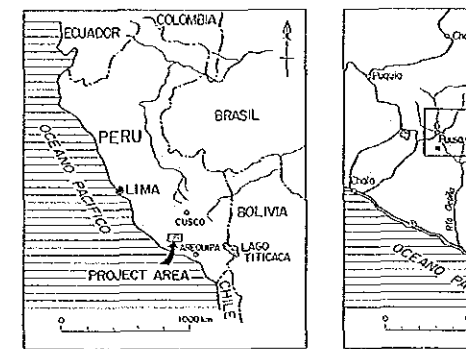


GEOLOGICAL PROFILE  
OF THE PIRCA SOUTHEAST

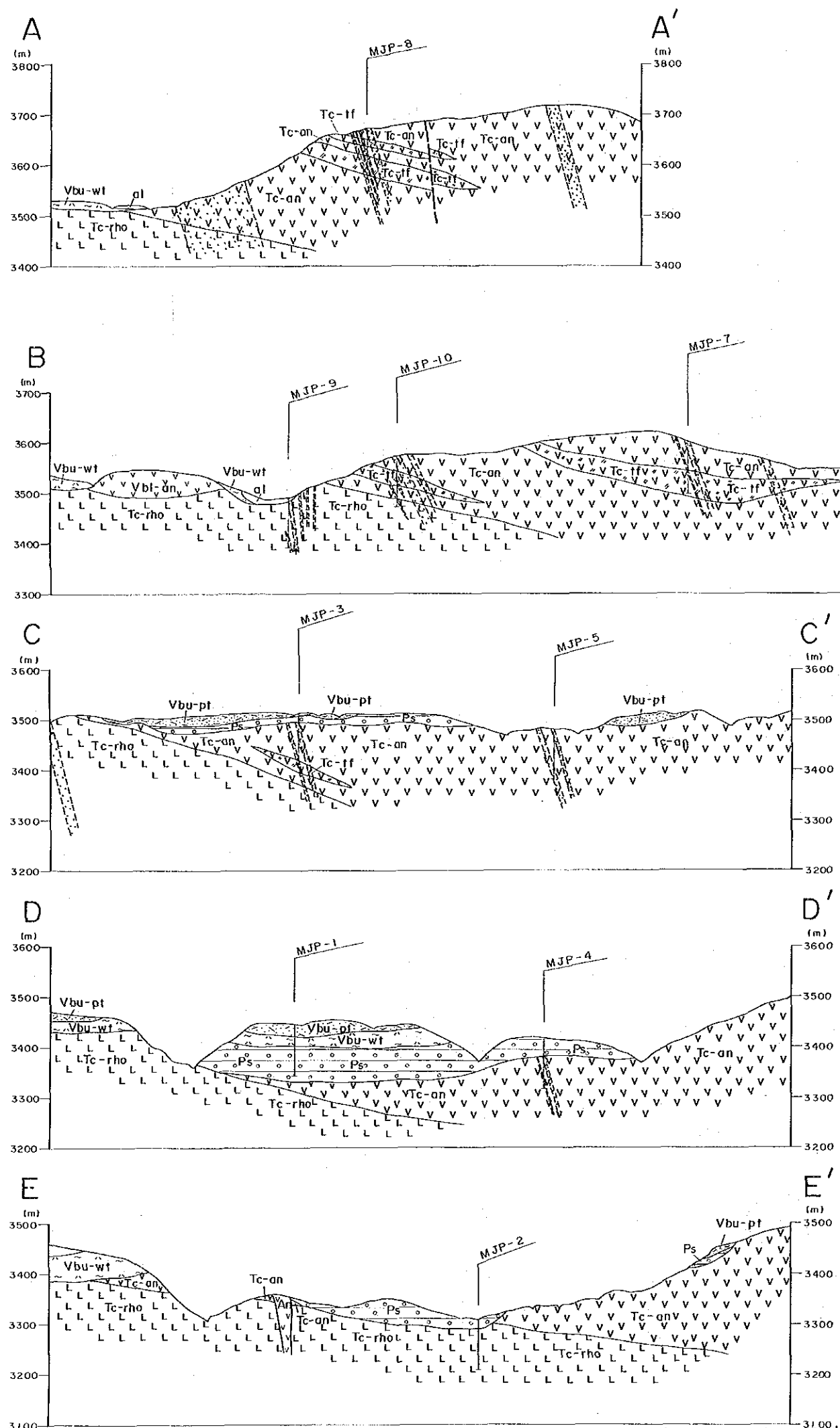
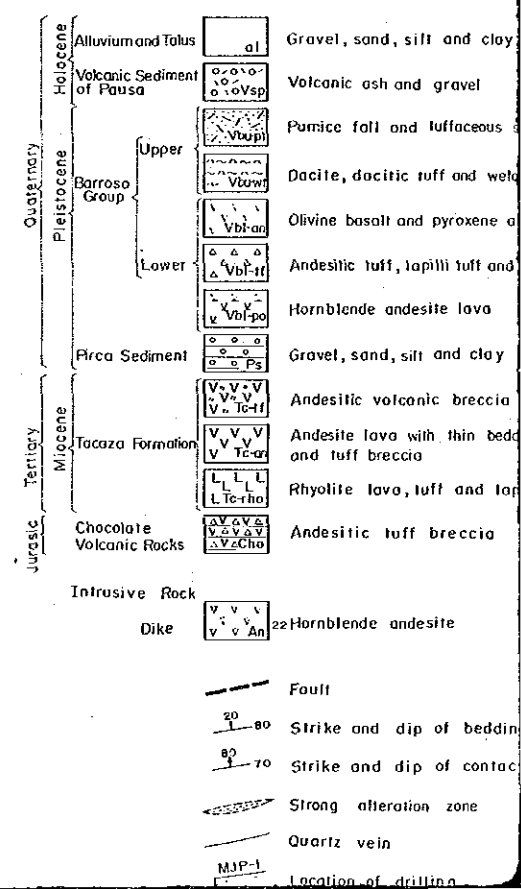
LOCATION INDEX

