

KGHM POLSKA MIEDZ - SIERRA GORDA PROJECT INTO THE DEEP



INTO THE DEEP

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Business manager Roberto Luna discusses the on-going development of the Sierra Gorda open pit copper mine project





Salt water pool - Earth work

As well as having the distinction of being known as the driest desert in the world, the Atacama Desert of Northern Chile is home to the Sierra Gorda project. “A large tonnage, open pit copper mine development,” explains business manager Roberto Luna, “it boasts deposits that total up to 2.2 billion tonnes of measured and indicated resources, and reserves amounting to some 1.3 billion tonnes.”

Estimated to have a useful life of 20 years, two phases of activity have been proposed. The first of these will run from 2014 until 2017 and will feature an ore throughput rate of 110 kilotons per day. The second phase will then commence in 2017 and is expected to involve ore throughput reaching levels of 190 kilotons per day on average.

The main plant equipment needed to be brought together for the first phase of the project includes one primary crusher, four secondary crushers, three ball mills, four high-pressure grinding rolls and 32 floatation cells. In turn, six 73yd³ shovels, 41 cubic metre front loaders, six drills, and 29 trucks with a 300 tonne capacity are being considered for the mine.

As is the norm for an open pit mine, the ore from Sierra Gorda is hauled by trucks to a primary crusher. By means of conveyors over the ground the ore is then transported from the crushing stages to the concentrator plant, before grinding is carried out through ball milling using hydrocyclone classification circuits. The ore released from wet grinding is then recovered during the bulk copper and molybdenum flotation stage.



SalfaCorp



As an industry leader, Salfa Montajes, a SalfaCorp subsidiary working in industrial construction and assembly in mining and energy, has been awarded construction and installation of the Sierra Gorda Processing Plant (110,000 ton per day capacity) dry and wet areas. With a contract totaling over \$350 million dollars, the Sierra Gorda project covers all multidisciplinary areas with a commitment of over 10,000,000 man-hours from the start of Civil Works to the launch of the plant, including raw materials stockpiling, secondary and tertiary grinding (HPGR), secondary and tertiary sieves, crushing, floatation, filtration and tailings thickeners, among other areas. As part of this process, for the past two years Salfa Montajes has taken part in the project's constructability with Sierra Gorda S.C.M., both in Chile and Canada. Salfa Montajes has been involved in every stage of the project, including construction strategy, organizational structure, logistics, as well as assessment and awareness of the construction CAPEX in each of the engineering stages.

With 83 years of experience behind it, SalfaCorp is ranked in the top 5 in Latin America companies in engineering and construction, leading the Chilean market with annual sales of more than \$1.7 billion dollars, and with a workforce of over 44,000 and 2,400 professionals. Constant evolution and innovation has permitted Salfa Montajes to be an industry leader in its areas of specialty and service. It has reached successful international expansion to key regional markets such as Peru, Colombia, Panama, and Uruguay, with active participation and dedicated client service. Throughout its history, the company has demonstrated an outstanding ability to grow in a sustainable manner and offering solutions for a variety of services, including construction and industrial assembly, civil construction, infrastructure, industrial maintenance, mine development, marine works, earth moving and EPC projects.

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Prestripping

The final product is a mixed copper and molybdenum concentrate that is sent to a flotation plant where molybdenum is recovered and copper concentrate remains as the tails. Both concentrates are then conveyed to marketing areas by a railway line located in the nearby Antofagasta.

A joint venture between KGHM Polska Miedz, the Japanese Sumitomo Metal Mining company and the Sumitomo Corporation, the Sierra Gorda project represents the implementation of the three parties' expansion, internationalisation

HATCH HELPS SIERRA GORDA BECOME ONE OF WORLD'S LARGEST MOLYBDENUM PRODUCERS



Sierra Gorda has turned to Hatch's EPCM expertise to support its ambitious copper / molybdenum plant project in the Antofagasta region of Chile. This is a unique opportunity for the company, since the mine's molybdenum ore grade for the first three years is about 900 ppm, which is significantly higher compared to the industry standard of less than 90 ppm.

Working with a tight timeline between July 2012 and May 2013, Hatch is responsible for all detailed engineering duties of the molybdenum flotation plant, including a thorough analysis of the basic engineering stage, and delivering all documentation needed for procurement and construction.

During its first three years of operation, the 110-ktpd ore throughput copper and molybdenum concentrator is expected to produce 450 ktpa of collective concentrate, of which 7 percent is molybdenum

concentrate. For the remainder of its estimated 22-year life, the plant will continue processing at 190 ktpd of ore generating 790 ktpa of collective concentrate with 1.5 percent being molybdenum concentrate. That transition will require a flexible design in order to accommodate the different ore throughput to be processed from year four onwards.

