REFERENCES

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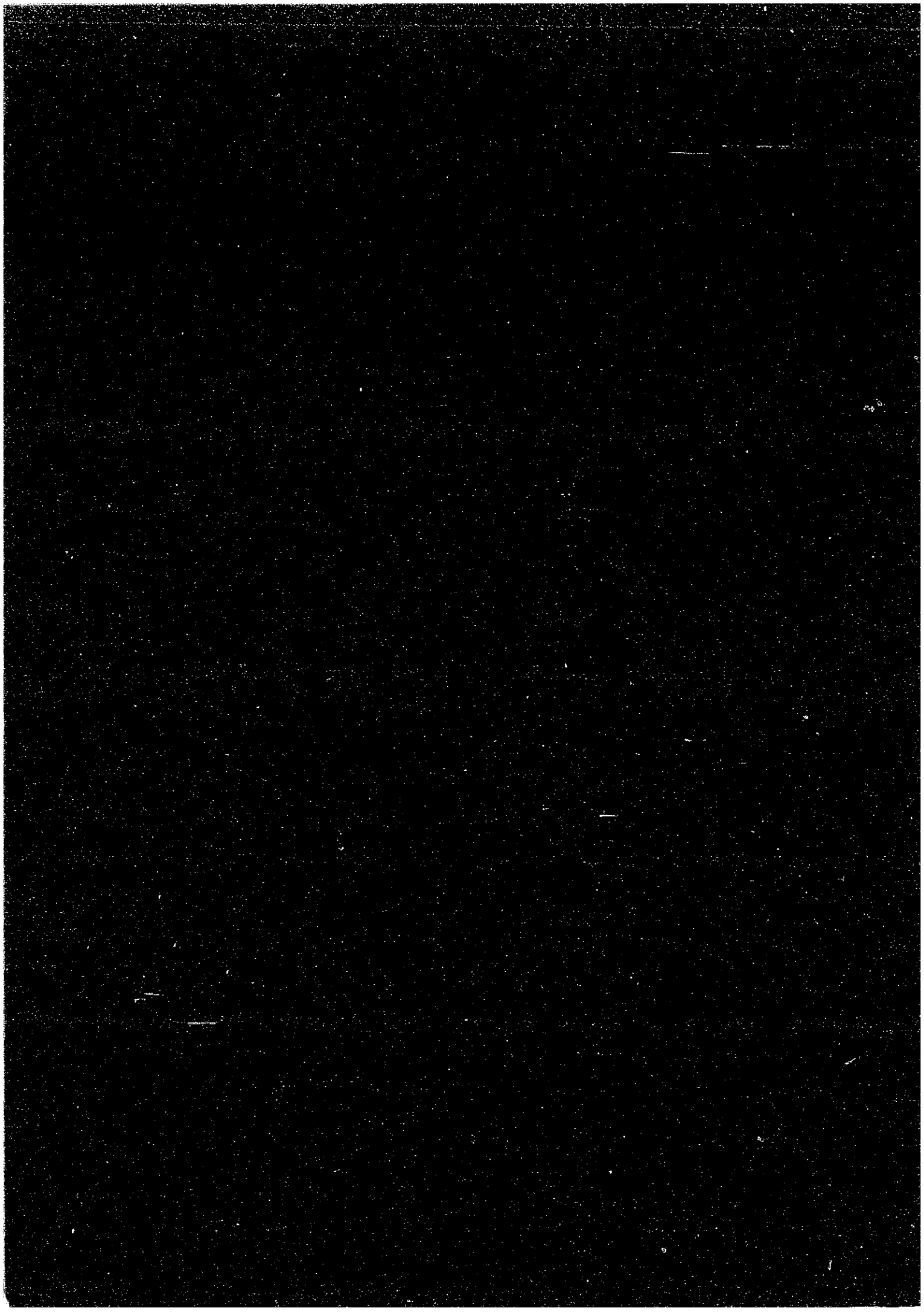

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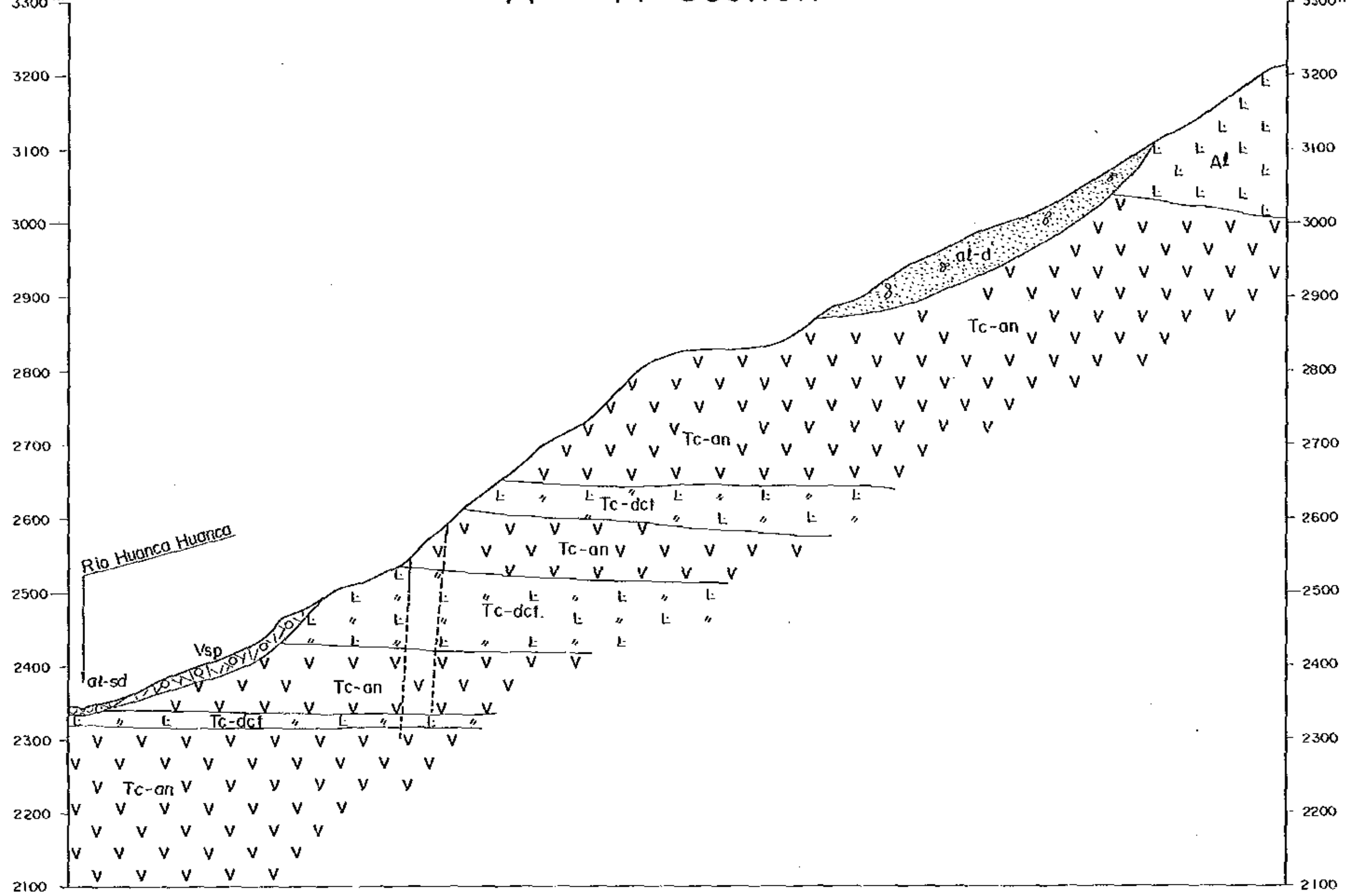

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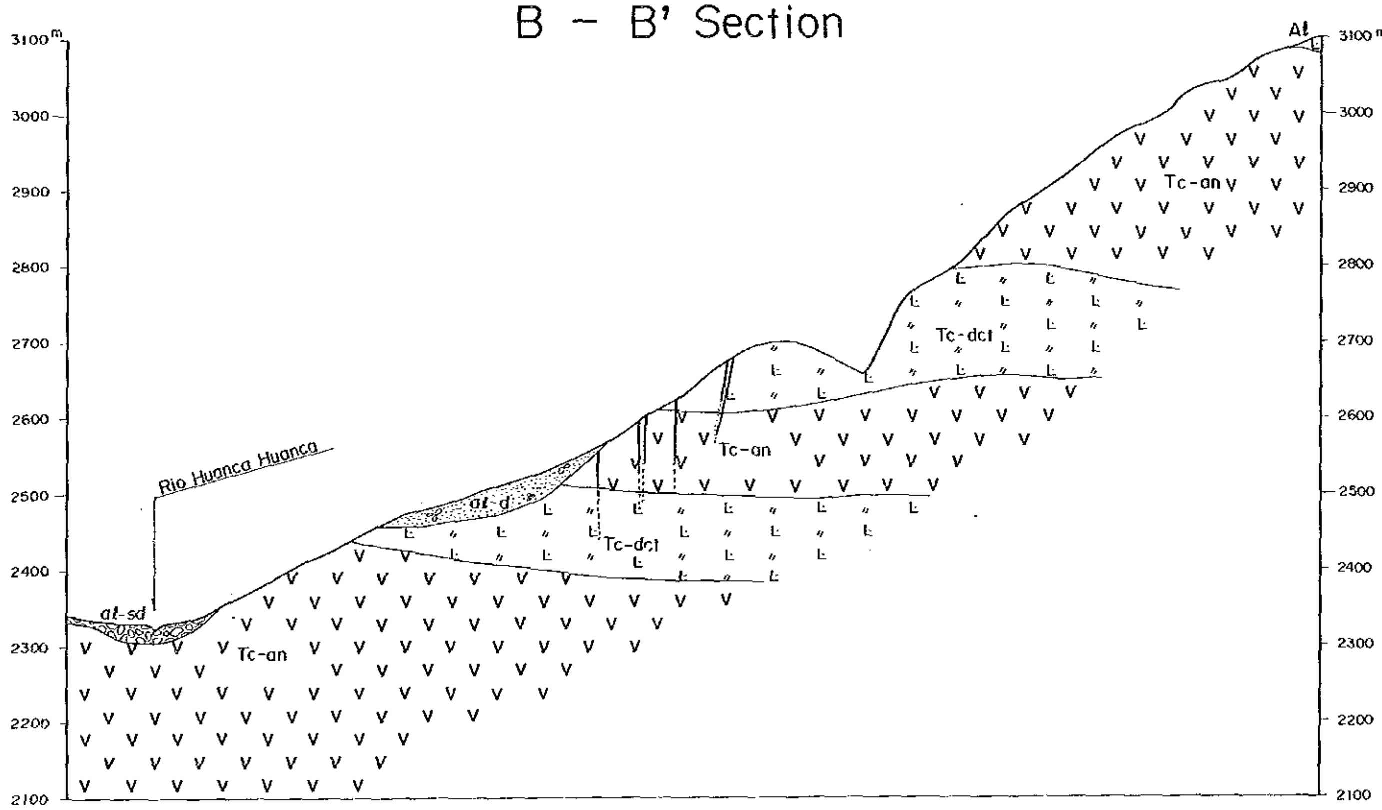

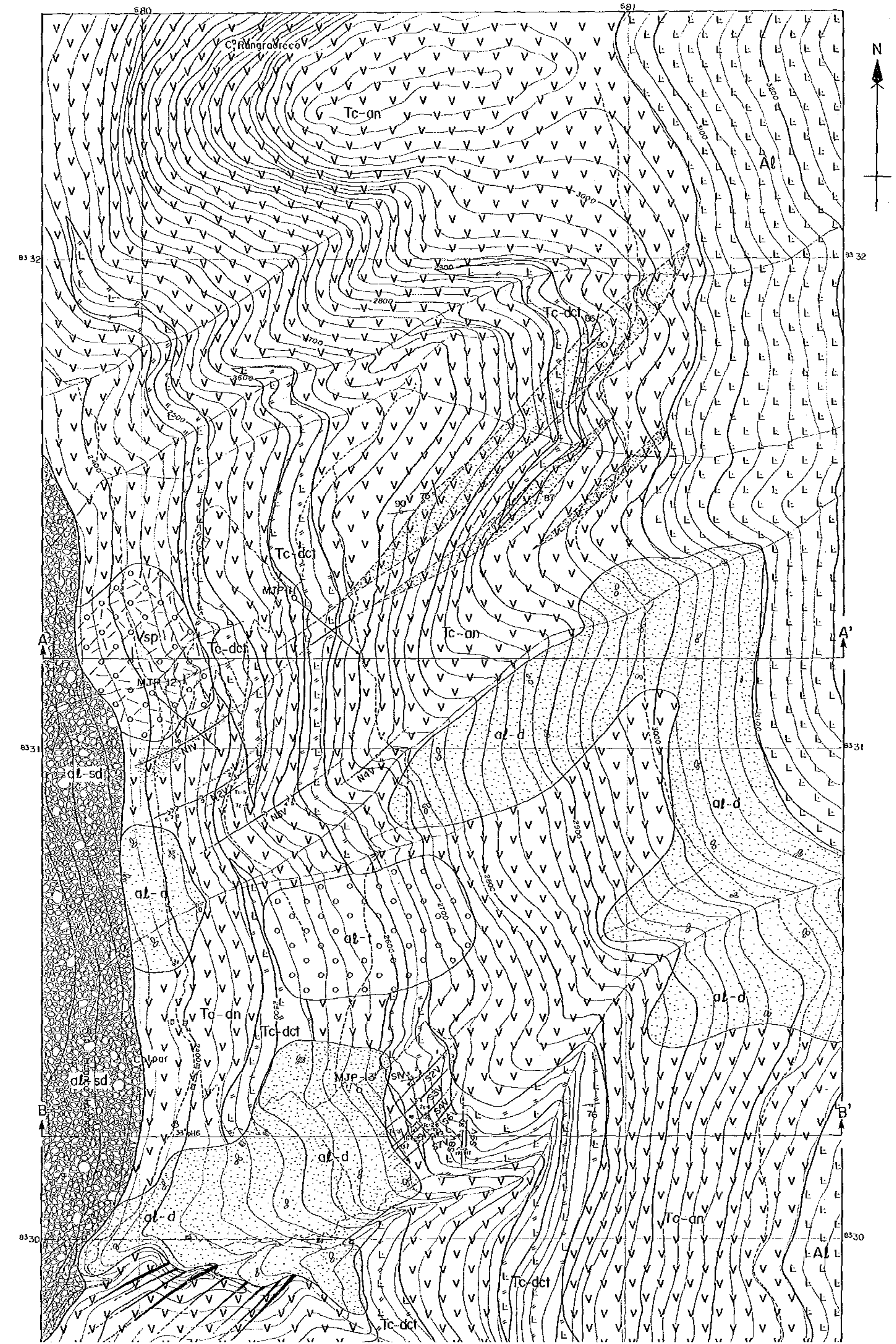

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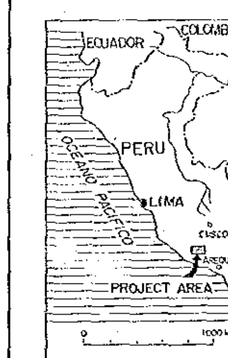

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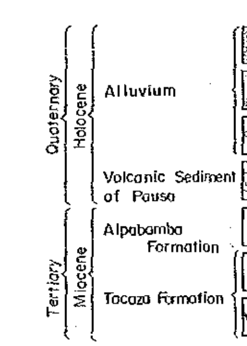

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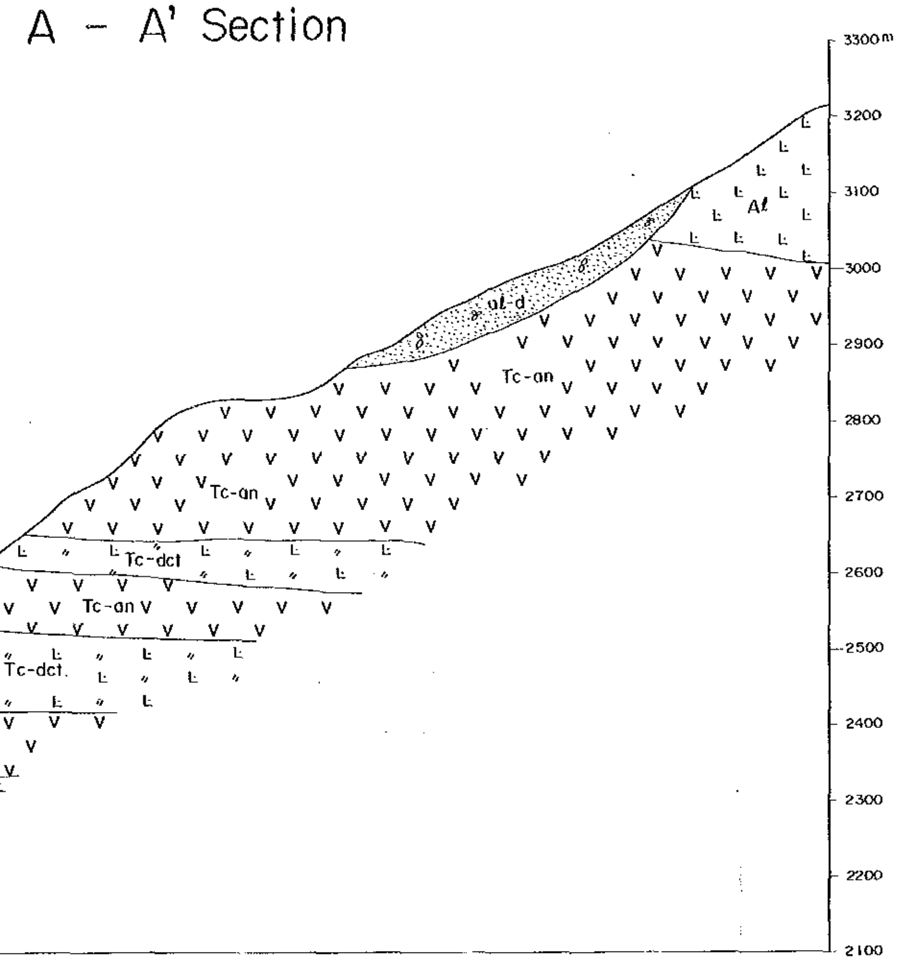

