FEASIBILITY REPORT

on

PIEDRA AMARILLA

to

C.S.I. Ag.

LOCATION AND BACKGROUND

Chile's 3rd Region or Atacama Region has historically been the second most important region in terms of mineral production, trailing only the 2nd Region in annual output of mineral commodities.

Copiapo, capital of the Atacama Region, was the first city founded in Chile, in 1536, and it's mining roots go back hundreds of years. Copiapo is an indigenous Indian word which literally means "gold cup". The first Spaniards obtained gold from hundreds of veins and workings in the nearby mountains.

During the 1800's, a huge silver strike was made about 40 miles south at Chanarcillo, and the first large commercial mining operation in Chile was initiated. Chanarcillo would eventually become the world's 3rd largest silver producer, and sale of silver bullion exceeded two hundred million dollars. Adjusting to today's metal prices and indexing for inflation would mean that Chanarcillo produced billions of dollars in silver bullion.

The first railroad in Latin America was constructed from Copiapo to Caldera, where a port was constructed for shipment of silver ore and bullion. Additional rail lines were constructed from Chanarcillo to the Copiapo river, where high grade ore was shipped for milling. Although the mine eventually played out in the late 1880's, many of the miners stayed on in the area and worked small prospects of copper and gold.

A number of small copper operations were initiated prior to World War 1, the most notable being the mines and smelter at Canto de Agua, about 60 miles south of Copiapo. High grade veins of copper, averaging more than 20% copper (using a cutoff grade of 8%) were mined at Cerro Blanco and Canto de Agua. Ore was shipped by wagon to the crude smelter where a rough dore was produced, which averaged > 80% copper and 4 to 5 lbs of gold and silver per ton of dore. The smelted dore was shipped to U.S. buyers for refining.

Most of the small mining operations in the region ceased during World War 1, except for the nitrate operations in the second region. This continued a cycle of boom and bust, wherein local mining activity was largely tied to world economic conditions and demand.

Towards the end of World War 1, Andes Copper Company began construction of the Potrerillos copper complex. This included engineering of the open pit mine, construction of ore processing and smelter facilities, and construction of a port facility at Chanaral to handle imports of fuel oil and copper exports. This was one of the first major construction projects undertaken in the world following construction of the Panama Canal in 1914 and initiation of the hostilities of World War 1 the same year. The scale of the mining project at Potrerillos, its remoteness, and the general lack of infrastructure in the region made this one of the great engineering feats in mining history, and is a credit to the "can do" attitude of American engineering in its heyday.

During the 1950's, a number of small copper projects were started in the region, due in part to strong copper prices. Some of these remain in operation today, and include the operation of Sali Hochschild, San Rafael, San Jose, and others. The projects have expanded and contracted along with market conditions over the last 40 years. The Chilean government agency ENAMI, or Empresa Nacional de Mineria, constructed a smelter and refinery at Paipote, some 5 miles south of Copiapo, to handle production from these small producers, and currently buys from dozens of smaller mills which may each produce a ton of concentrate a day.

In the late 1950's, the ore grades at the Potrerillos mine began to decline. A portion of the mine slumped, covering the ore body with millions of tons of rubble. Andes Copper had decided to abandon the mine, but discovered a large porphyry at Indio Muerto, some 30 kilometers distance. A concentrating plant was built, and ore extracted underground. Concentrates are piped to the railway at Llanta, and shipped to Potrerillos for refining. The grateful miners named the mine El Salvador, literally "The Savior".

Declining copper prices during the 1970's and early 1980's put the region in a prolonged recession. Adoption of a new mining code in 1983, which guaranteed ownership rights by foreigners brought most of the world's major mining companies into the area by 1985. A partial list of some of these companies and projects either in production or in the engineering stage can be found in Table 1.

Completion of construction on the Candelaria project in 1994 will permit the Copiapo - El Salvador area to produce 324,000 metric tons of copper per year. Gold production in the area currently stands at 382,000 troy ounces per year, but could increase to as much as 962,000 ounces per year should the projects slated for development actually go into production. Cominco was attempting to sell its interests in the Lobo and Marte mines because of metallurgical problems encountered with heap-leaching at high altitudes and higher than expected sulfide content in the ore.

The Refugio mine has large tonnage reserves but a relatively modest grade, and may not go into production until there is an improvement in metal prices. The La Pepa mine was briefly in production during 1990, but ran into organizational problems within the consortium.

TABLE 1

MAJOR MINING OPERATIONS - COPIAPO DISTRICT

Mine Location	Company	Minerals	Annual Production
El Salvador-Potrerillos	Codelco (Chile)	Copper Gold	130,000 mt 17,000 tr oz
El Hueso	Homestake (USA)	Gold	75,000 tr oz
La Coipa	TVX/Placer Dome (Brazil,Canada)	Gold/Silver	200,000 tr oz (Au equivelent)
Marte	Cominco/Anglo Amer. (Canada,S.Africa)	Gold	150,000 tr oz
Lobo	Cominco/Anglo Amer.	Gold	200,000 tr oz
Refugio	Bema Gold (USA)	Gold	200,000 tr oz
La Pepa	(Consortium)	Gold	30,000 tr oz
Candelaria	Phelps Dodge (USA)	Copper Gold	110,000 mt 80,000 tr oz
Ojos del Salado	Phelps Dodge	Copper	24,400 mt
Paipote	ENAMI (Chile)	Copper Gold	60,000 mt 10,000 tr oz
Designed Annual Production:		Copper Gold	324,000 mt 962,000 tr oz

Other important ore districts which are undergoing evaluation include Tinajas, Esperanza, and Pantanillo.

Mineral Properties.

C.S.I. Ag has been actively prospecting in the Copiapo area since 1986. Most of the exploration efforts have been centered in a remote area known as the Piedra Parada Salar, an enclosed drainage basin located some 250 kilometers northeast of Copiapo. A number of important mineral properties have been constituted, and are known collectively as the Piedra Amarilla properties, which means "yellow stone", and refers to the outcrops of native sulfur found on the mineral properties.

The Piedra Parada Salar is found at 26o 20' S latitude and 68o 45' W longitude. The salar is bordered by two large volcanic ranges to the south, the Cuyanos and Sierra Nevada ranges, which reach up to 6,000 meters in elevation.

The Claudio Gay range borders to the west, and consists of ryolitic volcanics of late Permian age, the oldest volcanics in the 3rd region. The range is largely composed of remnants of two large caldera type features, wherein the volcanics either subsided or eroded into caldera structures.

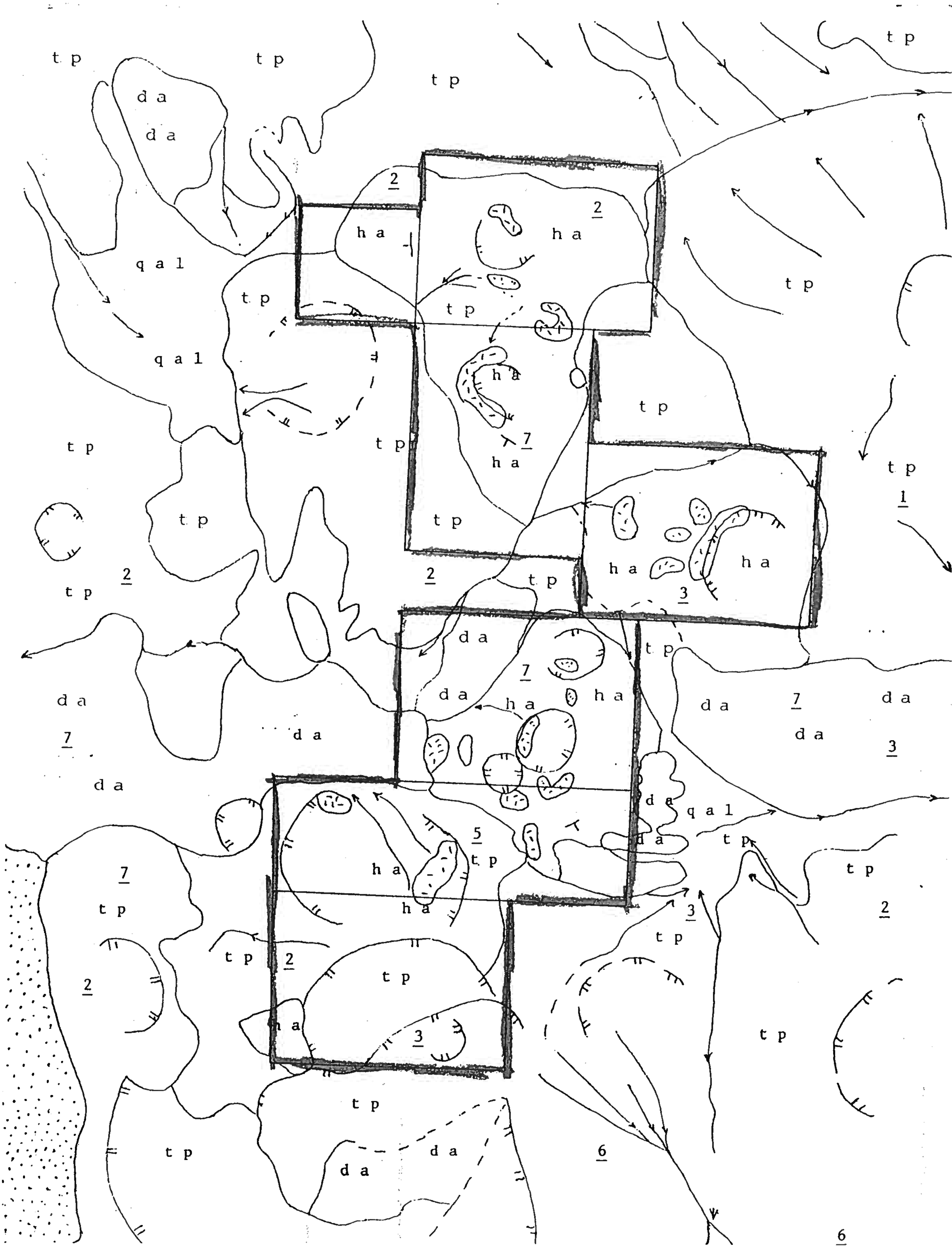
The Piedra Amarilla properties form the eastern border of the Piedra Parada Basin. The properties lie only a few kilometers from the Argentina border.

Prior to the exploration activities by C.S.I., there were no constituted mineral properties in the Piedra Parada area. The Piedra Amarilla properties were initially claimed in August of 1987 and have been fully constituted since May of 1990. A number of large mining companies have claimed exploration properties in the general area, but none of these have been fully constituted. Some of these companies are Phelps Dodge, Anglo American, Goldfields, Codelco, and Cyprus Mines.

The first access roads near the Piedra Parada Salar were built by Andes Copper during the 1920's. A pumping station and aqueduct were constructed at La Ola, and water from the Rio Leoncito was pumped to Potrerillos for use in ore beneficiation. A modest recreational area was developed at the Rio Negro hot springs for use by mining personnel.

Andes Copper geologists studied the Cuyanos range in the late 1920's while searching for native sulfur. Old reports indicate blocked out sulfur reserves of 500,000 metric tons, grading 50% sulfur. Two adits were driven into the caliche, and a few hundred tons of high grade sulfur were extracted for use in copper refining. The adits and remnants of an old mining camp are still visible.

Codelco began exploration activities north of the Salar about 1985. An access road was built to the Panteon de Aliste area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and extended northward to the Azufrera Tres Puntas. Portions of the Tres Puntas formation were trenched, and Codelco claimed several properties from the Tres Puntas area eastward to the Agua de Morales formation.

In 1986, Codelco constructed a road partway up the southern half of the Cuyanos range, and initiated a drilling program. Codelco also drilled a small formation near the Agua de la Falda range just to the south of the Cuyanos range.

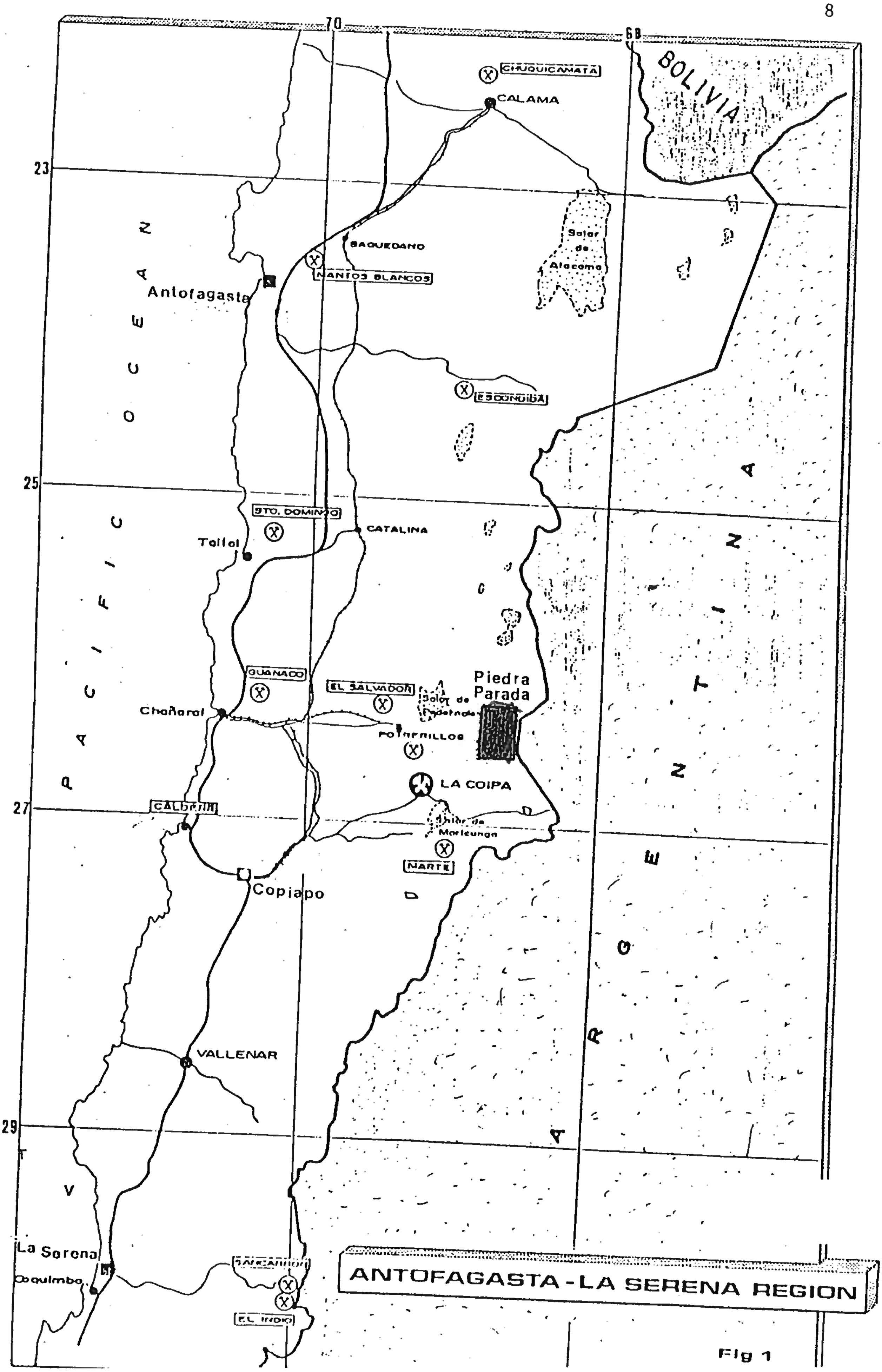
During the last part of 1987 and 1988, Anglo American carried out an extensive geo-chemical sampling program throughout the Piedra Parada Salar area. Several areas were identified as altered anomalies and were claimed as exploration properties.

Several claims were filed on the Carolina properties and portions of the Piedra Amarilla properties, but C.S.I. had filed much earlier and Anglo American had to abandon their claims. Anglo still has substantial exploration properties throughout the basin. As a courtesy to C.S.I., lab results from 196 samples covering much of the basin area were made available on an unofficial basis by certain Anglo exploration personnel.

