Mineral Exploration Network

Summary Reports Tamuja Licence

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Contents

1. ABSTRACT:

Silver and lead ores were intensively mined in the Plasenzuela district during the 19th and the beginning of the 20th. centuries. The ores are contained in cement breccias or fill mainly E-W trending southwards dipping fractures. The five mines and the many smaller workings which constitute the district occur in a N-S belt approximately 10x3 Km in extent near the western contact of the Plasenzuela granitic stock.

Ore host rocks are the slightly metamorphosed detritic materials of the Precambrian Schist-Greywacke Complex, composed mainly of pelites with some interlayered volcanites. The most typical ores are arsenopyrite, pyrite, sphalerite, galena, chalcopyrite and silver-bearing sulphosalts; such as freieslebenite, freibergite and miargyrite in a quartz-siderite gangue. They define a meso-epithermal paragenesis and show typical hydrotermal infill textures, frequently zoned and occasionally cataclastic.

The alteration relating to the ores are usually low-grade, with the most widespread being silicification and carbonate alteration; but a peculiar form of sulphidization consisting of arsenopyrite diffusion produces narrow haloes around the veins.

Various similarities with the Coeur d'Alene deposits can be observed. The genesis is interpreted in terms of repeated fracturing associated with hydrotermal flow related to the Plasenzuela granite. The metallic content being possibly derived from the volcano-sedimentary sequences contained in the metamorphic aureole.

2. INTRODUCTION

MEN (Finland) has collected all the available information for the Tamuja group of mines obtained in Spain, in order to assess the potential for mining exploration in the area and plan the survey that will be undertaken.

Based on the historical results achieved by IGME (Spanish Mining Geological Institute) and SIGEO (System of Geological Information of Extremadura) it is believed that the Tamuja group of occurrences has a significant potential and deserves further exploration.

MEN (Fin) plans an intensive exploration campaign on the basis of a desktop data review done in the last year and the results obtained in the initial reconnaissance campaign.

The Tamuja group of occurrences are in different types of mineral licenses, almost all of them are found in Tamuja License, this is a investigation license, and a small group of them are in Trujillo Oeste License, an exploration license.

In Spain There are three types of mineral licenses, exploration license, investigation license and exploitation concession:

Exploration license will be awarded for studies and surveys that apply techniques that do not alter the terrain substantially. These are granted for a maximum period of one year, extendable for another year with a minimum length of 300 mining grids and maximum of 3,000.

Investigation license allows the holder the right to perform within its perimeter, studies and work to highlight and define one or more mineral resources, from sections C) or D), for subsequent exploitation. These are granted for a period that does not exceed three years, unless extended, and cannot exceed 300 mining grids.

Explotation concession, which may be direct or derived from previous investigation licenses, giving the holder the right to the use of the resource inside its perimeter. They are granted for a period of 30 years, renewable for two further periods of 30 years and a maximum extension of 100 mining grids.

The mines found in this area had a high productivity and were extensively developed, but unfortunately there are no maps of the workings or reliable data regarding grade, tonnages mined or the lithologies of the exploited mineralized bodies.

The principal mines are: Serafina , La Petra, La liebre, La Arrebatada and La Sevillana . In all of them there are pits that reach 270 m depth, inaccessible today, which are next to standing chimneys and historical mine constructions.

