

Mining in Peru

The engine to rebuild an economy

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Cover photo courtesy of MMG-Las Bambas



Mining in the shadow of COVID-19

Peru faces a new challenge

With the exception of political turbulence – something the country is accustomed to – 2019 was a year of relative stability for Peru. In contrast to the social unrest and economic volatility that upset some of its South American counterparts, a stable currency and strong fiscal balance sheet had positioned Peru for solid growth above its modest 2.6% GDP appreciation rate in 2019. Mining investment that year to the tune of US\$6.15 billion, the highest mark since 2015, continued to be the cornerstone of Peru's economic health, as the industry accounts for 60% of the country's exports and over 50% of foreign investment.

2020 started on a positive note for Peru as the signing of a "phase one" trade agreement between the US and China on January 15th pushed the price of copper to a nine-month high of US\$2.88/lb. Although cumbersome bureaucracy has threatened the country's mining competitiveness, the development of large-scale projects Mina Justa and Quellaveco offered a near-term path to substantially increase the production of Peru's biggest mineral export.

By early February, a Chinese dynamic of a different kind conspired to send the red metal crashing to US\$2.50/lb, a 13% drop



Martín Vizcarra, President, Republic of Peru.

in reaction to the escalating COVID-19 outbreak, and a precursor to the freefall in March that saw copper dive to US\$2.10/lb, its lowest point since 2016. In February the supply chain had already been disrupted as miners were sent home, demand from China weakened and shipping companies became reluctant to expose workers to the virus, creating bottlenecks.

While the warning signs were there, few could have predicted the transformational impact of what actually occurred. Despite a 10% drop in attendance and the appearance of hand sanitizer at exhibition booths, the mood at PDAC in Toronto from March 1st to 4th was upbeat, buoyed by a large Peruvian

delegation led by Minister of Energy and Mines (MEM) at the time, Susana Vilca. Merely one week later, the World Health Organization (WHO) would characterize COVID-19 as a global pandemic and, on March 15th, President Vizcarra declared a country-wide stay-at-home order effectively shutting down the Peruvian economy and leaving only essential services running.

Anglo American withdrew the majority of its 15,000-strong workforce from its Quellaveco project in mid-March, maintaining only critical works, although CEO Mark Cutifani affirmed in April that the company still expects production to start in 2022. At sites already in production, such as Yanacocha (Peru's largest gold mine operated by Newmont), critical activity such as heap leaching and environmental maintenance continued as operations scaled down. MMG declared force majeure on copper concentrate supplies from its Las Bambas mine, followed by the company withdrawing its 2020 production forecast for Las Bambas on April 13th. "The first quarter was very challenging for the entire business, but particularly for our largest operation, Las Bambas," said Geoffrey Gao, MMG's CEO.




Since April several mining operations have reported COVID-19 cases among their workers. A case in point was Antamina, owned by BHP and Glencore, which reported 210 positive cases of COVID-19 on April 27th. Worryingly, 87% of the positive cases were asymptomatic, an indication of how easily the virus can spread undetected.

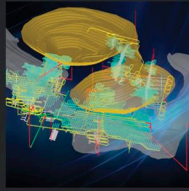


As the first country in Latin America, and one of the first outside China, to enforce a nationwide lockdown, Peru's mining industry has felt the economic effects more acutely than other leading mineral producers. Peru, the world's second-largest copper, zinc and silver miner, produced 768,463 metric tons (mt) of copper (down 22.6%), 398,771 mt of zinc (down 29%), 83,723 mt of lead (down 33%), 6,196 mt of tin (down 26.4%), 1.16 million ounces (oz) of gold (down 32.8%) and 33.76 million oz of silver (down 31.6%) from January to May, according to MEM figures.


The government's hard stance to ensure the health and safety of its population is commendable considering the country relied on only 200 ventilators at the start of the pandemic. However, despite the draconian lockdown measures enforced by the government, the country has been unable to flatten the curve. Official cases rose above 300,000 in July (the second highest in South America), and


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daily death rates plateaued around the 180 range, without showing signs of a noticeable downward trend.

President Vizcarra was able to act quickly due to Peru's fiscal strength. According to *Bloomberg*, the Andean country has accumulated savings in the past decade equal to about 15% of GDP, or 117 billion soles (US\$34.4 billion). The government can spend savings during the peak of the pandemic and tap into bond markets when conditions are favorable. "Investors are taking the long view and rewarding countries that are being proactive in tackling the virus," said Guido Chamorro, co-head of hard-currency debt at Pictet Asset Management in London, a statement Peru will hope holds true as the country looks to resuscitate its economy in the wake of the pandemic.

On April 29th, the Peruvian government announced a four-stage reactivation plan designed to open up its economy gradually. From a mining standpoint, large-scale open-pit operations and construction projects of national interest restarted in May. In June, large-scale underground mining (over 5,000 mt/d), medium-scale open-pit mining (more than 350 mt/d), greenfield exploration, and worker camps reopened. In July, medium-scale underground mining and greenfield exploration without camps (including processing plants) began.

In an online conference on July 9th, Minister of Energy and Mines (at the time) Susana Vilca told foreign reporters: "We are confident that production will be back at 100% by the end of July, and we will see a major recovery by December."

Less than a week later, on July 15th, Vilca was replaced by Rafael Belaunde Llosa, Peru's third Minister of Energy and Mines in 2020. For the country to fulfil its geological potential and become a more competitive mining jurisdiction, greater political stability is surely required.



