

Mineral Exploration Network

Summary Report on the Maria Licenses
Group of Mines

Mineral Exploration Network
07/06/2014

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1. Geology of the Area

Geologically it is part of the greywacke-shale complex, in contact with the Villuercas Paleozoic. The Villuercas Paleozoic consists of Ordovician-Silurian materials with strong presence of quartzites whose morphology reflects the folded structure of the massif. It is a succession of anticlines (Almonte, Ibor) and synclines (St. Lucia, Viejas) with a strike of NW-SE and a great longitudinal extent and varying wavelengths between 3 and 10 km. The Villuercas morphology is typical of the Appalachian relief where synclines form valleys and anticlines form mountains (Sierra Alta) and if eroded, the Precambrian materials below are exposed (Almonte and Ibor). The structure is complex due to the overlapping of three tectonic phases, pre-Variscan being the first one. While the macrostructure was developed in the first Hercynian phase, it was refolded by a second phase that affected the entire area and some areas intensively.

The fracturing, in the first stage associated with the second phase folding, allowed the development of fractures with abundant quartz segregation (ductile-brittle shears) with strikes N140 to 180° E and dips 60-70° W. These fractures are hosting the mineralization of sphalerite and galena in San Roque. Late fracturing resulted in fractures with strikes of NE-SW and WNW-ESE and may contain chalcopyrite (La Favorita).

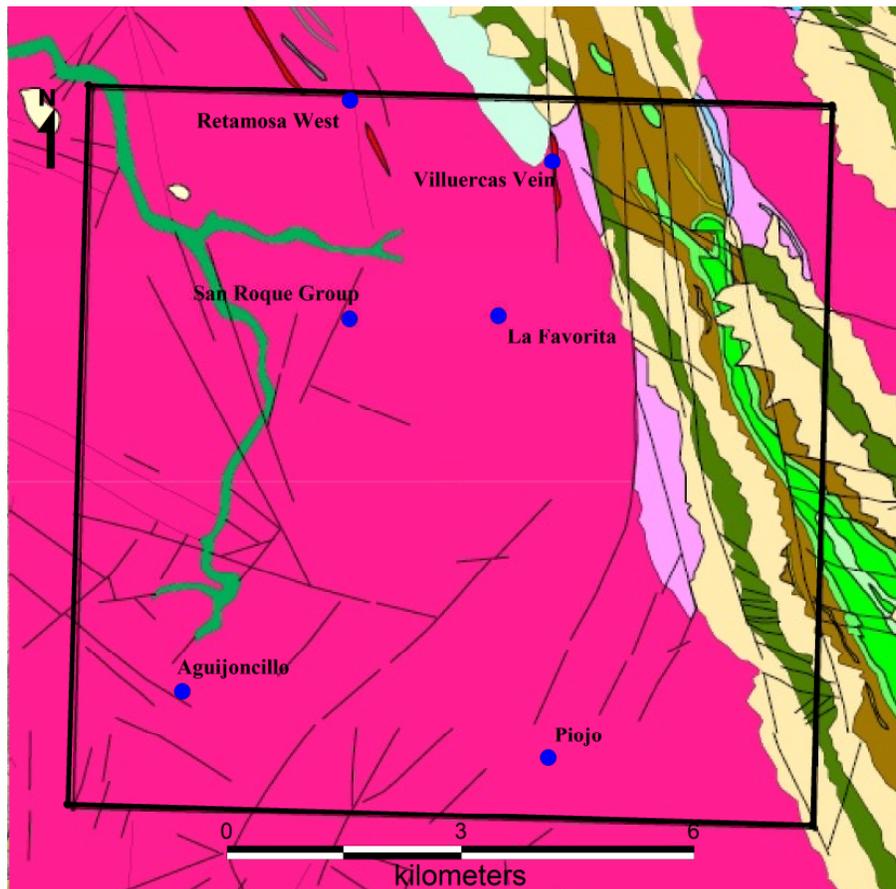


Fig. 1. Geology of the Area and location of most important occurrences

2. Previous Work Undertaken

Between 1980 and 1984 the IGME has conducted a number of research programs described below:

-Mining-Geological Survey of deposits of San Roque Mining Group, Mina Niraflores and others (Cáceres, Badajoz).

-In October 1980. Includes a brief field survey with 1:10,000 scale mapping. Also a recognition of the main occurrences (San Roque, La Favorita, El Aguijoncillo, El Piojo, Pozo Canela, etc.).

-In December 1981. Research studies for Pb-Zn-Sb in the areas of Aldeacentenera and Alburquerque (Cáceres-Badajoz). A geochemical survey was conducted in streams with sampling and analysis for Pb, Zn and Cu of 418 samples with a spacing of 500m. between samples. As a result five anomalous zones of Pb and Zn (AL-1, AL-2, AL-3, AL-4, AL-5) were detected.

-Three methods of geophysical prospecting were tested:
Induced polarization, combined trielectrode and charged body, the latter gave positive results.

-December 1981. Drill holes in Aldeacentenera Area(Cáceres). Three drill holes were done, SR1, SR2 and SR3 in Mina San Roque which cut several mineralized veins.

-December 1982. Investigation of Pb, Zn, Cu in the State Reserves in Extremadura. Geochemical prospecting campaign in soil, taken from 1379 samples, Pb and Zn analysis and interpretation was performed.

-The five areas (AL-1, AL-2, AL-3, AL-4 and AL-5) were prospecting with stream survey. An anomalous zone (AL-5) located south of San Roque was detected and could correspond to the extension of the veins of that mine.

-December 1984. Research of Zn (Pb) stratabound deposits of upper Extremadura. A geological map with 1:4.500 scale was constructed around San Roque. 18 drill holes were also done.

-In the Mina San Fernando geological study and sampling was undertaken, as well as two drill holes (SF-1 and SF-2).

-In San Roque was made a geophysical survey in a drill hole (SR-13). In the anomalous area AL-5 soil sampling campaign was undertaken with 105 samples and analysis by Pb, Zn and Cu that overlapped with geophysical anomalies (block chargeability-resistivity and dipole-dipole profiles).

-Thirty-two drill holes were drilled by the IGME.

-Extending of the area of investigation of Zn-Pb in the area of San Roque Mining Group (Aldeacentenera-Cáceres). December 1985.

-Computer processing of structural data collected in the 2,800 meters of cores obtained.

-The geophysical survey carried out by the methods of ground and chargeability-resistivity, has not been shown to be effective for locating the mineralized veins, due to the small size of them and the electrical discontinuity of the mineralized zones.



Fig.2: Location of Previous Works

-Geochemical soil survey done in the AL-5 gave as a result of well-defined anomalies that correspond to mineralized veins, making this method very suitable for systematic exploration of the area.

- October 1986. Drilling of 13 drillholes were drilled with continuous core, inclined 45° to the vertical, with a total of 2704.5 m Length: 9 in San Roque area, 3 in west of Retamosa and 1 in the Villuercas vein.

The areas of interest that emerged in this survey are:

- San Roque and its extension to the south.-La Favorita
- Villuercas Vein
- West Retamosa.
- Piojo Mine.
- Aguijoncillo Mine

