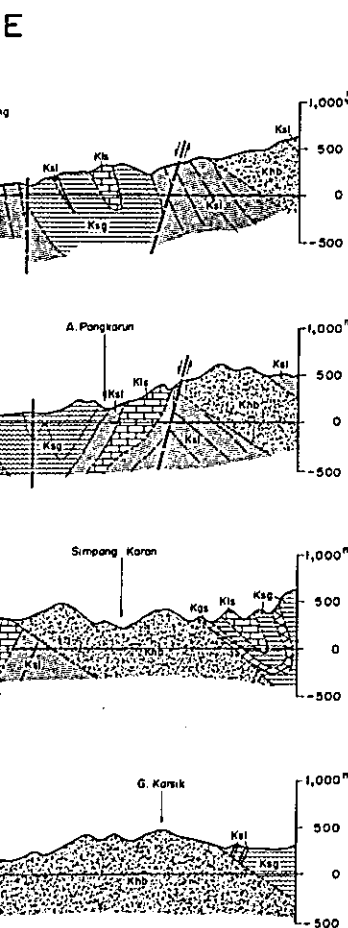
GEOLOGICAL MAP AND GEOLOGICAL PROFILE
OF PASAMAN AREA

Scale 1:40,000

0 1 2 3 km



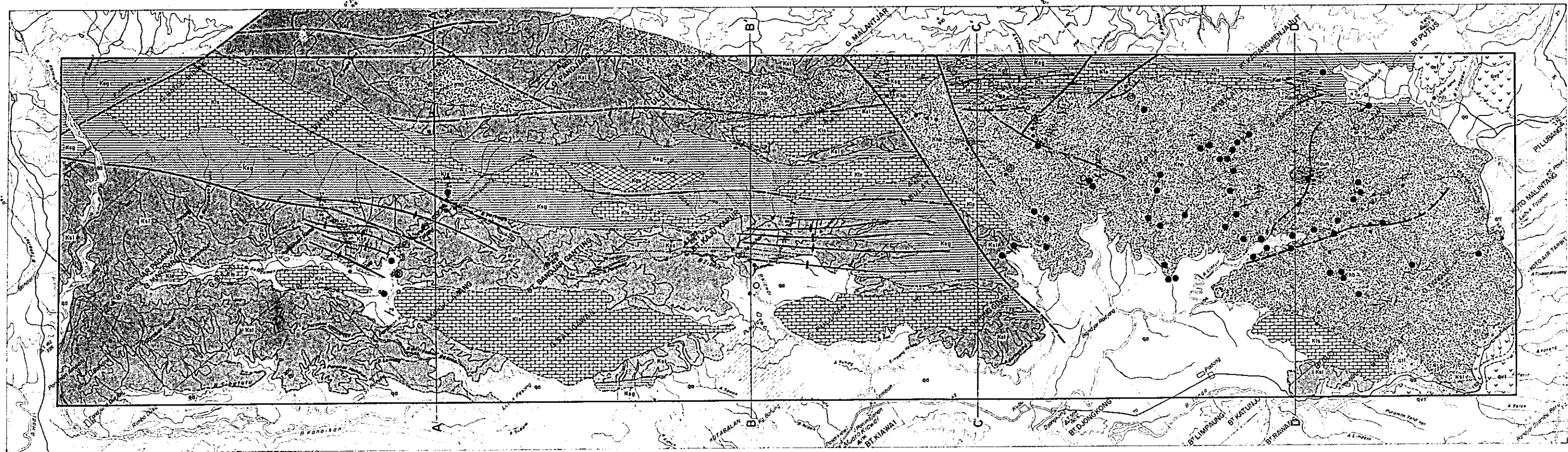
February - 1983



LEGEND

Geological Age		Geological unit	Sedimentary, Metamorphic & volcanic Rocks	Igneous Rocks
CENOZOIC	QUATERNARY		aa Alluvium	
			qtl Detrital Deposit	
		Talamau volcanics	av1 Andesite	
MESOZOIC	CRETACEOUS	Wayla Formation	Ksg Green Schist	Kdole Dolerite
			Kga Green Rock (Andesit)	Kadun Dunite
			Kls Limestone	Khb Horzburgite
			Kss Siliceous Schist, Sandstons	
			Ksl Pelitic Schist, Slate	

- Dip and Strike
- Joint
- Foliation
- Shear and Fault
- Sheared Zone
- Fault Confirmed
- Fault Inferred and, by Photolineament
- Anticlinal Axis
- Synclinal Axis
- A—A' Section line