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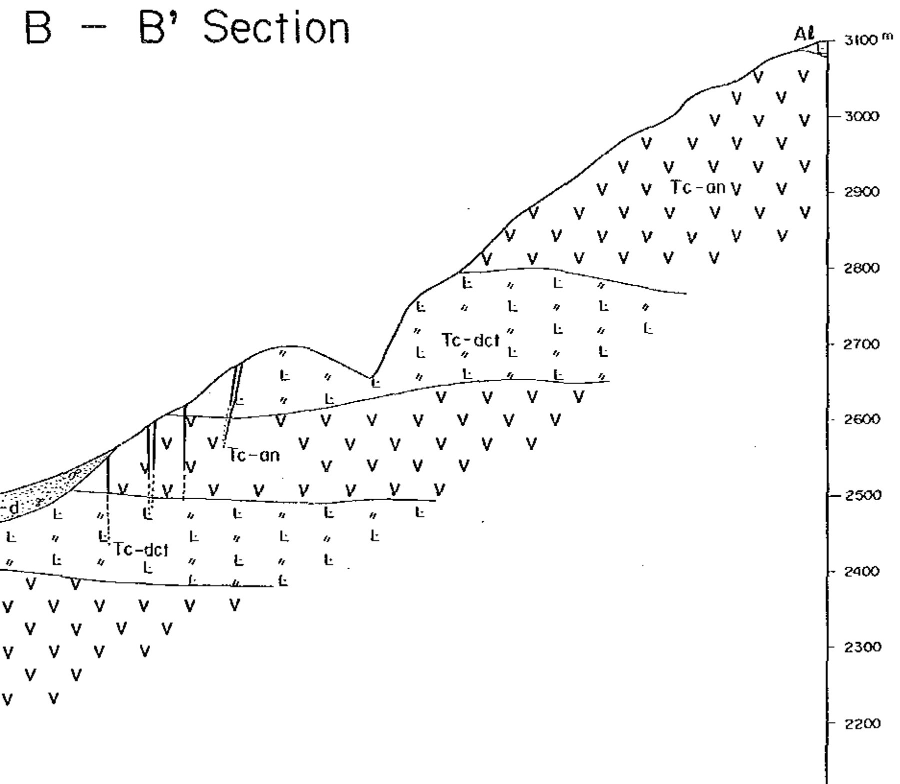
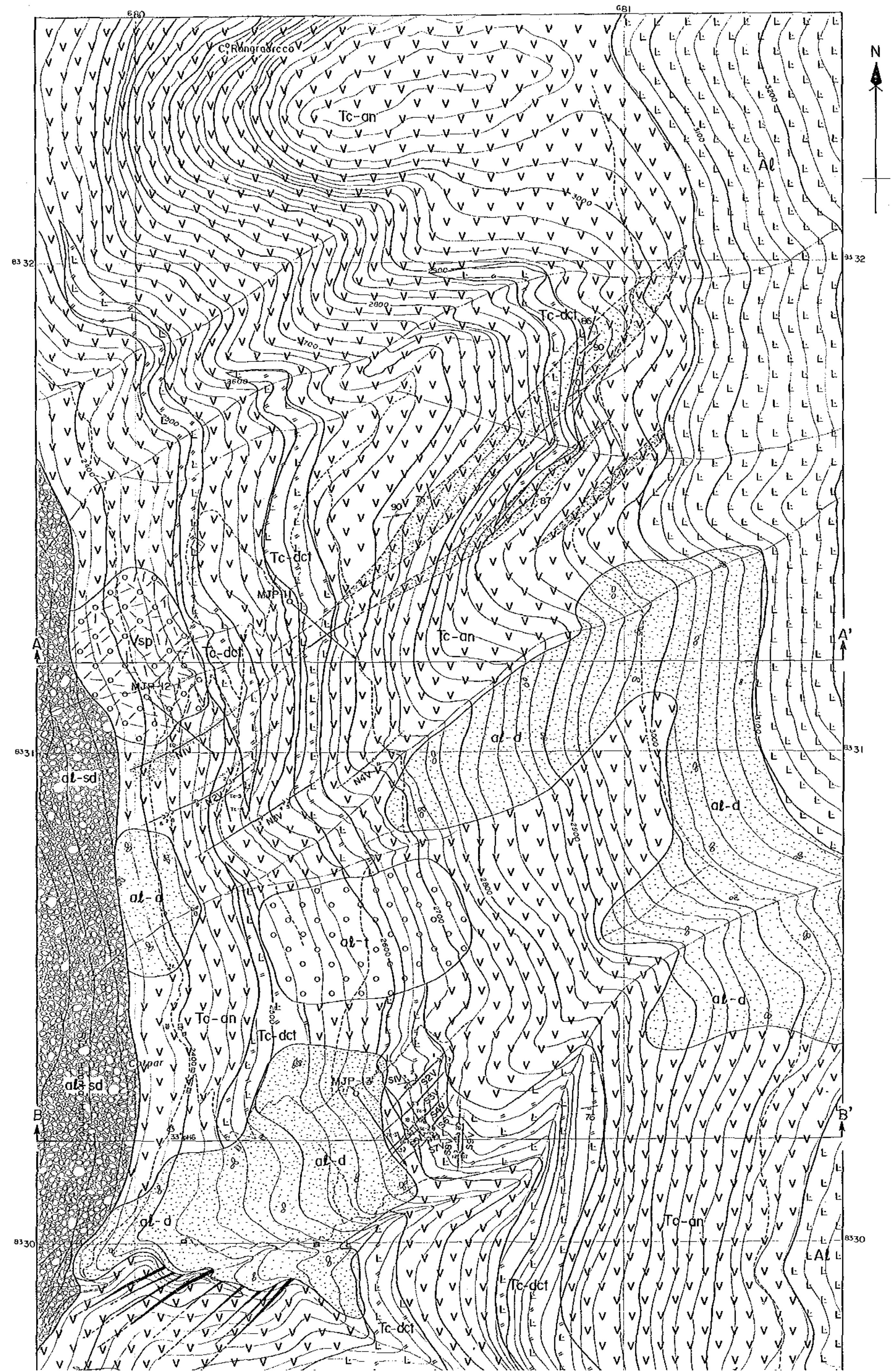
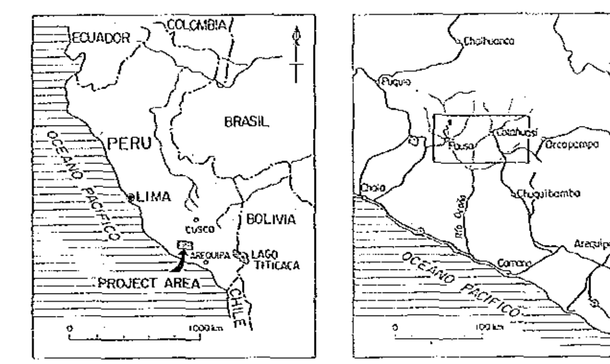




MINERAL EXPLORATION
IN
COTAHUASI AREA
(PHASE II)

GEOLOGICAL MAP AND SECTION OF THE COLPAR AREA

LOCATION INDEX



JAPAN INTERNATIONAL COOPERATION AGENCY
METAL MINING AGENCY OF JAPAN
INSTITUTO GEOLOGICO MINERO Y METALURGICO
JANUARY 1988

Scale 1 : 5,000
0 100 200 300 400 500m

LEGEND

Quaternary	Holocene	Alluvium	al-sd	*River sediments (gravel, sand)*
			al-d	Debris (gravel, sand silt, clay)
			al-t	Terrace (gravel, sand, silt)
		Volcanic Sediment of Pausa	Vsp	Tuffaceous silt, sand, gravel
Tertiary	Miocene	Alpabamba Formation	Al	Rhyolitic pyroclastic rocks
		Tacaza Formation	Tc-dct	Dacitic pyroclastic rocks
			Tc-an	Andesite lava and andesitic pyroclastic rocks

Strike and dip of joint

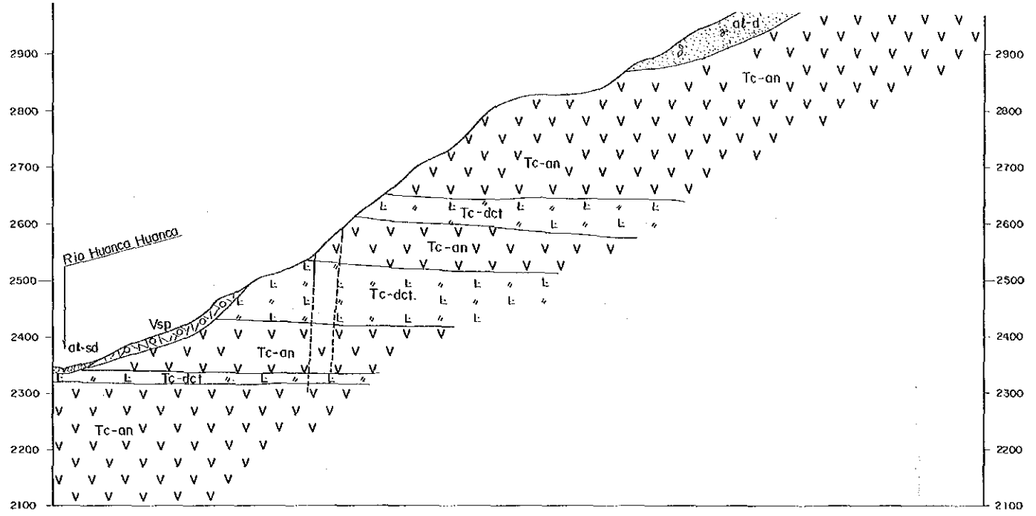
Old tunnel

Trenching site

Drilling site

Mineralization zone (Au, Ag)

Silicification zone with iron oxides



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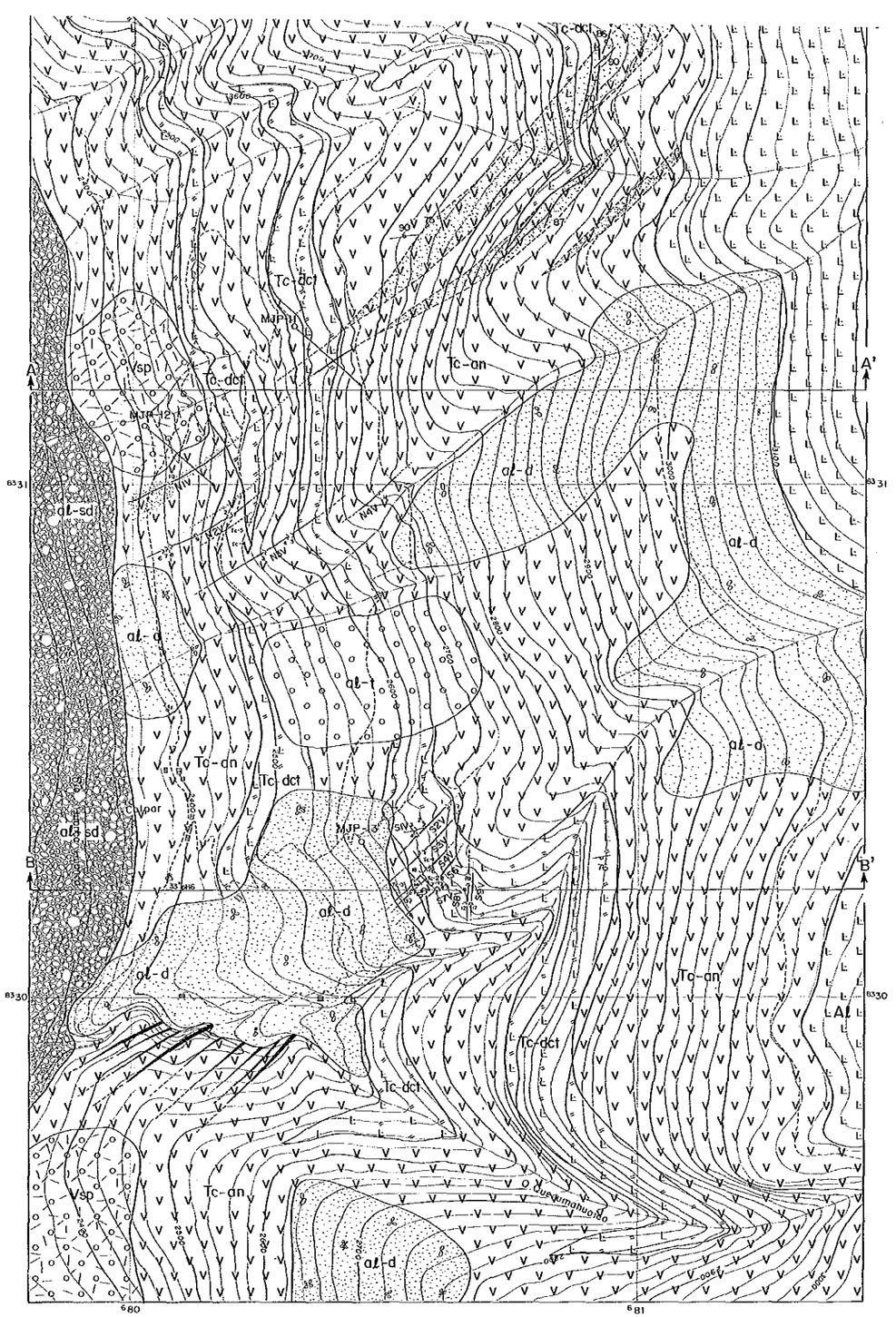

Scale 1 : 5,000

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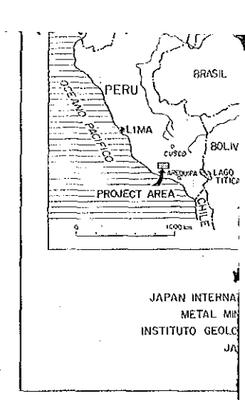

