P3'

P4'

P1

P1'

P2

P2'

N

Vbu-pt

Vbl-po

Tc-an

Vbl-tf

Tc-tf

Vbu-wt

Vbl-an

Tc-rho

al

Mo

Cho

Ps

MJP-1

MJP-2

MJP-3

MJP-4

MJP-5

MJP-6

MJP-7

MJP-8

MJP-9

MJP-10

Co. Sayhualoma

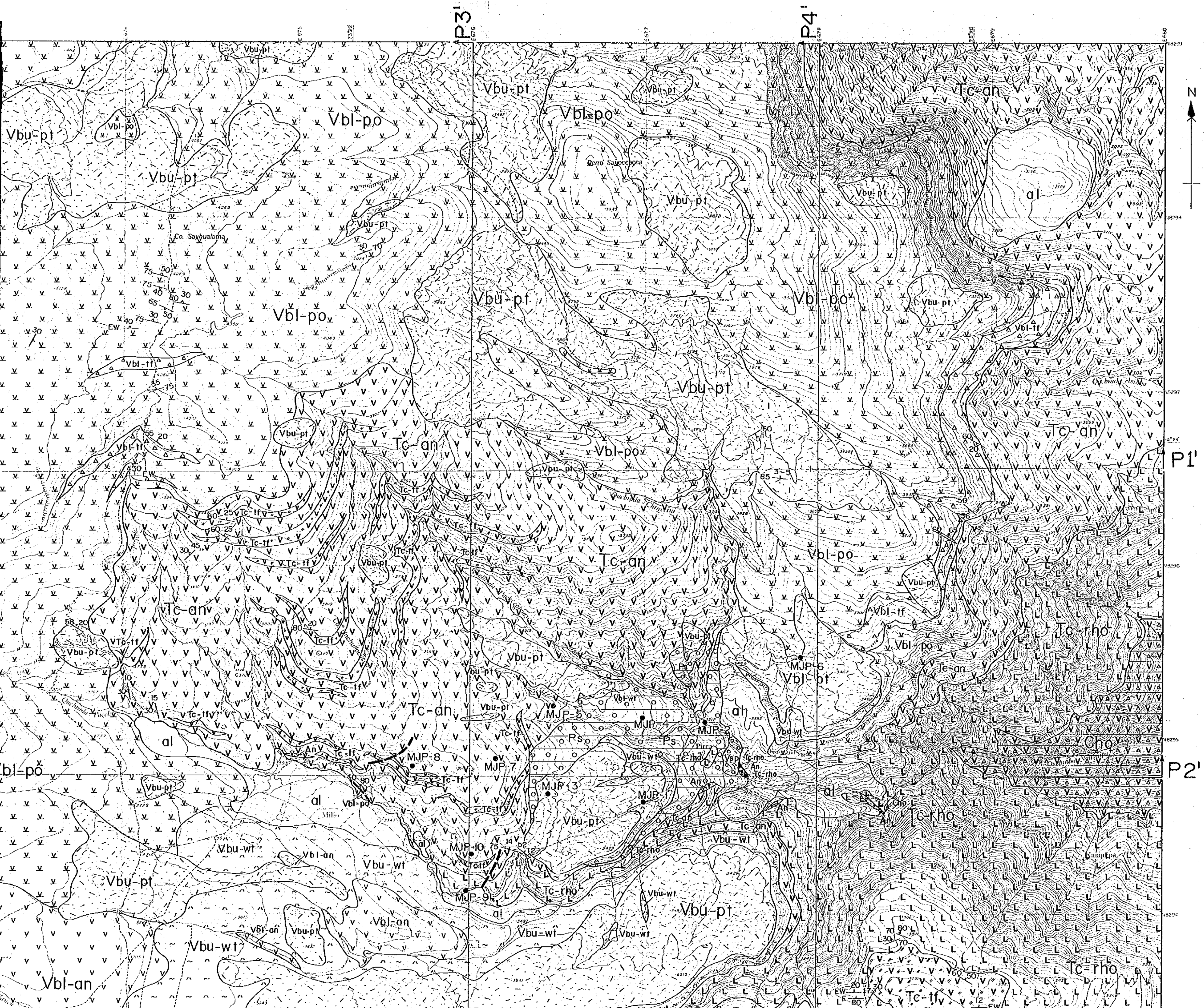
Co. Aashampa

Co. Yaqlla Pucu

Cerro Sayhuaccocca

Millo

Río de Yanu Huaco

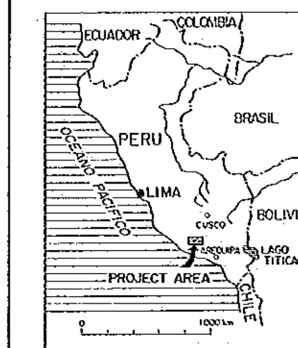


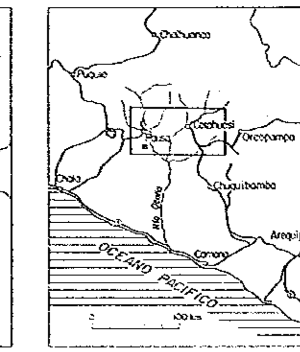
PL. 5

MINERAL EXPLORATION
IN
COTAHUASI AREA
(PHASE Ⅱ)

GEOLOGICAL MAP
OF THE PIRCA EASTERN AREA

LOCATION INDEX





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

Scale 1 : 10,000
0 0.5 1 km

LEGEND

Quaternary	Holocene	Alluvium and Talus		al	Gravel, sand, silt and clay
		Volcanic Sediments of Pausa		Vsp	Volcanic ash and gravel
	Pleistocene	Moraine Sediments		Mo	Gravel, sand and mud
		Barroso Group	Upper Formation	Vbu-pt	Pumice fall and tuffaceous sand
				Vbu-wt	Dacite lava, dacitic tuff and welded tuff
			Lower Formation	Vbl-an	Pyroxene andesite lavas
				Vbl-tf	Andesitic tuff, lapilli tuff and tuff breccia
				Vbl-po	Hornblende andesite lava
		Pirca Sediments		Ps	Gravel, sand, silt and clay
Tertiary	Miocene	Tacaza Formation		Tc-tf	Andesitic tuff, lapilli tuff and tuff breccia
				Tc-an	Andesite lava with thin bedded tuff, lapilli tuff and tuff breccia
				Tc-rho	Rhyolite lava, tuff and lapilli tuff
Jurassic		Chocolate Volcanic Rocks		Cho	Andesite lava, andesitic tuff and tuff breccia (partly green semischist)

Intrusive rock

Dike	An	Hornblende andesite

80 80	Fault
80 80	Strike and dip of bedding
50 70	Strike and dip of flow structure
80 75	Strike and dip of joint

P1 Mo P1'

P2 P2'

