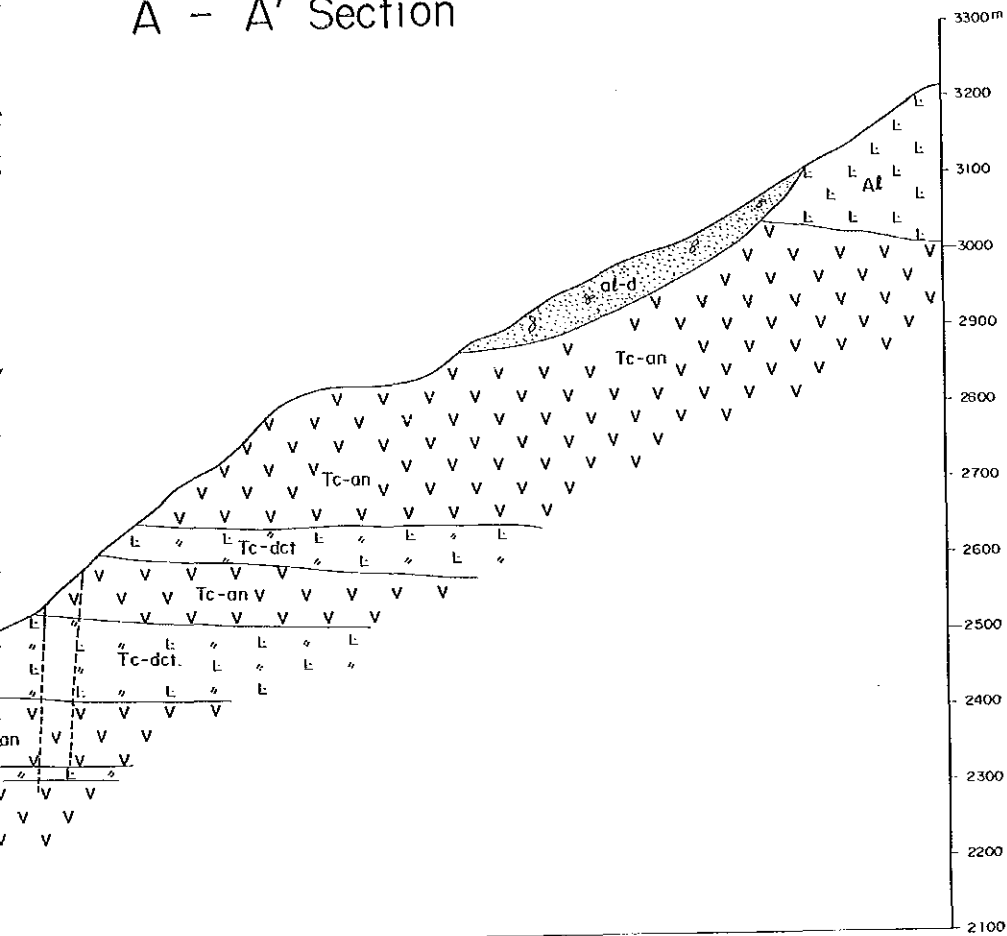
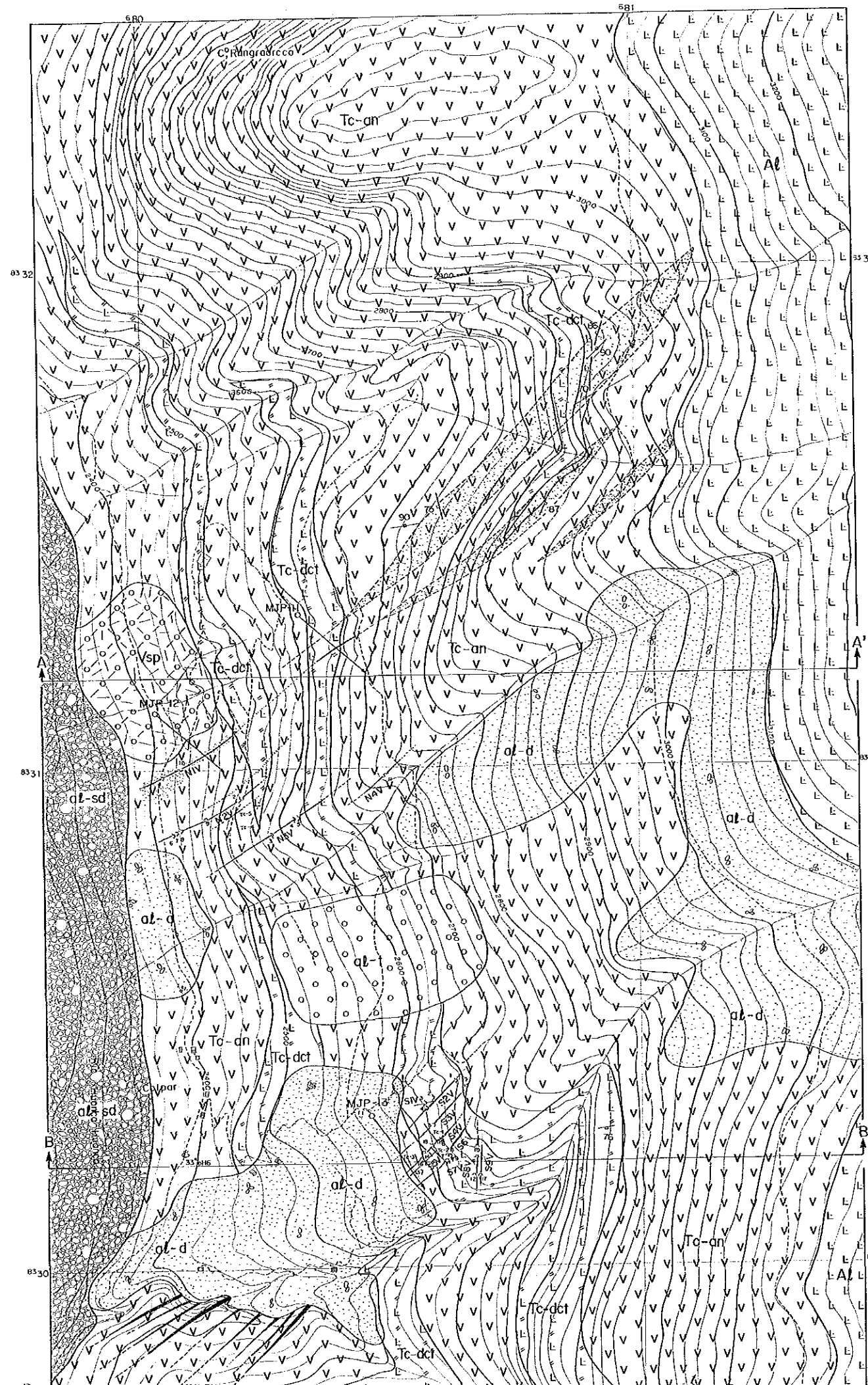
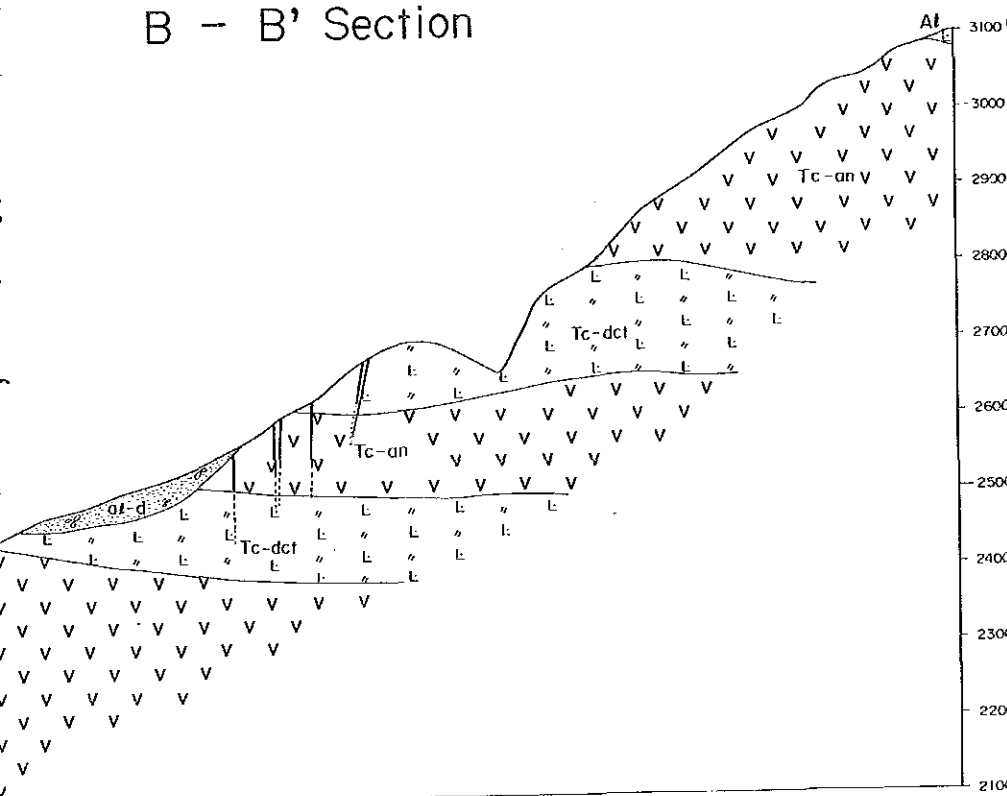


A - A' Section



B - B' Section



国際協力事業団
 17498
 国書資料室蔵

MINERAL EXPLORATION
 IN
 COTAHUASI AREA
 (PHASE II)