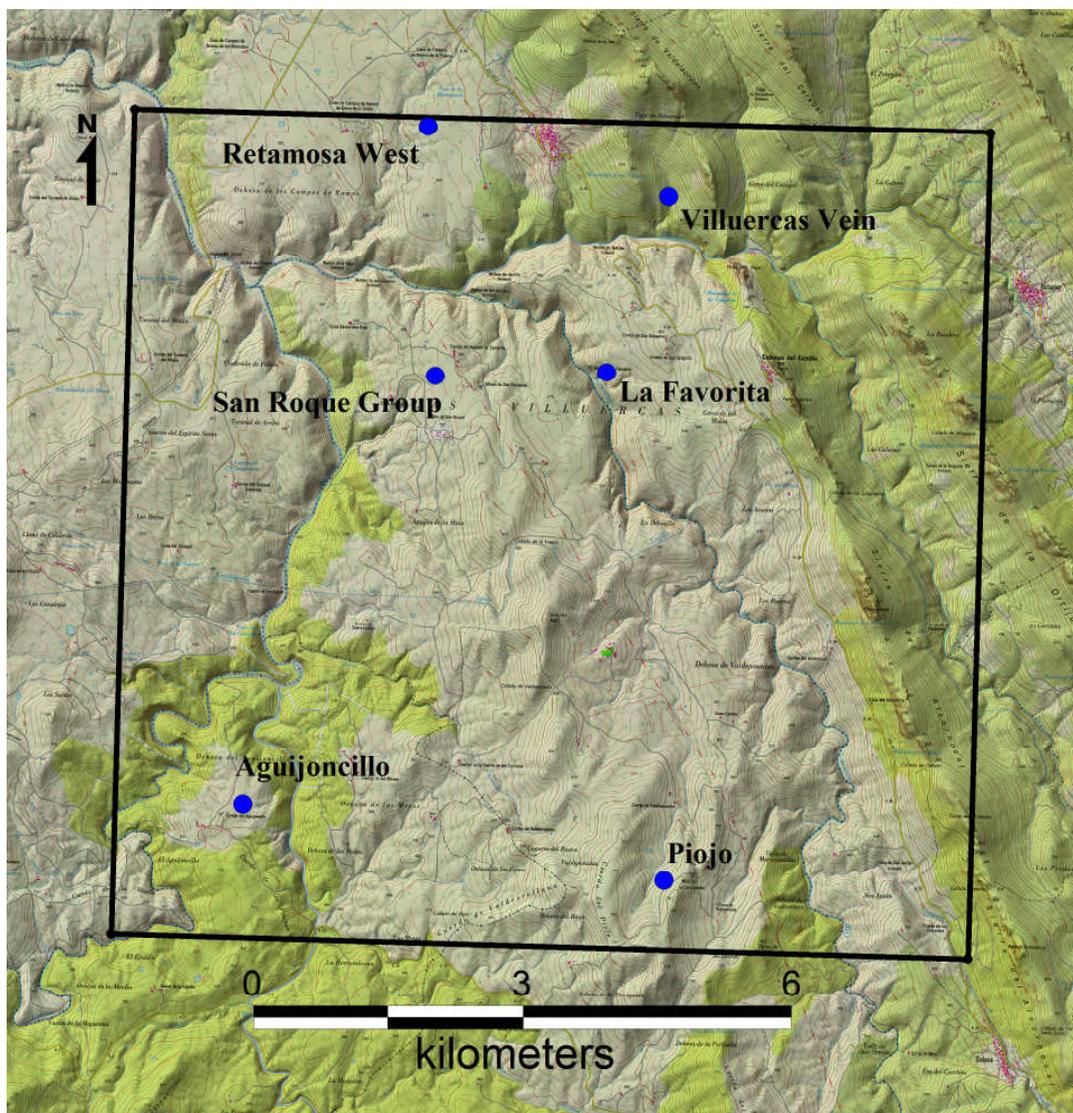


Fig. 3. Topographic map with the most important mining occurrences

3. Metallogenic Map

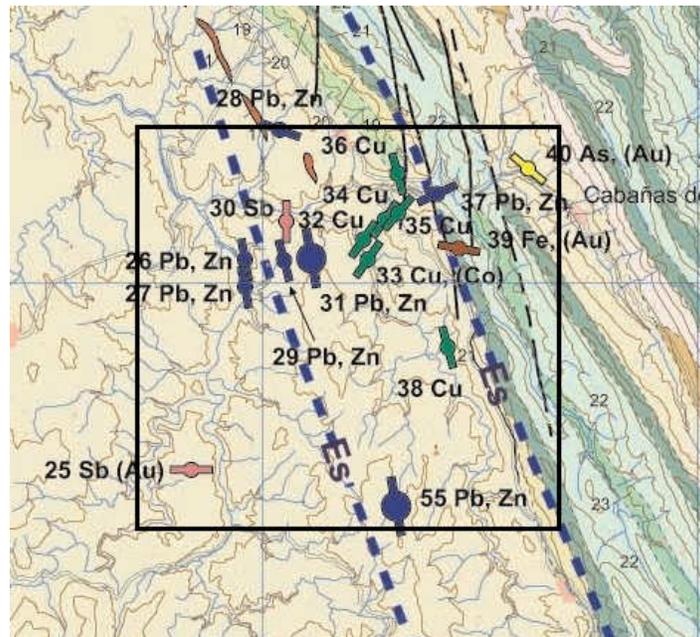


Fig.3 Metallogenic Map with Mineral Occurrences

Number	X_UTM	Y_UTM	Element	Name
25	278353	4375705	Sb(Au)	Mina del Agujoncillo
26	279600	4380525	Pb-Zn	Retozana
27	279600	4379900	Pb-Zn	Retozana II
28	280388	4383526	Pb-Zn	Mina Mantequera
29	280500	4380500	Pb-Zn	Grupo Minero San Roque
30	280545	4381403	Sb	Pozo Canela
31	281100	4380550	Pb-Zn	Mina San fernando
32	282300	4381000	Cu (Co-Ni)	Finca San gregorio
33	282412	4380535	Cu (Co-Ni)	Minal La Favorita
34	282800	4381450	Cu (Co-Ni)	Finca San gregorio
35	283100	4381600	Cu (Co-Ni)	Finca San gregorio
36	283104	4382513	Cu	Filon Villuercas
37	284000	4382050	Pb-Zn	Minal el Molino
38	284250	4378500	Cu	Alcornocal
39	284500	4380800	Fe	Peña del Castillo
40	286100	4382525	As (Au-Ag)	Mina Soltura
41	288700	4392450	Fe, Mn	Fuente del Bao
42	290619	4375471	Sb-(Au)	Las hambrientas
43	290656	4387430	Zn, Pb	El Rostro
44	291170	4388780	Fe, Mn	Pozo Gaspar
45	291188	4387410	Pb-Zn	San benito
55	283050	4374850	Pb-Zn	El Piojo Mine
61	283967	4369163	Cu	Cerro Valhondo Mine
67	287700	4370500	Au	Los escoriales
70	287920	4358570	Au	

Table 1. Metallogenic occurrences

4. San Roque group

4.1 Introduction

The "Grupo Minero San Roque", located in Berzocana (Caceres) is an important trace in regards to exploitation of Pb-Zn in the region. It is a group of veins in a Hercynian shear complex that affects the rocks of the Schist Greywacke Complex, where sphalerite and galena were extracted.

The paragenesis consists of sphalerite and galena with minor amounts of chalcopyrite, pyrite and some sulfides of Ag with quartz gangue and ankerite. There is no alteration of any kind within the host rock, which would be an indicator of the low temperature of the mineralizing solutions.

The sulfides are cementing quartz and ankerite, which have crystallized in veins generally parallel to the foliation.

In general, the mineralized veins are not deformed, as has been inferred from the observation of many mineralized samples of San Roque and San Fernando stocks. However there are quartz veins (mineralized or not) oblique to the main veins (and foliation) which are folded. Originally the mineralization seemed to be related to different degrees of brecciation.

4.2 Location

The Mining within the San Roque Group was an operation to extract Zn and Pb on a Philonian field formed by a bundle of veins, with at least six orebodies, with orientation N165° / 65°-75°W with variable width. ENADIMSA (1986) determined that the vein field is about 1,600 meters long and about 200 to 400 meters wide.

The San Fernando Mine, which appears 500 meters NE of San Roque and has an extent of 330 meters and 1 meter width, which also shows signs of having been exploited. It has two orebodies with orientations of N160 -170°, dip 60-70° W. The characteristics of mineralization are common to San Roque.

4.3 Paleogeography

The study area is located in the southern half of the Central Iberian Zone, where the structures are arranged with strong NW-SE orientation, leading to a succession of anticlines and synclines, surfacing in the first, materials belonging to the Upper Precambrian.

The transition from one unit to another has been at levels slump-gap more or less clear way, but given the characteristics observed in the area, it seems more reasonable to think that this limit is not abrupt, but gradual and between the two units there is a transit zone, where the mineralized area of San Roque would stand.

Main facies

The materials studied can be grouped in a series of facies, to produce a first paleogeographic approximation.

The different facies are very general facies, which would comprise a large number of subfacies, able to characterize different sub-environments, but given the limited sedimentological knowledge of CEG is not possible to specify more yet.

The main features of the facies defined are:

a) Deep marine facies

Corresponding to a minor facies alternation. Just parallel lamination and some "ripples and cross-lamination" have been observed.

These facies are the most develop in a regional scale and they include all the fine facies of more or less deep areas, although strictly not all match deposits abyssal plain, after as will be shown later, the delimitation of the slope is vague and with certain peculiarities.

b) Slope facies

The typical materials to characterize these facies (olistolites) are outside of the zone, but it is nonetheless pebbly mudstones are often present and areas with slumps, showing the existence of slopes.

c) Platform facies

Appear characterized by the presence of regional limestones, dolomites and schists. Usually present irregular width.

There are interbedded carbonate and clastic facies, with gradual transition between them.

All these carbonate deposits appear to be linked to the growth of algal and stromatolites. Within the platform facies, it is noted that there are detrital deposits, so it really should speak of a detrital and carbonate platform, although it is clear that the carbonate levels are more readily determinable.

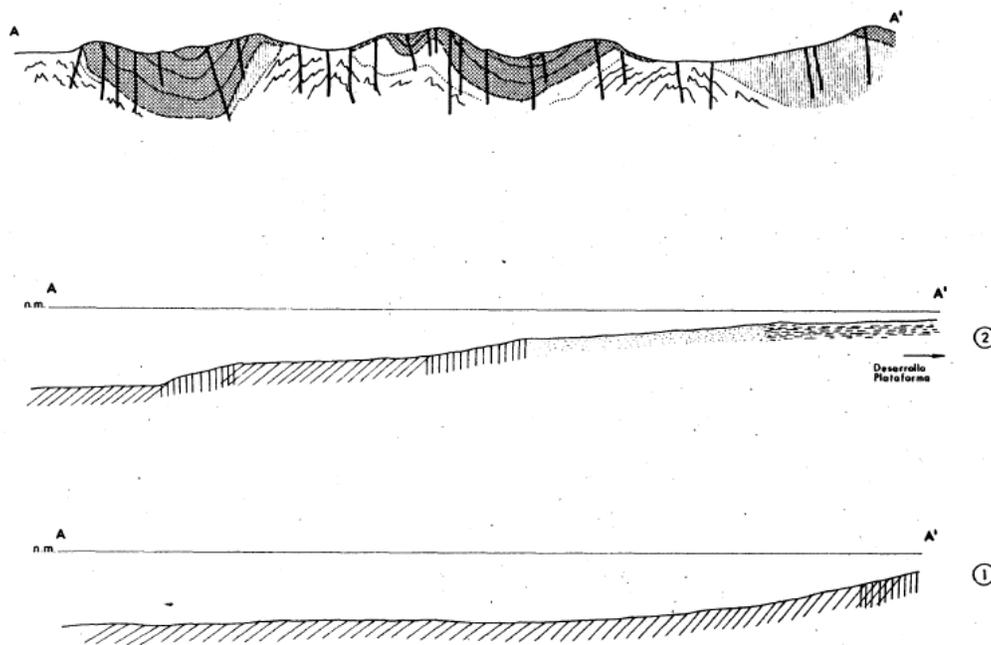


Fig. 43 ESQUEMA INTERPRETATIVO DE DISTRIBUCION DE FACIES. ① UNIDAD INFERIOR. ② UNIDAD SUPERIOR (Leyenda en la figura 45)

194.

