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Peru Mining 2015



PRE-RELEASE
EDITION

Mining in Peru

The industry starts 2015 strong, but questions remain about the development of new projects

2015 is the last year of Ollanta Humala's administration, and the electoral winds are already starting to be felt across the country in preparation for the 2016 presidential poll. According to optimists in the mining industry, this is good because the government will try to push new mine development and infrastructure projects in order to strengthen its legacy before leaving office. Pessimists, on the other hand, think that the government will have no interest in complicating its life by pushing through controversial mining projects.

In truth, the actions of the government alone will not determine what happens, but the government could certainly use an economic boost. After a series of downward corrections, it was published earlier this year that Peru's GDP only grew by 2.35% in 2014, the lowest rate since 2009, and the depression in demand and decline in prices for mineral commodities are certainly dragging down growth. GDP growth was just 1.68% in January 2015, although the mining and hydrocarbons sectors expanded by 5.6% during that period, compared to January 2014.

There are two projects expected to be highlights for Peru's mining industry in 2015, but the outlook for each depends on different factors for success. The first one is Southern Copper's Tía María, at which money has already been approved to start developing the mine, but community support threatens to undermine it. The second is Anglo American's Quellaveco, which is more linked to a corporate strategic production decision.

Peru's copper output stayed practically flat in 2014 at 1.38 million metric tons (mt), but the upward trend of the last year is assured moving forwards. Hudbay Minerals' Constancia, which started production in December, will reach commercial production this year to add 82,000 mt annually to Peru's copper portfolio. Freeport McMoRan's Cerro Verde's gigantic expansion from 120,000 mt per day (mt/d) to 360,000 mt/d should be ready by late 2015 or early 2016. Chinalco is expected to invest \$1.5 billion to expand its Toromocho operation, which produced a lower than expected 70,000 mt of copper last year due to technical and environmental problems.

Former Glencore Xstrata project Las Bambas, now 62.5%-owned by MMG Limited, will be a key addition to the country's copper production, with 2 million mt of copper during its first five years of operation, starting in 2016. Construction was 80% complete by the end of 2014, according to MMG. The operating consortium is investing around \$3 billion to put the project into production, on top of the nearly \$7-billion acquisition cost last year, a figure that includes the \$1.2 billion that was spent beforehand by Glencore Xstrata.

Other projects worth mentioning are Southern Copper's expansions at Toquepala and Cuajone; Buenaventura's Tambomayo gold project, a \$200-million, 150,000-ounces per year (oz/y) venture, expected to be commissioned in 2016; Rio Alto Mining's Shahuindo gold project, whose phase I will involve a \$70-million investment; Hochschild Mining's Inmaculada, which will start production this year, providing 6 to 7 million oz/y of silver equivalent; and Jinzhao Mining's Pampa de Pongo, a \$1.5-billion iron ore operation plus \$340-million port, which has been quietly advancing and already has received its environmental impact assessment approval.

Looking at production figures besides copper, gold output fell from 4.87 million oz in 2013 to 4.54 million oz last year; zinc production also decreased, from 1.35 million mt to 1.32 million mt; and both silver and lead saw increasing production to reach 123.8 million oz and 278,500 mt, respectively.

All in all, the official guidance is that there will be mining investments worth \$8.5 billion in 2015, a similar amount to last year. The figures look healthy considering the global commodity-pricing scenario, but the reality is that a big portion of these investments comes from the inertia of past decisions, and does not take into consideration the high opportunity cost of having large ventures in a standstill, such as Yanacocha's Conga project.

Carlos Gálvez, CFO of Buenaventura and recently elected President of the main industry association, the National Society of Mining, Petroleum and Energy (SNMPE), is not very optimistic for the coming years: "We had a \$60-65 billion investment portfolio, with forecasted annual investments of \$10 billion annually. In 2016 we will go down to levels below \$5 billion, and in 2017 we will be at \$2 billion. For 2018, if Quellaveco does not go ahead, we will be at zero. To be unable to have a permanent backlog of projects is a national shame. Something needs to be done," he says.

With uncertainty about future demand trends and the political results of the 2016 presidential elections and with some anti-mining leaders comfortably installed in several regional governments, the prospects for 2017 onwards do not look buoyant from the perspective of new project development. The government contends that it is aware of the problem and is trying to expedite the cumbersome bureaucracy for exploration projects, but it remains to be seen if these initiatives will have a positive effect in the short term.

Overall exploration expenditures in the country decreased by 50% between 2012 and 2014 although, to be fair, this trend has mirrored what has happened globally in the exploration business. In the words of Antonio Samaniego, president of Peru's Institute of Mining Engineers (IIMP), "the main priority in this cycle is not to stop exploration activities. It is a tough call for companies, but it is just a cyclical problem for the industry."

For Adolfo Vera, president and CEO of Southern Peaks Mining, a mid-tier producer, "the crisis in the junior segment is going to take its toll on the industry. Juniors are the ones that feed the value chain with new projects: junior companies started Toromocho and Constancia, for instance. On the other hand, community issues should



**Adolfo Vera, president & CEO,
Southern Peaks Mining**



With all-in-sustaining costs of \$543/oz, Lagunas Norte was Barrick's lowest cost operation worldwide in 2014. Photo courtesy of Barrick.

not stop the development of projects. The rights of the few should not affect the rights of the many."

LOW COSTS, THE RECIPE FOR SUCCESS

Peru's position as a world-class mining destination is not under question: beyond sociopolitical issues that need to be addressed on a project-by-project basis, with both good and bad outcomes depending on the case, the country offers key ingredients that make it an attractive country for investors. Its geological potential is world-class, and while other countries in Latin America such as Argentina and Colombia offer more untouched exploration opportunities, they present a whole different set of challenges for interested companies.

Peru has a wide array of expertise and service providers to support the industry and is not affected by the high power costs and water restrictions that Chile, the world's largest copper producer, suffers. At the end of the day, a good asset in Peru is as good as it gets, as proven by the recent acquisition of Rio Alto Mining by Tahoe Resources for \$1.12 billion.

Being able to produce profitably despite defensive prices globally is a key advantage for many Peruvian operations. Barrick's La-

gunas Norte, for instance, yielded 582,000 oz of gold in 2014 at all-in sustaining costs of \$543/oz, the lowest cost of all of the corporation's mines.

As a result of the low cycle, Barrick has heavily restructured, eliminating its regional South American management level, so the different countries now report directly to Toronto. In Peru, Lagunas Norte's enviable cost position allows for new capital investments to continue pushing for efficiency and extending mine-life. Manuel Fumagalli, executive director of Barrick in Peru, gives some operational details: "This year we expect to finish building the Phase 6 of the new leach pad, with an investment of approximately \$60 million. We also expect to begin the construction of a waste dump expansion, at a cost of approximately \$17 million".

"We currently have 2.8 million ounces in reserves, which means, at current prices, a life of mine that can last until approximately 2018. We are evaluating options to capitalize on the refractive material lying beneath the current ore deposit. This could extend the life of the mine", explains Fumagalli.

Besides Lagunas Norte, until very recently Barrick had its Pierina mine producing in Peru as well; this was the corporation's first operation in South America, and is now

"In 2016 we will go down to investment levels below \$5 billion, and in 2017 we will be at \$2 billion. For 2018, if Quellaveco does not go ahead, we will be at zero. To be unable to have a permanent backlog of projects is a national shame. Something needs to be done."

- Carlos Gálvez, president, National Society of Mining, Petroleum and Energy (SNMPE)



"The main priority in this cycle is not to stop exploration activities. It is a tough call for companies, but it is just a cyclical problem for the industry."

- Antonio Samaniego, president, Institute of Mining Engineers (IIMP)



undergoing a progressive closure phase. "Given that this is the first closure of a large-scale mine in the country, we want to set an example," says Fumagalli.