GEOLOGICAL MAP AND SECTION OF THE COLPAR AREA

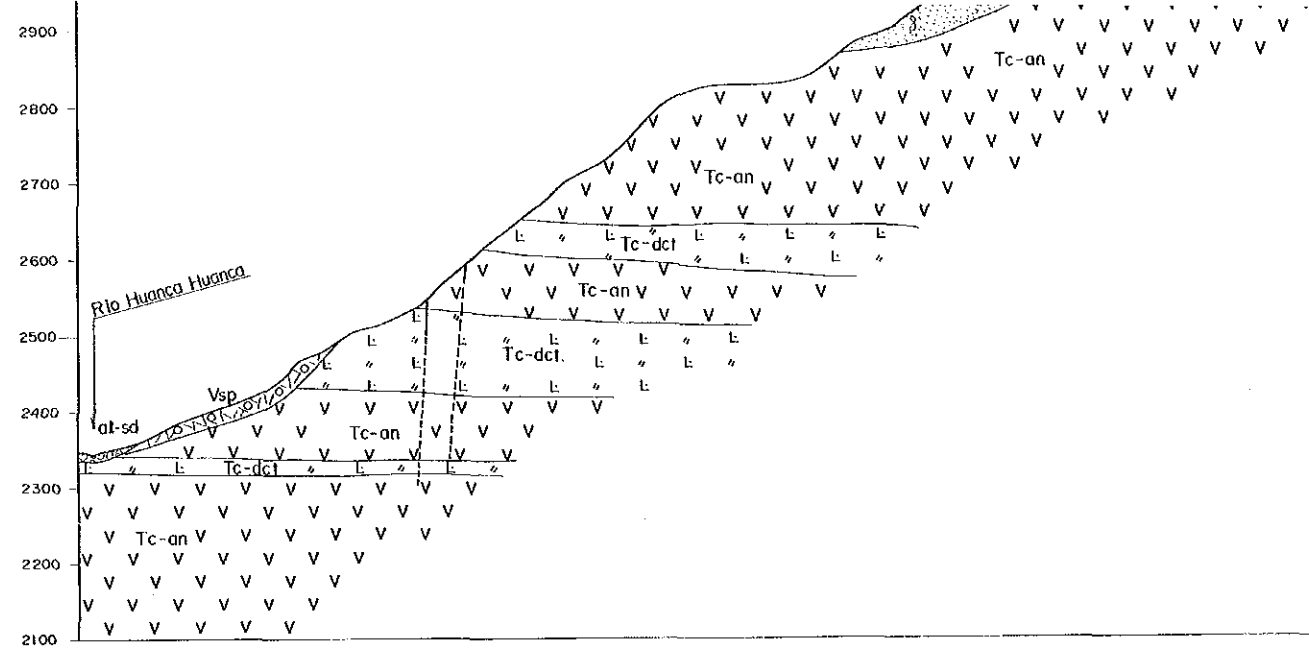
LOCATION INDEX

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

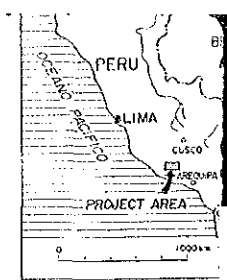
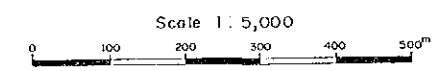
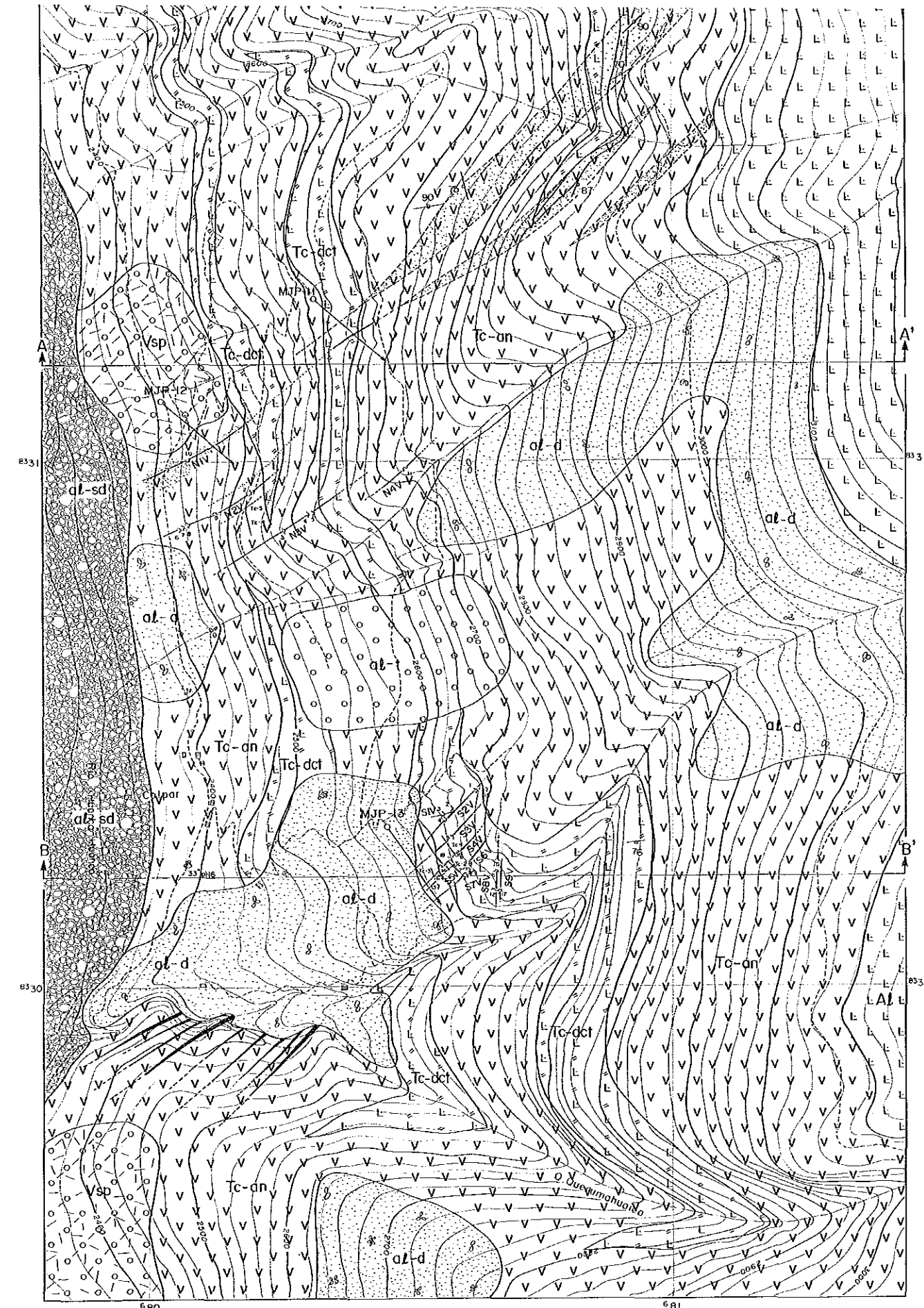
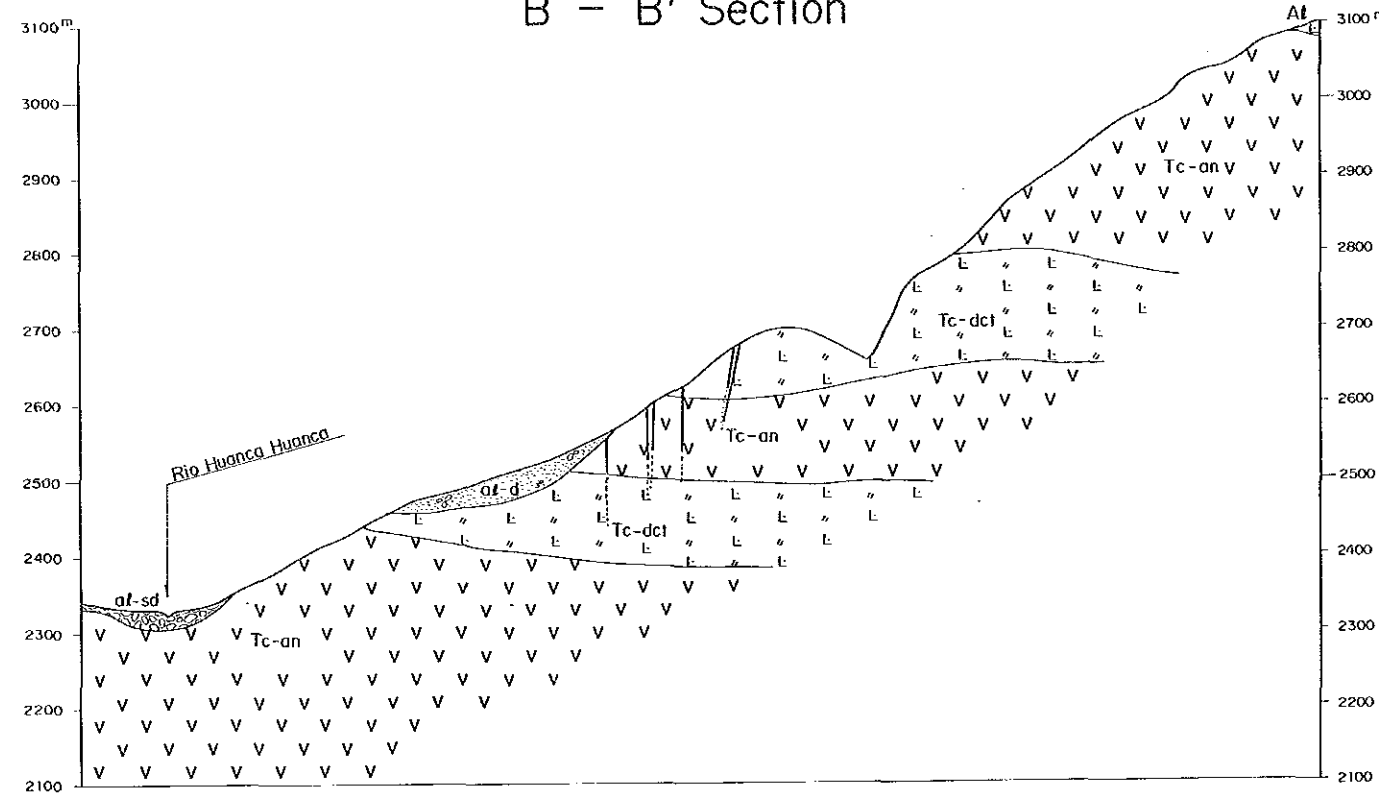
Scale 1:5,000

LEGEND

Quaternary	Holocene	River sediments (gravel, sand)
		Alluvium
Tertiary	Miocene	Debris (gravel, sand, silt, clay)
		Terrace (gravel, sand, silt)
		Volcanic Sediment of Pausa
		Tuffaceous silt, sand, gravel
Tertiary	Miocene	Alpabamba Formation
		Rhyolitic pyroclastic rocks
		Dacitic pyroclastic rocks
Tertiary	Miocene	Tacaza Formation
		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