Fig.4. Paleogeographic Cross-Section

This paleogeographic outline allows one to observe an evolution of the basin to shallower environments (FIG. 4) with a overlapping of platform and slope facies, typical of the upper unit, to finer and deeper facies in the lower unit. This corresponds to a model of coastal progradation, which is passed from conditions of "offshore" to intertidal and supratidal areas.

Within this scheme, the mineralized zone of San Roque is located at the transition zone between slope and deep marine facies, corresponding to the sedimentation of intermediate and outer fan environments.

4.4 Mining history

The first traces of mining activity in the study area are found in the remains of the Bronze Age, some 3,000 years ago.

Vetones Celtic warriors occupied the study area to the fourth century.

Walled enclosures built like Castro La Coraja, near Aldeacentenera to defend their positions were constructed and it is very likely to continue the exploitation of mineral deposits to source metals, especially iron, necessary for the manufacture of lances, knives, and horse tack utensils for war.

In 25 BC, the Romans gained the territories of the vetones in Villuercas. Also, there was the appearance of numerous villas and mines around Logrosan, Berzocana, Solana, Cañamero, Retamosa among others. The Romans were particularly interested in the argentiferous galena and iron from the ilmenite of river alluvium.



Fig.5. Lead Ingots from the Berzocana Museum.

In the mid-nineteenth century, the region of Villuercas saw a regeneration of mining. The existence of deposits of Sb, Cu and especially Zn and Pb allowed for the exploration and opening of mines; first governed by foreign companies then by local initiatives. A resurgence in mining contributed decisively to new state legislation for mines and especially the Mining Act of 1949.

Although we do not know the exact date of operations in San Roque or the Aldeacentenera Group, we know that operations resumed in 1898 on old mine workings from the mid-nineteenth century. These old workings were known as Mina Aguijón, named after the meadow that surrounds them.

In December 1898, the company "Minas Metalicas de Extremadura", with social residence in Brussels, leased the mine for exploitation. An old shaft 28 meters deep was dewatered and production of Zn began from a vein of sphalerite from which 250t was extracted in 1900 by the method of enhancement. In that year, San Roque Mining Group had 22 men inside the mine, 14 men outside the mine, 12 women and 17 boys. In 1903, mining operations to produce Zn Mine in San Fernando began, very close to San Roque.

In 1908, three veins, vein 1, 2 and 3, from W to E distributed in this order, with strikes of N-S and dip of 70-75° W were exploited. A fourth vein was unexploited. They are parallel and identifiable on the surface by quartz outcrops. The veins were visible from a long distance and in the north were crossed by two faults that formed an angle with the veins of about 45-50°. Veins 1 and 2 produced very little sphalerite and galena. The vein 3 produced 85% sphalerite and 15% galena with a grade of 50% Zn in sphalerite

and 55% Pb in the galena. In 1908, the average yield per square meter was 700 kg of ore.

Between 1909 and 1915, due to low metal prices and the First World War, the work was halted in San Roque. Only washing mineral tailings were sold, as happened in 1913 with a production of 60.2t of sphalerite and 9.8t of and galena.

In 1922, three veins in San Roque with widths between 1.5 and 2 meters were exploited, with average width of mineralization of 30 to 40 centimeters.

In 1956, exploitation began again after the reconstruction of the mine. Until 1962, production at the mine was increasing, with a average grade of 7% sphalerite and 1% galena.

The fall in lead prices in 1963 led to the decline of exploitation until the current date.

In 1980 the IGME initiated a series of research around the area of the "State Reserve Aldeacentenera"



Fig.6 Mine Buildings at San Roque

4.5 Structure

Structurally the mineralization is in a shear band sinistral to the main Variscan deformation.

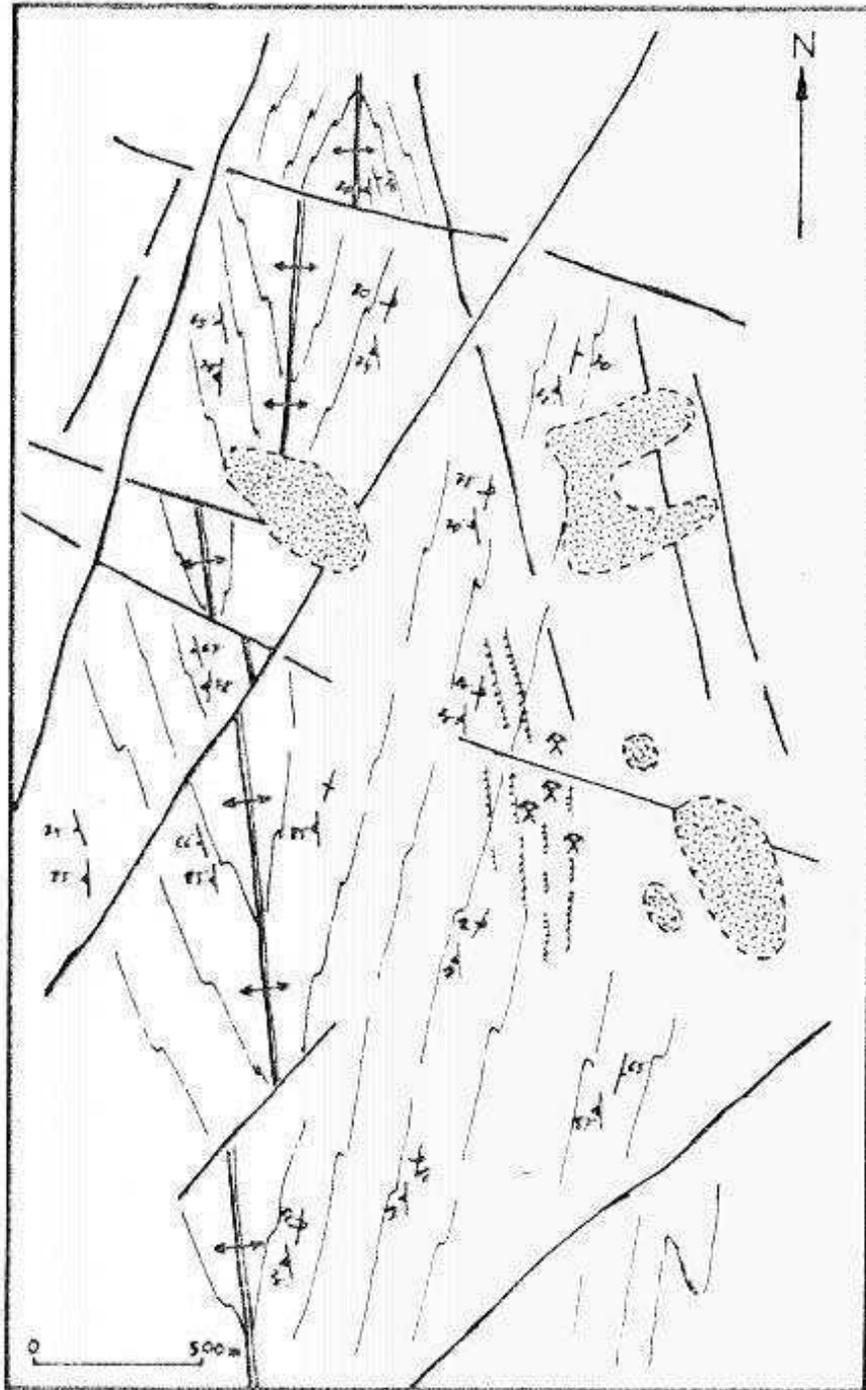


Fig.7 Structural Map of the San Roque group.

4.6 Mineralogy

The mineralization is mostly pre or non-tectonic, although there may be local phenomena of remobilization, resulting in post-tectonic overprinting. The mineralogical composition consists of sphalerite, galena, chalcopyrite, pyrite and ilmenite.

The mineral paragenesis observed in the samples of the tailings is from most to least important: sphalerite, galena, pyrite, marcasite and chalcopyrite. Gangue is formed of quartz and carbonates (the last one to a lesser extent). Also there is a presence of accessory minerals of pyrrhotite and boulangerite.

The mineralization is associated with silicified zones and is subparallel to the foliation, and it is present usually as massive or slightly banded units interbedded in the host rocks. Although sometimes it may appear as disseminations or filling cracks, which seems to indicate a syngenetic origin, without ruling out epigenetic phenomena as a result of subsequent remobilizations.

4.7 Origen of mineralization

There are several factors to consider for establishing the possible origin of the mineralization.

The metallogenic studies indicate that mineralization is low temperature, noting the abundance of cataclasis or deformation phenomena that affect the filling of the veins, such as the existence of shears and tectonic cataclasis in sphalerite and deformations more plastic in galena, as well as mortar and shade pressure textures in the quartz, which indicates that the mineralization is fundamentally syntectonic, although logically it is not included local remobilization that take place later.

The relationship of the mineralized shear zones is based on:

- Apparent structural control of the ore bodies
- Parallelism between mineralization and vein
- Intense deformation undergone
- Strong silicification

Of all the 33 mineralized levels studied in the cores, 76% are related to intraformational breccias or slumps, while the rest (24%) are related with greywacke leves more or less silicified, but Zn and Pb contents of these latter are significantly lower.

The common link between mineralization and intraformation breccias and slumps suggests that these facies are areas favorable for the emplacement of mineralization, because they have good condition of original porosity, and also in the rest of the facies the mineralization appears sporadically and always filling cracks.

