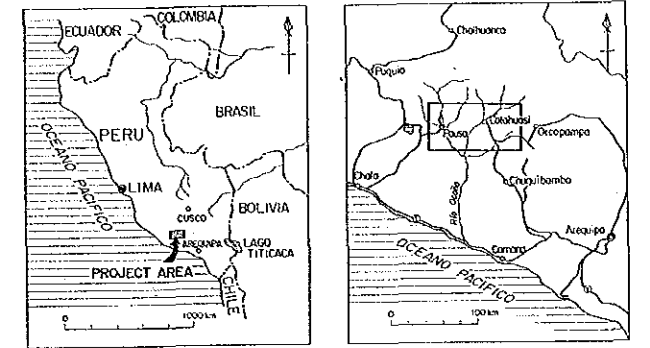


MINERAL EXPLORATION  
IN  
COTAHUASI AREA  
(PHASE I)

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### GEOLOGICAL MAP OF THE COTAHUASI AREA

LOCATION INDEX

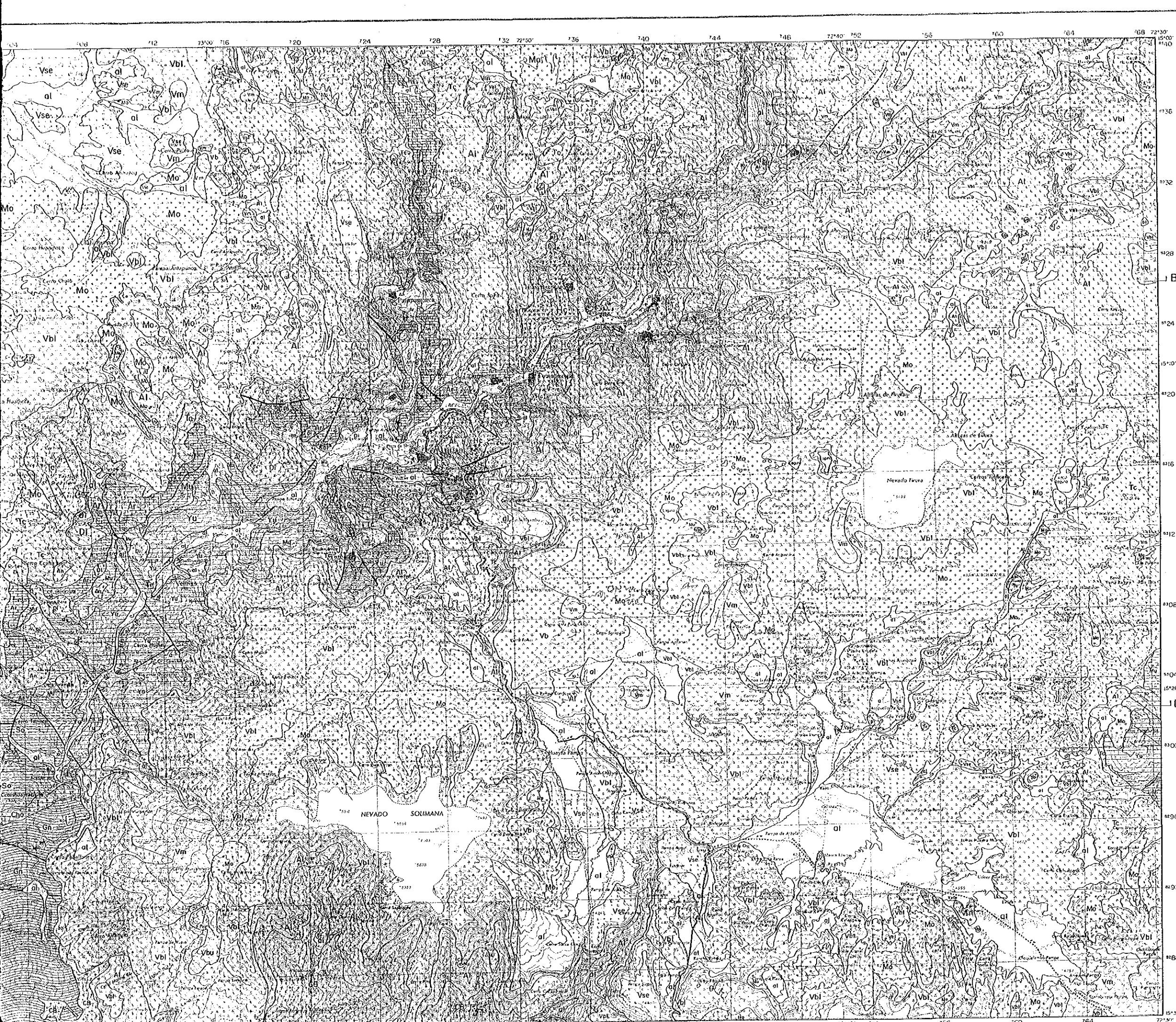


JAPAN INTERNATIONAL COOPERATION AGENCY  
METAL MINING AGENCY OF JAPAN  
INSTITUTO GEOLOGICO MINERO Y METALURGICO  
February 1986