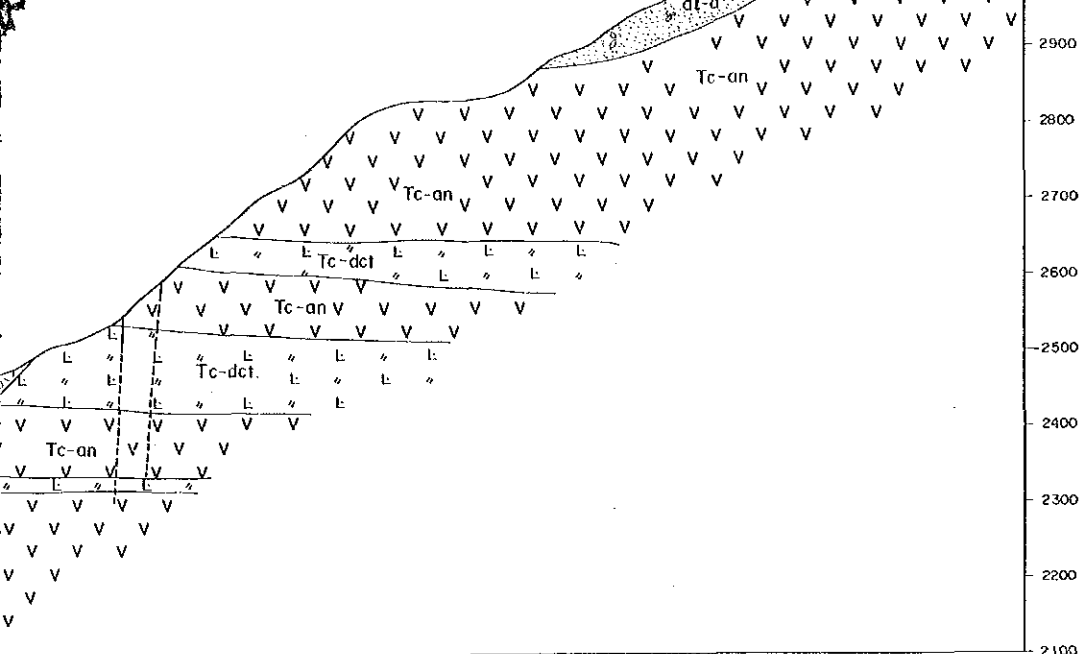


B - B' Section

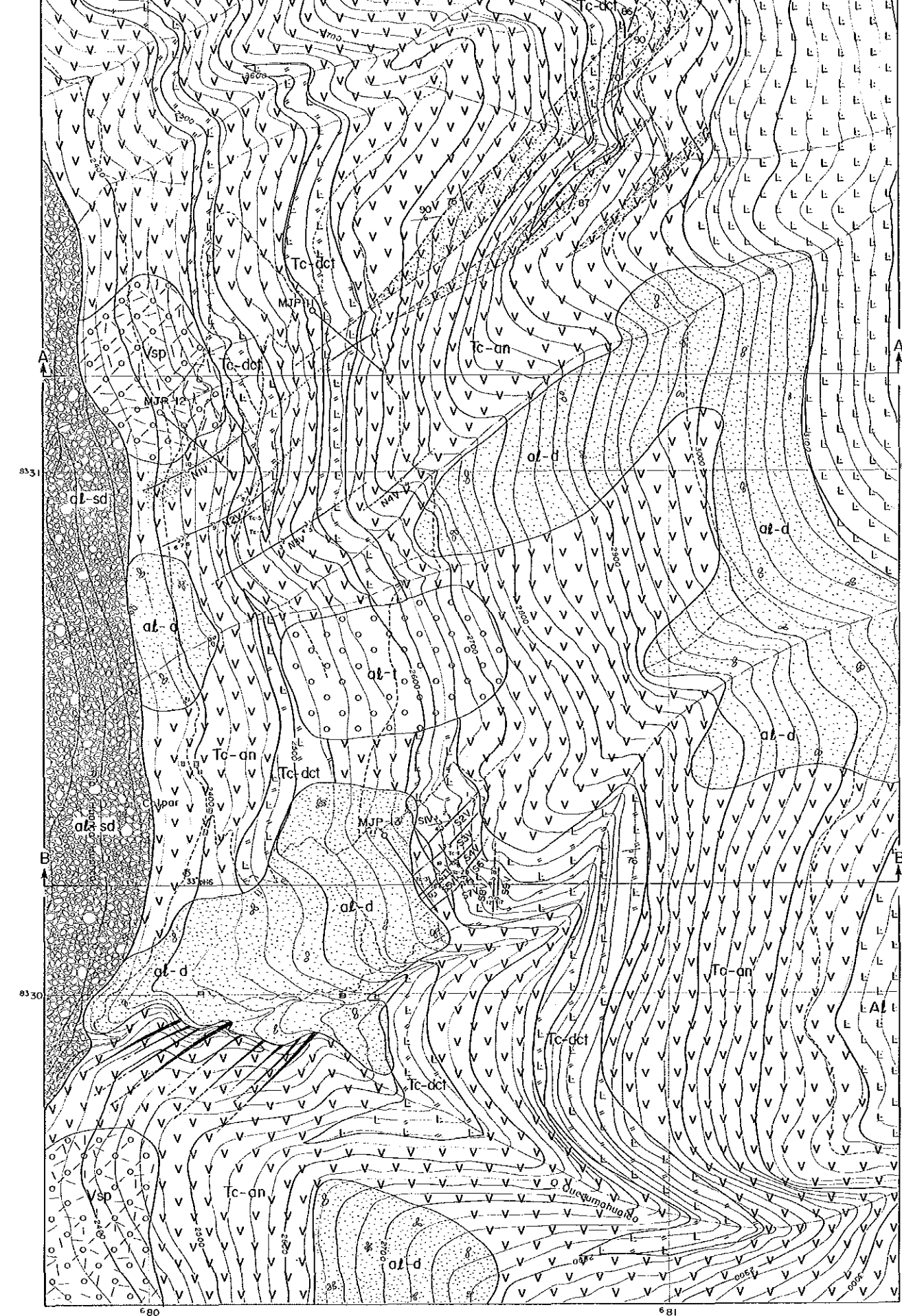
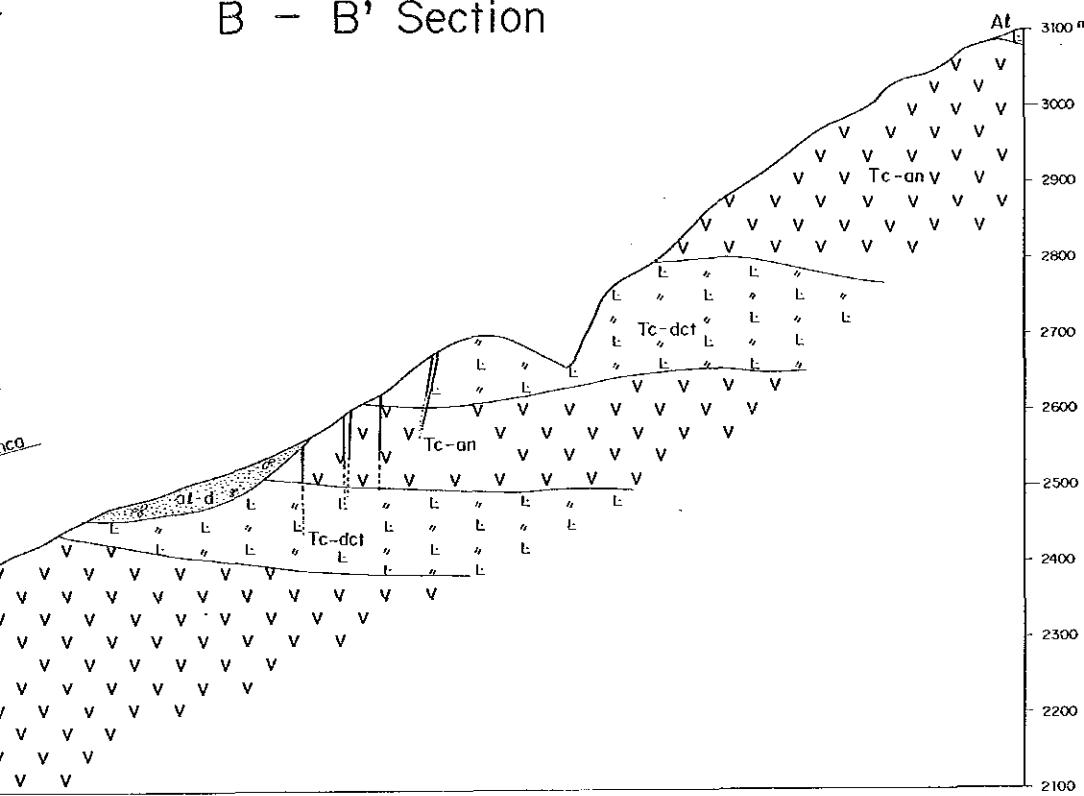


JAPAN
METEOROLOGICAL
INSTITUTE

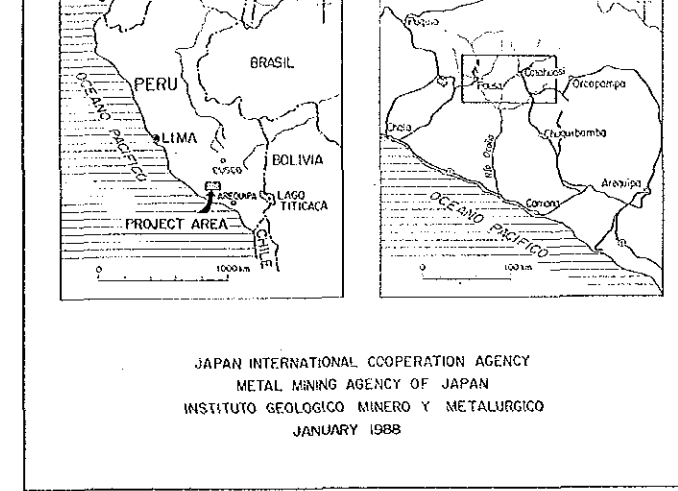
Quaternary	Alluvium
	Volcanic Sediment of Pausa
Miocene	Alpabamba Formation
	Tacosa Formation



B - B' Section



Scale 1:5,000



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

Scale 1:5,000

LEGEND

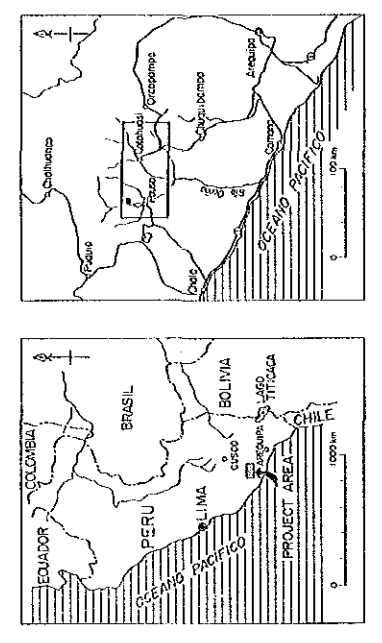
Quaternary	Alluvium	River sediments (gravel, sand)
		Debris (gravel, sand silt, clay)
Pleistocene	Terrace	Terrace (gravel, sand, silt)
		Tuffaceous silt, sand, gravel
Tertiary	Volcanic Sediment of Pausa	Rhyolitic pyroclastic rocks
		Dacitic pyroclastic rocks
		Andesite tava and andesitic pyroclastic rocks
Miocene	Alpabamba Formation	Strike and dip of joint
		Old tunnel
Tacoza Formation		Trenching site
		Drilling site
		Mineralization zone (Au, Ag)
		Silicification zone with iron oxides

西条協力事業団
1-7-103
国営資源開発局

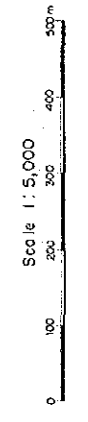
MINERAL EXPLORATION
IN
COTAHUASI AREA
(PHASE II)

LOCATION MAP OF ALTERATION
AND MINERALIZATION ZONES
OF THE COLPAR AREA

LOCATION INDEX

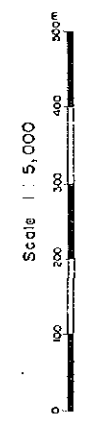
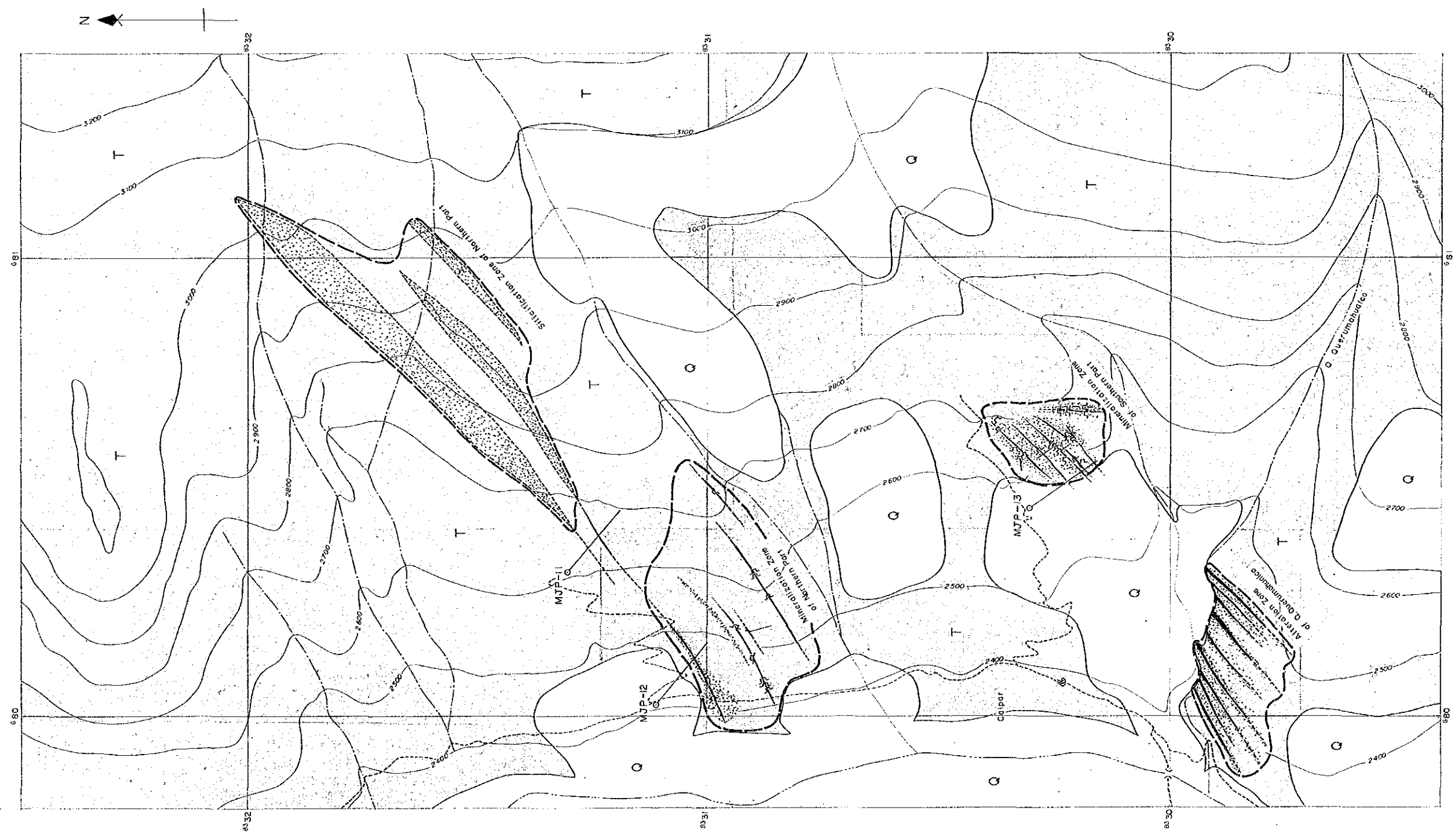