There is a clear structural control of mineralization, but there is a close relationship between the ore bodies and facies of intraformational breccias and slumps, leading to the origin of the mineralization as confusing.

The absence of thermal metamorphism and granitic outcrops (the closest are about 20 km from the study area), indicates that the mineralized bodies are due to mineralizing solutions that have originated from low temperature environments.

Associated with the second Hercynian phase, which in the study area and in other areas of Extremadura is a phase of inhomogeneous deformation, it develops parallel shears to the foliation easily identifiable because the silicification that occurs in them. Simultaneous to the development of the shears there is fluid mobilization which is confined in the gaps parallel to the foliation that previously had functioned as planes of movement of the shear. From the mentioned fluids occurs quartz precipitation, carbonates and sulphides, this precipitation is from late to post-kinematic with regards to deformation produced by the second phase, in San Roque and San Fernando.

There are two later stages of remobilization related to development of quartz Q2 and Q3, which do not have economic interest.

Associated with silicified zones:

The mineralization of Pb-Zn-Cu-Sb of Aldeacentenera area are associated with silicified zones that developed in the late stages of the second Hercynian phase. This phase that produced inhomogeneous deformation was responsible for the placement of granites in Centro Extremeño Center.

Thus the age attributed to Pb-Zn mineralization of San Roque by IGME (1984) is in the point of view too old (stage 1, pre-granitic intrusions)

Mineralization associated with late fractures:

In the mapped area three occurrences have been identified associated with late fractures:

With abundant secondary Cu (malachite-azurite) located at the Rio Berzocana, on an important vein recognized with a length of more than 1km and NE-SW strike. The fractured area is about 2m thick and within it there is an area (50 cm) more brecciated in which the ore is found, associated with quartz, cementing the grain of the host rock. It could be a SW extension of La Favorita displaced northward or other parallel fracture. The presence of native silver, was detected in the microscopic study,

Mining conclusions:

There is existing mineralization in the area of Zn, Pb, Cu and Sb. It has been differentiated into two types of occurrences:

1- Associated to silicified zones of second stages.

- San Roque -San Fernando (Zn-Pb-Cu)
- Villuercas -Alcornocal (Cu)
- Las Hambrientas -Pozo Canela (Sb)

2 - Associated with late fractures

- La Favorita (Cu)
- La Suerte (Sb)

The first type is more abundant and has greater economic importance than the second.

Except Cu occurrences, Alcornocal and Villuercas, all other are known since ancient times and were object of mining operations. The most important exploitation was the San Roque Mining Group, inactive since 1964.

The best known mineralization is San Roque-San Fernando. Seems to be low temperature, Blenda-galena-pyrite-chalcopyrite type with quartz and carbonate (ankerite) gangue. The mineral is cementing the quartz carbonate veins, parallel to the foliation, whose crystals grow perpendicular to walls and preferably not deformed.

4.8 Soil Geochemistry

1379 samples were taken according to a grid of 25 x 100 on an area of 6 km². This mesh has not been constant. In some areas a mesh of 50 x 100 has been used and others with a more distant and less favorable size, 50 x 200. In certain areas with evident contamination, sampling has been avoided, so there are some localities without samples.

The elements analyzed are Pb-Cu-Zn-Hg and Sb. The latter two are included for information on mineralization at depth. All elements were analysed by atomic absorption.

In conclusion

- Cu and Sb, are located outside of the mineralization.
- Only has detected an anomaly of Pb-Zn (anomaly A), located east of San Roque which corresponds to the mineralization known San Fernando and denouncing a rather meager surface development apart from polluting effects of tailings and paths.
- A clear grouping of Hg (Anomaly B) do not coincide with high values of Pb-Zn, which, in principle, can be regarded as an indicator of depth appears mineralization.
- A field survey of the anomalous areas revealed the relationship between the anomalies with the tailings from San Fernando, which makes discard this area for future work.
- The anomaly of mercury is poorly defined and it would be necessary to sample on east of the area to delimit it accurately before undertaking follow-up work.

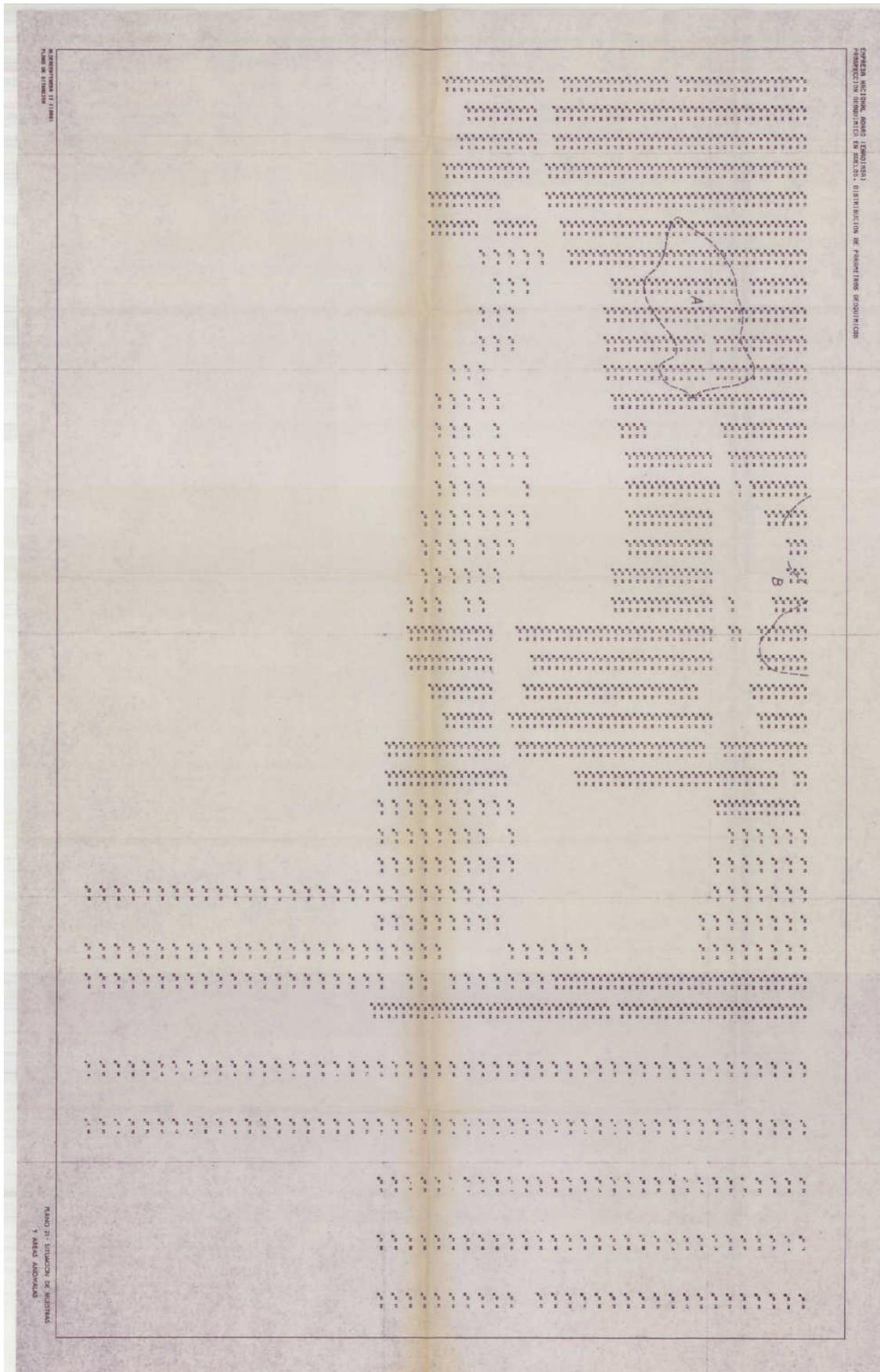


Fig. 9 Location of anomalous areas, results of the soil sampling

4.9 Stream Geochemistry

In December 1981 a geochemical survey was conducted in streams with sampling and analysis for Pb, Zn and Cu of 418 samples with a spacing of 500 m. between samples. As a result five anomalous zones of Pb and Zn (AL-1, AL-2, AL-3, AL-4, AL-5) were detected.