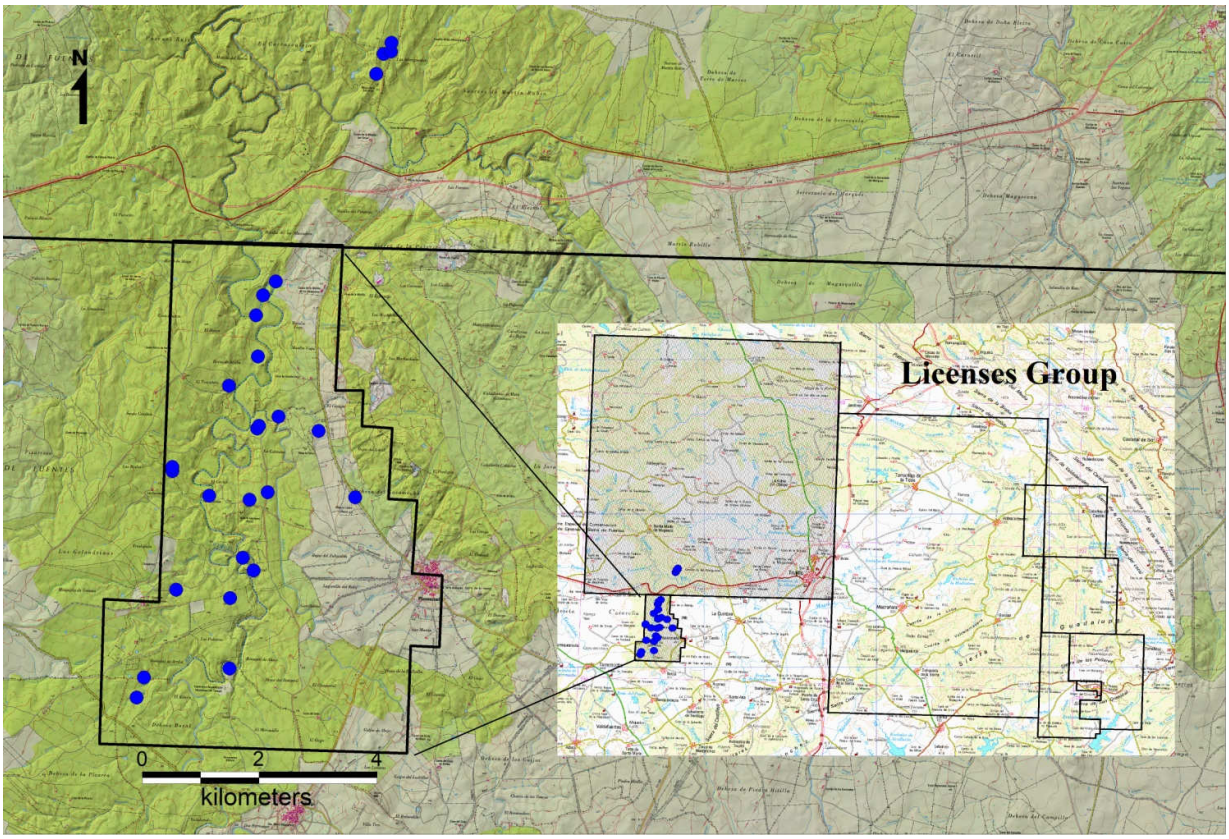

Fig. 1: Location of the Tamuja Investigation License and old mines.

3. GEOLOGY

The geology consists of a homogeneous series of banded slates, defined by alternating thin light horizons (Iimes and sand) and dark horizons (pelitic), with sporadic intercalations of greywackes and volcano-sedimentary units. On the eastern edge of granite, ductile shear zones with small extensions are observed, which are orientated N 10° to 20° W, with a northern displacement. The Plasenzuela granite is a stock with a concentric distribution of facies, with the most acidic and finer grained toward the outer boundaries.

The structure is complex because of the overlap of two Hercynian phases of deformation, the lack of guidance levels and lithological homogeneity make it difficult to reconstruct the structure. Macrostructures developed during the first phase were affected by igneous intrusions and also affected by later stages. The granite of Plasenzuela is a batholith which produced a halo of contact metamorphism of several hundred meters thick, in the Precambrian materials.