Scale 1 : 100,000  
0 5 10km

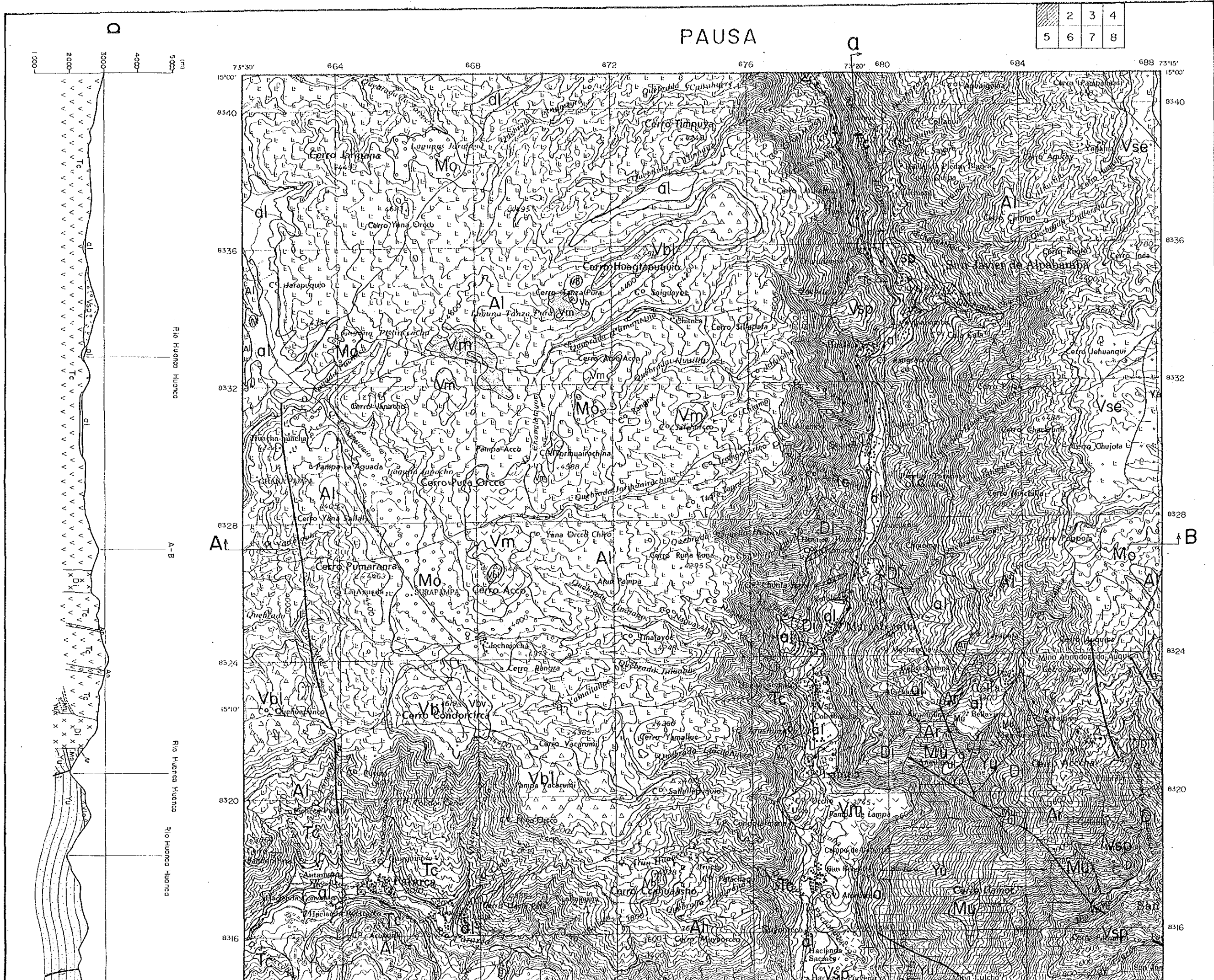
### LEGEND

|                  |                 |                            |                                       |  |   |
|------------------|-----------------|----------------------------|---------------------------------------|--|---|
| Cenozoic         | Quaternary      | Alluvium                   | al                                    | Sand, mud and gravel   |   |
|                  |                 | Mollebamba Volcanic Rocks  | Vm                                    | Andesite lava and volcanic ash   |   |
|                  |                 | Volcanic Sediment of Pauso | Vsp                                   | Volcanic ash, sand and gravel  |   |
|                  |                 | Lampa Volcanic Rocks       | Vlo                                   | Andesite (basaltic), volcanic breccia  |   |
|                  | Pleistocene     | Moraine Sediment           | Mo                                    | Gravel, sand and mud   |   |
|                  |                 | Barroso Group              | Upper                                 | Vb1  | Acidic tuff   |
|                  | Lower           |                            | Vb2                                   | Andesite lava and pyroclastic rocks  |   |
|                  | Tertiary        | Pliocene                   | Sencca Volcanic Rocks                 | Vsc  | Hornblende-biotite dacite lava, welded tuff and tuff  |
|                  |                 |                            | Huaylillas Formation                  | Hy   | Dacitic tuff (partly pumice bearing)  |
|                  |                 | Miocene                    | Alpabamba Formation                   | Ala  | Dacitic tuff, lapilli tuff, tuff breccia and welded tuff (partly with dacite lava or andesite lava) |