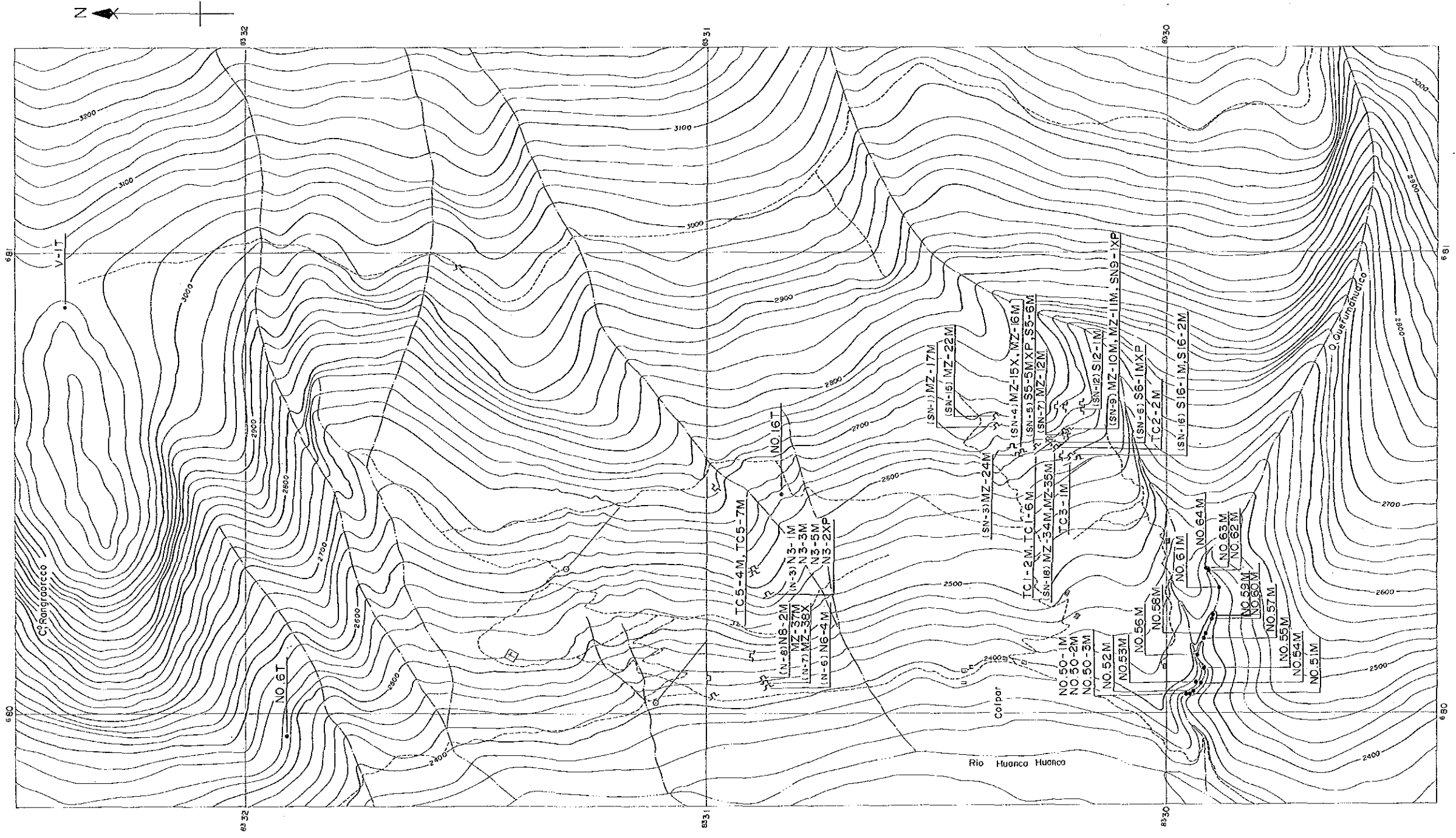
JAPAN INTERNATIONAL COOPERATION AGENCY
METAL MINING AGENCY OF JAPAN
INSTITUTO GEOLOGICO MINERO Y METALURGICO
JANUARY 1988



LEGEND

- Quaternary System
- Tertiary System
- Mineralization zone
- Silicification zone with iron oxides
- 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 II)

LOCATION MAP OF ROCK AND
 ORE SAMPLES 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

(P) : Polished Section
 (T) : Thin Section
 (X) : X-Ray Powder diffraction
 (M) : Chemical Analysis of Ore

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

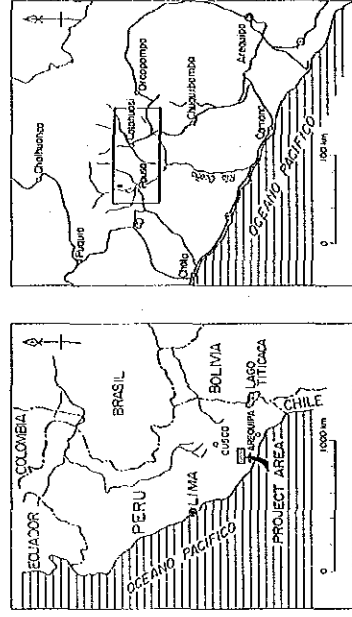
174183
 国産資源調査会

17498
 17498
 17498

MINERAL EXPLORATION
 IN
 COTAHUASI AREA
 (PHASE III)

LOCATION MAP OF OLD TUNNELS
 AND TRENCHES
 IN THE COLPAR AREA

LOCATION INDEX

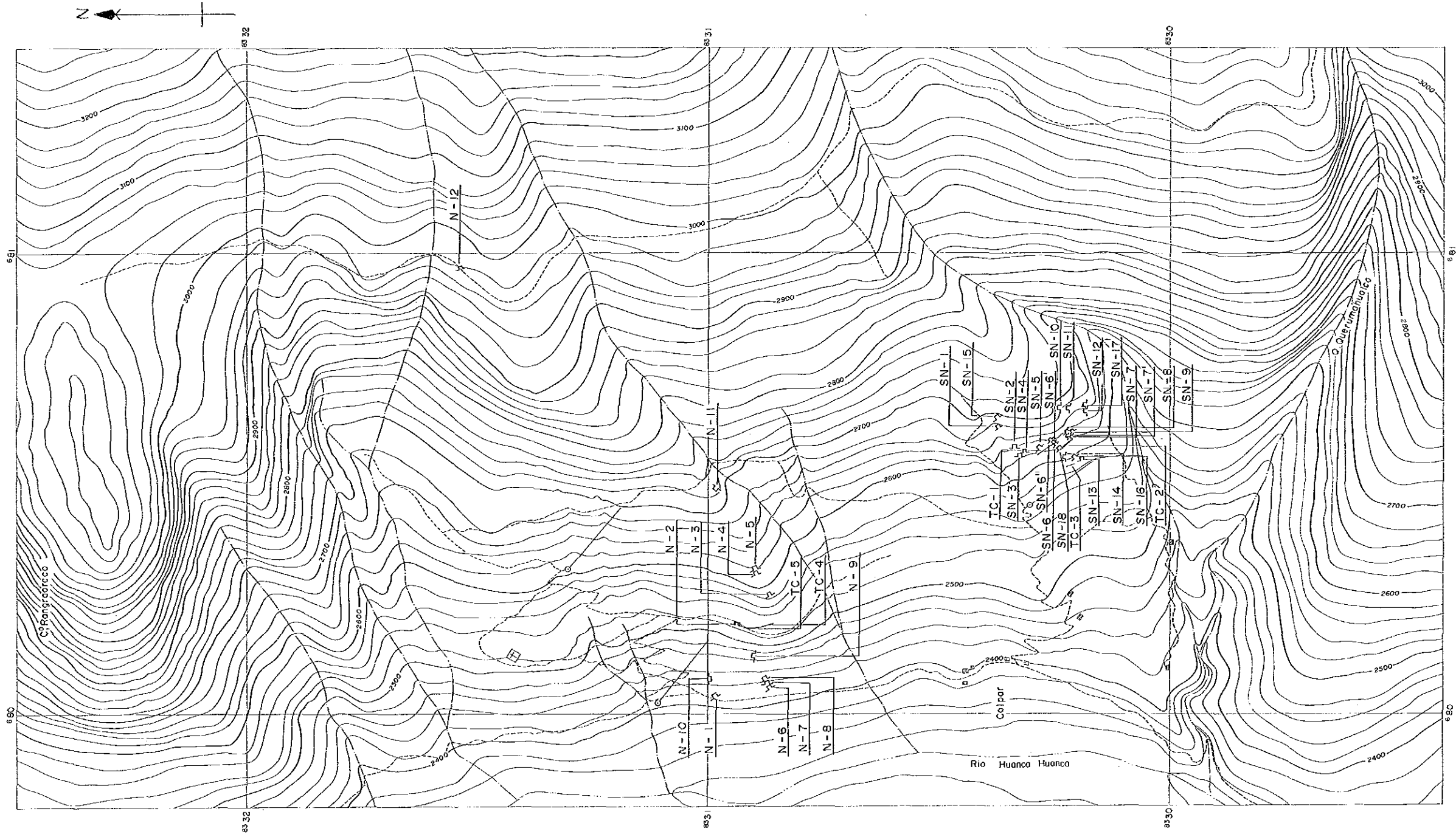


JAPAN INTERNATIONAL COOPERATION AGENCY
 METAL MINING AGENCY OF JAPAN
 INSTITUTO GEOLOGICO MINERO Y METALURGICO
 JANUARY 1968

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



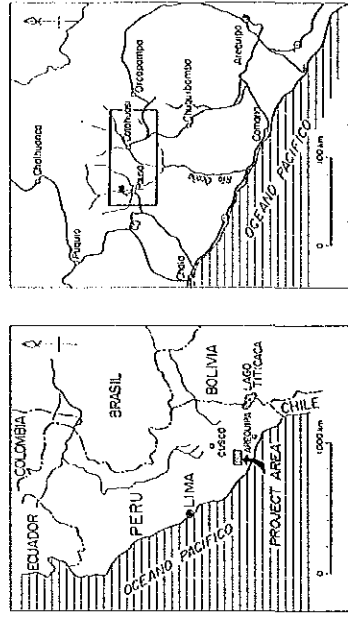
Scale 1 : 5,000
 0 100 200 300 400 500 m