A list of the constituted mineral properties owned by C.S.I. in the Piedra Parada area are listed below:

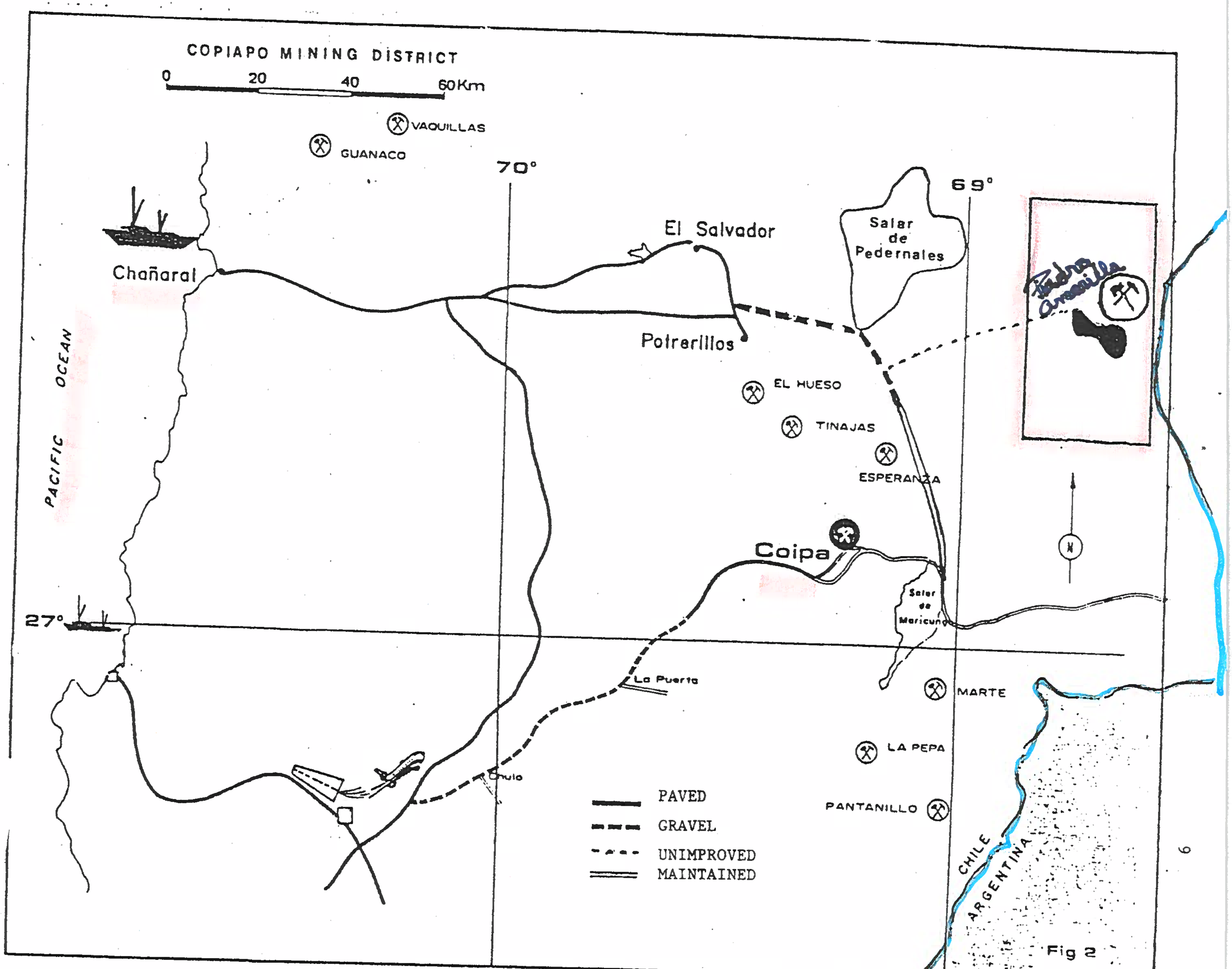
1. Piedra Amarilla 41
   300 hectacres
2. Piedra Amarilla 71
   288 hectacres
3. Piedra Amarilla 101
   300 hectacres
4. Piedra Amarilla 131
   300 hectacres
5. Piedra Amarilla 161
   300 hectacres
6. Piedra Amarilla 191
   300 hectacres
7. Piedra Amarilla 221
   300 hectacres
8. Piedra Amarilla 251
   300 hectacres
9. Piedra Amarilla 281
   100 hectacres
10. Carolina 1
    200 hectacres
11. Carolina 21
    200 hectacres

The properties total some 2,888 hectacres, or 7,191 acres. Properties 3 - 9 are contiguous and comprise about two thirds of the total land amount. Properties 4, 5, 7, and 8 have been extensively studied during the pre-feasibility stage and contain the bulk of the information discovered in the geological and metallurgical studies.



ANTOFAGASTA - LA SERENA REGION

Fig 1



COPIAPO MINING DISTRICT
0
20
40
60Km
VAQUILLAS
GUANACO
70°
69°
27°
Chañaral
El Salvador
Potrerillos
Salar de Pedernales
EL HUESO
TINAJAS
ESPERANZA
Coipa
Salar de Maricun
La Puerta
MARTE
LA PEPA
PANTANILLO
PACIFIC OCEAN
CHILE
ARGENTINA
PAVED
GRAVEL
UNIMPROVED
MAINTAINED
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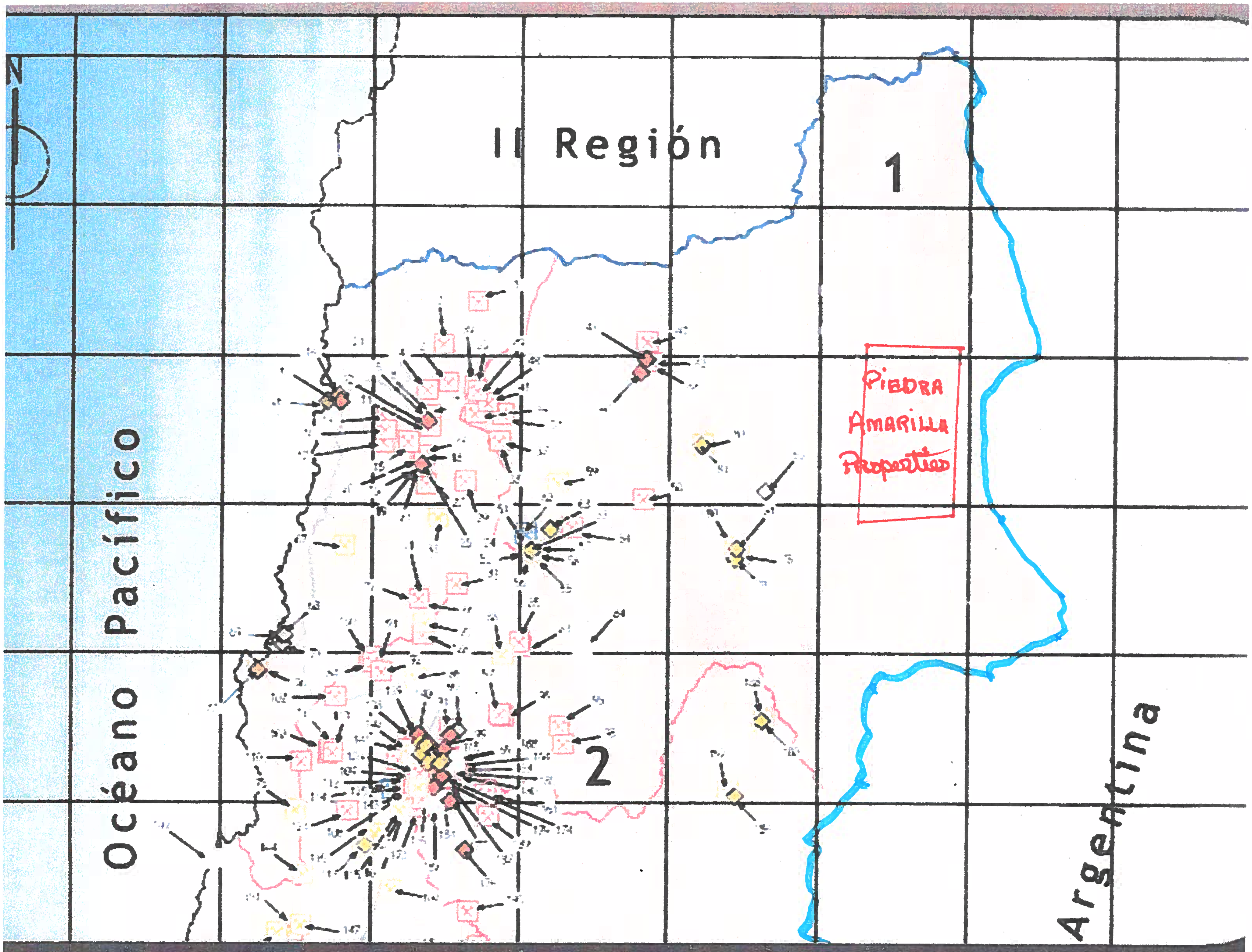
Fig 2



II Región
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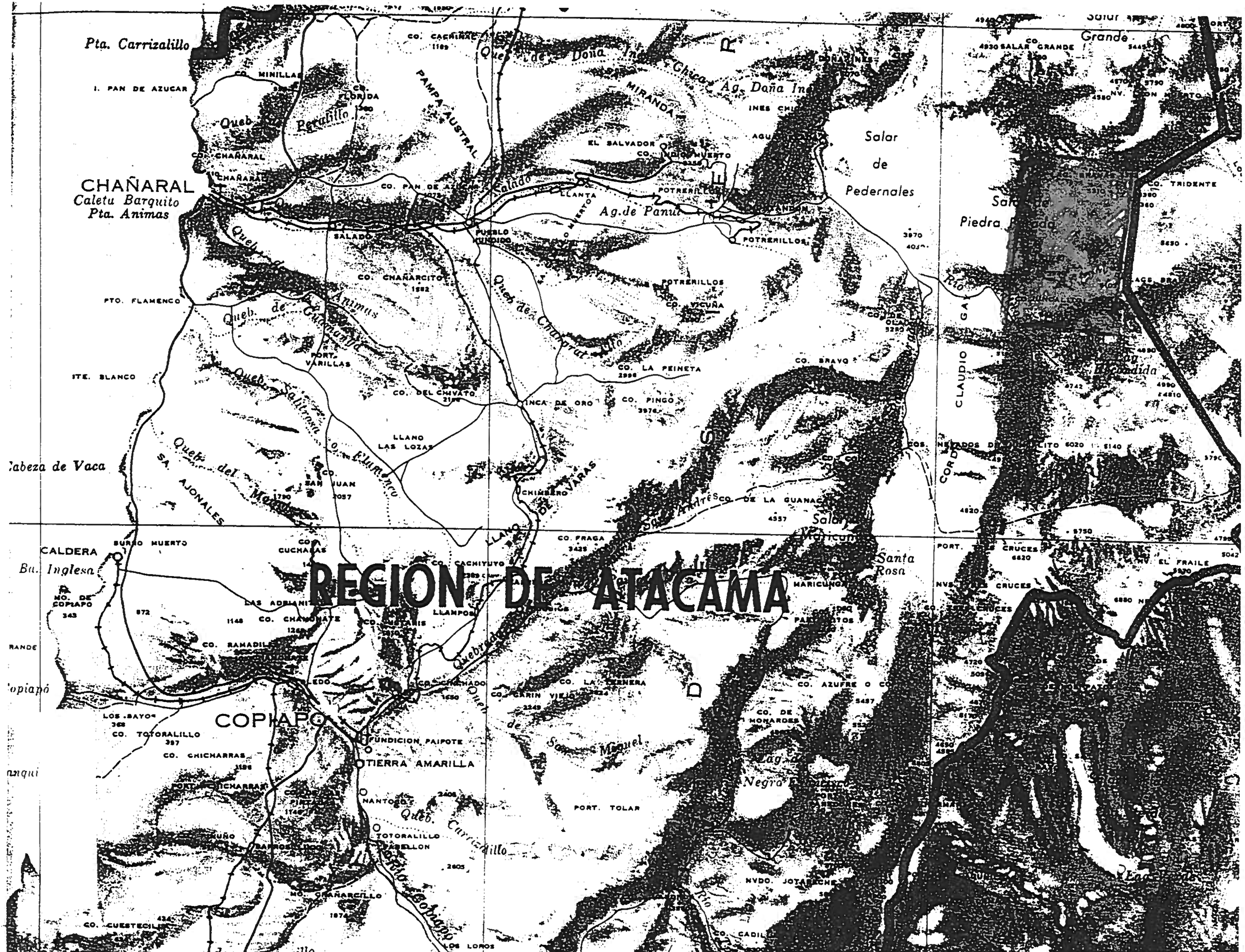
AMARILLA
Properties
2
Océano Pacífico
Argentina
N


REGION DE ATACAMA
Pta. Carrizalillo
I. PAN DE AZUCAR
CHAÑARAL
Caleta Barquito
Pta. Animas
PTO. FLAMENCO
PAMPA AUSTRAL
EL SALVADOR
POTRERILLOS
Salar de Pedernales
Salar de Piedra Pomez
LLANO LAS LOZAS
SA. AJONALES
CALDERA
Ba. Inglesa
COPIAPO
FUNDICION PAIPOTE
TIERRA AMARILLA
Santa Rosa
Salar Maricunga
CO. LA PEINETA
CO. BRAVO
CO. DE LA GUANACA
CO. AZUFRE O COPIAPO
PORT. TOLAR
CLAUDIO GAY
Quebrada de Chañaral
Queb. de Doña Inés Chica
Ag. Doña Inés
Queb. de Chañaral Alto
Queb. de San Miguel
Queb. Carrizalillo
Río Copiapó
Lag. Negro Francisco
Cabeza de Vaca

REGIONAL GEOLOGICAL INTERPRETATIONS

A regional geologic map on a scale of 1:1,000,000 and covering the northern third of the Atacama region is shown in figure RG-1. (Mercado, 1979) Major geological features run north to south, such as the Atacama fault system, morphological units such as granitic extrusions, volcanic systems, and so on.

Elevational increases are from west to east, with a general decrease in the age of morphological units from west to east.

Drainage of the coastal, interior basins and pre-cordillera areas is from east to west, while the cordillera areas are mostly confined to closed basins with drainage running largely from south to north.

The plutonic magma orogen in this portion of the central Andes is greatly influenced in the Pacific ocean along the Atacama Trench, where the Pacific "Nazca" tectonic plate collides with the continental or "South American" plate. The Nazca plate dives underneath the continental plate, forming a very deep offshore trench, reaching 8,000 meters in depth, the deepest ocean trench in all of the Americas. The Atacama Trench extends from Antofagasta to Caldera.

As a result of the tectonic collision, the continental plate has been lifted upward through constant block faulting. The plates grind laterally across each other, with the upward faulting of the continental plate producing seismic activity. The supression of the Nazca plate causes tremendous friction and pressures, and causes portions of the orogen to melt into magmatic material.

Geographical Units.

The portion of the Chilean Andes from the Pacific Ocean to the Argentina border as shown in figure RG-1 can be subdivided into four distinct geographical units:

1. The coastal ranges, which parellel the coast and reach inland some 70 kilometers, from roughly 70o to 70o 45' W. These ranges may reach 1,500 meters in elevation, but are for the most part less than 1,000 meters above sea level.

2. The interior ranges which are found between 69o 30' to 70o W. These ranges are below 3,000 meters in the northern portion of the region, but reach elevations of 4,500 meters at 27o S latitude.

3. The pre-cordillera, found between 69o and 69o 30' W. These ranges are generally between 3,000 to 4,000 meters in elevation, although the southern portion of the pre-cordillera at 27o S latitude has several peaks over 5,000 meters.

4. The cordillera, found between 68o and 69o W. The cordillera is generally above 4,000 meters in elevation, with several volcanic peaks over 6,000 meters.