P3 P4

Vbl-po

Vbu-pt

Tc-an

Vbl-an

Vbu-wt

Tc-rho

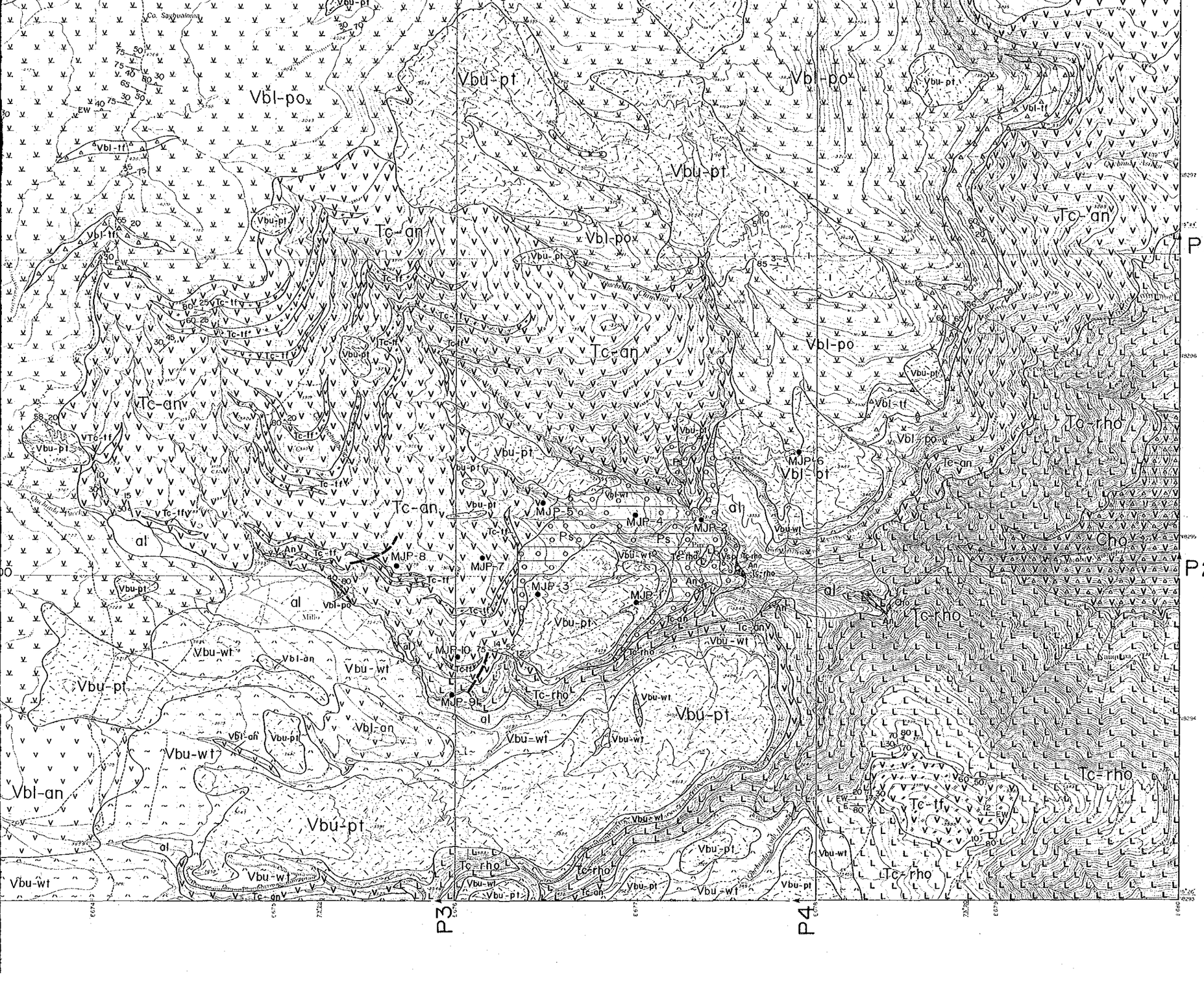
Cho

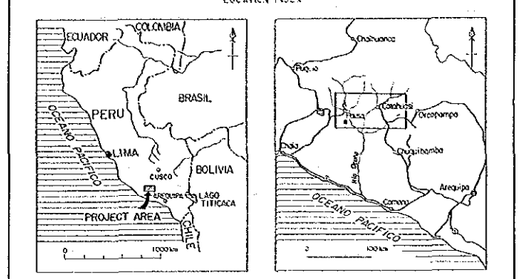
al

Tc-lf

Vbl-lf

MJP-1 MJP-2 MJP-3 MJP-4 MJP-5 MJP-6 MJP-7 MJP-8 MJP-9 MJP-10





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

Scale 1 : 10,000
0 0.5 1 km

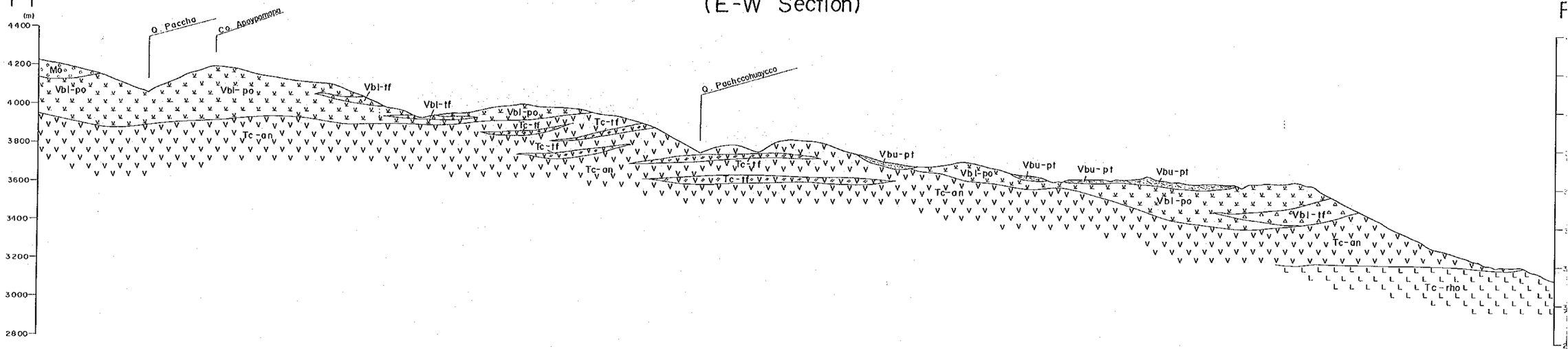
LEGEND

Quaternary	Holocene	Alluvium and Talus	al — Gravel, sand, silt and clay
		Volcanic Sediments of Pausa	Vs p — Volcanic ash and gravel
		Moraine Sediments	Mo — Gravel, sand and mud
	Pleistocene	Barroso Group, Upper Formation	Vbu-pt — Pumice fall and tuffaceous sand
			Vbu-wt — Dacite lava, dacitic tuff and welded tuff
			Vbl-an — Pyroxene andesite lavas
		Barroso Group, Lower Formation	VoFrt — Andesitic tuff, lapilli tuff and tuff breccia
			Vbl-po — Hornblende andesite lava
		Pirca Sediments	Ps — Gravel, sand, silt and clay
Tertiary	Miocene		Tc-tf — Andesitic tuff, lapilli tuff and tuff breccia
		Tacaza Formation	Tc-an — Andesite lava with thin bedded tuff, lapilli tuff and tuff breccia
			Tc-rho — Rhyolite lava, tuff and lapilli tuff
Jurassic		Chocolate Volcanic Rocks	Cho — Andesite lava, andesitic tuff and tuff breccia (partly green semischist)
Intrusive rock		Dike	An — Hornblende andesite