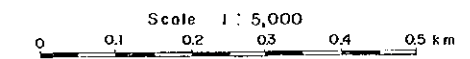
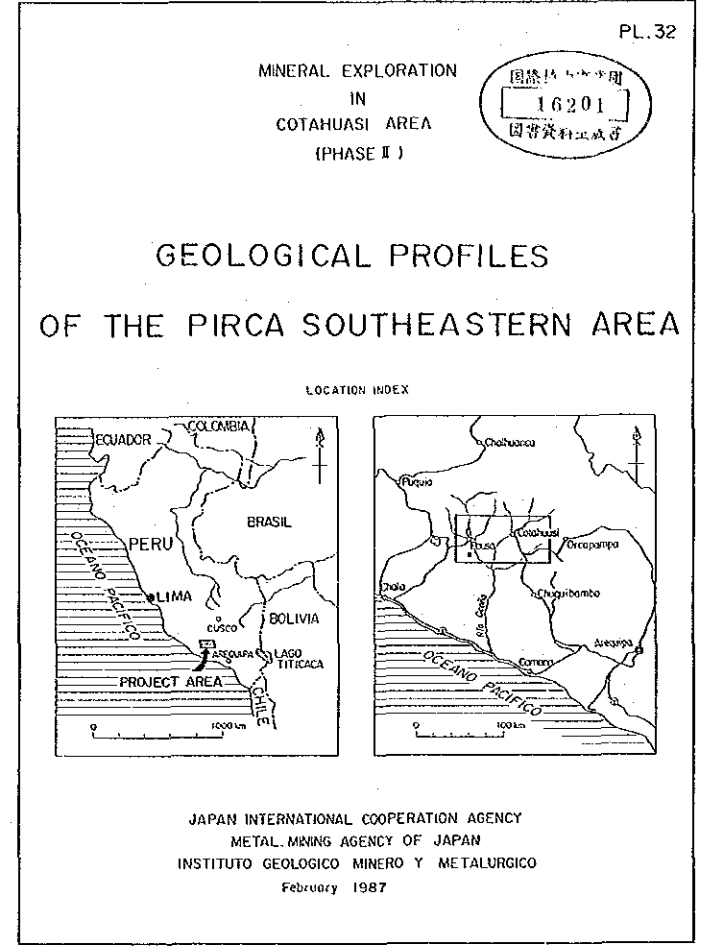
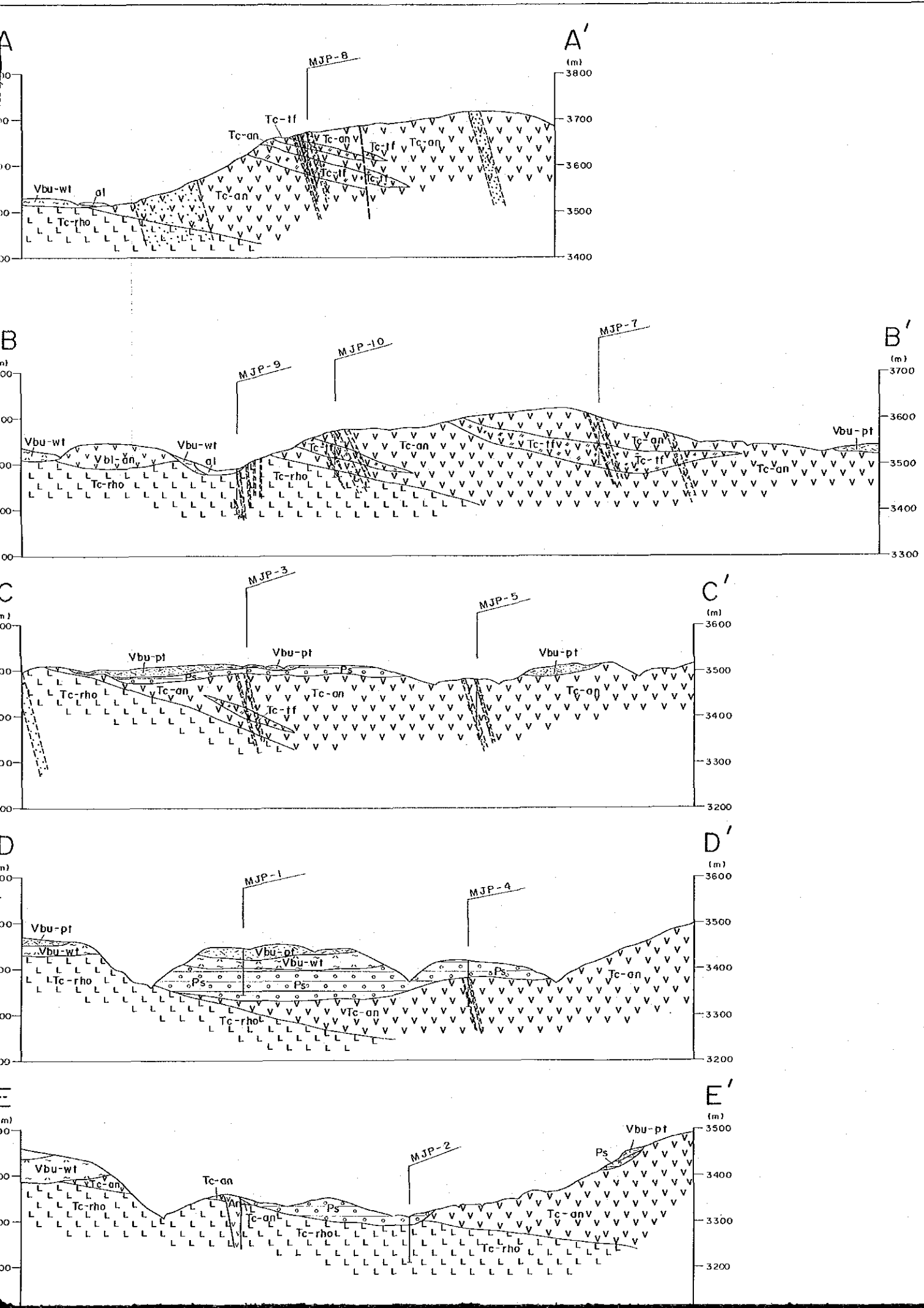


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INSTITUTO GEOLOGICO MINERO Y METALURGO  
February 1987

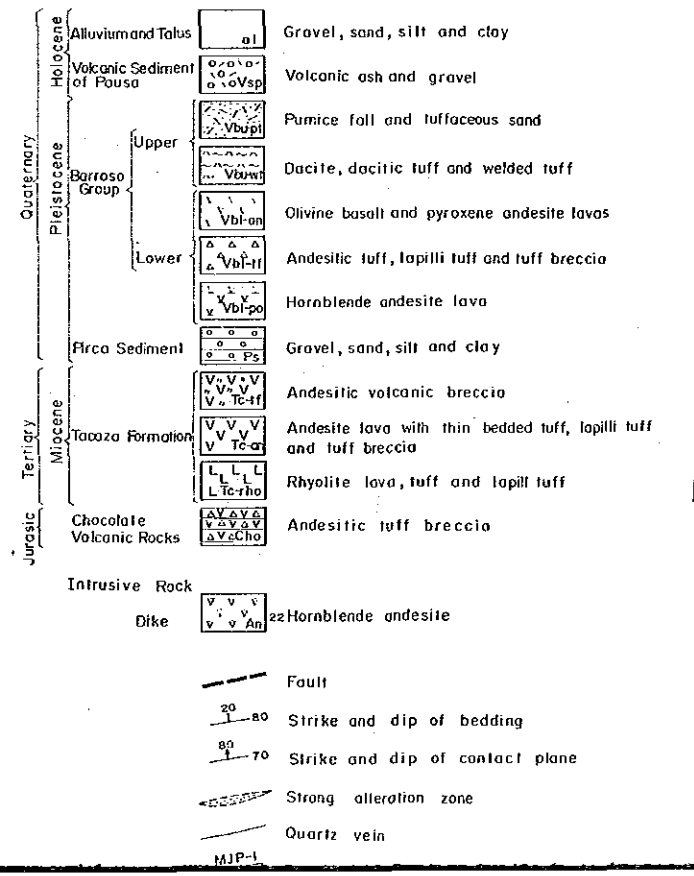
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LEGEND



