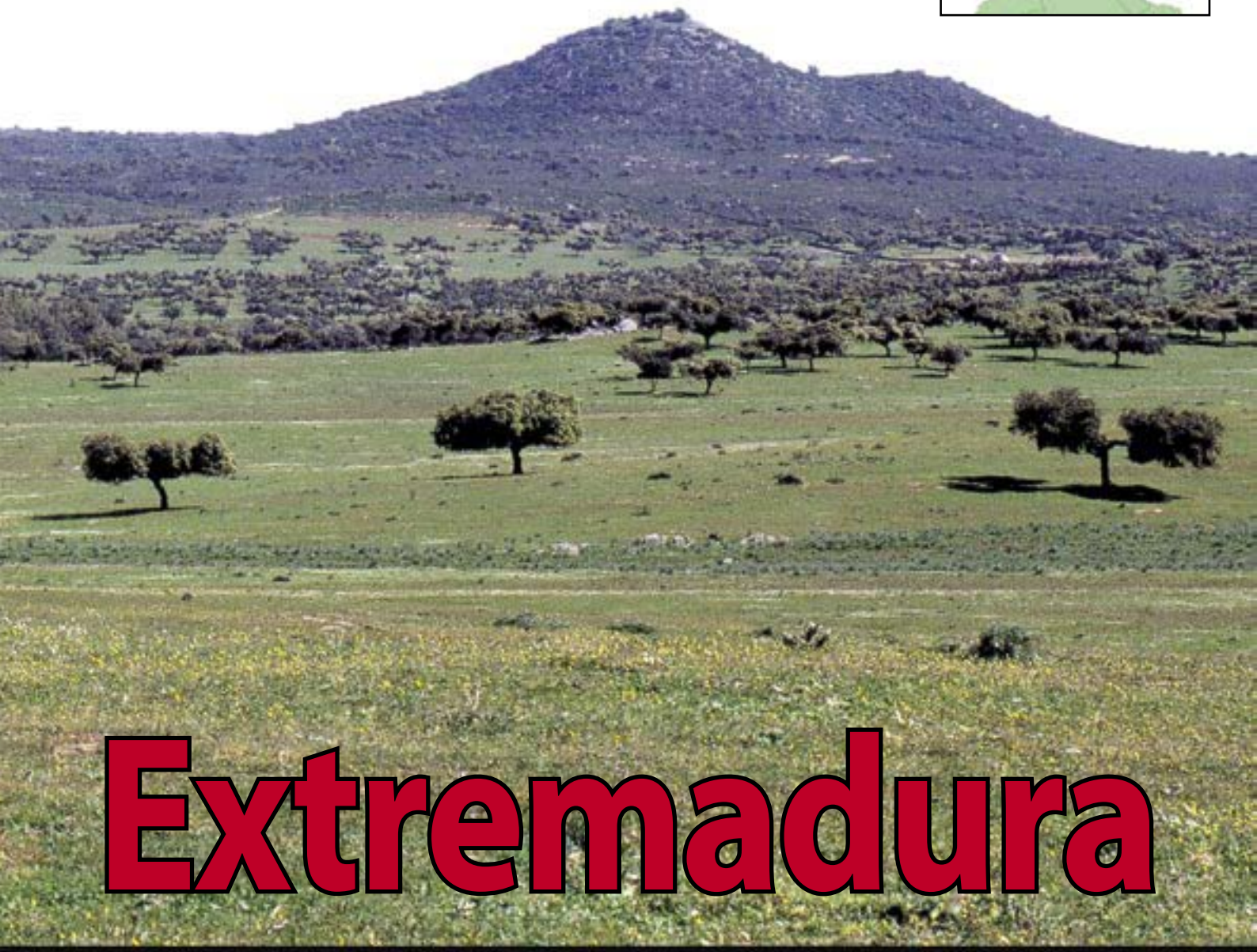
Mining Journal
SPECIAL PUBLICATION

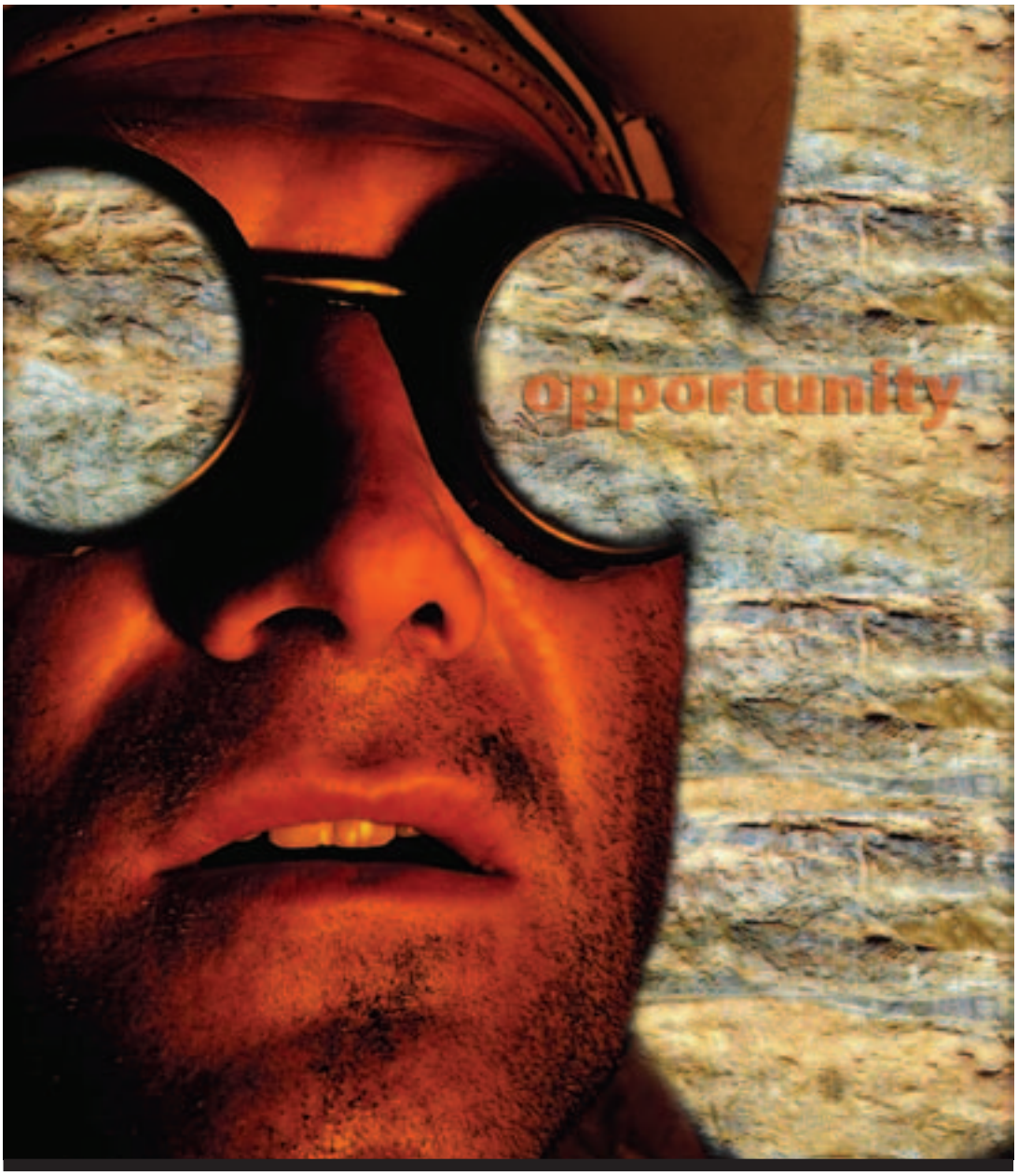


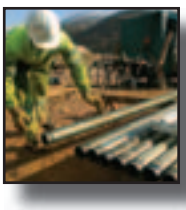
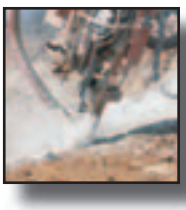
Extremadura

Spain's autonomous region offers:

- market proximity
- rich mining history
- Europe's newest nickel mine
- strong exploration possibilities

vision and experience produce opportunity





Rio Narcea Gold Mines, Ltd.

Phone: (416) 956 7470 or (34) 98 583 1500 Email: info@rngm.com www.rionarcea.com TSX:RNG AMEX:RNO

Achieving mid-tier status

- Established EU gold producer
- Low cost nickel production starting in 2005
- Two gold projects in development
- Nickel production of >8,000 T/yr 2005 onwards
  Gold production of >300,000 oz/yr by end of 2007

A Message from Mr Alfonso Perianes Valle

Consejería de Economía y Trabajo — D. G. de Ordenación Industrial, Energía y Minas

SINCE the dawn of civilisation in the Iberian Peninsula, mining has been one of the most important drivers for economic development in Extremadura. The Tartessus, the different Celtic-Iberian peoples, the Romans, the Visigoths, the Arabs… all took advantage of the rich deposits of iron, copper, lead, zinc, gold, silver, tungsten and tin within the region.

We should highlight the tin-tungsten mine of La Parrilla, the iron mines in the area of Jerez de los Caballeros (Badajoz), the Albalá uranium mine and the San Antonio antimony mine in Alburquerque. We should also mention the numerous occurrences of Sn-W, Bi, Cr, Au, Ni-Cu, Fe, Sb, Pb-Zn-Cu, Hg, Li-Rb-Cs, Ti, U and coal that are distributed throughout the region.

Since the middle of the 20th century, the great importance of metal mining to the gross national product of Extremadura steadily decreased, and today there is no production of metals in the region. However, it should be pointed out that production of nickel, copper and other metals is poised to take off at the new Aguablanca mine near Monesterio (Badajoz).

In the non-metallic sector, Extremadura produces industrial rocks and minerals and mineral waters. It has an important presence in the natural stone (granite and slate) sector, and also possesses several limestone and siliceous aggregates operations, as well as two important quarries for feldspar and clay. The great importance of mineral waters, bottled, as well as at long-established spas, should also be mentioned.

> "We hope that this special supplement will serve to underline the enormous mining potential that our region offers"

The Governing Body of Extremadura is well aware of the fact that the efforts of private enterprise to develop the region's minerals potential will be greatly enhanced if good infrastructure is in place. Thus, at the DGOIEM, we have carried out a series of policies designed to support the mining sector. These include technical support by means of geological/mining investigations of an infrastructural nature, the implementation of exploration projects in specific areas and the dissemination of all this information to interested parties. (In this regard, we should mention the SIGEO website.) A second policy milestone has been to ensure an adequate and agile management of mining rights.