Going north from Barrick's operation in the region of La Libertad is Cajamarca, the geology-rich but conflictive region where the Minas Conga project is on hold, and where Gold Fields operates its Cerro Corona gold and copper mine. The South-African based company managed a 35% free cash flow margin from this mine in 2014 despite the low cycle. Ernesto Balarezo, executive vice president for the Americas at Gold Fields, explains some of the cost-saving efforts that were behind this financial performance: "Fuel and power are key components of our costs. In 2014 we replaced our 70 to 100-mt trucks with a fleet of 30-mt trucks. Although we now have more trucks, we have reduced fuel consumption by 6%. We have had 12% savings in power consumption, thanks to an easier-to-process ore from the mine, and to the fact that we have switched to polymer mill liners instead of iron liners. We have also incorporated an additional crusher between the SAG mill and the ball mill, increasing pro-

ductivity; finally we invested \$7 million in two mobile crushers."

Optimizing this operation is key for Gold Fields, considering that the social environment in Cajamarca makes it impossible for the company to expand the mine: "For us, the most efficient growth would be via brownfield exploration around Cerro Corona, but we cannot apply this strategy. This situation goes against the best interests of the region and the country", Balarezo says. The company has virtually cut all its exploration programs worldwide, with the exception of its Salares Norte project in Chile, and plans to keep growing in the Americas through acquisitions.

In the medium-tier spectrum, a low-cost producer that is well adapted to the low cycle is Sierra Metals, a company that acquired the Yauricocha mine in Peru in 2011. In 2014 it had all-in sustaining cash costs of less than \$12/oz of silver.

Yauricocha is an underground polymetallic mine that has been in operation for over 60 years. Last year it produced over 2.1 million oz of silver last year, on top of some gold, copper, lead and zinc. With current reserves and resources guaranteeing at least five



GOLD FIELDS

"The new image of mining"

For Gold Fields, the actual results of a responsible management are a society in progress, a balanced environment and the security needed in order for all our employees to perform their job, because this way, and by considering the welfare of everyone, we can lead our country to the place it should be.

more years of production, there is no indication that the ore will run out soon, assures Sierra's president & CEO, Audra Walsh.

Moving forwards, the company plans to continue growth, both internally and through further acquisitions, taking advantage of the synergies created by the mines' cashflow and the operating teams in place in Peru and Mexico. "We primarily look at low-cost opportunities in precious metals. It is definitely a good time to go shopping", points out J. Alberto Arias, chairman of Sierra Metals.

Another clear example of the growth opportunities that Peru presents for mid-tier players is Southern Peaks Mining. The company operates Quiruvilca, a base metals asset acquired from Pan American Silver, and Condestable, an underground copper mine bought from Trafigura. With those two mines as its foundations, Southern Peaks is looking at potential acquisitions, and is also moving forwards at Ariana, a 70%-owned project in partnership with Pan American Silver, where a feasibility study has been completed.

Like Yauricocha, Quiruvilca and Condestable are mines that have been in operation for decades. Thinking outside the box is essential for achieving efficiencies, says Adolfo Vera, Southern Peaks' president & CEO: "Condestable is the second-largest underground mine in Peru, yet 70% of its production came from labor-intensive conventional mining (miners drilling with a jack-leg). We are trying to get 40% of our production through sub-level stoping with long-holes, which requires far less people. So far the results have been exceptional".



Once in full production, Husbay Minerals' Constanca mine will produce 82,000 mt/y Cu. Photo courtesy of Stracon GyM.

"You have to be very disciplined in this business. My experience, having been in different mines in different countries, is that discipline is disrupted every time you have money", Vera continues.

Is the low cycle, therefore, actually a good thing for miners? One thing is for sure: it is promoting creativity and innovation in order to lower costs, increase recovery rates and push competitiveness. In other words, it is allowing for profitable mines right at the bottom of the cycle, which is a recipe that will ensure Peru's strength in mining over the next decades.



Audra Walsh,
president & CEO,
Sierra Metals

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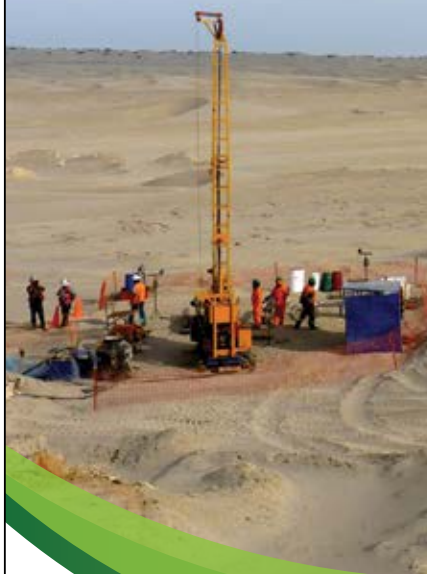
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Junior Companies

Explorers embrace new business models

Junior companies are implementing a wide variety of strategies to survive in the current market, including signing joint ventures, divesting non-core assets, investing in feasibility studies rather than drilling, and shifting the business focus towards a cash flow-creating model. Peru's geological potential remains strong, and even though some companies who cannot afford their exploration commitments are dropping land, other players are seeing more value in acquiring assets with proven information instead of dealing with the risks of greenfield exploration.

"This is my fourth bear market, and I have learned that in different market environments you do different things. When it is easy to get money and properties are expensive, we have tended to focus on early-stage exploration work. Now that properties are worth nothing and money is hard to find, we are looking at acquiring projects already found by others," explains Miles Thompson, president and CEO of Lara Exploration, a company focused on project generation.

Lara Exploration has managed to survive market volatility thanks to the income generated by joint ventures and project transactions. The company is active on many fronts: its main asset today is Liberdade in Brazil, where Chile's Codelco can earn in up to 70%. Together with Goldplata, Lara is setting up a new porphyry explorer with assets in Peru and Colombia. Other transactions in Peru include the sales of the Corina gold project to Hochschild for \$4.1 million plus a royalty and the Grace gold project to Aruntani for \$2

million plus a royalty. Together with Redzone Resources, Lara is also looking for a joint venture partner for the Lara and Tingo Este copper projects in Peru.

"Mining is not a business that you easily can run on a quarter-to-quarter or year-to-year basis. You need to have a sustained effort, so the junior model of finding a project, raising a couple of million dollars, drilling and hoping to get lucky is a lottery ticket. We consider it to be a kamikaze business strategy because you are hostage to the need to finance regularly. The prospect generator model is tried and tested in our business, as well as in the oil and gas industry," insists Thompson.

THE GOLD PROCESSING RUSH

Another growing business option for entrepreneurs in Peru's metals business is gold processing plants, due to the sizeable gold production coming from small miners. A company like Dynacor has demonstrated that investing in your own processing facility can pay attractive dividends, which can then be used to support exploration activities without having to raise funds in the stock exchange. Over time, what started as a supporting revenue generator became a core for the company, thanks to higher gold prices and to the Peruvian government's effort to formalize the artisanal gold mining segment. "In 2013, 22% of Peru's gold exports came from small mining operations, including formal, artisanal and illegal mines, and we are a formal company with the corporate governance standards of the Toronto Stock



The gold processing business model is providing companies with cashflow opportunities. Photo: Huanca mill, courtesy of Dynacor.

Exchange,” said Jean Martineau, president & CEO of Dynacor Gold Mines, pointing at the great business opportunity that the formalization process can bring to Dynacor.

The company operates the Huanca mill, with a capacity of 250 metric tonnes per day, and has recently received the construction permit for its second gold processing unit, Chala, which will have a 300-metric tons per day (mt/d) capacity.

While the company pioneered the gold processing business in Peru, Dynacor is no longer the only player in this segment. Inca One, Standard Tolling, Minera Gold and Anthem United are all investing in their own plants around the country. Martineau affirms that it will take these companies time to optimize their operations: “When we began we had low recoveries, but today we have almost a 95% recovery rate, which is one of the highest in the country. Now, many other companies are coming to replicate our business model, but you cannot achieve that overnight. When you build your mill, you design it according to your ore. In our case, we buy ore from 200-250 different miners. On the other hand, you need to build a network to source the ore, and that takes time.”