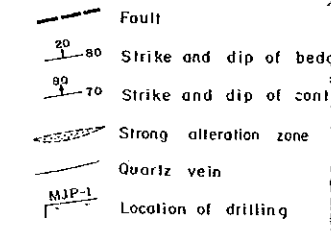
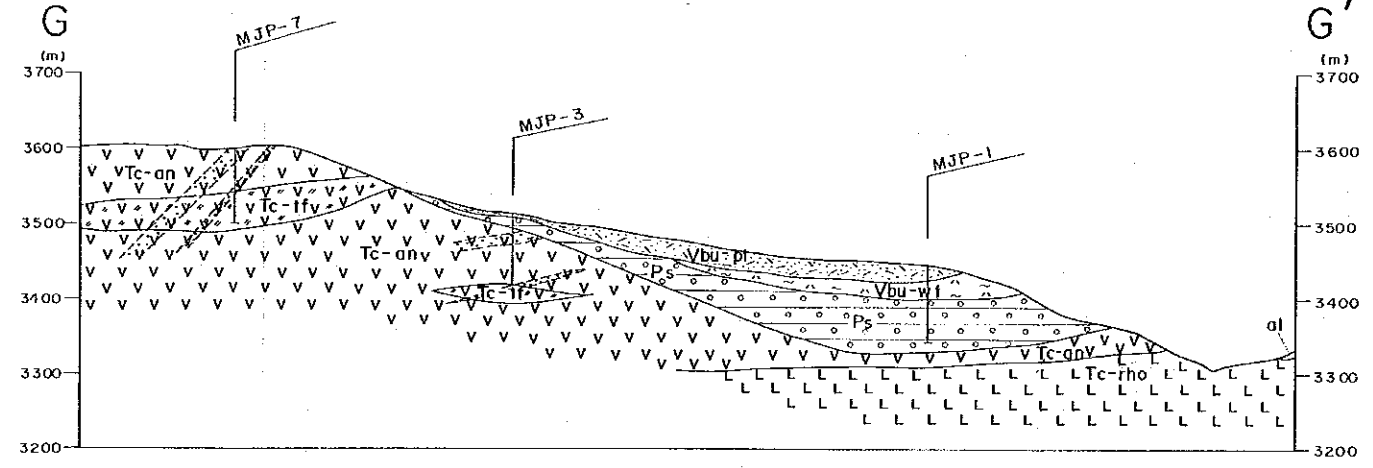
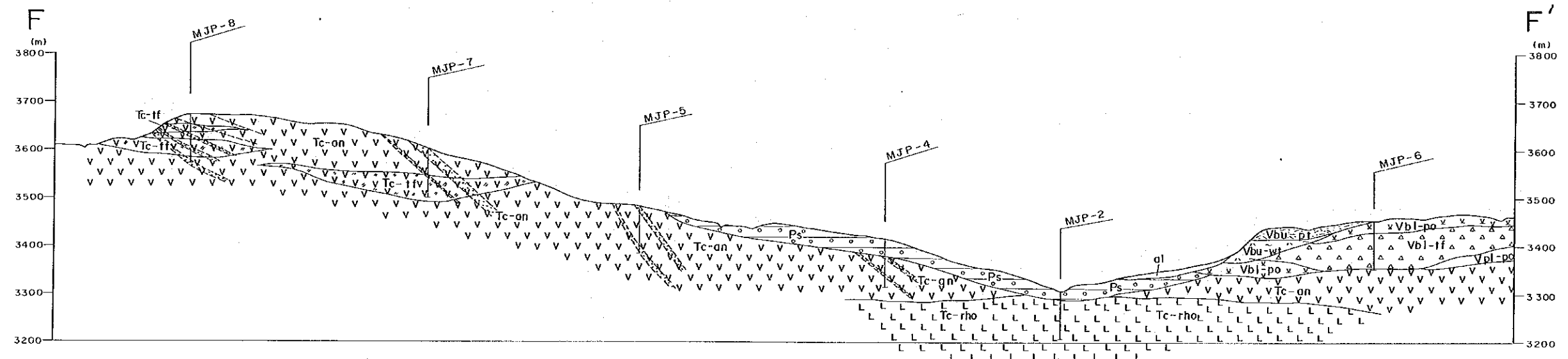
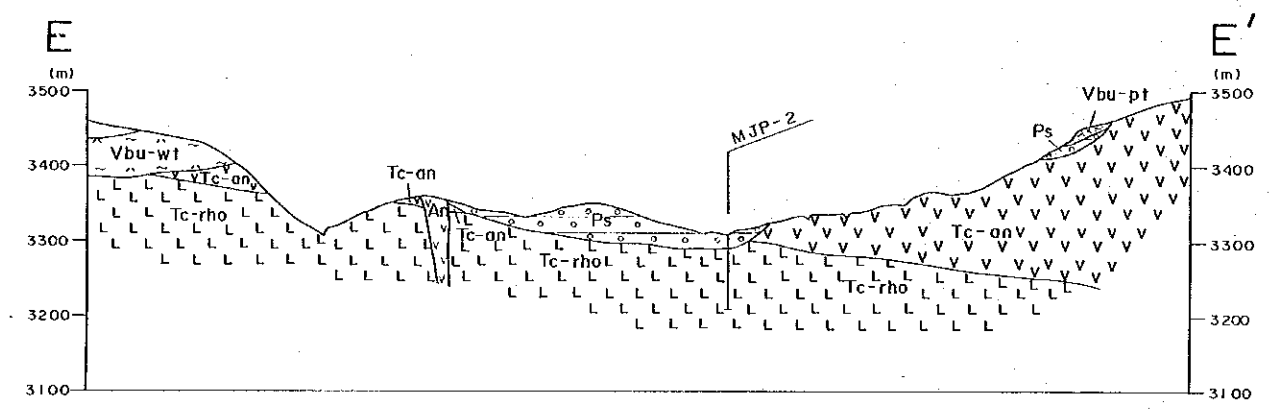
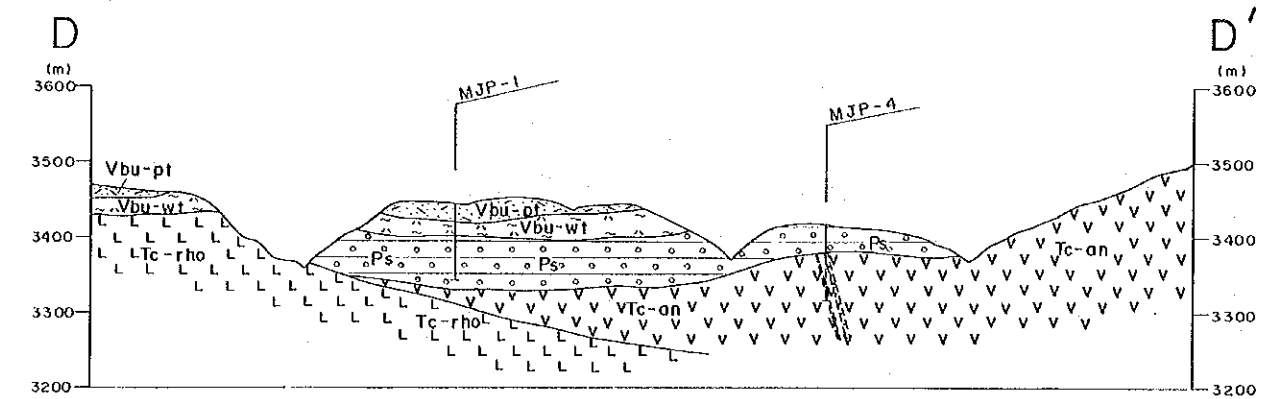
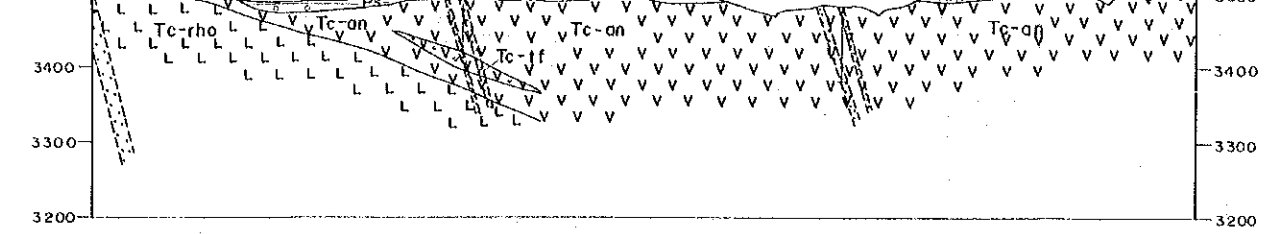