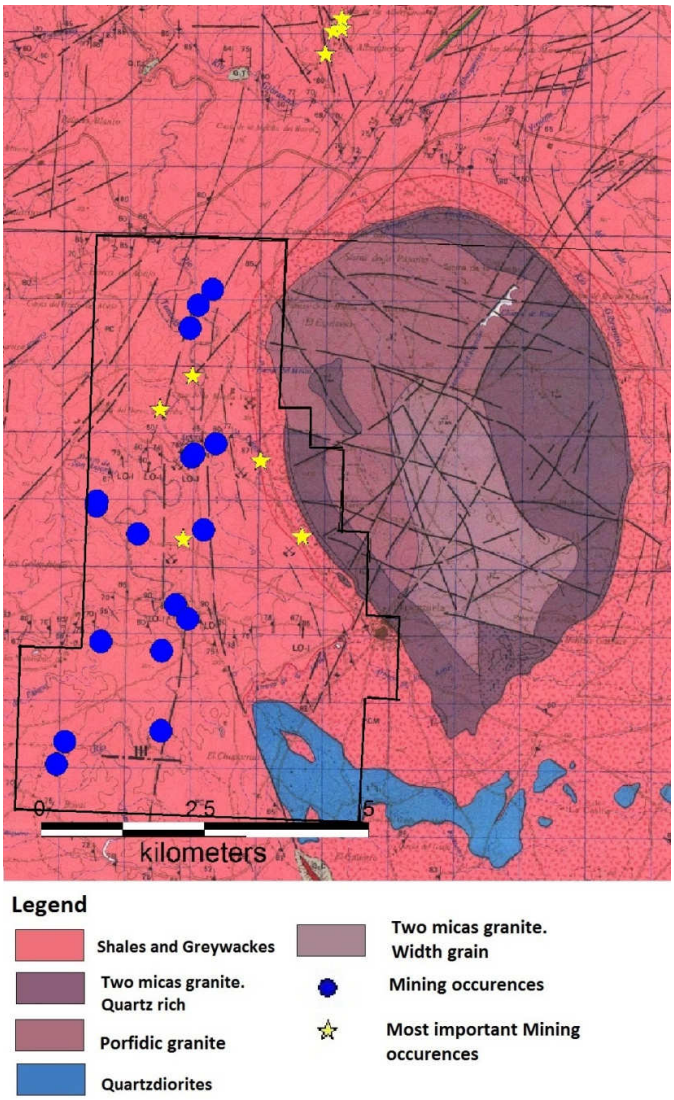

Fig. 2: Geology of the License Area and Mining occurrences

4. PLASENZUELA STOCK

The Plasenzuela pluton, like Trujillo's, has an elongated shape with a main NS orientation, intruding the ADE (Alogrupo Domo Extremadura) materials and presents a zonation of facies. On the northern edge, the dip of the contact is between 60° and 70°, while on the eastern edge contact is strongly vertical.

The granitic facies are differentiated on the basis of cartography, from the outer to the inner zones of the pluton are: an external leucogranite with muscovite and tourmaline; a two mica granite with albitization; and internal facies corresponding to a porphyritic biotite granite with varying amounts of cordierite. Medium grained granites with muscovite are as "patches" isolated in the inner zone of the pluton.

The geochemical content of U and Sn are higher than usual in this type of rock, therefore it would be classed as a "metalliferous granite".

5. HYDROTHERMALISM

The hydrothermal quartz veins can be classified into three types or generations, defined in relation to tectonic phases:

• Quartz Q0: Closely related to stratification and probably diagenetic in origin. In general they are very stretched and folded, with enlargements in the hinges of first phase folds. They are not mineralized.

• Quartz Q1: Parallel and orientated to the main foliation S1 or forming with it a small angle (0 to 20°) They are affected by the second phase crenulation and are mineralized.

• Quartz Q2: These are the youngest set of structures, which are not affected by crenulations and which fill late fractures. The veins have a tabular morphology or are filled with winding paths, in anastomosing networks and brecciated zones. These veins are those that have been most widely exploited. Their preferred strike are N-S and with a strike of E-W and dipping to the south.

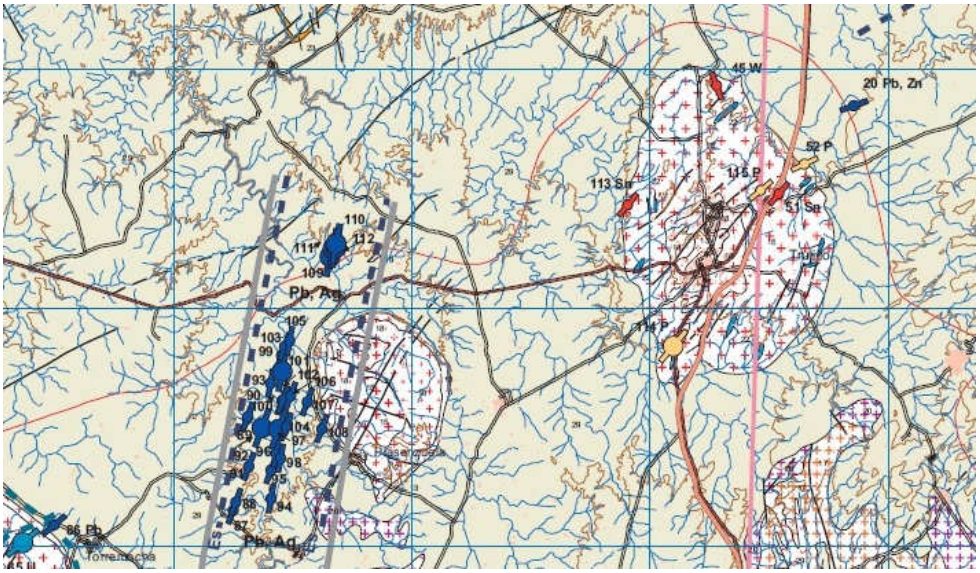

Fig.3: Plasenzuela and Trujillo Intrusions.

6. GENESIS

The veins themselves consist of mesothermal to meso-epithermal deposits of Pb-Zn-Ag, controlled by brittle deformation zones in detrital sediments (Upper Precambrian) weakly metamorphosed and spatially related with granitoids.