Martineau assures that only a portion of the aforementioned 22% of gold production will manage to successfully formalize, leaving the rest of the ore in a limbo where formal mills would not be able to purchase it. Yet, gold processors are not only looking for artisanal miners’ ore. Len Clough, president and CEO of Standard Tolling, explains that formal mining companies offer significant business opportunities as well.

“We have just signed a contract with a formal mining company: the beauty of which is that, being a larger contract, we can fill our initial capacity quickly. Once you reach capacity, you push grade and additional volume for expansion. We want to have a diversified portfolio. Ultimately, if we find a production-ready mining project, we could build a plant there easily.”

In December, Standard Tolling completed the acquisition of the Huamachuco plant in northern Peru for \$1.8 million, which was already partially built, and it expects to commission it in June with an initial capacity of 100 mt/d, expandable to 350 mt/d over the following months. Clough assures that the market offers great opportunities for newcomers, even if he recognizes that in Peru

there is already “a battleground for 1-ounce per metric ton (oz/mt) material.”

“When they source material in the north, operators in the south like Dynacor set a very high cut-off grade, for instance 1 oz/mt. In these mines, there is a lot of 15-gram per metric ton material that the other operators do not even touch. We are volume-focused, whereas our competitors are more grade-focused. We could comfortably have three to five plants north of Ancash, which would create a capacity of over 1,000 mt/d, but still not saturate the market.”

While Dynacor also has an exploration project, Tumipampa, on which it will spend \$5 million this year, the rest of the players are focusing solely on the processing business. Standard Tolling owns the Río Tabaconas project in Cajamarca (a former Grosso discovery) but it is looking at strategic options for it. Meanwhile, Inca One Gold is also concentrating on developing a network of processing plants in Peru, as explained by Mark Wright, its vice president for operations and new projects: “The junior resource space has been pretty tough for a while. We were an exploration company, but as with everybody else, we could not raise the neces-



*Jean Martineau,
president & CEO, Dynacor
Gold Mines*



*Len Clough, president and CEO,
Standard Tolling*

An advertisement for Standard Tolling and Minerios Unidos del Perú SA. The background is a blue-tinted image of a mining plant. In the foreground, there are yellow silhouettes of two people sitting on the ground. A green banner at the top reads "NORTHERN PERU'S LOCAL ORE PROCESSING PROVIDER". Below this, the logos for Standard Tolling (a yellow gear) and Minerios Unidos del Perú SA (a green gear) are shown. At the bottom, contact information for Edgar Barrios, VP Operations of Peru, is provided: Location: Huamachuco, La Libertad; E-mail: Barrios@standardtolling.com; Phone: +591 946 642 607.

sary capital to continue exploring. The gold milling business is a cash flow business, much less risky than punching holes,” he says.

The company acquired the Chala One gold plant in the region of Arequipa and obtained debt financing for \$5 million to scale up the facility to 100 mt/d and fund the initial ore acquisition, where grade is averaging 0.9 oz/mt. In March, the company announced that Chala One is already in commercial production.

Jaime Polar, vice president of operations and development at Inca One Gold, provides more details about the operation: “The plant had a capacity of 20 mt/d and we have expanded it to 100 mt/d. We are gradually scaling up, based on an indicator for the global efficiency of the plant. That includes a good use of the equipment, of the ore that we receive, and good production methods. Moving forward, the idea is to have properties up and down the coast to be able to service effectively the Peruvian market.”

GET ME SOME PRODUCTION

One of the key paradigm changes of the current market is that investors do not want the risks associated to exploration activities, and want instead to perceive that a project can be put into production rapidly and efficiently. In this respect, many companies are trying to make the most of their outlined resources to assess if that is possible, through feasibility and engineering studies.

In the words of Bob Baxter, president and CEO of Indico Resources, “there is certain apathy today in the investors community, which draws a line between early-stage projects and advanced projects, and do not want to consider anything that is not at a fairly advanced stage. The way we can add value to our shareholders is moving the project towards production, probably via a joint venture mechanism.” Indico’s main asset is Ocaña, where there is an inferred resource of 50 million mt of soluble supergene copper. The company believes that it can increase that figure significantly as mineralization extends to the east. “We have been running our internal models on an 80 million-mt situation and believe that on our side of the fence, within our property, we can have the potential for a 25,000 mt per year operation for 10 years, which could be easily augmented if we could add the neighboring property, which offers similar mineralization,” says Baxter.

The capital expenditure to put Ocaña into production is estimated at \$100 million, which is certainly modest for a copper project, but still out of reach for a junior company in today’s market; hence, the strategy of finding a partner. In the meantime, the company expects to

“Zinc has been the ugly duckling for a long time; yet the fundamentals of zinc are very good. Big zinc mines worldwide are shutting down. Then, there are no new mines starting, and the stocks keep dropping. My gut feeling is that the turning point is going to take place over the next 12 to 24 months”.



- **Graham Carman,**
president & CEO,
Tinka Resources

have completed a preliminary economic assessment (PEA) for Ocaña by August 2015.

In the precious metals segment, Andean Gold is focused on moving towards production as well. The company recently renegotiated the acquisition of its Urumulqui gold-silver project and now owns 100% of it. The project has a 43-101 resource estimate for nearly 2 million mt, which does not include further exploration campaigns since 2012. Alexander Peña, the company’s president & CEO, estimates that Urumulqui can be put into production at a cost of just \$10 million. “Although grade is not extraordinary, we expect the mining to be cheap, since all the resource is contained within a package of 1,500 meters long and 200 meters deep. We are very confident with the resource that we already have and our strategy is to move towards production, not to do more exploration.”

Peña further develops on the milestone of finally owning 100% of the project. “We can raise funds for Urumulqui, rather than dilute our share price on the stock exchange. Today, you have companies that have zero debt, \$10 million in the bank and a market valuation of \$5 million. How is it possible that a company is worth less than its monetary assets? The current market is terrible for juniors,” says Peña.

Other companies in the gold spectrum moving towards production are Lupaka Gold, which expects to start mining at Invicta’s Atenea vein by mid-2015 with an initial investment of \$2.5 million and a processing capacity of 300 mt/d; and Peruvian Precious Metals, who have recently signed joint ventures with a Peruvian contractor and a manufacturer of processing plants to get mining going at their Igor project, although for stock exchange considerations the company cannot talk about ‘production’ but ‘test mining’.

JUNIORS KEEP ADDING VALUE

There are a number of junior and mid-sized companies with significant assets in Peru, and while activity has slowed down, the country continues to offer a rich portfolio of projects for the medium-term. One of the key junior players in the copper segment, Panoro Minerals, has recently published a positive PEA for its Cotabambas Cu-Au-Ag project, with an estimated after-tax payback of 4 years. Meanwhile, AQM Copper, which holds 30% of the Zafranal copper project together with Teck and Mitsubishi Materials Corporation, is advancing a pre-feasibility drilling program at the project. The company has a total PFS budget of \$30 million and expects to release this study in early 2016.

“Our in-pit sulphide resource is about 353 million mt grading 0.41% Cu and 0.08 g/mt Au. The idea is to come up with a mine-life of around 20 years, with the lowest capex possible. One of the big drivers for the capex is the water solution. We are making good progress in finding the right solution for water supply,” says Bruce Turner, president and CEO of AQM Copper.

Turner boasts optimism about copper fundamentals: “There will likely be a copper surplus this year, but I think you will see the copper price moving back towards \$3 early next year. Then, the effect of the falling head grades, water supply issues other problems with current operations will become more tangible, and those, when combined with an uptick in the world economy, should push copper prices upwards again in 2017. This is when we expect to start construction at Zafranal if things go as planned.”

In precious metals, Minera IRL is looking at financing for its flagship Ollachea gold project, which has the necessary permits in place. The mine should yield around 930,000 oz of gold over nine years. Bear Creek Mining has cut its generative exploration to focus on completing a modified feasibility study at Corani, a very large Ag/Pb/Zn project, while the company continues to work with the Peruvian government to recuperate its Santa Ana project as well.