国際協力事業団
17498
国産天然資源調査

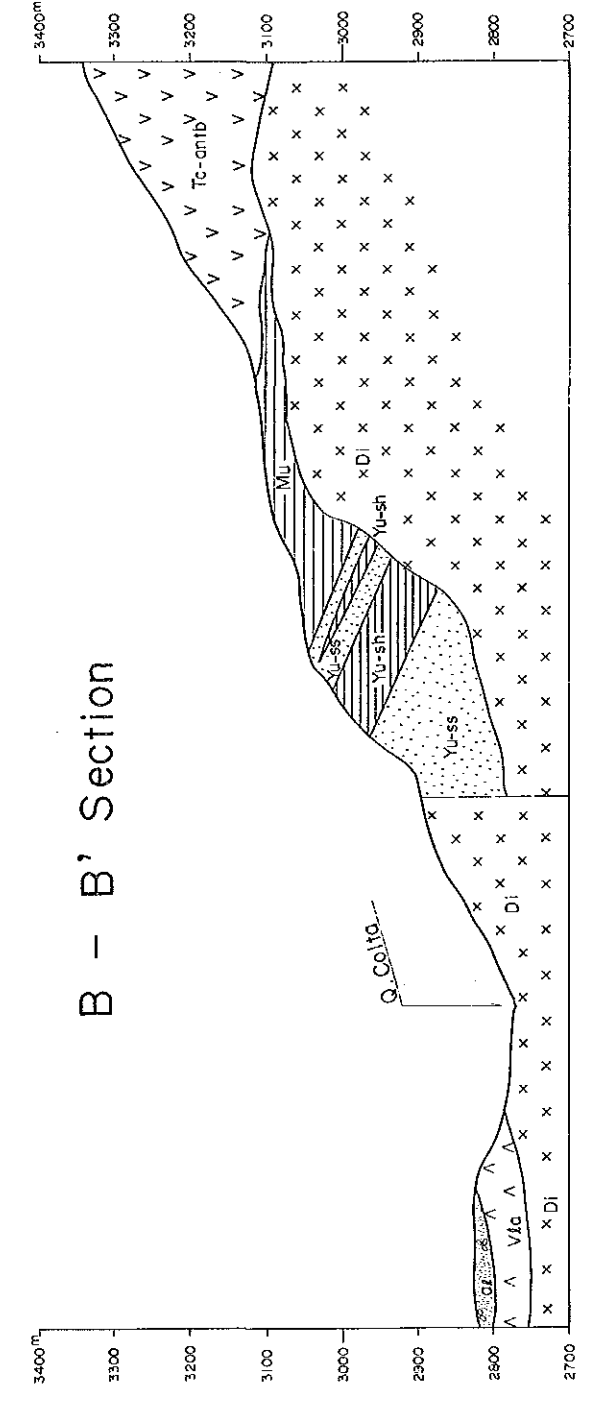
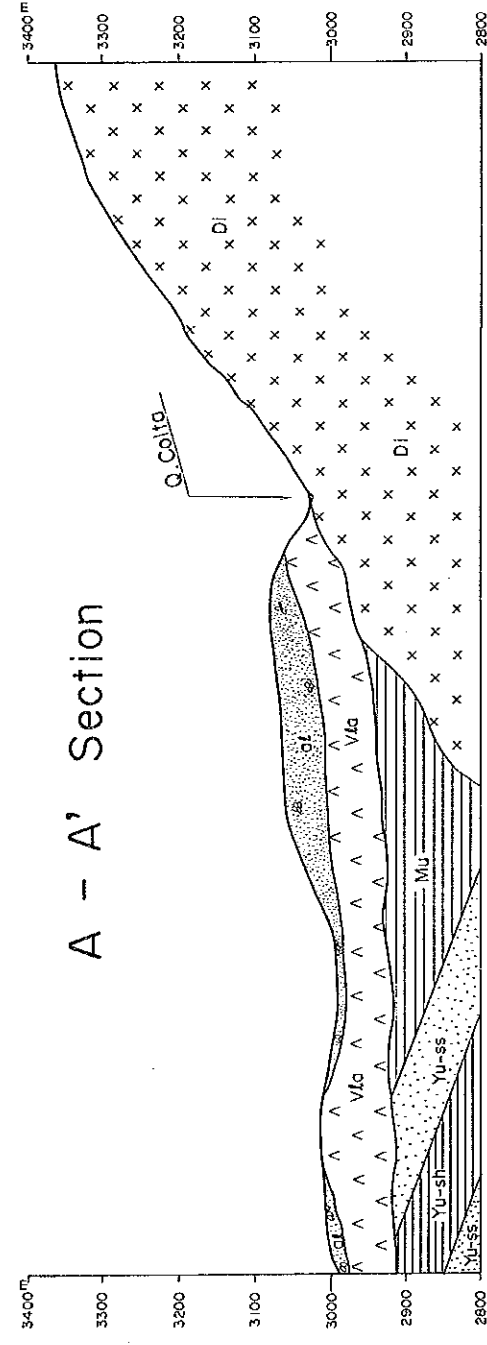
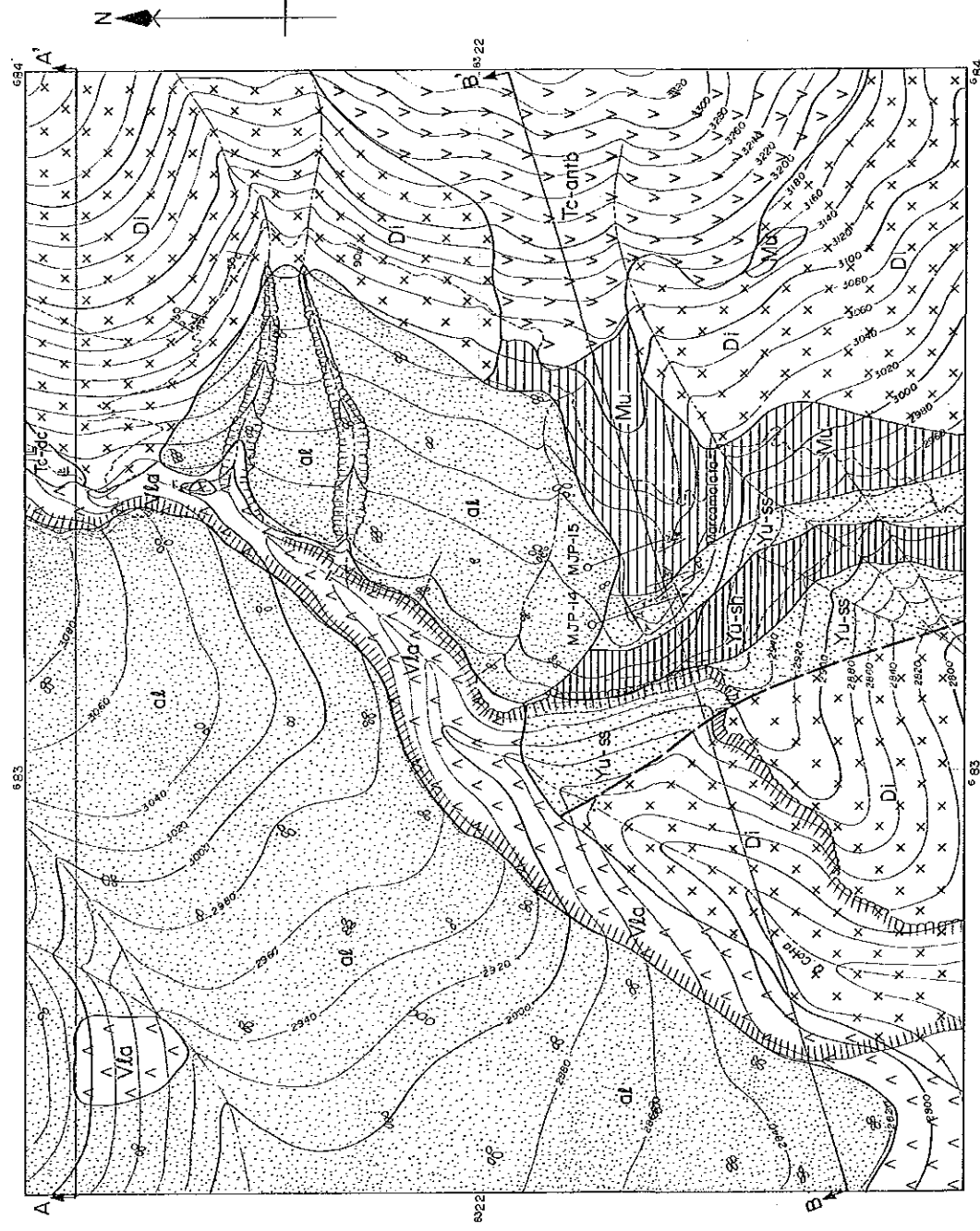
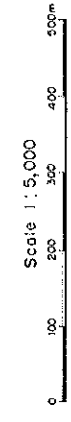
MINERAL EXPLORATION
IN
COTAHUASI AREA
(PHASE II)

GEOLOGICAL MAP AND SECTION
OF THE MARCAMLATA AREA

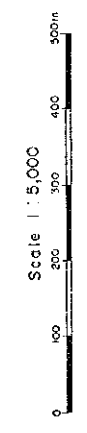
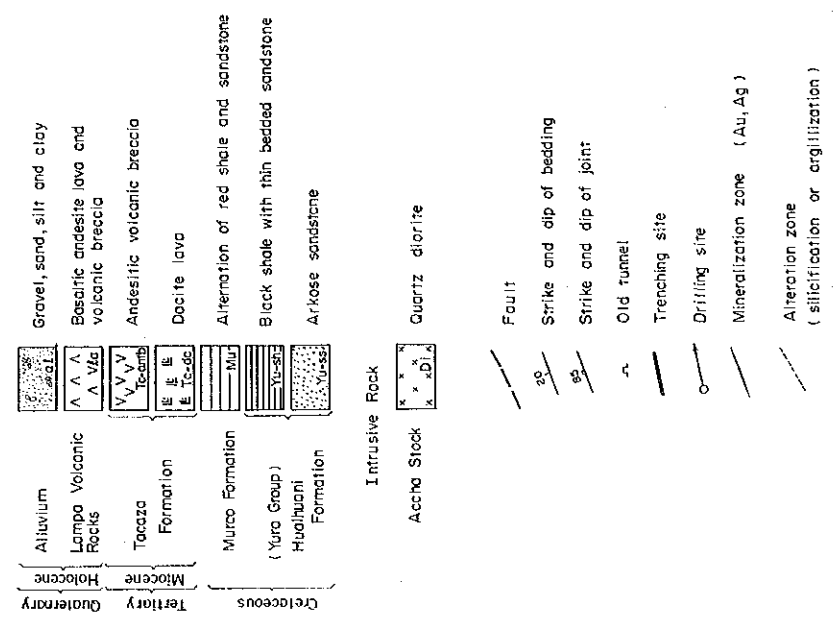
LOCATION INDEX