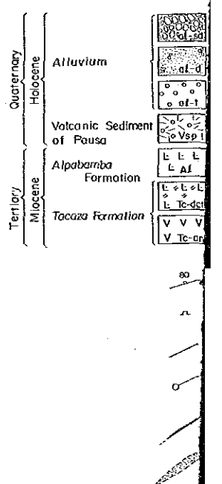

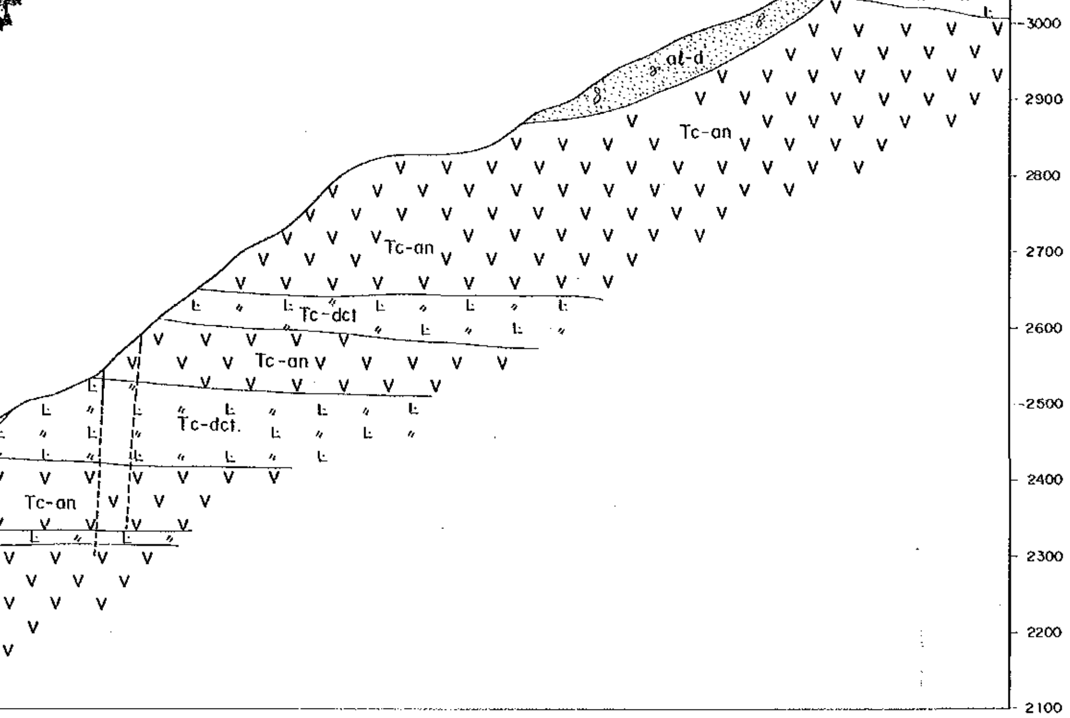

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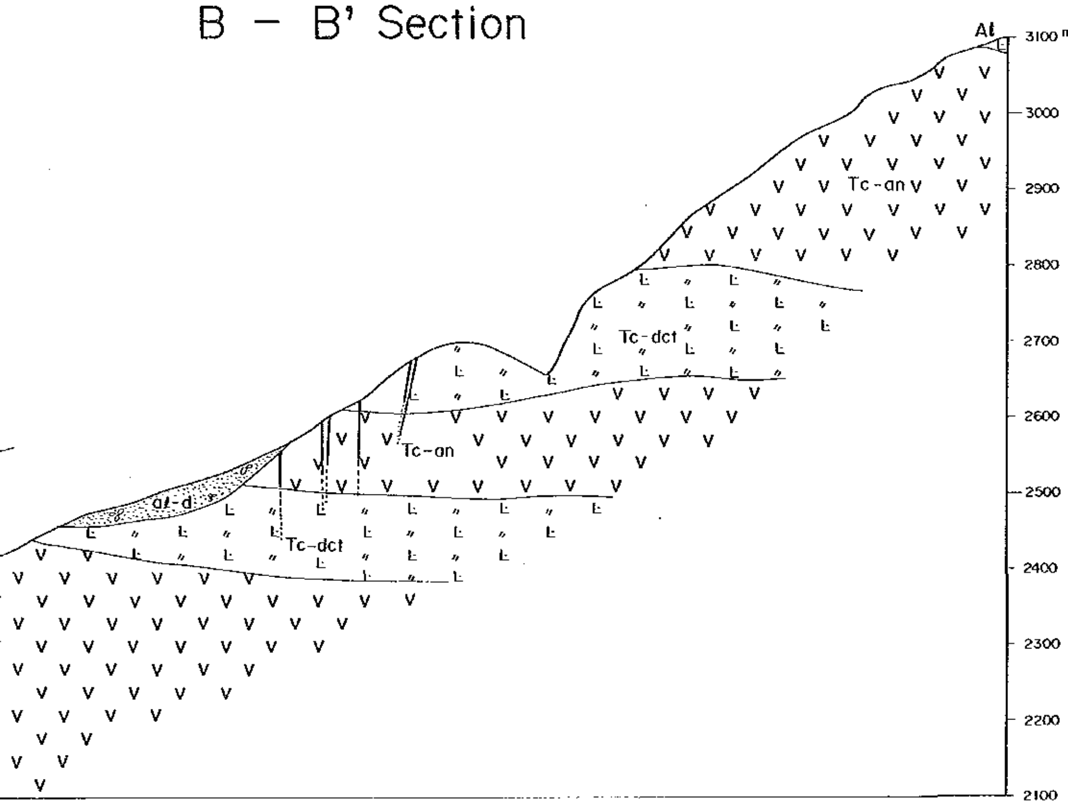

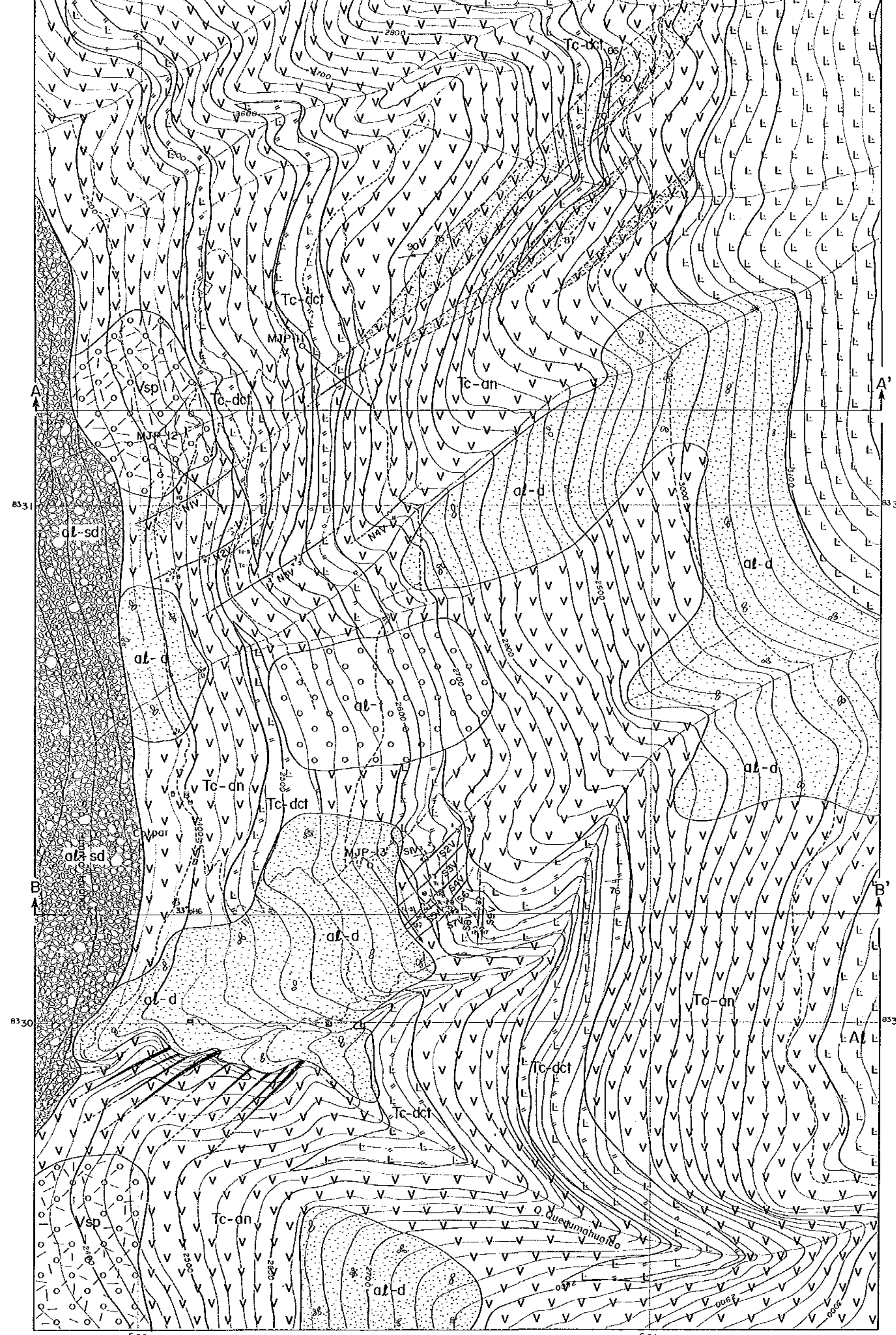

Scale 1 : 5,000

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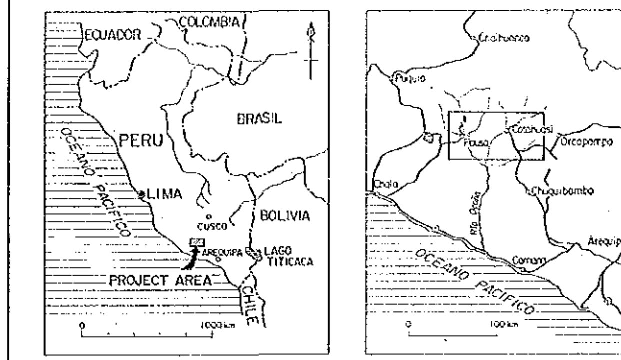


JAPAN INTERNATIONAL COOPERATION AGENCY
METAL MINING AGENCY OF JAPAN
INSTITUTO GEOLOGICO MINERO Y METALURGICO
JANUARY 1988

Scale 1 : 5,000

0 100 200 300 400 500m

LEGEND

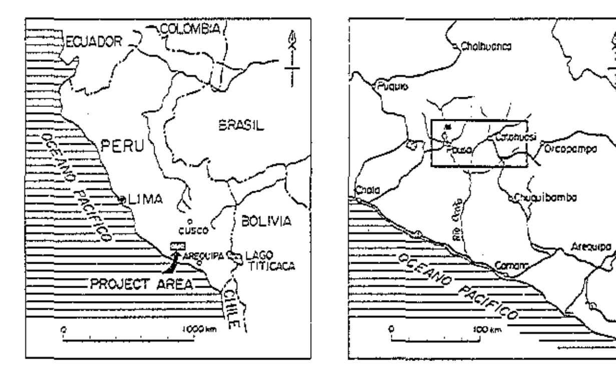
Period	Epoch	Unit	Symbol	Description
Quaternary	Holocene	Alluvium	al-sd	River sediments (gravel, sand)
			al-d	Debris (gravel, sand silt, clay)
			al-t	Terrace (gravel, sand, silt)
		Volcanic Sediment of Pausa	Vsp	Tuffaceous silt, sand, gravel
Tertiary	Miocene	Alpabamba Formation	Al	Rhyolitic pyroclastic rocks
		Tacaza Formation	Tc-dct	Dacitic pyroclastic rocks
			Tc-an	Andesite lava and andesitic pyroclastic rocks

- Strike and dip of joint
- Old tunnel
- Trenching site
- Drilling site
- Mineralization zone (Au , Ag)
- Silicification zone with iron oxides

MINERAL EXPLORATION
IN
COTAHUASI AREA
(PHASE II)

LOCATION MAP OF ALTERATION AND MINERALIZATION ZONES OF THE COLPAR AREA

LOCATION INDEX

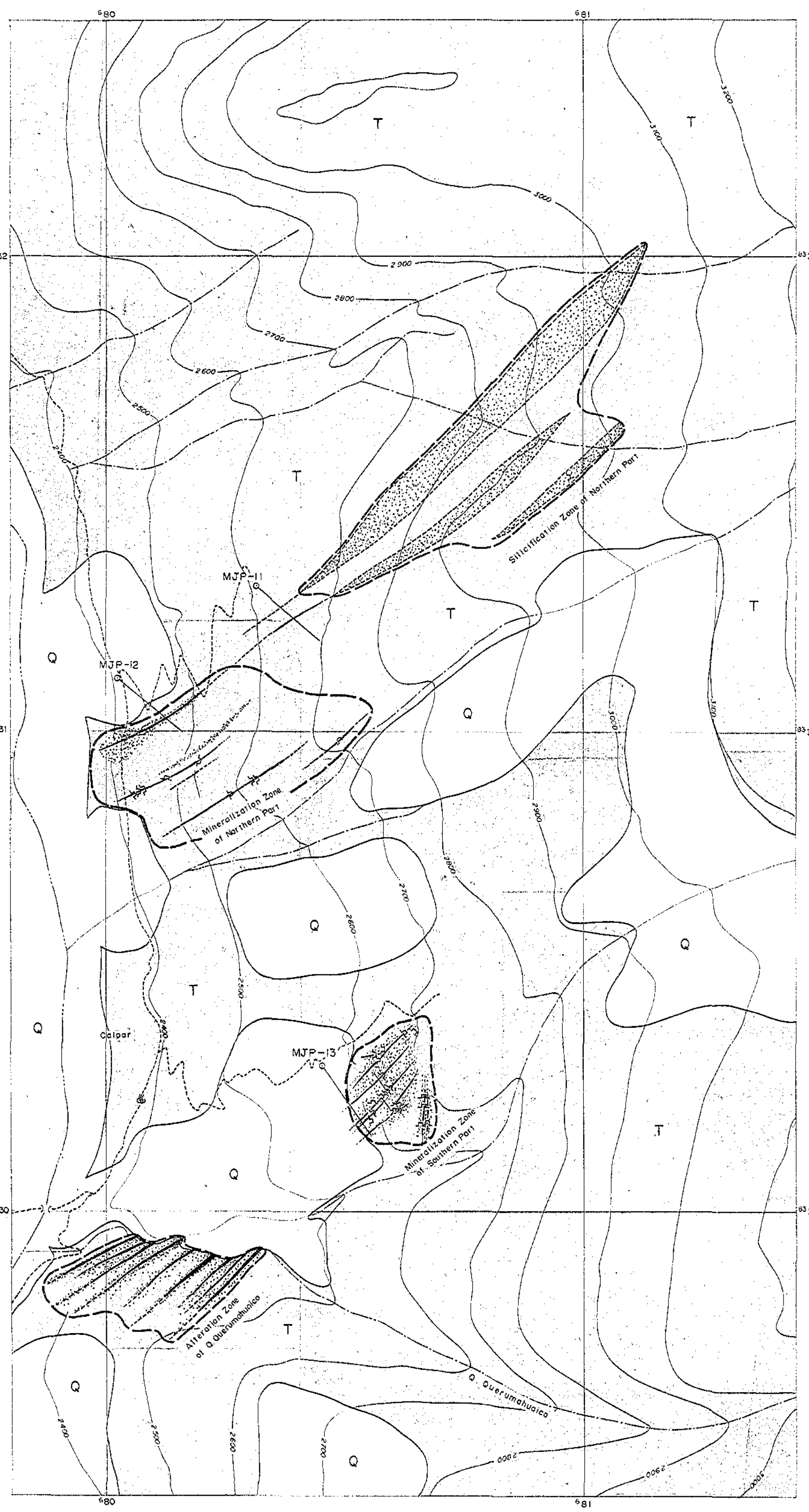


JAPAN INTERNATIONAL COOPERATION AGENCY
METAL MINING AGENCY OF JAPAN
INSTITUTO GEOLOGICO MINERO Y METALURGICO
JANUARY 1988

Scale 1 : 5,000
0 100 200 300 400 500m

LEGEND

- Quaternary System (Q)
- Tertiary System (T)
- Mineralization zone
- Silicification zone with iron oxides
- Old tunnel
- Trenching site
- Drilling site
- Alteration and mineralization zone



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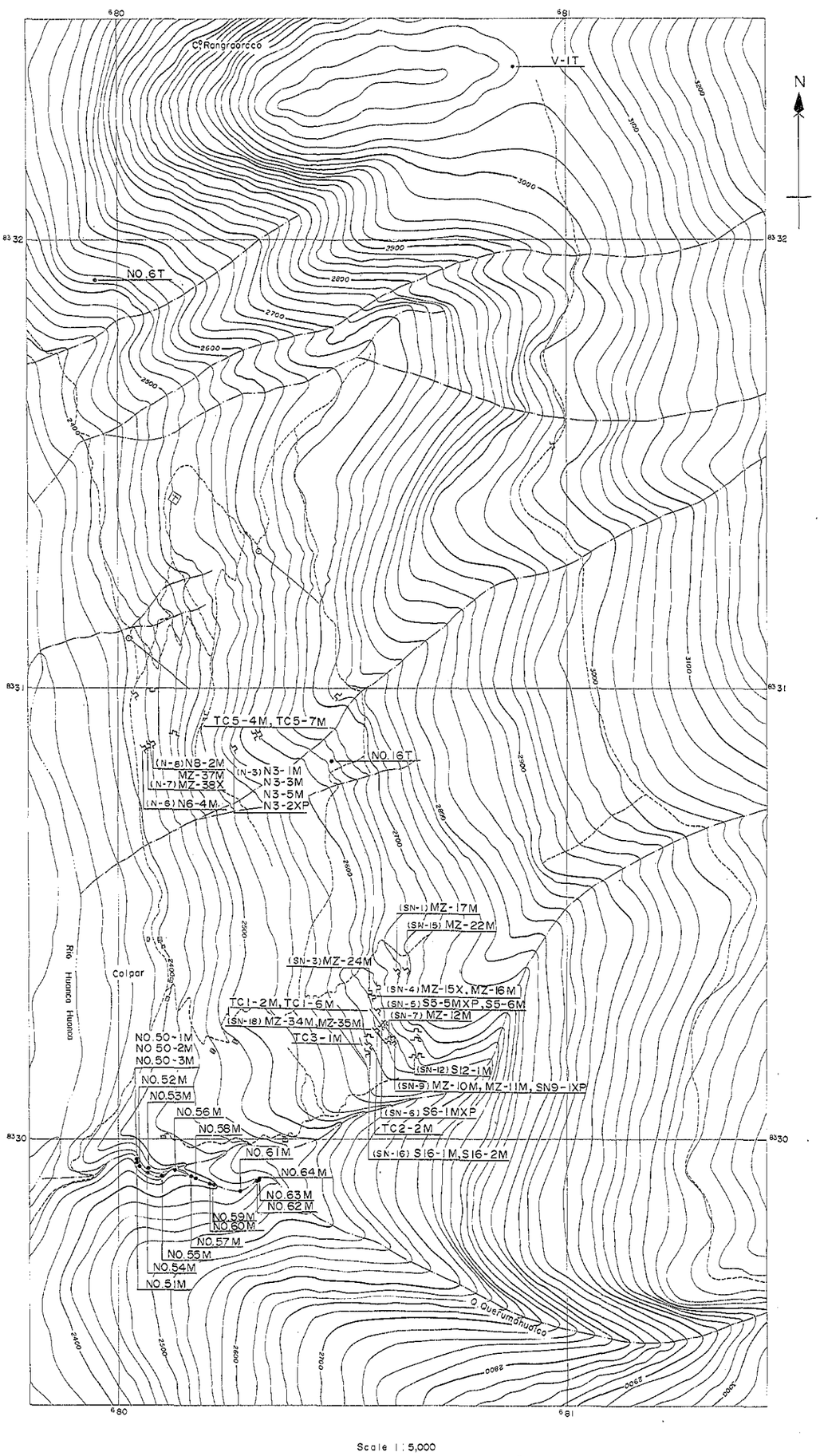
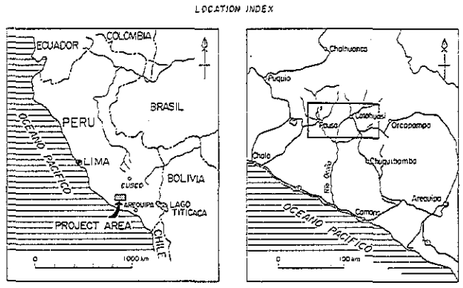