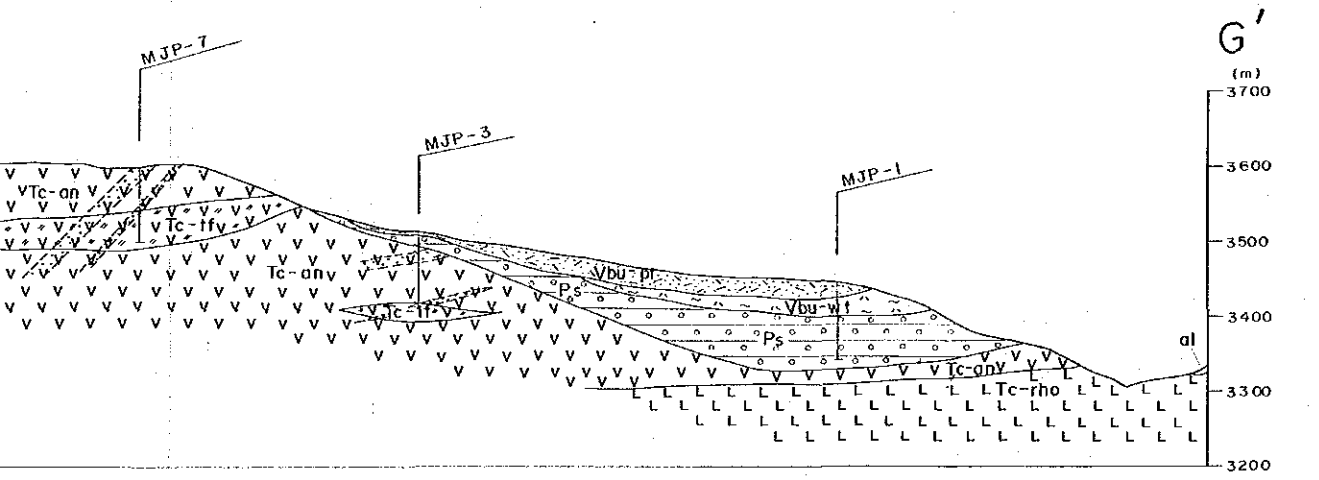
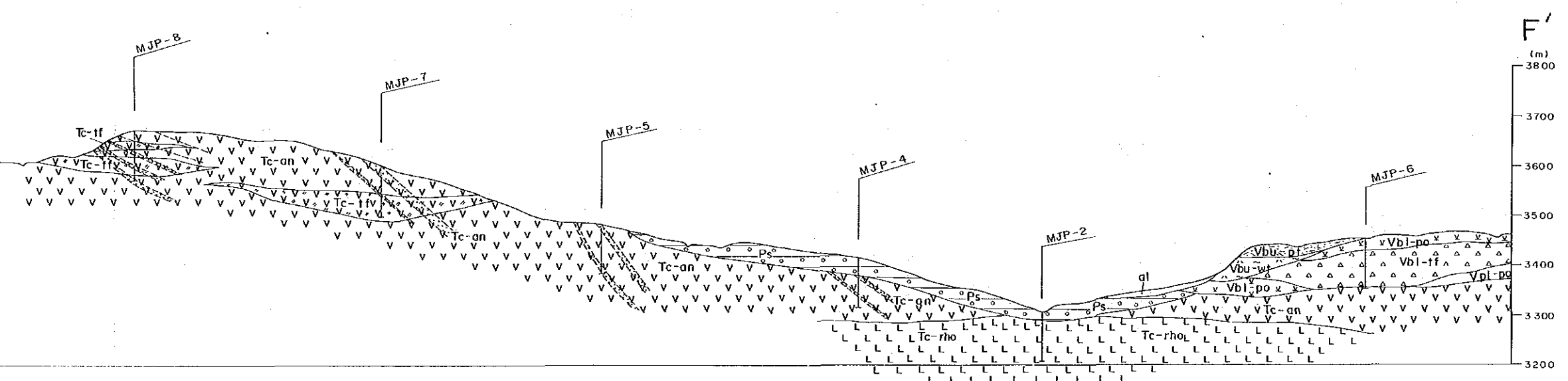
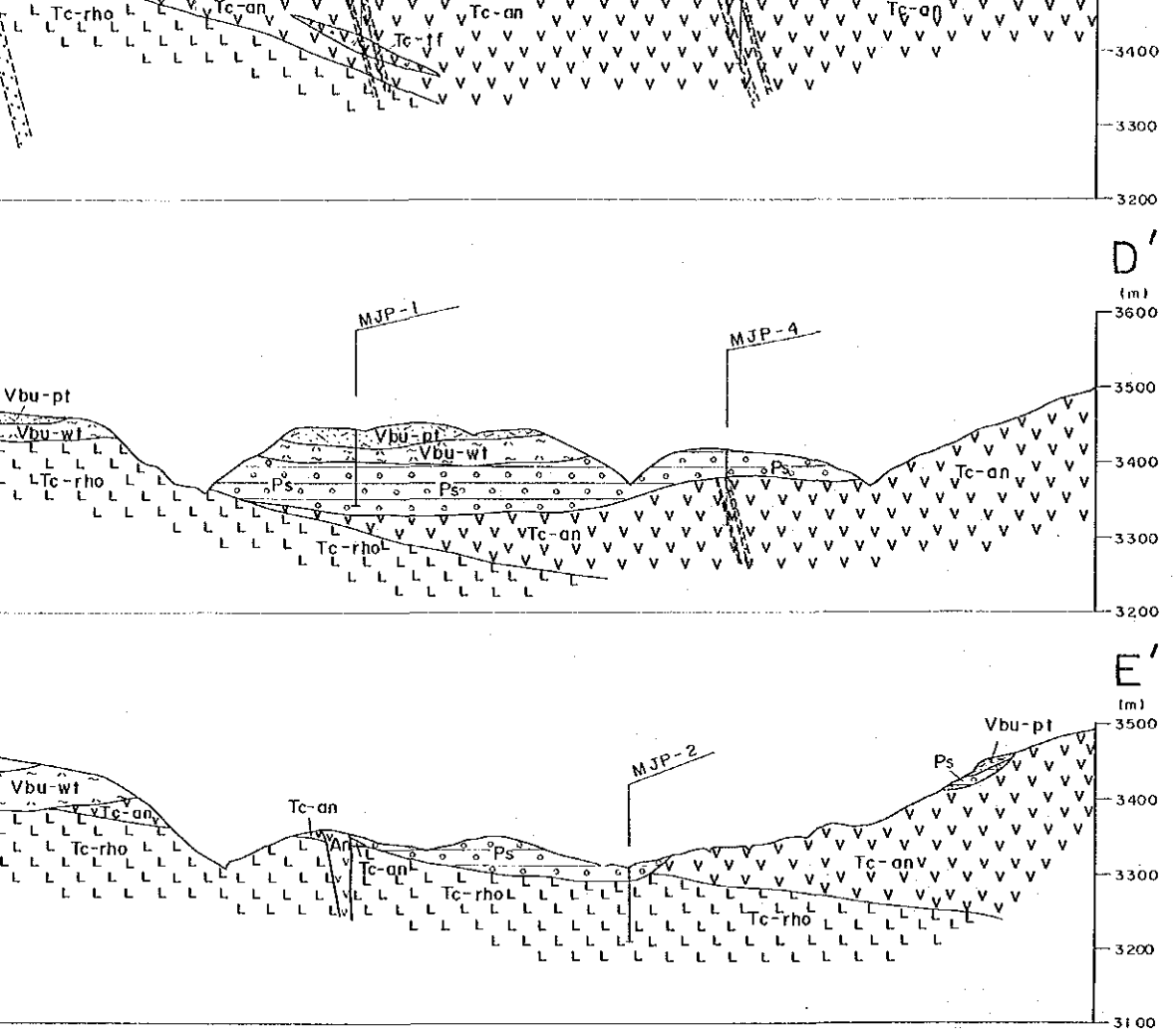
### LEGEND



LEGEND

Quaternary	Holocene	Alluvium and talus	al	Gravel, sand, silt and clay
		Volcanic Sediment of Pausa	o-o-o-o o-o-v-sp	Volcanic ash and gravel
	Pleistocene	Upper	Vbu-pl	Pumice fall and tuffaceous
			Vbu-wt	Dacite, dacitic tuff and w
		Lower	Vbl-an	Olivine basalt and pyroxene
			Vbl-ff	Andesitic tuff, lapilli tuff
	Pliocene	Vbl-po	Hornblende andesite lava	
		Ps	Gravel, sand, silt and clay	
	Tertiary	Miocene	Tc-ff	Andesitic volcanic breccia
			Tc-af	Andesite lava with thin breccia and tuff breccia
Tacoza Formations		Tc-rho	Rhyolite lava, tuff and	
		Tc-an	Andesitic tuff breccia	
Jurassic	Chocolate Volcanic Rocks	v-v-v-v v-v-c-ho	Andesitic tuff breccia	
	Intrusive Rock			
Dike			v-v-v-v v-v-an	22 Hornblende andesite





LEGEND

Quaternary	Holocene	Alluvium and Talus	al	Gravel, sand, silt and clay
		Volcanic Sediment of Pausa	Vsp	Volcanic ash and gravel
	Pleistocene	Upper	Vbup	Pumice fall and tuffaceous sand
			Vbuw	Dacite, dacitic tuff and welded tuff
		Lower	Vban	Olivine basalt and pyroxene andesite lavas
			Vbtf	Andesitic tuff, lapilli tuff and tuff breccia
	Pirca Sediment	Vbpo	Hornblende andesite lava	
		Ps	Gravel, sand, silt and clay	
	Tertiary	Miocene	Tc-vv	Andesitic volcanic breccia
			Tc-af	Andesite lava with thin bedded tuff, lapilli tuff and tuff breccia
Tc-af		Andesite lava with thin bedded tuff, lapilli tuff and tuff breccia		
Tc-rho		Rhyolite lava, tuff and lapilli tuff		
Jurassic	Chocolate Volcanic Rocks	Vcho	Andesitic tuff breccia	
<b>Intrusive Rock</b>				
Dike		An	Hornblende andesite	
Fault				
Strike and dip of bedding				
Strike and dip of contact plane				
Strong alteration zone				
Quartz vein				
MJP-1 Location of drilling				

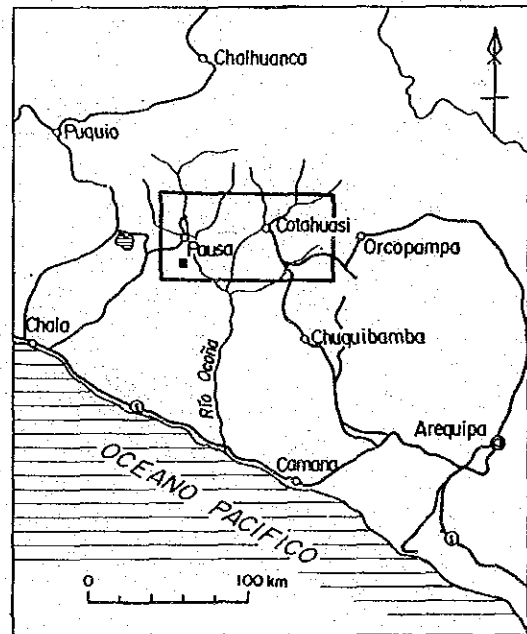
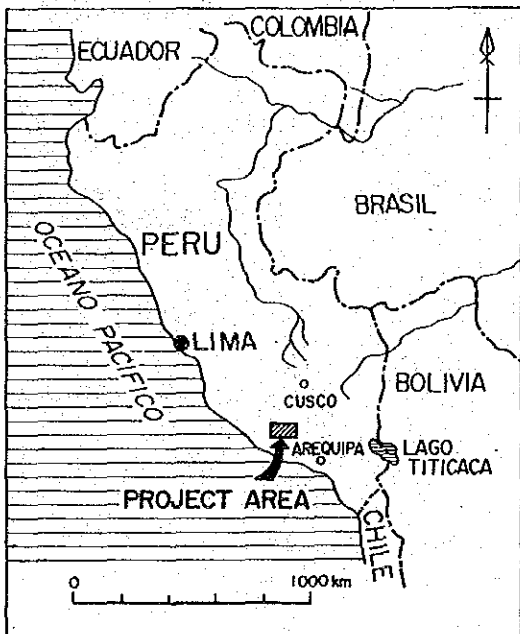
MINERAL EXPLORATION  
IN  
COTAHUASI AREA  
(PHASE II)