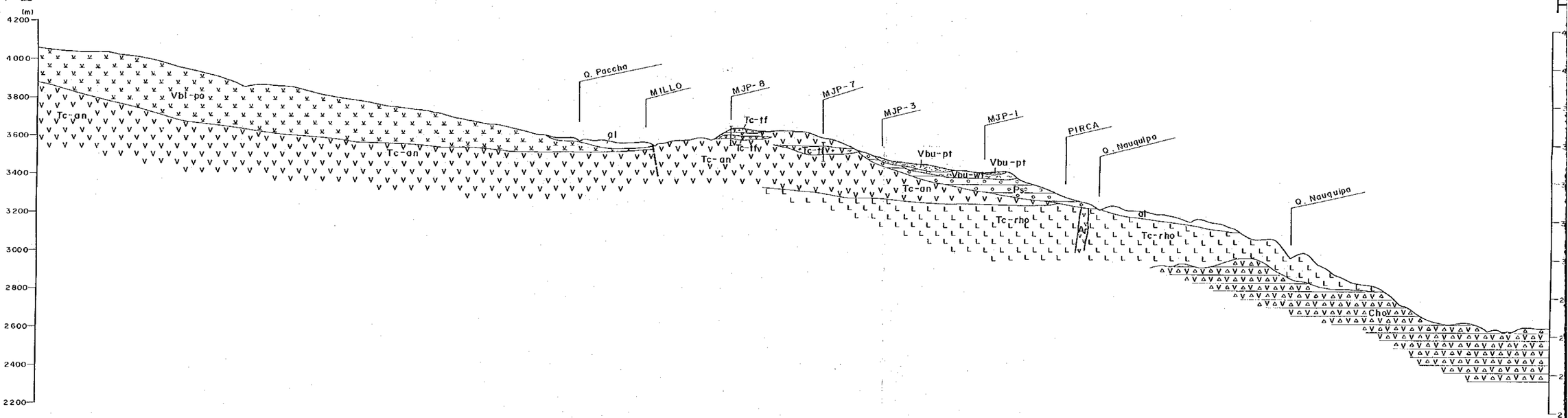
- Fault
- Strike and dip of bedding
- Strike and dip of flow structure
- Strike and dip of joint
- Strike and dip of dike
- MJP-1 Location of drilling
- Pt—Pt' Geological Profile line

(E-W Section)

P1

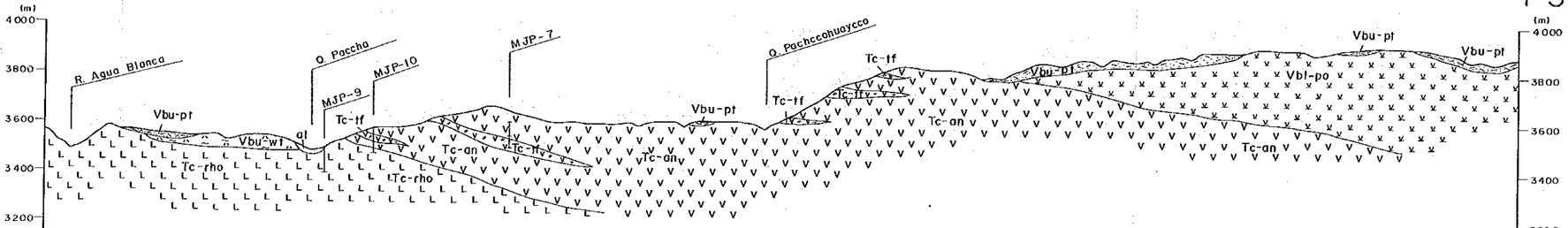


P2



(N-S Section)

P3

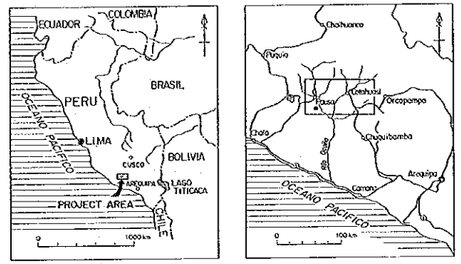


P3'

MINERAL EXPLORATION
IN
COTAHUASI AREA
(PHASE II)