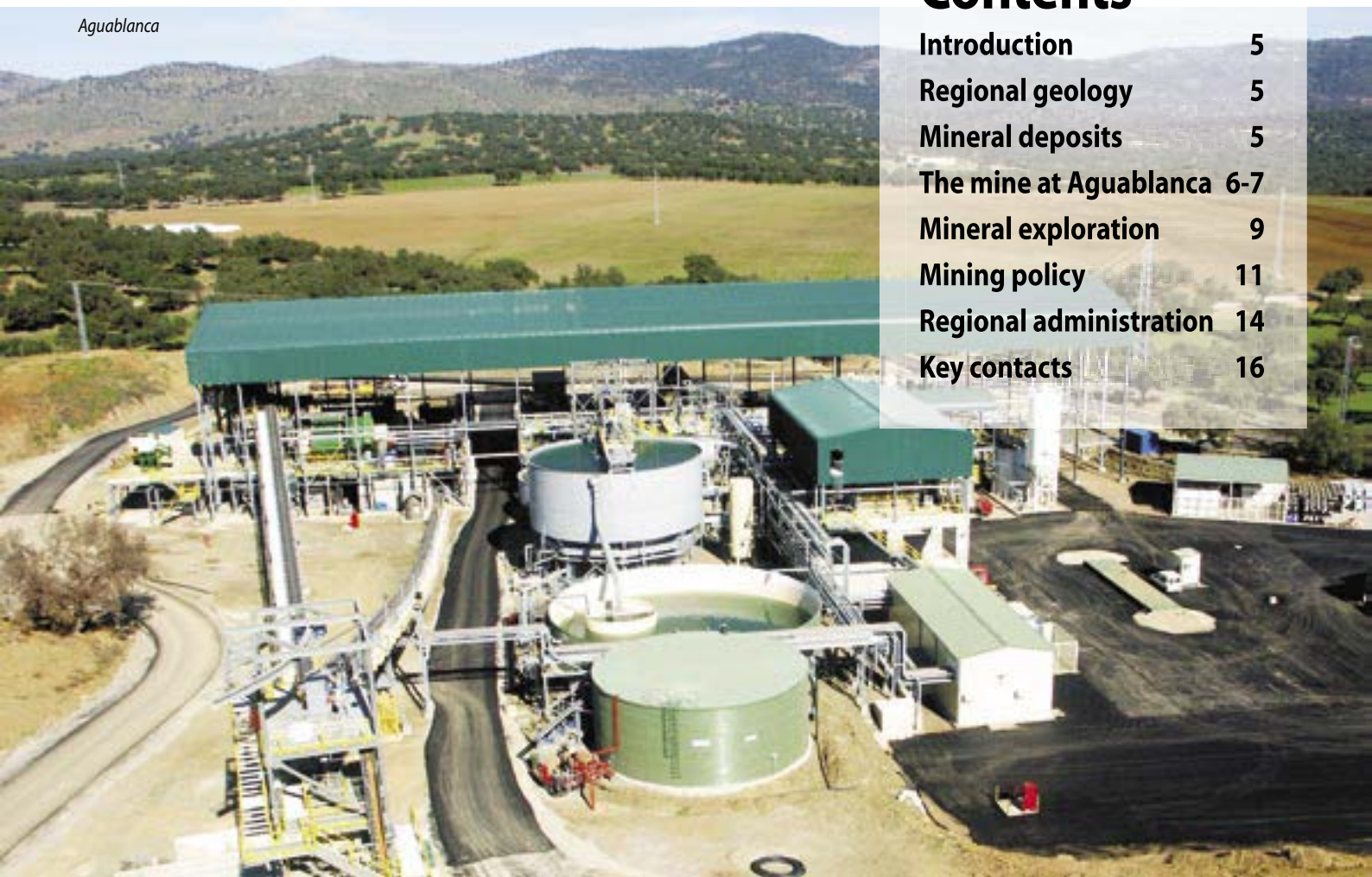
The Regional Administration has strongly supported the natural stone sector, and has created the Technological Institute of Ornamental Rocks and Building Materials (INTROMAC) as a technological centre of reference. Finally, we can say that the fourth policy milestone has been the promotion of the minerals sector by means of the publication of leaflets, books and CD-ROMs, as well as support and the participation in the most important industrial fairs of the sector.

Mr Alfonso Perianes Valle

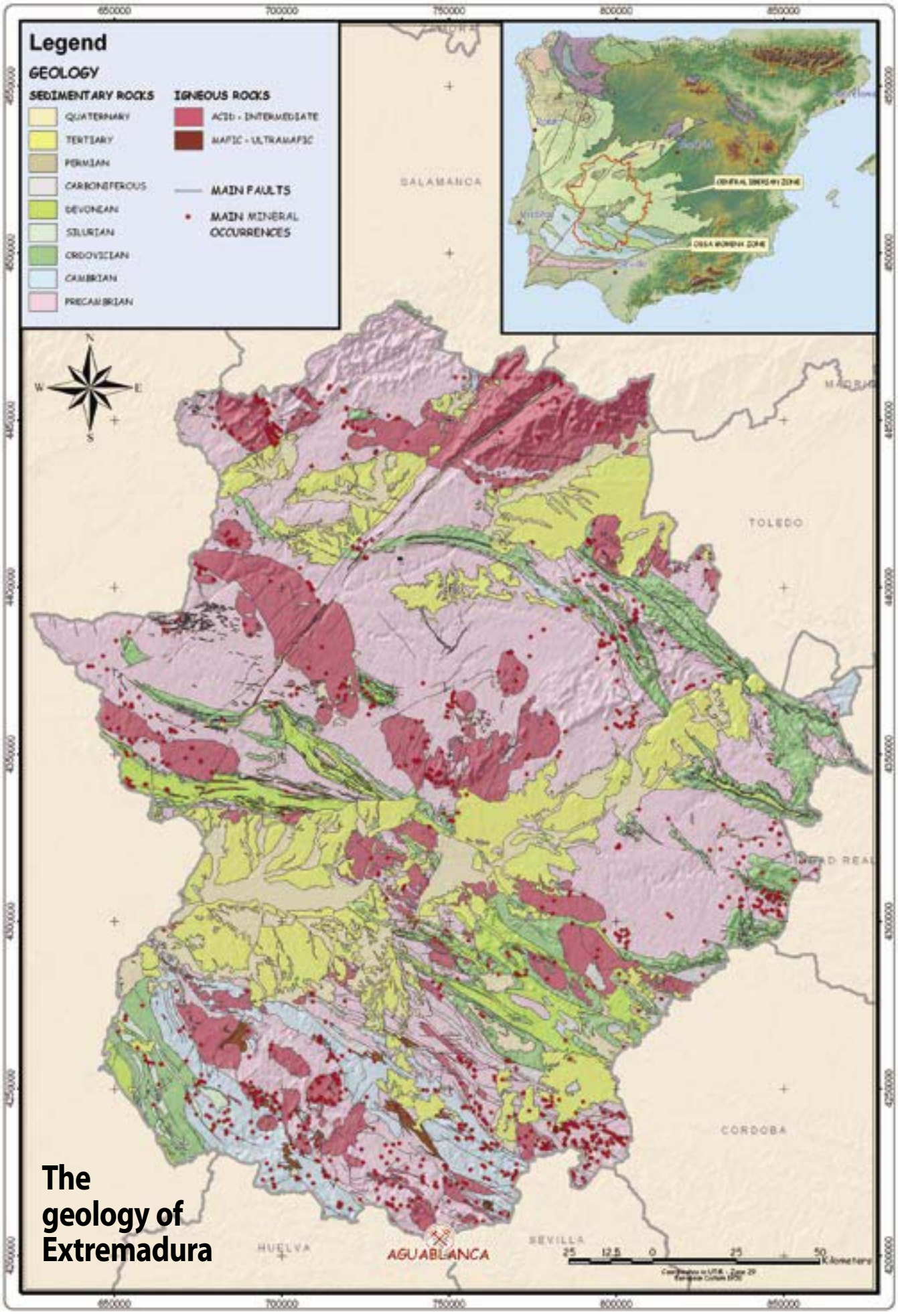
As an example of our support for the minerals sector, we present this special supplement dedicated to Extremadura in the *Mining Journal*, and hope that it will serve to underline the enormous mining potential that our region offers.

Alfonso Perianes Valle,
General Director of Industrial Planning, Energy and Mines, Governing Body of Extremadura

Contents



Aguablanca



The geology of Extremadura

Introduction

EXTREMADURA is one of the 17 Autonomous Regions with legislative powers that exist in Spain. Located in the southwest of the Iberian Peninsula, it covers an area of 41,634 km^2 and has just over 1.07 million inhabitants (a population density of some 26 inhabitants per km^2). The regional capital is Merida and Extremadura's territory comprises the provinces of Cáceres (in the north) and Badajoz (in the south).

Extremadura's road network stretches 8,698 km and its main road infrastructure comprises two great communication routes: the National-V or Motorway of Extremadura, running east-west and connecting the two peninsular capitals of Madrid and Lisbon; and the National 630, the former Roman Silver Road, which extends from north to south parallel to the Portuguese frontier and where construction has begun to widen it into a motorway.

The regional airport lies near Badajoz. Regular flights to Madrid and Barcelona are available from here. As for rail infrastructure, Extremadura boasts 988 km of track with modern trains, and the construction of the Madrid-Lisbon AVE (High Speed Train) line is foreseen during this decade.

Extremadura's economy is characterised by the significance of the service sector (69%), and over the past decade this sector has overtaken primary industry in terms of importance. The main industrial sub-sectors are energy, agri-businesses, cork, textiles and natural stone.

Regional geology

THE geology of the Extremadura region is characterised by the presence of two of the major tectono-stratigraphic zones of the Variscan Iberian Massif: the Central Iberian Zone (CIZ) to the north, and the Ossa Morena Zone (OMZ) to the south. The precise boundary between the two zones is a moot point.

Some authors consider the most important stratigraphic and structural changes to be in the Coimbra-Badajoz-Córdoba Shear Belt, which constitutes a blasto-mylonitic belt. Other authors prefer to place the boundary further north, in the Pedroches Batholith. They use palaeogeographic and geotectonic arguments and cite the fact that the pre-Ordovician stratigraphic sequence in the area between the two proposed boundaries is similar to that in the OMZ. Regardless of the precise location of the boundary, both zones display their own geological characteristics.

CENTRAL IBERIAN ZONE

The CIZ occupies the central part of the Iberian Massif and represents the inner part of the Variscan belt of southern Europe. The Slate and Greywacke Complex Domain (SGCD) is the largest domain of the CIZ and the most extensively represented in Extremadura.

The stratigraphy of the SGCD consists of a Neoproterozoic-Lower Cambrian succession formed by the Slate and Greywacke Complex and constitutes the most extensive group of meta-sedimentary rocks outcropping in Extremadura. In a general sense, this complex comprises two main units – Lower and Upper.

The Lower Unit includes the Precambrian-Cambrian transition and is formed by a monotonous succession of shales and sandstones, and occasionally conglomerate horizons and volcano-sedimentary rocks. Above this, and separated by an unconformity, the Upper Unit contains Cambrian sediments, predominantly pelitic, with beds of black shales, some conglomerates and sandstones, plus discontinuous horizons of limestone, phosphate and volcano-sediments. Paleogeographic analysis of these successions indicates sedimentation in a context of tectonic instability, related to the final episodes of the Cadomian Orogeny. This situation gave rise to the predominantly turbiditic filling (more than 11,000 m thick in some cases), of fault-separated basins.

Large lithologic variation, ranging from deep-basin turbidites to prograding shore deposits, dominate the rest of the Cambrian sediments. Siliciclastic and carbonate shelf sediments predominate (eg, the 500 m-thick Tamames Limestone).

The Cambrian sediments are overlain unconformably by Ordovician and other Palaeozoic pre-Variscan sediments. This succession outcrops in the inner parts of northwest-southeast synclines, which form the structure of this domain of the CIZ, and consists of mainly terrigenous, siliciclastic formations. These were laid down in a shallow platform environment and sedimentation is almost continuous (except for two paraconformities, in the Upper Ordovician and Middle Devonian).