Two of the most active juniors in 2015 are not focused on precious metals or copper. After switching to phosphates a couple of years ago, Focus Ventures is advancing its Bayóvar 12 project very quickly in northern coastal Peru, an area that is already considered a world-class phosphate district and where Brazilian miner Vale already has an enormous operation. Meanwhile Tinka Resources, who improved its access to financing following its merger with Darwin Resources last year, is focusing on its Ayawilca project, where it has recently released its first zinc resource of 13.3 million mt grading 7.7% zinc equivalent.

“Zinc has been the ugly duckling for a long time; yet the fundamentals of zinc are very

good,” affirms Graham Carman, president & CEO of Tinka Resources. “Big zinc mines worldwide are shutting down. Then, there are no new mines starting, and the stocks keep dropping. My gut feeling is that the turning point is going to take place over the next 12 to 24 months.”

Besides Ayawilca, the company also holds a silver resource at its neighboring property, Colquipucro, for a total of 32 million ounces (inferred; cut-off grade is 15 grams of silver per mt). The plan is to do a PEA on this project, where metallurgy is the key aspect to evaluate if the current resource is enough for a commercial operation.

“The silver is important to us because it gives us the possibility of early cashflow. The zinc would be an underground, higher-capital cost, longer-term operation, where at some point we may need a partner. The market is starting to perceive us more as a zinc company than a silver company. We like to point out that we have different options to add value,” says Carman.

With regard to Focus Ventures’ phosphate endeavor, the company has reinforced its ownership position, recently acquiring 70% of Bayóvar 12 after a renegotiation with the



The northern coast of Peru is becoming a world-class phosphate district. Photo courtesy of Focus Ventures.

PERU'S WORLDWIDE PRODUCTION RANKING (2013)

Source: USGS

Gold	5
Silver	3
Copper	3
Lead	4
Zinc	3
Tin	3
Molybdenum	4

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“There is plenty of land to keep making discoveries in Peru.”

What are ProEXPLO 2015's main topics of discussion?

In this ninth edition, we will have sessions on copper, gold, silver and polymetallic projects, covering exploration and project development, resource estimation and modeling, economic assessments, geological services, geophysics, geochemistry, structural controls, metallogeny, research and development, regulations and permits, corporate social responsibility in exploration, relationships with regional governments, and the Top Mining Exploration forum.

We have the following panelists to cover these topics: Kevin Heather of the Society of Economic Geologists (SEG) of the United States, Michael Doggett of Canada, Thierry Sempere of the Institut de Recherche pour le Développement (IRD) of France, and Jon Hronsky of Western Mining Services of Australia.

What can Peru do to expedite permits now that timelines are crucial for the survival of junior companies?

We can have a look at the situation in countries like Canada or Australia, which are the largest recipients of exploration dollars. These countries have incentives in place, including different sales and value added tax rebates for exploration companies, to encourage exploration, which is a high-risk business.

Peru is attracting a number of companies who, rather than conduct exploration, want to have cash flow from gold processing operations. Do you think this can help the development of a formal, small-scale, gold-mining segment?

What a mining country like Peru needs is for large, medium, and small-mining segments to comply with existing environmental regulations and standards. In the small mining segment, informal and illegal companies have played a key role in despoiling some regions, where the state is largely absent. To address this problem, the sector should receive formal investment, but for

consolidation, there are other variables that need to be analyzed and considered.

Do you think Peru still holds potential for large gold deposits like Yanacocha, or will we continue to see a decline in gold production?

As long as we increase the amount of exploration activities, there is always the possibility of finding new deposits due to the vast richness of the Peruvian Andes, and the fact that the exploration areas only represent 0.36% of the country's land, which, added to the 0.98% where mining activities are already taking place, only make up 1.3% of the total. There is plenty of land on which to keep making significant discoveries.

What formulas can junior companies apply to raise funds in this market?

One option is to sign joint ventures with other companies, in order to expand and better manage their project portfolios. This provides juniors with a better chance of obtaining financing, which is so scarce nowadays.

What is the toll that Peru's mining sector and its overall economy will pay if exploration activities continue to decrease?

Exploration is the first link of the value chain. The reduction in investment that is being made nowadays will limit future discoveries and make it difficult to sustain our mineral production in the long-term. Production will therefore progressively decrease, which will hurt our national economy. Currently, mining represents 50% of Peru's exports by value, 14% of GDP, 30% of tax revenues, and nearly 2 million direct and indirect jobs. In other words, we would face a very challenging scenario. It is essential to promote, with specific measures, the exploration segment in Peru. •



David Cass, president,
Focus Ventures

local partners. The idea is to be in a better position to raise funds for the project, says David Cass, president of Focus Ventures: “Despite the encouraging results the markets have been unforgiving. One of the issues we faced was that without an actual interest owned in the property it was difficult to attract funding through an industry partner or equity financing.”

Focus managed to put together a phosphate resource in a matter of months, currently standing at 115 million mt (indicated) and 73 million mt (inferred), both grading approximately 12.4% P₂O₅. With this in hand,

the company is undertaking an additional drilling campaign this year.

“We are confident, based on the extremely consistent geology, in particular the bed thickness and continuity over large strike lengths that we saw in the first 20 drill holes, that the additional 40 holes that are planned will help us nearly double this resource, and allow us to upgrade roughly 100 million mt to 150 million mt to the measured category,” says Cass.

In parallel to the resource definition, the company has already done metallurgical tests with Jacobs in Florida, and is evaluat-

ing two production scenarios, explains Cass: "Our PEA, currently underway, will look at production scenarios from 300,000 metric tons per year (mt/y) to 1 million mt/y. We are also looking at a near-term smaller scale operation to produce direct application phosphate rock. This does not require as much processing, is lower grade and sells for a much higher margin as an organic fertilizer product to local markets in South America." Besides Tinka and Focus, another junior actively drilling is Vena Resources at its Esquilache polymetallic project. Vena also holds uranium interests, a commodity where the main player is Macusani Yellowcake. In the middle of last year, the latter company reinforced its position through the acquisition of the Peruvian assets of Azincourt Uranium in the area of Puno.

With all this in mind, the truth is that life must go on in the project generation and development segment. Notwithstanding the challenges, the mining industry cannot afford to let its exploration business die. Good times or bad times, the sector needs explorers and drillers, as there is no other way to replace reserves and sustain mining production in the years ahead.

"The current government's bipolar nature also applies to the exploration business. Since this administration took over, the bureaucracy has become slower and more cumbersome; even in times when the market was very dynamic and there was money available, many projects did not receive any investment because of permitting, before the crisis hit. In environmental regulations, the government's attitude has always been punitive. Yet, exploration requires support rather than persecution. Beyond mere declarations, there is not a clear political route to promote exploration in Peru, unlike in other countries."

- Miguel Cardozo, president & CEO,
Alturas Minerals



"Most exploration companies are in a critical situation because, up until now, they had been raising funds in the public market. Today, the market is not providing any money because the risk factor is too high. With low metal prices, no-one is interested in exploration. The exploration companies that have survived are those that have enough cash, those that have merged with other companies that had a better financial position, or those who have managed to rapidly focus on small production projects."