The Plasenzuela mine is a representative example of this style of mineralization. Twenty-six occurrences have been identified, with a dozen of old mines that are in the exocontact with the western edge of the stock and are contained within the Plasenzuela shales and greywackes (of Alogrupo Domo Extremadura, ADE). The assemblages are quite complex, with abundant sphalerite, galena, siderite and antimony sulphides and are characterized by their high content of Ag deposits. The most representative are “Grupo Minero La Sevillana”, "La Serafina" "Casa Blanca, "Petra", "The Snatched", "La liebre", "Carmen" and "Las Golondrinas" among others.

This group of mineralization is located within shales and greywackes of Alogrupo Domo Extremadura (ADE), close to the western edge of the Plasenzuela granitic stock. Mineralization occurs as irregular veins whose geometrical features are similar to those of a stockwork. It is recognized several groups of veins whose characteristics are difficult to estimate because the inaccessibility of the place, but do not exceed 300m in length and depth. The assemblage consists of sphalerite, galena, boulangerite, jamesonite, pyrite, arsenopyrite and chalcopyrite in quartz and siderite gangue. Sulfides have small grains and minerals are arranged in bands or "belts" within veins, or local breccia zones. It should be noted that the presence of Ag and Sb in galena and sulfosalts can be regarded as economically important.

The mineralization at the western edge of exocontact in the Plasenzuela granite suggests that the origin of the metals can be related to differentiated pegmatites. This set of mineralization, which is occupying second order structures, is probably related to a major deformation band (BCM, Montanchez shear band), which is approximately NW-SE and. Spatially, it consists of a large group of related occurrences of mineralization at the regional scale (Gumiel and Campos, 2002). The two largest holdings seem to have been “La Sevillana” and “La Serafina”.

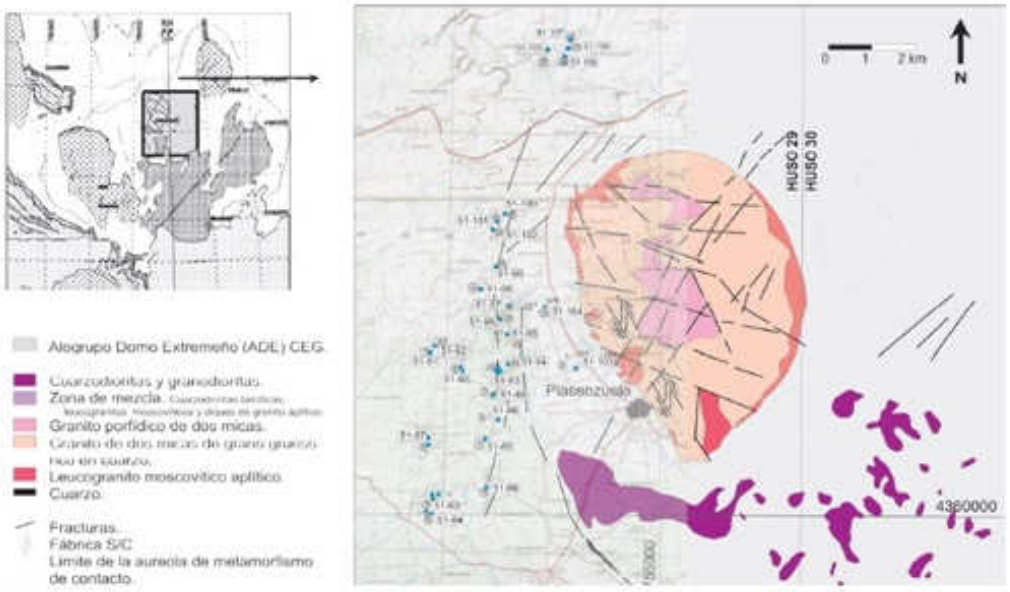

Fig.4: Mines Location West of the Intrusions

7. MINERALIZATION AND MINES

The geographical distribution of the mineralization configures an arc 10 km in length and 3 km wide, situated on the W- NW edge of the Plasenzuela granite. The area has been exploited in its entirety. There are innumerable tailings and shafts, although the main exploitations are in five places:

1. Mina La Serafina: It has been the most exploited, with three main shafts of 120, 211 and 277 meters depth, today inaccessible.

2-3. Mina del Horco and La arrebatada: Several inaccessible shafts up to 30 meters and numerous tailings inaccessible today .

4. Mina La Petra: There are two shallow inaccessible shafts.

5. Mina La Liebre: There is an inaccessible shaft of 80 meters.

6. Mina La Sevillana: After La Serafina is the most important, with several shafts up to 88 meters. In these mine workings there is are open galleries which allow for the study of in-situ mineralization. Main exploitations in La Sevillana were performed as inclined planes for fractures with E-W strike and dip of 20-30° to the south, where breccias cemented by quartz or tabular grains are present, represenatative of the the type Q2 type mineralized structures.