> "The geology of the Extremadura region is characterised by the presence of two major tectono-stratigraphic zones"

Structurally, this domain was affected by pre-Variscan deformation, which gave rise to three main disconformities. Subsequently, Variscan shortening in the SGCD is characterised by intense tangential deformation on the northern and southern margins, with recumbent folds and thrusts. In the central part, open folds with steep axial surfaces and little internal strain predominate. Late orogenic extension is represented by sub-horizontal shears, detachments and transcurrent shears, ranging in direction from northwest-southeast to north-south.

An essential characteristic of the CIZ is the abundance of granitic batholiths intruded during and after the Variscan Orogeny, and mainly derived from melting of the Serie Negra metasediments. The granitoids occur within a 600 km-wide belt, range in age from 325 Ma to 300 Ma and are rich in potassium. Basic rocks associated with Variscan magmatism are very scarce. Besides the Ni-Cu-Co mineralised gabbro-norites of Rio Malo, of uncertain age, the only important mafic to intermediate pluton is the pre-Variscan Mérida massif. Also, very small and discontinuous basic sills are interbedded in the Ordovician metasediments.

The other pre-Variscan igneous rocks are mostly small volcanic-subvolcanic or orthogneiss peraluminous bodies. The final igneous episode in the CIZ was the intrusion of the gabbroic Alentejo-Plasencia dyke (203 Ma). It is 75-200 m wide, more than 500 km long and the largest dyke in the Iberian Peninsula.

OSSA MORENA ZONE

The OMZ is the other major tectono-stratigraphic unit of the Variscan Iberian Massif that is represented in the Extremadura region. Occurring south of the CIZ, the OMZ is one of the most complex terranes in the region. The zone is elongate, trends northwest-southeast and exhibits the main geotectonic features of the OMZ. It contains sedimentary rocks belonging to a complex polyphase accretionary system ranging in age from late Riphean to late Carboniferous.

From a tectonic point of view, the OMZ bears evidence of Cadomian deformation and metamorphism, although the subsequent Variscan Orogeny is responsible for the final structure of the zone. The Variscan Orogeny has a marked transpressional character resulting from oblique convergence (southwest-northeast) and collision of the involved terranes (from south to north: South Portuguese Zone, Ossa Morena Zone and Central Iberian Zone). There is evidence of at least two major Variscan sutures: the Coimbra-Badajoz-Córdoba Shear Belt, in the northern OMZ, and the South Iberian shear zone, which forms the boundary with the South Portuguese zone.

The OMZ contains an important volume of igneous rocks, in the form of calc-alkaline intrusives and extrusives. The main magmatic events are recognised as being related to the Cadomian and Variscan orogenic cycles and to an intermediate extensional phase, mainly developed in Ordovician times.

Recent deep seismic reflection data, acquired as part of the southwestern Iberia Europrobe project across the transpressional Variscan orogen in southern Spain, have revealed the existence of a mid-crustal reflective body 140 km long and of variable thickness (up to 5 km). The conductivity image provided by coincident MT soundings, the amplitude characteristics of the seismics, mineralisation studies related to magmatic ore deposits, and the surface geology, suggest that the reflective body is a mantle-derived mafic intrusion emplaced in Variscan times, possibly linked to plume activity. Such a large intrusion can be expected to have exerted a major control on Variscan plutonism and the related ore-forming processes.

Mineral deposits

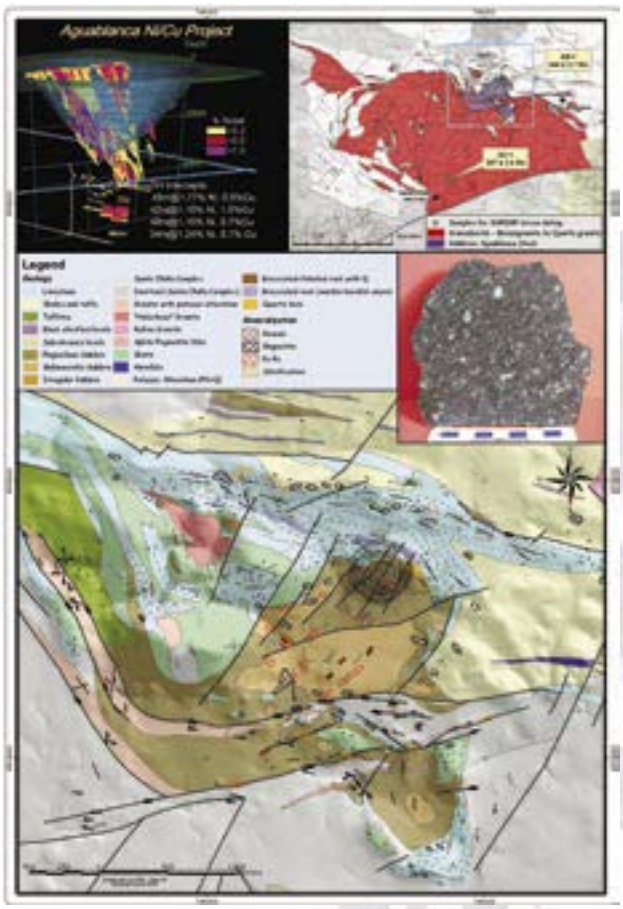
SINCE the Bronze Age, Extremadura has been known as a rich source of metals: gold, silver, lead, copper, tin and tungsten were exploited by the region's ancient inhabitants. More than 1,000 ore deposits are registered and are distributed in the CIZ as well as in the OMZ.

In the CIZ, metallogeny is related to magmatic

Continued on page 8

THE OMZ COMPRISES:

i) heterogeneous, dismembered pre-Cadomian sequences that contain high-grade metamorphic rocks and a thick siliciclastic sequence deposited in a passive margin, mainly Serie Negra;
ii) a synorogenic Cadomian unit that overlies discordantly the Serie Negra and contains andesitic calc-alkaline volcano-sedimentary complexes and flysch-like complexes, Lower to Middle Cambrian in age;
iii) the Serie Negra and the volcanic sequences are overlain unconformably by Middle to Upper Cambrian post-orogenic sediments and a volcanosedimentary unit formed in an environment of intra-continental rifting with bimodal volcanism;
iv) a sequence of passive margin deposits ranging in age from Ordovician to Lower Devonian; and
v) syn-Variscan sedimentary rocks deposited in restricted basins during the Carboniferous. Also, bimodal-alkaline magmatism associated with decompression in northwest-southeast tensional zones (interpreted as aborted rifting) occurs in the Lower Carboniferous.



The geology of Aguablanca

The mine at Aguablanca

LOCATED some 75km north of Sevilla, close to the southern border of Extremadura, Aguablanca represents southwestern Europe's only known nickel-sulphide deposit. Rio Narcea Gold Mines Ltd (Rio Narcea) acquired Aguablanca from Atlantic Copper SA and Presur in July 2001, and completed a bankable feasibility study in July of 2002. Construction of the mine began in mid-2003 and commissioning commenced at the end of 2004. The open pit mine is expected to achieve an annual production of 18 M lbs of Ni, 14 M lbs of Cu and 20,000 oz of PGM for a period of 10.5 years.

GEOLOGY AND MINERALISATION

The Aguablanca nickel-copper-PGM deposit lies on the southeastern flank of the Olivenza–Monesterio antiform in the Ossa Morena Zone within the Iberian Hercynian Massif.

The deposit has been defined by more than 45,000 m of drilling and comprises three zones of magmatic sulphide mineralisation within a gabbro-norite intrusive that occurs along the northern contact of the Santa Olalla plutonic complex. This Hercynian complex consists mainly of quartz-diorite, granodiorite and monzogranite, although the composition ranges from gabbro to granite. Its northern and southern limits are defined by major fault zones. The complex intrudes Upper Precambrian-Middle Cambrian formations consisting mostly of low-grade metavolcanics and metasediments (metapelites, marble and calc-silicates). A well-developed hypersthene-hornfels facies contact metamorphic aureole surrounds the plutonic complex. Skarns are abundant within the aureole.

The main part of the Aguablanca deposit is mostly formed by two steeply dipping, northwest-trending mineralised orebodies truncated by northeast-oriented, post-mineralisation faults. The sulphide ore is hosted by gabbro and gabbro-norites, and the sulphide minerals are predominantly pyrrhotite, pentlandite, chalcopyrite and pyrite, with minor marcasite and covellite. Magnetite is often present. Lesser amounts of PGM and gold are also associated with the sulphide minerals.

The main types of sulphide mineralisation recognised at Aguablanca include massive to semi-massive, disseminated and irregular in patches and lenses. Massive to semi-massive mineralisation is associated with magmatic breccias, which consist of sub-angular fragments of mafic-ultramafic (pyroxenite to gabbro and locally dunite) rocks, as well as fragments of skarn, hornfels and marble, in a matrix of semi-massive sulphides. Sulphides constitute 20-60% of the rock, pyrrhotite and pentlandite are dominant, chalcopyrite is less common and cobaltite is present occasionally. Within the higher-grade portions of the deposit (>1.0% Ni) the Ni:Cu ratios range from 3:1 to 5:1. The PGM identified include sperrylite and michenerite.

Disseminated mineralisation is characterised by

sulphides interstitial to the silicates (pyroxene, amphibole and plagioclase) and is generally associated with a porphyritic gabbro. This gabbro is fairly continuous and regular, and tends to display the highest grades near the mineralised breccias. Pyrrhotite, chalcopyrite and pentlandite are the main sulphides, which constitute 5-20% of the rock, with the Ni:Cu ratios ranging from 1:1 to1.5:1.

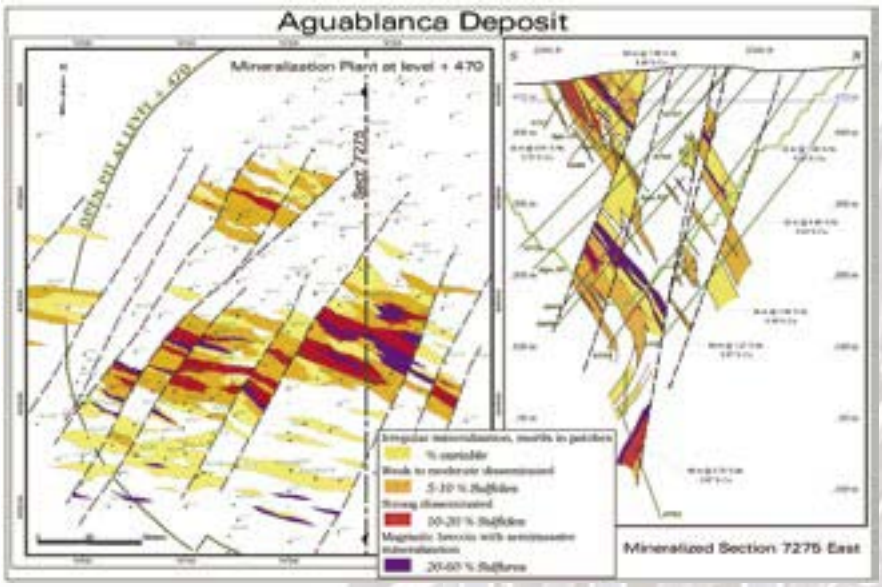
The more irregular mineralisation, in patches, aggregates or bands, typically occurs at the distal parts of the deposit and represents the transition zone from the disseminated mineralisation to the barren lithologies.

Mineralisation in the main zone extends to a depth of 450 m and the northern zone reaches a depth of 160 m. Beneath the main zone, a gently south-dipping higher-grade mineralised zone averaging 33 m in thickness is defined in a 60 m x 60 m area bounded by east-west- and northeast-trending faults. Further drilling will be needed to test the possible faulted extension of this mineralisation.