- Fernando Pickmann, partner,
Gallo Barrios Pickmann Abogados

Ayawilca Inferred Mineral Resource (Feb 26 2015)

13.3 million tonnes grading 7.7% Zinc equivalent (5.9% Zinc, 68 g/t Indium, 14 g/t Silver, 0.2% Lead) **Open in all directions**

Colquipucro Silver Oxide Mineral Resource (Feb 26 2015)

14.3 Moz silver (Indicated) & 13.2 Moz silver (Inferred)



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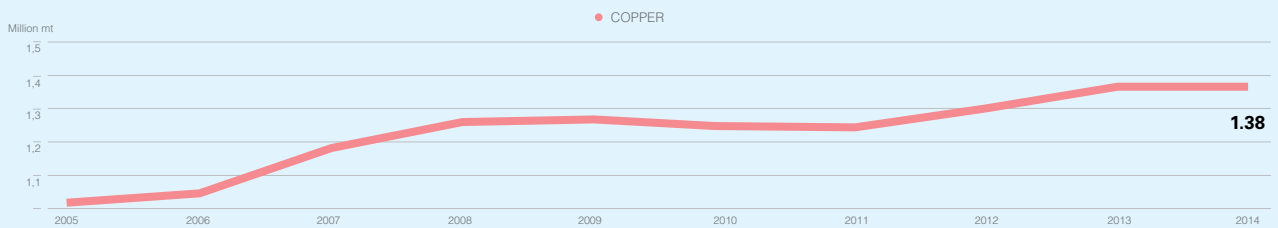
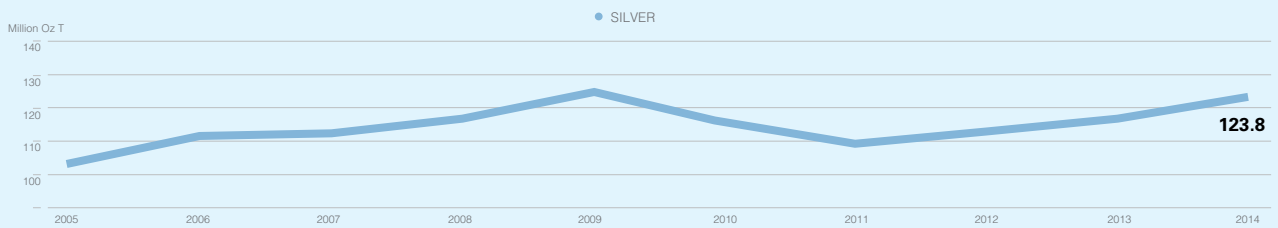
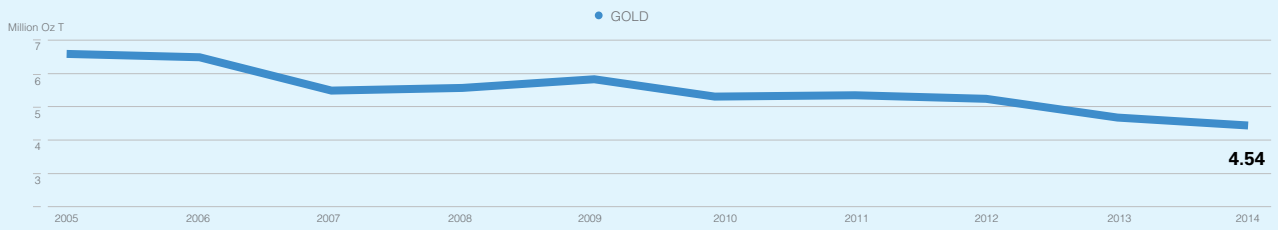
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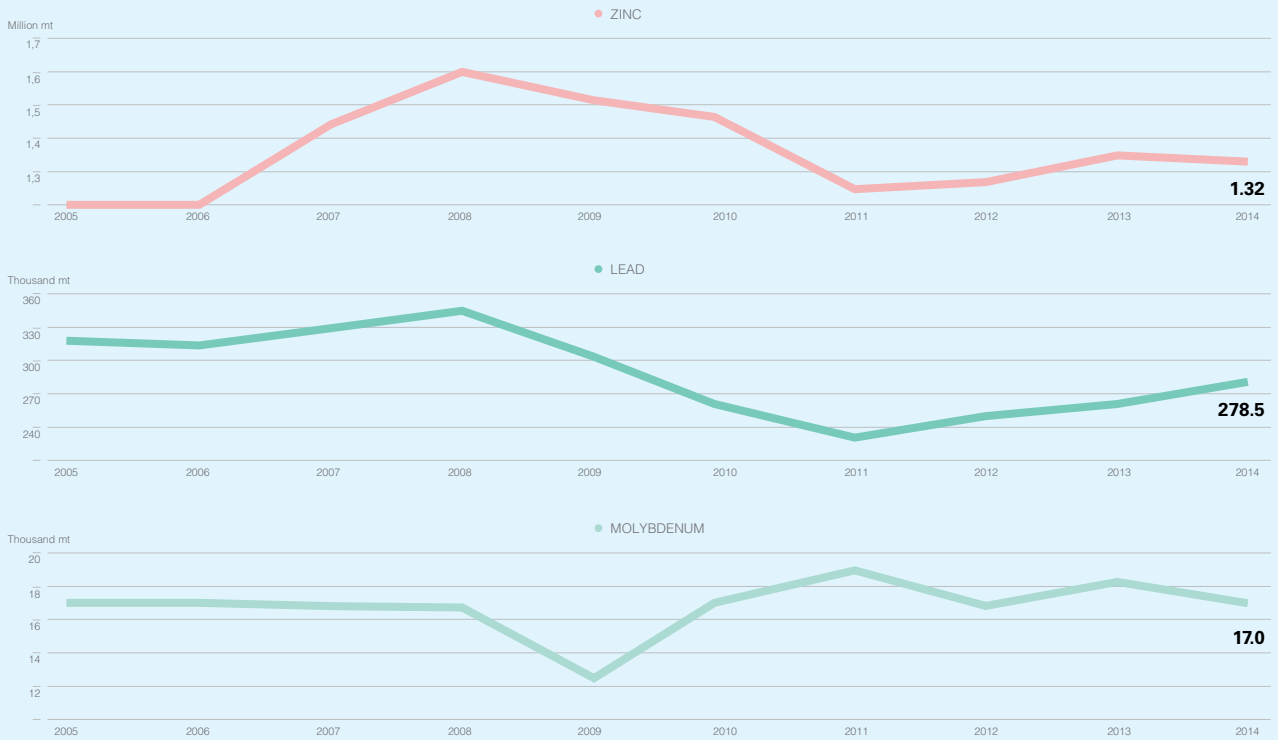
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Technology and services: the innovation push

Companies need to invest some time and money to think outside the box

Faced by challenging economic scenarios, companies have a dilemma to solve: they can do things the same way it has been done for years, lower some targets and try to decrease costs, in the hope that the storm will pass soon. Or, they can sit back and think on how to be efficient and profitable even if the storm becomes permanent.

The second option requires more time, more creativity and, initially, more money in most instances, but it is the long-term results that will prove the adequacy of this strategy. For miners who look at a 20-, 30- or 50-year horizon, constantly rethinking processes will certainly pay off.

“Miners need to ask themselves: what I can do that will increase my bottom line, without compromising the future of the operation? Can some capital costs for infrastructure be deferred? Can we modify the schedule to defer waste and bring high grade forward? Can we decrease the dilution of the ore? Is the mine optimized for the prevailing com-

modity prices?” explains Paul Murphy, Lima Manager at Mining Plus, an Australian engineering consultancy.

The research and development (R&D) support that providers can bring to the industry is invaluable. Certimin, a large laboratory, has created a new position exclusively dedicated to new technologies. After investing in a mini flotation pilot plant last year, which is already working on several projects for an important base metals producer in the country, the company is introducing aerophotogrammetry services with drones that add to its previous offer in geochemical, metallurgical and environmental analysis.

“Aero-photogrammetry offers multiple applications: we obtain very valuable data to measure the pit and the progress on mineral extraction, to carry out volumetric control, to manage inventory and planning for stockpiles and waste rock dumps, to detect acid concentrations in leaching pads, to monitor tailings dams and handle geomechanical

aspects, among others in the engineering, control and safety areas,” explains Luz Blancas, commercial manager of Certimin.


Another laboratory that works hand in hand with mining companies trying to optimize processes is Laboratorio Plenge. Over the years the company has strengthened its profile as a niche provider in metallurgical testing. Especially in the last couple of years, most of the business for the company has come from ongoing mining operations rather than exploration projects.