GEOLOGICAL PROFILES
OF THE PIRCA EASTERN AREA

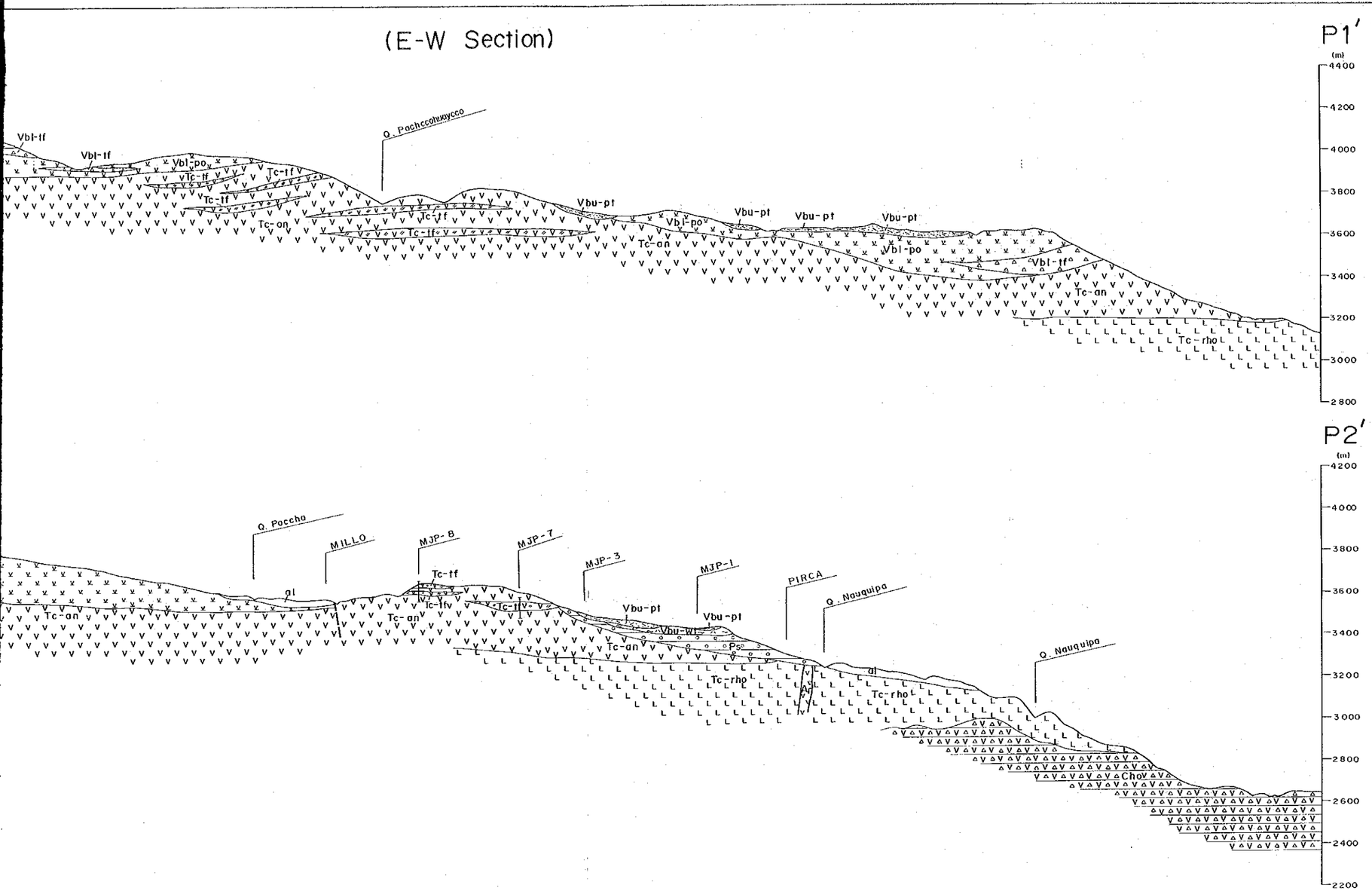
LOCATION INDEX



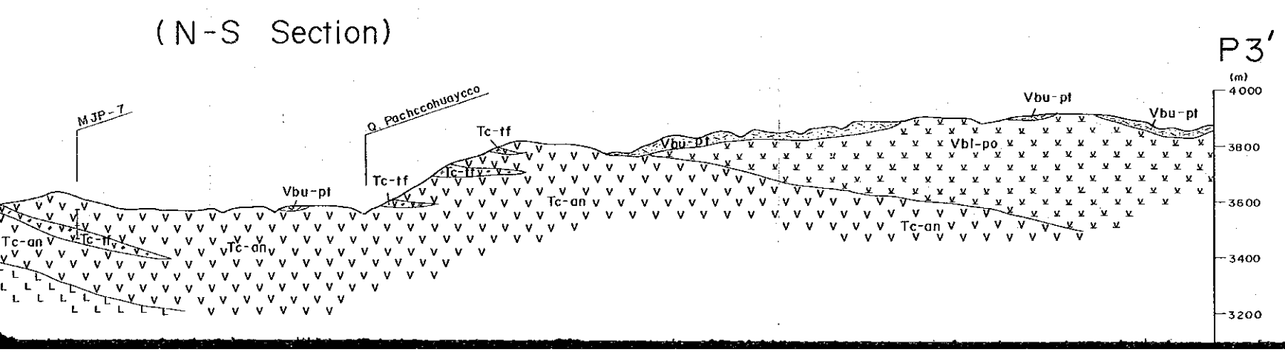
JAPAN INTERNATIONAL COOPERATION AGENCY
METAL MINING AGENCY OF JAPAN
INSTITUTO GEOLOGICO MINERO Y METALURGICO

February 1987

(E-W Section)



(N-S Section)



Scale 1 : 10,000

0 0.5 1 km

LEGEND

Quaternary	Holocene	Alluvium and Talus	al	Gravel, sand, silt and clay
		Volcanic Sediments of Pausa	Vsp	Volcanic ash and gravel
		Moraine Sediments	Mo	Gravel, sand and mud
	Pleistocene	Barroso Group, Upper Formation	Vbu-pt	Pumice fall and tuffaceous sand
			Vbu-wt	Dacite lava, dacitic tuff and welded tuff
			Vol-an	Olivine basalt and pyroxene andesite lavas
		Barroso Group, Lower Formation	Vbl-tf	Andesitic tuff, lapilli tuff and tuff breccia
			Vbl-po	Hornblende andesite lava
		Pirca Sediments	Ps	Gravel, sand, silt and clay
Tertiary	Miocene	Tacaza Formation	Tc-tf	Andesitic tuff, lapilli tuff and tuff breccia
			Tc-an	Andesite lava with thin bedded tuff, lapilli tuff and tuff breccia
			Tc-rho	Rhyolite lava, tuff and lapilli tuff
Jurassic		Chocolate Volcanic Rocks	Cho	Andesite lava, andesitic tuff and tuff breccia (partly green semischist)
		Intrusive rock, Dike	An	Hornblende andesite