Dr Ordoñez-Casado has recently carried out detailed geochronological studies of the Santa Olalla plutonic complex on behalf of Rio Narcea. Cathodoluminescence studies and in situ ion-microprobe analyses of single zircons were carried out at the Research School of Earth Sciences at the Australian National University in Canberra, Australia, using the sensitive high-resolution ion microprobe (SHRIMP) technique. An age of 344 ± 2.1 Ma was obtained for the mineralised Aguablanca gabbro (sample AB-1), and an age of 347 ± 3.4 Ma was obtained for the Santa Olalla granodiorite (sample SO-1).

These ages indicate that the igneous event responsible for the mineralisation at Aguablanca is related to the Hercynian orogenic cycle, and probably with an extensive (transtensive) episode during the Lower Carboniferous.

A genetic model envisages a first stage when a transitional deep magma chamber formed, with the primitive magma interacting at depth with the wall rocks. This resulted in extensive crustal contamination, concomitant sulphide magma immiscibility and settling of cumulates rich in sulphide and ortho- and clinopyroxene, to form a layered magmatic complex. A second stage envisages the emplacement of residual calc-alkaline gabbro to norite melts, and the development of an intrusive breccia containing fragments of the consolidated layered complex rocks and associated disseminated to massive sulphides.



Cross-section showing the deposit at Aguablanca

> "The mine has an estimated production life of 10.5 years, based on the open-pit reserves"

The existence of mafic and ultramafic intrusions in the Lower Carboniferous in the OMZ is being clarified by very recent deep seismic reflection data acquired as part of the Europrobe project across the transpressional Variscan orogen in southern Spain. The data reveal the existence of a mid-crustal reflective body 140 km long and of variable thickness (up to 5 km) possibly representing a mantle-derived mafic intrusion linked to plume activity.

AGUABLANCA'S MINERAL RESERVES AND RESOURCES

	Category	Tonnes (000s)	Ni (%)	Cu (%)	Combined PGM	Au (g/t)
Mineral reserves[1]						
Aguablanca	Proven	13,600	0.66	0.47	0.48	0.13
	Probable	2,100	0.62	0.44	0.45	0.12
	Total	15,700	0.66	0.46	0.47	0.13
Mineral resources[2]						
Aguablanca	Measured	2,300	0.73	0.54	0.55	0.13
	Indicated	1,700	0.60	0.53	0.45	0.14
	Total	4,000	0.67	0.54	0.51	0.14
	Inferred	5,950	0.53	0.46	0.40	0.13

1. Mineral reserves and resources are based upon the July 2002 Feasibility Study Report and stated in accordance with definitions adopted by the Canadian Institute of Mining, Metallurgy and Petroleum (CIM) on August 20, 2000 and were prepared by or under the direction of Alan C. Noble, O.R.E. Reserves Engineering, Colorado, USA, who is the independent "Qualified Person" for Rio Narcea as that term is defined in National Instrument 43-101. The mineral reserves were calculated using a €8.23/t net smelter return (equal to 0.256% Ni equivalent).
2. Mineral resources for the Aguablanca project have been estimated using a 0.2% Ni cut-off grade. Mineral resources (of all categories) that are not mineral reserves do not have demonstrated economic viability. Mineral resources do not include mineral reserves.

MINERAL RESOURCES/ RESERVES AND MINE PLAN

The feasibility study 'base case' pit design for the Aguablanca project contains a mineral reserve of 15.7 Mt at 0.66% Ni, 0.46% Cu and 0.47 g/t PGM with a strip ratio of 5.4:1, using a nickel price of US$2.99/lb and a copper price of US$0.73/lb. The mine has an estimated production life of 10.5 years, based on the open-pit reserves.

The on-site nickel sulphide flotation plant is designed to treat 1.5 Mt/y of ore, with an additional milling capacity of 0.3 Mt/y. The plant will produce a bulk copper-nickel-PGM concentrate but also has the flexibility to produce separate copper and nickel concentrates. Overall recoveries for the bulk concentrate production are estimated at 82% for nickel, 85% for copper and 75% for PGM and cobalt. Cash operating costs are expected to average US$2.40/lb Ni (life of mine) based on a nickel price of US$6.00/lb Ni.

Rio Narcea has an off-take agreement with Glencore International AG for the sale of 100% of the annual concentrate production at the mine until the year 2010. The concentrate will be trucked from Aguablanca to the ports of Huelva or Sevilla for shipment.

PROJECT EXPLORATION

Significant mine life extension and higher production are expected with underground development below the open pit. Defined by twelve holes, indicating higher nickel grades, on a spacing of approximately 50 m by 100 m, the lower continuation of the main zone has the potential to provide additional tonnage for an underground mining operation.

Rio Narcea started the construction of a production decline in mid- 2004. The development is expected to be completed within a period of 18 months and will enable Rio Narcea to complete infill drilling and also facilitate exploration drilling to confirm further extensions of higher grade mineralisation at depth.

The deeper mineralisation is significantly different in texture from the brecciated mineralisation above. Movement along post-mineralisation faults is believed to have displaced the continuation of the deep zone downward to the south of the pit boundary, where future deep drilling and down-hole geophysics is planned to explore the lower margins of the Aguablanca intrusive.

Continued from page 5

activity and the tectonic architecture described previously. The mineral deposits are classified according to different tectonic cycles:

i) the pre-Hercynian cycle in which antimony and mercury mineralisation is related to pre-orogenic volcanism;
ii) the Hercynian cycle, in which mineralisation occurs in veins and lodes in shear zones and in extensional faults related to collisional magmatism;
iii) tin and tungsten in intra and perigranitic veins, stockworks and greisens;
iv) uranium in intragranitic veins and in the surrounding metasediments;
v) lead-zinc, lead-zinc-copper and lead-silver in vein-type sulphide deposits;
vi) tin-lithium in pegmatites; and
vii) antimony and gold in quartz veins.

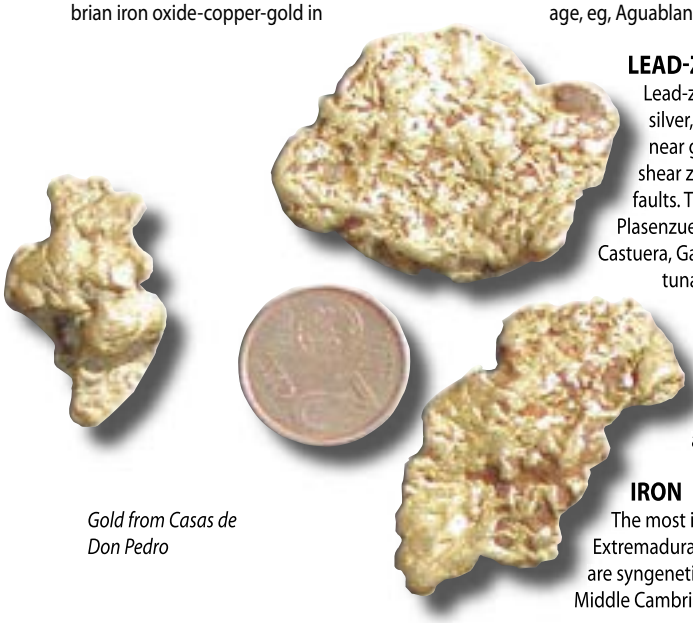
In the OMZ, mention should be made of:

i) replacement deposits and skarns with iron and copper-gold;
ii) magmatic nickel-copper sulphide deposits (Aguablanca);
iii) copper-gold-bismuth veins;
iv) lead-zinc-silver veins;
v) chromium deposits, related to ultrabasic rocks; and
vi) tungsten-bismuth mineralisation, in close relationship with highly-evolved epizonal leuco-granites.

Nickel-copper deposits occur in Aguablanca as magmatic sulphides disseminated in gabbros and gabbro-norites of Hercynian age

GOLD

The main gold deposits are related to: quartz veins with gold and gold+antimony, which fill extensional faults in shales of the CIZ eg, Casas de Don Pedro (Badajoz), Mari Rosa (Cáceres); veins related to shear zones, eg, La Codosera (Badajoz); veins in dykes of basic rocks, eg Vieros (northeast Cáceres); stratabound Lower-Middle Cambrian iron oxide-copper-gold in the OMZ, eg, Las Herrerias de Alconchel, La Vicaría and La Bilbaína (Badajoz); quartz veins with copper-gold, eg, La Hinchona, Abundancia, Extremeña (Badajoz); and placer-type detrital deposits of Tertiary-Quaternary age, eg, La Codosera (Badajoz) and Arroyo Fresnedoso (northwest Cáceres).



Gold from Casas de Don Pedro

NICKEL-COPPER

Deposits occur as magmatic sulphides disseminated in dunites and harzburgites of Proterozoic age, eg, Calzadilla (Badajoz), along with chromite concentrations; in gabbros, olivine gabbronorites and peridotites of Middle Cambrian-Lower Ordovician age, eg, Olivenza (Badajoz); and in gabbros and gabbro-norites of Hercynian age, eg, Aguablanca (Badajoz) and Rio Malo (Cáceres).

LEAD-ZINC-COPPER

Lead-zinc, lead-zinc-copper and lead-zinc-silver, occur as deposits of vein type in or near granite bodies, and are controlled by shear zones or almost always by extensional faults. They include Abadía, Ibor, San Roque, Plasenzuela, Alcollarín, in Cáceres and Siruela, Castuera, Garlitos, El Borracho, Santa Marta, Afortunada and the area of Azuaga in Badajoz.

There are also zinc-copper-lead (with minor silver-arsenic-antimony) volcano-sedimentary deposits of Vendian Age in Badajoz in the area of Puebla de la Reina (Las Herrerías) and in Azuaga (Fuente de la Gamarra).

IRON

The most important iron mineralisations in Extremadura are in the southwest of Badajoz. They are syngenetic stratabound deposits of Lower to Middle Cambrian age, interbedded in a volcano-sedimentary sequence of shales, siltstones and greywackes with basalts and rhyolites. Mineralisation consists of massive or scattered magnetite, with some chalcopyrite and gold. Examples include: Las Herrerías de Alconchel, La Bilbaína, La Bóveda and La Berrona.

There are also iron deposits related to skarns associated with Upper Precambrian and Lower Cambrian calcareous horizons, eg, Monchi and Colmenar.

In addition, there are iron oxide deposits of karstic origin, eg, La Jayona mine in Badajoz, which are associated with calcareous horizons of Lower Cambrian age.

TIN-TUNGSTEN-LITHIUM

In general, most of the tin and tungsten deposits are related to Variscan granites. They occur as veins, lodes and stockworks within the granites or at the exocontact, or as greisen in strongly altered granite bodies, eg, Perales del Puerto, La Lapa, Desquite, Teba and La Parrilla in Cáceres, and San Nicolás, Virgen de Gracia and Mari Juli in Badajoz.

In the last two cases, there are important concentrations of gold and bismuth.

Tin-lithium deposits, with accessory tantalum, are related to pegmo-aplitic dykes carrying cassiterite, lepidolite and spodumene, eg, Las Navas, Valdeflórez (Cáceres) and Tres Arroyos (Badajoz).

Some detrital placers carry tin, eg, the Santa María mine (Cáceres).

