

GLOBAL BUSINESS REPORTS

INDUSTRY EXPLORATIONS



MINING IN ONTARIO AND TORONTO'S GLOBAL REACH **2019**



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Engineering & Construction - Equipment & Technology - Digital Mine*

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Dear Reader,

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As the global mining industry continues on its path of recovery, Ontario, as Canada's largest producer of mining commodities with C\$9.9 billion of mineral production in 2017, is primed to take advantage as optimism returns. However, the financing has not flooded back to all sectors of the industry, with cannabis, cryptocurrencies and blockchain dominating the attention of the Canadian stock exchanges as junior mining companies struggle to attract investment.

In the face of this new competition, and on the back of a downturn that forced the industry to focus on increasing efficiency and productivity, an innovative ecosystem of institutions, SMEs and OEMs are producing cutting-edge technologies that will fundamentally change the global mining industry in the coming years. Innovation, so often a buzzword without basis in a conservative industry, is finally becoming a priority for mining companies, with technologies being introduced to create safer working environments, and reach deposits that were previously not commercially viable.

With major mining projects coming to the end of their mine life, the impending need for significant new discoveries has heightened the senses of the junior mining community, intensifying exploration in areas such as the Red Lake Gold Camp. The global reach of Ontario's mining industry also sees Toronto-based mining companies exploring a variety of foreign jurisdictions in search of the next world-class deposit.

It is then an exciting time for Global Business Reports to be back in Ontario. In this edition of our report, GBR investigates the latest developments across the full value chain, from the service and supply hub in Sudbury, to the financial institutions, junior explorers and mining producers in Toronto that anchor the global mining industry. GBR's research team was stationed in Ontario for three months, conducting face-to-face interviews with the key decision makers throughout the industry to provide a holistic view of Ontario's current business environment, and test the temperature of the global mining industry as well.

The result of Global Business Reports' research is the production and distribution of *'Industry Explorations - Ontario Mining and Toronto's Global Reach 2019'*, an up-to-date review of the current operations and projects and the latest trends in Ontario, with a wider look at the projects of Ontario-based companies elsewhere in Canada and internationally. A palpable sense of positivity has returned to the province, and the following pages are an illustration that the tide has turned as we enter the next upswing.

We would like to thank all our interviewees that have taken the time to provide their insights into the market. To all our readers, we always welcome your feedback or interest in being interviewed for future reports.

We hope you enjoy the read,



Alice Pascoletti
General Manager



Elisa Iannacone
Project Director

Global Business Reports

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Industry Explorations
 Global Business Reports

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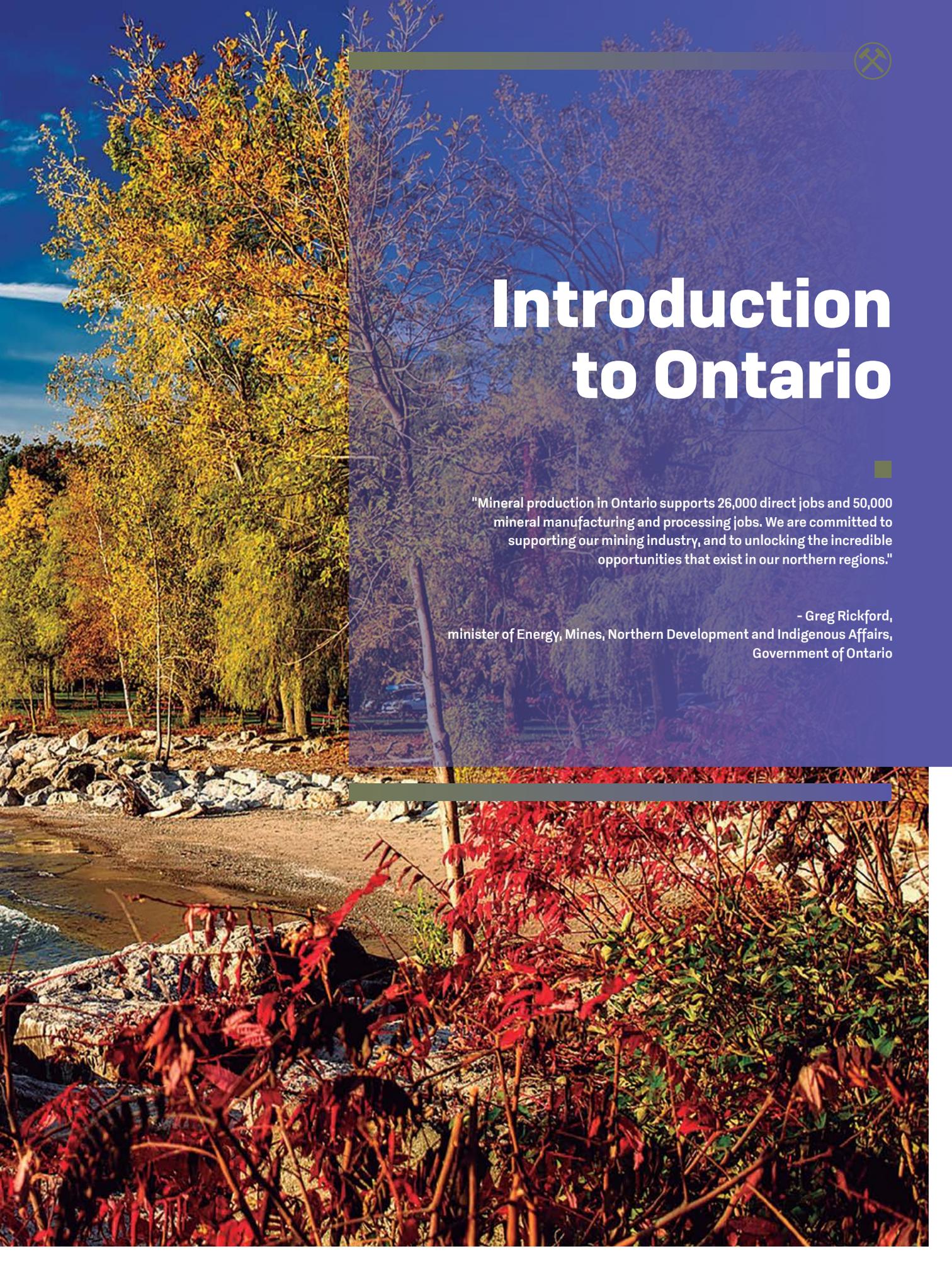