Víctor Gobitz, President, IIMP.

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The Industry Responds

"The lockdown on March 15th caught the mining industry by surprise," stated Víctor Gobitz, president of the Peruvian Institute of Mining Engineers (IIMP) and CEO of Antamina.

In his interview with Global Business Reports, Gobitz spoke of the peculiarities the sector presents, with isolated camps where miners work and live on shifts that are typically 14 days long, with seven days off. "To adapt to the pandemic, these shifts could be extended to 30 days work and 15 days off, or to even longer periods like in the 1990s, if the mining workers agree," he suggested, adding that extended shifts will become the new norm when the industry reopens during 2020, with very strict protocols to control people and cargo movement.

Mining companies do not operate as isolated entities, and extending new work protocols to all suppliers and contractors will be key. "I think we will see a consolidation period whereby mining operators will try to work with less contractors," said Gobitz, suggesting that contractors should be able to follow the same shift model as the mining operators themselves.

For the mining contractors in charge of large workforces at mine sites, the COVID-19 pandemic will have a significant and permanent impact, according to Gianflavio Carozzi, general manager of AESA: "It will also present opportunities to introduce change at a faster pace as we have had to react (by necessity) to cope with the crisis, which has brought down paradigms such as remote work and the use of technology."

Elaborating on the practical changes that will need to be implemented at mining operations as production is ramped up, Carozzi summarized: "It will change the way we operate and interact. It will change current health and safety protocols in order to preserve social distancing, and it will change the way we staff operations as mobilization will be limited."

What could these safety protocols be and how will they be measured? Professor Neil Ferguson of Imperial College London has said that a significant level of social distancing could be necessary until a vaccine is found, which optimistic estimates envisage is at least 12 months away. As lockdown restrictions are loosened and mining companies ramp up production, monitoring employee behavior for larger workforces will be paramount to mitigate risk. With this in mind, Canadian startup Minetell has created an enterprise SaaS (software as a service) platform that measures and monitors COVID-19 risk exposure and controls performance, and is offering a 60-day free trial to help essential service workers during the height of the pandemic. "Our platform delivers actionable and reliable information into the hands of decision-makers so they can ensure their workplaces are safe for their employees and their families, contractors and community partners," explained Michael Hartley, CEO and founder of Minetell, who added that the remote deployment model the company has been using since its inception two years ago means it does not have to adjust to the current context.

Social organization CopperAcción reported that nearly 1,000 miners had been infected from the beginning of the pandemic until the end of June, with over half coming from Horizonte (over 300 workers with the virus) and Antamina (229). In July, the suspension of operations at Trevali Mining's Santander mine, Hochschild Mining's Inmaculada mine, Fortuna Silver Mines' Caylloma mine, and Pan American Silver's La Arena mine, show that mining companies in Peru will have to adhere to the strictest health and safety protocols in a nation that is struggling to contain the virus.

The mining industry will play a key role in Peru's economic recovery as the country opens up, but the highest level of stewardship from both the government and the private sector is now required to negotiate this challenging period.

Mining Production

Copper's rebound offers hope

Before the COVID-19 pandemic grounded the majority of Peruvian mines to a halt, save for essential measures such as heap leaching, processing and environmental care and maintenance, Peru had experienced three years of stable copper production. In 2019, Peru's copper production stayed within a percentage point of the previous year's figure, reaching an annual total of 2.46 million metric tons per year (mt/y), a 0.8% year-on-year increase. Having experienced sharp growth between 2014 and 2017, moving from an annual average of less than 1.5 million mt/y in the years previous, this period of stability preceding the new decade was expected to be followed by growth. While it is hard to predict the full extent of the damage caused by the novel coronavirus, a robust near-term pipeline of expansion projects, anchored by two high-profile greenfield projects – Mina Justa and Quellaveco – gives Peru a solid platform for growth when operations are able to ramp up.

Furthermore, the market revival of the red metal in 2020, despite a depressed world economy, will inject much needed liquidity into producers looking to make up for time lost during lockdown. In March, copper traded below US\$2.00/lb, its lowest level since the global financial crisis of 2008-2009, but in a remarkable turnaround, a recovery of nearly 50% saw spot prices reach just shy of US\$3.00/lb by mid-July. High imports from China were the main catalyst for this rise, and government-backed infrastructure projects across the globe enhance a robust outlook.

In 2021, Southern Copper's Toquepala expansion will see its first full and uninterrupted year of production. Minsur's Mina Justa operation was expected to open by the end of 2020, but will now ramp-up in 2021, due to lockdown delays, and is expected to produce 100,000 mt/y of copper, including 58,000 mt of copper cathodes. Anglo American's Quellaveco will contribute a further 300,000 mt/y of copper starting in 2022. In February 2020, Hudbay Minerals secured a surface rights agreement with the community of Chilloroya for the Pampacancha satellite deposit located near the company's flagship Constancia copper-gold mine, the lowest cost open-pit sulphide copper mine in South America according to Hudbay, which announced it expects to be mining ore from the deposit in early 2021.

However, in the medium to long term, ambitions to close the production gap with Chile will be delayed. Although Chilean production fell by 0.8% in 2019 on the back of declining ore grades and financial issues at state giant Codelco, catching up to Chile's total of 5.78 million mt/y would require numerous district scale projects to move into production. Before the coronavirus outbreak, the Ministry of Energy and Mines (MEM) had predicted an increase in Peru's copper output of 27% by 2022, but progress will be partly dependent on the ironing out of social issues that have interrupted production at Las Bambas and delayed projects such as Southern Peru's Tía María and Southern Peaks Mining's Ariana.