| Tacaza Formation |                 |                            | Vtc                                   | Andesitic tuff breccia, Andesite, tuff and dacitic tuff breccia (greenish grey)        |   |
| Huanca Formation |                 |                            | Vhc                                   | Andesitic volcanic conglomerate, tuff breccia and tuffaceous sandstone (greenish grey) |   |
| Mesozoic         | Cretaceous      | Arcurquina Formation       | Arq                                   | Limestone and marl with sandstone and chert nodule                                     |   |
|                  |                 | Murco Formation            | Mu                                    | Red shale and sandstone with gypsum bearing conglomerate                               |   |
|                  | Jurassic        | Yura Group                 | Yu                                    | Quartzite, siliceous sandstone, black shale and alternation of quartzite and shale     |   |
|                  |                 | Socosani Formation         | So                                    | Black shale, limestone with sandstone and tuff   |   |
|                  |                 | Chocolate volcanic rocks   | Cho                                   | Andesitic tuff breccia, tuff, andesite and tuffaceous sandstone                        |   |
| Precambrian      |                 | Gn                         | Gneiss, gneissose granite and diorite |  |   |
| Tertiary         | Intrusive Rocks | Stock and Dyke             | VvAn                                  | Hornblende andesite, andesite  |   |
|                  |                 | Accha Stock                | VvDi                                  | Diorite and quartz diorite   |   |









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| 2 | 3 | 4 |
| 5 | 6 | 7 |
| 8 |   |   |



MINERAL EXPLORATION  
IN  
COTAHUASI AREA  
(PHASE I)

GEOLOGICAL MAP OF  
THE REGIONAL SURROUNDINGS  
(1)