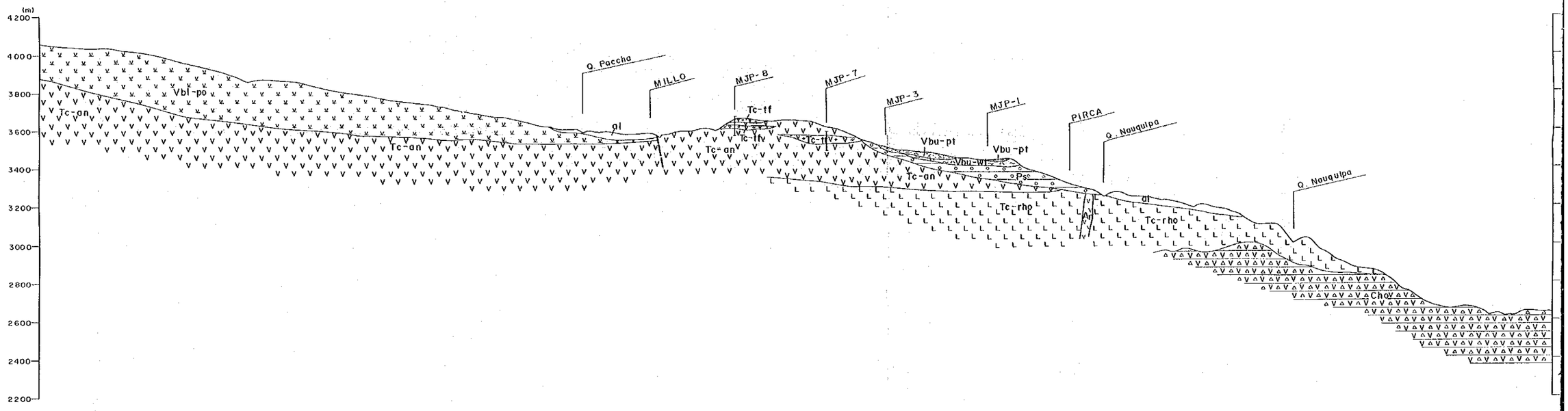
Fault

Strike and dip of bedding

Strike and dip of flow structure

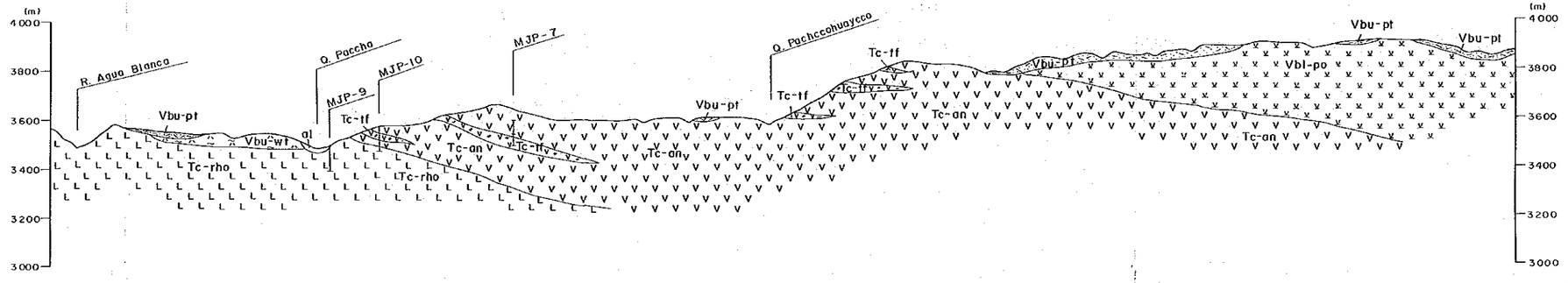
Strike and dip of joint

P2



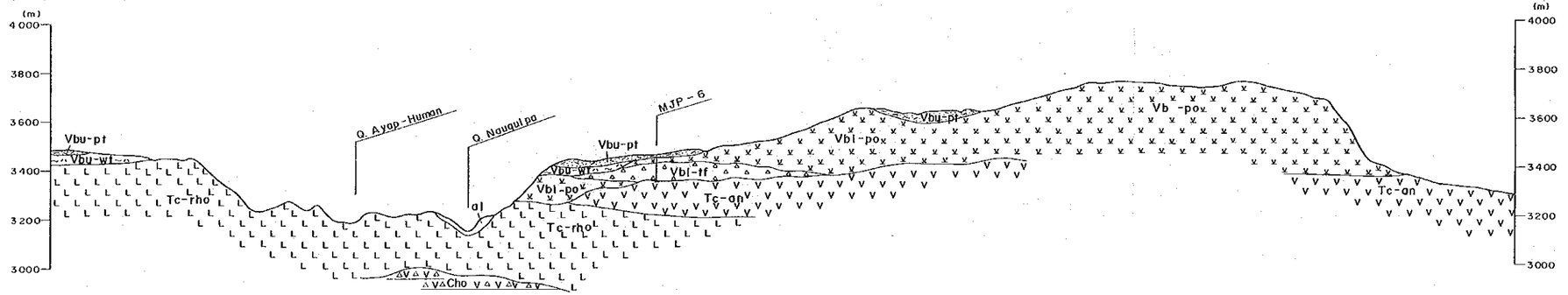
(N-S Section)

P3

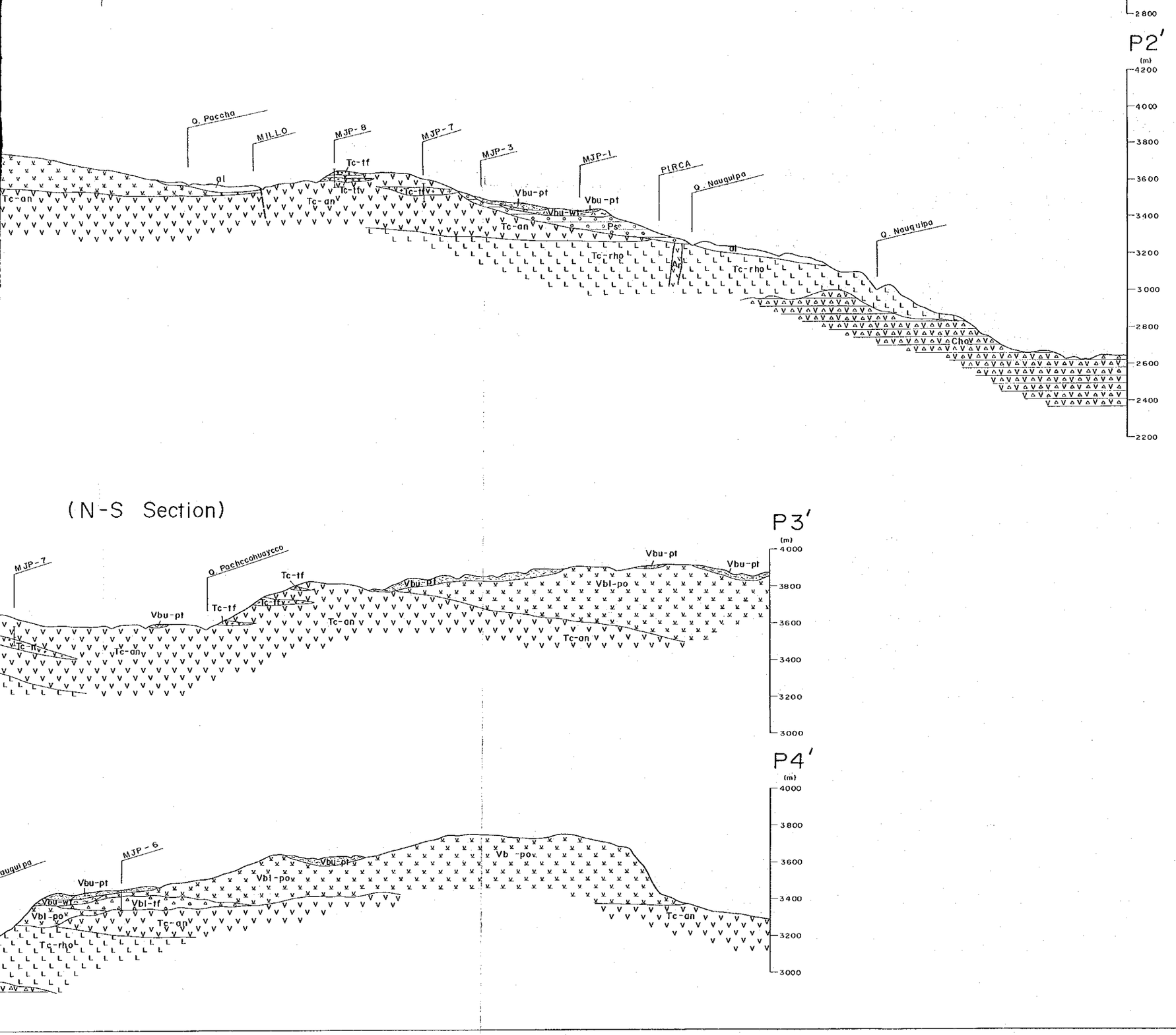


P3'

P4



P4'



P2′

(N-S Section)

P3′

P4′

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

Scale 1 : 10,000
0 0.5 1 km

LEGEND

Quaternary	Holocene	Alluvium and Talus	al	Gravel, sand, silt and clay
		Volcanic Sediments of Pausa	Vs-p	Volcanic ash and gravel
		Moraine Sediments	Mo	Gravel, sand and mud
	Pleistocene	Barroso Group, Upper Formation	Vbu-pt	Pumice fall and tuffaceous sand
			Vbu-wt	Dacite lava, dacitic tuff and welded tuff
			Vbl-an	Olivine basalt and pyroxene andesite lavas
		Barroso Group, Lower Formation	Vbl-tf	Andesitic tuff, lapilli tuff and tuff breccia
			Vbl-po	Hornblende andesite lava
		Pirca Sediments	Ps	Gravel, sand, silt and clay
Tertiary	Miocene	Tacaza Formation	Tc-tf	Andesitic tuff, lapilli tuff and tuff breccia
			Tc-an	Andesite lava with thin bedded tuff, lapilli tuff and tuff breccia
			Tc-rho	Rhyolite lava, tuff and lapilli tuff
	Jurassic	Chocolate Volcanic Rocks	Cho	Andesite lava, andesitic tuff and tuff breccia (partly green semischist)
		Intrusive rock, Dike	An	Hornblende andesite