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“Ariana is currently in a state of limbo and what is happening is not only a threat for the Ariana project, but for all new mining operations in Peru,” stated Adolfo Vera, Southern Peaks’ president and CEO, who clarified that, while there is no local opposition to Ariana, an NGO contesting the project caused Southern Peaks to reduce the rate of construction while awaiting a decision from the Constitutional Court. Underlining the role the mining industry plays in the country’s economic development, Vera suggested that this source of income should be protected instead of fought against. “Once the nonsensical claim is rebuffed, the Ariana project is approximately 18 months away from being completed,” said Vera, who went on to detail the progress made by Southern Peaks in 2019 by reinterpreting the geology of its Condestable flagship asset, increasing the life of mine significantly, and growing resources by a multiple of 2.4, a mark Vera expects to improve on again in 2020. “As soon as we obtain the permit, we will start to further expand the capacity at Condestable in light of the new size of the resource and reserve,” he explained, adding that the company hopes to have completed a feasibility study on the expansion of Condestable by 2021.



Adolfo Vera, president and CEO, Southern Peaks Mining.



Luis Rivera, executive vice president of the Americas region, Gold Fields.

Despite decreasing production, Peru remains the sixth biggest gold producer in the world and the second biggest silver producer. Declining output is being offset by surging prices, as gold approached US\$2,000/oz in July 2020, surpassing the all-time high set in 2011. Activity in the silver market surpassed gold, as it traded above US\$24/oz, its highest mark since 2013.

Buenaventura (BVN) is Peru’s biggest precious metals producer, with a wide array of its own operations and a stake in Yanacocha (Peru’s largest gold mine operated by Newmont). Víctor Gobitz, Buenaventura’s former CEO, acknowledged that the downward trend in gold production and diversification into base metals is being reflected in the company’s portfolio, with production falling at Orcopampa and La Zanja, and Yanacocha’s production currently stable at around 0.5 Moz/y, but expected to decrease in the coming years. “So, in the medium term, San Gabriel will be a key project for us as it will be a breaking point; while Yanacocha, Tantahuatay and La Zanja will become gold-copper producers and not just gold producers,” he explained.

When asked how base metals are playing an increasing role in Buenaventura’s production profile, Gobitz emphasized the idea that Buenaventura should be a long-lasting investment vehicle with consistent financial results, which can be achieved through diversification. “In this respect, it is easier to find larger deposits in base metals than in precious metals. We will always have a big focus on gold and silver, but industrial metals are becoming increasingly important,” he said.

Evidence of this came in December 2019, as Buenaventura announced a strategic investment into Canadian base metals junior Tinka Resources, who are advancing the Ayawilca zinc project.

Meanwhile, Gold Fields continued its growth in South America in 2019 with the advancement of its Salares Norte project in Chile, as well as the completion of a feasibility study at its Cerro Corona mine in Cajamarca, northern Peru, where mine life has been extended to 2030 – an extension of seven years. With a scoping study set to be performed in 2020 aimed at further extending the LOM at Cerro Corona to 2034, Luis Rivera, Gold Fields’ executive vice president of the Americas region, gave an overview of the milestones achieved by the company and its growth ambitions in Peru: “Gold Fields’ South American operations have the company’s lowest running costs in the world. The net profit coming out of Peru is 21% of the company’s entire profits. Our Peru business contributes approximately 310,000 gold equivalent ounces per year (oz eq/y), and our objective is to acquire another asset to reach a 500,000 oz eq/y target.”

Elaborating on Gold Fields’ priorities moving forward, Rivera added that key areas of focus include water stewardship, mine closure and the reduction of carbon emissions and energy usage.

A Precious Metals Bull Market

In Peru, gold production declined for the fourth consecutive year in 2019, with an output of 4.13 million ounces (Moz/y), a 9.94% decline from 2018. Likewise, silver saw a 7.24% decrease from 133.8 Moz/y to 124.1 Moz/y, its third consecutive year on a downward trend.

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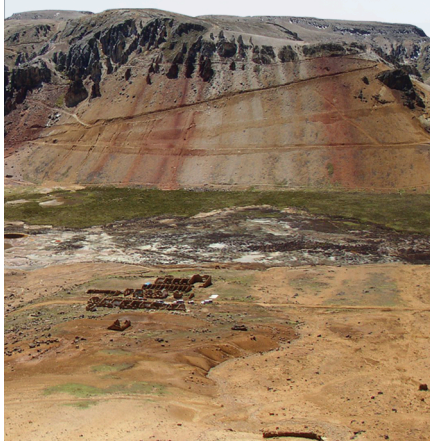
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Maintaining Peru's Project Pipeline

On January 29th, President Martín Vizcarra announced that Southern Peru's Tía María mining project in Arequipa will not be carried out during his government. "In this government no, there is no way," he affirmed, declaring that granting a construction permit does not necessarily imply having a social license. Although Vizcarra mentioned that other mining projects were being successfully developed, the risk that a project as high-profile as Tía María becomes the poster child for resource development in Peru, at least in the eyes of the general public, is not something that should be taken lightly.

"If you look at the outcome of the congressional election, you will notice that politicians with anti-mining rhetoric won in regions where mining is prevalent," observed Claudia Copper, who has been appointed the president of PERUMIN, the country's main mining convention and exhibition, for 2021. "Despite the mining sector giving a lot of money to the regions it operates in, there is still a lot of anger," she added, advising companies to be proactive in their engagement with communities instead of leaving the relationship building to the state.