ANTIMONY

The most important antimony deposit in the Iberian Peninsula is in Badajoz: the San Antonio mine. Mineralisation is related to pre-orogenic Devonian volcanism and occurs in a calcareous belt made up of carbonaceous limestones, intraformational breccias and calcareous shales, as well as some siliceous horizons, all of

Devonian age. The minerals include stibnite, scheelite, berthierite and pyrite. San Antonio operated until 1981.

Other antimony deposits are related to quartz veins filling extensional faults, eg, Mari-Rosa (Cáceres).

URANIUM

Uranium occurs in vein deposits filling extensional northeast-southwest faults, and within granites and surrounding metasediments.

The first includes Valderrascón (Badajoz) and Los Ratones y Cabeza de Araya (Cáceres) and the second type, El Lobo (Badajoz) and Cabeza de Araya (Cáceres). The mineral association is quartz-pitchblende-iron sulphides, accompanied by secondary minerals.

OTHER MINERALS

Although the new Aguablanca Ni-Cu mine in Badajoz will build to capacity production this year, during recent times mineral exploitation in Extremadura has been confined to non-metallic minerals.

Production includes natural stone (granite, slate, marble), aggregates, feldspar, quartz, clay, palygorskite and mineral water.

As regards granite, production in 2003 was 480,000 t, based on 104 operations scattered through four main areas – Quintana de la Serena, Trujillo-Plasenzuela, Garrovillas and Burguillos del Cerro.

There are two marble operations in Alconera (Badajoz) producing 1,250 t/y. Two slate quarries in Villar del Rey (Badajoz) and Ladrillar (Cáceres), produce 35,000 t/y.

In Ceclavin (Cáceres), a feldspar mine exploits the upper, altered part of the megacrystalline granite of Cabeza de Araya.

The exploitation of aggregates is widespread throughout the region. Materials include granite, quartzite, limestone, diabase, sand and gravel. Clays are exploited for ceramic use, and are sourced from altered Palaeozoic slates, and Tertiary beds along the River Guadiana (Badajoz).

Palygorskite is exploited at Torrejón el Rubio (Cáceres) and mineral water is abstracted for use in four bottled-water plants and at six spas.

The granite quarry at Quintana de la Serena

Mineral exploration

RIO NARCEA GOLD MINES LTD

Rio Narcea is conducting an aggressive exploration programme in the Extremadura region. The company currently controls around 3,000 km^2 through investigation permits and mineral state reserves. Although the main objective is to discover new magmatic sulphide deposits, it is also searching for moderate to large copper-gold deposits, with a special emphasis on those related to VMS and hydrothermal IOCG systems.

Rio Malo (Cáceres) is a Ni-Cu-Co occurrence in the CIZ of the Variscan Massif. Mineralisation consists of disseminated to massive pyrrhotite, chalcopyrite and pentlandite hosted in gabbros and gabbro norites of uncertain age. Two small stocks, northwest-oriented, have been mapped. These have intruded a Precambrian, turbiditic succession, which has been affected by a weak regional metamorphism during the Variscan Orogeny.

The disseminated sulphide mineralisation has average values of 0.55% Ni, 0.45% Cu and 0.07% Co; the massive sulphides average 1.12% Ni, 0.63% Cu and 0.17% Co. Minor mining activity took place during the 1950s, including a small shaft and a short adit opened from the bottom of the shaft. Investigation work conducted so far has included detailed mapping, stream sediment sampling, soil geochemistry, ground magnetics and EM as well as an airborne geophysical survey, including magnetic, radiometric and EM.

In all, four core holes have been drilled to date amounting to 1,200 m. Most have intersected disseminated and spotty pyrrhotite/chalcopyrite mineralisation. The best intercept so far has been 12 m averaging 0.1% Ni and 0.08% Cu.

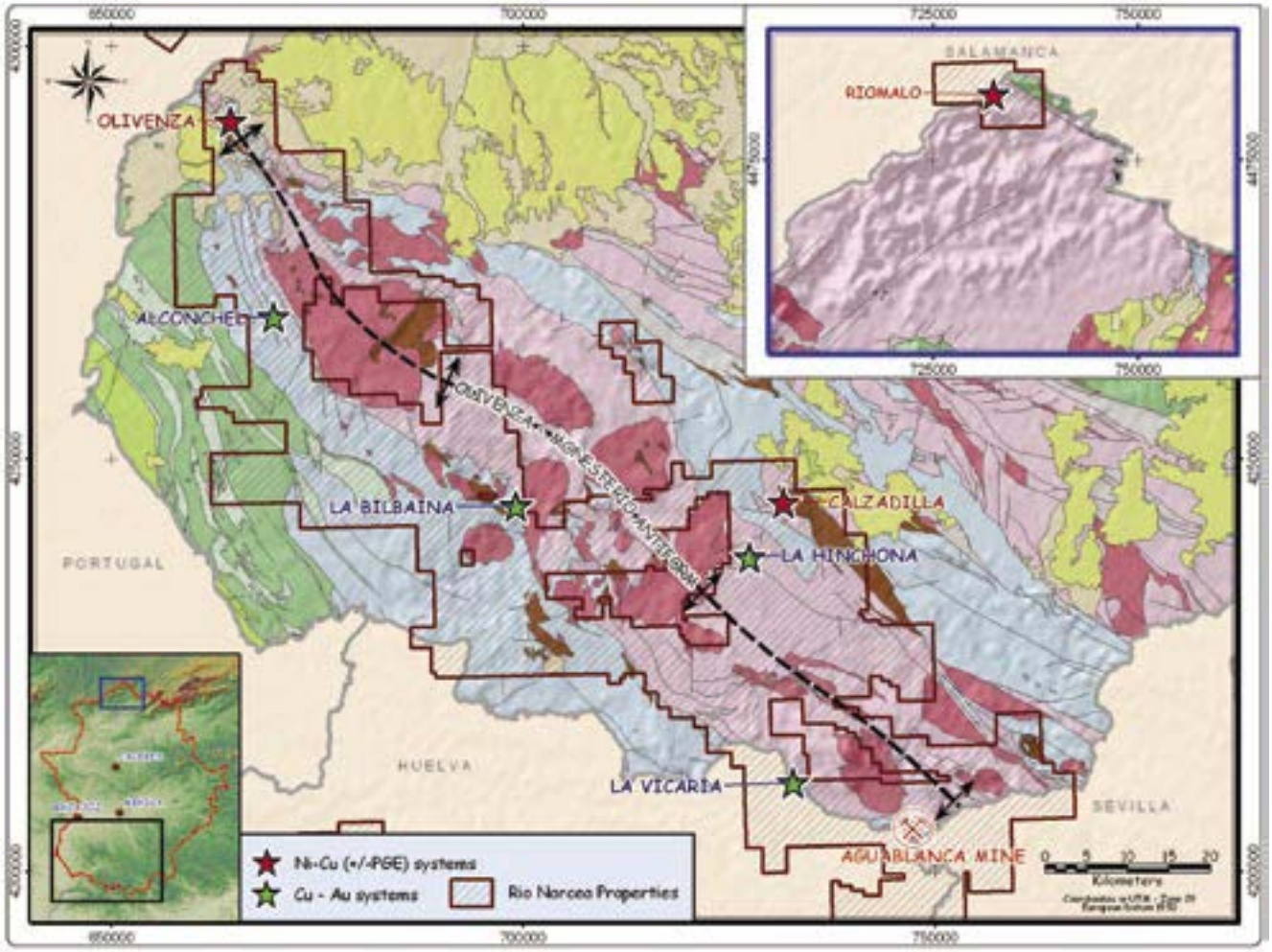
At **Calzadilla** (Badajoz), several Proterozoic ultramafic bodies have been mapped near Calzadilla village, on the northeastern flank of the Olivenza-Monesterio antiform. The most important body, **Cerro Cabrera**, measures 4 km x 2 km in areal extent, and is an ultramafic intrusion hosted in an Upper Precambrian-Lower Cambrian, volcano-sedimentary sequence. Mapped in detail by the IGME in the 1980s during a chromite investigation programme, it consists mostly of dunites and harzburgites, with minor pyroxenites.

Soil geochemistry over the entire ultramafic body has delineated a 1 km-long by 0. 2 km-wide Ni-Cu-Co soil anomaly at the southwestern limit of the intrusion, close to the contact with a small meta-gabbro body.

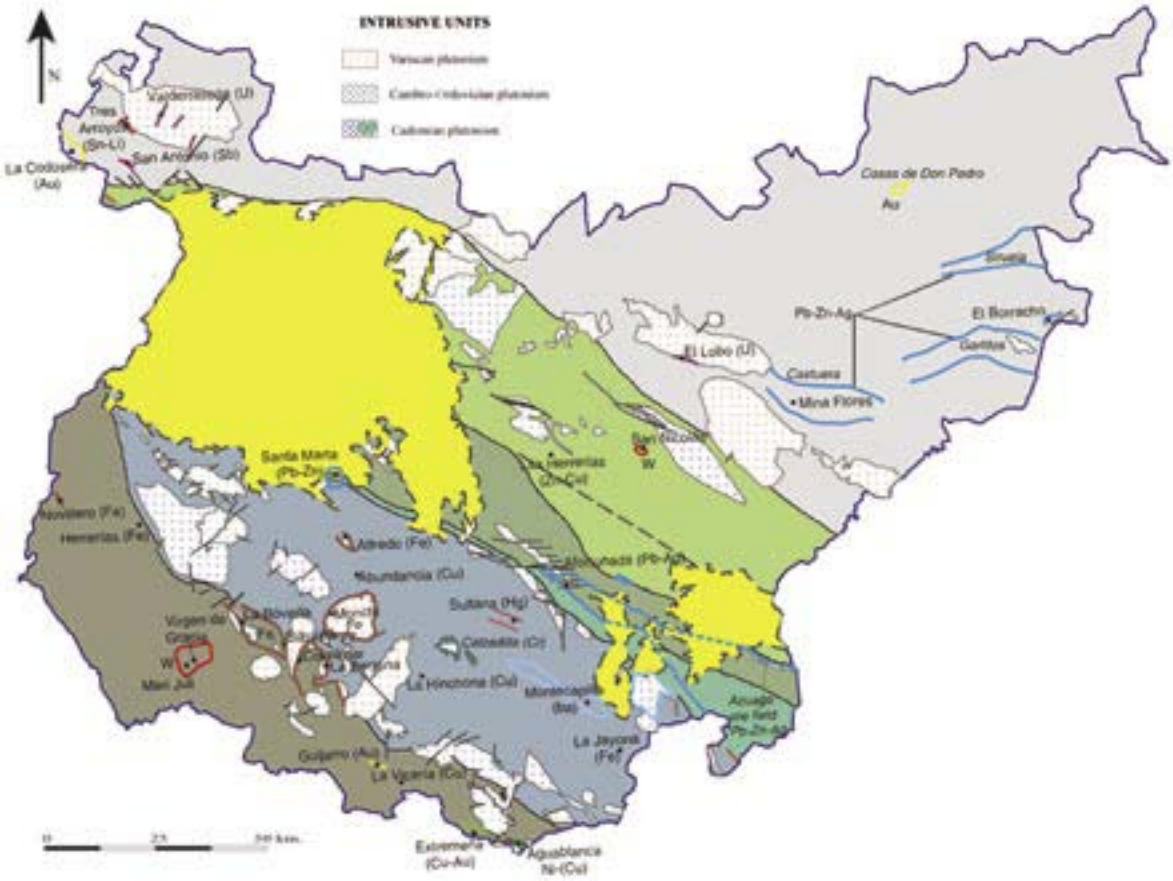
This anomaly, called **El Rosado**, is also coincident with IP and ground magnetic anomalies. Follow-up work has discovered a few small mineralised outcrops (mostly secondary Cu-Ni minerals, rare chalcopyrite) which returned values as high as 1% Ni, 4.6 % Cu, 0. 5 g/t Pt, 0.3 g/t Pd and 1. 4 g/t Au.