“Bearing in mind that many mines in Peru are poly-metallic, companies look at optimizing the operation favoring the best-performing metal, like silver, and minimizing the amounts of those elements that cause penalties such as arsenic. Generally, these changes in the process involve very low costs, and have great economic impacts,” explains Gustavo Plenge, general manager of Laboratorio Plenge.

Depending on the case, says Plenge, companies may decide to sacrifice recoveries in order to increase volumes, or focus on process efficiency: “For one particular client, we recommended changing the process and as a result the recovery rate went up from 84% to 90%. The return on investment for this modification was less than one year.”

BLASTING

Exsa, a blasting solutions company, is reaping the fruits of its R&D activities by introducing a new explosive technology to the market this year, called Quantex. It uses high-density ammonium nitrate, which is



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Las Bambas project. Photo courtesy of MMG.

easier to source if compared to the traditional porous ammonium nitrate. Gustavo Gómez Sánchez, commercial manager of Exsa, gives more details: “The main use of this technology is rock fragmentation in surface mining. The product offers cost savings of 15% to 20% and further significant savings on the operational aspects, as well as up to an 18% reduction in greenhouse emissions. In Peru, both Southern Copper, in Toquepala and Cuajone, and Newmont, in Yanacocha, are already using this product.”



Gustavo Plenge, general manager, Laboratorio Plenge



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“Miners need to ask themselves: what I can do to increase my bottom line, without compromising the future of the operation? Can some capital costs be deferred? Can we modify the schedule to defer waste and bring high grade forward? Can we decrease the dilution of the ore? Is the mine optimized for the prevailing commodity prices?”

- Paul Murphy, Lima manager, Mining Plus



Exsa is expanding its scope, opening up operations in Chile and increasing its service offering beyond the mere provision of explosives, with activities such as secondary drilling or the design and construction of explosives warehouses within projects such as Minsur’s Mina Justa and MMG’s Las Bambas. Product-wise, the company’s R&D department is working to improve its underground explosives offering, with a focus on dynamite.

Another big blasting solutions player, Orica, is mostly focused on open pit mining operations in Peru: clients include Barrick, Glencore, Freeport McMoRan, Chinalco and MMG. José Miguel Ríos, commercial lead for Peru and Bolivia at Orica, develops on the company’s offering: “We are very focused on high-energy explosives, variable density explosives and the electronic initiating systems. In high-

energy explosives we have the Fortis Extra and the Vistan/Vistis lines that are designed to make the link between the mine and the plant and to optimize the process where energy is more expensive. The cheapest energy is the chemical energy, the energy of the explosive. There, you can achieve enormous cost savings.”

Despite the crisis, Ríos anticipates solid growth in the open pit spectrum, with operations such as Cerro Verde increasing its explosives needs from 3,500 metric tons per month (mt/m) to 5,000 mt/m, and new high-volume operations coming up such as Las Bambas. “The open pit segment is in a better condition to handle lower copper prices. Besides, operations in Peru must be in the lower quartile of costs, if compared to other mines around the world,” he says.

EQUIPMENT

Being one of the main underground mining countries worldwide, over the years Peru has developed extensive expertise in this field. As a result of its innovation efforts, local equipment manufacturer Resemin has just introduced a new micro-jumbo, the Muki, designed to work in extreme narrow-vein operations, which allows for mechanization in tunnels where traditional methods were the only option. That has important implications safety-wise, but also it increases productivity, as explained by Resemin’s managing director James Valenzuela: “The Muki can radically change mining in extremely-narrow veins worldwide. There was not a machine with these features in the market. Is is a micro-jumbo with a width of 1.05 meters. It can drill a 2.4-meter hole in 40 seconds, as opposed to seven minutes with traditional methods.” The Muki is already operating in one of Castrovirreyna’s mines in Peru, and Valenzuela expects to sell it worldwide. Resemin exported 43% of the machines it produced last year.

Meanwhile, global manufacturer Atlas Copco is introducing the Simba S7 C long-hole drill, which incorporates a computerized system, and a new hand-held hydraulic rock drill. Atlas Copco’s general manager in Peru, Brian Doffing, provides more insights about the latter: “Peru is one of the two countries that we have selected to do the trials for this product. It can drive efficiencies up by at least 25% over traditional pneumatic drills in hard rock applications.”

The overall demand for new equipment is obviously lower than at the top of the cycle. According to Divemotor, which represents Mercedes Benz in Peru and is particularly strong in mining with the Actros truck model, the sale of mining-oriented vehicles decreased by 40% last year.

“We see great opportunities in medium-sized mining because mines are trying to lower operational costs. Many mine operators supply the fuel to their different contractors, and they are seeing that they can reduce costs



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by selecting the equipment brands that their contractors use,” affirms José Antonio Heredia, manager of Divemotor’s trucks division. As mentioned earlier in this special report, Gold Fields achieved fuel cost savings of 6% by replacing its truck fleet. Meanwhile, some service providers are also investing in new equipment, getting ready for when the market picks up. Explomin, a drilling contractor, has recently incorporated two Schramm reverse circulation drilling rigs worth \$1.5 million each. Its general manager, Noé Vilcas, explains: “We believe that this is the right time to increase our fleet and be ready for the market’s turnaround. Right now the equipment is available, and availability is a key issue in this business.”



*Gustavo Gómez Sánchez,
commercial manager,
Exsa*



*Carlos Soldi, general manager,
SVS Ingenieros (SRK)*

TRANSPORT AND INFRASTRUCTURE

The need for innovation is not just a result of lower market conditions in the mining sector. Peru offers other challenges in terms of social relations, for instance, that push providers to source locally and provide business opportunities for the communities; or serious infrastructure shortages, that affect the economic indicators of projects before and during the operation.

“Peru’s main challenge is its infrastructure deficit. As soon as you go out of Lima, the roads are in very bad condition. Without the necessary infrastructure of roads, energy and ports, all costs go up. There is this belief that companies must do the State’s work, and that way corporate social responsibility becomes public charity. The state should provide the necessary services so companies can operate,” affirms Carlos Soldi, general manager of SVS Ingenieros, now part of SRK, an international engineering consultancy.

Among others, bad infrastructure becomes a headache for transportation companies, which see their safety and timely deliveries compromised. Moving the necessary parts and equipment to the mining operations in very remote areas requires a whole engineering job, says Carlos Roldán, general manager of Stiglich Transportes: “Along the coast we have better roads, but they go through cities that have practically invaded the road, so there is high risk of accidents and human life loss. Also, there are so many intersections that the speed is very low. Taking a big cargo from Callao to the south, for instance, can take us five days. We need to

move by night, remove traffic lights and pedestrian bridges, and put them back on immediately after. Sometimes our work starts one year before.”

In this context, all sorts of providers, from food catering companies to fuel suppliers need to plan well in advance in order to always have product in stock. Eduardo Paredes, Sales Manager B2B at Nexo Lubricantes, a Shell distributor, elaborates on this: “the reliability of supplies is critical for the mining client. A mining operation cannot stop. We always have high levels of stock, with storage houses in Chimbote, Trujillo, Piura and Arequipa, as well as our main stockhouse in Callao. We also have big shoulders to invest in storehouses and keep inventories in remote sites.”

The mining industry will never stop facing challenges, from lower grades to higher processing volumes, all the way through water and tailings dams management. In this environment, providers will play a key role in supporting the miners with new ideas, as long as mining companies themselves also dedicate some people to listen and evaluate these new ideas as well.



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Engineering and construction companies do not escape the general mood of trying to bring efficiencies to mining clients. A few years ago pretty much any levels of *capex* could be justified, but today this is no longer the case. New projects need to be reengineered in order to accommodate lower metal price projections, or risk being discarded for economic reasons. Decreasing grades, difficult infrastructure, access to water and environmental and social issues are just some of the variables that can play a killer role for new mining ventures.