Why does this anger exist? Augusto Cauti, Vice Minister of Mines, spoke of the lack of trust that has grown in recent years amongst all parties in the mining sector and the need to present appropriate, transparent and clear information. "The mining sector is complex and not always easy to comprehend and comprehensive to be explained, and the challenge is to show the benefits the industry can provide to improve the quality of life to the inhabitants with something tangible rather than just rhetoric," he said, continuing: "I believe that developing projects in a low-profile manner and/or just as a good neighbor should be things of the past – the sector has to have a more visible face and involve more in alliances with people and local activities from the surrounding areas."

With a lack of major greenfield projects on the horizon after Quellaveco, which is expected to move into production in 2022, projects currently in the pipeline such as Bear Creek Mining's Corani silver-lead-zinc deposit in Puno have taken on elevated importance. Furthermore, in light of the need to revive the economy in a post-pandemic landscape, project development should become a priority. On a micro level, for the regions that host the projects, the importance of project development can be fundamental, a fact illustrated by the National Institute of Statistics (INE) declaring Puno as the poorest district in Peru. "Mining Canon (amounting



Anthony Hawkshaw, president and CEO, Bear Creek Mining.

to 50% of income tax, transferred to the regions and areas of influence of projects) has been decreasing in recent years, mainly due to the lower contributions from Minsur's San Rafael mine related to lower metal prices as well as production. The direct and indirect revenues to local communities from a project the size of Corani will have a transformational impact in the region," stated Elsiario Antúnez de Mayolo, Bear Creek's COO and general manager.

Andrés Franco, vice president, corporate development, elaborated how Bear Creek is working towards the diffusion of information by educating the local population on the project's environmental impact: "Selected community representatives were enrolled in an intensive program that covers the Environmental and Social Impact Assessment, or 'ESIA'," he explained, with the training covering such topics as use of chemicals and the milling processes. "These people now have extensive knowledge about the ESIA and are qualified to, and have been engaged to, explain environmental matters related to the Corani project to community members and visitors," Franco added, noting that such an initiative stimulates community engagement and provides a high level of transparency and, at the same time, mitigates any risks that stem from a lack of knowledge about the impacts of the project.

Bear Creek contracted Common Ground to undertake a follow up social review in 2019, and their findings highlight an important point occasionally overlooked when considering the dynamics of the relationship between mining projects and communities – once the locals are on board, they expect work to go ahead. "Common Ground's December 2019 report showed that we have done an excellent job in earning social license, but their one area of concern is that the people want the mine to be built and are waiting for us to start work to further improve their lives," observed Anthony Hawkshaw, Bear Creek's president and CEO.

Junior Exploration

Cumbersome permitting is holding Peru back

While mining producers had to adjust their yearly production forecasts in light of strict lockdown procedures, Peru's junior community was faced with a new set of challenges that compounded the already daunting task of advancing projects in a country that has seen exploration budgets decrease for the previous three years, dropping 13.5% from US\$413 million in 2018, and to US\$357 million in 2019. Buoyant metals prices in early 2020 offered fresh hope for downtrodden explorers; hope which was soon dashed by the COVID-19 wrecking ball that caused commodity prices to tumble and drilling programs to be put on hold. The S&P Global Market Intelligence Exploration Index dropped to a four-year low on April 16th, with pipeline activity, metals prices, drill results, financings and initial resource announcements all decreasing in March.

Looking at the Ministry of Energy and Mines (MEM) statistics, although investment into Peru's mining industry increased by over 20% in 2019, exploration was the one area which went down, as permitting issues delayed drilling campaigns, thwarting exploration activity. Paul Murphy, manager of the South America region for technical consulting firm Mining Plus, has noticed the worrying trend in junior activity: "Peru is just too well endowed geologically to ever be ignored by explorers, but in the current climate where drill permits are taking a considerable amount of time to be approved and with ongoing social challenges, this is testing the friendship between the jurisdiction and juniors," he said, adding that Peru has to be aggressive in ironing out corruption to attract more investment into its exploration sector.

"The government needs to see where there is potential and act quickly, because investors are tired of waiting two or three years to know if there really is potential and cannot continue to invest if they are uncertain there will be a sufficient or a timely ROI," stated Jorge Granda, general manager of AK Drilling, who remarked that by losing these opportunities, Peru loses its competitiveness and funds go to other jurisdictions.

Even before the pandemic, the leading authorities in Peru's mining industry were vocal in their acknowledgement that the climate for exploration must become more attractive if Peru is to maintain a healthy project pipeline. Augusto Cauti, Vice Minister of Mines, stated that stimulating exploration is a key government objective in 2020. As evidence of the government's commitment, Cauti pointed to the decree of urgency enacted on December 27th 2019, that grants the definitive rebate of VAT for the next three years. "Furthermore, we reinstated legislation that allows companies that invest large amounts in the country to perform accounting in US dollars," added Cauti, commenting that MEM is planning to review more adjustments to specific legislation to see how the permitting processes can be expedited.

Manuel Fumagalli, president of the National Society of Mining, Petroleum and Energy (SNMPE), was keen to emphasize the intention of the mining authorities to push for change. "Permitting times and regulations have increased in the last decade and the country has lost competitiveness," he said, revealing that the SNMPE is working with the government to streamline the permitting process, as the discussion to move the ILO



Jorge Granda, general manager, AK Drilling



Manuel Fumagalli, president, SNMPE.