GEOLOGICAL LOG OF DIAMOND  
DRILLING HOLE (MJP-1~MJP-10)  
IN THE PIRCA EASTERN AREA

Scale 1 : 200

LOCATION INDEX




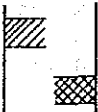

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February 1987

Drill Hole No.	Length (m)	Angle (°)	Location of Drill Hole		Elevation (m)
			Longitude	Latitude	
MJP-1	100.80	90	N8'294,638.2	E677,006.7	3,441.1
MJP-2	100.00	90	N8'295,108.1	E677,352.5	3,309.0
MJP-3	100.00	90	N8'294,686.8	E676,456.1	3,512.5
MJP-4	100.00	90	N8'295,133.7	E676,988.3	3,416.0
MJP-5	100.10	90	N8'295,191.2	E676,479.9	3,480.4
MJP-6	100.80	90	N8'295,480.0	E677,892.0	3,452.0
MJP-7	100.00	90	N8'294,901.1	E676,151.7	3,598.5
MJP-8	100.20	90	N8'294.865.9	E675,655.6	3,673.4
MJP-9	100.00	90	N8'294,132.0	E675.986.5	3,491.3
MJP-10	100.00	90	N8'294,354.5	E676,013.2	3,572.0

ABBREVIATIONS

(C) : crack  
(Qv): quartz vein  
(F1): flow structure  
(Py): crack with pyrite




SYMBOL

 quartz vein  
 silicified zone  
 sheared zone

EXAMINED SAMPLE

T : thin section  
P : polished section  
M : chemical analysis

ALTERATION AND MINERALIZATION GRADE

 strong  
 moderate  
 weak













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		0.00	Gravels and sand (talus) gravel: pebbles, cobbles and boulders of andesite (grey porphyrite andesite) sand: tuffaceous sand											
10		7.05	Grey porphyritic andesite lava (fresh) plhocryst: plagioclase $\phi 0.5 \sim 0.2$ cm, hornblend $\phi 1 \sim 2$ mm groundmass: fine grained plagioclase and glass partly porous *9.05 - 11.35m: sheared *9.05 - 12.95m: light brown colored											
20		23.60	Light purplish grey andesitic volcanic breccia breccia: angular breccia (mainly $\phi 10$ cm - ) of grey porphyritic andesite (the same composition as the above andesite lava) matrix: light purplish grey to grey andesitic ash. (unconsolidated to a little consolidated) partly of matrix is likely coarse sand *25.05 - 95.85m: seems to be gravel and sand											
30		62.60	*62.60 - 65.05m: grey porphyritic andesite breccia											
40		65.05	*65.05 - 66.55m: sandy ash											
50		66.55	Light purplish grey andesitic volcanic breccia *66.55 - 95.85m: this interval seems to be gravels and sand											
60		68.10		68.10 - 68.15m PEX - 1										
70		88.40		88.40 - 88.45m PEX - 2										
80		95.85	Andesitic volcanic conglomerate											
90		96.35	Brown - purplish brown, altered, brecciated andesite											
100		97.65	*96.35 - 97.65: networks of veinlet with black manganese oxides and brown iron oxides along cracks											
		100.90		100.10 - 100.15 PEX - 4										

weak argillization  
Mn-Fe oxides

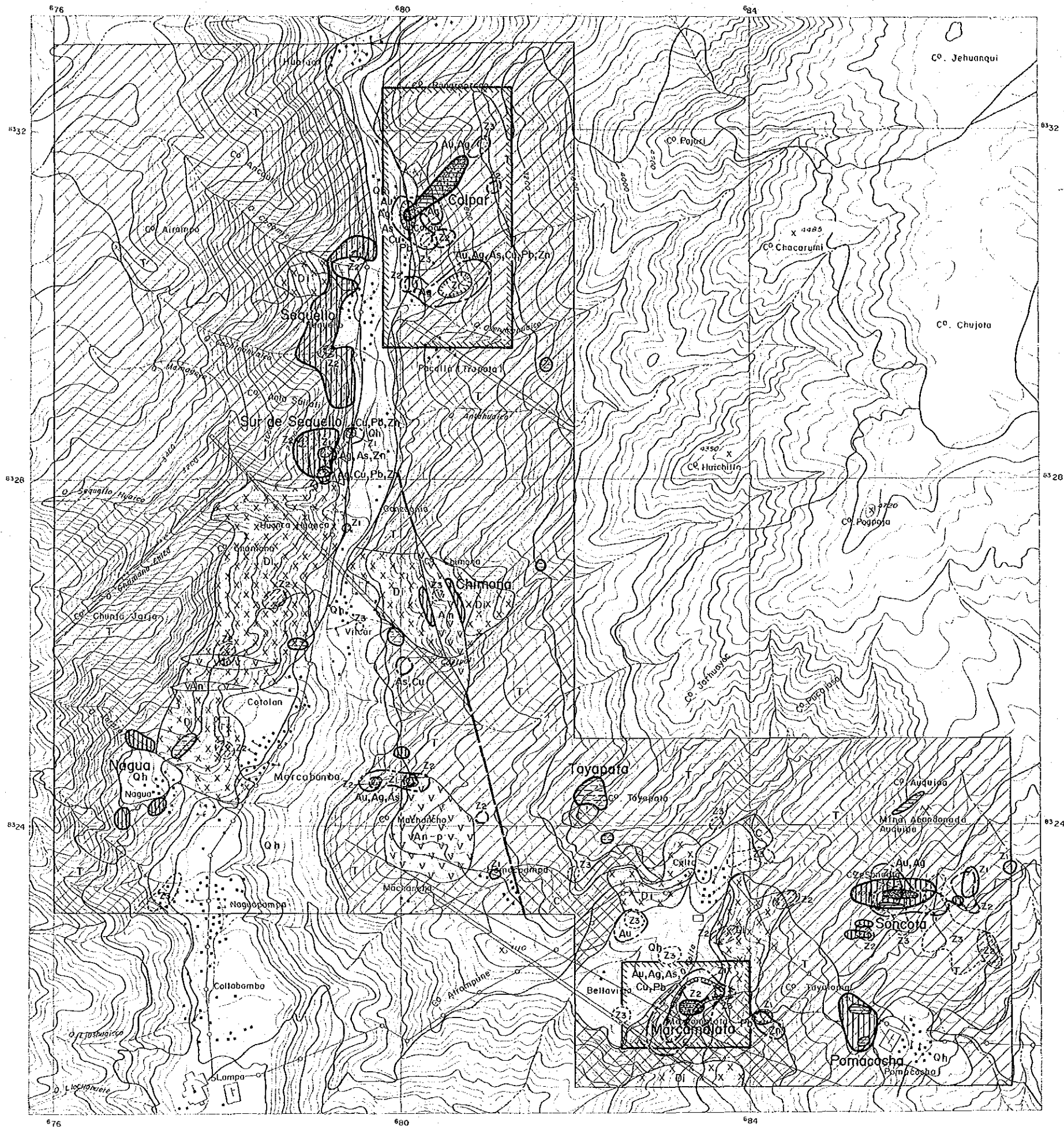












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MINERAL EXPLORATION  
IN  
COTAHUASI AREA  
(PHASE II)