LOCATION INDEX

JAPAN INTERNATIONAL COOPERATION  
METAL MINING AGENCY OF JAPAN  
INSTITUTO GEOLOGICO MINERO DE PERU  
February 1986

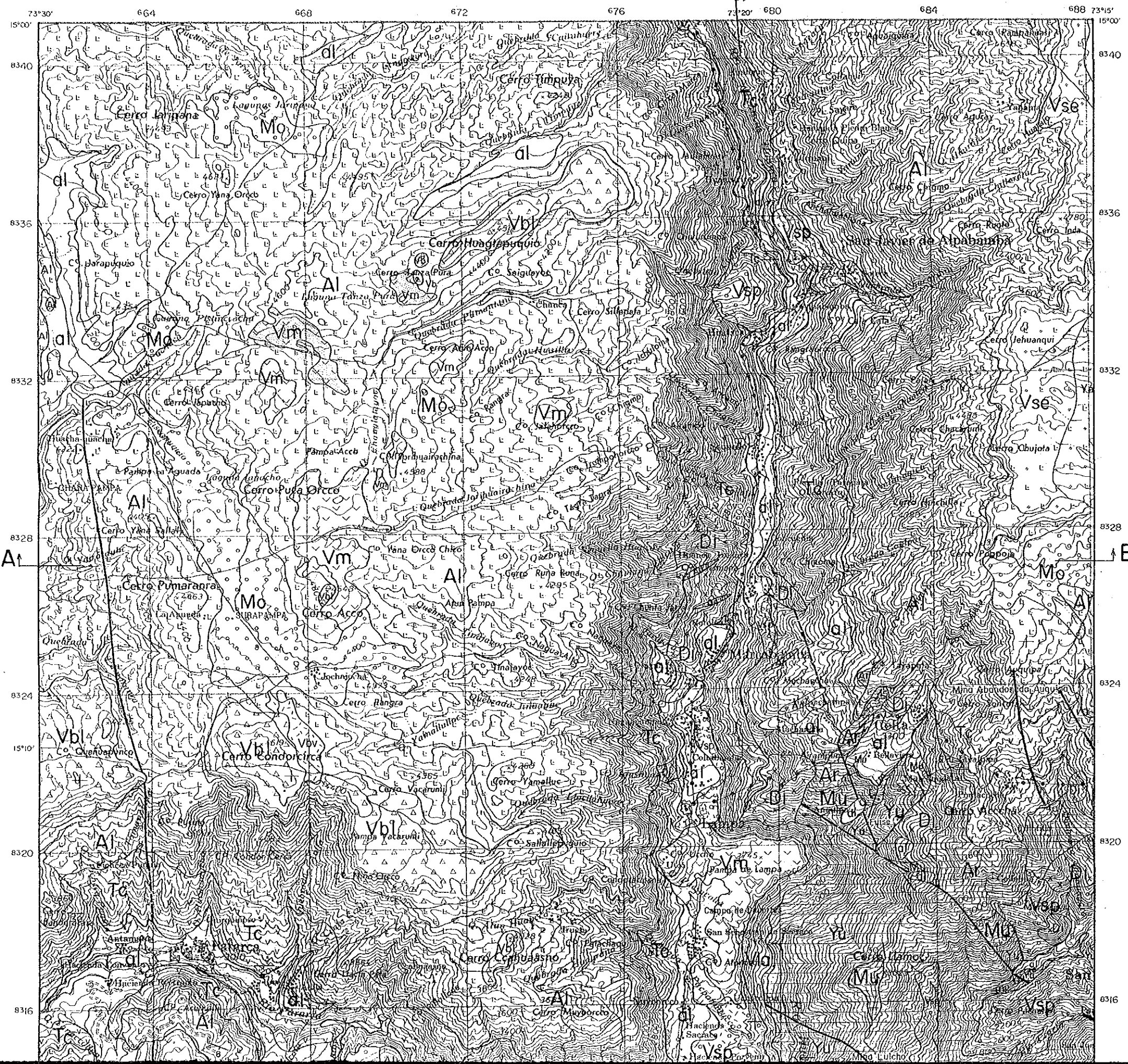
Scale 1 : 50,000

LEGEND

|                  |                          |                      |                            |                          |   |             |
|------------------|--------------------------|----------------------|----------------------------|--------------------------|---|-------------|
| Cenozoic         | Quaternary               | Holocene             | Alluvium                   | al                       | Sand, mud   |             |
|                  |                          | Holocene             | Mollebamba Volcanic Rocks  | Vm                       | Andesite  |             |
|                  |                          |                      | Volcanic Sediment of Pausa | Vsp                      | Volcanic  |             |
|                  |                          | Pleistocene          | Lampa Volcanic Rocks       | Vla                      | Andesite  |             |
|                  | Moraine Sediment         |                      | Mo                         | Gravel, sand             |   |             |
|                  | Tertiary                 | Pliocene             | Borroso Group              | Upper                    | Vbu   | Acidic tuff |
|                  |                          |                      |                            | Lower                    | Vbl   | Andesite    |
|                  |                          | Pliocene             | Senca Volcanic Rocks       | Vse                      | Hornblende welded tuff                              |             |
|                  |                          |                      | Huayllillas Formation      | Hy                       | Dacitic tuff  |             |
|                  |                          |                      | Alpabamba Formation        | Al                       | Dacitic tuff and welded tuff (partly with andesite) |             |
| Tacaza Formation |                          |                      | Tc                         | Andesitic and dacitic    |   |             |
| Cretaceous       | Paleocene                | Huancra Formation    | Hc                         | Andesitic and tuffaceous |   |             |
|                  |                          | Arcurquina Formation | Ar                         | Limestone and chert      |   |             |
|                  | Cretaceous               | Murco Formation      | Mu                         | Red shale bearing coals  |   |             |
|                  |                          | Yura Group           | Yu                         | Quartzite, and altered   |   |             |
| Jurassic         | Sacosani Formation       | So                   | Black shale                |                          |   |             |
|                  | Chocolate volcanic rocks | Cho                  | Andesitic tuffaceous       |                          |   |             |
| Precambrian      |                          | Gn                   | Gneiss, granite            |                          |   |             |
| Intrusive Rocks  |                          |                      | Stock and Dyke             | Vv                       | Hornblende  |             |