- Coastal Ranges -

The coastal ranges can be subdivided into four distinct geological units.

a) The coastal mountains which are adjacent to the ocean consist of granitic extrusions and sediments, both of paleozoic age, and which are interspersed along the coastline, having an approximate width of some 25 kms. Great blocks of granite and sediments have been uplifted by block faulting action related to the subduction of the Nazca plate. These blocks were subsequently cut by erosion from storm runoff and drainage from the interior basins. These mountains fall precipitously towards the coastline, with some slopes > 50 degrees. Few if any economic mineral deposits of any consequence have been located within these paleozoic formations.

b) Bordering the paleozoic formations is a granitic extrusive body of upper Jurassic age, which forms the western boundary or edge of the Atacama fault system. The Jurassic system varies in width, from 10 to 20 kms. A number of copper deposits are found along the fault, characterized by a deep oxide zone and low gold values. Mineralization is generally confined to deposition within vein and dike channel-ways with little dissemination within the granitic host-rock, although in some areas repeated intrusions of hydrothermal fluid has caused formation of deep stocks.

c) A granitic extrusive body of Cretaceous age forms the eastern boundary or edge of the Atacama fault system. This system is severely cut by d) volcanics of lower Cretaceous age, which were the catalysts for the introduction of the mineralized fluids along the fault system. Mineralized deposits along the eastern portion of the Atacama fault system are characterized by shallow oxide copper zone and higher gold values. The mines at Carrizalillo and Las Bombas are indicative of this type of mineralization.

d) Volcanics of lower Cretaceous age, which intrude the granitic body of the same period and extend eastward some 30 kms. A number of silver bearing deposits were exploited during the 19th century in this area. Within these volcanics were also found many of the iron ore deposits which were exploited during the 1950's and 1960's.

- Interior Ranges -

The northern portion of the interior ranges are dominated by volcanics of upper Cretaceous to lower Tertiary age. These ranges are separated from the coastal ranges by a central basin covered with deep Tertiary sediments. The large copper porphyries at Potrerillos and El Salvador were found along contact zones related to these volcanics.

The southern portion of the interior ranges are dominated by volcanics of Jurassic age. Some minor gold deposits have been found and exploited within these volcanics near Inca de Oro.

- Pre-cordillera -

The pre-cordillera is dominated by volcanics of middle to upper Tertiary age, interspersed and atop of marine sediments, largely metamorphosed, of Jurassic age. Some splendid gold deposits have been discovered along the contact zones between these formations, including the Coipa deposit, the El Hueso deposit, the Tinajas deposit, and the Esperanza deposit. Some large granitic blocks of Paleozoic age are found among the marine sediments.

- Cordillera -

The cordillera is dominated by volcanics of very late Tertiary to early Quaternary age. The western edge of these volcanics border volcanics of late Paleozoic to early Permian age. Granitic blocks of Paleozoic age appear in the southern portions of these formations. Only in the last few years have any extensive explorations been undertaken in the cordillera regions. The large gold deposits at Marte, Lobo, and Pantanillo have been found in these Quaternary volcanic formations.

A number of large mining companies are currently prospecting this area of the cordillera and have filed extensive claims. These include, Cyprus Mines, Phelps Dodge, Anglo American, Cominco, Goldfields, Placer Dome, Codelco, and others.

ENAP and a consortium of international petroleum companies extensively drilled the basin around the Salar de Pedernales. Although showings of natural gas were found, they were apparently not of economic importance. The drilling logs of ENAP would be of help in understanding the geological formations in the area and their inter-relationships.

TABLE 4

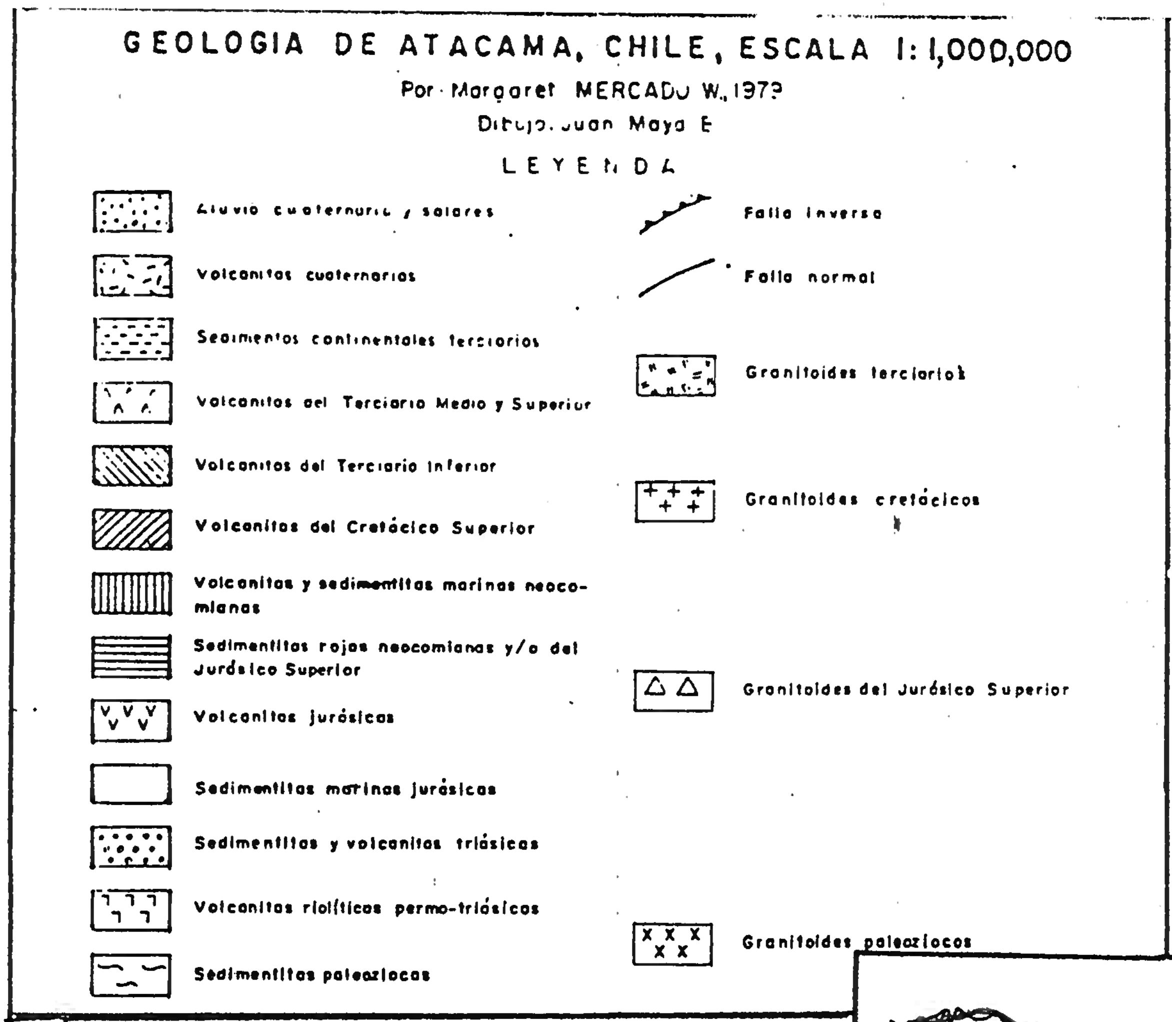
MINERAL RESOURCE CLASSIFICATION SYSTEMS

U. S. BUREAU OF MINES

- Measured.- Reserves or resources for which tonnage is computed from dimensions revealed in outcrops, trenches, workings, and drill holes and for which the grade is computed from the results of detailed sampling. The sites for inspection, sampling, and measurement are spaced so closely and the geologic character is so well defined that size, shape, and mineral content are well established. The computed tonnage and grade are judged to be acurate within limits which are stated, and no such limit is judged to be different from the computed tonnage or grade by more than 20 percent.

- Indicated.- Reserves or resources for which tonnage and grade are computed partly from specific measurements, samples, or production data and partly from projection for a reasonable distance on geologic evidence. The sites available for inspection, measurement, and sampling are too widely or otherwise inappropriately spaced to permit the mineral bodies to be outlined completely or the grade established throughout.

- Inferred.- Reserves or resources for which quantitative estimates are based largely on broad knowledge of the geologic character of the deposit and for which there are few, if any, samples or measurements. The estimates are based on an assumed continuity or repetition, of which there is geologic evidence; this evidence may include comparison with deposits of similar type. Bodies that are completely concealed may be included if there is specific geology evidence of their presence. Estimates of inferred reserves or resources should include a statement of the specific limits within which the inferred material may lie.



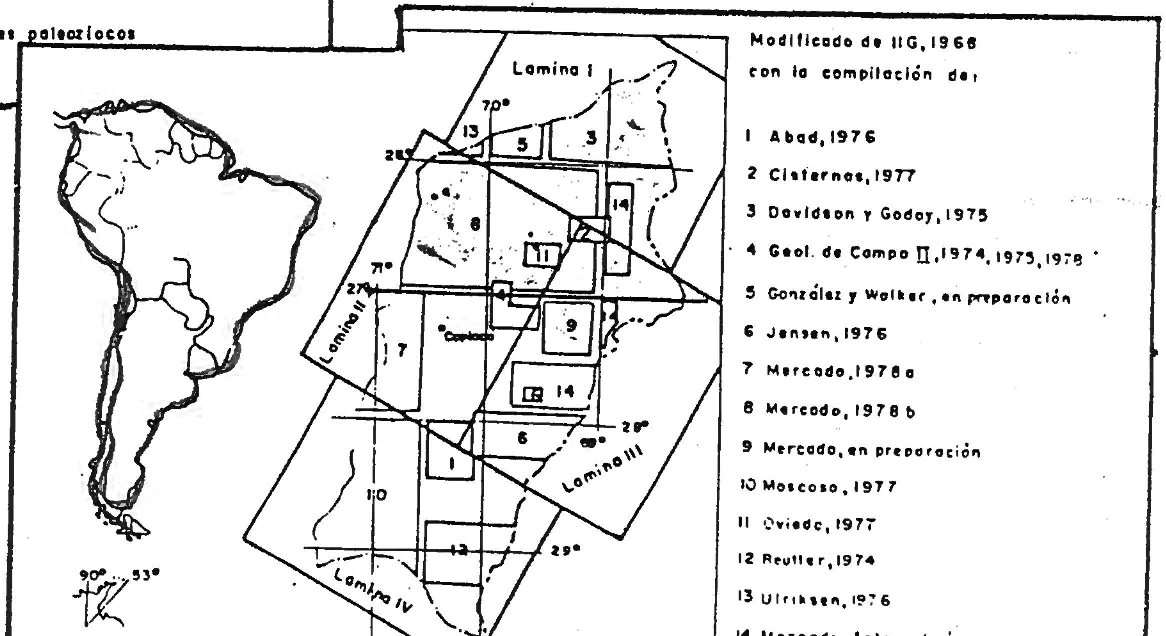


Figure A

REGIONAL GEOLOGY
NORTHERN ATACAMA REGION

LOCAL GEOLOGY

There are no detailed geological studies of the Piedra Parada Basin area. Available information such as that shown by Mercado is skeletal, (figure RG-1) and based on black and white aerial photography taken by SAF (Servicio Aereo Fotografico), a branch of the Chilean Air Force. These photographs are generally on a scale of 1:50,000 - 1:60,000.

SAF produces high quality topographical maps, on scales of 1:250,000 and 1:50,000. Minexco senior geologist Carlos Ulriksen has mapped all of the geological features of the Piedra Parada Basin area on a scale of 1:50,000. Although the geological mapping is preliminary and lacks some of the detail of mapping done on bigger scales, such as 1:10,000, it was deemed sufficient for the needs of this pre-feasibility study.

Minexco was able to obtain color aerial photographs of the basin on a scale of 1:40,000. Photocopies of these aerial photos are shown in figures 4-7. These cover the Piedra Amarilla and Carolina mineral properties. Minexco has additional color aerials which cover approximately 1500 km2 of the basin area. The aerials, which are available for study at Minexco's offices in Santiago, were the basis of the geological interpretations by Ulriksen. Aids used for geological interpretation include the following:

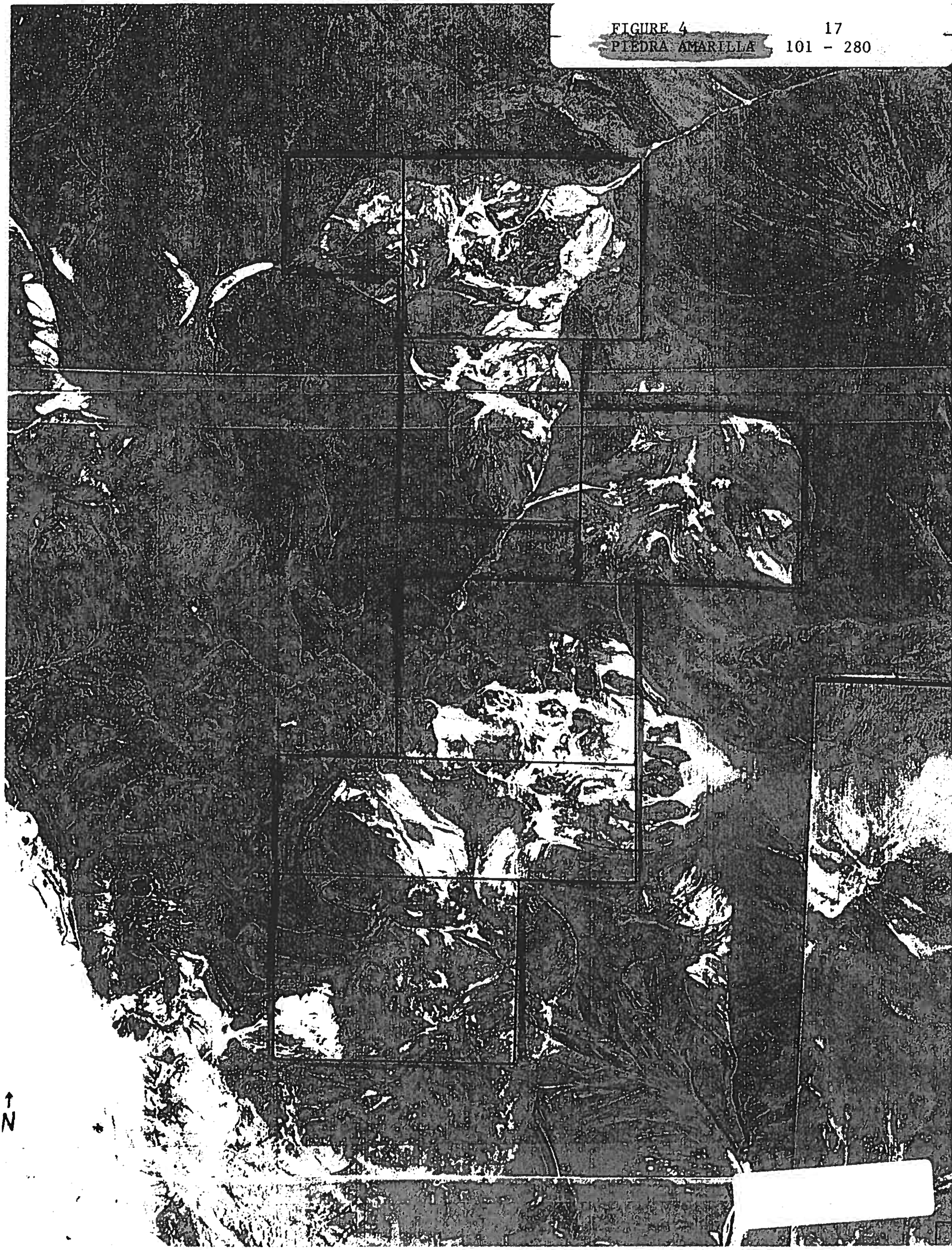
Landsat photographs, black and white, infrared - scale 1:250,000
45 SAF aerial photographs, black and white - scale 1:60,000
78 aerial photographs, color - scale 1:40,000
El Salvador and Laguna Verde maps - scale 1:250,000
Laguna Brava, Panteon de Aliste, Rio Juncalito, La Ola, Cerros Colorados, and Cerro Leon Muerto maps - scale 1:50,000