To date, four core holes have been drilled here, which have intersected three different styles of mineralisation: disseminated magmatic sulphides (pyrrhotite-chalcopyrite) running up to 0.43% Ni and 0.23% Cu (+135 ppb Pt+Pd) over 2.5 m; possible reef-type mineralisation, with a very low sulphide content (about 1-2%), running 201 ppb Pd+Pt over 6.7 m; and a late, superimposed hydro-thermal/skarn-type mineralisation that returned 1% Cu and 0.4 g/t Au over 2.2 m. The best result of the drilling programme was 0.59% Ni, 0.1% Cu and 270 ppb Pd + Pt over 1.3 m.

Geological map of Rio Narcea's exploration properties in Extremadura



Mineral occurrence map of Badajoz



At **Olivenza** (Badajoz), there is a 20 km-long, west-northwest-trending magmatic belt consisting of rift-related, mafic and felsic intrusives of Middle Cambrian to Ordovician age. They intrude Fe-rich, volcano-sedimentary sequences of Upper Proterozoic-Lower Cambrian age.

For the moment, the most interesting nickel target is **San Francisco de Olivenza**, a north-south elongated (3.5 km x 1.5 km) mafic-ultramafic intrusion comprising leuco-gabbros, irregular-taxitic gabbros, olivine gabbro-norites and minor peridotites.

A well-developed calcic skarn extends along the western contact of the intrusion where the most ultramafic facies have been mapped. Disseminated magmatic sulphides (pyrrhotite and lesser amounts of chalcopyrite) and gossans (running up to 0.45% Ni and 0.18% Cu, +124 ppb Pd) have also been found in that zone.

Three holes have been drilled so far in this project targeting coincident geochemical and geophysical (magnetic, IP and airborne EM) anomalies. The first hole cut four zones, between 2 m and 8 m long, with weakly disseminated magmatic sulphides (pyrrhotite and lesser amounts of chalcopyrite) averaging 0.1% Ni and 0.05% Cu respectively. The best result obtained so far has been 0.28% Ni and 0.13% Cu over 0.3 m.

The mineralisation is hosted by a 70 m-thick, sub-vertical ultramafic body consisting mostly of lherzolites and pyroxenites. Associated with the eastern contact of this body there is a 20 m-wide zone with several intervals of semi-massive to massive sulphide mineralisation, mostly pyrrhotite with minor chalcopyrite, which returned values of up to 0.41% Cu, with 438 ppm Co and 641 ppm Ni.

Las Herrerias de Alconchel (Badajoz) is an iron oxide (magnetite and minor haematite)-copper-gold mineralisation hosted by a volcano-sedimentary formation of Lower to Middle Cambrian age, on the south-western flank of the Olivenza-Monesterio antiform. The formation comprises shales, silstones and greywackes, with interbedded basalts and rhyolites. There are also coeval gabbros and alkaline granites nearby, as well as late diabase dykes.

The mineralised zone has been traced for at least 2 km and has an estimated true thickness of 30 m. An associated regional airborne magnetic anomaly extends for tens of kilometres along strike. Iron mineralisation consists of massive and disseminated magnetite that in cases is partially haematitised. Copper mineralisation, mostly malachite after chalcopyrite, seems to be related to a late and low-temperature hydrothermal event characterised by zones of intense silicification (quartz veinlets and silica flooding) and argillisation.

Channel chip sampling has returned: 2.5 m at 5.7 g/t Au (including 1 m at 10 g/t); 7.9 m at 2.25 g/t Au ; 3.3 m at 1.7 g/t Au; and 3 m at 4.7 g/t Au. Grab samples have returned up to 6.5 g/t Au and 1.1% Cu. The mineralisation has associated elevated values of Ba and Co, reaching up to 0.5% and 146 ppm respectively.

Interesting copper-gold values associated with this previously known iron-oxide mineralisation were discovered in the 1990s during a regional stream sediment survey financed by the Regional Government of Extremadura. This coincident Cu-Au anomaly covers an area of 4 km^2 around the old workings, including gold values of up to 534 ppb.

La Hinchona (Badajoz) is a north-northwest-trending, quartz-siderite, vein-type mineralisation exploited in the past for copper and gold. Located only 6 km south of Calzadilla, it is hosted by felsic to intermediate sub-volcanic porphyry dykes and Precambrian black shales.

Visible mineralisation extends for at least 900 m along strike and the estimated true thickness is 2 m. Dump samples returned values as high as 25 g/t Au and 11.85% Cu, with elevated Ag, As, Sb, Bi, Co and W values.

State-owned Presur drilled the structure during the 1980s and the best intersection was 0.3 m at 8 g/t Au. However, recent detailed mapping has revealed the presence of an associated, east-west trending, quartz vein system with returned values of 9.3 g/t Au, 1% Cu and 0.11% Co over 1 m.

Soil geochemistry has located two new copper-arsenic-gold) soil anomalies north and south of the old mine. Both are related to major east-west to east-northeast trending structures and have been traced for around 2 km.

Preliminary reconnaissance has discovered several zones with mineralised boulders (malachite and chalcopyrite) of quartz-goethite breccia. These returned values as high as 16.2 g/t Au and 1.15% Cu in the North anomaly and 10. 54 g/t Au and 2.52% Cu in the South anomaly. An IP survey conducted over these anomalies has delineated several chargeability anomalies coincident with soil geochemistry peaks.

La Vicaria (Badajoz) is a VMS-type Cu (+ Co and Au) mineralisation located on the southwest flank of the Olivenza-Monesterio antiform, between the Guijarro-Chocolatero gold project and the old Sultana gold mine.

There are abundant old workings and Roman slags in the project area, mostly following well-developed gossans (after massive sulphides) interbedded in Lower Cambrian volcano-sedimentary rocks.

> "Rio Narcea currently controls around 3,000 km^2 through investigation permits and mineral state reserves"

Exxon Minera investigated the area in the 1970s, and more recently, in 1992-93, Rio Tinto Minera completed 815 m of percussion drilling in 23 shallow holes. This work identified at least three main, northwest-trending, parallel zones of mineralisation distributed over a width of 300 m and extending along strike for around 1 km. The drilling results included: 36 m at 1.2% Cu and 161 ppb Au in the north zone; 26 m at 0.84% Cu and 153 ppb Au in the central zone; and 32 m at 0.81% Cu in the south zone.

La Bilbaina (Badajoz) is a north-south-oriented, 5-10 m-thick, magnetite, pyrite deposit with minor chalcopyrite and pyrrhotite, hosted in a Lower to Middle Cambrian volcano-sedimentary sequence. It lies on the southwest flank of the Olivenza-Monesterio antiform, close to the west contact of the Brovales intrusion.

It was exploited between 1951 and 1968 by shallow

Mining policy

MINING LEGISLATION

In Spain, according to the present Mining Law 22/1973, mining resources can be classified into four categories.

A) All mineral deposits and other geological resources, of scarce economic value and with a geographically restricted commercialisation (ie, aggregates).
B) Mineral and thermal waters, underground workings, and ore and waste from previous mining operations.
C) Mineral deposits and geological resources not included under A or B.
D) Coal, radioactive minerals, geothermic resources and bituminous rocks.

All mineral deposits and other geological resources are public-property goods, which means their investigation and exploitation can be carried out by the State itself, by means of the State reserves, or they can be transferred by means of the mining rights.

The preferential rights for the exploitation of the resources in section A are generally ascribed to the owners of the lands. To use the resources of section B, they must be previously declared as such.

The resources in sections C and D can be investigated or exploited by means of securing the appropriate permits for exploration or investigation, or an exploitation concession. To secure such mining rights, it is essential that land is freehold and recorded as such, except in the case of Exploration Permits, which can be issued for land that is not freehold. A parcel of land is considered to be recordable if, besides being free, it covers the minimum area of a mining square (approximately 500 m x 600 m).

Exploration permits are issued for work employing techniques that do not substantially alter the configuration of the terrain. They are given for a maximum period of a year, which can be extended for a further year, and for a minimum area of 300 mining squares and a maximum area of 3,000 mining squares.

Investigation permits give holders the right to carry out studies and work intended to make clear and define one or several mining resources belonging to the sections C or D, for their subsequent exploitation. They are issued for up to three years, except in the case of a deferment, and they cannot exceed 300 mining squares in area.

Exploitation concessions, which can be direct or derive from a previous investigation permit, give the holder the right to exploit the resource or resources. The concessions are granted for 30 years, and can be extended to two further periods of 30 years. The area covered by a concession must not exceed 100 mining squares.

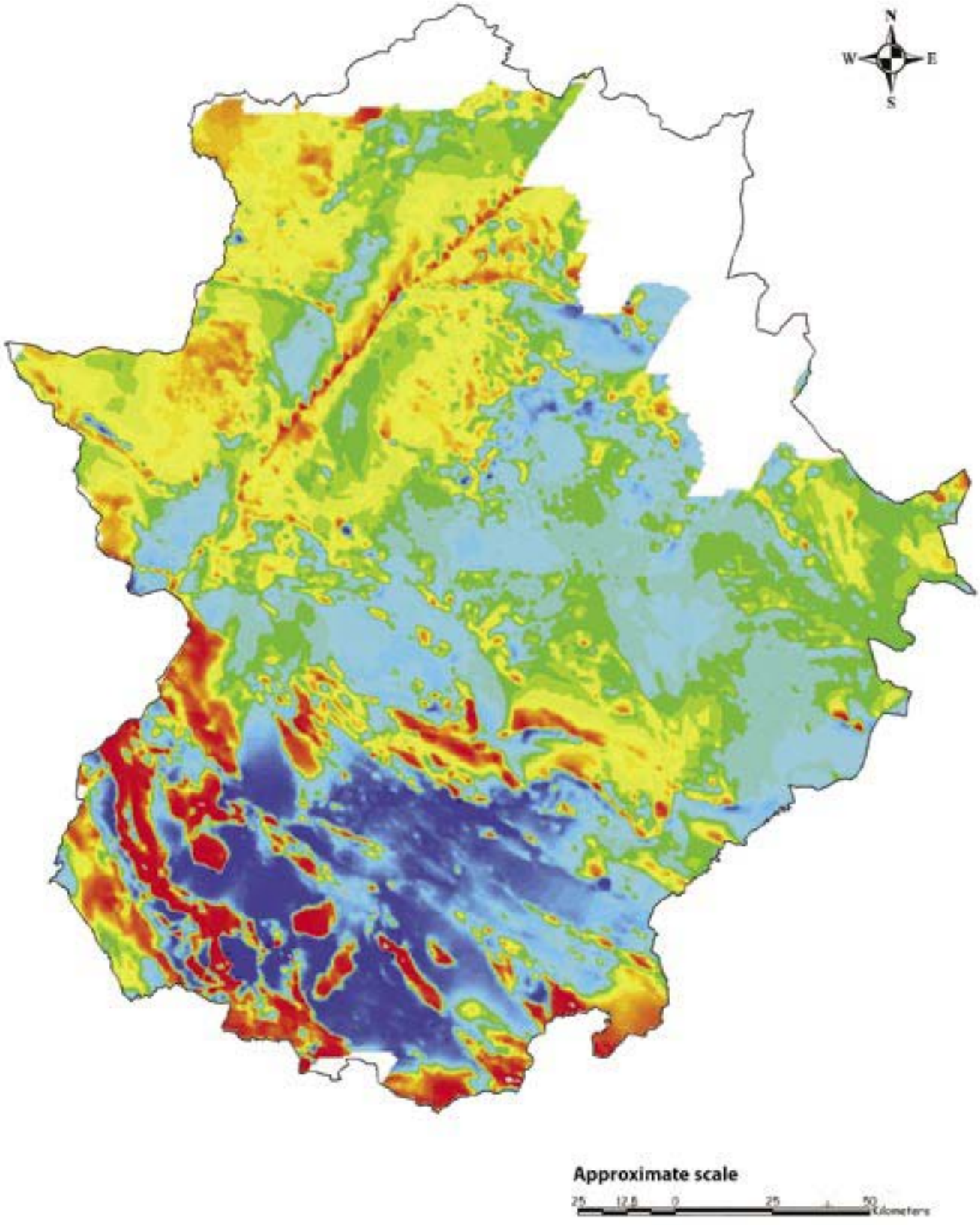
Mining rights can expire by voluntary resignation at the conclusion of the validity period, or by other causes regulated by the Mining Law.