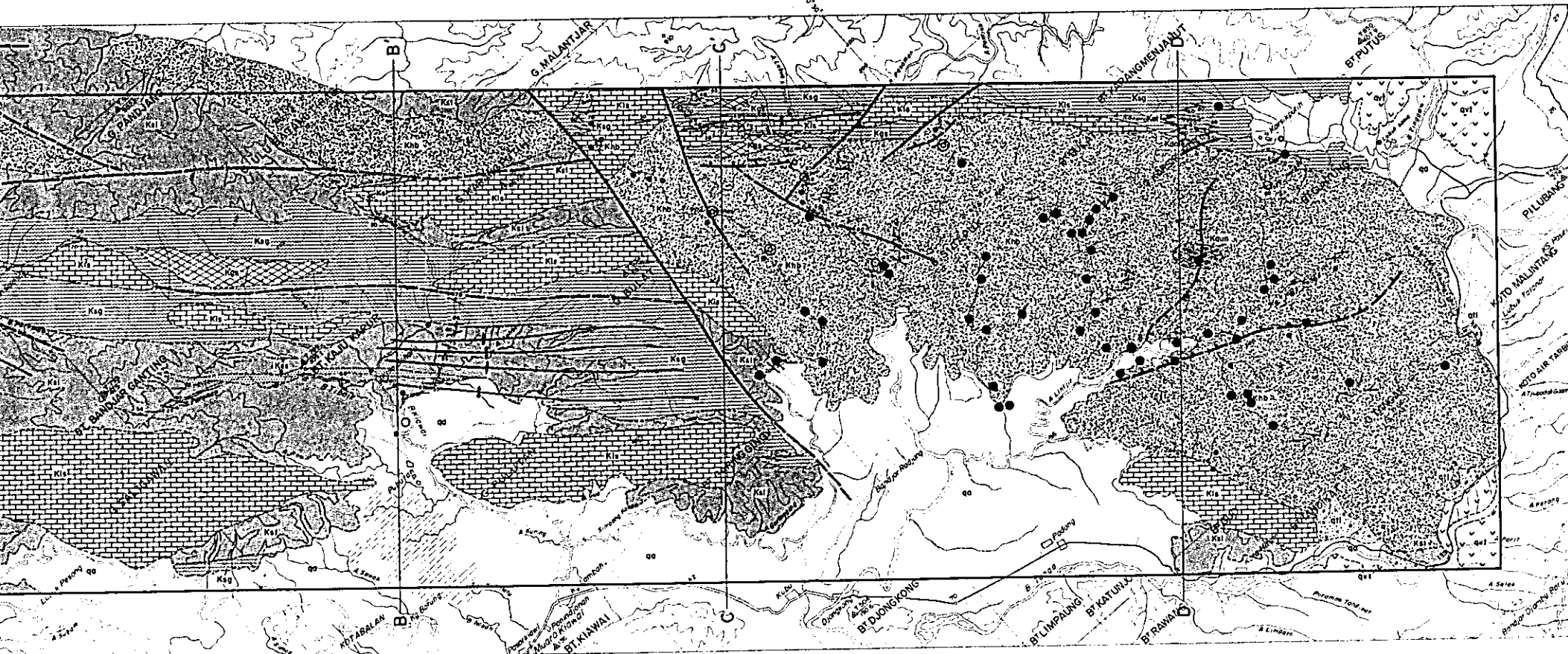
LEGEND

Geological Age	Geological unit	Sedimentary, Metamorphic & volcanic Rocks	Igneous Rocks
CENOZOIC	QUATERNARY	aa Alluvium	
		af Detrital Deposit	
	Talamau volcanics	av Andesite	
MESOZOIC	CRETACEOUS	Kga Green Schist	Kka Diabase
		Kgs Green Rock (Andesit)	Kdu Dunite
		Kls Limestone	Khb Harzburgite
		Ksa Siliceous Schist, Sandstone	
		Ksl Pelitic Schist, Slate	

- Dip and Strike
- Joint
- Foliation
- Shear and Fault
- Sheared Zone
- Fault Confirmed
- Fault Inferred and, by Photoalignment
- Anticlinal Axis
- Synclinal Axis
- A-A' Section line

Panning Result

Number (PCS)	1-25	26-64	65-160	161-410	411-1000
Chromite or Chrome - Spinel	•	◦	○	⊙	●



PL. IV-2

METAL MINING AGENCY OF JAPAN DIRECTORATE OF MINERAL RESOURCES
 JAPAN INTERNATIONAL COOPERATION AGENCY DIRECTORATE GENERAL OF MINES AND ENERGY
 REPUBLIC OF INDONESIA