In order to reduce costs, mining companies are strengthening their own procurement offices, increasing control over purchasing decisions and even questioning the previously dominant EPCM model for large projects. According to Óscar Scarpari, managing director for the Andean area at Techint Engineering & Construction, "the EPCM model generates a double layer of management in many areas. There is a trend in big mining projects to try to optimize the process, with more integrated EPC contracts. It is a model where we are very comfortable."

Although oil and gas has traditionally been the company's core, Techint E&C had already developed some significant projects in mining in Argentina and Chile, before being awarded some contracts by Jacobs and Chinalco for the Toromocho copper project in Peru, in areas such as the hydrometallurgical plant, power, instrumentation and optic fiber installations, and water transportation infrastructure.

Like Techint E&C, another contractor that comes from the oil and gas segment and that has been working at Toromocho is Serpetbol. The company focuses on medium-sized projects between \$10 and \$120 million. As new development projects have been scarce in Peru's mining sector over the last months, the company is trying to adapt to navigate the market's volatility, as explained by Jorge Taborga, its general manager: "Both mining and oil and gas producers are delaying their capital projects for the future, and the social issues have not been handled adequately. Additionally to the lower levels of work, a number of new competitors have established a presence in Peru over the last years. In or-

der to manage this new scenario, we have reengineered our cost structure, renewed our equipment fleet, and started to look at other opportunities, including maintenance projects."

Besides Toromocho, the other big mining project for Serpetbol was Constanca (Hudbay Minerals), Peru's latest copper mine to reach commercial production. The project was handled by Ausenco under an EPCM model; it was actually a great milestone for the Australian company, who had not handled an EPCM project of more than \$1 billion before.

"When you start a project, you need to have as few fixed variables as possible, because those limit the feasibility of the project," says Alberto Coya, general manager of Ausenco in Peru. "It is at the beginning of a project where you can introduce big cost-saving modifications. We are known for doing 'fit for purpose' engineering, according to the size and complexity of the project and to the client's needs in its cost structure. In several instances, we have shown that Ausenco can transform marginal projects into profitable projects."

Marcelo Martínez, business development leader at Golder Associates Peru, agrees that every project requires a tailor-made strategy: "In Peru there are many issues that are exciting and unique from a technical perspective. There are very large projects impacted by climate-altitude conditions, topography, seismic tectonic scenarios or seismogenic faults, landslide risks, etc., so you need to manage carefully the geological and geotechnical hazards in the area. Every project is different, there is not a copy-paste approach."

Golder Associates has had an office in Peru for 18 years, where it offers the company's core service areas, including ground engineering and water and environmental work, and its own laboratory in Lima. Country manager Brian Griffin says that the company is diversifying to adapt to the mining downturn, yet "even if mining investments are reduced, mining will continue to be our main market sector. We need to keep a robust service line in the country because we have clients that are depending on that."

Engineering consultancies typically grow and downsize easily according to project require-



Peru's copper production will continue its upward trend moving forwards. Photo: Las Bambas concentrator plant under construction, courtesy of MMG.

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ments; however, it is important to keep a minimum structure, below which it would be difficult to serve a market as large and diversified as Peru's mining industry.

Carlos Soldi, general manager of SVS Ingenieros, part of SRK, explains that his Lima office counts 100 professionals. "It is a similar size to SRK's Chile office. We do not intend to grow much more because with this number we can run the company efficiently and we can provide all the services we offer. This is one of our competitive advantages: not many consultancy firms operating in Peru have all their staff in-country. They are forced to bring expats, which increases costs."

WORKING HAND IN HAND WITH THE CLIENT

In order to achieve the best results, it makes sense for mining clients to select a preferred group of consultants and contractors they can trust to work on a regular basis for different projects and on the day-to-day of the mining operation. Stracon GyM, a large mining contractor, is working with two key clients in Peru, Rio Alto Mining and Hudbay Minerals, under 'alliance contracts'.

Steve Dixon, CEO of Stracon GyM, explains the concept: "Traditionally, contracting is a fairly hard-nosed industry, often resulting in the client and contractor not successfully delivering the best outcome for the project, because of misaligned objectives and contractual disputes. Alliance contracts, on the other hand, are quite flexible and can provide a platform from which to work together, to put the interests of the project first. It is not a complicated structure at all, but a key ingredient to success is trust."

In other words, contractors need to tick a number of boxes, including having strong engineering departments, great safety records, strong financial shoulders, and the will to assume important responsibilities for the success of the project. Pedro Romero, Director of OHL Construcción, part of a large international group with base in Spain, talks about the need for long-term commitments with the clients: "In this slower period, we are taking advantage of one of our virtues: our capacity to add value when clients are trying to lower their costs. We are ready to reduce costs thanks to our engineering capacity, without lowering quality. The fact that Peru is a home market for OHL helps us



Steve Dixon, CEO, Stracon GyM

promote our business in mining, which is a strategic sector."

OHL completed two large projects with major mining companies in Ancash and Apurimac last year, and expects to be awarded more work as soon as new projects receive the green light in the country. "Last year was not a good year overall, yet we had a significant presence in the mining sector. We completed 15 million man-hours with no lost-time incidents in our project in Apurimac; we also had an award for our environmental performance," Romero concludes.

Lower metal prices have especially damaged underground operations, as silver has been one of the most heavily affected commodities in this cycle. Underground mines do not rely on large volumes and economies of scale in the same way large open pits do, therefore contractors need to be very flexible to work together with the mining client for proper extraction planning and cost management.

JRC Ingeniería y Construcción, a Peruvian underground contractor, has been expanding its offering in order to provide an integrated contract mining service. "We virtually operate 100% of the mine, delivering the ore at the processing plant. This integrated approach allows for better operational planning, a more efficient assignment of resources, higher productivity and lower costs overall," says Wilder Ruiz Conejo, president of JRC.

One of JRC's key contracts is with Minera El Brocal at their Marcapunta Norte underground mine. As part of the company's corporate strategy, JRC is in the process of obtaining the triple certification, which is another example that shows how the mining industry is driving the development of stronger providers across the whole value chain.

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Lowering accident rates requires a combination of new technologies, safe procedures and awareness among workers. Photo: Constancia mine, courtesy of Stracon GyM.

Mining safety

'Zero' is more than a simple number

Peru's mining industry suffered 32 fatalities in 2014, a 32% reduction year-on-year. The downward trend seems positive, but surely the relatives of those who died on mining duty will not care about this. Indeed, human safety is that particular parameter where numbers never add up, unless there is a zero at the end of the spreadsheet; hence, the need remains for the industry to keep working on how to reach that goal. Already in Q1 2015, eight people have lost their lives in Peru's mining industry.

The safety challenge involves a multi-disciplinary approach: from continuous innovation in new, safer technologies, to intensive education and training to ensure that all workers not only understand how to follow the right procedures, but also are dedicated, 100% of the time, to their own safety and to the safety of those around them.



Brian Doffing,
general manager,
Atlas Copco

Peru has been a mining country for centuries, yet the experience of such a long history extracting metals does not take out the need for intensive training in this matter. In the words of Steve Dixon, CEO of mining contractor Stracon GyM, "the mining industry in Peru has experienced very strong growth over the last years, and it will grow again after the current slowdown. This means that a lot of inexperienced, young people will enter the industry, and keeping these people safe will be a huge challenge. The process is never going to end because everyone needs to return home safely every day."

Looking at the cold numbers from 2014, rockfall accidents accounted for 28% of deaths, followed by traffic crashes, which were 25%. While accident rates have consistently declined in recent years, Peru's Institute of Mining Safety (ISEM) is implementing a program with associated companies that aims to have zero fatalities by 2021 (see interview on last page).

INNOVATION AND AWARENESS

Creativity is a key ingredient in the industry's drive for lower production costs. The good news about this compulsory bias towards innovations is that better technology and processes have a positive impact on safety. Bearing in mind that a majority of deaths in Peru happen in underground mining environments, mechanization is a key aspect to take operators out of the line of fire.