Fault

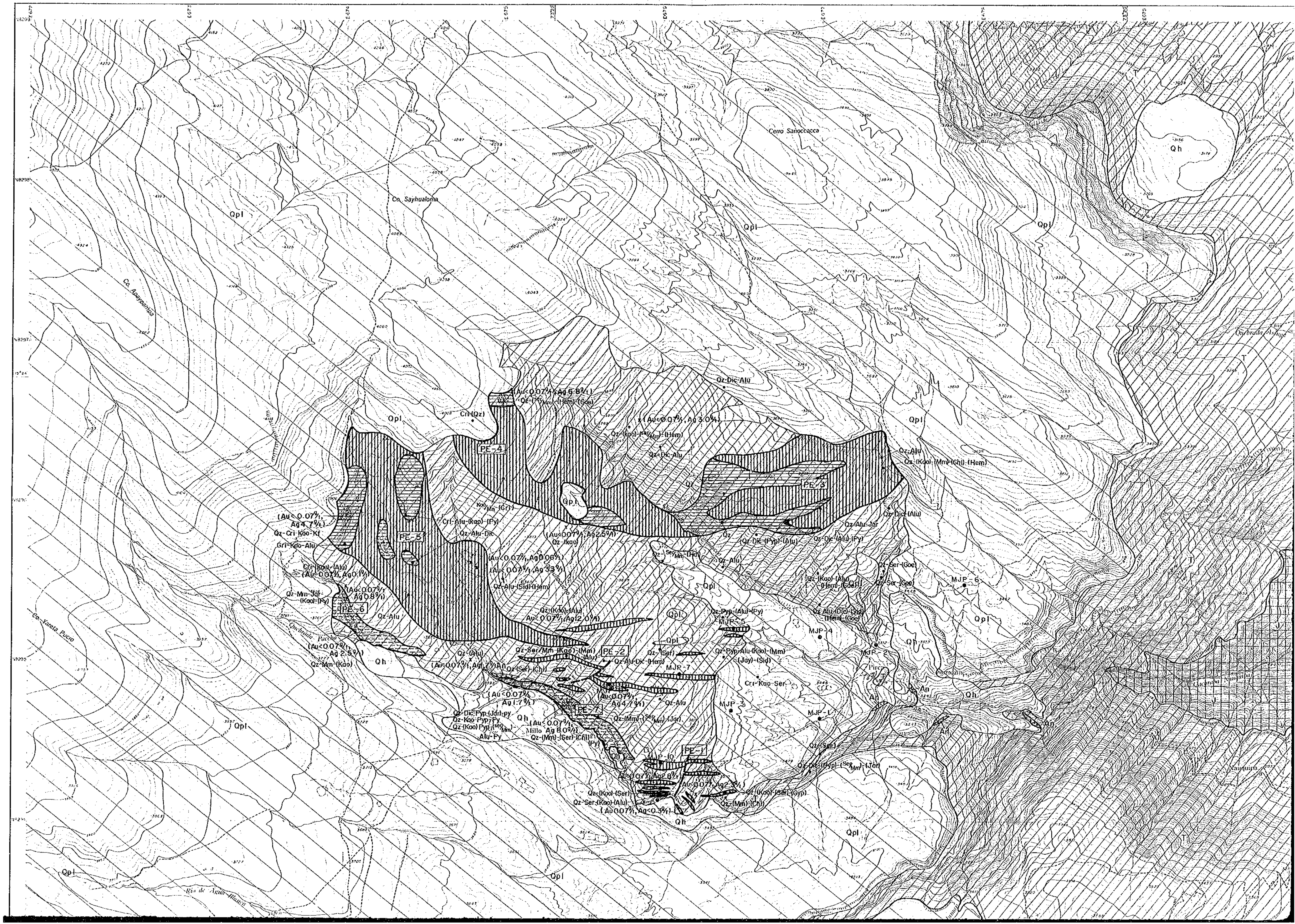
80 / 80 — Strike and dip of bedding

50 / 10 — Strike and dip of flow structure

80 / 15 — Strike and dip of joint

70 / 80 — Strike and dip of dike

MJP-1 — Location of drilling



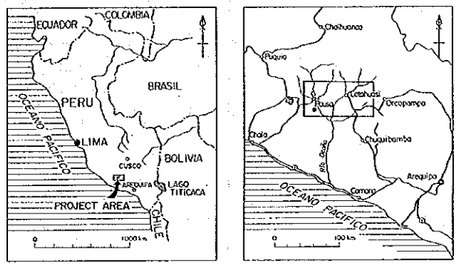
Cerro Sanoccacca
Co. Sayhualoma
Co. Apaypampa
Co. Yareta Pucro
Quebrada Puccho
Quebrada Asnaya
Quebrada Nuquina
Rio de Agua Blanca
Nauquina
Qpl
Qh
T
J
An
PE-1
PE-2
PE-3
PE-4
PE-5
PE-6
PE-7
MJP-1
MJP-2
MJP-3
MJP-4
MJP-5
MJP-6
MJP-7
Qz-Dic-Alu
(Au<0.07g/t, Ag 6.8g/t)
Qz-(Ser/Mm)-(Hem)-(Goe)
Cri-(Qz)
(Au<0.07g/t, Ag 3.0g/t)
Qz-(Kao)-(Ser/Mm)-(Hem)
Qz-Alu
Qz-(Kao)-(Mm)-(Chl)-(Hem)
Qz-Dic-(Alu)
Qz-Alu-Jar
Qz-Dic-(Alu)-(Py)
(Qz-Dic-(Pyp)-(Alu)
(Au<0.07g/t, Ag 4.7g/t)
Qz-Cri-Kao-Kf
Cri-Kao-Alu
Cri-(Kao)-(Alu)
(Au<0.07g/t, Ag 0.1g/t)
Qz-Mm-Jar-(Kao)-(Py)
(Au<0.07g/t, Ag 0.8g/t)
(Au<0.07g/t, Ag 2.5g/t)
Qz-Mm-(Kao)
Kao/Mm-(Cri)
Cri-Alu-(Kao)-(Py)
Qz-Alu-Dic
(Au<0.07g/t, Ag 2.5g/t)
Qz-(Kao)
(Au<0.07g/t, Ag 0.08g/t)
(Au<0.07g/t, Ag 3.3g/t)
Qz-Alu-(Sid)-(Hem)
Qz-(Ser/Mm)-(Hem)
Qz-(Kao)-(Alu)
Au<0.07g/t, Ag 12.0g/t)
Qz-Ser-(Goe)
Qz-(Kao)-(Alu)-(Hem)-(Goe)
Qz-Alu-(Dic)-(Sid)-(Hem)-(Goe)
Qz-Pyp-(Alu)-(Py)
Qz-Pyp-Alu-(Kao)-(Mm)-(Jay)-(Sid)
Qz-(Ser)
Qz-Alu-Dic-(Hem)
Qz-Ser/Mm-(Kao)-(Mm)-(Alu)
Qz-(Alu)
(Au<0.07g/t, Ag 1.7g/t)
Qz-(Ser)-(Chl)
Cri-Kao-Ser
(Au<0.07g/t, Ag 4.7g/t)
Qz-Dic-Pyp-(Jar)-py
Qz-Kao-Pyp-Py
Qz-(Kao)-Pyp-(Ser/Mm)-
Alu-Py
(Au<0.07g/t, Ag 8.0g/t)
Millo
Qz-(Mm)-(Ser)-(Chl)-(Py)
Qz-(Mm)-(Ser/Mm)-(Jar)
Au<0.07g/t, Ag 2.8g/t)
Au<0.07g/t, Ag 2.3g/t)
Qz-(Kao)-(Ser)
Qz-Ser-(Kao)-(Alu)
(Au 0.07g/t, Ag<0.3g/t)
Qz-(Kao)-(Ser)-(Gyp)
Qz-(Mm)-(Chl)
Qz-Dic-(Pyp)-(Ser/Mm)-(Jar)