"We have always believed that Hatch delivers strong engineering capabilities and expect they will fulfill their commitment to design this plant, a critical part of the project, within the tight schedule," said Joe Tis, vice president of development for Sierra Gorda.

Equipment covered under the project includes thickeners, flotation cells, molybdenum concentrate filters, regrinding mill, dryers, packing maxi bags equipment and associated infrastructure.

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A SUCCESSFULLY EXECUTED MISSION IS A NEW BEGINNING

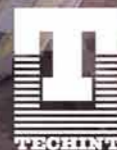
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and position strategy for the global copper and molybdenum market. The project presents the ideal opportunity to bring about increased resources, reserves and production, and ultimately raise the value of the three companies on a global scale.

“The primary challenge at the heart of this venture,” Luna continues, “is being able to design, procure, construct, commission and successfully start up a large scale project for a foreign company, where different visions inherent to the cultures of each participant are successfully integrated. Another challenge stems from the fast-track status of this particular greenfield project where deadlines are incredibly demanding and shorter than the industry average.”

Of equal importance is the need to capture, retain and train the employees required for the construction, operation and development of the project. At present, over 3500 people are assisting in the construction phase, with this number expected to peak

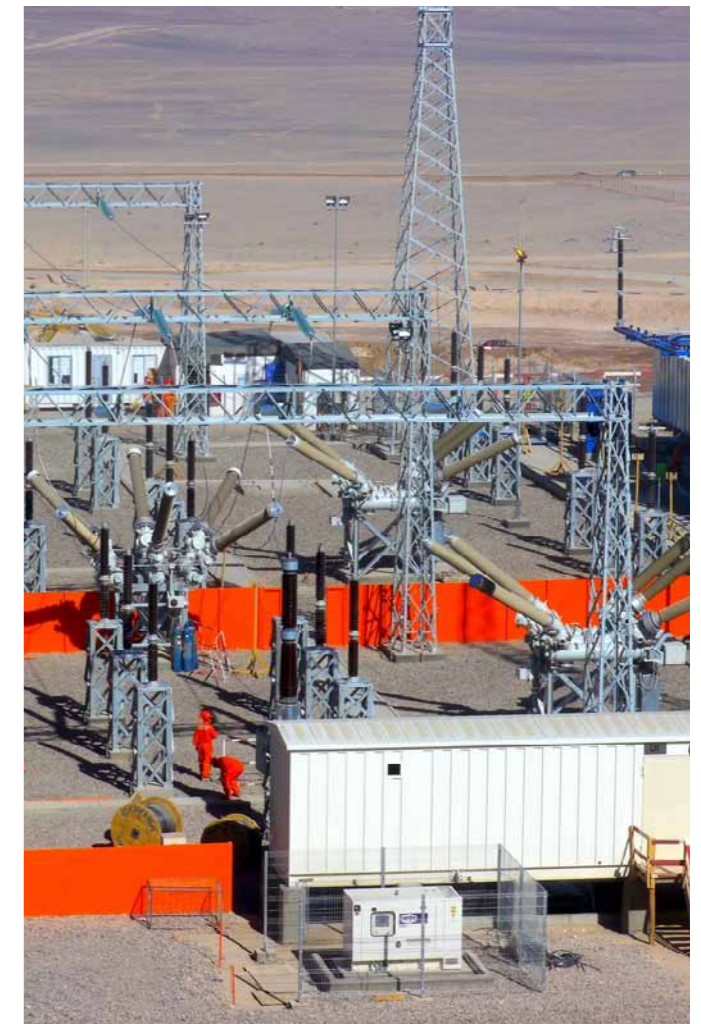
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Electrical substation

KNIGHT PIÉSOLD S.A.

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Knights Piésold S.A. is currently developing the detailed engineering of the tailings transport, tailings storage and water management systems for the operation of the Sierra Gorda Project. In order to address this project and comply with the expectations of Sierra Gorda, we have formed a multidisciplinary team composed of specialists from the following disciplines: civil, electrical, instrumentation, water and tailings transport, geotechnical and geology, construction, risks, project control, quality and safety. The strengths of our team, coupled with the collaboration and participation of the team from Sierra Gorda, have



enabled us to comply with the objectives defined at the outset of the project, in terms of both the agreed upon goals and deadlines. This has resulted in a final design of the deposit that meets the highest standards of both safety and constructability.