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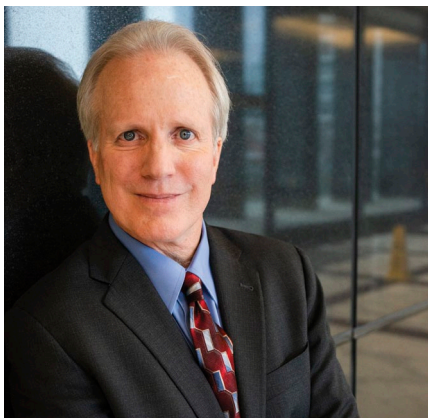
Convention 169's public consultation (consulta previa) from the exploration stage to the feasibility mining project development stage gathers pace.

Are fortunes about to change?

Despite the bleak backdrop of a turbulent first half of the year, the summer of 2020 has breathed new life into Peru's junior community. For a start, metals prices have flourished since the mid-March liquidity crunch that saw investors sell off stocks en masse. By July copper had reached a two-year high (US\$2.98/lb), silver was trading above US\$20/oz for the first time since 2016, and gold had surpassed the US\$1,900/oz for the first time since 2011. Even zinc started to show signs of life, recovering from a low of US\$0.83/lb in March to reach the US\$1/lb mark in July.

Perhaps more importantly, Peru's mining rules and regulations are set to be updated, with permitting touted to be high on the agenda. On July 9th, Susana Vilca, Minister of Energy and Mines at the time, announced in a meeting with the foreign press corps that two regulatory updates, the "Regulations of Mining Exploration" and the "Regulations of Mining Procedures," would be rolled out to reflect the new realities of exploration in a post-lockdown landscape. While details have yet to be released, the commission set up to produce the regulations is reported to have focused on the cumbersome bureaucracy surrounding permitting in Peru. As well as potentially reinvigorating Peru's exploration sector, these measures could provide a timely boost to an economy that has suffered greatly during the pandemic.

One of the silver linings to emerge from the post-pandemic landscape should be the elevated role that the mining sector will



John Black, CEO, Regulus Resources.

play in reviving global economies, especially in countries such as Peru that rely on the taxes and royalties paid by metals producers. "The pandemic will emphasize the importance that the mining industry has to Peru's economy and in the communities in which we work," suggested David Kelley, president and CEO of Chakana Copper.

The lockdown also offered the opportunity for juniors to spend time advancing work relating to the geology, engineering and economics of their projects. In the case of Regulus Resources, it has allowed the company to consider bringing forward the PEA for its AntaKori project to early 2021, according to CEO John Black. "When these crashes happen in the markets, like we have seen in reaction to COVID-19 and we saw in the global financial crisis in 2008, for juniors it really highlights the importance of having an excellent project, experienced management team and access to capital to come out the other end," he reflected.

Another junior poised to weather the COVID storm is Tinka Resources, after raising C\$18.5 million in January 2020 through



David Kelley, president and CEO, Chakana Copper.

a strategic partnership with Buenaventura, which bought a 19.3% stake in the company at a remarkable 100% premium to the share price when it was announced. Discussing how the current crisis could impact the markets moving forward, Tinka CEO Graham Carman commented: "On the positive side, there will be a reduction in supply from the shutdown or production cuts at many operations, which will mean base metals prices should recover quicker once we get back to more normal supply-demand conditions."

Copper

With copper surging to two-year highs in July on the back of heightened demand from China, and a longer term outlook reinforced by the growing electronic vehicle (EV) market, major producers will be on the lookout for district scale projects that can guarantee long term production. Considering the scarcity of sizeable junior copper assets globally, a name frequently brought up as a buyout candidate is Regulus Resources, whose AntaKori project has produced five of the top 20 copper intercepts reported worldwide over the

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Graham Carman, president and CEO, Tinka Resources.

last two years with mineralization close to surface, according to John Black. Black provided an update on the company's phase II drill program, mentioning that the focus has been to extend the mineralization, mostly to the north of the project. He also noted that the resource already announced has given Regulus a strong foundation to build upon, with 250 million mt of 0.48% copper and 0.29 g/mt gold in the indicated category and 267 million mt of 0.41% copper and 0.26 g/mt gold in the inferred category.

The Regulus management team has already had success with Antares Minerals, which was sold to First Quantum for C\$460 million in 2010, and Black believes they have the same scale of project or better with AntaKori. "We have already demonstrated a sizeable resource with great opportunity for expansion. We have the security of a solid investment premise on the known deposit, but also the benefit of additional exploration upside," concluded Black.

Another Canadian junior active in Peru, Chakana Copper, used the investment received from Gold Fields in May 2019 to start a 20,000 m drill program at its Soledad project in June 2019, with the aim of testing numerous targets and completing definition drilling on additional mineralized breccia pipes, according to president and CEO, David Kelley. After drilling 5,700 m of the program in 2019, Chakana made the decision to halt drilling and wait until an expansion of its drill permit had been granted to allow access to other parts of the property that have not been drilled yet. Kelley spoke of how Soledad is evolving from a mineralization standpoint: "Looking at the value of what we have drilled up to date, approximately 60% of the value sits in gold and silver and the remaining 40% sits in copper. I believe as we go deeper, copper will become more dominant."