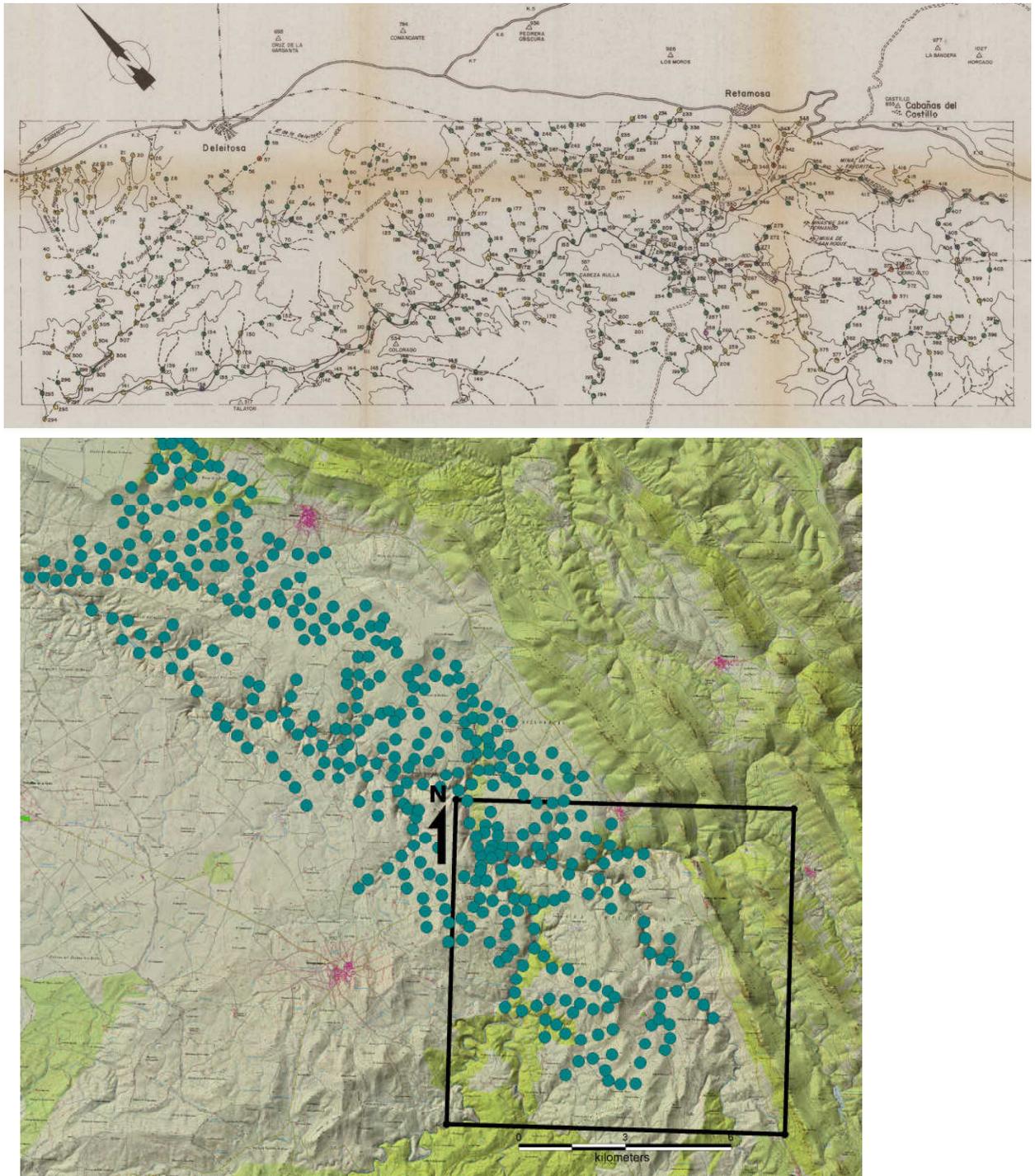


Fig.10 Stream Sampling carried out by IGME in 1981

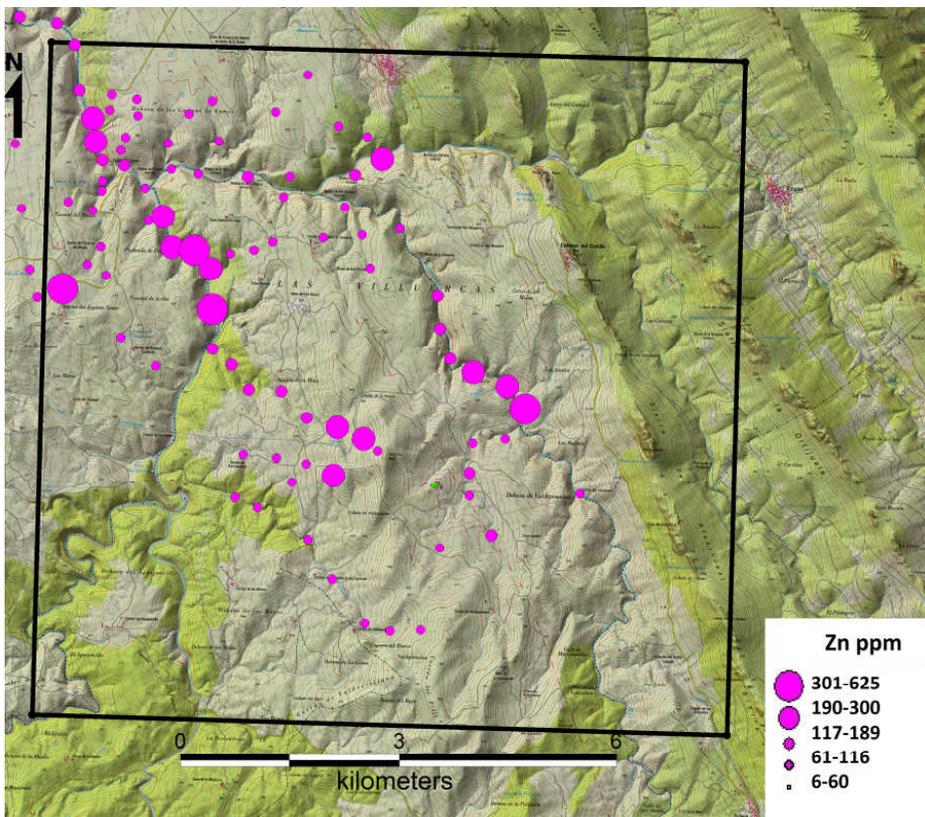
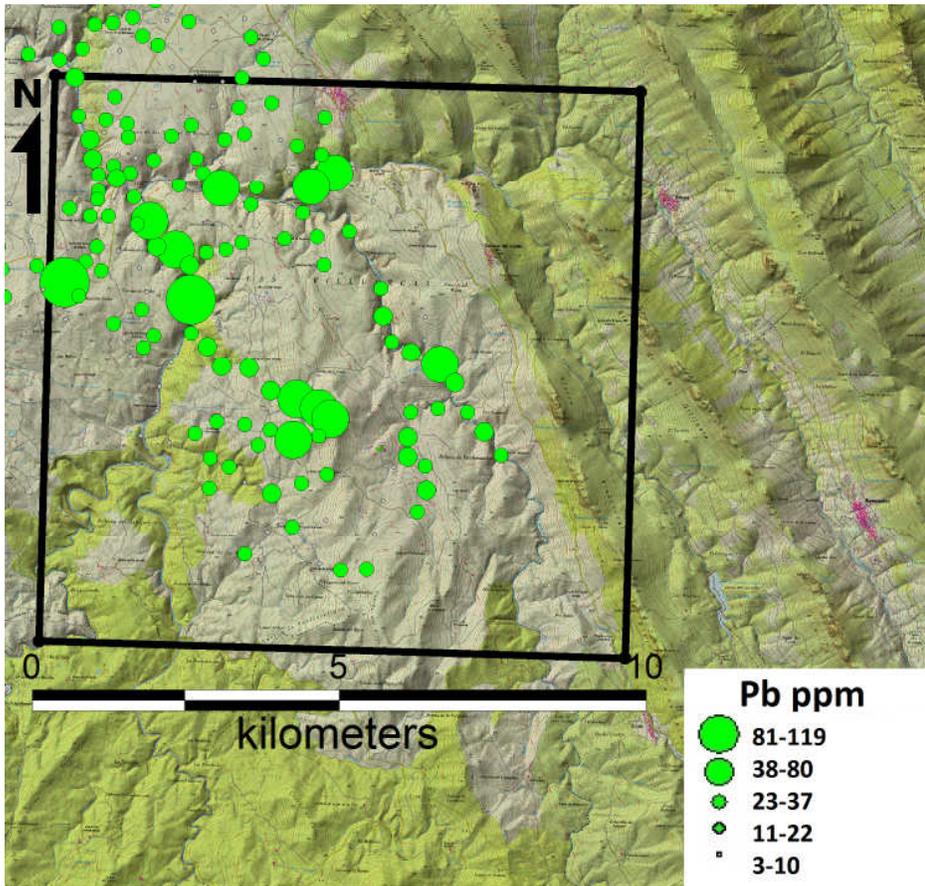