PL 7

MINERAL EXPLORATION
IN
COTAHUASI AREA
(PHASE II)

LOCATION MAP OF ALTERATION AND MINERALIZATION ZONES OF THE PIRCA EASTERN AREA

LOCATION INDEX



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

Scale 1 : 10,000
0 0.5 1 km

LEGEND

Geological System

- Qh — Quaternary (Holocene) System
- Qpl — Quaternary (Pleistocene) System
- T — Tertiary System
- J — Jurassic System

Intrusive Rock

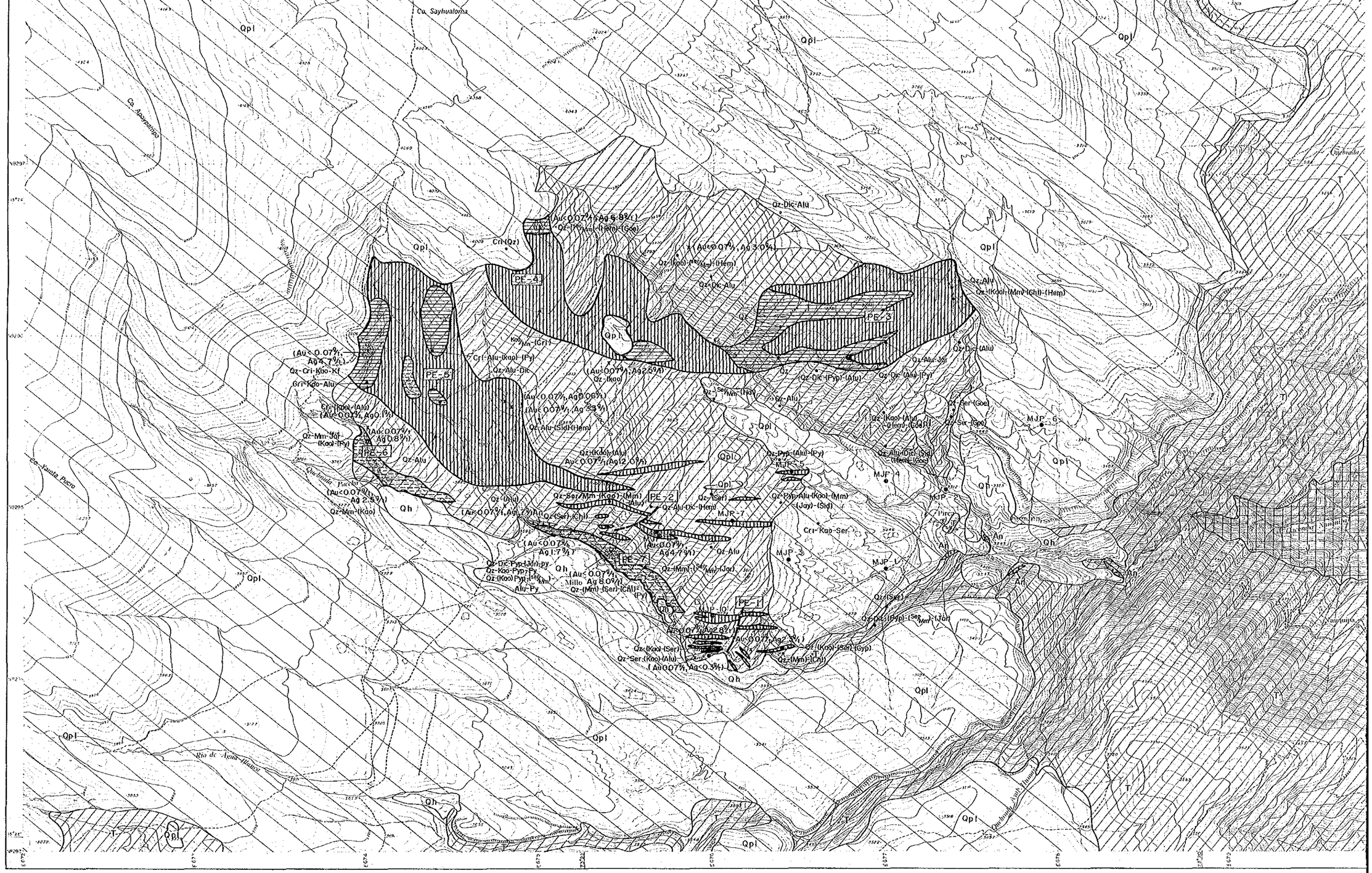
- An — Hornblende andesite
- Fault

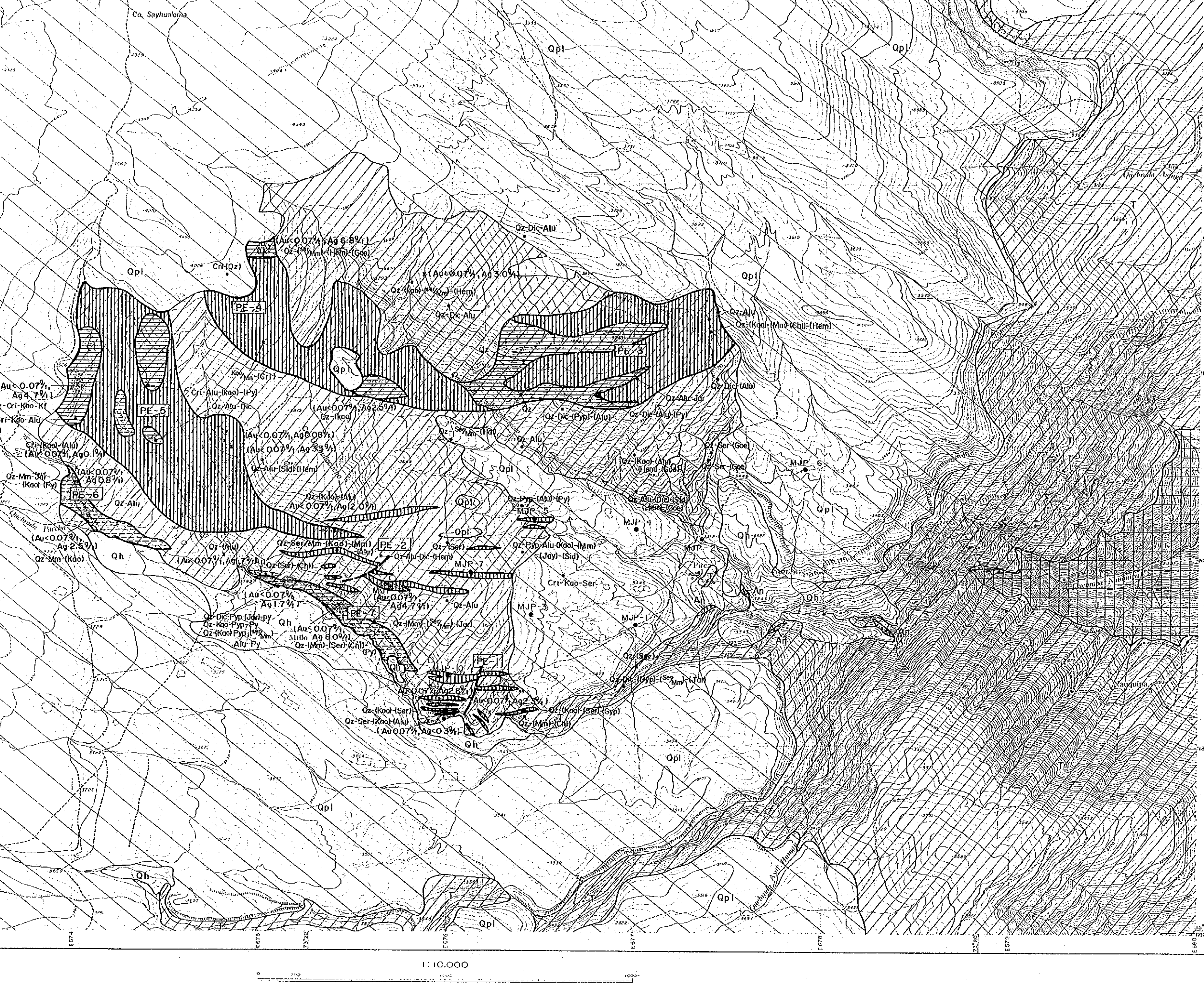
Alteration and Mineralization Zones

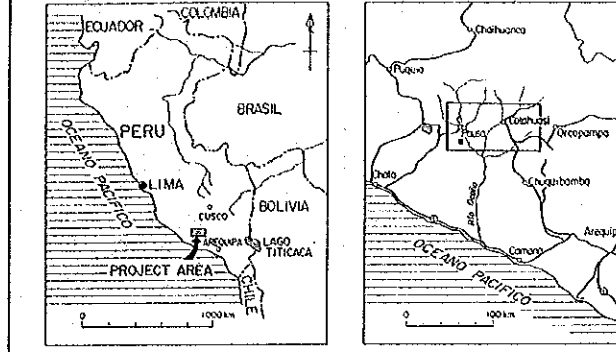
- Mainly silisification
- Silicification and argillization
- Mainly argillization
- Mineralization

Abbriviation

- Qz : quartz
- Kf : potasium feldsper
- Cri : α-cristbolite
- Hal : halloysite
- Kao : kaolinite
- Dic : dickite
- Pyp : pyrophyllite
- Mm : montmorillonite
- Ser : sericite
- Chl : chlorite
- Kao/Mm : kaolinite-montmorillonite mixed layer
- Ser/Mm : sericite-montmorillonite mixed layer
- Alu : alunite
- Jar : jarosite
- Gyp : gypsum
- Py : pyrite
- Hem : hematite
- Goe : goethite


Co. Sayhualoma
Co. Abayamba
Co. Yanata Puero
Qpl
Qh
T
Río de Agua Blanca
Quebrada Agua Tumana
Cri-(Qz)
PE-4
PE-3
PE-5
PE-6
PE-2
PE-7
PE-1
Qz-Dic-Alu
(Au<0.07%, Ag 6.8%)
Qz-(Py)-(Mn)-(Hem)-(Goe)
(Au<0.07%, Ag 3.0%)
Qz-(Kao)-(Mn)-(Hem)
Qz-Alu
Qz-(Kaol-(Mn)-(Chl))-(Hem)
Kao-(Mn)-(Cri)
Cri-Alu-(Kaol)-(Py)
(Au<0.07%, Ag 2.6%)
Qz-Alu-Dic
Qz-(Kao)
(Au<0.07%, Ag 8.0%)
(Au<0.07%, Ag 3.3%)
Qz-Alu-(Sid)-(Hem)
Qz-Dic-(Alu)
Qz-Dic-(Pyp)-(Alu)
Qz-Alu-Jar
Qz-Ser-(Goe)
Qz-(Kao)-(Alu)
-(Hem)-(Goe)