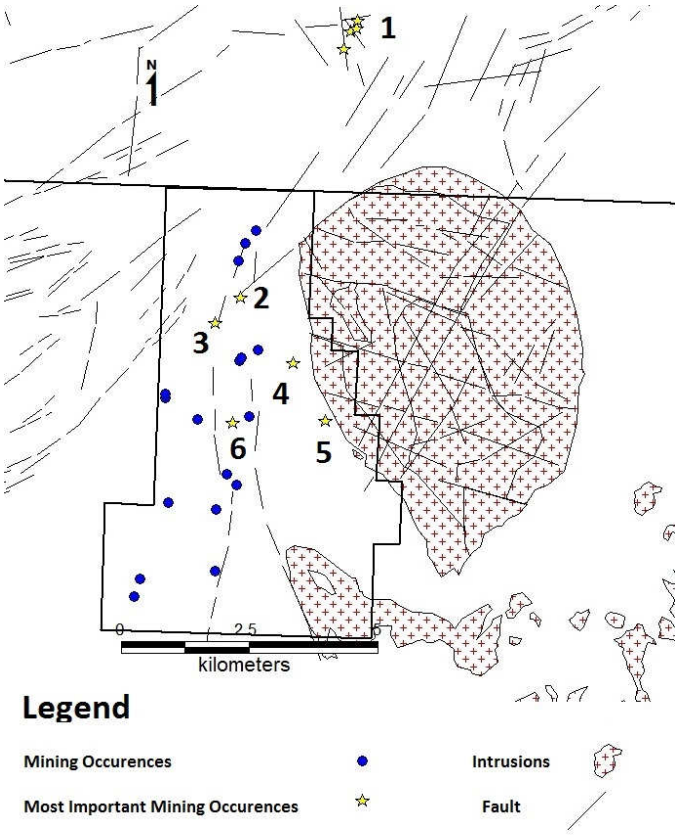

Fig.5: Location of the most important mining occurrences

This is essentially hydrothermal filling of sulfides, arsenic and antimony sulfides with quartz - carbonate gangue, which fills veins (Q1, Q2) and cements gaps in the host shale.

Argentiferous minerals are associated, on a microscopic scale, with galena, tetrahedrite, sphalerite, arsenopyrite, siderite (quartz) in fine aggregates, in small inclusions or cementing microfractures. Usually their grain size is fine to very fine.