Fig. 11 Geochemical map of Pb and Zn from the samples taken by IGME

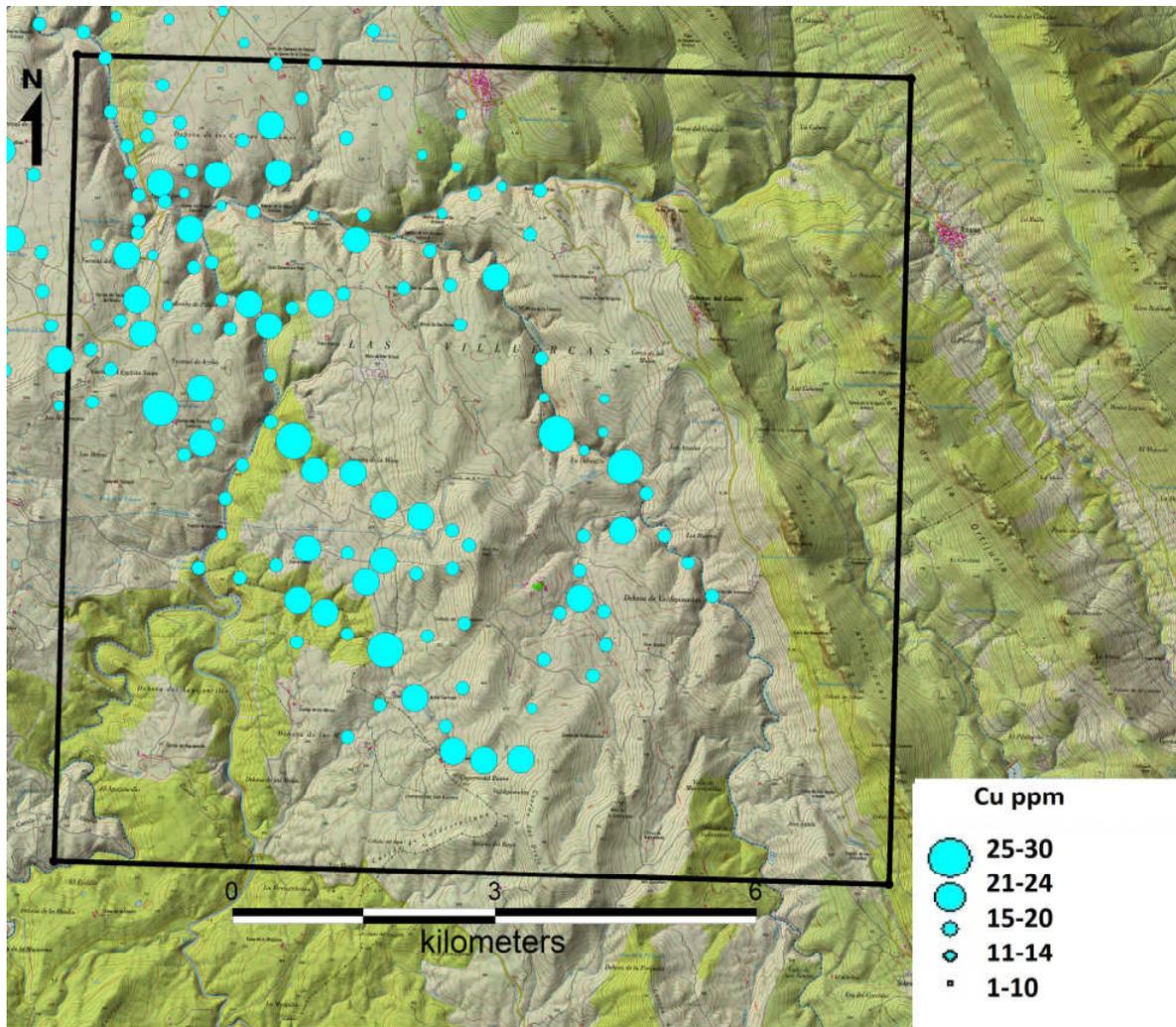


Fig. 12 Geochemical map of Cu from the samples taken by IGME

4.10 Trenches

The absence of soil geochemistry anomalies and the low resolving power of geophysical prospecting methods-tested by the IGME- led to abandon indirect survey methods and raise the need to cut through pits of potential orebodies located in the North and South of San Roque and San Fernando.

The high degree of weathering that causes the original sulfides contained in the veins have disappeared almost entirely and there is no more than mass of iron oxides, which greatly hindered the investigation. For this reason they have not been sampled in the pits for chemical analysis.

4.11 Drill Holes

The trenches have highlighted, in the northern and southern extensions of San Roque, a set of veins whose mining interest can only be confirmed by drilling.

There are nine drill holes and have a strike of W-E and a dip of 45°, the machines used were Neptune 1500 and Neptune 2000. It has been done with continuous core extraction using a wireline and diameters ranged between 82 and 47 mm. The recovery was at most close to 100%. A total of 2,054 meters has been drilled.



Fig.13 Drills Holes Locations

Core SSR 1 (Column No. 35) 180 meters.

(x: 280470, y: 4380730; z: 549)

The geology is inverted in all the core.

The cut materials are predominantly pelitic-greywacke alternations on thin banks interbedded with some several meters of massive greywackes. There is no much quartz veins. Only in the meter 138 there is a wide quartz vein followed by a tectonized zone, all without visible mineralization.

This drill hole confirms the absence of mineralized veins in north of the San Roque fault in this area.

Core SSR 2 (Column No. 36) 243 meters

(X: 280405, y: 4379655; z: 541)

The geology is normal until the meter 17 from which is inverted to 107, and then returns to be normal until about 178 meters where again be reversed until the end of the core.

The step from normal to inverse geology is not well defined. The materials are predominantly alternating shales and greywackes in millimeter to decimetre banks with some wide banks (5-10 m) of massive greywackes, especially in the 111 to 122 m and 157 to 171.

There are veins of quartz frequent, some mineralized with sphalerite visible mainly in themeters165,173, 175, 205, 208 and 228.

Core SSR 3 (Column n° 37) 244 meters

(X: 280460, y: 4379215, x: 552).

The geology is normal until the 143 meter and thereafter, inverse.

The materials are predominantly alternating shales and greywackes, with some banks of massive greywacke of 1-4 m thick.

Very abundant quartz veins had been cut with 1 meter wide all without mineralization.

With this core was confirmed the suspicion that practically there is no mineralized veins in relation to the normal flank of the anticline of San Roque.

Core SSR 4 (Column No. 38) 265 meters

(X: 280650, y: '4 .379.370, z: 560)

The geology is inverted in all the core. The materials are predominantly alternating shales and greywackes. There are wide sections of massive greywackes throughout the core (width to 12 meters). The mineralized veins occur throughout the core, the wide is up to 35 cm and the Zn contain is significant.

This core confirms the southward extension of San Roque veins, known in previous campaigns.

Core SSR 5 (Column No. 39) 240 meters.

(X: 280610, y: 4379205; z: 563)

The geology is inverted until meter 25, where is normal up to 57, being then inverted through. The structure is repeated on the core SSR2 regarding the hinge of the anticline of San Roque.

The materials are greywacke-pelitic alternations with abundant massive greywacke banks up to 20 meters thick in the second half of the survey. The quartz veins are abundant but poorly mineralized (meters 64, 97, 102, 108, 170, 176, 178 and 255).

This core confirms, like the SSR 4, the southward extension of the veins of San Roque.

Core SSR 6(Column No. 40) 215 meters.

(X: 280570, y: 4378930; z: 556)

The series is inverted in all the core. The materials are predominantly greywacke-pelitic alternations with few massive levels of greywacke up to 5 m thick.

The quartz veins are abundant although scarcely mineralized and very low content (meters 149, 153 and 119).

This core seems to indicate the southern limit of San Roque Veins.

Core SSR 7(Column No. 41) 233 meters

(X: 280745, y: 4378740; z: 558)

The geology is inverted in all the core. The materials are predominantly greywacke-pelitic alternations with low massive levels of greywacke. Abundant quartz veins but generally poorly mineralized.

This core, with the SSR-6 and SSR-8 seems to confirm the no extension of the vein set of San Roque to the South.

Core SSR 8 (Column No. 42) 230 meters

(X: 280580, y: 4378735; z: 545)

The geology is inverted in the whole core. The materials are predominantly greywacke-pelitic alternations with low massive levels of greywacke. The quartz veins are abundant but very poorly mineralized in general.

This core confirms, with the two previous, the end to south of SSR 5, of San Roque mineralized veins.

Core SSR 9 (Column No. 43) 201 meters

(X: 280410, y: 4379405; z: 541)

The geology is normal until the meter 45 from which is inverse. This change correspond to the hinge of the anticline of San Roque, as in SSR-2 and SSR-S.

The materials are predominantly greywacke-pelitic alternations with abundance of massive greywacke levels in the central part of the core. The quartz veins are abundant although mineralized only a vein in the meter 65 is mineralized.

This core confirms, as SSR 2 and SSR 3, the absence of mineralization in the normal flank of San Roque anticline.

Conclusion of the drill holes:

From the columns of the cores, they have shown in a serie of sections (map No. 64) in which interpolating cutoff from the cores with mineralized veins and assigning to these veins a dip of 70 ° westward, it has been drawn its theoretical traces in surface (map N° 64 and 30). In general these superficial traces coincide with the veins cut in the trenches, confirming the validity of the applied angle of dip.

Seven ore bodies have been identified corresponding to veins whose line is obtained by joining cutoff points in the cores.

Besides these seven major veins there are quartz veins with millimeter and centimeter widths sometimes also mineralized, which are not considered to be generally isolated and therefore would not be exploitable.

The limits of the vein field are defined as:

-To the North, San Roque fault, with strike ENE-WSW , beyond which no mineralized veins appear. Probably San Fernando veins are its continuation.

-To the South, from the core SSR5 do not appear mineralized veins and it seems that is not a precise limit, but to be coined.

-To the West, the hinge of the San Roque Anticline, in whose normal flank (west) appears veins, but not mineralized.

-To the East, it has not located any structure that explains the no presence of veins beyond the vein VII.

Thereby a vein field is delimited with a maximum length of 1200 meters and a width of 300 meters associated with a shear zone.

It was impossible to study the total meters drilled (4,524 m '26) for limited time, so six cores were elected in June, with a total of 1299'95 m, for which the minimum observations were made to obtain a first characterization. The cores used are: SR-5, SR-6, SR-7, SR-10, SR-14 and SR-18.

4.12 Economic Interests

In summary, the present study it can be concluded that there is data to suspect a potential economic interest of the studied bodies. This interest will primarily focus on two types of options:

- 1) Primary sulfides (base-metals), especially Cu.
- 2) Noble metals, especially silver, apparently related to supergene processes linked to the oxidation zone. No detected supergene enrichment processes of Cu.

In our view the mining potential of the study area still cannot conclusively be determined due to lack of subsurface information in areas away from San Roque-San Fernando.

With the level of information available it can be accepted that the width of the known orebodies in San Fernando-San Roque is very small (decimeter) and separation between them excessively large (decametric to hectometric). However the recognized length of this ore bodies is large (kilometer).

However this study has highlighted the abundance of silicified zones of San Roque type, although the most frequent individual widths ranging are from 25 to 50 cm, it was found that often grouped in bundles in which the linear frequency more probably it is between 0.1 and 1 vein/m and with a maximum width of 5 m. Also in some cases the vein sets are grouped into corridors with hectometric widths (North Sector).