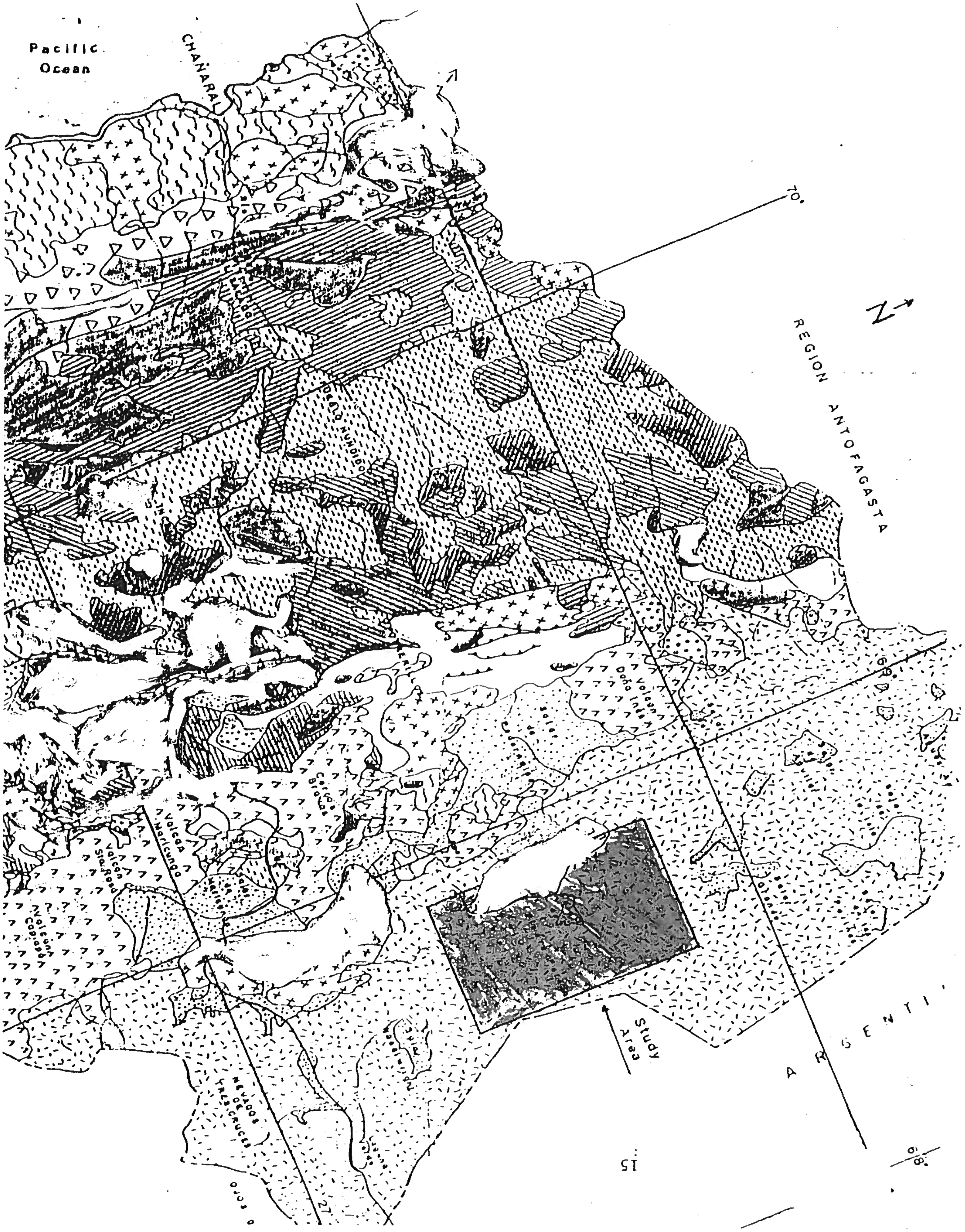
Geological aids were combined with a number of field trips to the Piedra Parada basin area during 1988. The geological work done to date is only the first step and forms the basis of detailed field work which should be carried out during feasibility studies.

Volcanics.

The majority of the volcanics in the Piedra Parada area are of dacitic and of dacitic-andesitic composition, (intermediate chemistry) characterized by modest or low iron content, and dominant quart silica content. Most of these volcanics are believed to have originated from a large granitic batholith of Paleozoic age. The batholith is exposed as occasional laccoliths along the entire cordillera of the 3rd Region, with a greater preponderance of exposed laccoliths found along the border with Argentina in the southern half of the Region.

FIGURE 4 17
PIEDRA AMARILLA 101 - 280




Pacific Ocean
CHAÑARAL
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REGION ANTOFAGASTA
69°
Volcan Doña Inés
Cerros Bravos
Volcan Copiapo
Volcan Sta. Rosa
NEVADOS DE TRES CRUCES
Study Area
A R G E N T I
68°
27

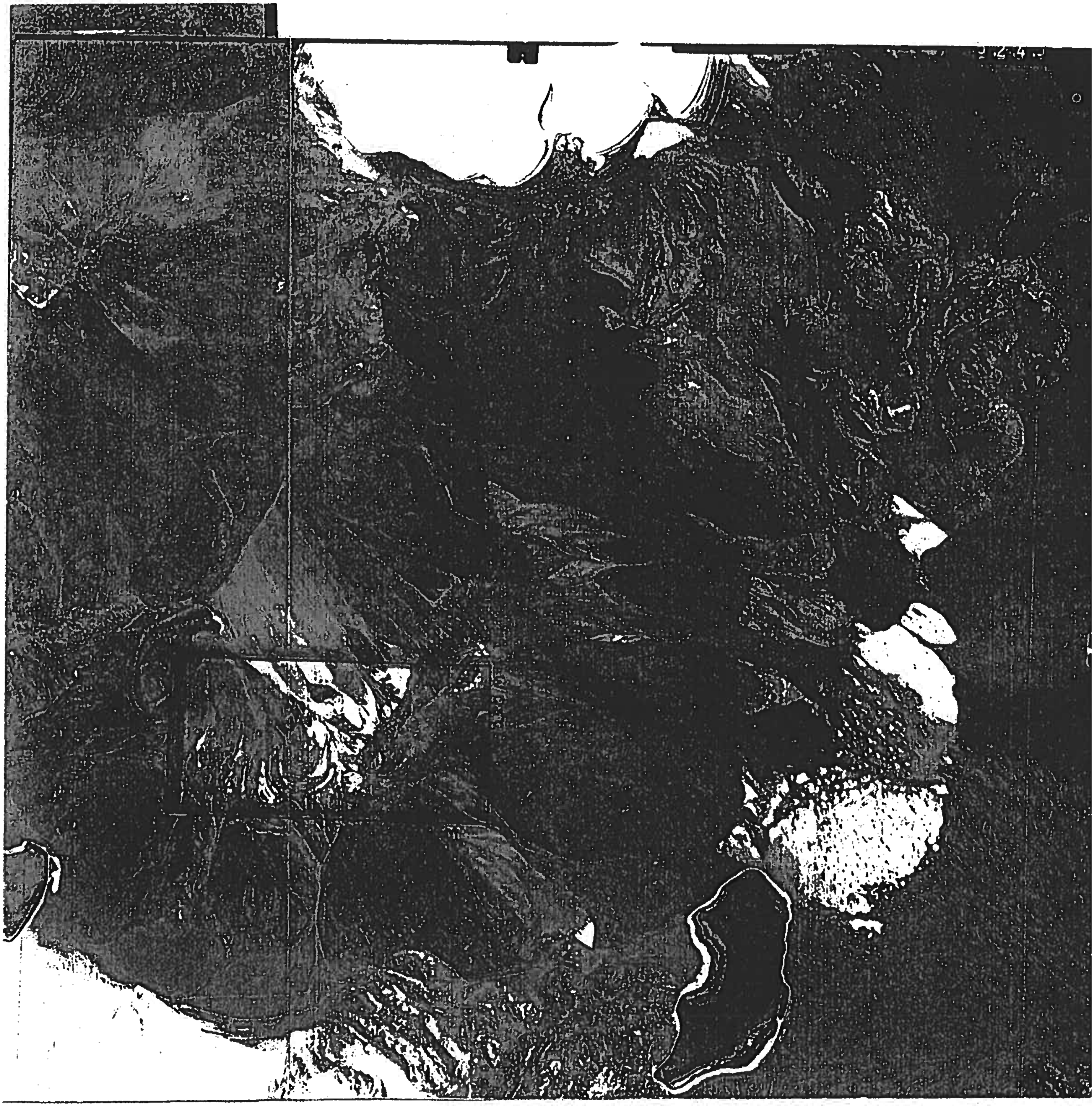
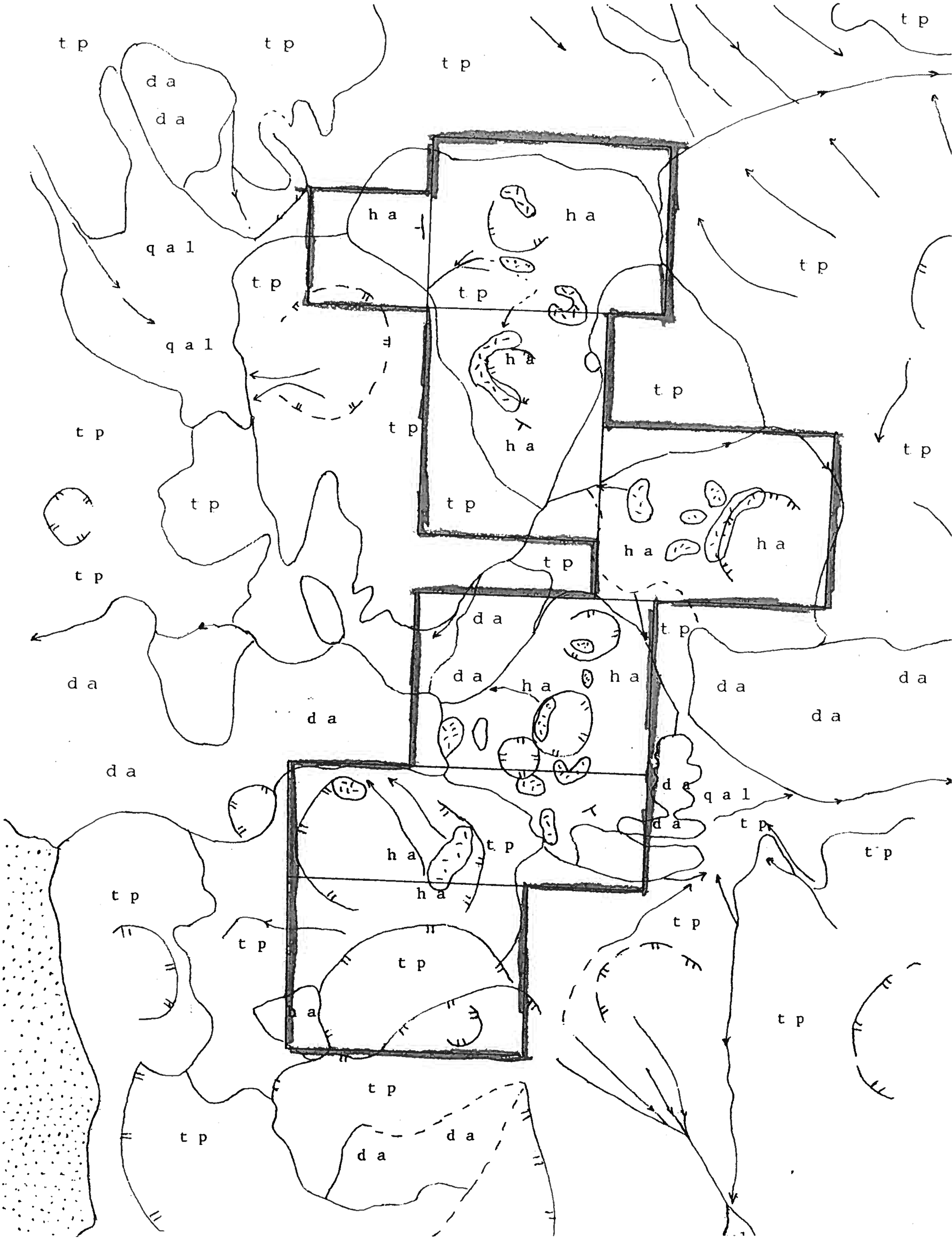


FIGURE 5 PIEDRA AMARILLA '71

FIGURE 6
PIEDRA AMARILLA 41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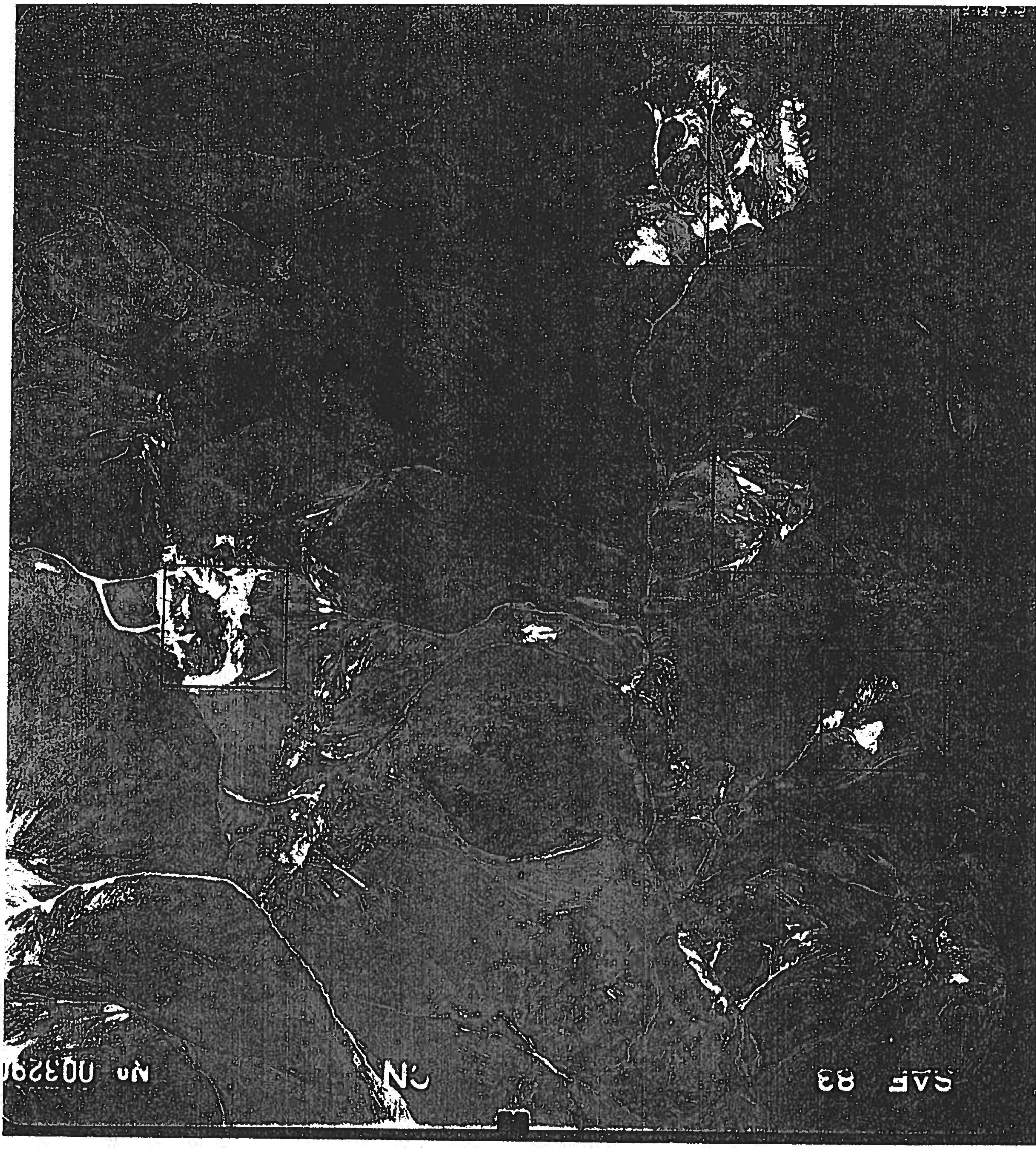


FIGURE 7 CAROLINA 1 - 20

The batholith in the Piedra Parada area and northward is believed to have undergone a process known as isostatic compensation, in which the lower portions of the batholith sank to sufficient depth to melt the components into mass magma. The melting of the lower portions of the batholith were aided by the friction and pressures created by the subduction of the Nazca plate under the continental plate.

During the late Tertiary and early Quaternary ages, the mass magma surfaced through deep faults and cracks, largely as ash, lapilli, and small volcanic blocks, and forming the volcanic structures found in the basin today. The Permian volcanics of the adjacent Claudio Gay range are believed to have formed in a similar fashion, but at a much earlier time period.

The lack of basaltic flows, which contain a higher iron content and predominate in some of the other areas of Chile, would seem to eliminate primary magma as the source of the Piedra Parada volcanics.

Age.

No rock dating has been done to determine the specific formative ages of the different volcanic episodes within the basin. Mercado (figure RG-1) shows a preponderance of Quaternary volcanics. Field observations by Ulriksen indicate that many of these structures are probably much older, from at least late Tertiary times.