8. METALLOGENIC

Number	X_UTM	Y_UTM	Name	Element	Mineralogy	Morfology	Litology
87	232457	4361503	Rincon Sur	Pb-Ag-Zn-Sb	qz,sl,gn,sag,spb, py, calc, ank, sid.	Vein 20º	Shale, Greywacke
88	232580	4361846	Rincon Norte	Pb-Ag-Zn-Sb	qz,sl,gn,sag,spb, py, calc, ank, sid.	Vein 20º	Shale, Greywacke
89	233066	4365372	La minilla Sur	Pb-Ag-Zn-Sb	qz,sl,gn,sag,spb, py, calc, ank, sid.	Vein 20º	Shale, Greywacke
90	233070	4365441	La minilla Norte	Pb-Ag-Zn-Sb	qz,sl,gn,sag,spb, py, calc, ank, sid.	Vein 20º	Shale, Greywacke
91	233131	4363343	Las Golondrinas	Pb-Ag-Zn-Sb	qz,sl,gn,sag,spb, py, calc, ank, sid.	Vein 20º	Shale, Greywacke
92	233699	4364949	El Carmen group	Pb-Ag-Zn-Sb	qz,sl,gn,sag,spb, py, calc, ank, sid.	Vein 20º	Shale, Greywacke
93	234035	4366831	La arrebatada	Pb-Ag-Zn-Sb	qz,sl,gn,sag,spb, py, calc, ank, sid.	Vein 20º	Shale, Greywacke
94	234044	4361999	Villasviejas	Pb-Ag-Zn-Sb	qz,sl,gn,sag,spb, py, calc, ank, sid.	Vein 20º	Shale, Greywacke
95	234054	4363201	Pozo Palacios	Pb-Ag-Zn-Sb	qz,sl,gn,sag,spb, py, calc, ank, sid.	Vein 20º	Shale, Greywacke
96	234270	4363888	North addit Las golondrinas	Pb-Ag-Zn-Sb	qz,sl,gn,sag,spb, py, calc, ank, sid.	Vein 20º	Shale, Greywacke
97	234386	4364883	La sevillana group	Pb-Ag-Zn-Sb	qz,sl,gn,sag,spb, py, calc, ank, sid.	Vein 20º	Shale, Greywacke
98	234456	4363675	las golondrias east	Pb-Ag-Zn-Sb	qz,sl,gn,sag,spb, py, calc, ank, sid.	Vein 20º	Shale, Greywacke
99	234496	4368033	trench Casa Blanca	Pb-Ag-Zn-Sb	qz,sl,gn,sag,spb, py, calc, ank, sid.	Vein 20º	Shale, Greywacke
100	234517	4366097	North shaft la sevillana	Pb-Ag-Zn-Sb	qz,sl,gn,sag,spb, py, calc, ank, sid.	Vein 20º	Shale, Greywacke
101	234529	4367329	North Horco	Pb-Ag-Zn-Sb	qz,sl,gn,sag,spb, py, calc, ank, sid.	Vein 20º	Shale, Greywacke
102	234550	4366145	Jabalí shaft	Pb-Ag-Zn-Sb	qz,sl,gn,sag,spb, py, calc, ank, sid.	Vein 20º	Shale, Greywacke
103	234619	4368375	Casa blanca shaft	Pb-Ag-Zn-Sb	qz,sl,gn,sag,spb, py, calc, ank, sid.	Vein 20º	Shale, Greywacke
104	234696	4365012	norht east shaft la sevillan	Pb-Ag-Zn-Sb	qz,sl,gn,sag,spb, py, calc, ank, sid.	Vein 20º	Shale, Greywacke
105	234835	4368611	Casa blanca group	Pb-Ag-Zn-Sb	qz,sl,gn,sag,spb, py, calc, ank, sid.	Vein 20º	Shale, Greywacke
106	234882	4366303	La dehesa	Pb-Ag-Zn-Sb	qz,sl,gn,sag,spb, py, calc, ank, sid.	Vein 20º	Shale, Greywacke
107	235567	4366057	Petra	Pb-Ag-Zn-Sb	qz,sl,gn,sag,spb, py, calc, ank, sid.	Vein 20º	Shale, Greywacke
108	236193	4364923	La liebre	Pb-Ag-Zn-Sb	qz,sl,gn,sag,spb, py, calc, ank, sid.	Vein 20º	Shale, Greywacke
109	236555	4372155	Serafina shaft 1899	Pb-Ag-Zn-Sb	qz,sl,gn,sag,spb, py, calc, ank, sid.	Vein 20º	Shale, Greywacke
110	236678	4372498	Serafina shaft	Pb-Ag-Zn-Sb	qz,sl,gn,sag,spb, py, calc, ank, sid.	Vein 10º,20º	Shale, Greywacke
111	236801	4372540	Round shaft serafina	Pb-Ag-Zn-Sb	qz,sl,gn,sag,spb, py, calc, ank, sid.	Vein 10º,20º	Shale, Greywacke
112	236811	4372689	Square shaft La serafina	Pb-Ag-Zn-Sb	qz,sl,gn,sag,spb, py, calc, ank, sid.	Vein 10º,20º	Shale, Greywacke