## INTERPRETATION MAP OF THE MARCABAMBA AREA

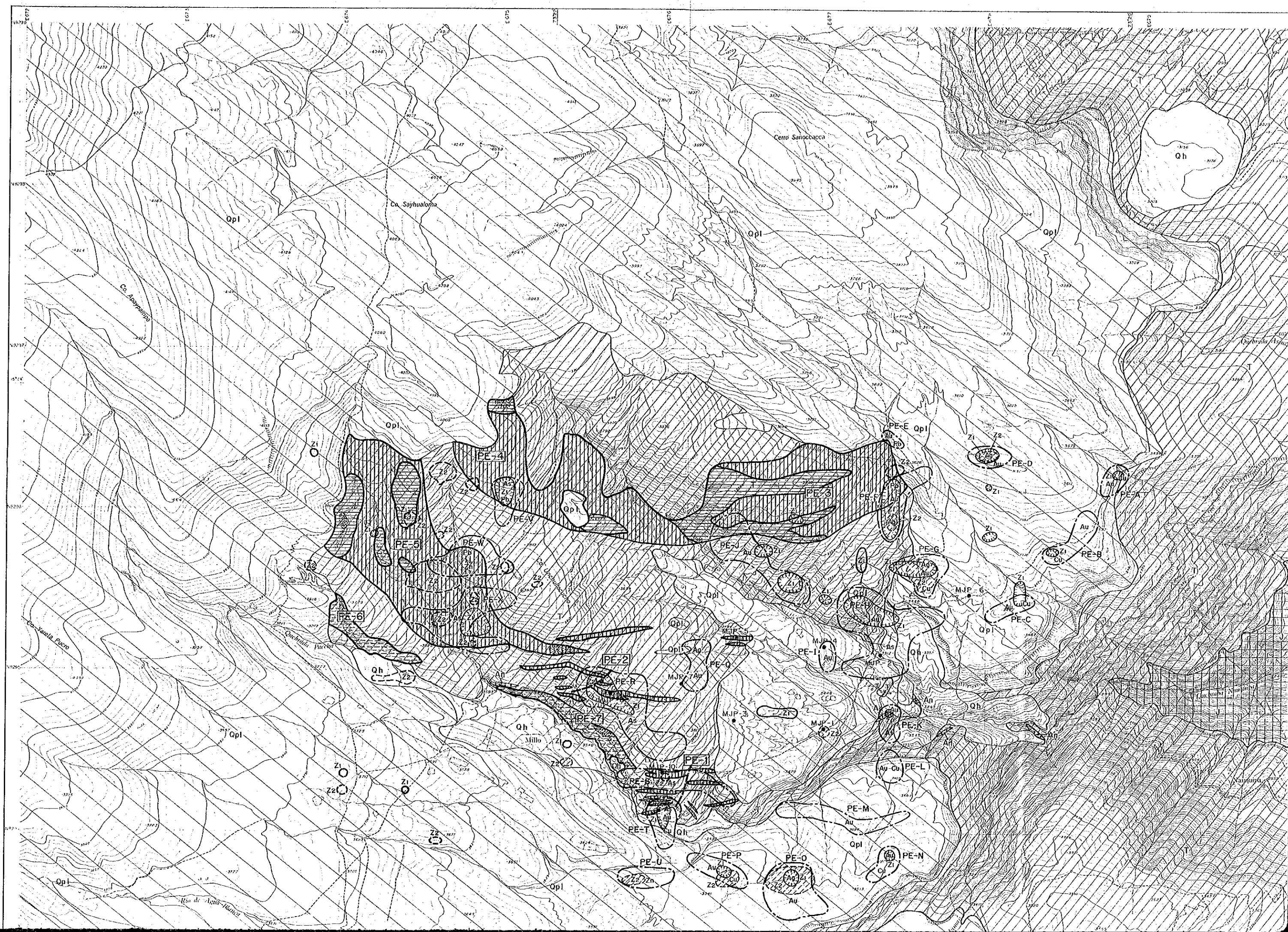
LOCATION INDEX

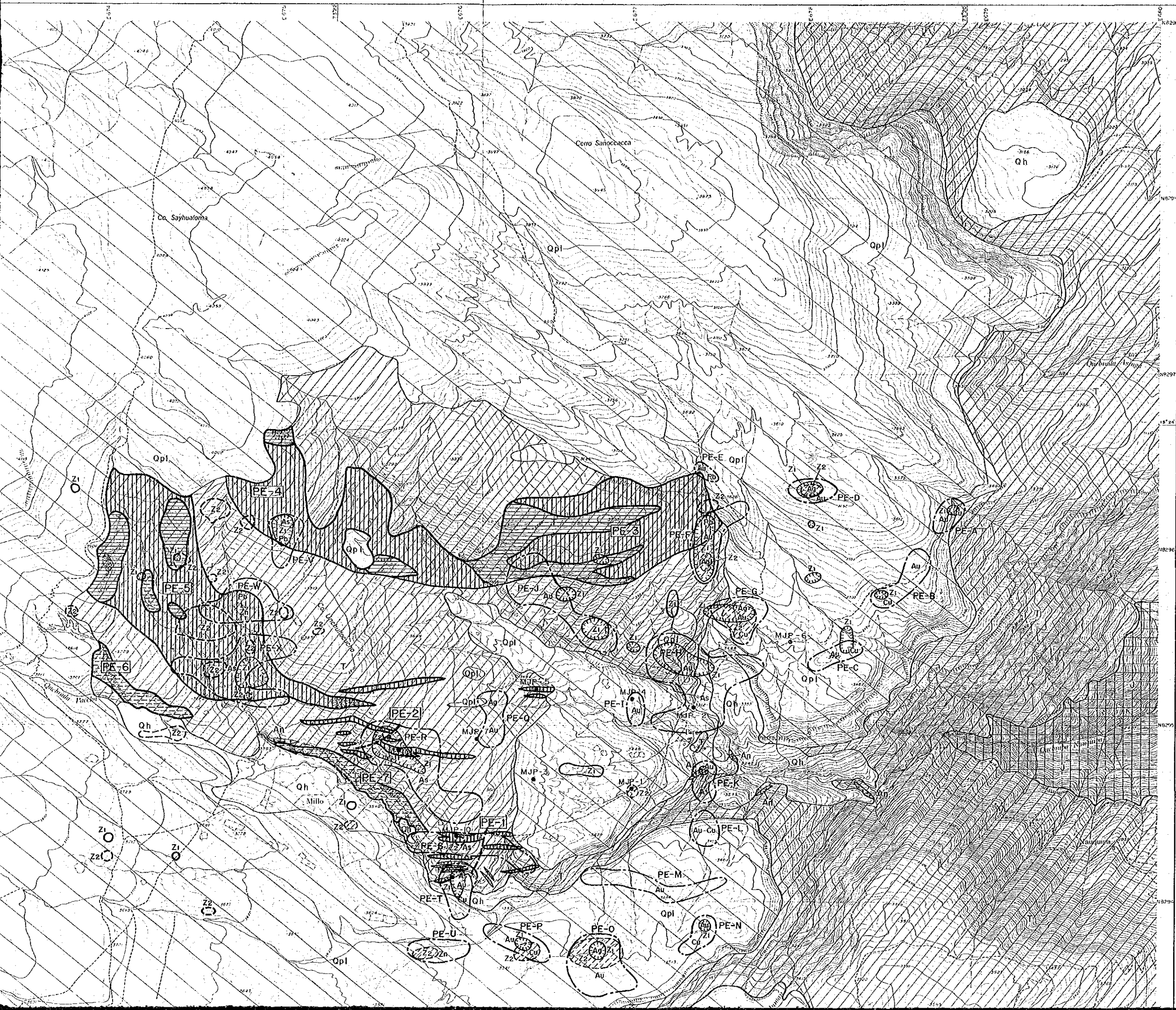
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METAL MINING AGENCY OF JAPAN  
INSTITUTO GEOLOGICO MINERO Y METALURGICO  
February 1987