MINERAL EXPLORATION
IN
COTAHUASI AREA
(PHASE II)

LOCATION MAP OF ROCK AND ORE SAMPLES OF THE COLPAR AREA

LOCATION INDEX



JAPAN INTERNATIONAL COOPERATION AGENCY
METAL MINING AGENCY OF JAPAN
INSTITUTO GEOLÓGICO MINERO Y METALURGICO
JANUARY 1988

Scale 1 : 5,000
0 100 200 300 400 500m

LEGEND

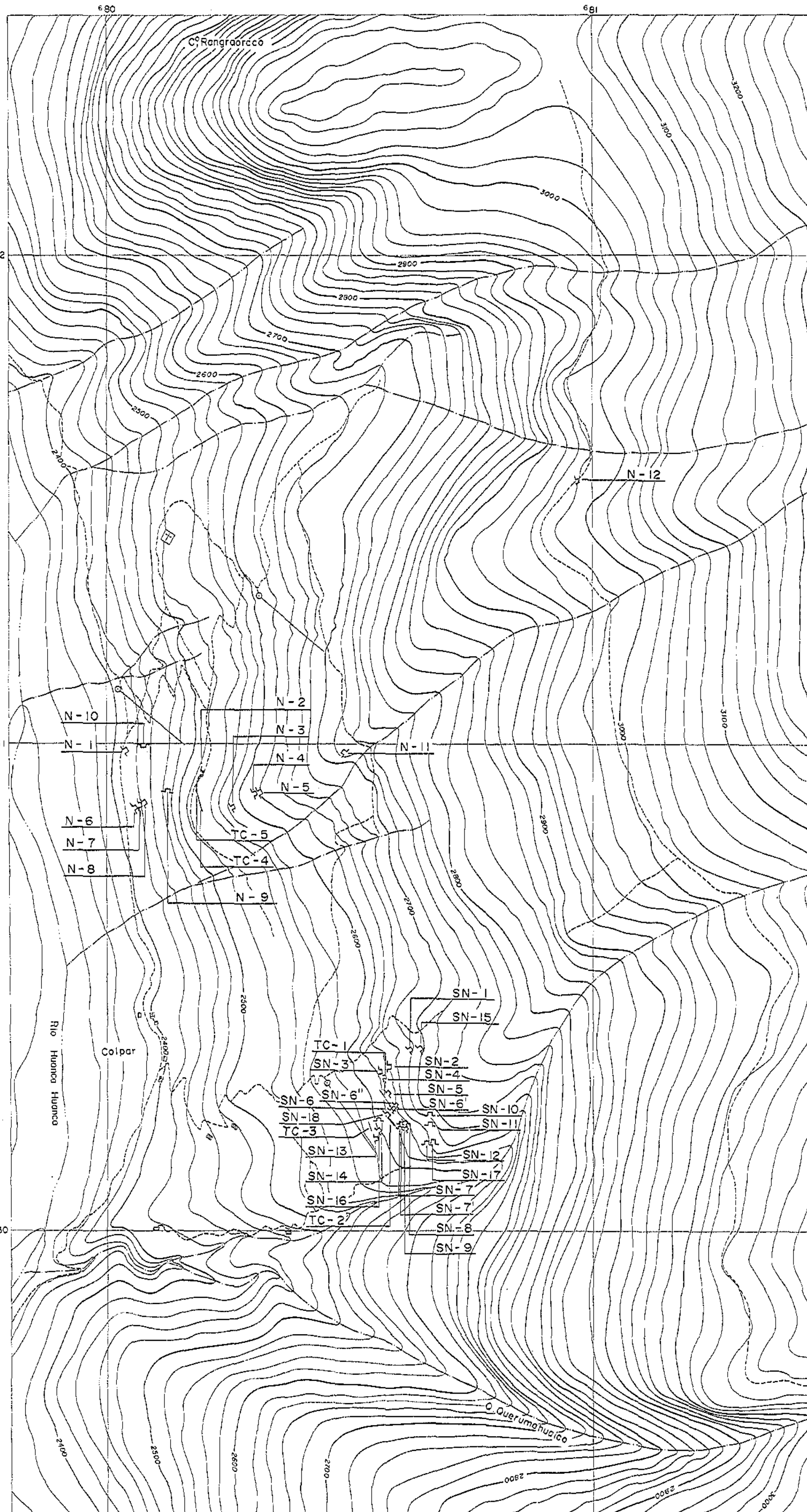
(P) : Polished Section

(T) : Thin Section

(X) : X-Ray Powder diffraction

(M) : Chemical Analysis of Ore

(SN-1) MZ-17M — Number of tunnel / Number of sample

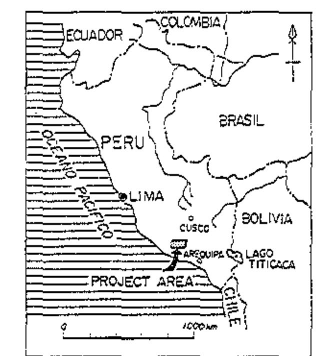


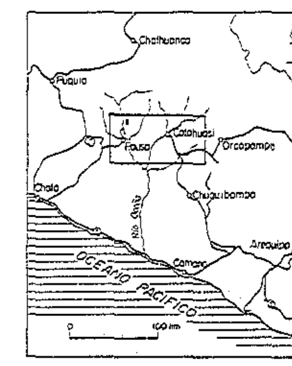
Scale 1 : 5,000

MINERAL EXPLORATION
IN
COTAHUASI AREA
(PHASE III)

LOCATION MAP OF OLD TUNNELS AND TRENCHES IN THE COLPAR AREA

LOCATION INDEX





JAPAN INTERNATIONAL COOPERATION AGENCY
METAL MINING AGENCY OF JAPAN
INSTITUTO GEOLOGICO MINERO Y METALURGICO
JANUARY 1988

Scale 1 : 5,000
0 100 200 300 400 500 m

LEGEND

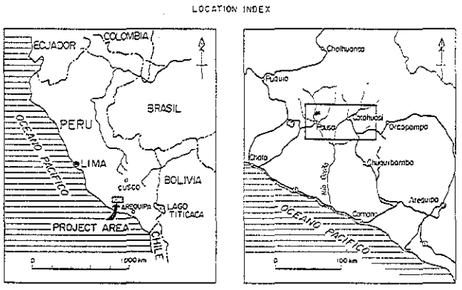
N-3 ← Number of Tunnel
← Old Tunnel

TC-1 ← Number of Trench
← Trench

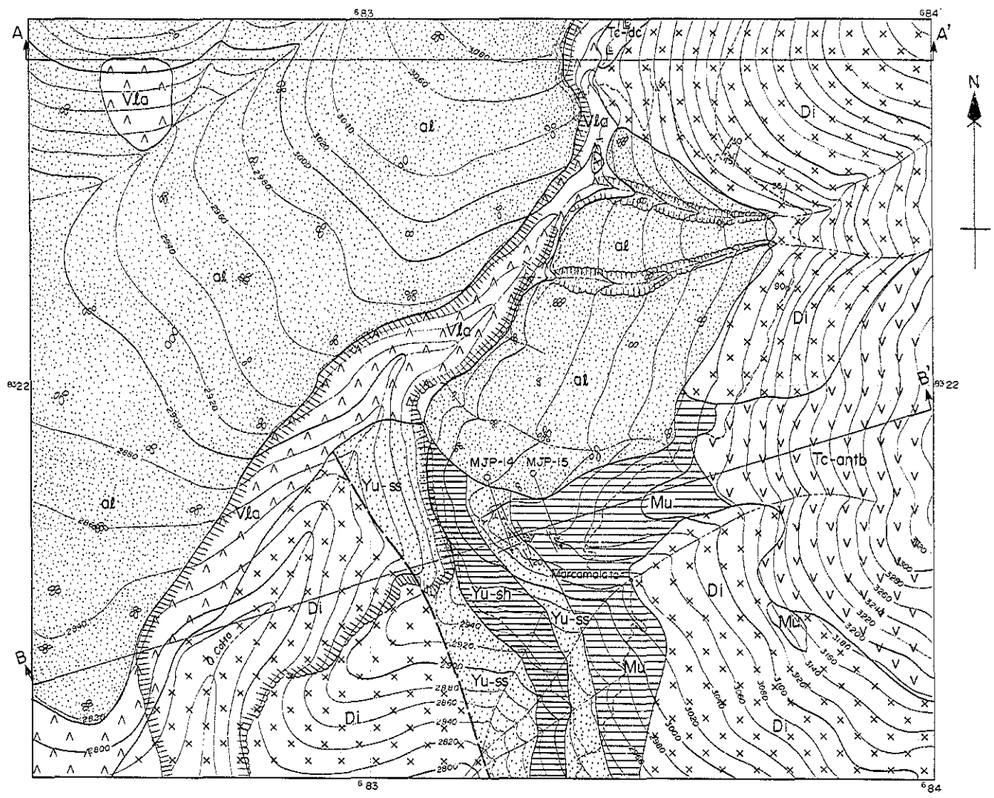
MINERAL EXPLORATION
IN
COTAHUASI AREA
(PHASE II)

GEOLOGICAL MAP AND SECTION OF THE MARCAMALATA AREA

LOCATION INDEX



JAPAN INTERNATIONAL COOPERATION AGENCY
METAL MINING AGENCY OF JAPAN
INSTITUTO GEOLOGICO MINERO Y METALURGICO
JANUARY 1988



Scale 1 : 5,000
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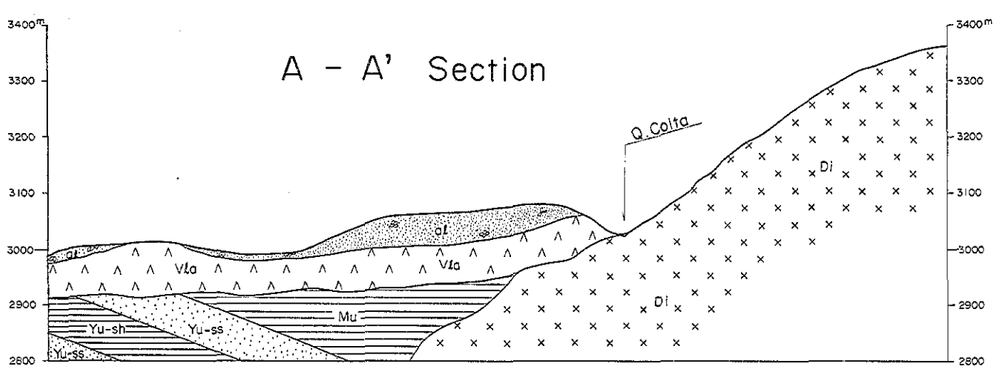
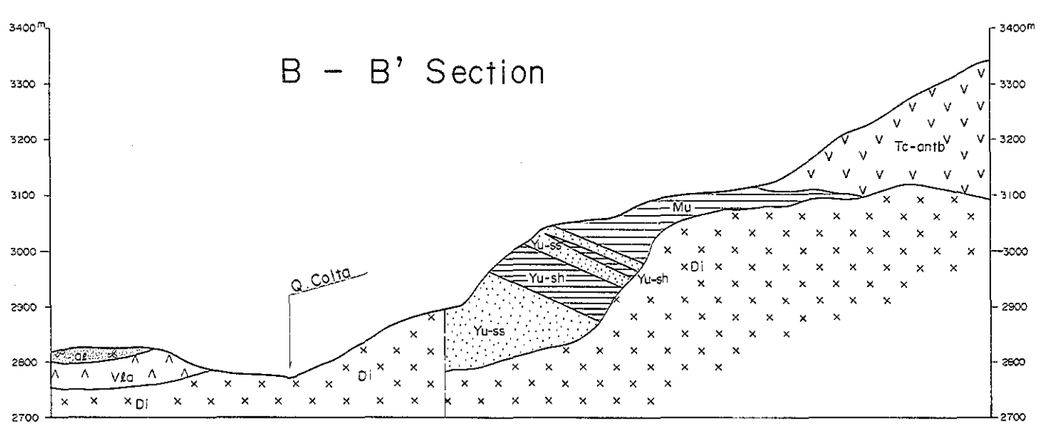


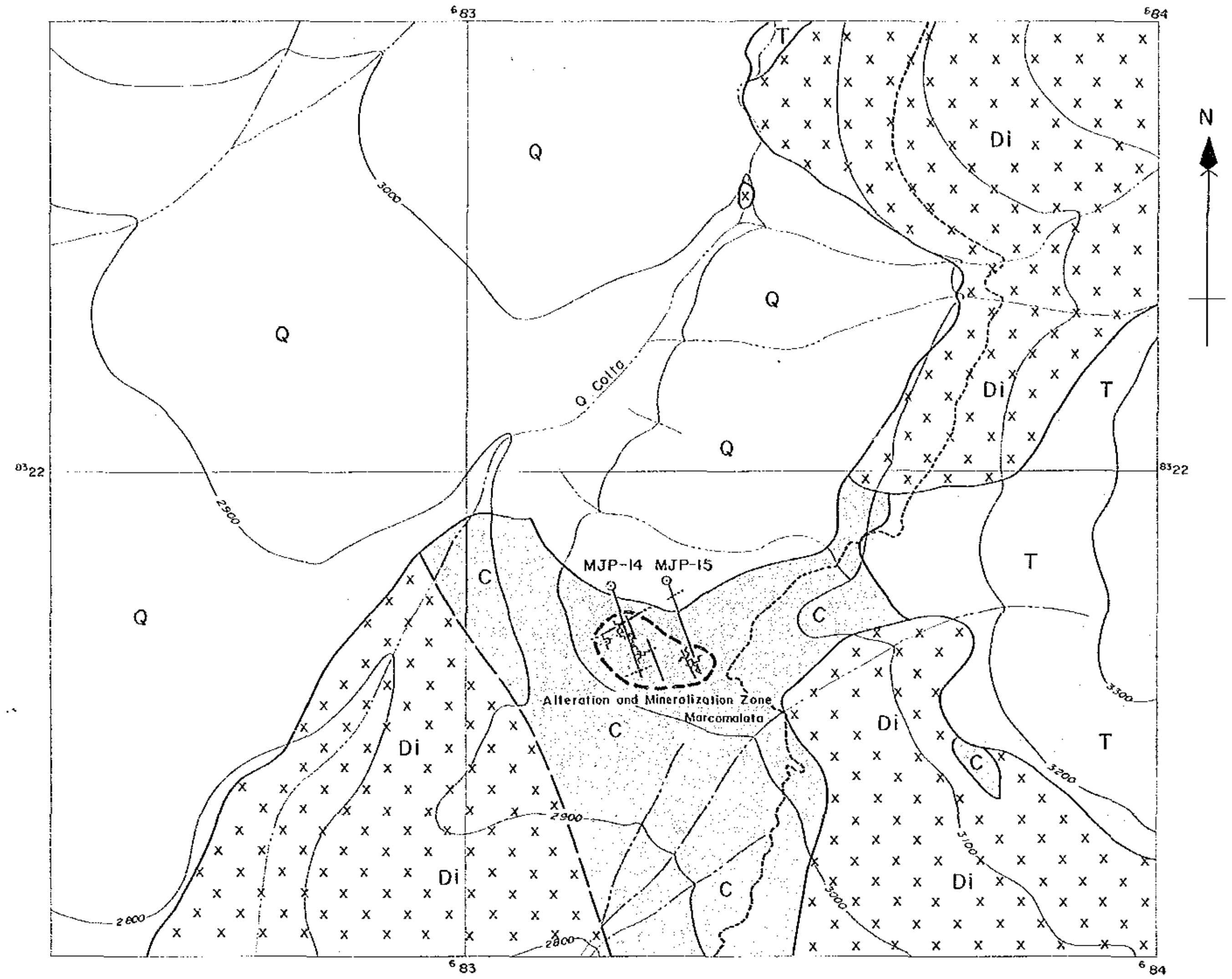


Scale 1 : 5,000
0 100 200 300 400 500m

LEGEND

Quaternary	Holocene	Alluvium	Gravel, sand, silt and clay
		Lampa Volcanic Rocks	Basaltic andesite lava and volcanic breccia
Tertiary	Miocene	Tacaza Formation	Andesitic volcanic breccia
			Dacite lava
Cretaceous		Murco Formation	Alternation of red shale and sandstone
		(Yura Group) Hualhuani Formation	Black shale with thin bedded sandstone
			Arkose sandstone
Intrusive Rock			
		Accha Stock	Quartz diorite

- Fault
- Strike and dip of bedding
- Strike and dip of joint
- Old tunnel
- Trenching site
- Drilling site
- Mineralization zone (Au, Ag)
- Alteration zone (silicification or argillization)



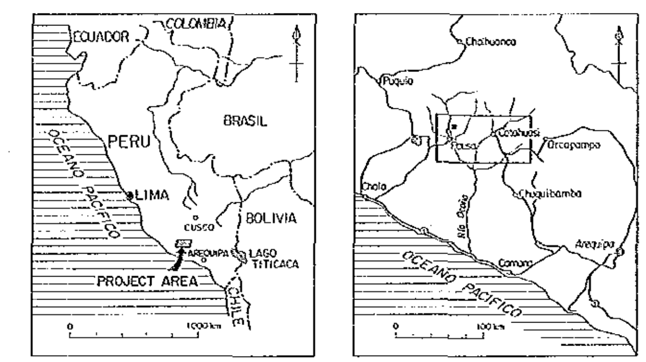
Scale 1 : 5,000

0 100 200 300 400 500m

MINERAL EXPLORATION
IN
COTAHUASI AREA
(PHASE Ⅲ)