When asked about the potential scale of the project, Kelley outlined Chakana's initial

target for publishing a resource is 10 million mt, which will allow for investor confidence and put the company in a position to raise money to continue aggressive exploration. "There are approximately 40 to 50 breccia pipes. Each breccia pipe varies in size and we have confirmed that the breccias become bigger at depth. We have never seen the bottom of a breccia pipe, even though our deepest breccia intercept is over 700 m."

Zinc

The dire performance of zinc in 2020 has left some producers operating at a loss, and zinc-focused juniors looking to raise money at the risk of severe dilution as share prices have fallen in tandem with a demand decimated by COVID-19. However, for well-financed juniors with the capacity to weather the current bear market while they increase resources and reserves, the hope is that when their projects have advanced to development stage, the supply and demand dynamics will have swung back in their favor.

Graham Carman of Tinka Resources explained how the Ayawilca project will come online in about four years, and the company is fully cashed up (C\$21 million in the bank and no debt as of April 2020) and permitted for exploration work through to 2021. Acknowledging that work at Ayawilca in 2020 has been impacted due to Coronavirus, Carman gave an update on the current project timeline: "We expect to have an expanded and improved zinc resource late 2020, and then be able to commence a PFS during 2021-2022. As long as permitting can be completed on time, first production at Ayawilca could be in 2024."

Another junior with a path to produce zinc concentrates, as well as lead, silver and gold, is Cerro de Pasco Resources (CDPR), which in November 2019 announced it would acquire Volcan Compañía Minera's Oxidos de Pasco asset for US\$30 million. On March 17th both parties agreed to extend the closure date of the acquisition until June 27th in light of the COVID-19 situation. Steven Zadka, CDPR's executive chairman, suggested that CDPR is trading on different territory to most juniors as it is acquiring a producing company: "As we are going to be producing revenue, we now have the ability to tap into non-dilutive capital sources such as streaming and debt," he said, noting that there is also a lot of equity upside for investors considering the 140 million mt of material inside the mine in addition to exploration potential. "When an equity IRR is supplemented against a non-dilutive capital, you are looking at a really high return on investment," stated Zadka.



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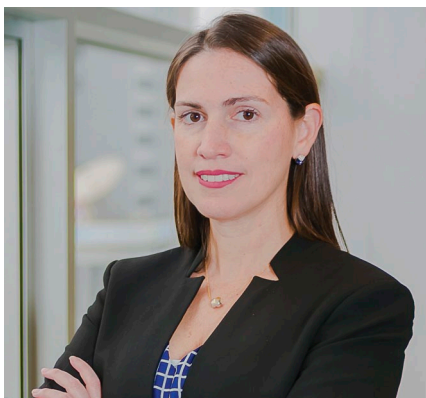
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Engineering, Construction and Consulting

Growth through consolidation

On January 2nd, 2019, the first act in a wave of consolidation that would define the mining industry took place as Barrick merged with Randgold, followed by Newmont's acquisition of Goldcorp in April. Consolidation was not confined to the precious metals producers, as some of the largest EPCM and consulting houses ramped up M&A activities to bolster their service offerings with clients increasingly looking for a one-stop-shop instead of outsourcing to multiple suppliers.

In April 2019, Australian EPCM giant WorleyParsons announced the completion of the US\$3.2 billion acquisition of Jacobs ECR (Energy, Chemicals and Resources) division, rebranding to "Worley" in the wake of the transaction. On the consulting side, ERM (Environmental Resources Management) acquired CSA Global in July, a coming together of mining and environmental expertise – another of the prevalent themes in recent years – as environmental social governance (ESG) has moved quickly to the forefront of strategy for mining companies. In February 2020, ERM acquired Critical Resource Strategy & Analysis – a specialist sustainability advisory company.



Alexandra Almenara, general manager, Peru, SNC-Lavalin.

One of the major international engineering firms to have strengthened through acquisitions in recent years is SNC-Lavalin, which, in 2019, enjoyed its best year since starting operations in Peru, according to general manager Alexandra Almenara. Affirming that the company had gained the trust and respect of the Peruvian market, Almenara mentioned that a focus on studies, construction management and supervision, and environmental work have been driving business growth in Peru. "Building upon the 2017 acquisition of WS Atkins, our consulting services in innovation and new technologies have grown," she said. "Mining companies in Peru are becoming more eager to listen

to alternative solutions on how they can optimize their production, become more efficient and more sustainable," observed Almenara, listing services provided by SNC-Lavalin such as laser scanning for brownfield projects, drones for surveillance and monitoring, 3D, 4D and up to 7D modeling for engineering designs, and the implementation of road maps for new technologies in the future.

Innovation has also been a growth driver for Wood, since the US\$2.2 billion merger of Wood Group and Amec Foster Wheeler, according to Franco Pedraz, operations manager for mining & minerals at Wood's Peruvian office. "We believe that if a company and its operations are digitized, the initial capex investment will decrease the opex significantly. I think as soon as people have enough examples of projects where technology impacted the opex savings, they will place a bigger emphasis on the implementation of innovation."

Patrick Smith, managing director and CEO of AMC Consultants, commented that the ability to start a mine with new innovations is more feasible for those with bigger budgets and large-scale, long-life mines, such as open-pit copper operations, for example. "However, it is more common for companies to evaluate their projects on the basis of tried and tested technologies, and then, after they have built the mine, implement extra technologies to improve the operation," he explained.