If we admit that the silicified zones (Q1) of second phase were potential deposits without surface expression mineralized (occurrences), it is clear that the mining and economic potential of the area would be huge not only for its wealth but by the geometric features of some of them, likely to benefit the open pit.

The research should seek to recognize, by soil geochemistry, trenches and drill holes, the North and South extensions of San Roque and San Fernando and the area AL-5 (new geochemical anomaly).

4.13 Reserves Estimation

The area of San Roque deposit has recognized a vein field with seven main bodies defined, with 1,297,350 tons at an average grade of 0.82% Pb and 6'59% Zn. The vein field is extend to a maximum length of 1,200 m, with a total width of 300 m and a recognized maximum depth of 250 m. Being separated between 20 m and 60 m,

as minimum distance and maximum respectively. The strike of these bodies is N15°E and dip 70 ° W.

From the number of inferred tonnage would have to remove the tonnage already exploded in San Roque Mining Group, which for lack of accurate data on its operation has not been calculated. However, the exploited area affects at least 3veins with a maximum length of approximately 200 m and 50 m depth recognized.

Vein Number	Length (m)	Depth (m)	Medium Thickness (m)	Tonnage	Pb (Tn)	Zn (Tn)
1	140	140	0,63	35809	8,59	1554,11
2	440	90	0,38	43639	672,04	2277,96
3	690	11	0,71	142071	667,73	6009,6
4	540	160	0,99	248054	2505,35	28278,16
5	600	210	1,14	416556	4248,87	24618,46
6	490	250	0,63	223807	2081,41	12801,76
7	500	235	0,55	187412	468,56	9989,06
Total				1297350	1652,52	85529,11
					0,82%	6,59%

***Estimated Density: 2,9**

Reference: IGME report-6502_0005 (Informe final de trabajos 1985-87, MEMORIA; Final Report of Works from 1985-87, MEMORY)

4.14 Conclusion

From studies, we have obtained a number of conclusions that are indicated below:

- The study area is located in a regional paleogeographic context, being framed in a wide transition zone between slope facies and deeper marine facies.

In the materials studied, we have characterized the structures, facies sequences and the most frequent.

- The general features of the average sedimentation deposits correspond to intermediate and outer fan.

- When there is a close relationship between ore bodies and specific facies consist of slumps and intraformational breccias. Although it is recognized as a factor of more visible structural concentration, one cannot rule out primary origin of the mineralization for establishing genetic hypothesis.

Have been identified and mapped numerous bundles of fractures and silicified throughout the area, both in the San Roque (map n° 4 to 12) and the remaining area of the Reserve (drawing No. 4).

The estimated tonnage is about 1.3×10^6 t with an average grade of 0.82% Pb and 6.59% Zn. With the current price of Zn and Pb it has a little economic interest, both for

its overall dimensions, as for being far apart and low thickness bodies. In any case, should be deducted from the total reserve, and the already exploited, which has a length of approximately 200 m and a depth exceeding 50 m.

However, if the price of Zn and Pb had a significant economic assessment, should be consider the feasibility of carrying out the operation of the San Roque Mining Group, given the longitudinal extension presenting vein field.

5. La favorita

The site is an example of kind of copper mineralization from the last hercynian. The mineralogy, textures and geochemistry of the ore was studied by light microscopy and in thin sections and polished sections; X-ray diffraction (XRD), electron microscopy (EPMA), X-ray fluorescence (XRF) and atomic emission spectrometry (IcpAES).

The mine La Favorita is a small-scale operation, idle day today, in which copper minerals were extracted.

The site of La Favorita is formed by a beam Philonian consists of three main veins orientation $N35^{\circ} - 45^{\circ} / 90^{\circ}$. Becomes a length of 500 meters and the thickness of each vein is between 1-1.5 meters. Hydrothermal alterations appear. Silicification processes and apatitizacion are closely related to the proportion of metallic phases, so that the more intense of these, the greater the amount of sulfides.

The electron microprobe analyzes as well as ICPAES have revealed abnormal levels in certain elements having the sulfided phases. The chalcopyrite analyzed have values are Sn to 2%, Moup to 5800 ppm, 2400 ppm Pb, Bi up to 1900 ppm,, 680 ppm and Ag up to 470 ppm Sb. In some cases appear centered chalcopyrite with up to **500 ppm Au and Pt to 1300 ppm**. Sphalerite and chalcopyrite are often associated. The whole mineralization has content of 5.1%, 2% Cu, 1100ppm Ni, 800 ppm Zn, 600 ppm As, 400 ppm Sb and Co, 200 ppm Pb and 33 ppm Ag. Regarding the genesis of the deposit, it was due generate tension shear fragile condition. Mineralizing fluids could be related or not, with igneous bodies outcropping and the host rock is a metamorphic rock, although it is likely to have a mixed origin.

6. Villuercas's Vein

These zones are silicified from second phase, it is the same type as those observed in San Roque but surface mineralization has Cu as secondary minerals (malachite).

The occurrence at Villuercas consists of sections which are displaced from the same vein affected by a fracture with a sinistral WNE-SW direction. It is located in the NE section of the map area and crosses the River Almonte and Retamosa-Solana Road.

The most striking evidence of this is the size of the structure in which it is located, that area has been recognized in more than 15 km with varying thickness between 5 and 20 m, and the abundance of oxidized products that in places are reminiscent of a possible "gossan".

The average orientation of the vein is 165 SW 55. Limited by Ordovician quartzites which are in contact with the materials that constitute the CEG (complejo esquistos grauváquico) which is the host rock to the veins.

On the road, south of Almonte, and thanks to some recent works on the banks of it, outcrop can be seen showing the Villuercas vein. We can identify: 1) highly oxidized zone with traces of carbonates of about 5 m thickness; with a thickness of about 20 m. 2) Zone dominated by host rock (phyllite and greywacke) crossed by very tectonized numerous quartz veins with carbonates and silicified toward more thickness to the roof 10 m 3) Very rusty area quartz and carbonates (5 m thickness) with Cu visible.

Samples from each of the three sections gave anomalous values of Cu (7400 ppm) and Ag (99 ppm) in the third section (Sample 100-FQ ALDEA E-1). Content in Pb (120 ppm) and 21 ppm Zn, decreased gradually towards the bottom, like Cu and Ag, with values of 70 ppm Cu, Pb and Zn 10 ppm 15 ppm in the second section and Cu values of 13 ppm, Pb <10 ppm, 8 ppm Zn and Ag <2 ppm in the first section (Sample ALDEA-FQ-100-E-3).

It was considered of great interest to recognize by a drill hole three unoxidized sections of the Villuercas veins (see section 5.2), and to study the potential litho-geochemistry by metallic elements in the host rock of Villuercas veins. Regarding the occurrence, Villuercas cannot be regarded as a resource before it has been traced to depth by drill holes in order to confirm the presence of primary mineralization and characterized appropriately. If the results were positive, dimensions of the structure show that it could host a huge reservoir.

The presence of mineralization in this vein was evident in the geological and mining 1:5000 scale study's.

However, the contents of Pb, Cu, Zn and Ag surface samples are encouraging in some cases, so it was considered necessary to make a probe to determine the depth extension of the mineralized structures, their development and content. This survey was located

west of the vein and with an inclination of 45 °, the maximum allowed by the machine used (Neptune 1500), in order to cut the structures with the lowest possible angle.

Core SV-1 (Column N° 19)

Coordinates (x: 283.300, and: 4,382,050; z: 485) ..

The materials are greywakes banks and shales in low thickness (millimeter and centimeter) with ill-defined boundaries trasposición due to the high degree of tectonización. The quartz veins are also very frequent remobilization and form a anastomosed network on the rock.

The most intensely tectonized and greater proportion of quartz veins area is between 41.5 and 57.7 meters that corresponds to what constitutes the outcropping quartz core of Villuerca vein.

After this stretch and many veins appear centimetric quartz veins along the probe.

The contents of Pb, Zn and Ag are very low, the maximum of Zn is at 199 meter reef with 840 ppm. The Pb gives a maximum of 28 ppm silver and less than 2 ppm.

These low contents induce rejected this area, then, although the development of this structure in surface and depth is significant and promising aspect would have to present a much greater grade that raised a continuation of the investigation.

7. Retamosa west

7.1 Geochemical prospecting in the drainage

The area displayed stands next to the works of San Roque and San Fernando. It occupies a strip which lies to the east of the workings and extending south and north, with the same direction as the veins. The samples were analyzed for Pb, Cu, Zn, Sb and Hg by Atomic Absorption. When the plans for distribution of elements is overlap with the veins, it is found that those bodies that may be leading to the presence of anomalous samples, to a narrow band, are limited to the northwest quadrant of the survey area, with a length of around 1,300m and a width not exceeding 200m. This body is positioned parallel to the veins leading to the mineralization of San Roque and San Fernando and would, therefore, a new system that can be mineralized.

7.2 Drill Holes

Drill hole SWR 1 (Column No. 16)

(X: 280710, y: 4383305; z: 566)

Stratigraphic and tectonic criteria indicate that the series is reversed throughout the survey.

Overall in the upper most abundant detrital material (greywacke) being towards the end of the survey most abundant shales, which appear in banks several meters without almost greywakes collations.

The veins are abundant in 53 to 66 meters, 98 to 108 and 144 to 154. They are white quartz veins, ie hydrothermal appearance and little or no tectonized.

The contents of Pb, Zn and Ag do not exceed 125, 107 and <2 ppm, respectively, so we can say that they are almost non-mineralized.

Core SWR-2 (Column No. 17)

(X: 280510, y: 4383235; z: 547)

Criteria indicate that the polarity is reversed series throughout the core.

Are the predominant materials in alternation with pelitic and greywakes levels, the last in minor proportion.