Ulriksen constructed a relative time scale, found in figure 8, which shows different periods of volcanic activity relative to one another in the main property group of the Piedra Amarilla properties. As can be seen in the aerial photographs, many of the older features in the basin were changed or reworked by the continuous introduction over a substantial period of time of newer volcanics.

It is common to observe these newer volcanics partially covering older structures. A check with the Chilean National Mining Service and other records indicates that there are no active volcanoes in this area of Chile.

Volcanic types.

The volcanoes within the Piedra Parada Basin can be generally classified into two different categories, strato-volcanoes and cinder cones.

1. Strato-volcanoes are the dominant structures in terms of individual mass and height within the basin area. These consist of alternating layers of pyroclastic material and lava flows. The volcanic slopes are steep at the top, exceeding 30 degrees.

PIEDRA AMARILLA PROPERTIES

RELATIVE TIME SCALE

q a l	Quaternary Alluvium
	Piedra Parada Salar and Alluvial Scarps of Interbedded Sediments

- Volcanics -

1 - Youngest Volcanic Formations

7 - Oldest Volcanic Formations

Inferred Age of volcanics -

Late Tertiary to Early and Middle Quaternary

Scale = 1:40,000. Geology by Carlos Ulriksen G. 1988

Slopes at the bottom of strato-volcanoes are modest. The layered strata are indicative of cyclical changes in the nature of the eruptions. The strato-volcanoes found in the southern half of the basin, such as those which compose the Cuyanos and Sierra Nevada ranges, have a greater proportion of lava flows than the those found in the northern portions of the basin. The Panteon de Aliste and Cerros Colorados formations, for example, are more evenly built by alternating layers of pyroclastic ejecta and lava flows.

2. Cinder cone volcanoes are common throughout the middle areas of the basin, and are formed largely from tephra or ejecta in the form of ash, dust, lapilli, and larger volcanic blocks. These are blown out of the fissures of the volcanic conduit by high pressure gasses as pyroclastic material. Lava flows are rare or intermittent and comprise a much smaller portion of the total volcanic material.

The pyroclastic material has compacted into breccia tuffs near the volcanic cones or conduits, and into finer tuffs away from the cones. These tuffs are often layered, indicating cyclical deposition of pyroclastic material. The Piedra Amarilla properties largely consist of cinder cone volcanoes. A more thorough understanding of the formative volcanic processes is necessary in order to comprehend the mineralization of these formations.

The cinder cone volcanics which comprise the Piedra Amarilla properties have been chemically altered by the subsequent introduction of hydrothermal intrusions of gas and super-heated liquids. Although all three forms of matter - solid, liquid, and gas - are ejected from most volcanic structures, the nature of the formation produced by the volcano depends largely upon the proportion of each of these states of matter and the order in which they are expelled.

Piedra Amarilla Properties.

The Piedra Amarilla Properties are composed of a group of related volcanic cinder cones of late Tertiary age. The cinder cones where created largely by dacitic flows of ash, lapilli, and small volcanic blocks. These cinder cones sit atop a basement formation not well identified, but presumed to consist of rhyolitic flows from the Claudio Guy range and a combination of salar and marine sediments. Drilling logs from ENAP taken during exploration of the Salar de Pedernales might better identify the possible makeup of the basement formation.

During several separate periods of hydrothermal mineralization, super heated solutions, charged with steam and other gasses escaped from the congealing magma in enormous quantities, carrying with it mineral matter which was deposited at higher levels where the pressure and temperature were less intense. Fissures and cracks in the dome formations provided channel ways for the movement of these solutions, and became the sites where deposition took place. The gas and liquid phases were intimately associated, but some predominantly gaseous activity occurred separately.

Water vapor as super-heated steam proves to be the main component of magmatic gasses. Magma typically contains up to 11% steam at great pressures. Other volcanic gasses include carbon dioxide, compounds of sulfur (sulfur dioxide and hydrogen sulfide), chlorine (ammonium chloride, hydrochloric acid), fluorine, and boron. Temperature of these gasses often exceeds 650o C.

The introduction of hydrothermal fluids is among the last expressions of volcanic activity. Large areas of the Piedra Amarilla properties have been altered by the introduction of these fluids, changing the texture and composition of the volcanic tuffs into caliche (a Chilean term).

Most of the original orthoclase feldspars have been decomposed into white argillous kaolinite, giving the silica formations a whiteness which is distinctive and helps to distinguish them from the surrounding country rock. Prospecting activities initially incorporated location of caliche formations in finding altered geological areas.

The host-rock for the Piedra Amarilla deposit is considered dacitic tending to rhyolitic in composition, consisting largely of ash flows and pyroclastic breccias compacted into tuffs. These tuffs have been hydrothermally altered by subsequent introduction of large amounts of gas, steam, and other liquids. The hydrothermal activity may have been related to the last episodes of the cinder cones, as well as to the many volcanic formations which were later introduced in the adjacent area.

The morphology is similar to that found at the Coipa formation, wherein acid volcanics are composed of altered breccia tuffs overlying a sedimentary bed.

Analysis of the host-rock indicate that silicates comprise the vast majority of pyroclastic material. Diffraction has identified quartz and its polymorphs, cristobolite and tridymite as the major host-rock components. The presence of cristobolite indicates a very hot formative environment as crystallization begins at a relatively high temperature (1470o C.).

A number of feldspar minerals are present, with the calcium-sodium plagioclase feldspars dominating the potassium orthoclase feldspars. These latter have been largely altered to kaolinite by intrusions of sulfur and carbonate solutions. The feldspars, which include alumina as a component, together with kaolinite

PIEDRA AMARILLA PROPERTIES

LOCAL GEOLOGICAL INTERPRETATION

- Alluvium -

q a l	Quaternary
	Piedra Parada Salar and Alluvial Scarps

- Volcanics -

t p	Tuffs and Pyroclasts
d a	Dacite to Andesite
h a	Hydrothermal Alterations
	Caliche and Sulfur
	Crater - Open ended where eroded

Mineral Properties

Drainage

Strike/Dip

Scale = 1:40,000. Geology by Carlos Ulriksen G. 1988 make up a composite of approximately 3.5% of the host-rock content as accessory silicates. The deposit is geologically classified as acid volcanics, meaning that the total silica content is greater than 65%. If elemental sulfur is excluded, the actual silica content of the Piedra Amarilla deposit is >90%.

Economic Minerals.

Mineralization deposited within the structures of the Piedra Amarilla properties has been identified and in many cases quantified using a variety of analytical means. These include atomic absorption, fire assay, x-ray fluorescence, wet chemical leaching analysis, and microscopic studies. Table 2 identifies typical mineralization found in the varying grades of caliche contained in the properties.

- Titanium -

Titanium is widely and abundantly distributed throughout the properties. Microscopic analysis has identified rutile (TiO_2) as the principal titanium mineral in the Piedra Amarilla deposit, accounting for >95% of all titanium present. Rutile is the most economically desirable of all titanium minerals because of the ease of its conversion into commercial grade pigment and metal.

Other titanium minerals present but accounting for less than 5% of titanium content include in order of importance ilmenite ($FeTiO_3$), and sphene (Si_5TiCa). TiO_2 content averages 3.20%.

The rutile mineralization is intimately associated with the silica content of the deposit, overlying the quartz crystals as clasts and elongated prismatic inclusions. It is presumed that the rutile is present as an accessory mineral of the silica host-rock. The titanium is distributed over the entire deposit, and grade distribution is too consistent to have developed from hydrothermal intrusions alone.

Particle size of the rutile generally varies from 80 um to 20 um, with a predominance of the finer sized particles. A small portion of the rutile mineralization averaging 5 um is finely disseminated throughout the quartz host-rock and is probably uneconomical to recover. Much of the rutile may have formerly been sphene or ilmenite. Post intrusions of sulfur and carbonate solutions may have transformed most of this into rutile by releasing the calcium and iron as sulfates and carbonates.

Rutile and sphene are known to be accessory minerals of extrusive volcanics which are products of mass magma, especially acid volcanics which have cut through intrusive batholiths. On the other hand, primary magma contains principally sphene, ilmenite and titanium associated with biotite.

TABLE 2

Mineral/ Element	Content - Low Grade Caliche	Content - High Grade Caliche
SiO2	75.10%	70.02%
S	10.50%	20.10%
TiO2	2.64%	2.74%
Al2O3	0.85%	0.50%
H2O (Moisture)	1.82%	1.65%
CaO	0.26%	0.19%
Na2O	0.10%	0.06%
MgO	0.07%	0.05%
K2O	0.07%	0.03%
Fe	0.32%	0.17%
Au	0.34 - 9.88 g/t	0.20 - 9.88 g/t
Ag	7.00 g/t	7.00 g/t
As	40 ppm	31 ppm
Se	20 ppm	31 ppm
Te	19 ppm	32 ppm
Bi	4 ppm	26 ppm
Cl	370 ppm	310 ppm
Cu	19 ppm	38 ppm
Cr	19 ppm	5 ppm
Mn	27 ppm	17 ppm
Mo	45 ppm	23 ppm
Pb	7 ppm	5 ppm
Sn	50 ppm	400 ppm
V	<45 ppm	45 ppm
Zn	9 ppm	0.4 ppm

Rutile appears as secondary mineralization in deposits associated with primary magma, such as copper porphyries and ferrous deposits. Czamanske and others (1981) indicate that rutile mimics the distribution of the original magmatic titanium minerals. Secondary rutile mineralization reaches its greatest abundance and grain size in the biotite potassium feldspar alteration zone of porphyries in the Western United States. In peripheral alteration zones, rutile abundance and grain size progressively diminish. In many porphyries, the distribution of rutile and of copper ore is about the same.

Table 3 below lists some titanium bearing deposits in Chile and elsewhere.

Table 3.

Deposit	Location	Type	% TiO2
San Manuel	Arizona	Copper Porphyry	0.75%
Tangse	Sumatra, Indonesia	Copper Porphyry	0.30%
Tacora	1st Region, Chile	Acid Volcanics	0.80%
Purico	1st Region, Chile	Acid Volcanics	0.20%
La Coipa	3rd Region, Chile	Acid Volcanics	1.00%
Volcan de Copiapo	" "	Acid Volcanics	1.30%
Algarrobo	3rd Region, Chile	Iron Deposit	1.20%
El Teniente	6th Region, Chile	Copper Porphyry	0.80 %
PIEDRA AMARILLA	3RD REGION	ACID VOLCANICS	3.20%

- Sulfur -

Deposition of elemental sulfur occurs as a result of hydrogen sulfide and sulfur dioxide gasses combining under pressure. The reaction precipitates the sulfur with water (steam) given off as a byproduct. Unlike the titanium mineralization, the sulfur is found as localized deposits, following the fissures and channel ways of the volcanic domes, creating veins that give the mineralization a style reminiscent of pegmatite or dike formations. Channel ways of nearly pure sulfur can be found, ranging from a few centimeters to over 4 meters in width. The mineralization generally penetrates into the porous areas of the caliche, with a corresponding decrease in grade as one moves away from the main channel ways. Deposition of sulfur is among the last expressions of volcanic activity. The process may be multi-stage, occurring over several different gaseous periods. Some of the gaseous activity could have resulted during the last stages of the introduction of newer volcanics in the adjacent area.

Caliche deposits are thought to be generally parallel to sub-parallel to the surrounding terrain, having been formed in mushroom fashion with the roots extending into the volcanic conduit. The caliche deposits thin with distance away from the cones.

- Gold and Tellurium -

The principal source of the worlds gold mineralization occurs as a result of hydrothermal deposition within intrusive and extrusive igneous rock formations. Most of the major gold reserves are found in sediments or placers or as disseminations adjacent to weathered igneous formation. Gold is common in distinctive types of volcanic rocks, often associated in tuffs with manganese or altered quartz minerals.

Primary gold mineralization in the **Piedra Amarilla** deposit is assumed to have taken place during the liquid phases of hydrothermal activity. Gold is found in the native state as well as a compound of tellurium abundant in the deposit. Native gold has been assayed at 0.2 - 0.34 grams per ton in the near surface areas.

Gold values associated with telluride mineralization have been tentatively identified at 4.50 **grams per ton Au.** The telluride mineralization is thought to consist of krennerite (Au,Ag)Te2 with a minor proportion of calaverite (AuTe2).

Tellurium is one of the rarest of all minerals, having an average crustal abundance of about 2 parts per billion. Only the radio-active series of elements and rhenium are less abundant. Telluride gold deposits are nearly as scarce. There are thought to be two main geological environments in which gold and silver tellurides occur.

The first is in pre-cambrian rocks, or metamorphosed volcanic lava, such as at Kalgoorlie, Australia. In this deposit, native tellurium is rare, native gold is abundant, and tellurides of Hg, Cu, and Bi are generally present. The stable form of AuTe2 is clearly calaverite, not krennerite, and the telluride minerals lack crystalline form.

The second type of geological environment for gold and silver tellurides is similar to that found at **Piedra Amarilla.** Veins, fissures and breccia pipes formed in tertiary rocks, such as in Cripple Creek, Colorado; Emperor, Fiji;and the Carpathian mountains of Russia are the present day models for this type of mineralization. In this type of occurrence, veins are vuggy and composed of quartz and carbonate minerals. Adjacent to the veins there is intense alteration of the host-rock due to the introduction of large amounts of hydrothermal fluids, carbon dioxide, and sulfur. Native tellurium is more abundant and native gold is rare. Tellurides of metals other than gold are present in lesser amounts. Krennerite is dominant over calaverite.

Tellurium content in the caliche has been determined at 19 part per million for lower grade caliche and 32 parts per million for medium grade caliche. The selenium content is almost identical, unlike other sulfide deposits where selenium is much more abundant. Though tellurium and selenium are closely related chemically, they behave differently in ore formation. In the subgroup of S-Se-Te, tellurium forms the largest and hence most polarized ions.

The size of a tellurium atom or ion and its polarization properties determine the formation of the tellurides of silver, gold, and other elements. Bond forming properties grow stronger from S-Se-Te. Thus, selenium forms independent minerals under special conditions only. For the most part, it enters the isomorphous lattice of the sulfides.

The chemical and metalloid properties of tellurium determine the structure of the tellurides. The solubility and volatility of the compounds of tellurium determine its paragenesis. This is expressed in the almost complete absence of selenium and tellurium in higher temperature sulfide deposits, and in the enrichment with tellurium of the lower temperature minerals found in epithermal deposits such as **Piedra Amarilla**.

Most of the tellurium crystallizes out during the epithermal stage. While sulfur passes easily into a hexavalent state and can form sulfates in the oxidized zone, tellurium becomes tetravalent with ease and forms tellurides.

It has been concluded from examination of tellurium minerals in deposits, that metal affinity to tellurium increases in the series :

$$Cu < Pb < Ni < Bi < Hg < Ag < Au$$

Hence, gold tellurides occur in the presence of the metal sulfides of this series. Comparison shows that the above series agrees fairly closely with the series of decreasing polarization:

$$Ag > Au > Hg > Tl > Pb > Bi > Cu > Ni > Fe$$

A number of problems have been encountered in utilizing standard atomic absorption and fire assay methods to quantify the exact amount of gold per ton contained in the tellurides. The compounds have a low volatilization point and the gold is not readily reduced using standard assay procedures.

Presence of the tellurides and their quantification was discovered using x-ray fluorescence procedures. Confirmation was attempted in part using standard leaching procedures. Leaching results of 1.75 grams per ton were obtained in one of the tests, corresponding to about 18% of the gold values assayed using x-ray fluorescence. Oxidation of the telluride mineral prior to leaching will enable a larger percentage recovery of gold content. A number of metallurgical steps will need to be accomplished during the feasibility studies.

- Silver -

Exact silver content of the Piedra Amarilla deposit is yet to be quantified, but is shown preliminarily as a minimum of 7 grams per ton, based on leach extraction tests. Microscopic tests revealed existence of some native silver. Precipitates of silver have been obtained in laboratory tests. When performing some gravitational tests, a compound similar to silver chloride was obtained in the concentrates. More diffraction work will have to be done to determine the exact makeup of the silver mineralization.

Some silver is undoubtedly associated with the telluride mineralization, in the form of hessite (Ag_2Te) and with the krennerite $(Au,Ag)Te_2$.

- Other Minerals -

Other minerals which can possibly be exploited include silica, kaolinite, and possibly alunite.

Extraction of sulfur and titanium will leave a fairly high purity silica tailings. Some of these can possibly be commercialized in the local economy. The refinery at Potrerillos, for example, must buy large quantities of low grade quartz ore from local gold miners to use as flux in their smelting operation.