Table 1. Metallogenic Occurrences in Tamuja License

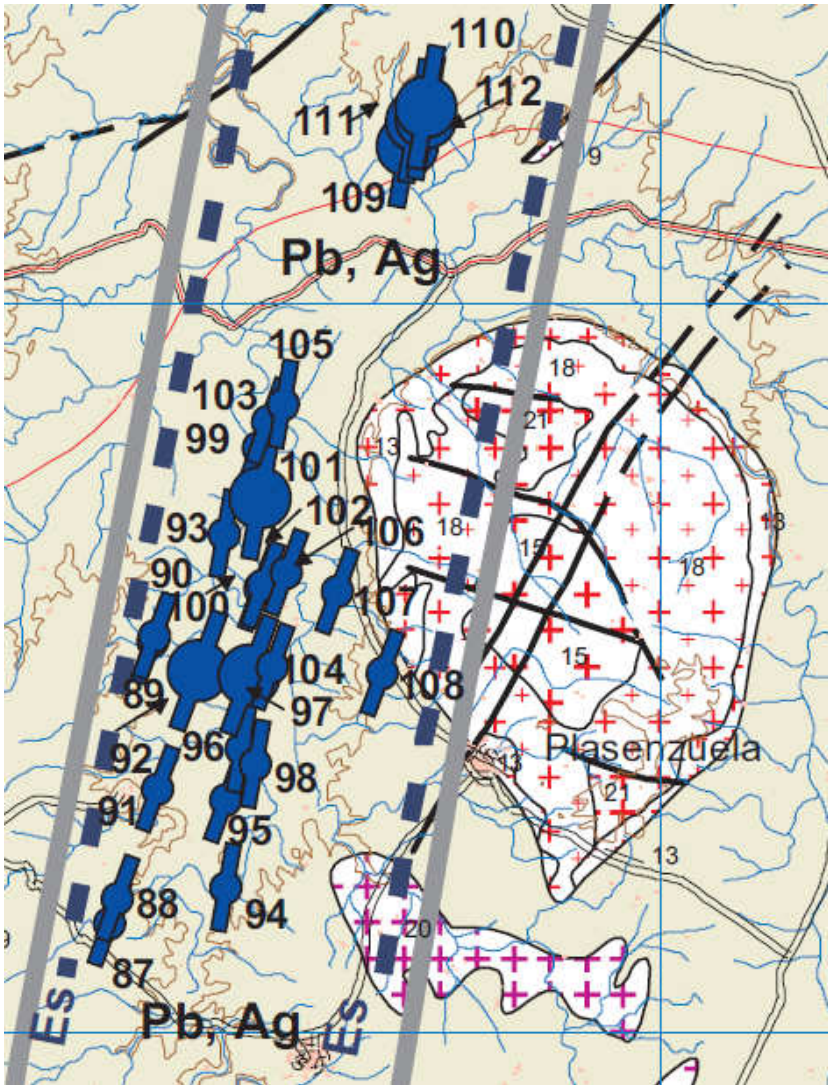

Fig. 6. Metallogenic Occurrences in Tamuja License

9. HISTORY

Mining Group La Sevillana, Plasenzuela (97, 100, 104)

There are some of the old buildings of these mines still standing today, which is testament to its historical importance. There are two main shafts and two other small shafts, to a depth of about 300m and the remains of a foundry. The tailings have been subsequently worked because the veins are not visible; it is difficult to find significant signs of mineralization. This mine ceased to be exploited in 1908.

Mining Group La Serafina (109 to 112)

There are three main pits, mining buildings and chimneys in a lineup of about 400 m. Although mineralized veins are exposed they have a maximum width of 1.75m, in which the sulfides were present at a thickness of 50cm. This mine was probably exploited by Romans because of its high silver content. It was exploited finally in 1914-1915, having started mining operations in 1860.

The argentiferous galena ore was coveted by Roman miners, although their main interest was focused on existing mineralization in Badajoz (Castuera, Llerena and Azuaga), they also exploited the underground mines in Berzocana and Plasenzuela, in Caceres.

Finally, although its peak took place in the late nineteenth century, the presence of silver, lead and zinc in this area of Extremadura were very important, highlighting the importance of the Plasenzuela mineralization (Caceres), namely mines La Serafina and La Sevillana among a very large group of sites. Therefore, its rich and varied fields of the same lithologies make this sector of the Extremadura metallogenic zone of high economic importance.

10. PREVIOUS WORK

IGME carried out a stream sampling in 1981, as a result 268 samples were taking in the area and allow us to create a geochemical map with Pb and Zn anomalies.