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Workers

at around 7000 in the near future. Once into the operational stage, a total of 2000 individuals are due to be active in carrying this stage of the project through.

As a result of internal and external factors in Chile, and the mining world in general, there is an increasingly strong demand for qualified labour and mining supplies, which has conspired to produce an increase in prices. This has impacted directly on projects that are currently under execution. “The Sierra Gorda project has not escaped the effects of

this,” Luna highlights. “As a hedge against potential fluctuations that could impact upon project costs and completion, moves have been made to commit purchase orders and contracts at the earliest stage possible.”

Northern Chile’s geographic characteristics, namely the scarcity of water and energy, have also raised several issues. To overcome these, the project follows the current trend of using seawater in the mining process. This water will be carried by means of a 141 kilometre pipeline with a flow rate of 1500 litres per

141 KM

Length of pipeline carrying sea water to the project

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Engineering, Environment and Community An ongoing challenge

<p>ENGINEERING</p> <ul style="list-style-type: none"> Tailings Deposit Design Heap Leach Design Geotechnical Design for Mining Infrastructure Hydrology - Hydrogeology Geotechnical Studies Quality Control and Assurance 	<p>ENVIRONMENT AND COMMUNITY</p> <ul style="list-style-type: none"> EIAs and Social Impact Studies Environmental and Social Baseline Studies Air and Water Quality Studies Environmental Management and Citizen Participation Legal and Environmental Audits Mine Closure Planning and Warranty Estimation
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SIERRA GORDA: SEAWATER TRANSPORT PROJECT

BRASS Chile S.A. was contracted by Sierra Gorda S.C.M. for the Detailed Engineering of the 145 km – 36” diameter Seawater Transport with a maximum capacity of 1,500 l/s. The pipeline utilizes a RFP Pipe at low pressure and CS at high pressure section. To enable delivery from coast to mine site at 1700 masl, 3 pump stations connected in booster mode are utilized: one at the coast and 2 intermediate. Each intermediate station has 7 high pressure pumps in parallel with 3,160 kw motor capacity each. A chemical treatment plant with high efficiency filters are located at the first intermediate pump station. Operation is controlled through a SCADA system connected through fiber optic cables.

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second. Furthermore, two industrial water supply contracts have been entered into with Aguas Antofagasta and FCAB respectively. Processed at its on-site water treatment plant, this water will be made suitable for human consumption.

Meanwhile, the power required for the project will be generated by a coal-fired thermoelectric power plant located in Mejillones. From here a 140 kilometre long, 220 kilovolt transmission line will supply energy to a primary substation that will also be located on-site.

To date, 2012 has seen the project achieve several milestones, all of which revolve around the mine area itself. In addition to the mine loop now being in operation, March 2012 saw the start-up of the pre-stripping stage. Looking towards the years ahead, by the end of 2013 it is hoped that pipeline construction will be complete, plant mechanics in place and the pre-commissioning stage will have begun.

INGENIERÍA CIVIL VICENTE (ICV)

Ingeniería Civil Vicente S.A. (ICV S.A.) is proud to have been able to participate, from the very beginning, in the Sierra Gorda mining project in Chile, providing earth movement services for the construction of its preliminary platforms and infrastructure. The implementation of this important contract implied major logistics and engineering challenges for our company and its successful completion reflects the joint efforts of ICV and the client, Minera Quadra Chile Limitada. This key milestone in ICV’s history has added to our company’s experience, enhancing its capacity to undertake other similar projects for Chile’s large-scale mining industry.

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“THE PROJECT HAS BEEN PROGRESSING AS PLANNED AND IN ACCORDANCE WITH THE SCHEDULE”



Flotation cells

CAT shovel



2014

.....
Entry into production to begin

These events will then be followed in 2014 with the starting up of the commissioning phase, the opening of port facilities and the completion of ramp up operations.

“The project has been progressing as planned and in accordance with the schedule put in place by the joint venture partners,” Luna says. “The project’s critical path remains unchanged with originally scheduled deadlines still maintained and entry into production expected to begin during the first semester of 2014.”

As it relates to the immediate future, the goal for the rest of 2012 is to have the entire necessary infrastructure in place in order to allow the normal development of construction work. This requires the completion of camps, mesh halls, offices, recreational areas and a polyclinic. “In addition,” Luna says, “pre-stripping, pipeline and civil construction work in dry and wet areas have begun with our own equipment and personnel, while the project will continue to meet its expected output levels.” **BE**

For more information about KGHM Polska Miedz - Sierra Gorda Project visit:
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