The kaolinite can be separated from the gangue material either prior to or after flotation by simple decantation.

Some alunite appears to be present in parts of the deposit. If treated with sulfuric acid, a useful fertilizer of potassium sulfate could be manufactured and sold in the local agricultural market.

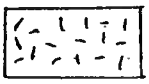
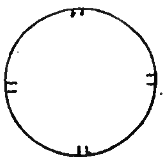
PIEDRA AMARILLA PROPERTIES

PRELIMINARY GEOLOGICAL FIELD INTERPRETATION
PIEDRA AMARILLA 131 and 161

- Alluvium -

q a l	Quaternary

- Volcanics -

t p	Tuffs and Pyroclasts
d a	Dacite to Andesite
h a	Hydrothermal Alterations
tp-ha	Alterations intermixed with t p
	Caliche and Sulfur
	Craters and Domes, undifferentiated

 Drainage

 Strike/Dip

Scale = 1:15,000. **Geology by Carlos Ulriksen G. 1988**


P.A. 131
P.A.161
P.A. 191
tp
da
ha
qal
tp-ha

Piedra Parada Salar.

Some preliminary fieldwork has been done on the eastern portions of the Piedra Parada Salar. A summary is presented here for informational purposes only.

The Piedra Parada Salar is an active evaporite body which drains a 500 km2 section of the cordillera. The drainage basin area is further outlined in the hydrology section of this report.

Although extensive studies have been carried out on several of the salars in northern Chile, we are not aware of any study undertaken on the Piedra Parada Salar. The Salar receives water inflow mostly in the form of subterranean thermal waters. These thermal waters are generally cool or luke-warm by the time they reach the Salar, and enter the Salar at the margins as can be seen in the aerial photographs.

Thermal springs feeding Piedra Parada have their source in the surrounding ranges, including the Cuyanos, Cerro Negro, Cerro Piedra Parada, Cerro Panteon de Aliste, and Claudio Gay ranges.

The salars in this area of Chile have one of the worlds highest rates of evaporation. The intense solar heat created by the high altitude combines with a low relative humidity and strong afternoon winds to produce a high rate of evaporation. Annual cloud cover is minimal, and annual precipitation is usually modest, so that most of the surface area of the salar is usually covered during periods of melted runoff to only a very shallow depth.

The thermal waters feeding into the Salar have leached large amounts of mineral components from the surrounding country rock. The minerals have precipitated into sedimentary formations during periods of evaporation. Some of the dominant minerals have compacted into layers inter-bedded one with another in a type of loose arenite formation. The prevailing winds blow from the northwest and have concentrated much of the loose minerals into the eastern and south-eastern portions of the basin, much in the same way as sand dunes.

The salar is slightly tilted toward the northwest as a result of regional block faulting, elevating the eastern portions of the salar. The winds have subsequently carved the dune-type mineral layers into low scarps, 10 meters and more in height. (see Figure 11)

Mineralized terraces are formed mainly by gypsum, clay as kaolin, some silica-quartz, fine grained sandstone, limonite, and siltstone. The mineralized beds lie horizontally, the different minerals inter-bedded one with another. The upper portions of the terraces consist mainly of gypsum, both pure and clayed.

A typical profile, from top to bottom, is shown in Table 4.

TABLE 4

Mineralized Bed	Depth
Gypsum-Kaolin (white bed)	3.0 meters
Iron Oxide (limonite)	0.5 meters
Gypsum-Clay	3.5 meters
Limonite-Iron Oxides	1.0 meters
Gypsum	2.0 meters

A number of other abundant mineral crystals, typical of evaporite bodies can be observed. These include ulexite, anhydrite, halite, calcite, and so on. The saline waters found in the central area of the Salar contains dissolved minerals of carbonates, low lithium values, and other chlorides and sulfates not yet precipitated.

The sediment depth of the Salar is not known, but may be as much as 100 meters, with the lower portions containing minerals in ancient sedimentary bodies. The water and mud depth from the surface is probably only a few meters in the center of the Salar.

Figure 12 is a copy of the aerial photographs taken of the Salar. Figure 13 shows were several channel samples were taken vertically through the arenite formations. Results of the samples are shown in Table 5.

Minerals of importance include gold, silver, titanium compounds, lead, and strontium. These minerals were leached from the surrounding country rock by chloride and carbonate waters. Sulfur is found as a mineral compound in conjunction with gypsum and anhydrite.

Potential above ground tonnage of the arenite formations in the eastern portion of the Piedra Parada Salar is estimated at 100,000,000 metric tons. These mineral properties are not yet constituted and have not been studied sufficiently to determine any real economic value.

However, the large mineral reserves, and ease of ore extraction and comminution make this an area which should be targeted and explored in additional detail.

FIGURE 11

DUNE FORMATIONS IN THE PIEDRA PARADA SALAR

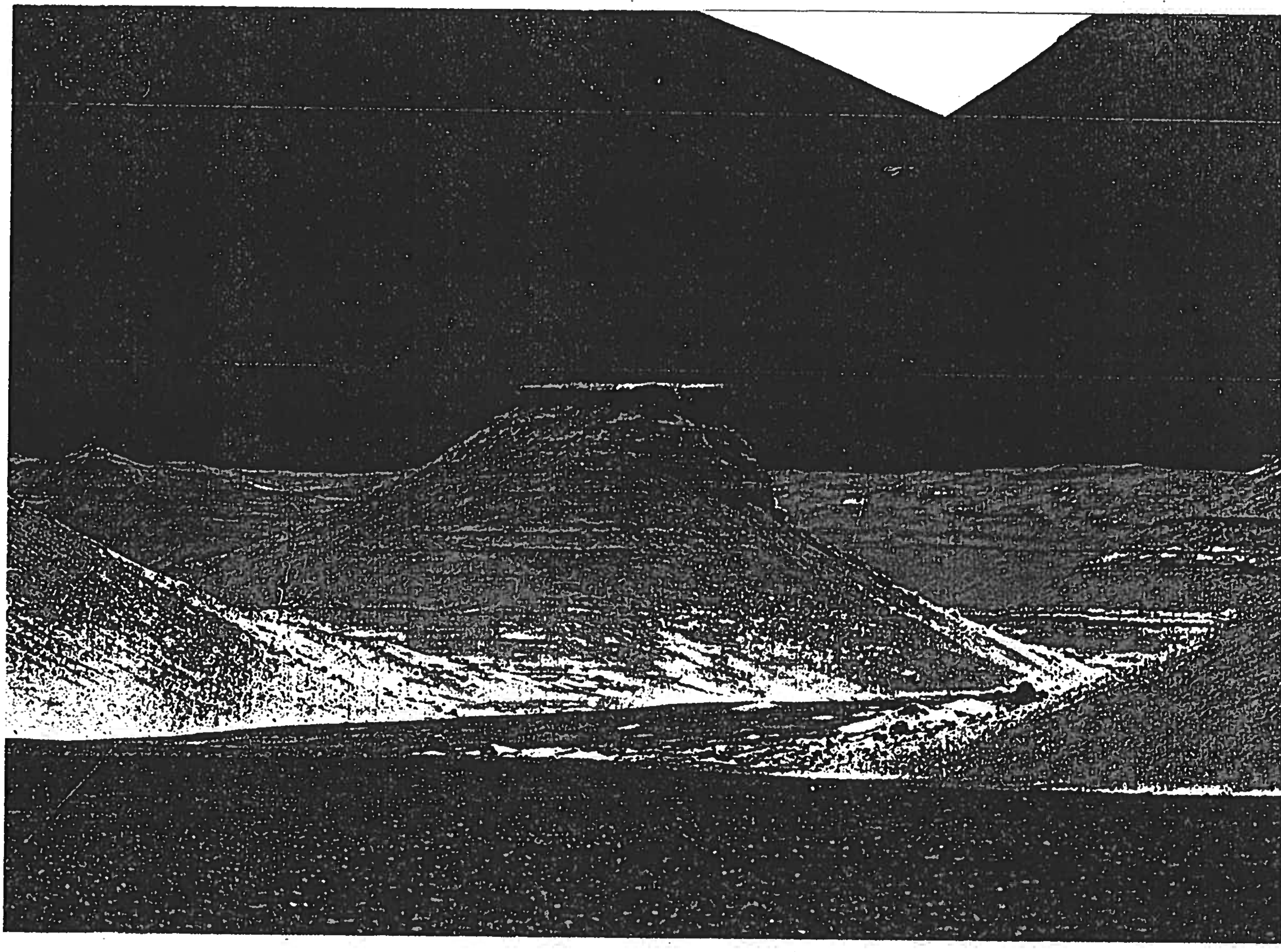


FIGURE 12
AERIAL PHOTO OF PIEDRA PARADA SALAR

PIEDRA PARADA SALAR

Sample Location Map

Scale Approx. 1:40000

Figure 13

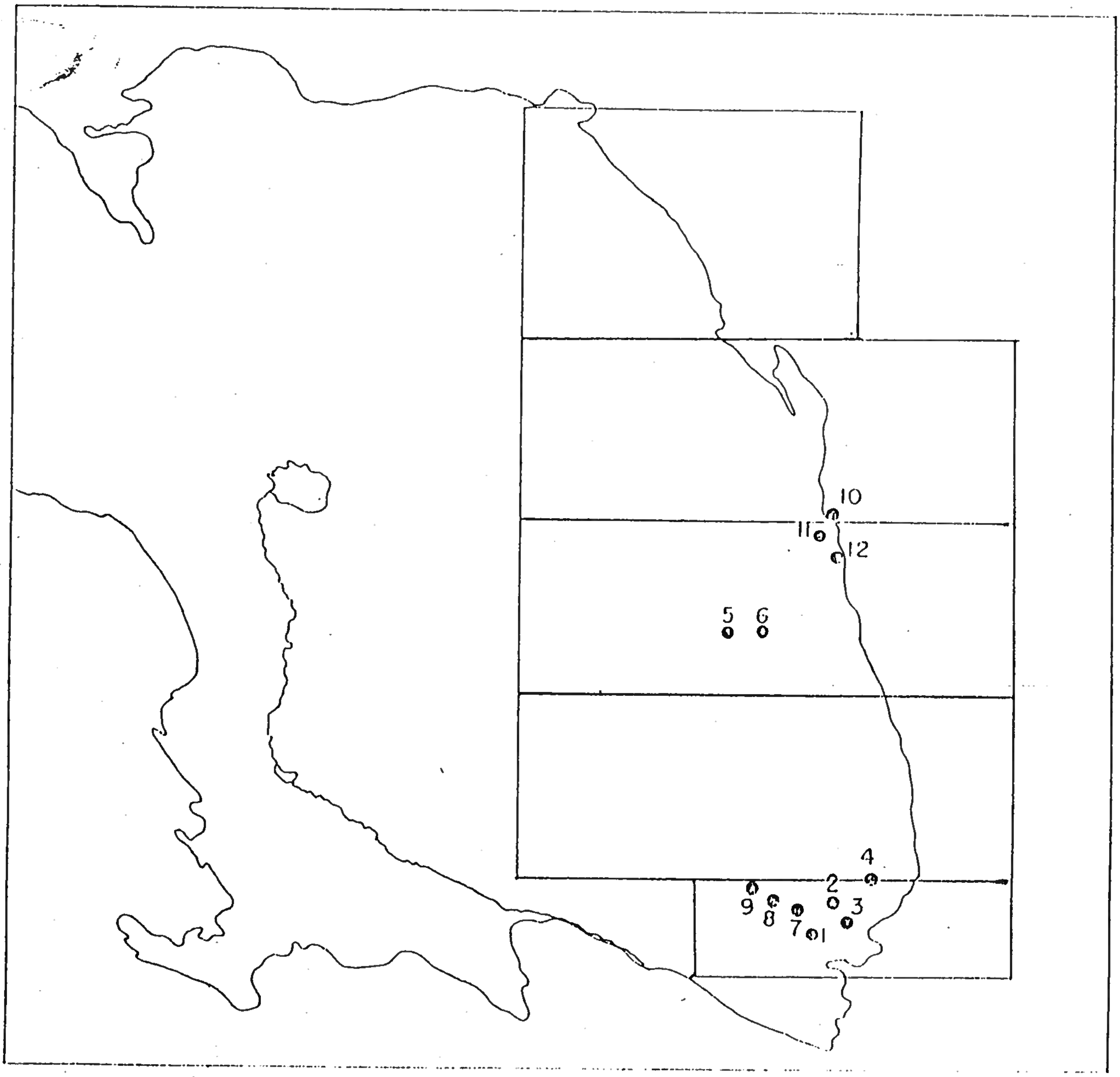


TABLE 5

SAMPLE #	WEIGHT	%TiO2	% Pb	% Sr	Au g/t	Ag g/t
1	10 KILOS	2.0	0.9	3.7	0.2	18
2	10 KILOS	1.83	1.2	2.1	TRACE	16
3	10 KILOS	1.67	1.2	3.5	TRACE	13
4	10 KILOS	2.00	0.6	1.7	0.2	15
5	10 KILOS	1.83	0.6	1.5	0.1	13
6	10 KILOS	1.67	0.7	2.4	0.3	10
7	10 KILOS	1.67	0.7	1.6	0.8	9
8	10 KILOS	1.83	1.4	2.3	0.7	9
9	10 KILOS	1.67	1.4	2.4	0.7	16
10	5 KILOS	1.00	0.1	0.8	NOT	TESTED
11	5 KILOS	1.36	NOT	TESTED	NOT	TESTED
12	5 KILOS	1.27	NOT	TESTED	NOT	TESTED
TOTAL AVERAGE	105 KILOS	1.65	0.88	2.2	0.33	13.22

TiO_2, Pb and Sr were analyzed using x-ray fluoresence.

Au, Ag were analyzed via Atomic Absortion.

Samples 1-9 were taken by verticle channel cuts.

Samples 10-12 were taken horizontally along the marging of the salar.

ORE RESERVES

Ore reserves have been quantified in three different mineralized sections within the core of the Piedra Amarilla property group. These cover portions of Piedra Amarilla 131, 161, 221, and 251. Reserves are quantified as both indicated and inferred, according to the Mineral Resource Classification System of the U.S. Bureau of Mines (see Table 6).

A reserve exploration program was outlined in April, 1988 in conjunction with the R.M. Parsons engineering company of Pasadena, California, who was commissioned to execute a pre-feasibility sulfur study on the mineral properties. Field exploration was carried out by Minexco in June and early July of 1988.

Ore reserves in Sections 2 and 3 were quantified by trenching predetermined areas associated with caliche mineralization. Section 1 was quantified by digging shallow pits for removal of bulk samples, and by sampling large outcrops which are exposed as hardened tuffs.

Trenched areas were sampled along 15 meter horizontal channels in both the mid-walls and floors. Some 15 tons of samples were removed from Sections 2 and 3, and some 5 tons from Section 1.

Sulfur reserves as quantified in the R.M. Parsons report were determined by using specified cut-off grades. In adding TiO_2 rutile and gold telluride mineralization, the reserves in this report use no cut-off grades because of poor grade correlation between minerals.

Trench and pit locations are shown in Table 7. Figures 14 and 15 show trench and pit schematics. Each of the properties was subdivided into 100 meter x 100 meter sections (one hectacre) and sample results plotted and given a preponderance or area of influence of approximately 100 meters.

Depth dimensions of inferred and indicated ore reserves were conservatively determined using local geological characteristics such as outcrops and exposed caliche.

Although the sample base is sufficient for pre-feasibility purposes, it is inadequate for determination of measured reserves. Additional trenching and possibly some drilling will be required in conjunction with a detailed geological study during execution of the feasibility study.

A larger sample base and detailed geology will permit reserves to move into the "measured" catagory, and will undoubtedly enlarge the reserve base by uncovering additional reserves in the adjacent areas.

TABLE 6

MINERAL RESOURCE CLASSIFICATION SYSTEMS

U.S. BUREAU OF MINES

- Measured - Reserves or resources for which tonnage is computed from dimensions revealed in outcrops, trenches, workings and drill holes and for which the grade is computed from the results of detailed sampling. The sites for inspection, sampling, and measurement are spaced so closely and the geologic character is so well defined that size, shape and mineral content are well established. The computed tonnage and grade are judged to be accurate within limits which are stated, and no such limit is judged to be different from the computed tonnage ore grade by more than twenty percent.