As portrayed in the previous article, local equipment manufacturer Resemin has come up with a small jumbo, the Muki, for very narrow vein operations. According to James Valenzuela, managing director of Resemin, "old

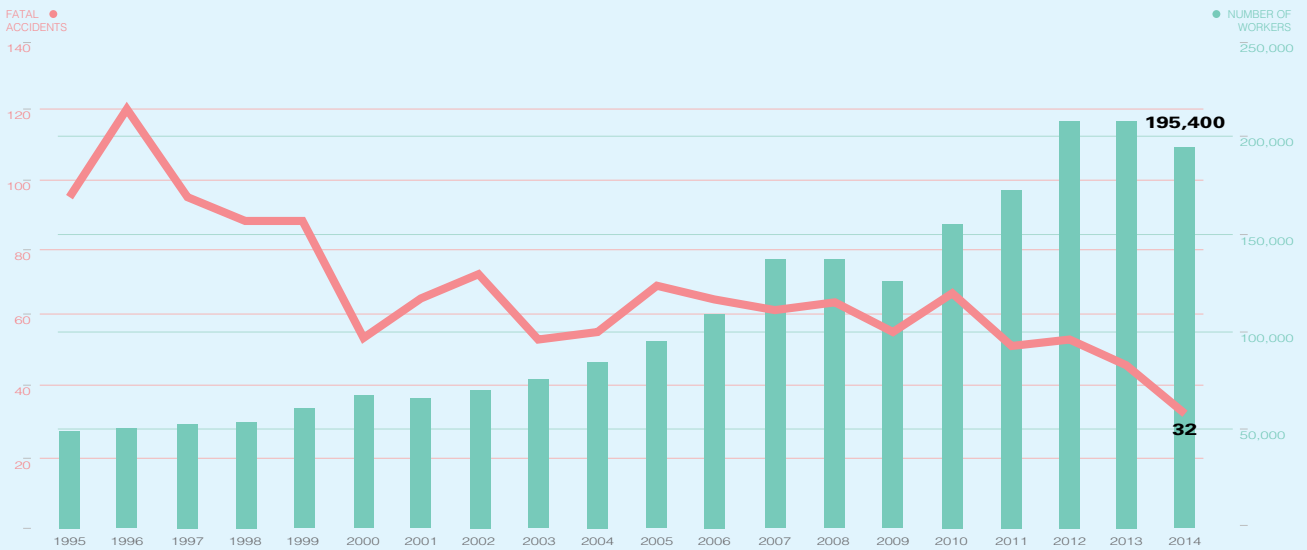
mining was built on rails and wooden frames; many mines are going back to that standard, which poses high risks for operators. It is inconsistent with modernity, but the problem is that until now there was no equipment in the market for these types of veins."

As underground operations go deeper, Peru can learn from the experience of other mining countries, namely South Africa. International engineering firm WorleyParsons, for instance, acquired TWP of South Africa in 2012, and incorporated important expertise designing shafts and introducing mechanized mining models. The company is currently developing two shafts for Peruvian clients. "In Peru there are not many underground miners that have mechanized and modernized their operations. Traditional methods are still very much in use. We are trying to introduce new models for underground extraction. It does not matter if the client has a disseminated resource or the mineral is contained in veins. We can help them with the best model for each case," affirms Néstor Chacón, business development manager at WorleyParsons.

Atlas Copco, a global manufacturer of mining equipment, also looks at new safety features through research and development (R&D). Its general manager in Peru, Brian Doffing, gives his view on how to make underground operations safer: "The first level is automation or tele-remote control. We offer systems where we can have a mock setup to drive the machine from 300 meters away. In the future you will be able to control the machine from the surface. The second level is how you can protect the operators that are inside the machines, so we have override

FATAL ACCIDENTS VS NUMBER OF WORKERS

Source: ISEM



systems that prevent you from taking potentially dangerous actions. Then, the third level is our people.” Again, the “people” level is related to training, education, awareness and a safety culture across the organization. Gustavo Gómez Sánchez, commercial manager at

blasting solutions company Exsa points out that “by nature, we need to carry safety in our DNA because we handle highly dangerous products. In my opinion, we already are at a very high level in products and processes. Therefore, the next big step is working on the behavioral side of things.”

Dooffing of Atlas Copco amplifies this point: “We use internal success stories to generate awareness among our people. This year in March we are celebrating three years with no accidents in 10 of our contracts. If our people working at 4,000 meters above sea level can have zero accidents, then we all can.”

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- José Miguel Ríos, commercial lead, Peru and Bolivia, Orica

"Mining is the sector in Peru with more regulations in terms of safety. The Supreme Decree 055 is not missing any substantial points if compared to the safety regimes of other countries. The national regulation is starting to be applied to other industries, but the mining sector is many years ahead. The regulation is clear, strong and demanding, and allows companies like MSA to innovate."



- José Luis Tamayo, product manager, fall protection, MSA



"The safety standard that serious mining operators have imposed in the Peruvian market has raised the bar for all companies that want to work in the industry. Stiglich is recognized in the market for its experience, team of professionals and safety standards. We are very aware that a human life is priceless."

- Carlos Roldán, general manager, Stiglich Transportes

"We have come a long way since safety was looked at as a cost. It is part of operations, and you are not going to be competitive if you are not running a safe operation. We are providing a service to our clients who depend on a good health and safety environment for their people. We do a lot of risk assessment in our engineering and environment work, just like our clients, and we have to be part of that process."



- Brian Griffin, country manager, Golder Associates

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Fernando Borja

Manager, Peru's Institute of Mining Safety (ISEM)



When and why was ISEM created?

In 1996, Peru's mining industry had 120 fatal accidents; it was at that point that stakeholders started to implement new strategies. There were improvements in the regulatory framework and enforcement, and the industry introduced new management systems and new technologies in occupational safety and health (OSH). Additionally, ISEM was created in 1998 as a non-profit organization. At that time, there was not a critical mass of safety professionals, so we started training those in charge of health and safety in the operations, before moving to training initiatives for all workers. Over the last three years we have provided over one million man hours of training annually, which is the equivalent of 600 workers training 365 days a year.

Fatalities in Peru's mining industry decreased from 47 in 2013 to 32 in 2014. Is it possible to reach zero deaths?

We are implementing a program of zero accidents for 2021, which is Peru's bicentenary. Our aim is that the companies participating in this scheme will represent at least 100,000 workers. We are already working with 20 to 25 companies to define the road map. Looking at statistics, from 1996 to 2000, there was a reduction in fatal accidents. From 2000, the evolution in absolute numbers has been fairly flat, but with a downward trend. However, the evolution of the indicators has been remarkably positive. In 1996, when we had 120 deaths, the industry counted 50,000 workers. In 2014, there were 32 fatalities among 200,000 workers. In other words, fatal accidents have decreased by 75%, even if the mining workforce has quadrupled. Having said this, our goal will always be zero accidents.

"Every accident is unacceptable and can be prevented."

What type of accident happens more frequently?

The fatal accident caused by rockfall is the more frequent one, although for a few years traffic accidents accounted for more deaths. Ten years ago, we analyzed the main causes behind rockfall accidents, and as a result companies have been implementing certain measures: for instance, they have created geomechanics departments, provided better training, improved blasting processes, changed mining methods, and acquired better rock support technologies.

What is Peru's safety legislation like?

The main piece of legislation, the DS 055-2010 EM, has incorporated the basis of the main integrated management systems, such as OHSAS 18001. If a company complies with the regulations, it will be easy for them to have a good OSH performance and obtain the relevant certifications. As in every management tool though, it is always possible to introduce improvements.

What final message you would like to send to the audience in the mining industry?

People go to work to earn a living, not lose their lives. For this reason, we consider every accident unacceptable and preventable. To achieve that, companies, the state, workers and civil society must work together to eradicate accidents and illnesses from the workplace. •

GBR would like to thank all the companies and institutions interviewed for their time and dedication.

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If you would like to be interviewed for the report, please contact Alfonso Tejerina alfonso@gbreports.com

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