Scale 1 : 25,000  
0 1 2 km

### LEGEND

<p><b>Geological System</b></p> <ul style="list-style-type: none"> <li> Quaternary (Holocene) System</li> <li> Tertiary System</li> <li> Cretaceous System</li> </ul> <p><b>Intrusive Rocks</b></p> <ul style="list-style-type: none"> <li> Andesite</li> <li> Porphyritic andesite</li> <li> Diorite-quartz diorite</li> </ul> <p><b>Alteration and Mineralization Zones</b></p> <ul style="list-style-type: none"> <li> Mainly silicification</li> <li> Silicification and argillization</li> <li> Mainly argillization</li> <li> Mineralization</li> </ul>	<p><b>Geochemical Anomaly</b> (Univariate Analysis)</p> <ul style="list-style-type: none"> <li> Anomaly zone and anomalous element (Au, Ag, As, Cu, Pb, Zn)</li> </ul> <p><b>(Principal Components Analysis)</b></p> <p><b>•1st Principal Component</b></p> <ul style="list-style-type: none"> <li> + Anomaly (Z1)</li> <li> - Anomaly (Z1)</li> </ul> <p><b>•2nd Principal Component</b></p> <ul style="list-style-type: none"> <li> + Anomaly (Z2)</li> <li> - Anomaly (Z2)</li> </ul> <p><b>•3rd Principal Component</b></p> <ul style="list-style-type: none"> <li> + Anomaly (Z3)</li> </ul> <p> Recommended Area</p>
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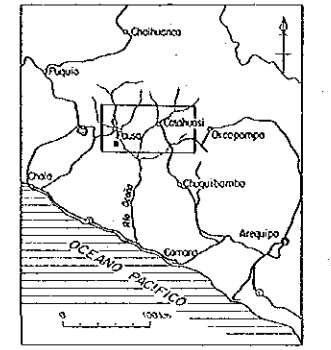
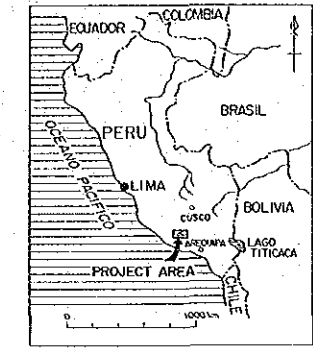


MINERAL EXPLORATION  
IN  
COTAHUASI AREA  
(PHASE II)

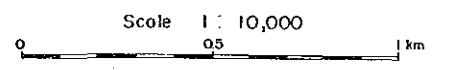
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### INTERPRETATION MAP OF THE PIRCA EASTERN AREA

LOCATION INDEX

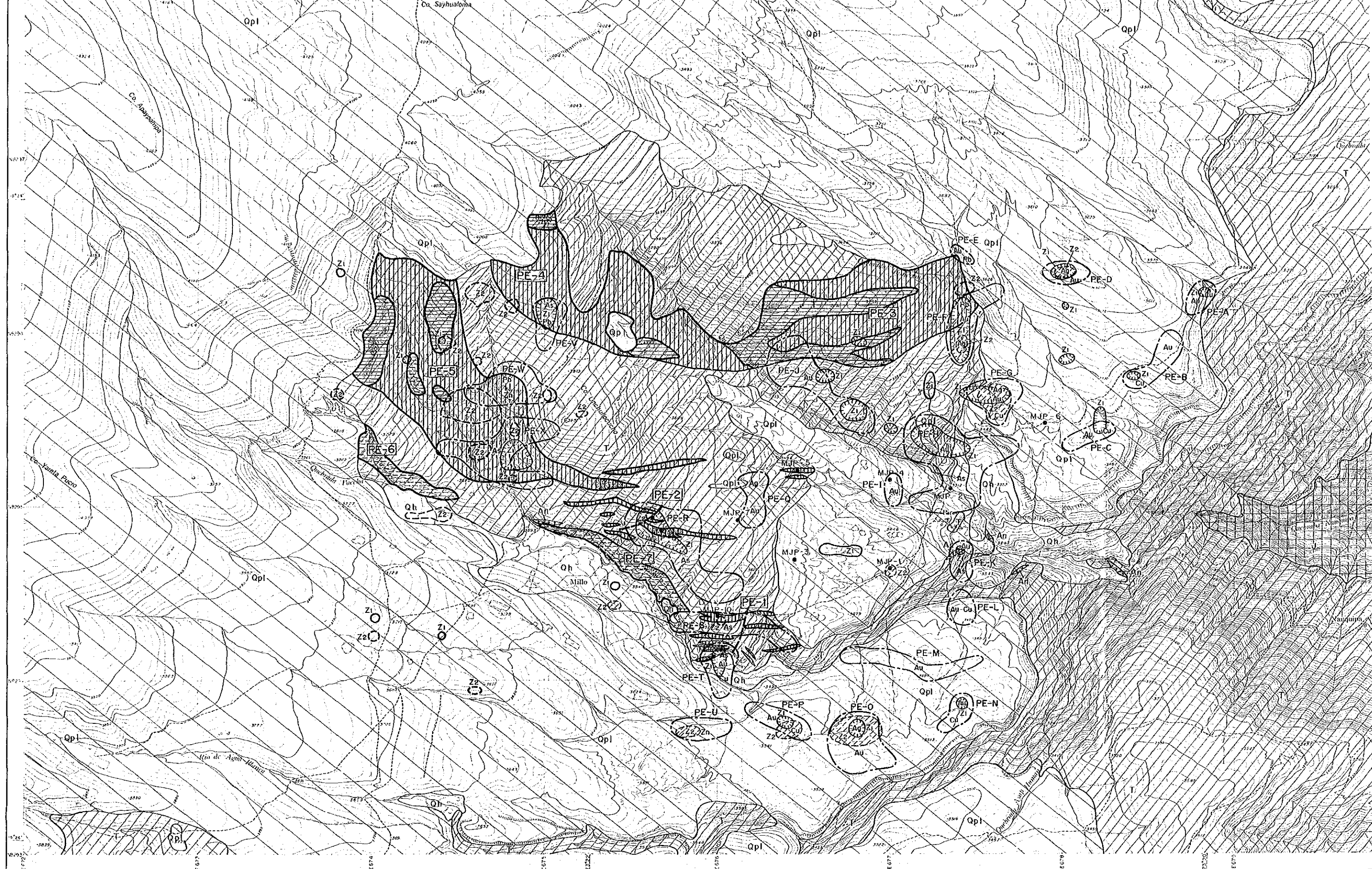


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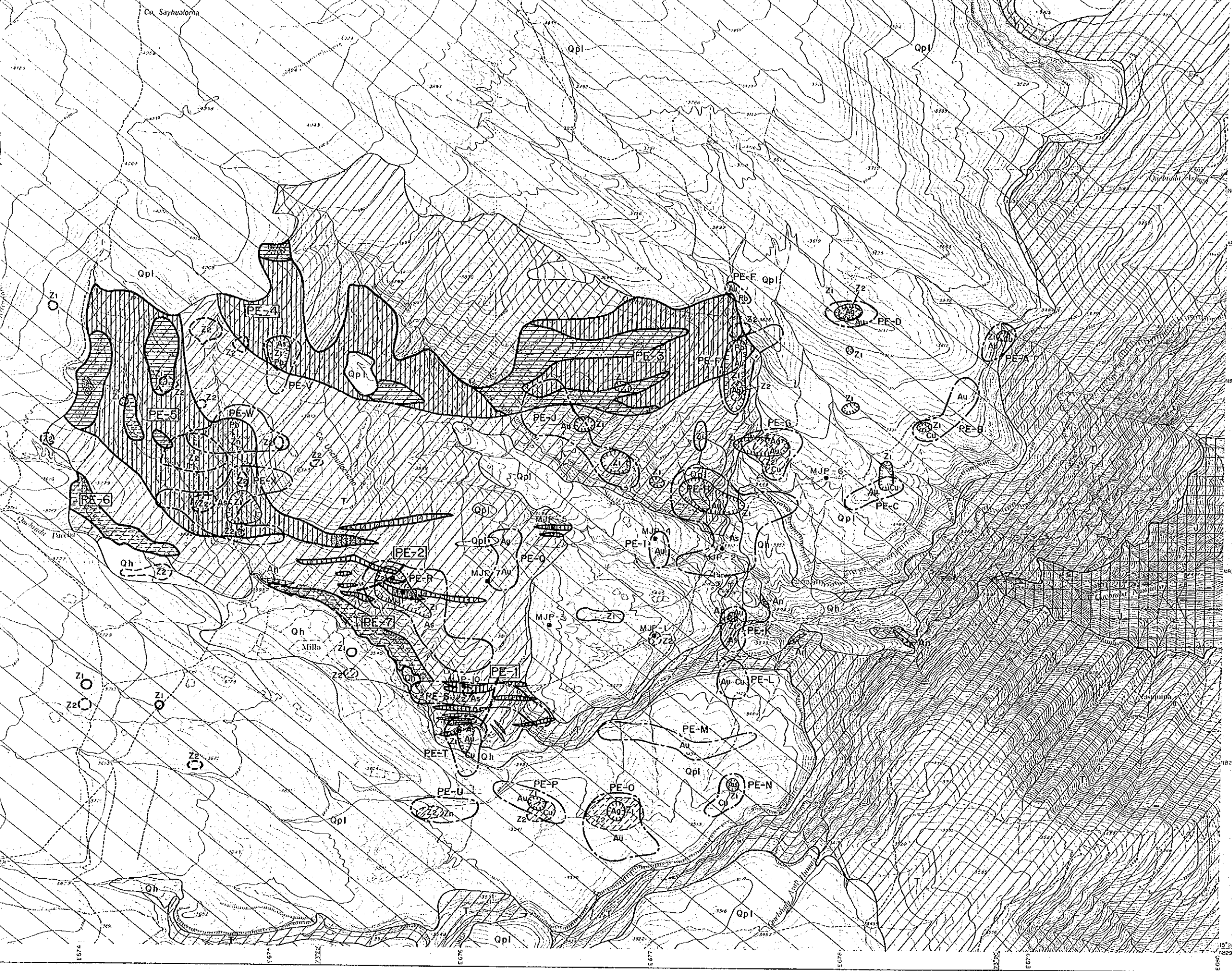