- Indicated - Reserves or resources for which tonnage and grade are computed partly from specific measurements, samples, or production data and partly from projection for a reasonable distance on geologic evidence. The sites available for inspection, measurement, and sampling are too widely or otherwise inappropriately spaced to permit the mineral bodies to be outlined completely or the grade established throughout.

- Inferred - Reserves or resources for which quantitative estimates are based largely on broad knowledge of the geologic character of the deposit and for which there are few, if any samples or measurements. The estimates are based on an assumed continuity or repetition, of which there is geologic evidence; this evidence may include comparison with deposits of similar type. Bodies that are completely concealed may be included if there is specific geological evidence of their presence. Estimates of inferred reserves or resources should include a statement of the specific limits within which the inferred material may lie.

TABLE 7 - PIEDRA AMARILLA TRENCH LOCATIONS

Trench	UTM Location	Trend	Length x Depth
1	7,088,125 N 533,400 E	N x S	75m x 2m
2	7,088,125 N 533,350 E	E x W	60m x 1m
3	7,088,135 N 533,370 E	E x W	35m x 2m
4	7,088,050 N 533,250 E	NW x SE	50m x 1m
5	7,088,050 N 533,250 E	SW X NE	50m x 1m
6	7,088,500 N 532,875 E	N x S	50m x 2m
7	7,088,500 N 532,850 E	NW x SE	50m x 1m
8	7,088,250 N 532,600 E	NW x SE	50m x 2.5m
9	7,088,230 N 532,375 E	W x E	35m x 1m
10	7,088,400 N 533,100 E	N x S	35m x 1m
11	7,088,350 N 533,100 E	E x W	60m x 2m
12	7,088,625 N 533,150 E	E x W	40m x 1.5m
13	7,089,100 N 533,750 E	E x W	30m x 1.5m
14	7,087,400 N 532,400 E	N x S	100m x 2.5m
15	7,088,000 N 533,000 E	N x S	30m x 1m
16	7,088,000 N 533,100 E	N x S	30m x 1m
17	7,087,875 N 533,450 E	E x W	30m x 1.5m

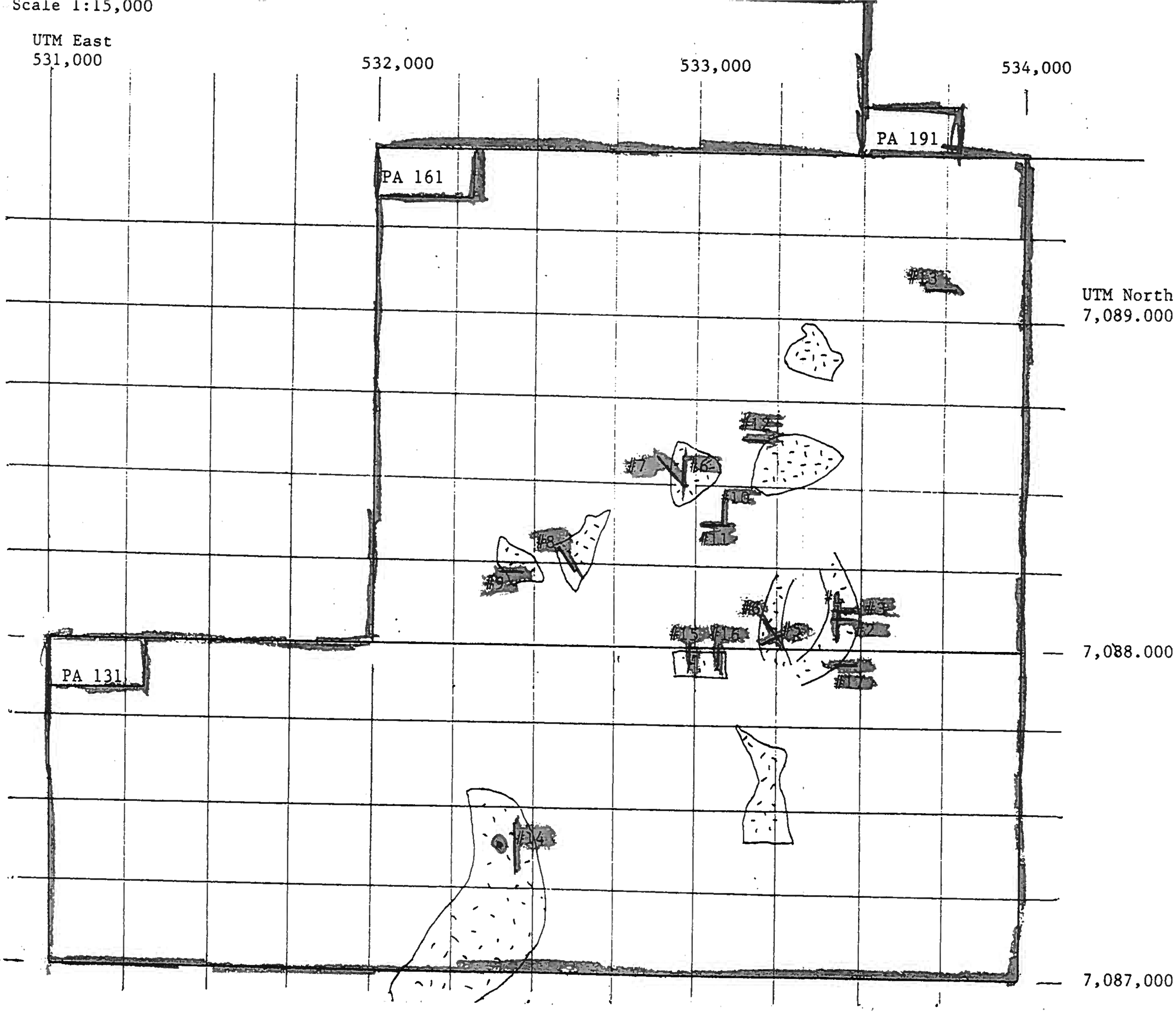
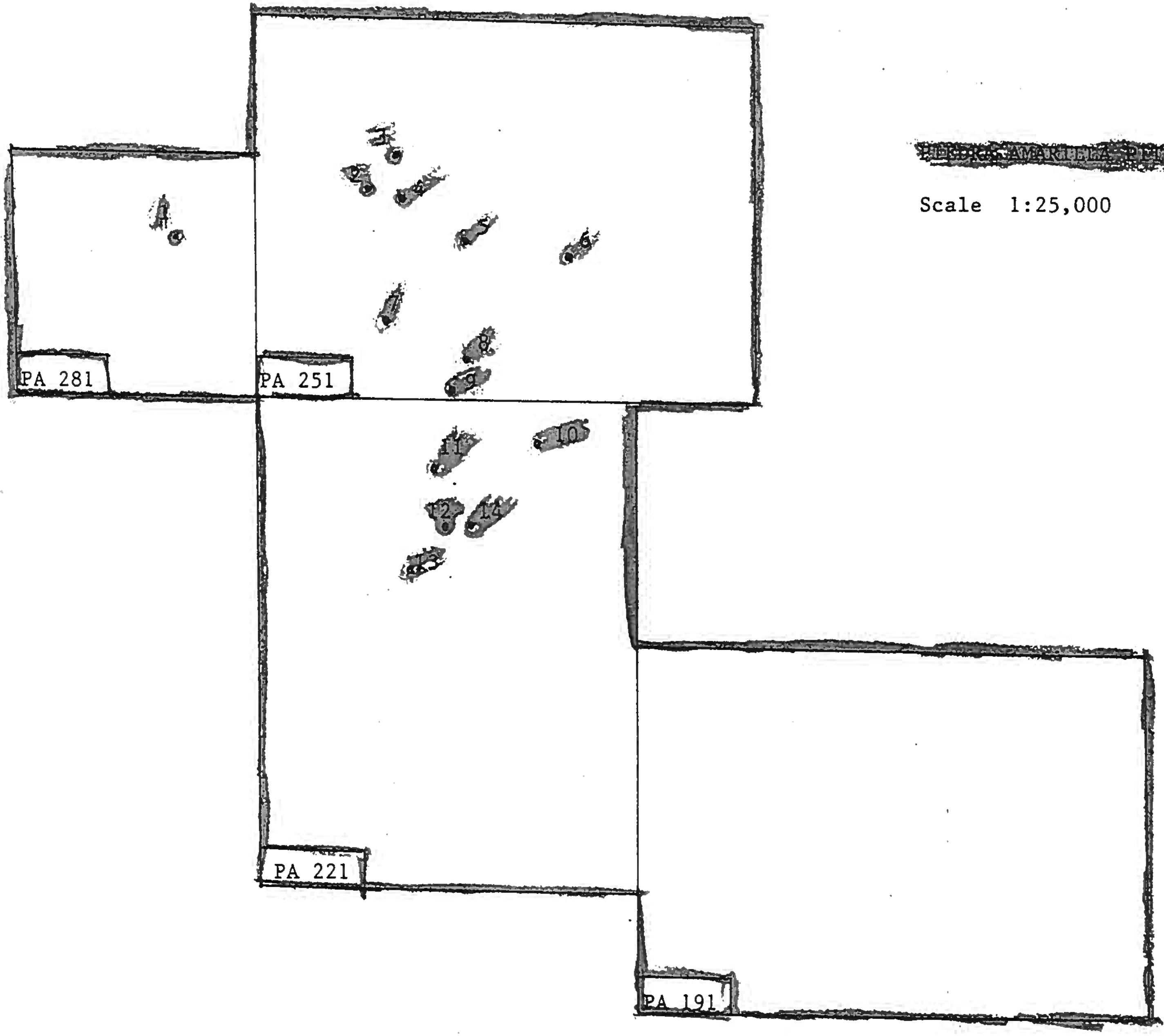

Scale 1:15,000
UTM East
531,000
532,000
533,000
534,000
UTM North
7,089.000
7,088.000
7,087,000
PA 131
PA 161
PA 191
#14
#9
#8
#7
#6
#10
#11
#12
#13
#15
#16
#5
#4
#3
#2
#17

TABLE 7 Continued

Location of Sampling Pits

Pit #	UTM North	UTM East
1	7,092.650	531.700
2	7,092.875	532.475
3	7,093.000	532.600
4	7,092.850	532.625
5	7,092.650	532.875
6	7,092.600	533.550
7	7,092.300	532.550
8	7,092.175	532.850
9	7,092.025	532.800
10	7,091.825	533.150
11	7,091.759	532.725
12	7,091.500	532.775
13	7,091.250	532.625
14	7,091.475	532.900
15	7,087.425	532.375



PIEDRA AMARILLA PFI LOCATIONS

Scale 1:25,000

Bulk Samples.

More than twenty tons of samples were extracted from the pits, trenches, and outcrops for assay and metallurgical work. This included extraction of three groups of bulk samples containing 8, 6, and 4 tons respectively.

Sample extraction for assay work was supervised by Minexco senior geologist Carlos Ulriksen. Extraction of bulk samples was executed by a crew from Jorquera Limitada, a mine engineering firm specializing in topographic work from Copiapo.

Areas for extraction of bulk samples were identified by personnel from Intec-Chile during a site visit subsequent to the trenching program. Fourteen of the eighteen tons of bulk samples were sent to the Intec laboratories in Santiago, with the other four tons going to the Marambio laboratory in Copiapo.

Sulfur Reserves.

Blocked out sulfur reserves include indicated reserves of 21,120,000 metric tons grading 19.84% sulfur, and inferred reserves of 79,760,000 metric tons grading 10.66% sulfur (see figures 16-17, table 8). The grades correspond closely to the composite bulk samples assayed by Intec-Chile of medium grade and low grade caliche, containing 20.5% and 10.5% sulfur respectively (table 8).

In projecting sulfur grades into inferred mineralized areas, sulfur values were given as approximately 50% of the values contained in the adjacent indicated reserves.

Some of the trenches and pits failed to reach below the alluvial material and thus have low or no sulfur values. The Parsons pre-feasibility report originally discarded these samples because they fell below the predetermined cut-off grade. In adding titanium and gold values, however, these areas have been added back because of a poor correlation between the minerals.

For example, the highest gold values occur in the alluvial trenches, which should be expected because of artificial gravitational concentration through the erosional processes.
In adding these additional reserves, the total reserves have been increased nearly four-fold from the original Parsons report to more than one hundred million tons. The downside is that the overall grade has dropped to 12.58% sulfur.

Because there are no major producers of native sulfur, Parsons, in designing the pre-feasibility study, had assumed that sulfur grades would probably have to be a minimum of 30% in order to make the project economically attractive. Based on blocked out reserves averaging 32% sulfur, a production price of $35 per metric ton F.O.B. was achieved, which would make the project very low cost compared to frasch producers in the U.S. and Mexico.

An extensive metallurgical study was undertaken by Intec-Chile and Corfo on the medium grade caliche (20% sulfur) and low grade caliche (10% sulfur) found at the Piedra Amarilla properties. Intec designed a new method to upgrade poor sulfur caliches through use of a flash flotation technique which permits rapid evacuation of a rougher concentrate in a large volume cylindrical flotation cell, which allows for processing of much larger ore tonnages in relatively short periods of time.

Because sulfur is naturally hydrophobic, one of the problems in designing a flotation circuit for higher grade sulfur ores is that the flotation kinetics don't permit a sufficiently rapid evacuation of the rougher concentrate. This allows some of the gangue material to continue on into the cleaner flotation circuit.

The flash flotation method developed by Intec allow grades of sulfur of 10% or even less to be processed for about the same cost of sulfur ores exceeding 30%. Since sulfur has now largely become a byproduct, the additional mining and crushing costs involved in mining lower grades are amortized among the various recovered mineral products.

Depth of Reserves.

In projecting the depth of the mineralized areas, a depth of 12 meters was chosen. This is based on the outcrops in area 1 which in some areas exceeded six meters, and on the depth of the trenches which was two meters in many areas. In studying exploration results of some of the volcanic sulfur deposits in Chile's Region 1, it was shown that many areas had layered depositions of native sulfur reaching as much as 50 meters in depth.

A drilling program on the Piedra Amarilla property group may show that sulfur beds lie beneath many of the alluvial areas. Trenching was hampered in part by ground ice which was prevalent in some areas. The trenching program was carried out in July, the coldest month in the Cordillera. The only snowfall occurred at the beginning of May, and the subsequent melting allowed for formation of ground ice during the cold months of June and July.

It should be noted that the sulfur reserves on the Piedra Amarilla 41 property have not been sampled nor blocked out, but based on visual evidence the aggregate reserves surpass all of the other Piedra Amarilla properties in both quantity and grade. The property lies an additional 1,000 meters in elevation, and pending road construction presently has very difficult access.

TABLE 8 - Sulfur Samples and Distribution

Trench & Sample #	Sulfur %	As ppm	Se ppm	Te ppm
1 - 001	9.6	1.6	8.2	1.8
1 - 002	26.9	0.8	65.0	30.0
1 - 003	24.7	1.0	37.0	20.0
2 - 004	3.6	3.1	4.9	0.5
2 - 005	2.8	2.5	2.9	0.2
2 - 006	42.2	0.9	52.0	8.4
3 - 007	24.5	2.8	48.0	6.4
3 - 008	22.0	3.8	34.0	5.5
3 - 009	17.7	1.0	3.4	1.1
4 - 010	3.6	3.1	4.9	0.5
5 - 011	2.8	2.5	2.9	0.2
6 - 012	15.1	0.6	2.7	0.9
6 - 013	14.2	2.3	3.3	1.0
6 - 014	29.8	-	-	-
7 - 015	17.6	0.8	3.5	1.2
7 - 016	4.5	2.7	2.3	0.8
8 - 017	32.3	0.8	0.3	0.2
8 - 018	26.2	-	-	-
9 - 019	4.2	4.2	25.0	0.4
10 - 020	0.0	1.2	0.1	0.1
11 - 021	0.2	2.1	0.2	<0.1
12 - 022	6.2	1.2	0.2	<0.1
13 - 023	0.0	1.9	0.1	<0.1
14 - 024	0.7	2.5	0.2	0.1
14 - 025	91.5	2.0	0.3	0.1
14 - 026	10.4	4.0	0.2	<0.1
14 - 027	21.0	4.0	0.4	<0.1
14 - 028	0.0	1.7	0.6	<0.1
14 - 029	0.0	1.5	0.3	<0.1
15 - 030	15.0	7.1	25.0	2.9
15 - 031	14.7	-	-	-

TABLE 8 Continued - Sulfur Samples and Distribution

Trench & Sample #	Sulfur %	As ppm	Se ppm	Te ppm
16 - 032	0.0	38.0	1.4	0.4
16 - 033	0.0	32.0	1.0	0.4
17 - 034	38.9	17.0	76.0	46.0
17 - 035	0.2	19.0	0.4	<0.1
17 - 036	0.3	17.0	1.7	<0.1

PIT SAMPLES

Pit & Sample #	Sulfur %	As ppm	Se ppm	Te ppm
1 - 037	0.4	25.0	0.2	<0.1
2 - 038	33.4	0.1	67.0	22.0
3 - 039	34.8	<0.1	67.0	11.0
4 - 040	12.6	-	-	-
5 - 041	26.8	-	-	-
6 - 042	2.2	23.0	0.4	<0.1
7 - 043	0.81	-	-	-
8 - 044	33.4	35.0	20.0	35.0
9 - 045	33.5	1.7	2.9	0.4
10 - 046	6.7	66.0	0.4	<0.1
11 - 047	47.4	-	-	-
12 - 048	36.5	3.0	4.1	0.5
13 - 049	47.5	-	-	-
14 - 050	37.1	2.6	3.3	0.3
15 - 051	31.01	-	-	-

TABLE 8 Continued - Sulfur Samples and Distribution

BULK SAMPLES

Bulk Sample #	Sulfur %	As ppm	Se ppm	Te ppm
INTEC - 1 6,000 kilos	10.5%	40.0	32.0	19.0
INTEC - 2 8,000 kilos	20.5%	31.0	31.0	32.0
Marambio - 1 4,000 kilos	31.0%	-	-	-

* samples with - signifies element not assayed in that sample

Figure 16

Sulfur Ore Reserves - Section 1

Legend.