MINERAL EXPLORATION IN NORTHERN SUMATRA
 REPUBLIC OF INDONESIA

MAP OF RELATIONS BETWEEN GEOLOGICAL STRUCTURE AND MINERALIZATION AND PANNING RESULT IN PASAMAN AREA

Scale 1:40,000

February - 1983

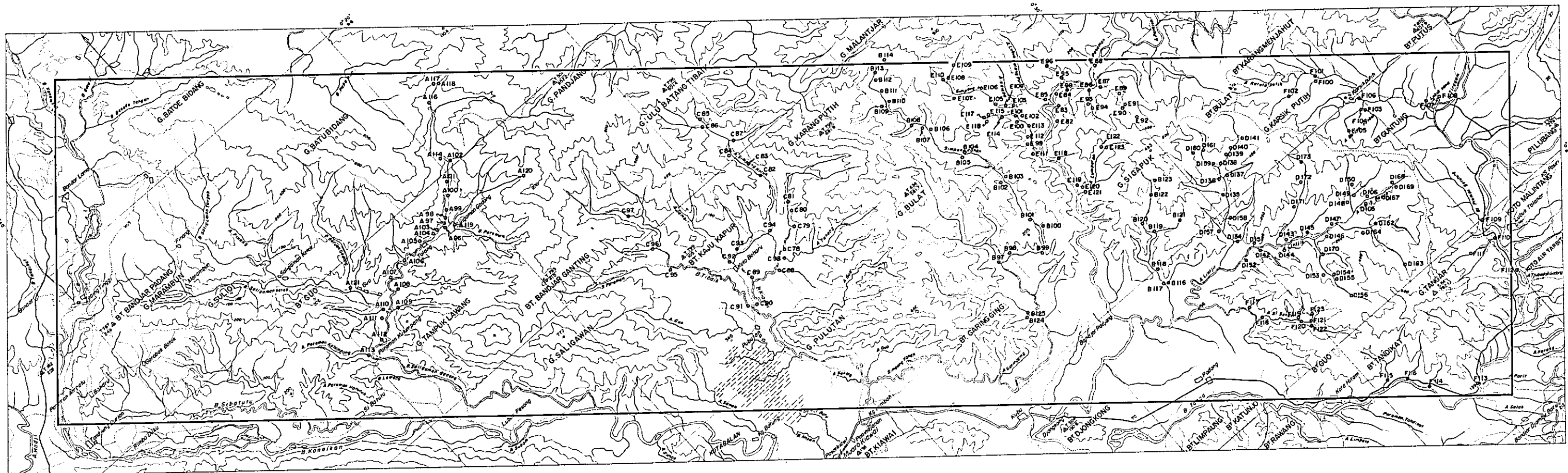
Igneous Rocks

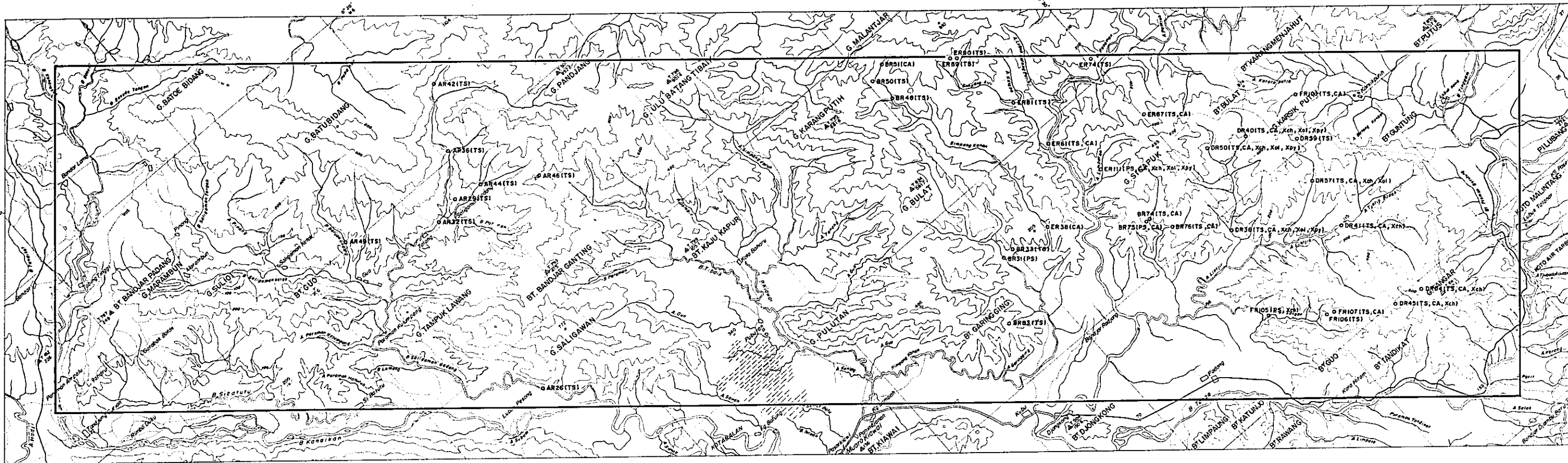
	Kade Dolerite
	Kdw Dunite
	Khd Harzburgite