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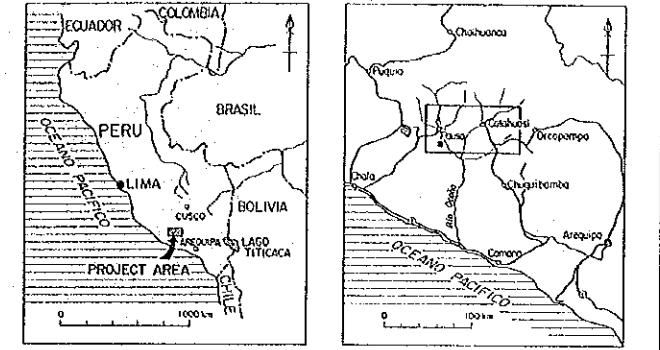
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Quaternary (Holocene) System	Anomaly zone and anomalous elements
Quaternary (Pleistocene) System	<b>(Principal Components Analysis)</b>
Tertiary System	• 1st Principal Component
Jurassic System	+ Anomaly
<b>Intrusive Rock</b>	- Anomaly
Hornblende andesite	• 2nd Principal Component
Fault	+ Anomaly
<b>Alteration and Mineralization Zones</b>	- Anomaly
Mainly silicification	
Silicification and argillization	
Mainly argillization	
Mineralization	



1:10,000



Scale 1:10,000

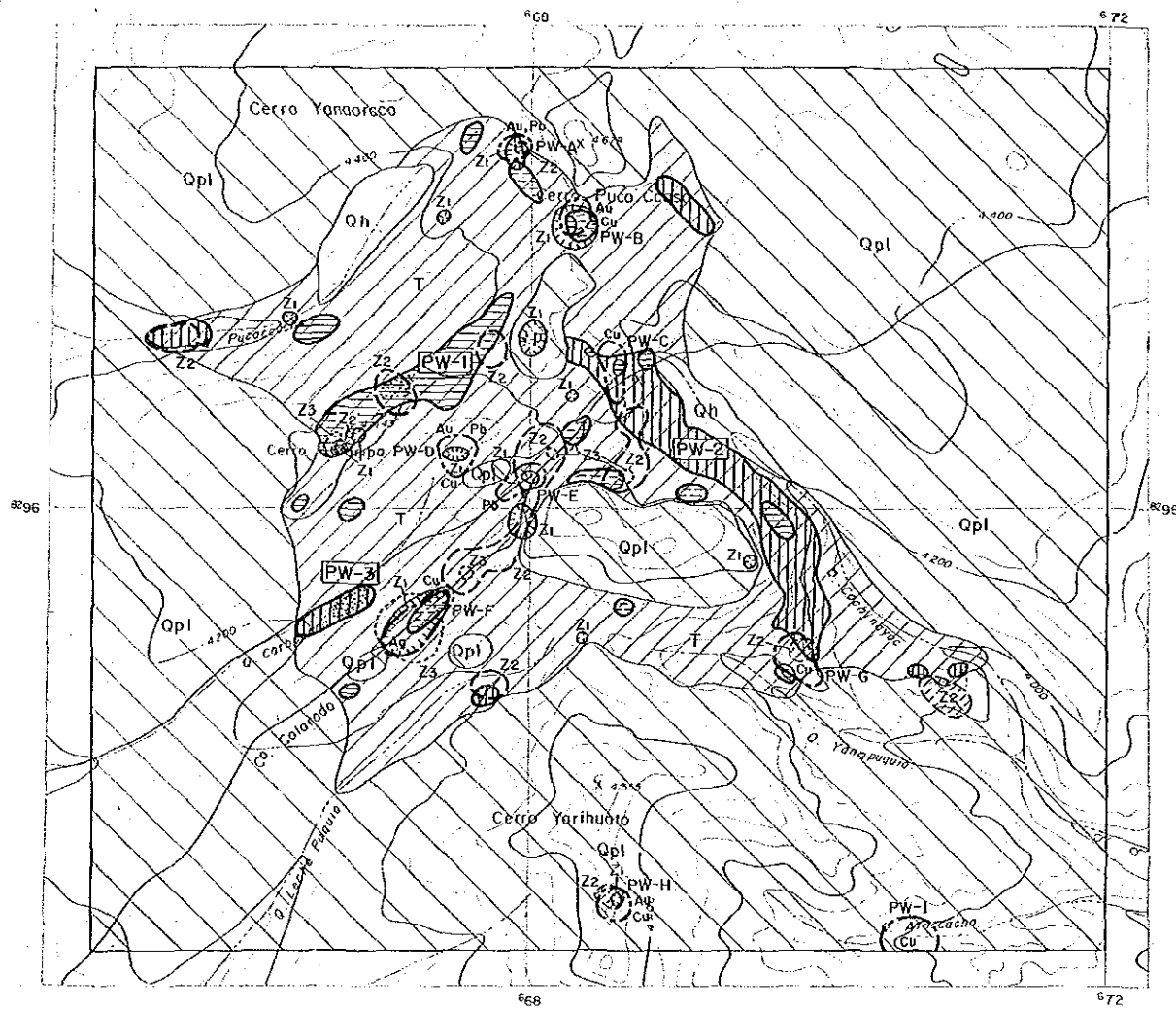


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 METAL MINING AGENCY OF JAPAN  
 INSTITUTO GEOLOGICO MINERO Y METALURGICO  
 February 1987

Scale 1:10,000

**LEGEND**

- |  |                                     |
|--|-------------------------------------|
| <b>Geological System</b>                   | <b>Geochemical Anomaly</b>          |
| Quaternary (Holocene) System               | <b>(Univariate Analysis)</b>        |
| Quaternary (Pleistocene) System            | Anomaly zone and anomalous elements |
| Tertiary System                            | (Principal Components Analysis)     |
| Jurassic System                            | <b>• 1st Principal Component</b>    |
| <b>Intrusive Rock</b>                      | + Anomaly                           |
| Hornblende andesite                        | - Anomaly                           |
| Fault                                      | <b>• 2nd Principal Component</b>    |
| <b>Alteration and Mineralization Zones</b> | + Anomaly                           |
| Mainly silicification                      | - Anomaly                           |
| Silicification and argillization           |                                     |
| Mainly argillization                       |                                     |
| Mineralization                             |                                     |



### LEGEND

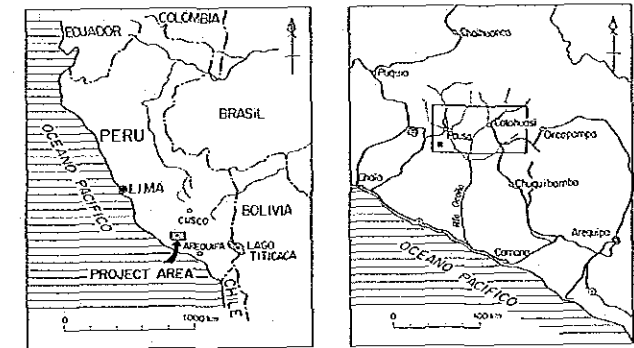
- Geological System**
- Quaternary (Holocene) System
  - Quaternary (Pleistocene) System
  - Tertiary System
- Alteration and Mineralization Zones**
- Mainly silicification
  - Silicification and argillization
  - Mainly argillization
  - Mineralization
- Geochemical Anomaly**  
**< Univariate Analysis >**
- Anomaly zone and anomalous elements  
 Au, Ag, As, Cu, Pb, Zn
- < Principal Components Analysis >**
- \* 1st Principal Component**
  - + Anomaly
  - + Anomaly
  - Anomaly
  - \* 3rd Principal Component**
  - + Anomaly

MINERAL EXPLORATION  
 IN  
 COTAHUASI AREA  
 (PHASE II)

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### INTERPRETATION MAP OF THE PIRCA WESTERN AREA

LOCATION INDEX



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 METAL MINING AGENCY OF JAPAN  
 INSTITUTO GEOLOGICO MINERO Y METALURGICO  
 February 1987

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