LOCATION MAP OF ALTERATION AND MINERALIZATION ZONES OF THE MARCAMALATA AREA

LOCATION INDEX



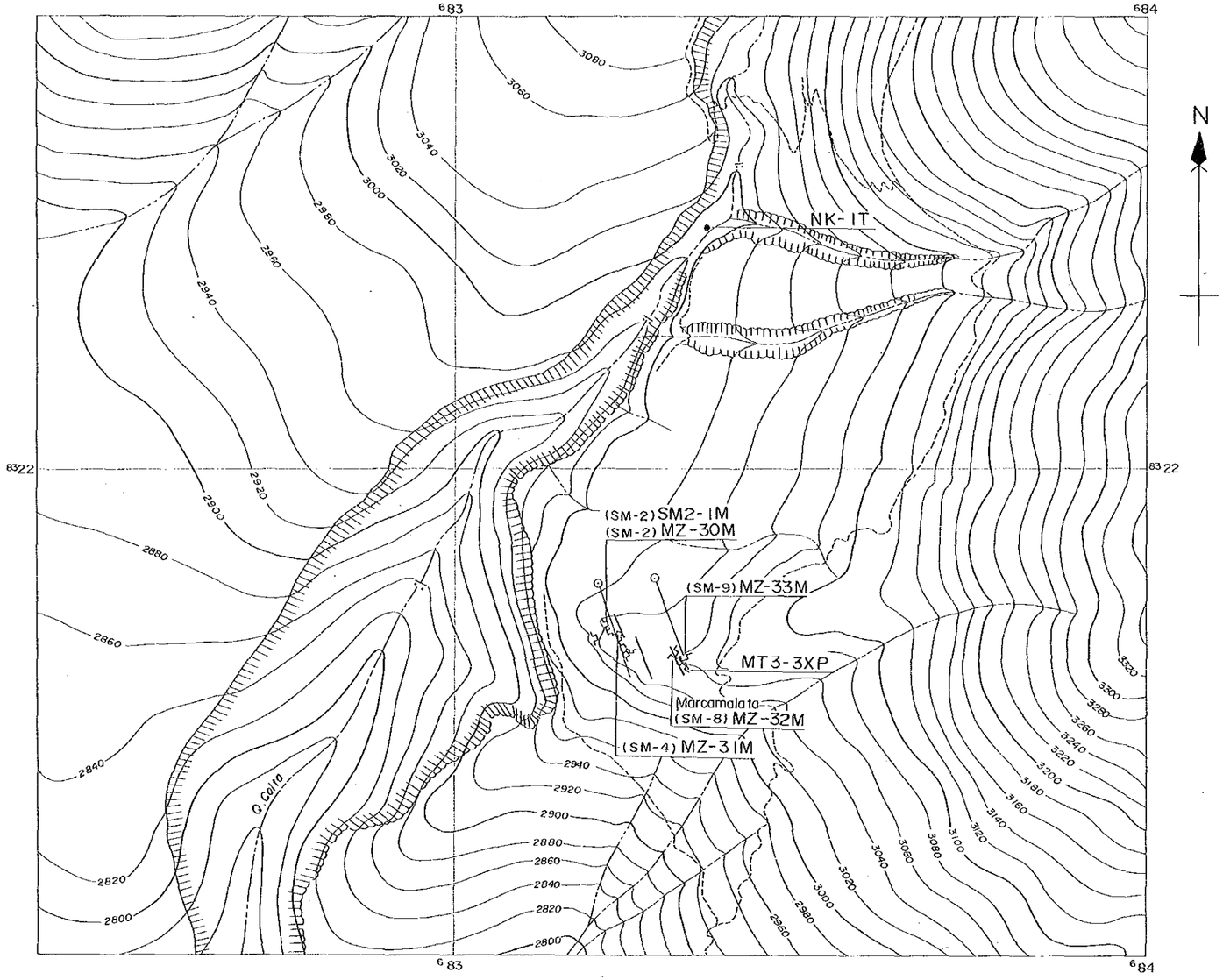
JAPAN INTERNATIONAL COOPERATION AGENCY
METAL MINING AGENCY OF JAPAN
INSTITUTO GEOLOGICO MINERO Y METALURGICO
JANUARY 1988

Scale 1 : 5,000

0 100 200 300 400 500m

LEGEND

- Q — Quaternary System
- T — Tertiary System
- C — Cretaceous System
- Intrusive Rock
- Di — Accha Stock (Quartzdiorite)
- Mineralization zone
- Alteration zone (silicification or argillization)
- Fault
- Old tunnel
- Trenching site
- Drilling site
- Alteration and mineralization zone



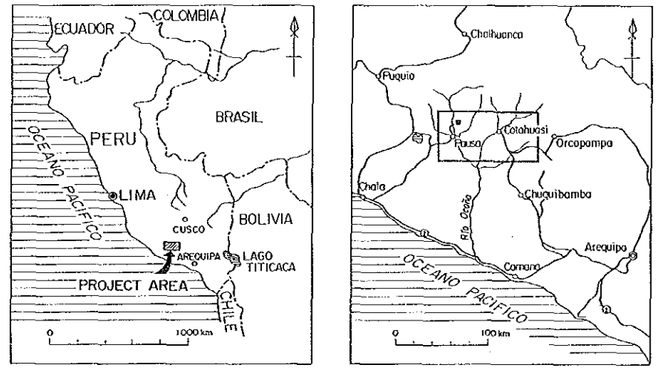
Scale 1 : 5,000

0 100 200 300 400 500m

MINERAL EXPLORATION
IN
COTAHUASI AREA
(PHASE Ⅲ)

LOCATION MAP OF ROCK AND ORE SAMPLES OF THE MARCAMALATA AREA

LOCATION INDEX



JAPAN INTERNATIONAL COOPERATION AGENCY
METAL MINING AGENCY OF JAPAN
INSTITUTO GEOLOGICO MINERO Y METALURGICO
JANUARY 1988

Scale 1 : 5,000

0 100 200 300 400 500m

LEGEND

(P) : Polished Section

(T) : Thin Section

(X) : X-Ray Powder diffraction

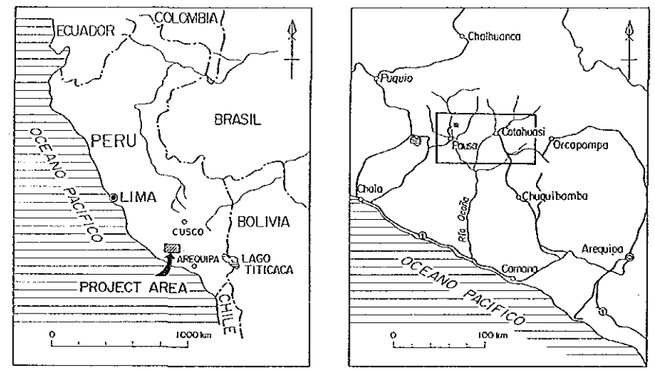
(M) : Chemical Analysis of Ore

(SN-1) MZ-17M
Number of tunnel
Number of sample

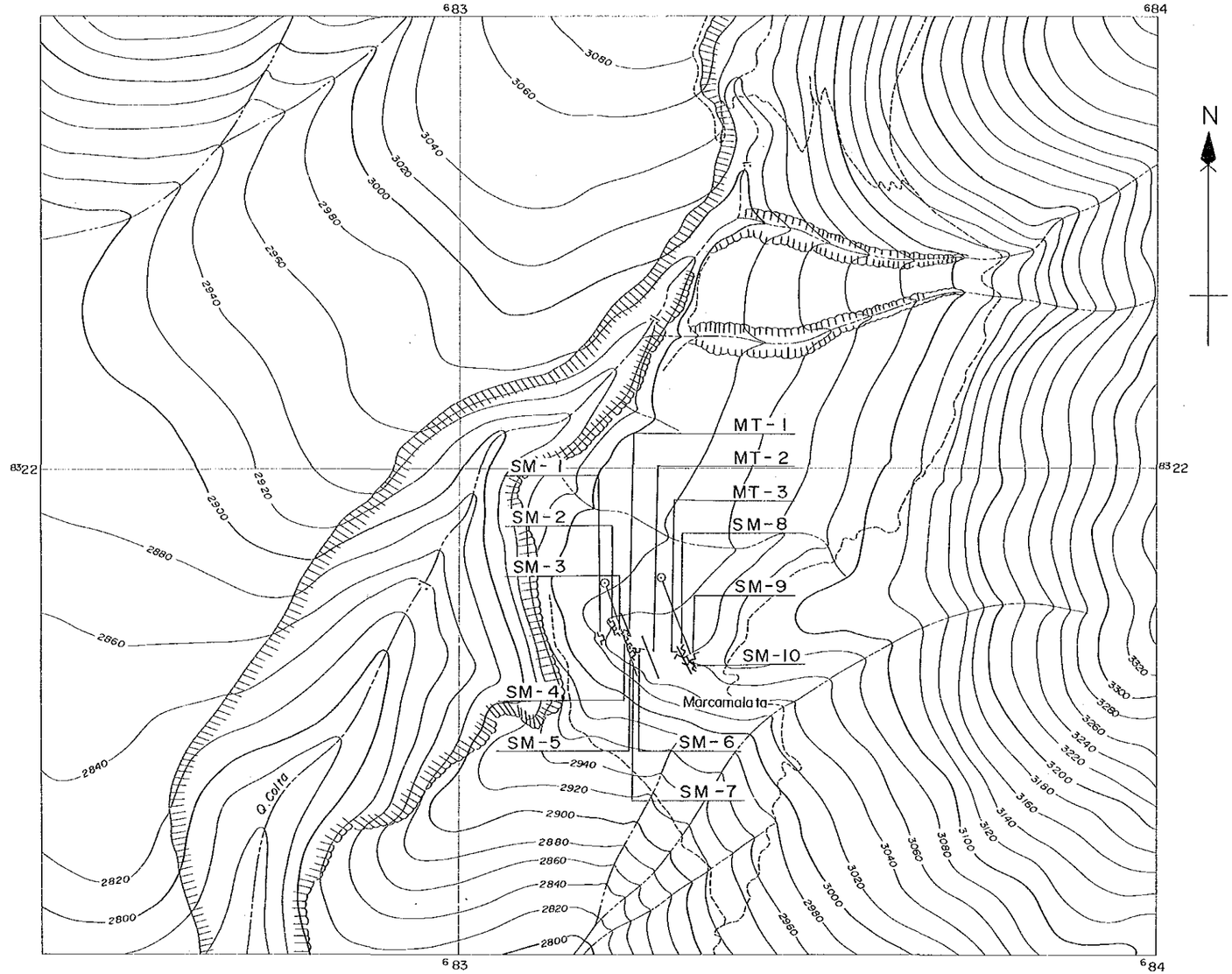
MINERAL EXPLORATION
IN
COTAHUASI AREA
(PHASE Ⅲ)

LOCATION MAP OF OLD TUNNELS AND TRENCHES IN THE MARCAMALATA AREA

LOCATION INDEX



JAPAN INTERNATIONAL COOPERATION AGENCY
METAL MINING AGENCY OF JAPAN
INSTITUTO GEOLOGICO MINERO Y METALURGICO
JANUARY 1988



Scale 1 : 5,000

0 100 200 300 400 500m

Scale 1 : 5,000

0 100 200 300 400 500m

LEGEND

SM-2 ← Number of Tunnel
Old Tunnel

MT-1 ← Number of Trench
Trench

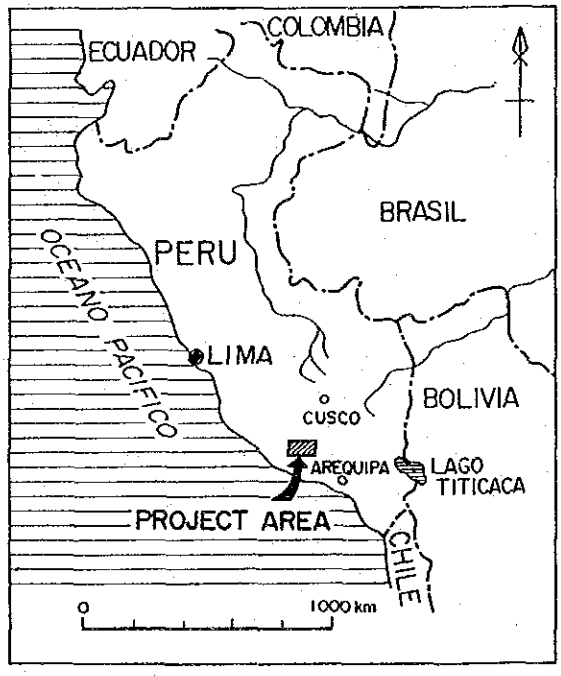
PL.9

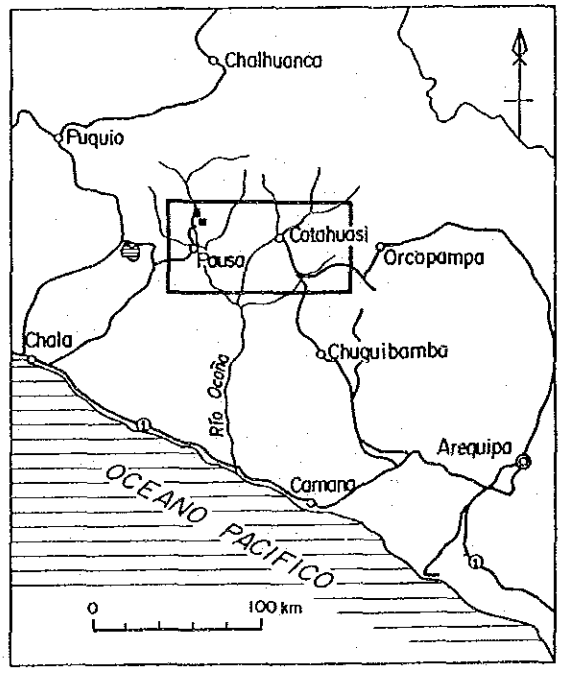
MINERAL EXPLORATION
IN
COTAHUASI AREA
(PHASE Ⅲ)

GEOLOGICAL LOG OF DIAMOND DRILLING HOLE (MJP-11,12,13,14,15)

Scale 1 : 200

LOCATION INDEX





JAPAN INTERNATIONAL COOPERATION AGENCY
METAL MINING AGENCY OF JAPAN
INSTITUTO GEOLOGICO MINERO Y METALURGICO
JANUARY 1988

MJP-11(1) Direction : SE 50° , Angle : - 45° , Depth : 251.05m

SCALE (m)	GEOLOGIC COLUMN	DEPTH AND CORE ANGLE (m) (°)	DESCRIPTION	POSITION OF EXAMINED CORE SAMPLES	ALTERATION AND MINERALIZATION: Silic	Qz-V	Arg	Meta-M	Cal-V
		1.50	0.00~9.60m Alluvium 0.00~1.50m: grey soil and small (φ1~4cm) gravel 1.50~9.60m: mainly gravel (φ1~10 cm) with grey soil. gravel ... grey andesite and light grey dacite, unglar.						
10		9.60 11.50 13.70 15.00 16.70 17.30 18.10 19.60	grey to greenish grey porphyritic andesite with many fractures 9.60~11.50 m, 17.30~18.10 m, 19.60~28.90 m: many fracture zone.						
20		28.90							
30		29.50 29.70~29.90	yellowish brown weathered andesitic tuff breccia 29.70~29.90 m: strongly sheared zone with clay. 30.40~32.90 m: sheared zone (many fracture)						
		39.00	grey andesitic tuff breccia breccia: light grey porphyritic andesite (φ1~5 cm) matrix: grey andesitic tuff brown to dark brown iron oxides along many cracks.						
40		42.00 42.25~42.30 43.00	42.25~42.30 m: white calcite vein network						
		44.20 43.55 43.90	grey dacitic lapilli tuff with quartz grain. lapilli: white grey dacite (φ0.5~2.0 cm)						
		46.30 49.00	grey hard compact andesitic fine tuff 46.30 m: white lenticular calcite vein						
50		50.20	grey andesitic tuff breccia breccia: mainly light grey porphyritic andesite (φ0.5~7.0 cm)						
		53.90 54.40 55.30~55.50	greenish grey hard compact andesitic tuff 53.90~54.40 m, 55.30~55.50 m: greenish grey andesitic tuff breccia with dissemination of pyrite 55.50~57.90 m: dark grey hard massive andesitic fine tuff						
		57.90							
60		60.50 61.00 63.25	light greenish grey andesitic tuff 60.50~61.00 m: light greenish grey andesitic lapilli tuff 63.25 m: white calcite veinlets						
		65.30							
		69.00	dark grey hard massive andesite mafic mineral changed to chlorite 69.00 m: calcite veinlet (w=0.3 cm)						
70		75.60 76.50	75.60~76.50 m: light grey weakly altered andesite 76.00 m: lenticular pyrite vein 76.05 m: white calcite vein (w=1.0 cm) with crystal of calcite						
80		83.20~83.40 83.85 85.90 88.25~89.25 89.85	dark grey hard massive andesite with calcite veinlet, 83.20 m~83.40 m: white calcite veinlet (w=0.1~0.2 cm) 83.58 m: calcite vein (w=0.5 cm) 85.90 m: calcite veinlet 88.25~89.25 m: six calcite veinlets (w=0.2 cm under) in andesite 89.85 m: calcite vein	~ 84.10m IT					
90		94.10~94.20 95.10 96.40 98.10 99.90	dark grey hard massive andesite mafic mineral changed to chlorite 94.10~94.20 m: white calcite veinlet 95.10~96.40 m: calcite veinlet and network 98.10 m: white calcite vein (w=0.5 cm) 99.90 m: calcite vein (w=0.2 cm)						
100									

