



Cobre Las Cruces

21st Century Mining

- Cobre Las Cruces is the largest private industrial investment in the province of Seville in Andalusia, Spain, standing at almost €1,100 Million
- The hydrometallurgical plant just celebrates its 10th Anniversary with 585,000 tonnes of copper cathode produced since 2009 (70,738 tonnes in 2018).
- CLC provides direct employment to nearly 800 people and generates a further 1,500 indirect jobs.
- The new mining project (Polymetallurgical Refinery) will extend the life of the mine over 10-15 years. Its unique technology will represent an international benchmark in the mining sector

Cobre Las Cruces, the mining-hydrometallurgical complex located in the municipalities of Gerena, Salteras and Guillena in Seville province, is one of the principal benchmarks for international mining today. Both because of its major role in the resurgence of metal mining in Spain and its technological innovations, the company, wholly owned by the Canadian multinational First Quantum Minerals, a world leader in the sector, represents a before and after of one of the humanity's oldest activities.

The private investment is one of the largest – almost €1,100 Million to date– made in the last 30 year in Andalusia and is also the greatest international capital investment in a single project in the province of Seville. No less significant is the local impact, in terms of job creation and the direct, indirect and induced effects on activating the economy of a markedly rural zone.



Cobre Las Cruces operates an open pit mine on the same site as a hydrometallurgical process plant that represents the principal technological innovation of the project. This is the only industrial facility of its kind operating in Europe.

PROJECT PHASES

- Start of exploration: 1992
- Discovery (May 1994) and evaluation of the mineral deposit: 1994-99
- Feasibility Study and Environmental Impact Assessment: January 2000 – March 2001
- Period for approving permits required for the start-up: 2001- 2006
- Land acquisition, Financing studies and start of detailed engineering: 2004-2005
- Acquisition of Project by INMET Mining:
 - ◆ 70% in August 2005
 - ◆ 100% in June 2010
- Acquisition of Project by First Quantum Minerals
 - ◆ 100% in April 2013
- Construction: 4th Quarter 2005 – 4th Quarter 2008
- Start of Production: June 2009
- Estimated production linked to the life of mine: until the end of 2020.
- Closure: 2 years for site rehabilitation
- Post-closure Phase: 2 years

FIGURES

CONCEPT

Initial capital investment, assessment and Feasibility Study	€70 M
Construction investment (2005 – 2008)	€504 M
Initial Bonds deposited	€20+ M
Civil Liability insurance	€30 M
Investment in Water Management Global Plan	€40 M
TOTAL INVESTMENT FROM START OF PROJECT (1991 – 2019)	~€1.100 M
Production 2018	70,738 Tonnes
Turnover 2018	€398 M



PROJECT DESCRIPTION

The mineral deposit is located on the easterly edge of the Iberian Pyrite Belt crossing southern Portugal virtually from its west coast, and extending through the Spanish provinces of Badajoz, Huelva and Seville. Production started in 2009 and is estimated to be completed by the end of 2020. One of the main characteristics of the mine is its high grade (the percentage of copper per tonne of mineral) of between 5 and 6%. The average in the international copper mining sector does not go above 1%.

The mining operation is conducted using open pit methods. The final pit forecast for the current project will be 1,600 metres long and 900 m in diameter. Excavation of the mine have progressed towards to the East in 6 consecutive phases.

A deposit of primary sulphides of copper, zinc, silver and lead have also been identified under the current deposit, which can extend the useful life of the mine between 10 and 15 years, as described in the section headed "The Future" in this dossier.

HYDROMETALLURGICAL PLANT. FROM ORE TO COPPER IN 8 DAYS

The hydrometallurgical plant is the heart and key constituent of the complex. Unique in continental Europe, this is where the ore is converted into sheets of copper using a process that has technical, economic and environmental benefits and indeed is considered by the international mining industry as clean technology for obtaining copper. The process results in the so-called copper cathodes, classed by the London Metal Exchange as grade A with 99.999% pure copper. This is the final product of Cobre Las Cruces, ready for sale and transformation into copper sub-products.

The time taken from the mineral entering the plant until leaving it converted into copper cathodes is just 8 days and comprises five phases:



The mineral enters a circuit to reduce its particle size in three crushing stages until, when less than 15 millimetres thick, it is stored in a silo with capacity for 3,500 tonnes of ore. From there, the wet process begins, with the mineral undergoing a grinding stage using a ball mill. When the size is under 150 microns, it is sent to the mill thickener.