Qz-Alu-(Dic)-(Sid)
-(Hem)-(Kao)
Cri-Kao-Alu
(Au<0.07%, Ag 0.9%)
Qz-Mn-Kaol
(Kaol-Py)
(Au<0.07%, Ag 0.8%)
Qz-Alu
Qz-(Kao)-(Alu)
Au<0.07%, Ag 2.0%)
Qz-Pyp-(Alu)-(Py)
Alu-Py-5
Qz-(Ser)
Qz-Pyp-Alu-(Kao)-(Mm)
(Jay)-(Sid)
(Au<0.07%, Ag 2.5%)
Qz-Mn-(Kao)
Qz-Ser/Mn-(Kao)-(Mm)
(Alu)
Qz-Alu-Dic-(Hem)
Qz-(Alu)
(Au<0.07%, Ag 7.3%)-Qz-(Ser)-(Chl)
Cri-Kao-Ser
(Au<0.07%, Ag 1.7%)
(Au<0.07%, Ag 4.7%)
Qz-Alu
Qz-Dic-Pyp-(Jdn)-py
Qz-Kao-Pyp-Py
Qz-(Kao)-Pyp-(Py)
Alu-Py
(Au<0.07%, Ag 8.0%)
Qz-(Mn)-(Ser)-(Chl)-(Py)
Qz-(Mn)-(Ser)-(Jar)
Qz-Dic-(Pyp)-(Ser/Mn)-(Jar)
Qz-(Ser)
(Au<0.07%, Ag 2.8%)
Qz-(Kaol-(Ser)
Qz-Ser-(Kao)-(Alu)
(Au007%, Ag<0.3%)
Qz-(Kao)-(Ser)-(Gyp)
Qz-(Mn)-(Chl)
MJP-1
MJP-2
MJP-3
MJP-4
MJP-5
MJP-6
MJP-7
Pirca
Au
Ag
1 : 10.000
0
100
500
1000





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

Scale 1 : 10,000

0 — 0.5 — 1 km

LEGEND

Geological System

- Qh — Quaternary (Holocene) System
- Qpl — Quaternary (Pleistocene) System
- T — Tertiary System
- J — Jurassic System

Intrusive Rock

- An — Hornblende andesite
- Fault

Alteration and Mineralization Zones

- Mainly silisification
- Silicification and argillization
- Mainly argillization
- Mineralization

Abbriviatiom

- Qz : quartz
- Kf : potasium feldsper
- Cri : α-cristbalite
- Hal : halloysite
- Kao : koolinite
- Dic : dickite
- Pyp : pyrophyllite
- Mm : montmorillonite
- Ser : sericite
- Chl : chlorite
- Kao/Mm : kaolinite-montmorillonite mixed layer
- Ser/Mm : sericite-montmorillonite mixed layer
- Alu : alunite
- Jar : jarosite
- Gyp : gypsum
- Py : pyrite
- Hem : hematite
- Goe : goethite