ASSAY RESULTS									
Sample No	Depth (m)	Width (m)	Au (g/t)	Ag (g/t)	Cu (%)	Pb (%)	Zn (%)	As (%)

CORE RECOVERY (%) 0 50 100

SCALE (m) 0 10 20 30 40 50 60 70 80 90 100

MTP-11(2)

Direction : SE50° , Angle : -45° , Depth : 251.05 m

SCALE (m)	GEOLOGIC COLUMN	DEPTH AND CORE ANGLE (m) (°)	DESCRIPTION	POSITION OF EXAMINED CORE SAMPLES
100			dark grey hard massive andesite with reddish brown iron oxides along cracks, mafic mineral changed to chlorite.	
		104.70	104.70 m: white calcite veinlet (w = 0.5 cm) 105.20~105.75 m: brown iron oxides along many cracks	
		105.20 105.75		
110		111.35	111.35 m: calcite veinlet	
		117.00	117.00~118.80 m: grey to light grey bleached andesite with dissemination of pyrite crystal	
		118.80 119.35~119.70	118.80~122.20 m: light grey strongly altered lapilli tuff	←119.35~119.40m 1PX
120		120.70~120.75 120.95	119.35~119.70 m: dark grey quartz vein with breccia of strong silicified rock and disseminated metalic mineral (Cp, Sp, Ga, Py).	
		122.20	119.70~120.70 m: light grey strong silicified lapilli tuff with many quartz veinlets contain metalic mineral (Cp, SP, Ga, Py) 120.70~120.75 m: light grey to dark grey brecciated quartz vein with dissemination of pyrite. 120.75~120.95 m: light grey strongly silicified rock. 120.95~122.20 m: light grey strongly bleached lapilli tuff	
130			light greenish grey dacitic lapilli tuff lapilli: ungular to subungular lapilli (φ0.5~2.0 cm) of andesite and dacite matrix: greenish grey tuff with quartz grain	
		135.50	dark greenish grey dacitic lapilli tuff lapilli: green porphyritic andesite (φ2 cm under) matrix: dark greenish grey tuff with quartz grain	
		136.35	gradual change	
140			light greyish green dacitic tuff with green lenticular patch and quartz grain	←145.20m 2T
150		151.55	151.55 m: white quartz vein (w = 0.7 cm)	
			light greyish green dacitic tuff with small breccia of green andesitic tuff, green lenticular patch and quartz grain (φ0.1 cm)	
160		161.60	graduar change	
			green dacitic tuff with small (φ0.2~0.4 cm) breccia of green andesite ≫ light grey dacite and quartz grain in matrix * no contain lenticular green patch	
170		173.00	gradual change	
			green dacitic lapilli tuff lapilli: ungular, dark green andesite, grey andesite and light grey dacite (φ3 cm under, ave 0.5~1 cm) matrix: small fragments of rock and quartz grain	
180		179.00	parti-colored dacitic tuff breccia breccia: φ5 cm under, some kind of andesite matrix: rock fragments and quartz grain	
		181.50 182.20	light green dacitic fine tuff	
			green dacitic lapilli tuff	
		185.95	green to light green dacitic tuff breccia breccia: φ5 cm under, grey andesite white dacite etc. matrix: rock fragments and quartz grain	
190		190.15	white grey hard compact dacitic tuff breccia breccia: φ5 cm under, white grey dacite matrix: rock fragments and quartz grain * weakly silicified rock, dissemination of pyrite	
		197.25	light green dacitic tuff with light green lenticular patch	
200				

ALTERATION AND MINERALIZATION: Silic, Qz-V, Arg, Meta-M, Cal-V; Py; Cp, Sp, Ga

ASSAY RESULTS

Sample No	Depth (m)	Width (m)	Au (g/t)	Ag (g/t)	Cu (%)	Pb (%)	Zn (%)	As (%)
	119.35							
1 M	119.70	0.35	0.41	104.0	0.34	2.98	0.01	—
2 M	120.10	0.40	0.14	32.3	0.08	0.29	0.01	—
3 M	120.95	0.85	0.14	28.3	0.03	0.17	0.02	—

CORE RECOVERY (%) 0 50 100

SCALE (m)

MTP-11(3) Direction : SE 50° , Angle : − 45° , Depth : 251.05m

SCALE (m)	GEOLOGIC COLUMN	DEPTH AND CORE ANGLE (m) (°)	DESCRIPTION	POSITION OF EXAMINED CORE SAMPLES	ALTERATION AND MINERALIZATION: Silic	Qz-V	Arg	Meta-M	Cal-V	ASSAY RESULTS: Sample No	Depth (m)	Width (m)	Au (g/t)	Ag (g/t)	Cu (%)	Pb (%)	Zn (%)	As (%)	CORE RECOVERY 0 50 (%) 100	SCALE (m)
200		201.40	light green dacitic tuff with light green lenticular patch																	200
		202.40	201.40~202.40 m: white grey weakly altered dacitic tuff (bleached)																	
			light greenish grey dacitic tuff with green patch and quartz grain in matrix.																	
210		209.50 209.75																		210
		211.40 212.00	211.40~212.00 m: white and grey lenticular quartz vein let.			H														
220		219.30																		220
		220.40	220.40 m: small fault? grey clay (thickness 3 cm)																	
			light green dacitic tuff with small fragments (φ0.5 cm under) of andesite and dacite ≫ lenticular green patch, and quartz grain in matrix																	
230		231.55	gradual change																	230
			light green dacitic lapilli tuff lapilli: φ2 cm under, dark green and grey andesite, white grey dacite and a little of green patch matrix: small fragments of rock and quartz grain																	
240		241.80	green dacitic tuff breccia																	240
		242.70	light green dacitic tuff with small fragments (φ0.5 cm under) of andesite and dacite, and quartz grain in matrix.																	
250		249.65																		250
		251.05	light green dacitic lapilli tuff																	

MJP-12(1) Direction : SE50°, Angle : −45°, Depth : 250.46 m

DESCRIPTION

Pausa Sediments
silt, sand, gravel
silt and sand: white to light grey tuffaceous silt and sand.
gravel: size under 20 cm, bio-dacite, light green andesite, dark grey andesite.

dark grey hard compact andesite with weak chloritization.

- 18.34~19.05 m: brown iron oxides along cracks.
- 19.54~19.90 m: strongly sheared zone with brown and white clay
- 21.15~24.85 m: light grey weakly altered andesite
- 24.35~24.85 m: argilized zone with iron oxides
- 24.85~27.27 m: dark grey to light grey hard compact hornblende andesite.
- 25.35~25.47 m: brown iron oxides

27.27~39.55 m: light greenish grey weakly altered andesitic tuff
- 28.40~29.10 m 30.30~30.60 m: strongly sheared zone fault breccia with clay
- 35.30~35.50 m: brown iron oxides along cracks and quartz veinlets (w = 0.5 cm)
- 39.55~43.52 m: light grey hard compact bleached andesitic tuff with pyrite and brown iron oxides along crack.
- 43.52~46.10 m: brownish grey strongly sheared zone

greenish grey hard compact andesitic tuff with lenticular green patch and a little breccia of andesite (ϕ1~3 cm), yellowish brown iron oxides along crack.

light greenish grey hard compact andesitic tuff with a little breccia of grey andesite (ϕ1~3 cm)

- 63.80~65.67 m: grey to light grey strongly silicified rock with dissemination of pyrite.
- 65.35~65.48 m: grey quartz veinlet network

light greenish grey hard compact andesitic tuff with small breccia (ϕ0.5 cm) of grey andesite.

- 75.40~76.80 m: light grey strongly silicified rock with dissemination of pyrite
- 75.47~75.60 m: very strongly silicified zone with quartz vein (w = 2 cm), Cp, Ga, Sp

greenish grey weakly altered andesitic tuff

- 84.05~84.14 m: white grey quartz vein
- 88.00~88.08 m: grey quartz vein
- 88.67~88.75 m: grey quartz vein
- 90.02 m: dark grey breccia vein with a little Cp. and many pyrite crystals
- 91.65 m: black mineral and pyrite along crack

grey to light grey silicified andesitic tuff with dissemination of pyrite.

light greenish grey silicified rock (dacitic tuff?) with phenocryst of quartz grain (ϕ0.1~0.2 mm)

POSITION OF EXAMINED CORE SAMPLES

- 25.05 m IT
- 75.47m IP
- 99 m 2T

ASSAY RESULTS

Sample No	Depth (m)	Width (m)	Au (g/t)	Ag (g/t)	Cu (%)	Pb (%)	Zn (%)	As (%)
1M	65.35 65.50	0.15	0.27	14.0	−	−	−	−
2M	75.40 75.60	0.20	3.54	705	−	−	−	−
3M	84.05 84.15	0.10	0.14	13.3	−	−	−	−

ALTERATION AND MINERALIZATION: Silic, Qz-V, Arg, Py, Meta-M

CORE RECOVERY (%): 0, 50, 100

SCALE (m): 0, 10, 20, 30, 40, 50, 60, 70, 80, 90, 100

MJP-12(2)

Direction : SE 50° , Angle : −45° , Depth : 250.46 m

DEPTH AND CORE ANGLE (m)	DESCRIPTION	POSITION OF EXAMINED CORE SAMPLES
100.50	white grey very strongly silicified rock (dacitic tuff) with phenocryst of quartz grain and lenticular breccia	
(j) 45°		
108.20		
108.40~108.75		
109.80	light grey strongly silicified dacitic tuff with phenocryst of quartz	
110.05		
(v)	111.50~112.95 m: light grey very strongly silicified rock with black mineral (Sp, Ga, Ag? Py) along cracks	
111.50 30°	112.95~113.95 m: dark grey quartz vein with black mineral and pyrite.	← 113.62m 2PX
112.95	113.95~114.70 m: light grey strongly silicified rock with black mineral (Sp, Ag?) along open crack	
113.95		
114.70		
119.80	119.80~121.00 m: light grey strongly silicified rock with black vein along crack.	
121.00	121.00~122.00 m: grey very strongly silicified rock with black vein network and pyrite vein along cracks.	
122.00	122.00~123.30 m: light grey strongly silicified rock with black vein along crack.	
123.30		
125.40	light greyish green hard compact andesitic tuff with lenticular green patch	
(j) 50°		
131.20	131.20~131.40 m: strongly silicified zone	
131.40	131.32 m: quartz veinlet (w=0.5 cm) along crack	
(v)		
136.40 35°	136.40 m: quartz veinlet (w=0.2 cm)	
	light greyish green hard compact andesitic tuff with lenticular green patch and a little breccia of andesite (φ1 cm)	← 139.22m 3T
(j) 50°		
(v)		
146.97 45°	146.97 m: black mineral (Sp, Ag?) and Cp along crack	
149.35		
149.70		
150.50~150.75		
151.10	151.55 m: white calcite veinlet (w=0.2 cm)	
151.55	152.10~152.20 m: grey clay vein with pyrite vein (w=0.2~0.5 cm)	
152.10~152.20 50°		
	light greenish grey silicified andesitic tuff with lenticular green patch	
158.00 (j) 60°	158.00~158.05 m: white grey strongly silicified zone.	
164.50 (j)	164.50 m: white quartz - calcite vein (w=0.5 cm)	
165.65 65°	165.65 m: white quartz - calcite vein (w=0.1 cm)	
166.60 (v) 50°	166.60 m: white quartz vein (w=0.8~1.0 cm)	
167.12 (v) 50°	167.12 m: white quartz vein (w=0.5 cm)	
(v)		
171.30 30°	171.30 m: white quartz vein (w=1 cm)	
	176.45 m: quartz veinlet (w=0.1 cm)	
178.00	light grey medium to strongly silicified andesitic tuff, bleached.	
178.50		
180.77	180.77~184.10 m: strongly sheared zone with grey clay along crack	
181.50	181.50 m: fault breccia with grey clay	
184.10		
186.30	186.30 m: black mineral (Mg, Sp) irregular vein	
	186.30~193.70 m: dots and veinlet of black mineral	
189.20	189.20 m: black mineral (Sp, Mg, Mn?, Py) lenticular vein (w=3 cm)	
193.70~193.80	193.70~193.80 m: white grey to grey quartz-chlorite vein with black mineral	
193.80~193.90	193.80~193.90 m: grey clay and silicified rock	
193.90~194.00	193.90~194.00 m: grey clay	
195.10		
	grey silicified andesitic tuff with lenticular green patch	

ALTERATION AND MINERALIZATION: Silic, Qz-V, Arg, Py, Meta-M

ASSAY RESULTS

Sample No	Depth (m)	Width (m)	Au (g/t)	Ag (g/t)	Cu (%)	Pb (%)	Zn (%)	As (%)
	111.92							
4M	112.52	0.60	0.07	56.5	<0.01	0.01	0.10	—
5M	112.95	0.43	0.14	3.6	<0.01	<0.01	<0.01	—
6M	114.50	1.55	0.21	22.3	<0.01	<0.01	0.06	—
	121.00							
7M	122.00	1.00	0.27	15.3	—	—	—	—
	186.30							
8M	186.50	0.20	0.07	3.0	—	—	—	—
	189.00							
9M	189.30	0.30	13.10	360	—	—	—	—
	193.70							
10M	193.80	0.10	0.14	3.6	—	—	—	—

CORE RECOVERY: 0 50 (%) 100

SCALE (m): 100 110 120 130 140 150 160 170 180 190 200

MJP-12(3) Direction : SE 50° , Angle : −45° , Depth : 250.46 m

DEPTH AND CORE ANGLE (m) (°)

Depth (m)	Core angle
200.50	
202.22	
203.35~203.38	(v) 35°
204.25	
204.85	
206.60~206.70	
206.95~207.00	
211.20	
212.30~212.60	(v) 35°
212.60~212.75	
212.75~213.10	
213.30	
214.00	
216.57~216.77	
218.72	
220.62	
220.80	
221.20	
222.85	
224.35	(v) 30°
225.35	
230.05	(v) 15°
230.20~230.50	
235.80	
236.05	(ℓ) 60°
239.60	
246.58	(j) 20°
246.78	
247.70	
248.40	
249.00	
250.46	

DESCRIPTION

200.50 m: dots of black mineral
202.22 m: quartz veinlet with reddish brown mineral
203.35~203.38 m: white quartz vein with black mineral (w = 2.5 cm)
204.25~204.85 m: quartz veinlet network with black mineral
206.60~206.70 m: grey to white quartz vein network
206.95~207.00 m: black and reddish brown vein (w = 1.5 cm)

light greyish green andesitic tuff with lenticular green patch

white grey strongly silicified andesitic tuff with dots of black mineral
212.30~212.60 m: breccia bearing dark grey quartz vein
212.60~212.75 m: black vein (w = 7 cm) with white calcite veinlets (0.1 cm)
212.75~213.10 m: dark grey quartz vein with black mineral
213.10~213.30 m: grey strongly silicified rock
213.30~214.00 m: grey quartz vein with white quartz vein network
216.57~216.77 m: lenticular black vein
220.62 m, 220.80 m: black veinlet and dots
220.95~221.05 m: white quartz vein (w = 0.2 cm)
221.20~221.30 m: white quartz veinlet and black veinlet

222.85 m: lenticular black vein (w = 1.0 cm)

224.35 m: black vein with pyrite (w = 0.5 cm)
225.35 m: grey and black quartz vein (w = 1.5 cm)

light greenish grey medium silicified andesitic tuff with lenticular green patch.

230.05 m: grey quartz vein with reddish brown mineral and pyrite
230.20~230.50 m: quartz veinlet network

235.80~236.05 m: white quartz vein network

greyish green hard compact andesitic tuff with lenticular green patch and small breccia of grey andesite.