# PAUSA

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|---|---|---|
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| 5 | 6 | 7 |




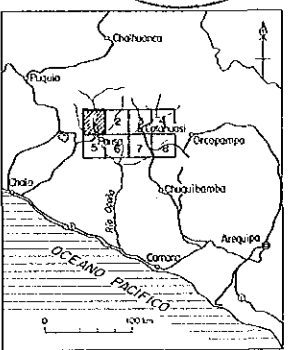
PL. 3-(1)

MINERAL EXPLORATION  
IN  
COTAHUASI AREA  
(PHASE I)

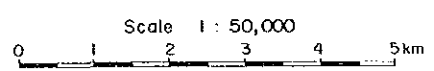
## GEOLOGICAL MAP OF THE REGIONAL SURVEY AREA (1)

(1) 国際協力事業団  
15147  
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LOCATION INDEX

JAPAN INTERNATIONAL COOPERATION AGENCY  
METAL MINING AGENCY OF JAPAN  
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February 1986



### LEGEND

|                  |                          |                            |   |  |                                     |   |
|------------------|--------------------------|----------------------------|---|--|-------------------------------------|---|
| Quaternary       | Holocene                 | Alluvium                   | ai  | Sand, mud and gravel   |                                     |   |
|                  |                          | Mollebamba Volcanic Rocks  | vvm   | Andesite lava and volcanic ash   |                                     |   |
|                  |                          | Volcanic Sediment of Pausa | ovosp   | Volcanic ash, sand and gravel  |                                     |   |
|                  |                          | Lampo Volcanic Rocks       | avla  | Andesite (basaltic), volcanic breccia  |                                     |   |
|                  | Cenozoic                 | Pleistocene                | Moraine Sediment  | omo  | Gravel, sand and mud                |   |
|                  |                          |                            | Barroso Group   | Upper  | vbu                                 | Acidic tuff   |
|                  |                          | Lower                      |   | vbl  | Andesite lava and pyroclastic rocks |   |
|                  |                          | Tertiary                   | Pliocene  | Sencca Volcanic Rocks  | lvse                                | Hornblende-biotite dacite lava, welded tuff and tuff  |
|                  |                          |                            |   | Huayllillas Formation  | hy                                  | Dacitic tuff (partly pumice bearing)  |
|                  |                          |                            | Miocene   | Alpabamba Formation  | lal                                 | Dacitic tuff, lapilli tuff, tuff breccia and welded tuff (partly with dacite lava or andesite lava) |
| Tacaza Formation | vtc                      |                            |   | Andesitic tuff breccia, Andesite, tuff and dacitic tuff breccia (greenish grey)        |                                     |   |
| Mesozoic         | Cretaceous               | Huanca Formation           | vhc   | Andesitic volcanic conglomerate, tuff breccia and tuffaceous sandstone (greenish grey) |                                     |   |
|                  |                          | Arcurquina Formation       | arc   | Limestone and marl with sandstone and chert nodule                                     |                                     |   |
|                  | Jurassic                 | Murco Formation            | mu  | Red shale and sandstone with gypsum bearing conglomerate                               |                                     |   |
|                  |                          | Yura Group                 | yu  | Quartzite, siliceous sandstone, black shale and alternation of quartzite and shale     |                                     |   |
| Precambrian      | Socosani Formation       | so                         | Black shale, limestone with sandstone and tuff                  |  |                                     |   |
|                  | Chocolate volcanic rocks | cho                        | Andesitic tuff breccia, tuff, andesite and tuffaceous sandstone |  |                                     |   |
|                  | Gneiss                   | gn                         | Gneiss, gneissose granite and diorite                           |  |                                     |   |
| Intrusive Rocks  |                          | Stock and Dyke             | vvan  | Hornblende andesite, andesite  |                                     |   |