Once mining rights for sections B, C and D have expired, or once the State has lifted its reserve rights, a contest to solicit new mining rights over the expired terrains should be carried out.

The following types of mineral rights are recognised:

i) Exploitation Licences for resources in category A;
ii) Licences/Concessions for the exploitation of resources in category B;
iii) Exploration Permits for resources in categories C and D;
iv) Permits for the investigation of resources in categories C or D;
v) Concessions for the exploitation of resources in the sections C or D, which can be direct or derivative;
vi) Permanent reserves of the State for resources in sections C or D; and
vii) Provisional reserves of the State for resources in sections C or D.

Airborne magnetic map of Extremadura



open pits and minor underground workings that are evident almost continuously for around 1 km. About 1 Mt of ore was mined, with average grades of around 52.5% Fe.

Subsequently, the Spanish Geological Institute (IGME) investigated La Bilbaina between 1968 and 1972, estimating remaining reserves at 7 Mt at the same Fe grades and 0.11% Cu.

Current sampling at surface and underground has yielded high copper and gold values; the best result is 2.9 g/t Au and 0.43% Cu over 0.75 m. The mineralisation is believed to be syngenetic, with subsequent shearing and metasomatic alterations associated with the Brovales pluton.

OTHER PROJECTS

Besides Rio Narcea Gold Mines' exploration activity, **Inmet Mining Corp** is investigating the Pb-Zn-Cu volcano-sedimentary deposit of Las Herrerías in Puebla de la Reina (Badajoz), and **MSA Projects** is starting exploration at the Casas de Don Pedro (Badajoz) and Los Vieros (Cáceres) gold deposits.

Regional administration

THE State and the Autonomous Regions share Spain's administrative powers relating to mining rights. The State Administration, through the Ministry of Industry, Tourism and Commerce, has been entrusted with regulating the Mining Regime and managing national mining reserves.

The regional administration bodies have been entrusted with the competences of implementation, that is to say, the functions of management and planning, and follow-up of investigatory work and the exploitation of the mining resources.

In the case of Extremadura, these functions are assumed by the **General Directorate of Industrial Planning, Energy and Mines (DGOIEM)** of the governing body of Extremadura.

Furthermore, the DGOIEM, as a support agency for the development of the mining sector of Extremadura, carries out a series of actions *(see box, above)*.

ACTIONS CARRIED OUT BY THE DGOIEM:

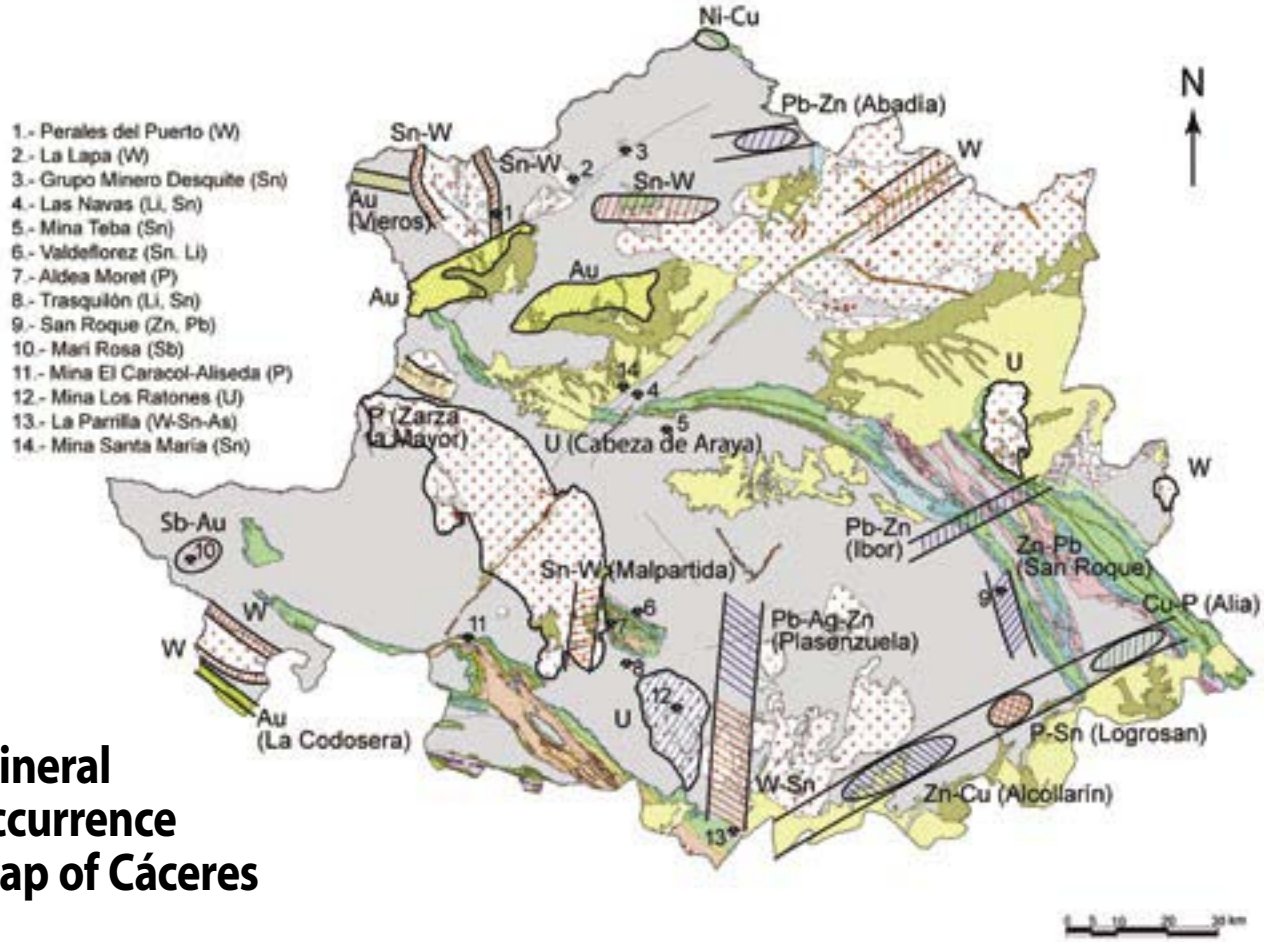
i) Geological and mining investigation of the region by detailed exploration in areas of known mineralisation, or through basic geological, metallogenic and geochemical mapping. In this regard, the following maps and reports are available:
- Geological-Mining Map of Extremadura at a scale of 1:300,000 (1987);
- the investigation of chromium, nickel, gold and platinum in Calzadilla de los Barros (Badajoz) (1988);
- the investigation of gold, wolfram, tin and antimony in La Codosera and Villanueva de la Sierra (Cáceres) (1991);
- a report on Mineral exploration in Llera (Badajoz) (1993);
- Geochemical multi-element map No.827 at 1:50,000 scale (Alconchel) (1998);
- Geophysical Investigation in Olivenza (Badajoz) (2001);
- Metallogenic Provincial Map of Extremadura (2004);
- the Project of Cartography and Geochemical Exploration in the province of Badajoz (in progress); and
- a 1:50,000-scale continuous digital geological map of Badajoz (in progress).

ii) The diffusion of geological and mining information, through the Geological and Mining Information System of Extremadura(SIGEO).

iii) The promotion of the minerals sector through the publication of books, atlases and maps, including: *Mining in Extremadura* (1992); *Geological Map and Mineral Resources* from several sectors of Extremadura at a scale of 1:100,000; and the *Atlas of Ornamental Rocks of Extremadura* (2004).

iv) The creation of the Technological Institute of Ornamental Rocks and Building Materials (INTROMAC).

"This year the completion of new Metallogenic Provincial Map of Extremadura is anticipated"



Mineral occurrence map of Cáceres

GEOLOGICAL INFRASTRUCTURE

Geological maps at a scale of 1:50,000 are available for the whole of Extremadura. The Geological and Mining Institute of Spain (IGME) carried out the mapping under the MAGNA plan. Some of these maps are outdated and for this reason the DGOIEM has just started to elaborate the Continuous Geological Map of the Province of Badajoz at a scale of 1:50,000, in collaboration with the IGME and the University of Extremadura. The aim is to provide continuous and up-to-date geological cover, with a single legend for the whole of Badajoz. The data will be presented in digital form, in GIS format and should be completed in 2006.

In 1987, the DGOIEM published the Geological Mining Map of Extremadura at a scale of 1:300,000. This was the first metallogenic map for the entire region, in which the geology and the mineral deposits of Extremadura are described.

This year the completion of the new Metallogenic Provincial Map of Extremadura is anticipated. It will represent the most up-to-date inventory of the region's mineral resources and is being carried out in collaboration with the IGME. In addition, the DGOIEM has a systematic plan for metallogenic mapping at a scale of 1:100,000, the so-called 'Geological and Mineral Resources Map of Extremadura'.

In terms of geophysics, regional airborne magnetometric and radiometric surveys cover 80% of Extremadura, and a gravimetric survey at a density of 1 point per km^2 is available for the entire territory.

GEOLOGICAL AND MINING INFORMATION

The Geological and Mining Information System of Extremadura (SIGEO) is a website where you can interactively consult the mining cadastre map and all the geological mining information of Extremadura in GIS format. The Internet address is:

http://sinet3.juntaex.es/sigeo/web.

SIGEO aims to facilitate and promote the development of the region's mining sector by providing, via the Internet, the most up-to-date basic geological and mining information, as well as the latest information about mining rights.

The DGOIEM is aware of the huge potential that Extremadura offers, and since 1983, with the aim of promoting the development of new mining projects, it has undertaken considerable work concerning the potential for mineral exploitation, especially for ornamental stone and industrial minerals, but also for metallic ores and mineral waters.

The homepage of the sigeo website

Its activities include geochemical exploration, as well as geological and metallogenic mapping, and it has amassed a vast quantity of cartographic information, plus reports and publications.

All this information has been scanned, digitised and integrated into the DGOIEM's GIS. In addition, the Governing Body of Extremadura has developed a new computer application that allows the Mining Cadastre to be generated in GIS format, the so-called Mining Information System of Extremadura (SIMEX).