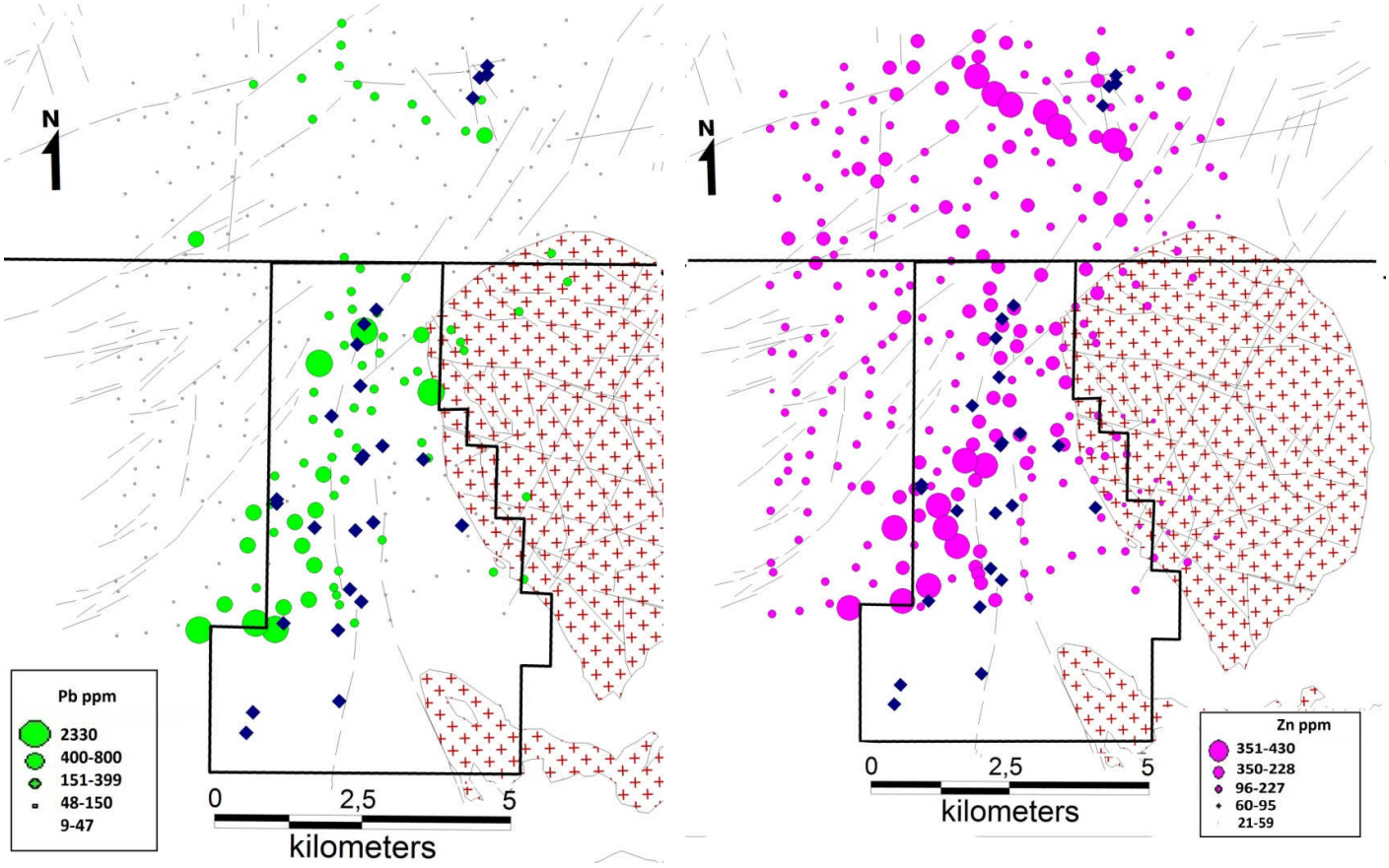

Fig. 7. Pb and Zn anomalies, from the samples taken by IGME

Also another study done by IGME, from 1986 to 1988, identified a mineralized body in the area of El Horco, It consists of a fracture zone with a strike of N18 °E and subvertical dip. It contains average grades of 1.11% for Pb, Zn 448gr/Tm, 30.43 gr/Tm Ag and 120 ppb Au. This vein is 320 meters long and is 50 m in depth, the estimated tonnage is 200,000 tonnes.

11. CONCLUSIONS

The area is a series of meso-(epi) thermal concentrations, tightly controlled by a phase of brittle deformation and genetically related with the intrusion of the Plasenzuela granite. Plasenzuela is responsible of the circulation of hydrothermal fluids; the metal content can be derived from a pre - enriched sedimentary cover. The paragenesis, which records a succession of episodes of brecciation and hydrothermal filling is complex and varied; at the beginning there is a deposition of siderite, arsenopyrite and quartz, followed by quartz, arsenopyrite , sulfides (pyrite, sphalerite, pyrrhotite , galena, chalcopyrite, marcasite) and tetrahedrite, freibergite or Ag-tennantite.

Also produced are the characteristic in-fill structures in the most typical veins consisting of: siderite and marginal arsenopyrite, quartz, sphalerite and sulfides in the center; finally, the precipitation of argentiferous sulfides took place, with freibergite, miargirita, pyrargyrite, polybasite, diskrazite, native silver and argentite. Simultaneously very limited alterations in the host rock occurred, especially silicification and dissemination of arsenopyrite. The evolution of the paragenesis indicates enrichment of fluids in Sb and Ag, which precipitate in meso-epithermal late stages, showing a higher thermal gradient in Mina La Serafina. Overall, there are similarities in metallogenesis with the Coeur d' Alene district, Idaho.

12. SUGGESTED EXPLORATION PROGRAMME

With the information available for this area and in order to assess the minning potential of Tamuja group occurrences the suggested exploration programme is:

-Create a 1:10.000 scale geological map that will try to define the most prospective areas. It will take representative rock samples, on which petrographic studies will be applied.

-Stream sediment and soil sampling, which allow us to create maps of geochemical anomalies for different elements, previous study in our laboratory by X-ray fluorescence and ICP-MS.

-Ground magnetics and electromagnetics, which will allow us create maps of any magnetic anomalies to identify the extent of the bodies.

-With the previous studies we will able to identify the areas with the greatest potential for a drilling campaign.