246.58~246.78 m: grey quartz feldspar vein
247.70~248.40 m: white quartz vein network
248.40~249.00 m: andesitic tuff breccia

POSITION OF EXAMINED CORE SAMPLES

215.70 m 3P

ALTERATION AND MINERALIZATION

Silic, Qz-V, Arg, Py, Meta-M

ASSAY RESULTS

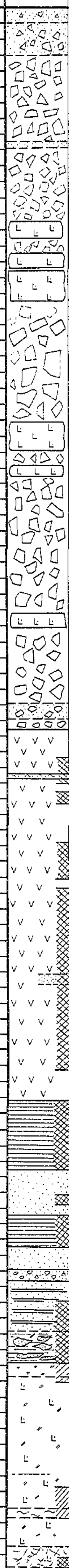
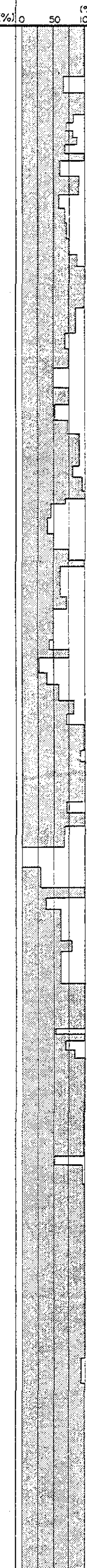
Sample No	Depth (m)	Width (m)	Au (g/t)	Ag (g/t)	Cu (%)	Pb (%)	Zn (%)	As (%)
	212.30							
11 M	212.55	0.25	0.27	5.3	—	—	—	—
12 M	212.75	0.20	0.48	7.3	—	—	—	—
13 M	213.10	0.35	0.21	5.8	—	—	—	—
	213.30							
14 M	214.00	0.70	0.21	5.3	—	—	—	—
	247.70							
15 M	248.40	0.70	<0.07	1.3	—	—	—	—

CORE RECOVERY (%)

0 50 100

SCALE (m): 200, 210, 220, 230, 240, 250

MJP-13(1) Direction : SE 35° , Angle : -45° , Depth : 250.20m

SCALE (m)	GEOLOGIC COLUMN	DEPTH AND CORE ANGLE (m) (°)	DESCRIPTION	POSITION OF EXAMINED CORE SAMPLES	ALTERATION AND MINERALIZATION (Silic, Qz-V, Arg, Py, Meta-M)	ASSAY RESULTS: Sample No, Depth (m), Width (m), Au (g/t), Ag (g/t), Cu (%), Pb (%), Zn (%), As (%)	CORE RECOVERY (%) 0 50 100	SCALE (m)
0		1.00 3.00	Alluvium 0.00~1.00 m: grey sand and pebble gravel of dacite 1.00~3.00 m: pebble gravel of dacite and grey soil 3.00~8.40 m: cobble and pebble gravel of light grey dacite, ≫ rhyolite, andesitic tuff.					0
10		8.40 8.90	8.40~8.90 m: grey sand and granule 8.90~13.55 m: cobble gravel of dacitic lapilli tuff and parplish grey dacite					10
		13.55 14.50 15.50 16.45 16.55 18.40	13.55~18.40 m: block of light grey to light brownish grey dacite					
20			18.40~26.10 m: boulder (max. φ30 cm) and cobble gravel of grey andesite, yellowish grey dacite and light grey dacite					20
		26.10 27.95 28.85 29.50	26.10~29.50 m: block and pebble gravel of dacite					
30			29.50~38.25 m: pebble gravel of light grey dacite, greenish grey andesite and parplish grey dacite (max. φ20 cm).					30
40		38.25 39.05	38.25~39.05 m: block of parplish grey dacite 39.05~45.5 m: pebble of grey andesite and a little bit of parplish dacite					40
		43.95 44.95 45.55	43.95~44.95 m: grey soil and pebble gravel					
50		47.30 48.35 48.65 49.05 49.50 50.30	dark grey weakly weathered andesite with xenolith of green andesite (φ5 cm). 48.35~48.65 m: grey clay with small chips of andesite					50
60		52.80 55.05 55.65 61.15 61.95 67.20	dark grey porphyritic andesite with many cracks, phenocryst of plagioclase (φ0.5 cm -) 61.15~61.95: slime of grey andesite	68.10m 1T				60
70		69.20	dark brownish grey tuffaceous shale with many fracture.					70
		73.50 75.25 75.75	grey tuffaceous coarse grained sandstone					
		76.40	dark brownish grey tuffaceous shale with many fracture					
80		78.45 79.95 80.65 81.85 83.75	grey tuffaceous coarse to fine grained sandstone with thin bedded brownish grey shale 79.95~80.65 m: grey tuffaceous conglomerate pebble: subangular, φ=1 cm±	80.85m 2T				80
			brownish grey shale with dark grey lenticular sandstone					
		85.80 86.85 87.00	light green fine dacitic tuff, weakly argillization					
90		92.90 93.70 95.10 95.75 97.50 98.20 98.80 99.00 (1) 50°	light grey massive dacitic tuff with green lenticular patch and quartz grain green patch: φ1 cm × 0.3 cm under, lenticular quartz grain: φ0.2 cm± 92.90 m: brown iron oxides along crack 95.10~95.75 m: weakly argillization 97.50~98.80 cm: dacitic tuff with brown iron oxides along crack and stain.		I			90
100								100

13(2)

Direction : SE 35° , Angle : − 45° , Depth : 250.20 m

DEPTH AND CORE ANGLE (m)	(°)	DESCRIPTION	POSITION OF EXAMINED CORE SAMPLES
		light greenish grey dacitic tuff with green lenticular green patch (φ1 cm × 0.3 cm) and quartz grain	← 100.40 m 3T
103.60		103.60~104.00 m: light green ducitic fine tuff	
104.00			
112.90		gradual change	
		light green massive dacitic lapilli tuff with lenticular green patch (φ1~3 cm) and quartz grain	
120.90		gradual change	
		light green dacitic tuff with green patch (φ1 cm×0.3 cm under)	
122.70	(V) 55°	112.70 m: white quartz vein (w = 0.5 cm)	
123.80		gradual change	
		light green dacitic fine tuff	
126.25		gradual change	
126.90	(V) 45°	light green dacitic tuff with green patch (φ1 cm × 0.3 cm ±)	
		126.90 m: white quartz vein (w = 0.03 cm) with pyrite	
130.50		gradual change	
		light green dacitic tuff with a little small green patch	
135.75		gradual change	
		light green dacitic tuff with green patch and andesite breccia (φ0.4 cm under) of grey green light brown.	
141.80		gradual change	
		dacitic lapilli tuff with quartz grain	
144.00		lapilli: φ3 cm under, lapilli of andesite	
		light green massive dacitic tuff with a little breccia.(φ1 cm ±) of white dacite and green andesite.	
154.85		gradual change	
		white grey bleached dacitic tuff with quartz grain	
156.90			
157.55		156.90~157.55 m: dark grey strongly altered rock with white quartz veinlets network and grey clay	
159.00			
160.10		159.00~160.10 m: reddish brown iron oxides network	
160.40		160.10~160.40 m: dark grey strongly altered rock with white quartz veinlet network.	
		white grey bleached dacitic tuff with white lenticular patch and quartz grain	
175.50		gradual change	
		light green dacitic tuff with light green lenticular patch and quartz grain	
	(I) 40°		
181.50		gradual change	
		light greenish grey dacitic tuff breccia	
		breccia: φ2~5 cm, ungular, breccia of green and brown andesite, porphyritic andesite and dacite.	
		matrix: small fragments of andesite and quartz grain	
		196.55 m: white quartz vein (w = 0.5 cm)	← 193.60 m 4T
196.55		gradual change	
		white grey strongly altered rock	
		199.00 m, 199.05 m: white quartz veinlet	
198.70		199.45~199.60 m: white grey strongly altered rock with	
199.45~199.60		crystal of Cp., Sp. and fine black mineral	

ALTERATION AND MINERALIZATION: Silic, Qz-V, Arg, Py, Meta-M

ASSAY RESULTS

Sample No	Depth (m)	Width (m)	Au (g/t)	Ag (g/t)	Cu (%)	Pb (%)	Zn (%)	As (%)
	156.90							
1M	157.55	0.65	<0.07	3.6	—	—	—	—
	199.45							
2M	199.60	0.15	2.33	80	0.03	0.33	0.48	—

CORE RECOVERY (%) 0 50 100

SCALE (m) 100 110 120 130 140 150 160 170 180 190 200

MJP-13(3)

Direction : SE 35° , Angle : − 45° , Depth : 250.20m

Depth and core angle (m) (°)	Description
200.50 201.14~201.30 202.20 203.50 204.20 205.80	white grey strongly altered rock 200.50 m: lenticular vein of Sp, Cp, Ga and Py. 201.14~201.30 m: white quartz vein network with black mineral 201.20~201.25 m: Sp≫Ga>Cp>Py 202.20~203.50 m: strongly altered rock with partly lenticular veinlet of Sp and Cp. 203.50~204.20 m: white grey strongly altered rock with Sp-Cp-Ga-Py veinlet network and disseminated 204.20~205.80 m: white grey strongly altered rock with partly black vein network — gradual change
212.90~213.10 216.50	white to light grey massive altered (bleached) dacitic tuff with dissemination of pyrite, quartz grain 212.90~213.10 m: black veinlet with Sp≫Ga>Cp — gradual change
225.00 227.40	light grey weakly altered dacitic tuff with breccia of light green lenticular andesite (φ1~3 mm) and partly white quartz veinlet 225.00~227.40 m: dissemination of pyrite and black fine veinlet
240.25 240.35 (V) 60°	light grey weakly altered (bleached) dacitic tuff with light green andesite and quartz grain, partly white quartz veinlet • sometimes contain breccia (φ2 cm) of green porphyritic andesite 240.25 m, 240.35 m: white quartz veinlet (w=0.1~0.3 cm)
250.20	light grey weakly altered dacitic tuff with quartz grain and small (φ1~3 mm) light green andesite.

Position of examined core samples: 205.65 m IP; 205.70 m X

Alteration and mineralization: Silic, Qz-V, Arg, Py, Meta-M

ASSAY RESULTS

Sample No	Depth (m)	Width (m)	Au (g/t)	Ag (g/t)	Cu (%)	Pb (%)	Zn (%)	As (%)
3 M	199.60 200.60	1.00	0.27	1.9	<0.01	0.06	0.03	—
4 M	201.14	0.54	0.48	6.3	0.06	0.14	0.29	—
5 M	201.30	0.16	5.04	450	0.79	1.37	1.30	—
6 M	202.05	0.75	<0.07	2.3	<0.01	0.03	0.07	—
7 M	202.75	0.70	0.07	4.1	0.03	0.04	0.13	—
8 M	203.50	0.75	<0.07	5.0	0.06	0.12	0.14	—
9 M	204.20	0.70	0.21	18.0	0.18	0.86	1.62	—
10 M	205.05	0.85	<0.07	1.3	<0.01	0.01	0.02	—

CORE RECOVERY (%) 0 50 100

SCALE (m): 200, 210, 220, 230, 240, 250

MJP-14(1) Direction : SE 20° , Angle : -45° , Depth : 200.65m

DEPTH AND CORE ANGLE (m)	(°)	DESCRIPTION
		Alluvium
2.20		0.00~2.20 m: dark grey soil with small root
		2.20~6.95 m: brownish grey soil with a little gravel of quartzite
6.95		6.95~8.90: gravel of quartzite and dacite
8.90		
6.70		white grey hard compact arkose sandstone
		8.90~12.75 m: light grey quartz vein network, likely breccia vein.
12.75		
14.15~14.25		14.15~14.25 m: white quartz vein with druse
17.40~17.50		17.40~17.50 m: light grey quartz vein, partly brown quartz and black band
18.42~18.47		18.42~18.47 m: light grey quartz vein with black fine band
		white grey hard compact arkose sandstone
22.80		
23.15~23.25		23.15~23.25 m: light grey to grey quartz vein with dissemination of pyrite and white clay
23.60		
24.30		
25.70		
26.10		
28.00		
28.50		28.00~30.70 m: light grey arkose sandstone with brown to reddish brown iron oxides along many cracks
30.70		
32.00		grey to dark grey shale
		30.70~32.00 m: grey shale with small chips of black shale
		32.00~36.75 m: dark grey shale, sheared
(b) 36.75 50°		36.75~43.00 m: grey to dark grey massive shale
42.30~42.65		
(b) 43.00 50° 43.90		43.00~43.90 m: alternation of grey fine sandstone and dark grey shale
44.50		43.90~44.50 m: light grey fine sandstone
46.10		black to dark grey massive shale
47.00		
47.55		47.00~47.55 m: strongly sheared zone, black clay and small chip of black shale
		grey to dark grey hard massive shale
57.40~57.50		57.40~57.50 m: lenticular pyrite vein
		grey to dark grey hard massive shale
(b) 64.80 ~65.15 45°		64.80~65.15 m: black carbon bearing black shale
		grey to dark grey massive shale
69.25		black massive shale
75.75		black carbon bearing black shale
		77.30~78.50 m: black coal
78.70		alternation of black shale and grey fine to medium grained sandstone
(b) 81.90 55°		mainly black shale, partly intercalated with very thin bedded fine sandstone and lenticular sandstone
87.60~87.70		87.60~87.70 m: pyrite veinlet
89.20	(b)	
89.80~90.35	30°	alternation of black shale and grey to dark grey sandstone
91.00		
91.70		
92.95~93.15		92.95~93.15 m: grey sandstone with many pyrite
93.30		grey to dark grey medium grained sandstone with calcite veinlet.
97.80		dark grey massive shale

POSITION OF EXAMINED CORE SAMPLES	ALTERATION AND MINERALIZATION: Silic	Qz-V	Arg	Py
	8.90			
	14.15			
	17.40			
	23.15			
	28.50			

ASSAY RESULTS: Sample No	Depth (m)	Width (m)	Au (g/t)	Ag (g/t)	Cu (%)	Pb (%)	Zn (%)	As (%)
1 M	10.15	1.25	< 0.07	2.3	—	—	—	—
2 M	11.60	1.45	< 0.07	1.9	—	—	—	—
3 M	12.75	1.15	< 0.07	0.3	—	—	—	—
4 M	14.25	0.10	< 0.07	< 0.3	—	—	—	—
5 M	17.50	0.10	< 0.07	0.3	—	—	—	—
6 M	18.47	0.07	< 0.07	0.3	—	—	—	—
7 M	23.25	0.10	< 0.07	0.5	—	—	—	—
8 M	29.65	1.15	< 0.07	0.5	—	—	—	—
9 M	30.70	1.05	< 0.07	3.3	—	—	—	—

CORE RECOVERY (%) 0 50 100

SCALE (m) 0 10 20 30 40 50 60 70 80 90 100

MTB-14(2)

Direction : SE 20° , Angle : − 45° , Depth : 200.65m

DEPTH AND CORE ANGLE (m)	DESCRIPTION	POSITION OF EXAMINED CORE SAMPLES
101.40	dark grey massive shale	
	black massive shale with thin calcite veinlet	
107.10	grey massive shale	
112.00		
112.80	dark grey massive shale	
113.70	113.70~114.30 m: alternation of black shale and grey sandstone	
114.30	114.30~115.20 m: grey fine to medium grained sandstone with thin bedded black shale	
115.20	115.40~115.60 m: grey shale with many pyrite	
115.40~115.60	dark grey massive shale	
121.90		
122.80		
123.30		
127.15	127.25~128.15 m: dark grey shale with many pyrite veinlet network	
127.25~128.15		
128.45		
130.30		
131.30	grey to dark grey fine grained sandstone with very thin bedded black shale	
133.15	133.15 m: brown iron oxides along crack	
134.20	black to dark grey massive shale	
139.40		
141.05	141.35~141.70 m: grey fine grained sandstone	
141.35	141.50~141.60 m: concentrated pyrite	
141.70	*black to dark grey massive shale*	
146.75~148.90	146.75~146.90 m: dissemination and veinlet of pyrite	
	148.60~148.65 m: black carbon bearing black shale	
149.50		
150.30	grey to dark grey fine sandstone with pyrite along crack	
151.35	150.30 m, 151.35 m: quartz veinlet	
151.45	151.45~152.10 m: black shale with a little carbon stain and thin bedded sandstone	
152.10	153.00~153.20 m: disseminated pyrite	
153.00~153.20		
156.45		
156.95	gradual change	
	grey hard massive medium grained sandstone with white quartz veinlet (w < 0.5 cm)	
161.95~162.05	161.95~162.05 m: white quartz vein network with brown iron oxides along crack	
164.95	164.95~165.30 m: light grey silicified sandstone	
165.30~165.40	165.30~165.40 m: quartz vein with brown iron oxides	
165.70	165.40~165.70 m: light grey strongly silicified sandstone	← 166.50m 1P
166.40~166.55	165.70~166.40 m: light grey and light brown very strongly silicified sandstone with quartz vein network	← 167.80 m 2PX
167.30	166.40~166.55 m: white quartz vein with druse	
167.85	166.55~167.30 m: grey to light grey silicified sandstone with white quartz veinlet.	← 172.85m 1T
168.85	167.30~167.85 m: light brown very strongly silicified sandstone with quartz veinlet.	
171.40	167.85~168.85 m: light grey silicified sandstone with white quartz veinlet.	
171.80	grey hard massive medium grained sandstone	
179.22~179.40	171.40 m: white quartz vein network (w = 1 cm)	
180.00	171.80 m: white quartz vein (w = 2 cm)	
	179.22~179.40 m: white and grey quartz vein	
183.60	179.40~180.00 m: light grey silicified sandstone with white quartz veinlet	
184.75	183.60 m: white quartz vein (w = 0.5 cm)	
	184.75 m: white quartz vein (w = 0.5 cm)	
188.40	gradual change	
	light grey hard massive fine to medium grained arkose sandstone with brown iron oxides along crack.	
196.75	gradual change	
	white grey hard massive fine grained arkose sandstone	
200.65	200.40~200.50 m: white quartz veinlet network	

ALTERATION AND MINERALIZATION: Silic, Qz-V, Arg, Py

ASSAY RESULTS

Sample No	Depth (m)	Width (m)	Au (g/t)	Ag (g/t)	Cu (%)	Pb (%)	Zn (%)	As (%)
	115.40							
10M	115.60	0.20	<0.07	2.5	—	—	—	—
	165.30							
11M	165.70	0.40	<0.07	2.3	—	—	—	—
12M	166.55	0.85	<0.07	2.5	—	—	—	—
	167.30							
13M	167.85	0.55	<0.07	0.5	—	—	—	—
14M	168.55	0.70	<0.07	0.5	—	—	—	—
	179.22							
15M	179.40	0.18	0.07	2.3	—	—	—	—