The copper is dissolved using atmospheric ferric leaching by mixing the mineral with oxygen and sulphuric acid. There are eight 350 m³ reactors connected in cascade. The process takes about 8 hours and ensures copper recoveries of above 90%.

After clarification and cooling, the solution is stored in a regulating tank from where it passes to solvent extraction, a process that eliminated the dissolved impurities.

The product resulting from solvent extraction is a completely clean, enriched electrolyte that proceeds to electrowinning. The electrolyte is filtered and distributed into cells through which a continuous current is passed. After about 7 days in the cells, the copper sheets are harvested.

The performance of the plant has been the key in the company's evolution since production began in June 2009. In 2018 the production reached 70.738 tonnes.

WATER MANAGEMENT

Water management is a crucial issue on which the project's sustainability depends. Protection of the groundwater resource is ensured by the dewatering-reinjection system (DRS). This consists of a ring of pumping wells that intercept the flow of groundwater before it enters the open pit mine and diverts it via closed pipelines to the permanent treatment plant. There the water is subjected to treatment by reverse osmosis and it is then pumped to



the different reinjection sectors. The reinjection wells are located between 1 and 2.5 km from the mine pit. Reinjection not only avoid the water resource from being lost but also notably improves it in the area near the mine, since the water returned to the aquifer is of much better quality than the natural water.

SUSTAINABILITY AND CORPORATE SOCIAL RESPONSIBILITY

CLC has always been guided by principles of sustainability and corporate responsibility, promoting continuous improvement in all spheres of the project, in line with achieving operational excellence and applying best practices in areas such as health and safety, the environment and commitment with the social setting of the mine.

Aspects of environmental protection have been integrated into the project planning since the exploration stages, continuing through the production stage and on to the mine closure plan, prioritising preventive actions before corrective one and managing the efficient use of the resources – mineral, water and land.

Among the numerous environmental measures taken in the project, the following stand out:

- ⇒ recuperation and regeneration of a livestock trail and three streams that were diverted to avoid being affected by the mining activity.
- ⇒ revegetation and landscaping of the different areas affected by the mining activity, e.g. placement of topsoil on the slopes of the waste dumps.
- ⇒ cataloguing of flora and fauna, particularly important being the programme undertaken to protect the stripe necked terrapin and the project to protect the population of great bustards, a protected species, both with successful results.

With regard to caring for and protecting the company's human resources, risk prevention and management are incorporated throughout the company. The professional skills of the workforce are another priority for CLC, which in the last three years are given 64,000 hours of training to employees and site contractors.



Another of the essential points of interest in CLC's actions is its commitment to collaboration with the local communities. The company has made a major effort to generate local employment in the district where it is located. Ambitious courses have been given to train people with no experience in mining, who were then incorporated to perform different tasks, thereby consolidating a qualified job.

As at 31st December 2018, Cobre Las Cruces provided direct employment to over 800 people, between its own personnel (258) and the contractors who work every day on the company's site facilities (548). The indirect and induced employment is estimated to include a further 1,500 people.

In mid-2011 the company set up a Local Community Relations Panel formed by representatives from different groups, the purpose of which is to identify actions that bring benefits to the local residents and encourage social harmony with the activity.

CLC's presence has generated an economic activity of considerable value to the neighbouring communities which can be seen in the creation of businesses and the reactivation of different services among which stand out hostelry and transport among others. Likewise, a good number of small and medium sized businesses have found in Cobre Las Cruces an opportunity to gain an entry into the mining sector market, in operations both in Spain and abroad.

The creation of the Cobre Las Cruces Foundation in October 2010 was a decisive boost to involving the company in socioeconomic, cultural, sports participation and environmental actions mostly orientated at improving the quality of life of the residents of Gerena, Guillena, Salteras and La Algaba. To date, the Cobre Las Cruces Foundation's social investment has been close to 9 million euros.

Among the main activities of the Foundation, the CLC Industrial School stands out, for the professional training of unemployed people from the area, and also the "Five Nines" Award to the best local entrepreneurial project, as well as other initiatives.

In November 2012, the especial sensitivity of Cobre Las Cruces towards the difficulties which the economic crisis was causing in the four local municipalities, led to the signature of



an agreement named the “Municipal Development Plan” with the four municipalities. This is the largest agreement of this kind signed by a private company in its direct area of operation and was renewed for a further four years at the end of 2016.

INNOVATION

One of the most important objectives of Cobre Las Cruces is to lead the revival of modern, sustainable mining in Andalusia. Continuous investment in the best technology and commitment to innovation are therefore the basis for the project and the linchpin of its economic management. There are many examples of the application of innovations in the complex, as we have seen above. Below are highlighted some of the milestones in both production and environmental aspects.