In the level with 20 metres there is a level of conglomerates with some grains with centimeter and pelitic matrix.

There are veins in 8 to 14 meters and 104 to 121. They are white quartz veins with hydrothermal appearance and little tectonizado.

The contents are very low (max Pb: 70 ppm, Zn: 1060 ppm and Ag <2) so we can say, as in the previous survey, this area is poorly mineralized.

Core SWR-3 (See map # 18)

(X: 280385, y: 4383520; z: 547)

The cut materials are mostly detritus. Greywakes are fine to medium grained with few pelitic intercalations towards the end of the survey become greywakes massive medium to coarse grained.

No cut veins and cut materials do not exhibit anomalous contents or red colors and surface but the normal appearance of greywakes throughout the area.

7.3 Conclusion

From this drill hole campaign the following conclusions can be drawn:

- The series, as in much of the area of San Roque, is inverted and thus corresponds to a reverse side of a large structure.
- The cut materials are greywakes, similar to those of the rest of the area, perhaps with a sharper differentiation between lithologies and size of banks. Levels of conglomerates have also been cut.
- The veins cut correspond roughly to those recognized in surface and present a different aspect of San Roque, with white quartz, with a low grade of tectonic and without visible mineralization. This shortage of sulfur have been confirmed by the analysis: Pb contents are all less than 125 ppm, the Zn, less than 1.060 and silver, less than 2 ppm

8. Piojo Mine

“El Piojo” is located on a narrow strip of Upper Vendian age materials which are generically referred to as "banded shales" with the occasional occurrence of conglomeratic units. The materials are placed in a narrow syncline subparallel to the Villuercas Mountains.

There is evidence of having been worked prior to 1876, the date on which it was abandoned.

The mine was abandoned in 1876; the renewed interest of the mine is due to its similarity to the San Roque mineralization, as the vein is affected by the same tectonic episode resulting in mylonitization and a fine-grained mineral texture exhibiting both sphalerite and galena. The silicification of host rock is lower than in San Roque.

El Piojo is parallel to San Roque (approx. 170°) and the Berzocana-Cañamero fault, it is suggested that the vein from El Piojo is found on a parallel fracture subordinate from the main fault zone, as in San Roque Mine. El Piojo would be a mineralized vein from the first mineralizing phase and deformed during the Hercynian second phase.

No geochemical analysis has been undertaken on samples from this locality, therefore it is suggested that future work should be focused upon geochemical surveys, analysis of outcrop samples and geophysical surveys.

9. Aguijoncillo Mine

The "Mina del Aguijoncillo" (Garciaz) has a series of hydrothermal quartz veins with a centimeter thickness and a strike and dip of N90°E/25°-40°N. Breccia textures and undulating extinction in quartz are common.

The mineral assemblage consists of quartz and stibnite, with native antimony, arsenopyrite, carbonate (siderite), pyrite, chalcopyrite, and plagioclase; supergene processes have led to the occurrence of iron oxyhydroxides and marcasite.

The dominant hydrothermal alteration is silicification and to a lesser degree carbonatization and sericitization-muscovitization.

The multi-elemental analysis carried out on mineralized samples gives values of up to 9.4% of Sb, 4.8 ppm of Au and 4 ppm of Ag.

10. Drillholes Location

In total in Maria License there are 32 drill holes that give important information about the mineralization. The location of them is shown in the image below.

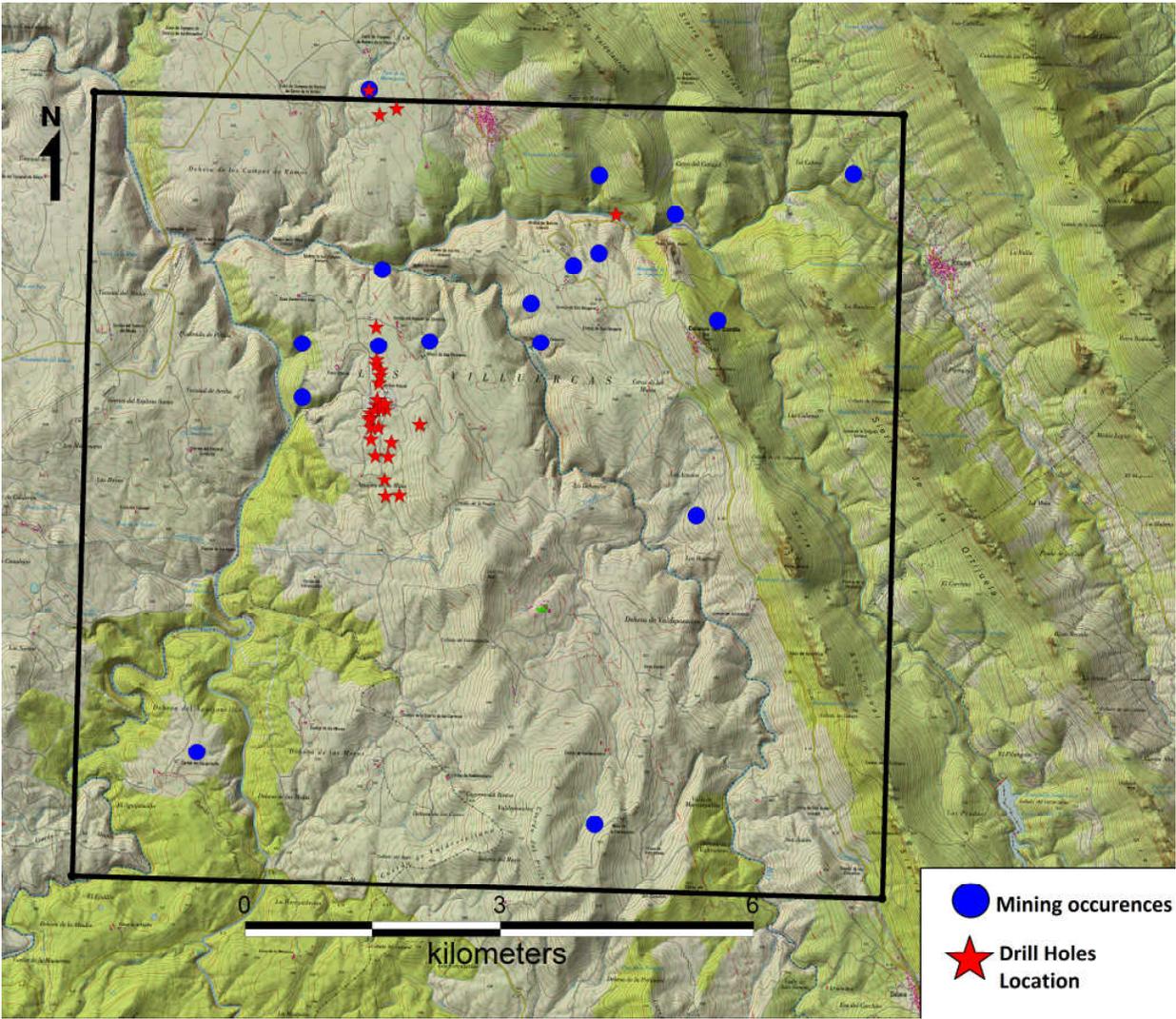


Fig. 14 Location of drill holes done by IGME

11. Conclusions

With the geological and mining studies we have been able to characterize the structures carrier sulphides mineralization as silicified zones, associated with the second phase (Q1) - composed of bundles of veins with sizes between 25 and 50 cm.

The width of the groups is usually around 20 meters and these are grouped in corridors with sizes up to 200 m. Their lengths of the order of 1 km.

The areas with most interest are San Roque - San Fernando where mineralization is low temperature with quartz and carbonate gangue. The crystals are generally slightly deformed, so that relative to the second phase is attributed an age post-kinematics. The geochemical prospecting in the eastern half of the study's area has revealed a number of anomalies corresponding with known evidence with a little interest. Recognition of surface of quartz veins in the study area has resulted in the location of areas of interest plus preferred San Roque: the Villuercas's vein and West Retamosa zone.

The Villuercas's vein is hosted in a large fracture zone included in a corridor of Phase 2 and consists of a series of quartz veins that form an intricate network in highly fractured shales and greywackes. Development has a surface of about 1 km.

The contents of Pb, Zn and Ag obtained in the drill holes and surface are very low (maximum: Pb: 28 ppm, Zn: 840 ppm and <2 ppm). In the "W Retamosa" area prospecting geochemistry in the drainage network has located an anomalous zone that corresponds to a group of veins that have been cut with trenches and drill holes.

The veins are grouped in bundles of 5 to 10 m thick, composed of dykes up to 20 cm thick. Drill holes have cut these veins and allowed to define them as of Q3, late, poorly mineralized and different from those of San Roque (Q1) type. The contents are generally very low (maximum: Pb: 125 ppm, Zn: 1.060 ppm Ag and 42 ppm).

Trenches were cut into the sandstone levels rich in Fe oxides that were studied for their potential interest, but the origin of the red colour appears to be related to recent supergene processes and have no associated mineralization.

More important studies have been undertaken in the San Roque area. The soil geochemical prospecting has led to two anomalies: one associated with the mineralization of San Fernando, already known, and Hg that remained poorly defined. The trenches have allowed one to define the Philonian field of San Roque on the north, south and west and check the poorly developed reefs of San Fernando and the area of drill hole SR-21.

The drill holes have provided the most complete information possible to define seven major veins, recognized depth and average size and its mineralization grade.

The groups of veins defined are 1,200 m high and 300 m wide.

The sedimentological study has allowed for the characterization of the structures, facies and more frequent sequences, framing the area of transition between slope facies and deeper marine facies with a sedimentary intermediate and outer fan.