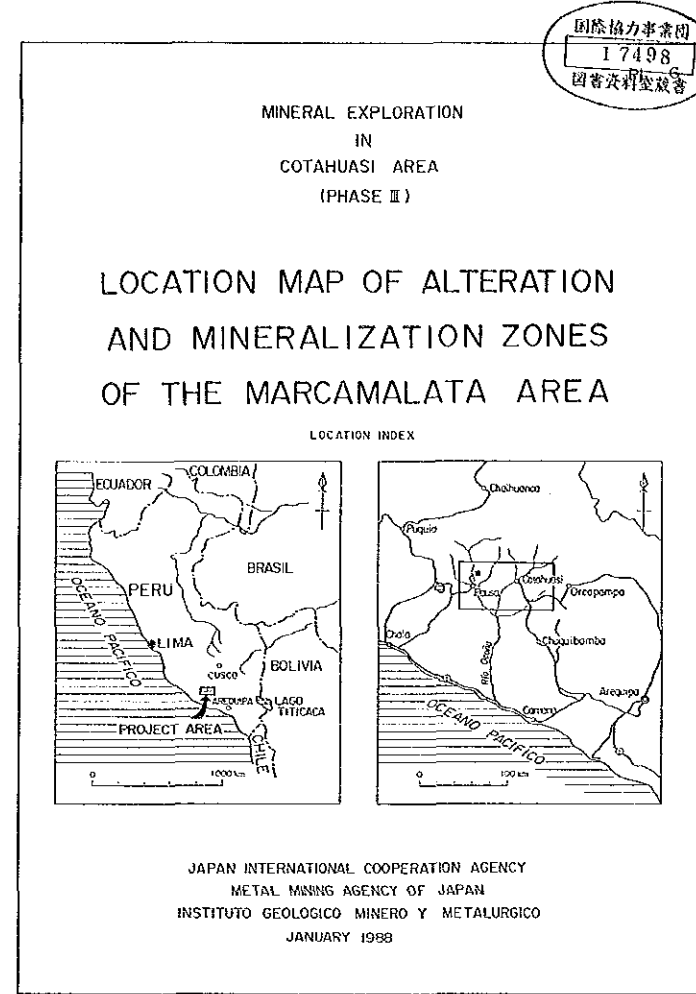
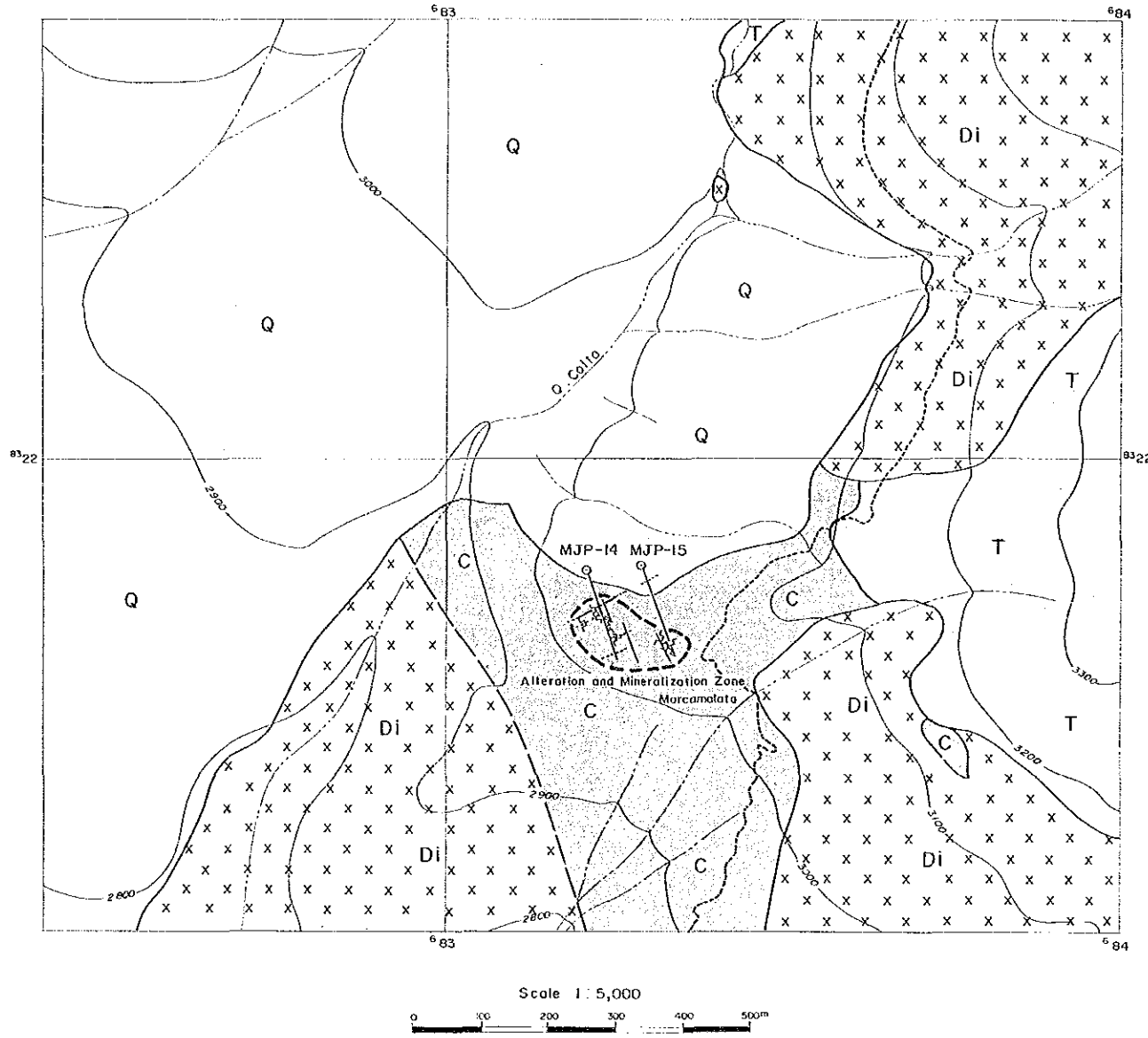


JAPAN INTERNATIONAL COOPERATION AGENCY
METAL MINING AGENCY OF JAPAN
INSTITUTO GEOLOGICO MINERO Y METALURGICO
JANUARY 1988



LEGEND





LEGEND

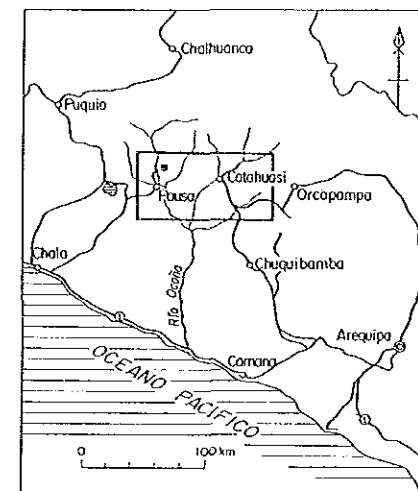
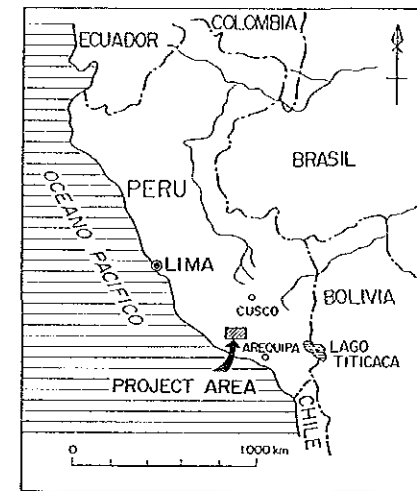
- | | |
|-----------------------------|---|
| Quaternary System | Mineralization zone |
| Tertiary System | Alteration zone (silicification or argillization) |
| Cretaceous System | Fault |
| Intrusive Rock | Old tunnel |
| Accha Stock (Quartzdiorite) | Trenching site |
| | Drilling site |
| | Alteration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

国際協力事業団
17498
図書資料室蔵

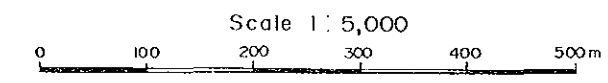
MINERAL EXPLORATION
IN
COTAHUASI AREA
(PHASE III)

LOCATION MAP OF ROCK AND
ORE SAMPLES OF
THE MARCAMLATA AREA

LOCATION INDEX

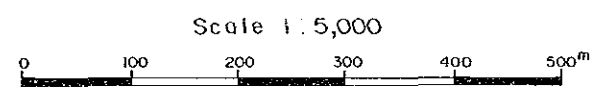
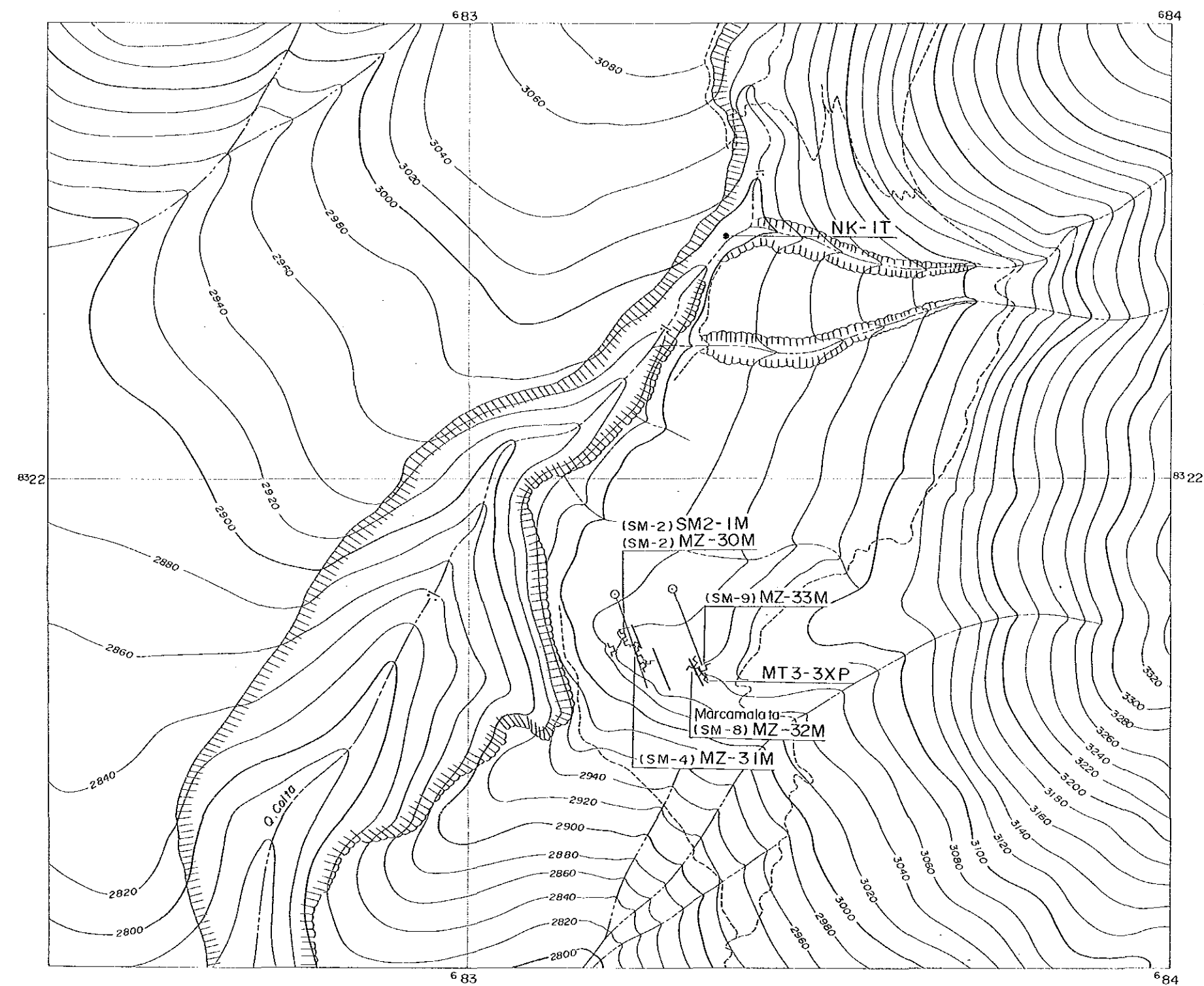
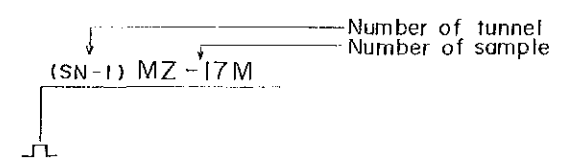


JAPAN INTERNATIONAL COOPERATION AGENCY
METAL MINING AGENCY OF JAPAN
INSTITUTO GEOLOGICO MINERO Y METALURGICO
JANUARY 1988



LEGEND

- (P) : Polished Section
- (T) : Thin Section
- (X) : X-Ray Powder diffraction
- (M) : Chemical Analysis of Ore

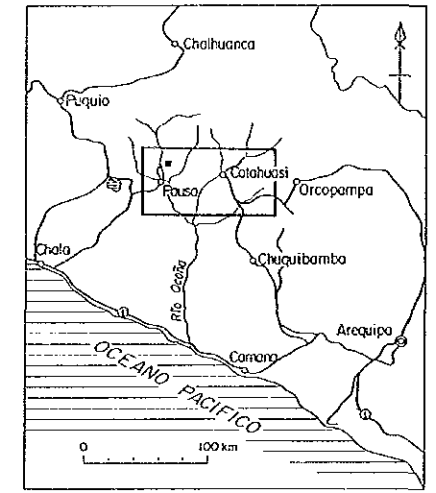
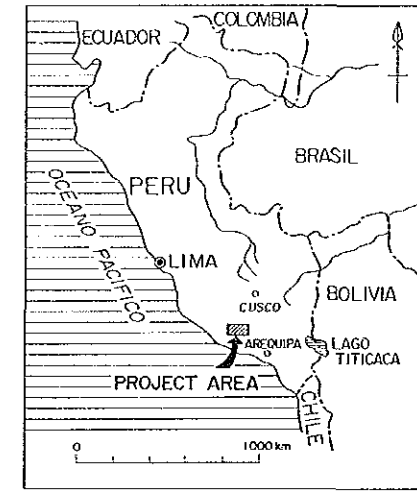