0 - 5%	Green
5 - 10%	Violet
10 - 15%	Red
15 - 20%	Orange
> 20%	Yellow
.	Pit Sample Locations

Indicated Reserves - Bounded Pink Line

Indicated Ore Tonnage - Section 1

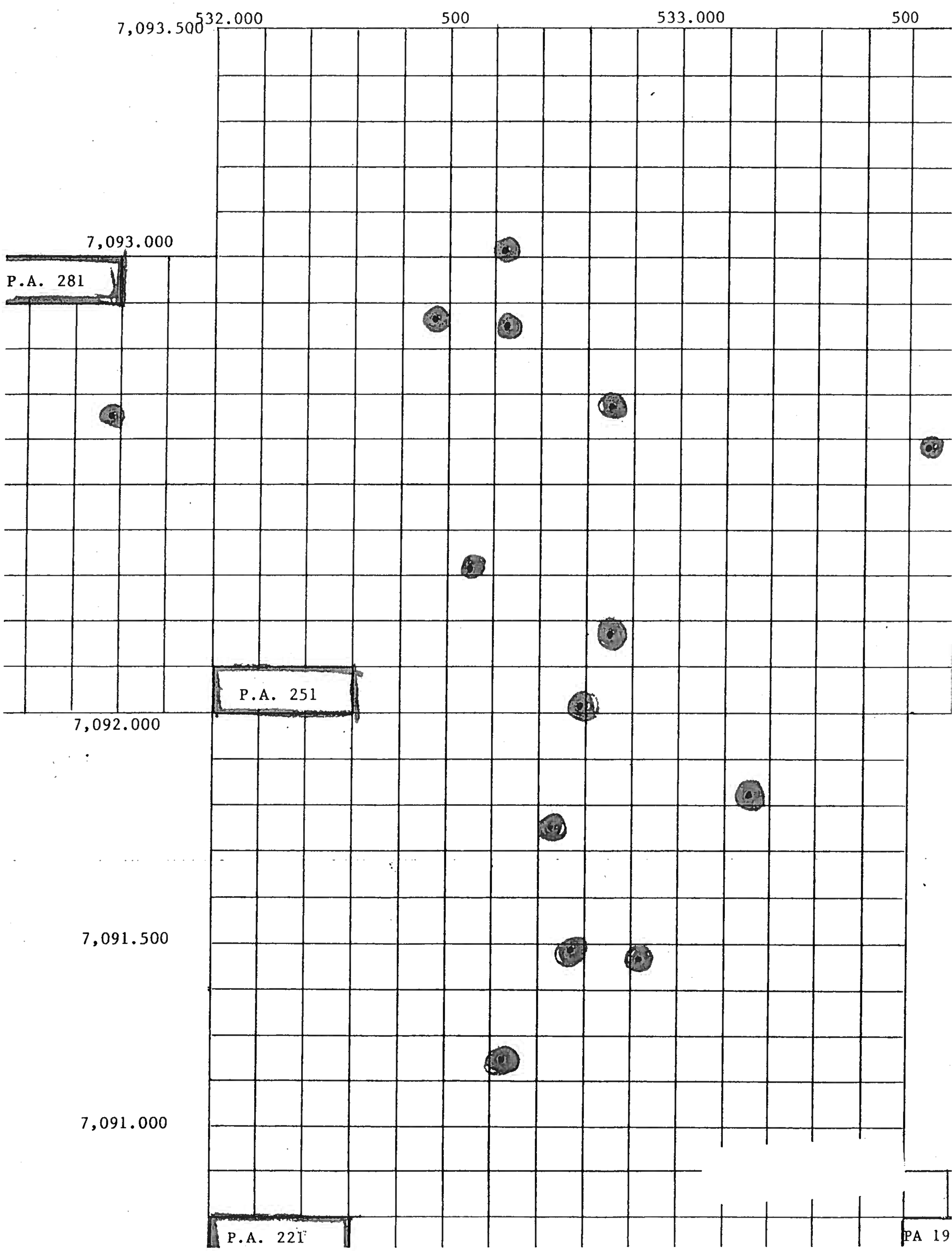
	Grade	Metric Tons	Net Sulfur in Metric Tons
1.	1.14%	1,440,000	16,360
2.	6.70%	480,000	32,160
3.	12.60%	480,000	60,480
4.	37.94%	3,840,000	1,456,800
	25.10% (Ave.)	6,240,000	1,565,800

Inferred Ore Tonnage - Section 1

Grade	Metric Tons	Net Sulfur in Metric Tons
12.55%	28,320,000	3,554,160

Total Inferred and Indicated Ore - Section 1

Grade	Metric Tons	Net Sulfur in Metric Tons
14.81%	34,560,000	5,119,960



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500
533.000
500
7,093.000
P.A. 281
P.A. 251
7,092.000
7,091.500
7,091.000
P.A. 221
PA 19

Figure 17

Sulfur Ore Reserves - Sections 2 and 3

Legend.

0 - 5%	Green
5 - 10%	Violet
10 - 15%	Red
15 - 20%	Orange
> 20%	Yellow
.	Pit Sample Locations

Indicated Reserves - Bounded Pink Line

Indicated Ore Tonnage - Section 2

	Grade	Metric Tons	Net Sulfur in Metric Tons
1.	0.73%	2,160,000	15,840
2.	6.20%	480,000	29,760
3.	14.00%	960,000	134,400
4.	18.35%	3,120,000	572,400
5.	29.30%	960,000	281,280
	======	==========	=========
	13.46%	7,680,000	1,033,680

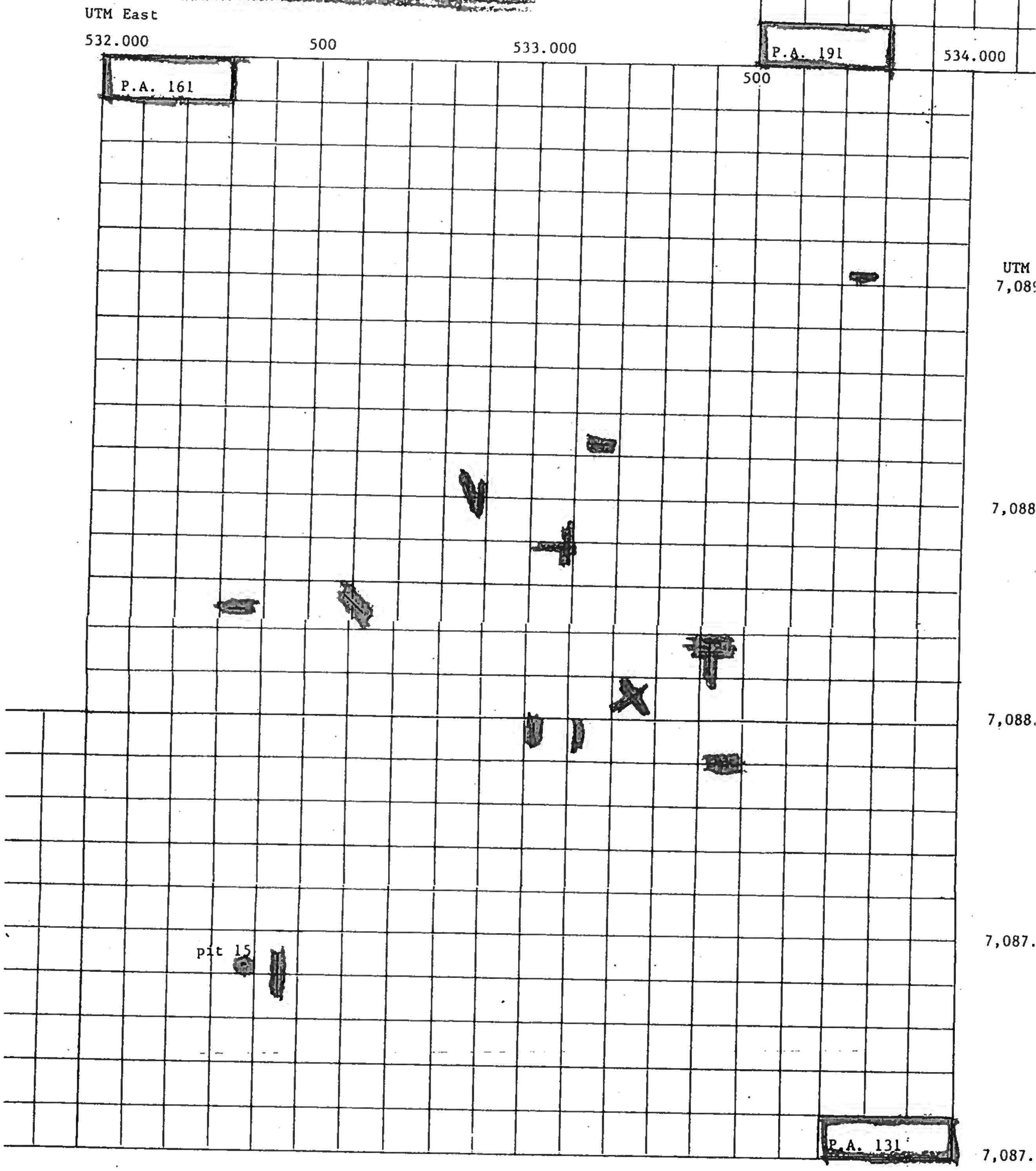
Inferred Ore Tonnage - Section 2

Grade	Metric Tons	Net Sulfur in Metric Tons
6.73%	17,040,000	1,146,792

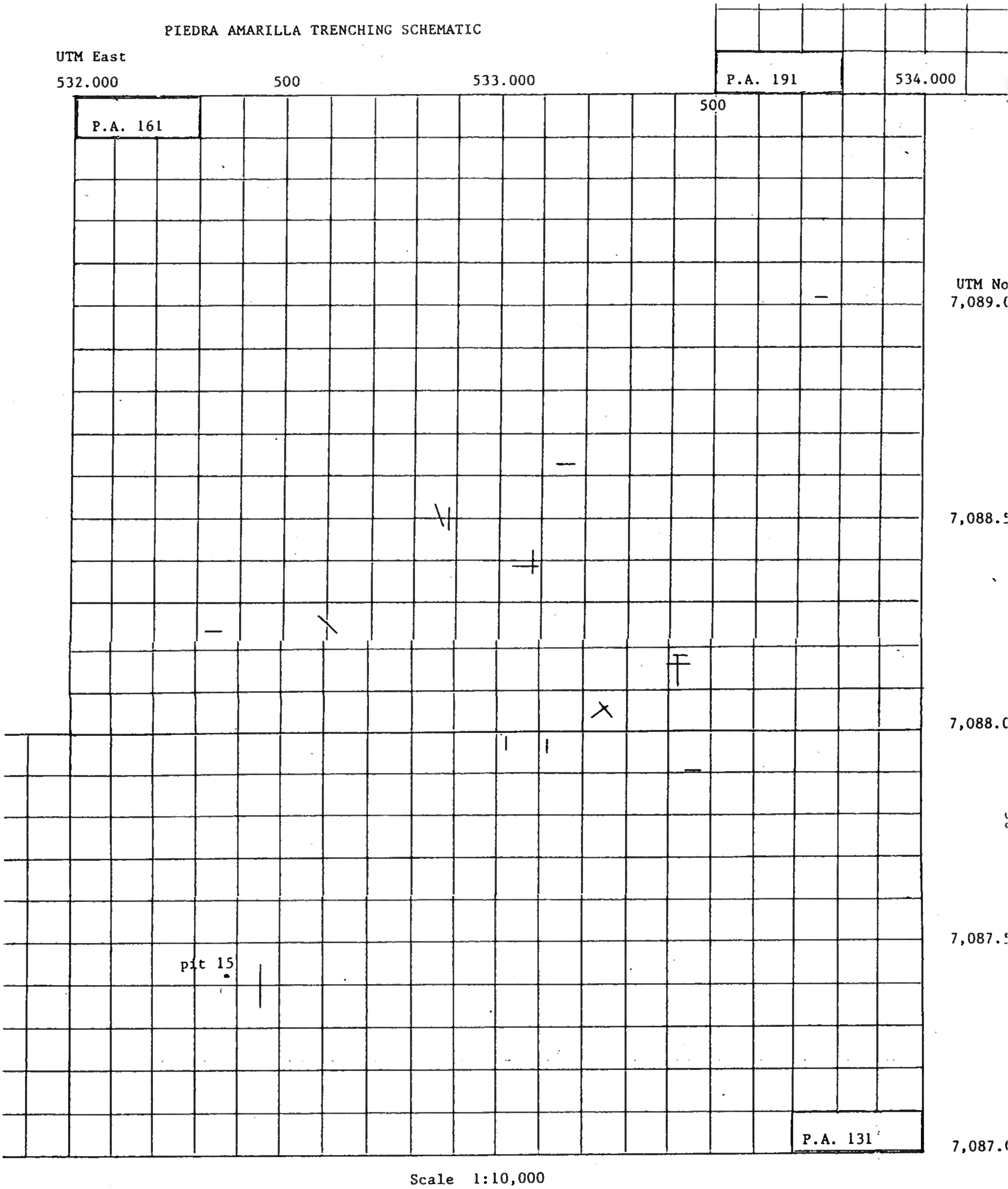
Total Inferred and Indicated Ore - Section 2

Grade	Metric Tons	Net Sulfur in Metric Tons
8.82%	24,720,000	2,180,472

PIEDRA AMARILLA TRENCHING SCHEMATIC



Scale 1:10,000


PIEDRA AMARILLA TRENCHING SCHEMATIC
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P.A. 191
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P.A. 161
UTM No
7,089.0
7,088.5
7,088.0
7,087.5
pit 15
P.A. 131
7,087.0
Scale 1:10,000

Sulfur Ore Reserves - Sections 2 and 3 continued

Indicated Ore Tonnage - Section 3

Grade	Metric Tons	Net Sulfur in Metric Tons
22.09%	7,200,000	1,590,480

Inferred Ore Tonnage - Section 3

Grade	Metric Tons	Net Sulfur in Metric Tons
11.05%	34,400,000	3,801,200

Total Inferred and Indicated Ore - Section 3

Grade	Metric Tons	Net Sulfur in Metric Tons
12.96%	41,600,000	5,391,680

Total Indicated Sulfur Reserves - Section 1, 2, and 3

Grade	Metric Tons	Net Sulfur in Metric Tons
19.84%	21,120,000	4,189,960

Total Inferred Sulfur Reserves - Sections 1, 2, and 3

Grade	Metric Tons	Net Sulfur in Metric Tons
10.66%	79,760,000	8,502,152

Total Indicated and Inferred Sulfur Reserves - Sections 1, 2, 3

Grade	Metric Tons	Net Sulfur in Metric Tons
12.58%	100,880,000	12,692,112