Innovation in the industrial process

The CLC plant is unique in the world thanks to its system for treating copper, based on hydrometallurgy. Compared to the traditional alternative of pyro metallurgy, where the ore is smelted in a foundry, this process eliminates transport to offsite smelters and prevents the emission of SO₂ to the atmosphere.

One of the key phases of this process takes place in the leaching towers which have been developed exclusively for CLC by the Finnish company, Outokumpu, which was awarded the prize for the Best Innovation in Quality thanks to our project, and enables an end product of unbeatable quality to be obtained.

Innovation in planned environmental restoration

Integration of the mine site into its surroundings and its subsequent restoration have been provided for from different perspectives.

The use of transfer mining permits the open pit to be progressively restored from year 9 and the waste dumps to be replanted from day 1. Productive use of the land for agricultural, forestry and social purposes has also been promoted after completion of the mining activity.



Innovation in water management

Cobre Las Cruces manages several types of water and effluents. On the one hand, there is the treated urban wastewater pumped from the San Jeronimo sewage plant in Seville. In this case, a purification technology is used that enables major savings in water and recycling of this resource for industrial usage. On the other hand is the preservation, in quality and quantity, of the Niebla-Posadas aquifer that flows over the mineral deposit, guaranteed by means of the Dewatering-Reinjection System (DRS).

CLC has the most advanced facilities of their kind in the world: a Permanent Water Treatment Plant based on the combined use of physical-chemical purification techniques and reverse osmosis, which enable risks to be eliminated and which guarantee that no water unfit for human consumption is injected into the aquifer.

Innovation in waste management

One of the principal contributions is the management of the industrial mining waste and its minimal impact possible on the surroundings. The residue is dried and placed in a tailings storage facility within the mine site. This encapsulated storage system of the dry waste has been one of the most important points in the environmental feasibility of the project, which has no tailings dam.



THE FUTURE OF CLC

Current activity

At present CLC is conducting the open pit mining of a mineral deposit of Secondary Copper Sulphides (Chalcocite) and transforms the ore into 99.999% pure copper sheets, called cathodes. According to the mining operation schedule, by the end of 2020 the resources in the mineral deposit will have been completed, meaning the end of the company's mining activity.

The PMR Project

Lying underneath the secondary sulphides currently being mined are additional mineral resources of more than 30 million tonnes of Primary Polymetallic Sulphides containing copper, zinc, lead and silver, which could enable the mining project to be continued for at least a further 10 to 15 years.

CLC has therefore extended the forecasts of its productive period by developing these new resources and broadening its activity with the Poly Metallurgical Refinery (PMR) project. This project refers to the technological capability of producing several metals, since zinc, lead and silver will be added to copper, the principal element mined. All this will be conducted in a single integrated refinery, unique in the world, that will operate with the company's own minerals and will be able to treat raw materials brought in from other sources.

In this respect, a Pilot Plant worked in 2016 and 2017 on analysing and researching experimental data in order to obtain the technical and process information needed to be able to design the new polymetallurgical industrial refinery.

The PMR project will represent an investment of more than 400 million euros. It is currently in the phase of obtaining permits from the administrations (permit applications were submitted on 5 October 2018).

This project means a unique innovation in the world in the field of mining. Las Cruces has developed a new technology capable of exploiting a type of polymetallic mineral very



abundant in the south of the Iberian Peninsula (the Pyrite Belt) but which until now was not profitable to treat due to its technical complexity.

The PMR Project has the following benefits:

- It prolongs the life of the current mining project and thus its economic and employment impact.
- It diversifies its product portfolio, adding zinc, lead and silver to the current copper line.
- Positions the Andalusian industry at the forefront of global innovation in the mining sector.
- It represents a pioneering technology, unique in the world, sustainable and 100% developed at Cobre Las Cruces.

With the new project...

- Las Cruces will not only produce copper: it will also produce zinc, silver and lead.
- An underground mine will replace the current open pit mine.
- A new polymetallurgical plant, unique in the world, will be built.
- From mine to metal, all in the same mining-industrial complex.
- The exploitation of the additional mineral resources in CLC would mean extending the company's activity by a minimum 10-15 years.
- Given the versatility of the Plant, it would be possible to prolong its life even more by feeding it with mineral or concentrates from other mines, which would open up extraordinary perspectives for the Iberian Pyrite Belt and would consolidate Andalusia as an international benchmark for mining.