国際協力事業団
17498
圖書資料室蔵書

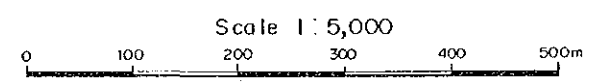
MINERAL EXPLORATION
IN
COTAHUASI AREA
(PHASE III)

LOCATION MAP OF OLD TUNNELS
AND TRENCHES
IN THE MARCAMALATA AREA

LOCATION INDEX

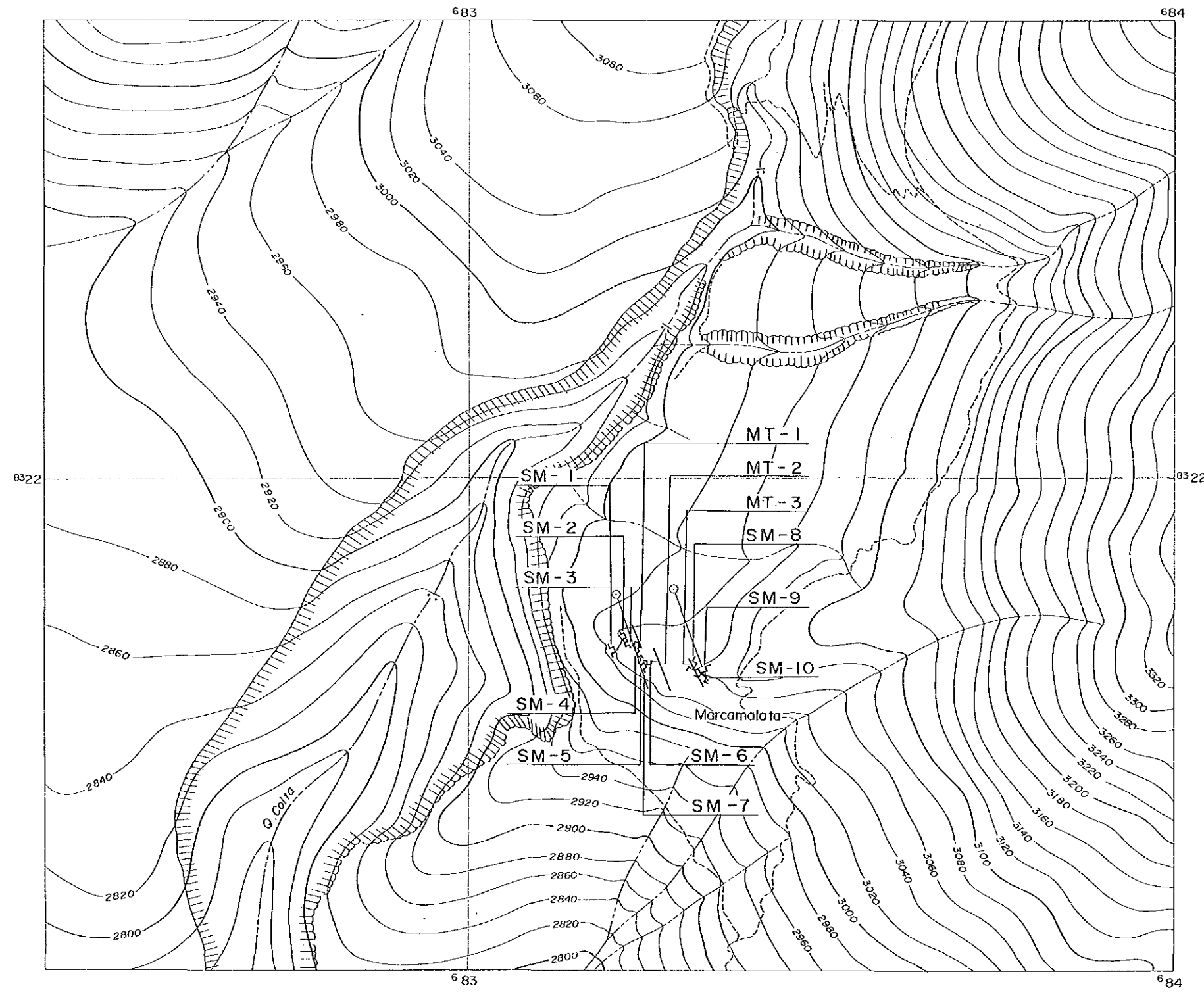


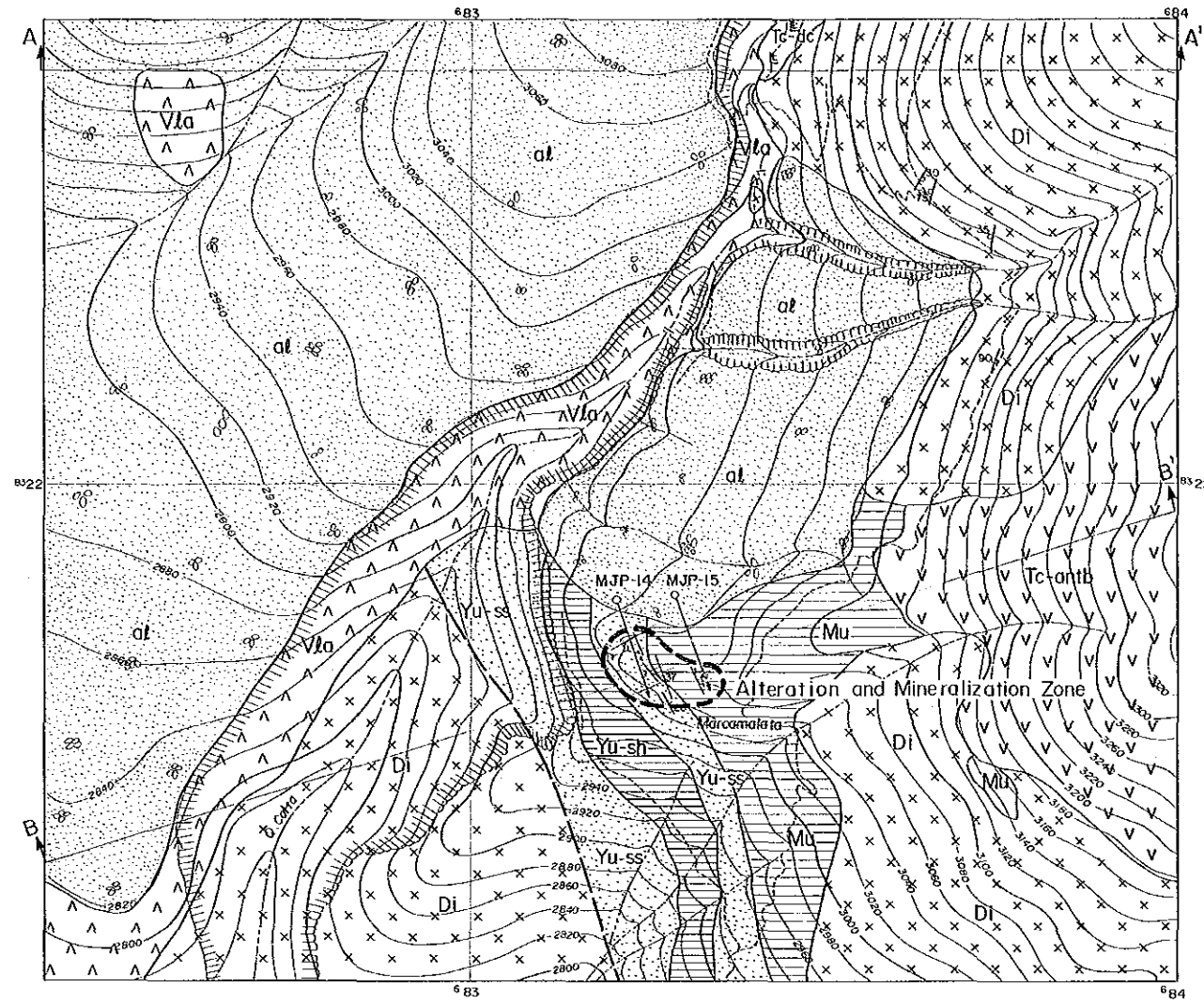
JAPAN INTERNATIONAL COOPERATION AGENCY
METAL MINING AGENCY OF JAPAN
INSTITUTO GEOLOGICO MINERO Y METALURGICO
JANUARY 1988



LEGEND

- SM-2 ← Number of Tunnel
- Old Tunnel
- MT-1 ← Number of Trench
- Trench





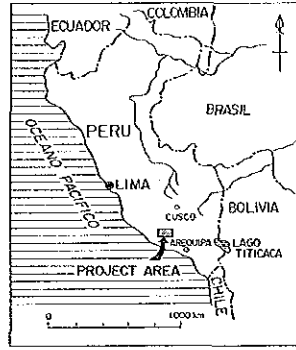

Scale 1 : 5,000

PL. II

MINERAL EXPLORATION
IN
COTAHUASI AREA
(PHASE III)

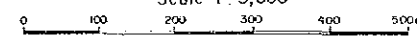
INTERPRETATION MAP
OF THE MARCAMLATA AREA

LOCATION INDEX

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

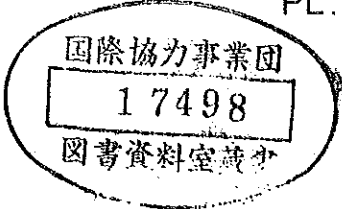
Scale 1 : 5,000



LEGEND

Tertiary	Quaternary	Alluvium		Gravel, sand, silt and clay	Fault		Fault
		Lampa Volcanic Rocks		Basaltic andesite lava and volcanic breccia			Strike and dip of bedding
	Miocene	Tacaza Formation		Andesitic volcanic breccia			Strike and dip of joint
				Dacite lava			Old tunnel
Cretaceous	(Yura Group)	Murco Formation		Alternation of red shale and sandstone		Trenching site	
		Hualhuani Formation		Black shale with thin bedded sandstone		Drilling site	
				Arkose sandstone		Mineralization zone (Au, Ag)	
		Intrusive Rock				Alteration zone (silicification or argillization)	
		Accha Stock		Quartz diorite		Alteration and Mineralization Zone	

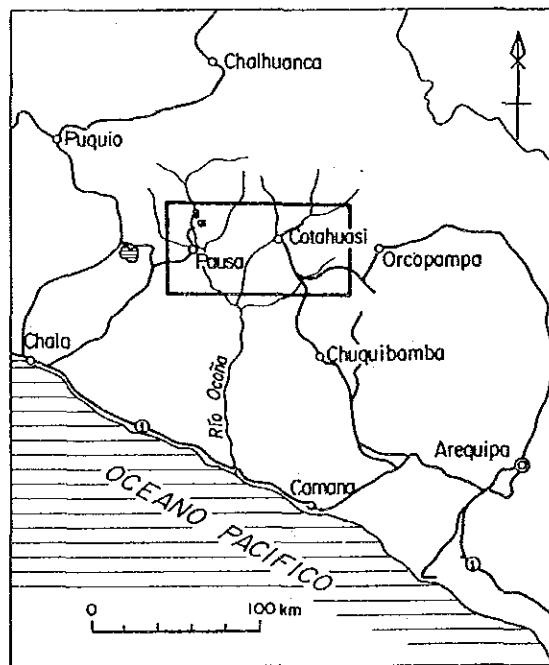
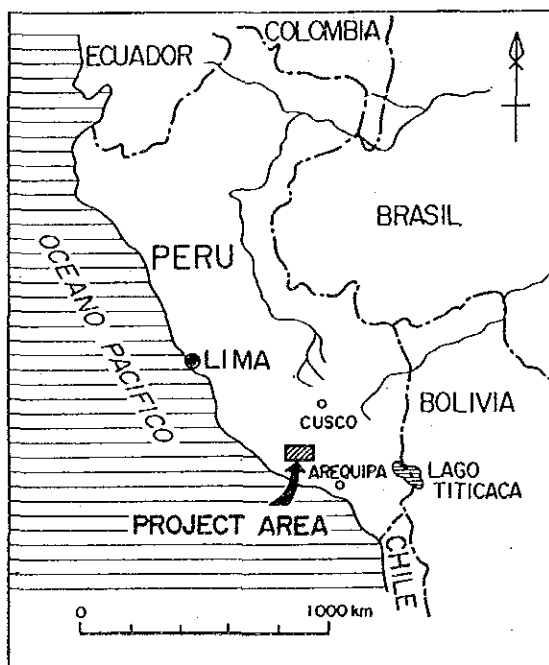
MINERAL EXPLORATION
IN
COTAHUASI AREA
(PHASE III)