> "SIGEO aims to facilitate and promote the development of the region's mining sector by providing, via the Internet, the most up-to-date basic geological and mining information"

Thus, all the information regarding mining rights has been automatically integrated into the GIS, and the decision by the Governing Body of Extremadura to make all this geological mining information available on the Internet has resulted in the development of SIGEO.

SIGEO gives interactive access to geospatial data corresponding to geology, hydrogeology, hydromineral resources, mineral deposits, drill holes and trenches, remote sensing, geochemical surveys, geophysics, exploration projects, rock samples, interesting outcrops of natural stones, plus access to the Mining Cadastre of Extremadura and to mineral exploration reports.

The system is subdivided into three subsets: interactive cartography; exploration reports; and metadata. The interactive cartography has a series of GIS functions, which makes SIGEO a very powerful and versatile instrument for mineral exploration.

THE PROVINCIAL METALLOGENIC MAP OF EXTREMADURA

The DGOIEM, in collaboration with the IGME, has recently produced the Provincial Metallogenic Map of Extremadura at a scale of 1:200,000, with the aim of compiling a complete inventory of the region's mineral resources.

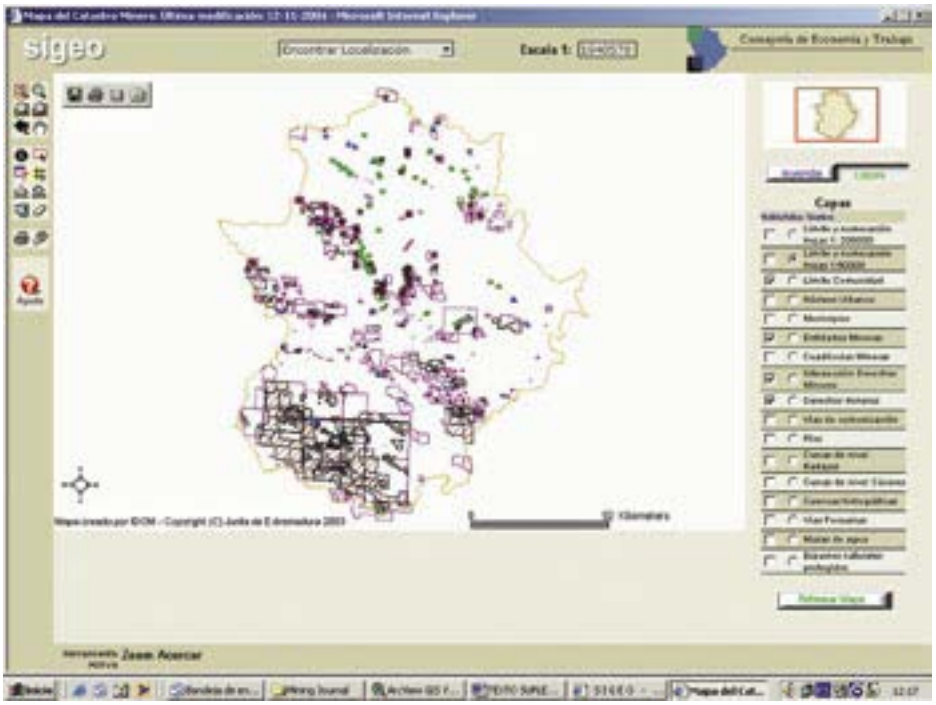
The work included the systematic study and identification of mineralisation and mineral occurrences at more than 1,000 sites. The occurrences have been studied and sampled, and their metallogenic and geochemical characteristics have been logged.

The resultant Provincial Metallogenic Map of Extremadura and geo-reference data base contain the relevant information on all the mineral occurrences that have been studied.

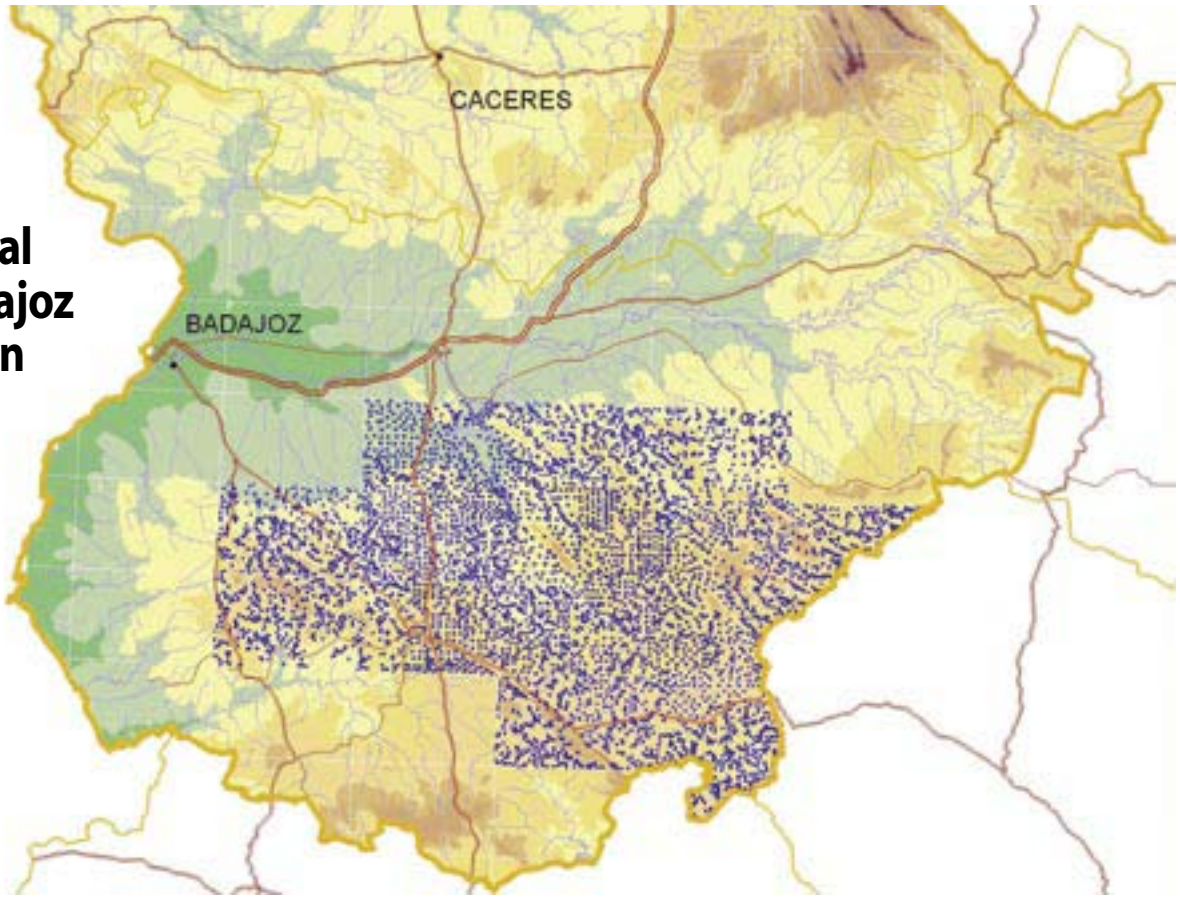
GEOCHEMICAL EXPLORATION IN OSSA MORENA (BADAJOZ)

This project has been carried out in collaboration with the IGME and its main goal has been to complete a multi-element geochemical exploration survey over an area of 6,245 km^2 in the Ossa Morena area. Sample density was around 1 sample/km^2 for sediments and 1 sample/5 km^2 for pan concentrates. A total of 5,416 sediment samples were collected, plus 814 pan concentrates and 100 rock samples.

Samples were analysed for Au + 48 elements, includ-



Mining Cadastre of Extremadura, November 12, 2004



Geographical map of Badajoz with location of stream sediment samples

ing B, Se, Cd, Te and Bi, using ICP-plasma and neutron activation techniques. The pan concentrates were also studied with the hand lens. The results of the survey are now being interpreted before production of geochemical maps that will show anomalous areas.

AIDS AND INCENTIVES

The Spanish Government has implemented a series of specific incentives to promote mining, and these are managed by the Central Administration through the Ministry of Industry, Tourism and Commerce. Benefits can be divided into two groups: those related to direct economic promotion, and those providing indirect benefits.

The former include concessions and grants for exploration and development activities, exploitation of mineral deposits and work related to protecting the environment. Indirect benefits can be in the form of reduced taxes for companies undertaking activities covered by the Mining Law.

> "The Spanish Government has implemented a series of specific incentives to promote mining"

In addition, the Regional Administration of Extremadura, through the Ministry of Regional Government of Economy and Work, makes available a number of grants and assistance to businesses and intermediate organisations, with the objective of promoting the economic growth of Extremadura, thereby consolidating a solid and competitive business network. Moreover, the Regional Administration has created PROMOREDEX (Business and Industrial Promotion Network in Extremadura).

DIRECTORY

■ **General Directorate of Industrial Planning, Energy and Mines (DGOIEM). Governing Body of Extremadura. (Dirección General de Ordenación Industrial, Energía y Minas. Junta de Extremadura.)**

Address: Paseo de Roma s/n
06800 Mérida (Spain)
Tel: +34 924 005605
Fax: +34 924 005601
Web: www.juntaex.es
E-mail: dgoieym@eco.juntaex.es

Senior Geologist: Carlos Alcalde
Tel: +34 924 005618
Fax: +34 924 005601
E-mail: calcalde@eco.juntaex.es

■ **General Directorate of Business and Industrial Promotion (PROMOREDEX). Governing Body of Extremadura. (Dirección General de Promoción Empresarial e Industrial. Junta de Extremadura.)**

Address: Paseo de Roma s/n
06800 Mérida (Spain)
Tel: +34 924 005475
Fax: +34 924 005495
Web: www.juntaex.es, www.promoredex.com
E-mail: dgpei@eco.juntaex.es

■ **Technological Institute of Ornamental Rocks and Building Materials (INTROMAC). (Instituto Tecnológico de Rocas Ornamentales y Materiales de Construcción.)**

Address: Campus Universidad de Extremadura. Crta de Trujillo, s/n
Apartado de Correos 135
10071 Cáceres (Spain)
Tel: +34 927 181042
Fax: +34 927 181041
Web: www.intromac.com
E-mail: informacion@intromac.com

■ **General Directorate of the Environment. Governing Body of Extremadura. (Dirección General de Medio Ambiente. Junta de Extremadura.)**
Address: Avda. Portugal, s/n
06800 Mérida (Spain)
Tel: +34 924 002342
Fax: +34 924 002443
Web: www.juntaex.es
E-mail: dgm@aym.juntaex.es

■ **Ministry of Industry, Tourism and Commerce. (Ministerio de Industria, Turismo y Comercio.)**
Address: Paseo de la Castellana, 160
28071 Madrid (Spain)
Tel: +34 902 446006
Fax: +34 91 4578066
Web: www.min.es
E-mail: info@min.es

■ **Geological and Mining Institute of Spain. (Instituto Geológico y Minero de España.)**

Address: C/ Rios Rosas, 23
28003 Madrid
Tel: +34 91 3495700
Fax: +34 91 4426216
Web: www.igme.es
E-mail: sec.dg@igme.es

Published by:
Mining Communications Ltd
Albert House,
1 Singer Street,
London, EC2A 4BQ, UK
Tel: +44 (0)20 7216 6060
Fax: +44 (0)20 7216 6050
E-mail: editorial@mining-journal.com
www.mining-journal.com

Supplement editor: Roger Ellis
Design and production: Tim Peters
Printed by Stephens & George, Merthyr Tydfil