Local Players in the Market

2019 was also a successful year for Peru's local engineering firms, as brownfields expansion projects for medium-sized operations, rather than the big EPCM jobs suited to the international heavyweights, offered opportunities for growth. This was the case for BISA Ingeniería de Proyectos, which enjoyed its first full year of independence from Buenaventura in 2019, and has worked with Yanacocha, Antamina, Nexa Resources, Buenaventura and Chinalco in recent years. Federico Schwalb, BISA's CEO, explained that the company was restructured in 2016 to focus on its core business – engineering, consulting and construction management – leading BISA to break even in 2017, followed by revenue increases of 25% in 2018 and 21% in 2019.

Of the services offered by BISA, Schwalb has seen a growing demand for the PMO (Project Management Office) service, where a third party company can be the eyes and ears of an operation, showing the mining company how to execute a project properly. "BISA has realized that a good way to take on projects is by integrating a PMO



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which can plan, execute and control,” he said, adding: “We expect this area of business to grow in 2020 and I think that we will become the PMO partner for many more projects.”

Underground Mining Contractors

The global mining industry is migrating underground as ore grades decline and the incremental extraction of earth's finite resources continues. In some countries, such as Canada and South Africa, underground mining is the norm, with operating depths more than 3 km below the surface. In neighboring Chile, Codelco's Chuquibambilla, at one point the largest open pit copper mine in the world by excavated volume, opened its underground operation in August 2019, allowing the state copper giant to exploit the remaining resources located below the current ore deposit until 2058.

While there are currently no large scale underground mines in Peru, there has already been growth in this segment with medium to small scale operations, and the myriad of mining contractors active in Peru are preparing for the impending growth opportunities in the years to come, with the likes of Yanacocha underground, Corocochayco and Antamina all expected to transition underground in the new decade.



Gianflavio Carozzi, general manager, AESA.



Greg Jackson, managing director, Byrncut Offshore.

In 2017, a joint venture agreement was signed between underground Australian contractor Byrncut Offshore (Byrncut) and local Peruvian firm San Martín with the transition to large-scale underground mines in mind. The move to the type of underground mining Byrncut specializes in – large open stopes, sub level caves and block caves using bulk mining methods with large tonnage – has yet to gather pace in Peru, as projects such as Yanacocha underground have suffered delays due to metallurgical issues moving from an oxide ore body to a sulphide ore body. However, Byrncut remains committed to South America in the long run, ac-

ording to managing director Greg Jackson, as the company sees the move to large-scale underground mining as inevitable. Jackson explained how Byrncut works directly in the R&D phase with OEMs, providing feedback on how equipment can be developed to suit the specifics of different mines. “As Peru does not yet have experience in large-scale underground operations, when the transition happens Byrncut will be well placed to suggest the most suitable mining methods and technology to implement,” he said.

Many projects also begin as underground operations with no open cut component at all, such as Nexa Resources' Cerro Lindo

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polymetallic mine in Chincha, one of the world's 15 largest zinc mines. INCIMMET is one of the contractors working at Cerro Lindo and Eduardo Cossio Chirinos, INCIMMET's CEO, spoke of the new technology being introduced to the operation to boost productivity and cut operational costs: "Within the new fleet we will have at Cerro Lindo we purchased a machine that performs the cable bolting service and requires only one operator, compared to the old machines that require seven for the whole process."

Another of the major players in Peru's underground mining value chain is AESA, which achieved record sales in 2019 due to a combination of new projects as well as ramp ups on existing projects, according to Gianflavio Carozzi, CEO. Detailing how a sharpened focus on safety has been key to AESA's growth, Carozzi explained how the company reshaped its policies, standards and procedures in order to address a reality in Peru: low reading comprehension rates. "You cannot just assume that your policies, procedures and training material are going to be well understood," he said, continuing: "We thus decided to use alternative methods of delivery, particularly a bigger use of visual aids. As such, we started the use of comics and animated videos to inform on critical aspects of safety."



Enrique Sattler, CEO, Robocon.

Technological Advancements

Extracting ore at depth can be a complicated, costly and dangerous business, and a worrying rise in the number of fatalities at Peru's mine sites in 2019 (40 deaths, versus 27 deaths in 2018) has heightened the need to remove workers from areas of risk. One of the ways this risk is being mitigated is through technology, and in particular the mechanization of services.

Peruvian company Robocon is the only shotcrete contractor in the world to be affiliated with EFNARC (European Federation for Specialist Construction Chemicals and Concrete Systems), and has been mecha-

nizing underground processes with the likes of Buenaventura and Pan American Silver. Furthermore, Robocon has been integrating with contractors to work on tenders for small mines that are transitioning from dry to wet shotcrete, according to CEO Enrique Sattler. Discussing Robocon's latest technologies, Sattler explained how the company tailors its solutions depending on the context of the mine: "Our solutions will transform narrow vein mining, as tasks that used to take 1.5 days (or three shifts) can now be completed in 30 minutes in a secure operation," he said, adding: "The objective is to mechanize the shotcrete solutions, rather than use a larger workforce."

One of the innovations being used in Volcan's Chungar mine in Peru by Robocon is the slick line shotcrete transportation method – a vertical pipe that takes shotcrete from the surface to depth through gravity. Working in collaboration with Tumi Raise Boring and Robocon's sister company Tecnomecánica, Robocon can ensure the tunnel has the correct proportions so the shotcrete is transported downwards efficiently. "This saves mining companies time and has significant cost benefits – the investment is paid off in only 12 months and increases the productivity of the mine," affirmed Sattler.