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

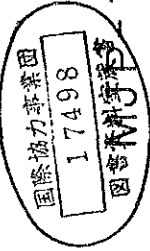
Scale 1 : 200

LOCATION INDEX



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

SCALE (m)	GEOLOGIC COLUMN	DEPTH AND CORE ANGLE (m) (°)	DESCRIPTION	POSITION OF EXAMINED CORE SAMPLES	ALTERATION AND MINERALIZATION	ASSAY RESULTS								CORE RECOVERY (%)	SCALE (m)
						Sample No	Depth (m)	Width (m)	Au (g/t)	Ag (g/t)	Cu (%)	Pb (%)	Zn (%)		
200	L L L L L	201.40 202.00	light green dacitic tuff with light green lenticular patch 201.40~202.40 m: white grey weakly altered dacitic tuff (bleached)											100	200
	L L L L L L L L L	209.50 209.75 211.40 212.00	light greenish grey dacitic tuff with green patch and quartz grain in matrix. 211.40~212.00 m: white and grey lenticular quartz vein let.		Il I I I									100	200
	L L L L L L L L L	219.30 220.40	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											100	200
	L L L L L L L L L	231.55	gradual change 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											100	200
	L L L L L L L L L	241.80 242.70	green dacitic tuff breccia light green dacitic tuff with small fragments (φ0.5 cm under) of andesite and dacite, and quartz grain in matrix.											100	200
	L L L L L L L L L	249.65 251.05	light green dacitic lapilli tuff											100	200

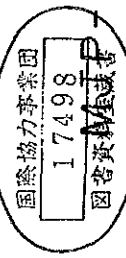


12(3) Direction : SE 50° , Angle : -45° , Depth : 250.46 m

SCALE (m)	GEOLOGIC COLUMN	DEPTH AND CORE ANGLE (m) (°)	DESCRIPTION	POSITION OF EXAMINED CORE SAMPLES	ALTERATION AND MINERALIZATION	ASSAY RESULTS							CORE RECOVERY (%)		
						Sample No	Depth (m)	Width (m)	Au (g/t)	Ag (g/t)	Cu (%)	Pb (%)		Zn (%)	As (%)
200		200.50 202.22 203.35~203.38 204.25 204.85 206.60 206.95~207.00	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)		Silic Qtz Arg Py Melo-M										
210		211.20 212.30 212.55 212.60 212.75 213.10 213.30 216.57~216.77	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 220.82 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	213.70 m 3P	Silic Qtz Arg Py Melo-M										
220		219.72 220.82 221.20 222.85	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)		Silic Qtz Arg Py Melo-M										
230		230.05 236.82 239.60	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		Silic Qtz Arg Py Melo-M										
240		246.58 247.70 248.40 249.00	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		Silic Qtz Arg Py Melo-M										
250		250.46			Silic Qtz Arg Py Melo-M										

Sample No	Depth (m)	Width (m)	Au (g/t)	Ag (g/t)	Cu (%)	Pb (%)	Zn (%)	As (%)
1 M	212.30	0.25	0.27	5.3				
2 M	212.75	0.20	6.48	7.3				
3 M	213.10	0.35	0.21	5.3				
4 M	213.00	0.70	0.21	5.3				

Sample No	Depth (m)	Width (m)	Au (g/t)	Ag (g/t)	Cu (%)	Pb (%)	Zn (%)	As (%)
15 M	247.70	0.70	<0.07	1.3				



13(1) Direction : SE35° , Angle : -45° , Depth : 250.20m

SCALE (m)	GEOLOGIC COLUMN	DEPTH AND CORE ANGLE (m) (°)	DESCRIPTION	POSITION OF EXAMINED CORE SAMPLES	ALTERATION AND MINERALIZATION	ASSAY RESULTS							CORE RECOVERY (%)	SCALE (m)
						Sample No	Depth (m)	Width (m)	Au (g/t)	Ag (g/t)	Cu (%)	Pb (%)		
0	Alluvium	0.00												0
0-10	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: cobbles and pebble gravel of light grey dacite, > rhyolite, andesitic tuff.	0.00 3.00 8.40												0-10
10-20	8.40~8.90 m: grey sand and granule 8.90~13.55 m: cobbles gravel of dacite lapilli tuff and purplish grey dacite 13.55~18.40 m: block of light grey to light brownish grey dacite	8.40 8.90 13.55 14.30 15.50 16.45 16.55 18.40												10-20
20-40	18.40~26.10 m: boulder (max. φ30 cm) and cobbles gravel of grey andesite, yellowish grey dacite and light grey dacite 26.10~29.50 m: block and pebble gravel of dacite 29.50~38.25 m: pebble gravel of light grey dacite, greenish grey andesite and purplish grey dacite (max. φ20 cm). 38.25~39.05 m: block of purplish grey dacite 39.05~45.5 m: pebble of grey andesite and a little bit of purplish dacite 43.95~44.95 m: grey soil and pebble gravel	26.10 27.95 28.65 29.50 38.25 39.05 43.95 44.95 45.55												20-40
40-50	45.55~47.30 m: dark grey weakly weathered andesite with xenolith of green andesite (φ5 cm). 47.30~48.35 m: grey clay with small chips of andesite 48.35~48.65 m: grey clay with small chips of andesite	47.30 48.35 48.65 49.50 50.30												40-50
50-60	50.30~55.65 m: grey porphyritic andesite with many cracks, phenocrysts of plagioclase (φ0.5 cm-). 61.15~61.95 m: slime of grey andesite	55.65 61.15 61.95												50-60
60-70	61.95~67.20 m: dark brownish grey tuffaceous shale with many fractures. 67.20~69.20 m: grey tuffaceous coarse grained sandstone 69.20~73.50 m: dark brownish grey tuffaceous shale with many fractures	67.20 69.20												60-70
70-80	73.50~75.95 m: grey tuffaceous coarse to fine grained sandstone with thin bedded brownish grey shale 75.95~80.65 m: grey tuffaceous conglomerate pebbles: subangular, φ=1 cm± 80.65~81.95 m: brownish grey shale with dark grey lenticular sandstone 81.95~83.75 m: light green fine dacitic tuff, weakly argillization 83.75~85.60 m: light grey massive dacitic tuff with green lenticular patch and quartz grain 85.60~87.60 m: green patch: φ1 cm X 0.3 cm under, lenticular quartz grain: φ0.2 cm±	73.50 75.95 75.95 76.40 78.45 79.95 80.65 81.95 83.75 85.60 86.85 87.60												70-80
80-90	87.60~92.90 m: brown iron oxides along crack 92.90~95.75 m: weakly argillization 95.75~97.50 m: dacitic tuff with brown iron oxides along crack and stain.	92.90 93.70 95.10 95.75												80-90
90-100	97.50~98.80 m: dacitic tuff with brown iron oxides along crack and stain. 98.80~99.60 m: dacitic tuff with brown iron oxides along crack and stain. 99.60~100.00 m: dacitic tuff with brown iron oxides along crack and stain.	97.50 98.80 99.60 100.00												90-100

I

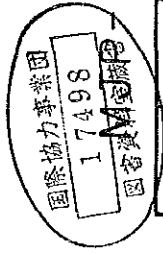


17498

3(2)

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

SCALE (m)	GEOLOGIC COLUMN	DEPTH AND CORE ANGLE (m) (°)	DESCRIPTION	POSITION OF EXAMINED CORE SAMPLES	ALTERATION AND MINERALIZATION	ASSAY RESULTS							CORE RECOVERY (%)	SCALE (m)
						Sample No	Depth (m)	Width (m)	Au (g/t)	Ag (g/t)	Cu (%)	Pb (%)		
100	L	103.50 104.00	light greenish grey dacitic tuff with green lenticular green patch (φ1 cm X 0.3 cm) and quartz grain 103.60~104.00 m: light green dacitic fine tuff	100.40m 3T										
		112.90	gradual change											
		122.70 123.60	light green massive dacitic lapilli tuff with lenticular green patch (φ1~3 cm) and quartz grain gradual change											
		126.25 126.90	gradual change light green dacitic tuff with green patch (φ1 cm X 0.3 cm under) 112.70 m: white quartz vein (w=0.5 cm) light green dacitic fine tuff											
		130.50	gradual change light green dacitic tuff with green patch (φ1 cm X 0.3 cm ±) 126.80 m: white quartz vein (w=0.03 cm) with pyrite gradual change											
		135.75	gradual change light green dacitic tuff with a little small green patch											
		141.80 144.00	gradual change light green dacitic tuff with green patch and andesite breccia (φ0.4 cm under) of grey green light brown. dacitic lapilli tuff with quartz grain lapilli: φ3 cm under, lapilli of andesite											
		154.85 156.90 157.55	gradual change white grey bleached dacitic tuff with quartz grain 156.90~157.55 m: dark grey strongly altered rock with white quartz veinlets network and grey clay											
		159.00 160.10 160.40	159.00~160.10 m: reddish brown iron oxides network 160.10~160.40 m: dark grey strongly altered rock with white quartz veinlet network.											
		175.50	white grey bleached dacitic tuff with white lenticular patch and quartz grain gradual change											
		181.50	light greenish grey dacitic tuff breccia breccia: φ2~5 cm, angular, breccia of green and brown andesite, porphyritic andesite and dacite. matrix: small fragments of andesite and quartz grain gradual change											
		186.55 188.70 193.60	186.55 m: white quartz vein (w=0.5 cm) gradual change white grey strongly altered rock 189.00 m, 199.05 m: white quartz veinlet 199.45~199.60 m: white grey strongly altered rock with crystal of Op., Sp. and fine black mineral	193.60m 4T										



15 (2)

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

SCALE (m)	GEOLOGIC COLUMN	DEPTH AND CORE ANGLE (m) (°)	DESCRIPTION	POSITION OF EXAMINED CORE SAMPLES	ALTERATION AND MINERALIZATION	ASSAY RESULTS							CORE RECOVERY (%)	SCALE (m)	
						Sample No	Depth (m)	Width (m)	Au (g/t)	Ag (g/t)	Cu (%)	Pb (%)			Zn (%)
100		101.40	light grey to grey shale grey to dark grey shale with many fracture												
		105.85~106.00 106.80~106.10 107.20~107.40 108.10	black carbon bearing black shale pyrite along fracture black carbon bearing black shale												
110		110.10 111.10 111.45 112.75 113.55	blackish grey shale black carbon bearing black shale												
		117.80	mainly grey massive shale, partly light grey massive												
		126.05													
		136.20 136.80													
		140.90 141.50	grey to dark grey massive shale												
		146.65 147.00	grey silt stone												
		148.40	grey to dark grey sandstone with thin bedded black shale and pyrite along crack crystal quartz veinlet (w = 0.1 cm) along crack												
		150.45	black massive shale												
		154.30 154.60	dissemination of pyrite black carbon bearing black shale												
		156.20 157.65 159.10	alternation of dark grey sandstone and black shale black shale and lenticular grey sandstone with pyrite black shale with thin bedded dark grey sandstone and thin lenticular sandstone												
		165.00 165.80	grey medium grained sandstone with veinlet and dissemination of pyrite												
		167.20 167.70	black shale												
		171.55	dark grey fine grained sandstone												
		173.20 173.95 174.50	dark grey to black massive shale												
		177.40 178.00 178.65	lenticular pyrite vein												
		181.80 182.60	strongly sheared zone												
		184.00	crystal of pyrite along crack												
		188.50	pyrite along crack												
		194.10 194.80 195.25	pyrite veinlet network (w = 2 cm) pyrite												
		197.45 197.80 198.25 199.10 200.35	pyrite veinlet network												

10 M 197.45

0.35 < 0.07 1.9