- | | | | |
|--|-----------------|--|--------------------------------------|
| | Dip and Strike | | Fault Confirmed |
| | Joint | | Fault Inferred and by Photolineament |
| | Foliation | | Anticlinal Axis |
| | Shear and Fault | | Synclinal Axis |
| | Sheared Zone | | A - A' Section line |

Panning Result

Mineral	Number (PCS)				
	1-25	26-64	65-160	161-410	411-1000
Chromite or Chrome - Spinel	•	○	○	◎	●





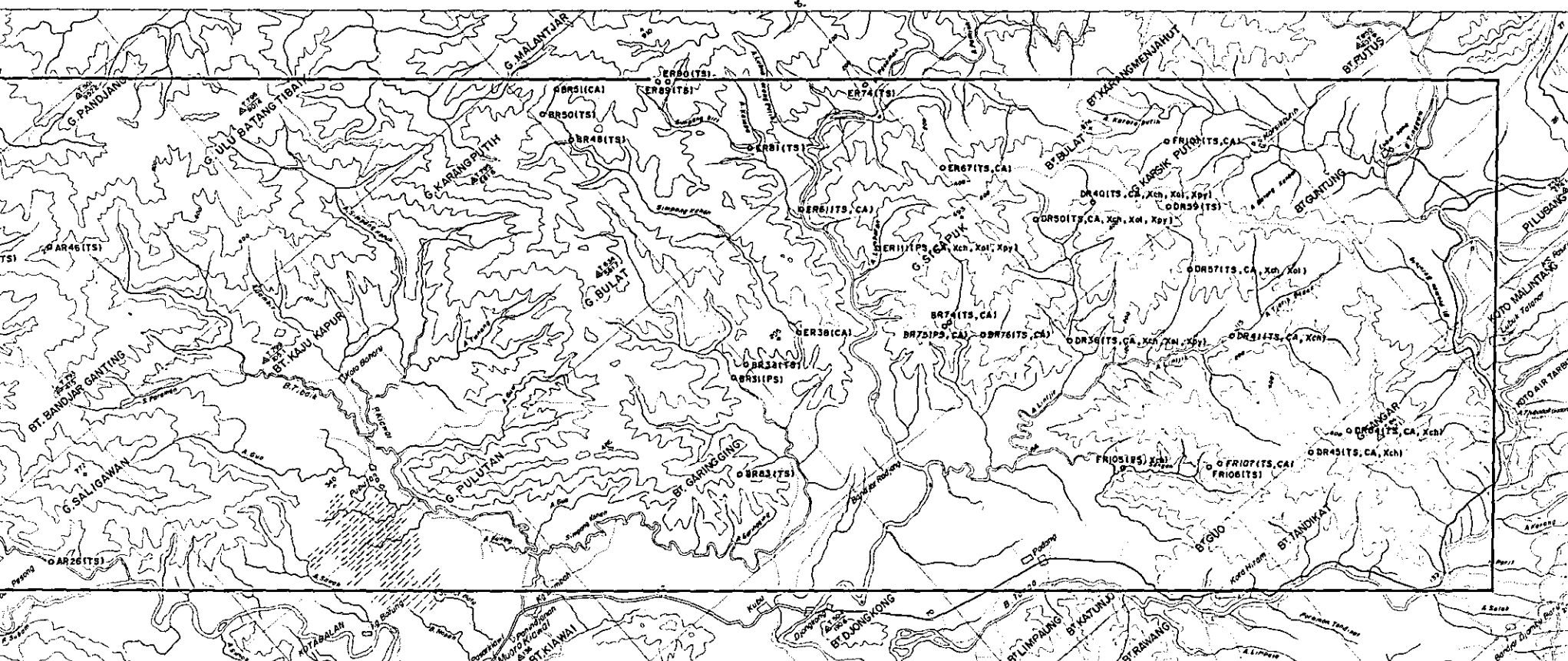
LEGEND

AR26 - FR107 : Sample No.
 TS : Thin section

PS : Polished section or Polished thin section
 CA : Chemical Analysis

Xch : Microprobe Analysis of Chromite
 Xol : Microprobe Analysis of Olivine

Xpy : Microprobe Analysis of Pyroxene



Sample No. PS : Polished section or Polished thin section Xch : Microprobe Analysis of Chromite Xpy : Microprobe Analysis of Pyroxene
 CA : Chemical Analysis Xol : Microprobe Analysis of Olivine