CORE RECOVERY: 0 50 (%) 100

SCALE (m): 100 110 120 130 140 150 160 170 180 190 200

MJTP-15(1) Direction : SE 20° , Angle : − 45° , Depth : 200.35 m

Geologic column (0–100 m):

Depth and core angle (m) (°)	Description
0	Alluvium
	light brownish grey soil (grey silt and sand)
6.10	grey soil contained gravel (φ1~5 cm) of black shale, grey andesite, green andesite and tuff.
12.60	light brownish grey soil with a little gravel
17.15	17.15~18.05 m: gravel of grey to brownish grey andesite
18.05	18.05~18.55 m: grey sand
18.55	18.55~19.45 m: light brown soil
19.45	19.45~20.20 m: gravel of black shale and andesite
20.20	20.20~23.00 m: gravel of greenish grey diorite and grey sand
23.00	23.00~23.45 m: gravel of brown shale and white sandstone
23.45	reddish brown shale
24.05	brown to greyish brown weathered shale
25.65	white grey argillaceous weathered shale
27.05	light grey to white grey hard compact arkose sandstone with brown to reddish brown iron oxides along crack.
28.75~29.00	28.75~29.00 m: white quartz veinlet network
32.70	32.70~34.20 m: grey hard compact silicified arkose sandstone with white quartz vein network and black patch of pyrite
34.20 / 34.60	34.60 m: grey clay (w = 1 cm)
35.00	35.00~37.15 m: grey arkose sandstone with brown iron oxides along crack
37.15	grey clay
37.45	37.45~37.65 m: grey arkose sandstone
	light grey to grey shale with yellow, brown and reddish brown iron oxides along crack.
44.30	light grey to grey massive shale
50.80 / 51.70	
56.30 / 56.80	56.30~56.80 m: grey shale
59.00	light grey to grey massive shale
63.35~63.65	63.35~63.65 m: reddish brown iron oxides along crack with dissemination of pyrite
63.95	63.95~67.00 m: grey shale with pyrite veinlet and dissemination, weakly silicified.
64.90	
67.00 / 67.60	alternation of grey shale and light grey sandstone
68.35	67.00~68.35 m: reddish brown iron oxides along crack.
69.55	68.35~69.55 m: dark grey arkose sandstone with pyrite and black mineral
70.35~70.45	70.35~70.45 m: grey shale
70.75~70.85	70.75~70.85 m: white quartz vein and yellowish brown clay (w = 5 cm)
74.80~85.00	74.80~85.00 m: iron oxides along crack
	grey to light grey arkose sandstone, hard compact.
82.20~82.40	82.20~82.40 m: white quartz vein network
82.75	82.75~83.80 m: white quartz vein network and crystal quartz along open crack
83.80	
84.50~85.00	84.50~85.00 m: quartz vein (w = 2 cm) × 6
85.25~85.40	85.25~85.40 m: white quartz vein network
85.40	white grey arkose sandstone with brown to reddish brown iron oxides along crack
89.25	
90.50	
91.50	91.85 m: reddish brown iron oxides
92.20 (V)	92.20~93.80 m: white to greyish white strongly silicified arkose sandstone with veinlet and spot of pyrite
93.48~93.65 45°	93.48~93.65 m: yellowish brown and reddish brown veinlet network of iron oxides
93.80	grey to light grey clay with pyrite
94.60	black carbon bearing black shale
95.40	dark grey shale with pyrite along crack
98.95	light grey to grey shale

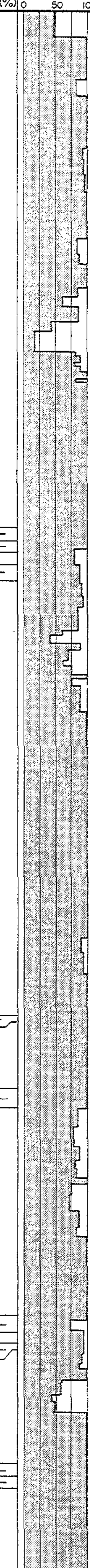
Position of examined core samples: 93.60 m IP

Alteration and mineralization (Silic, Qz-V, Arg, Py)

Assay results

Sample No	Depth (m)	Width (m)	Au (g/t)	Ag (g/t)	Cu (%)	Pb (%)	Zn (%)	As (%)
1 M	32.70 33.45	0.75	< 0.07	1.9	—	—	—	—
2 M	33.45 34.20	0.75	< 0.07	1.0	—	—	—	—
3 M	35.00 36.00	1.00	< 0.07	0.3	—	—	—	—
4 M	63.70 64.00	0.30	0.07	0.3	—	—	—	—
5 M	68.35 69.55	1.20	< 0.07	1.3	—	—	—	—
6 M	82.75 83.80	1.05	< 0.07	0.5	—	—	—	—
7 M	84.50 85.00	0.50	< 0.07	0.8	—	—	—	—
8 M	92.20 93.10	0.90	< 0.07	0.3	—	—	—	—
9 M	93.80	0.70	< 0.07	2.8	—	—	—	—

Core recovery (%) 0 50 100:



Scale (m): 0 10 20 30 40 50 60 70 80 90 100

MJR-15 (2)

Direction : SE 20° , Angle : −45° , Depth : 200.35 m

DESCRIPTION

DEPTH AND CORE ANGLE (m) (°)	DESCRIPTION
100.00–101.40	light grey to grey shale
101.40	grey to dark grey shale with many fracture
105.85~106.00, 106.80, 107.20~107.40, 108.10	105.85~106.00 m: black carbon bearing black shale 106.80~108.10 m: pyrite along fracture 107.20~107.40 m: black carbon bearing black shale
110.10, 111.10, 111.45, 112.75, 113.55, 117.80	blackish grey shale 111.10~111.45 m: black carbon bearing black shale
	mainly grey massive shale, partly light grey massive
126.05 (b) 45°, 136.20, 136.80, 140.90, 141.50	grey to dark grey massive shale
146.65, 147.00	146.65~147.00 m: grey silt stone
148.40 (c) 45°	grey to dark grey sandstone with thin bedded black shale and pyrite along crack 148.40 m: crystal quartz veinlet (w = 0.1 cm) along crack
150.45, 154.50, 154.80 (b) 50°	black massive shale 154.30~154.60 m: dissemination of pyrite 154.50~154.80 m: black carbon bearing black shale
156.20	alternation of dark grey sandstone and black shale
157.65	black shale and lenticular grey sandstone with pyrite
159.10	black shale with thin bedded dark grey sandstone and thin *lenticular sandstone*
165.00, 165.40, 165.80, 167.20, 167.70	grey medium grained sandstone with veinlet and dissemination of pyrite 165.40~165.80 m, 166.20~166.30 m, 167.20~167.70 m: black shale
171.55 (b) 65°	dark grey fine grained sandstone
173.20, 173.95, 174.30, 177.40, 178.00, 178.65, 181.80, 182.60, 184.00, 185.70, 186.00, 187.15, 188.50, 194.10, 194.80, 195.55, 196.80, 197.45~197.80, 198.25, 199.10, 199.80, 200.35	dark grey to black massive shale 177.40 m: *lenticular pyrite vein* 181.80~182.60 m: strongly sheared zone 185.70 m: crystal of pyrite along crack 188.50 m: pyrite along crack dark grey to black massive shale 194.10~194.12 m: pyrite veinlet network (w = 2 cm) 194.80 m: pyrite 197.45~197.80 m: pyrite veinlet network

ASSAY RESULTS

Sample No	Depth (m)	Width (m)	Au (g/t)	Ag (g/t)	Cu (%)	Pb (%)	Zn (%)	As (%)
10 M	197.45 197.80	0.35	<0.07	1.9	—	—	—	—

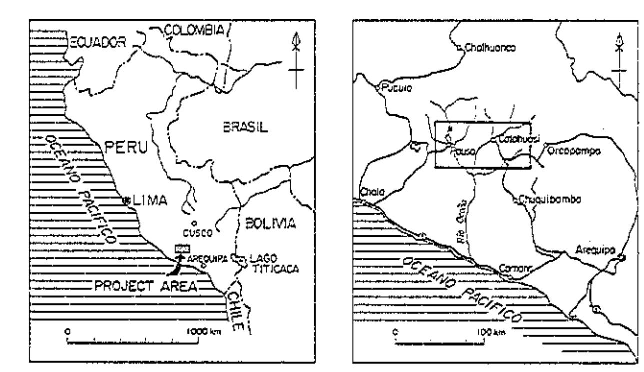
Columns: SCALE (m) 100–200; GEOLOGIC COLUMN; POSITION OF EXAMINED CORE SAMPLES; ALTERATION AND MINERALIZATION (Silic, Qz-V, Arg, Py); CORE RECOVERY (%) 0 50 100.

PL. 10

MINERAL EXPLORATION
IN
COTAHUASI AREA.
(PHASE II)

INTERPRETATION MAP OF THE COLPAR AREA

LOCATION INDEX



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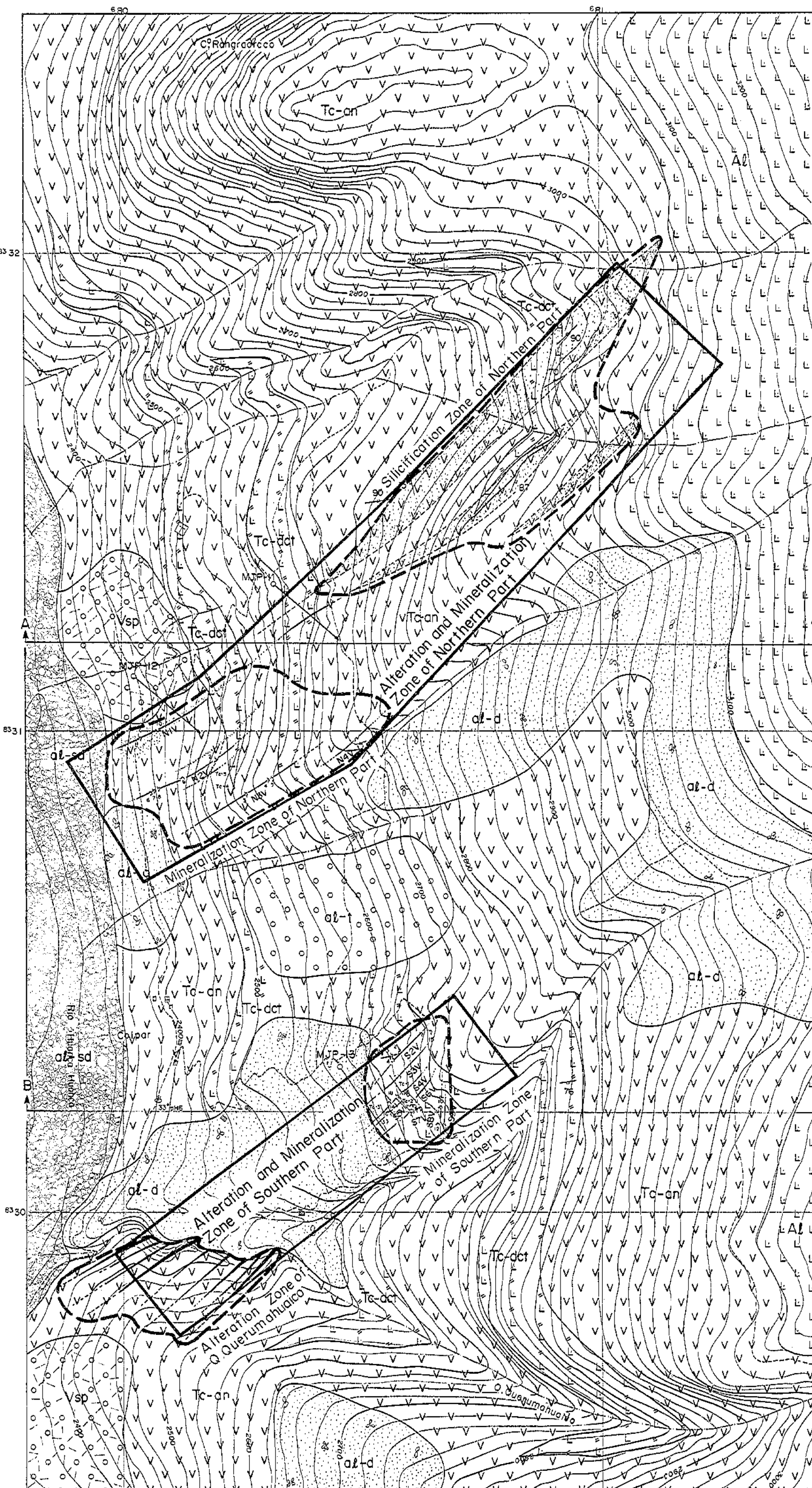
INSTITUTO GEOLOGICO MINERO Y METALURGICO
JANUARY 1988

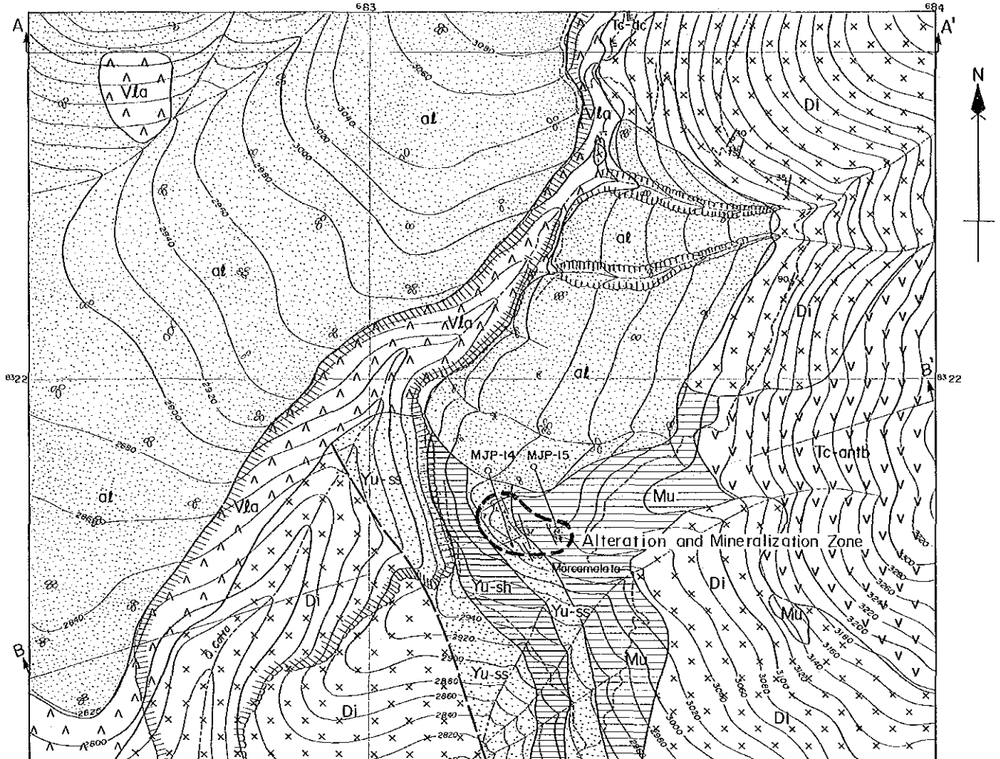
Scale 1 : 5,000
0 100 200 300 400 500m



LEGEND

			Symbol	
Quaternary	Holocene	Alluvium	al-sd	River sediments (gravel, sand)
			al-d	Debris (gravel, sand silt, clay)
			al-t	Terrace (gravel, sand, silt)
		Volcanic Sediment of Pausa	Vsp	Tuffaceous silt, sand, gravel
Tertiary	Miocene	Alpabamba Formation	Al	Rhyolitic pyroclastic rocks
		Tacaza Formation	Tc-dct	Dacitic pyroclastic rocks
			Tc-an	Andesite lava and andesitic pyroclastic rocks

- Strike and dip of joint
- Old tunnel
- Trenching site
- Drilling site
- Mineralization zone (Au, Ag)
- Silicification zone with iron oxides
- Recomended Area



Scale 1 : 5,000

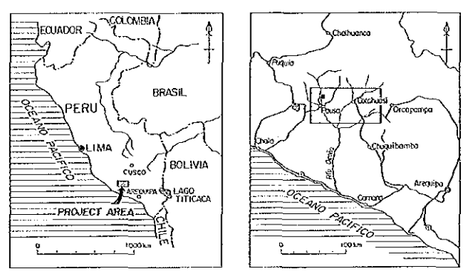
0 100 200 300 400 500m

PL. II

MINERAL EXPLORATION
IN
COTAHUASI AREA
(PHASE II)

INTERPRETATION MAP OF THE MARCAMALATA AREA

LOCATION INDEX



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INSTITUTO GEOLOGICO MINERO Y METALURGICO

JANUARY 1989

LEGEND

Quaternary / Holocene	Alluvium	al	Gravel, sand, silt and clay
	Lampa Volcanic Rocks	Vla	Basaltic andesite lava and volcanic breccia
Tertiary / Miocene	Tocaza Formation	Tc-anb	Andesitic volcanic breccia
		Tc-dc	Dacite lava
Cretaceous	Murco Formation	Mu	Alternation of red shale and sandstone
	(Yura Group) Hualhuani Formation	Yu-sh	Black shale with thin bedded sandstone
		Yu-ss	Arkose sandstone
Intrusive Rock			
	Accha Stock	Di	Quartz diorite

- Fault
- 20 Strike and dip of bedding
- 85 Strike and dip of joint
- Old tunnel
- Trenching site
- Drilling site
- Mineralization zone (Au, Ag)
- Alteration zone (silicification or argillization)
- Alteration and Mineralization Zone