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Equipment and Services

The dichotomy between innovation and price

Just as the downturn seemed to be in the mining industry's rear-view mirror and the focus had shifted from cost-cutting exercises to increasing production efficiency, COVID-19 struck. In a post-pandemic climate, will operators favor lower-cost suppliers, or will mining companies look to compensate for lost production by investing in new technologies that boost metal output?

Fernando Samanez, VP mining equipment and sales for the Pacific Rim at Metso, believes the need to recover production lost during Peru's extended lockdown could benefit service providers: "When things restart and ramp up, there could be a lot of opportunities as mining producers look to compensate for lost production by increasing throughput," he reflected, adding: "When plants are restarted and looking for 5% more throughput, for example, new technology will have to be implemented."

However, those expecting sweeping changes should probably not hold their breath, as technology that disrupts tried and tested mining methods will face opposition from a low-cost labor force in need of work. "Right now, I do not think it is the right moment to incorporate disruptive changes that would involve big job losses," remarked Víctor Gobitz, president of the Peruvian Institute of Mining Engineers (IIMP) and former CEO of Buenaventura. Speaking in April, Gobitz commented that the adoption of new technology will have to happen step by step: "At the moment, people are our first priority;



Alejandro Caicedo, general manager, Peru, Orica.

the second priority is keeping the essential care and maintenance on our sites; the third priority will be to restart mining operations. Only when we have a stable operation will we look at new technology and efficiency measures."

On the other hand, measures will have to be taken to ensure that mining operations comply with new safety standards, and in this case the implementation of new technologies to mitigate the risk of COVID-19 spreading will be necessary. "COVID-19 is accelerating the adoption of certain technology-based solutions in order to be more efficient and more secure," said Marcos Wieland, general manager of digital transformation company Sitech, part of the Ferrycorp group that includes Caterpillar distributor Ferreyros. "For instance, the vision of having a paperless



Miguel Ángel Arenas, general manager, Geotec.

mine through digitalization is becoming a must," he affirmed, as the use of digital tablets negates the need for workers to pass paper from hand to hand.

Considering the financial burden caused by COVID-19, will investment in innovation become an afterthought? While acknowledging the impact the pandemic will have on mining budgets, Wieland believes it is not the time to eliminate or turn down technology projects: "On the contrary, we believe it is the opportunity to strengthen the digital transformation agenda: efficiency is required more than ever and technology can help."

For Jorge Granda, general manager of AK Drilling, technology should be used to improve machine efficiency, but not to remove human operators, underlining their importance for matters of safety and quality:

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"Drilling is an artisanal practice where the human factor goes hand in hand, and therefore we do not believe that 100% automation will be achieved or is recommended," he said.

On the topic of how to price services, Granda mentioned it would be ambitious to claim that drilling clients are all willing to pay for quality, but the importance is starting to be understood after some of the majors suffered poor results attributed to cheap drilling. "Our challenge for 2020 is to provide a sophisticated product with front-line technology and highly-trained personnel at low prices," he said, mentioning the new technologies AK Drilling is developing in liaison with IDS, such as horizontal drilling, deep-pit drilling and automated diamond drilling.

"The price is still very important for many customers, however, more automated services with higher safety standards are becoming increasingly popular," observed Miguel Ángel Arenas, general manager of Peruvian drilling contractor Geotec, who has also noticed customers becoming more sophisticated in their requests for new technologies. "An example of this is the directional drilling service Geotec implemented in Peru along with our partner in the US," he said.

Automated drilling equipment is becoming more commonplace in Peru, particularly with the biggest players in the industry, such as at the Newmont-operated Yanacocha mine, where Geotec has been using the Epiroc Smart rod handling machines. "Although this represents a bigger upfront investment, they increase safety and productivity significantly," stated Arenas, who explained that the capital investment is paid back as the machines can drill during downtime. Expanding on this theme, Arenas commented that Geotec is working on an artificial intelligence (AI) project to increase production and remove drilling workers from the firing line, a key focus area for 2020.

Environmental concerns are also high on the agenda for mining companies as public scrutiny and stricter regulations require operations to have smaller footprints, which has led Geotec to bring more compact and automated drilling rigs to the market, according to Arenas. Explaining how Geotec has developed smaller equipment that cuts water usage and reduces footprint as part of the company's three-year contract with Las Bambas, he added: "Since Las Bambas has a commitment with the local communities, we had to develop new working strategies to reach the high standard of service that they have set for their project."

The competitive market for blasting services in Peru is served by both international and local explosive companies, including large players such as Orica, Famesa, Enaex and Maxam. So how does a business differentiate itself from the competition? One way is to buy the competition. On February 18th 2020, Orica announced it would acquire Exsa, Peru's largest manufacturer and distributor of industrial explosives, which Orica's managing director and CEO Alberto Calderon stated will immediately establish Orica as the number one player in Peru.

For Alejandro Caicedo, Orica's general manager in Peru, the winning players in the medium and long term will be those who can provide value and technology, rather than those that offer the lowest price. Giving the example of Orica's introduction of the Bulkmaster 7 Mobile Manufacturing Unit in Antamina, Caicedo added: "We are developing a fully automated blasting process, which considers innovations like WebGen, the world's first wireless initiating system that operates remotely, and BlastIQ, a cloud-based digital platform designed specifically to enable continuous improvement of blasting outcomes."

Discussing how products are developed in the blasting industry, Caicedo was keen to stress that Orica looks for an integrated solution rather than simply a product, citing the company's acquisition of GroundProbe as evidence of Orica's commitment to offer an 'end-to-end' approach.