Introduction to Ontario

"Mineral production in Ontario supports 26,000 direct jobs and 50,000 mineral manufacturing and processing jobs. We are committed to supporting our mining industry, and to unlocking the incredible opportunities that exist in our northern regions."

- Greg Rickford,
minister of Energy, Mines, Northern Development and Indigenous Affairs,
Government of Ontario



Ontario: an Overview

Canada's preeminent
mining powerhouse

8

ONTARIO AT A GLANCE

Sources: Statistics Canada, Ontario Ministry of Finance

Provincial capital:

Toronto

Canada Federal capital:

Ottawa

Premier:

Doug Ford (Progressive Conservative)

Area total:

1,076,395 km² (of which: 14.7% water)

GDP growth (2017):

2.8%

Inflation (2017):

1.7%

Revenue from goods manufactured (2017):

C\$304.9 billion

Private and public investment (2017):

C\$68.5 billion

Ontario, Canada's largest province in terms of population and GDP contribution, is also Canada's largest mineral producer, and can rightfully claim to be the home of Canadian mining. Ontario's significance to the industry goes far beyond this, however, as the Toronto stock exchanges, financial institutions, major mining companies and a plethora of juniors operating in jurisdictions on every continent are based in a province whose foundations and wealth are intrinsically linked to mining.

The endowment of rich and diversified mineralization has allowed Ontario to nurture a deep rooted mining tradition, with gold deposits such as the Red Lake camp, the Kidd Creek base metal mine in Timmins, and substantial nickel production from the Sudbury basin providing northern Ontario with an economic backbone. Although mineral production has been the basis of Ontario's mining success, it is the geographical location of the province which has created a financial ecosystem unrivalled in mining terms, with its neighbour and fellow mining powerhouse Quebec as a trading partner, and proximity to the money markets and industrial centers in northeastern USA. While Wall Street and the City of London can lay claim to being the financial centers of the world, it is Toronto's Bay Street which leads the way in global mining financing, with the TSX and TSXV ably supported by the Canadian Securities Exchange (CSE) and numerous investment firms with the means and expertise to dictate and support projects both domestically and globally.

The global reach of Ontario's mining industry was particularly pertinent in 2018, as the delicate relationship between Canada and its biggest trading partner, the US, highlighted the importance of diversified trade relationships and increased transactions in jurisdictions away from North

America. On November 30, 2018 at the G-20 summit in Buenos Aires, meeting for the first time since the revised North American Free Trade Agreement (now called USMCA) was signed, Prime Minister Trudeau, President Trump and President Enrique Peña Nieto of Mexico hailed the agreement as a success that will provide jobs and security whilst alleviating political tensions. However, the deal must first be approved by congress, and political volatility south of the border has prompted Canada to advance trade talks with other nations such as China. In a mining context, globalization has long been apparent, exemplified by PDAC, the world's largest mining conference, represented by a record 135 countries in 2018.

The exploration sector has suffered since 2012, as low commodity prices and competition from new industries such as cannabis, blockchain and cryptocurrencies has taken significant risk capital out of the market. However, mineral exploration expenditures in Ontario reached C\$593 million in 2018 – an increase of 13% from 2017, and an indication that Ontario's mining industry is at the beginning of an upward curve. This figure should increase again in 2019, as the federal government committed to a five-year renewal of the mineral exploration tax credit (METC) on November 21, 2018. Previously, the METC had been renewed annually since its introduction in 2000, and the added security and clarity of a renewal that lasts until 2024 provides a timely boost to the junior community.

Mergers, discoveries and a new mine signal the dawn of a golden era

On September 24, 2018, Barrick Gold and Randgold Resources announced agree-

ment on a share-for-share merger valued at US\$6 billion, creating an industry-leading gold mammoth that will focus on assets in tier-one jurisdictions. This new incarnation of Barrick will own half of the world's top ten tier-one gold assets, and over 77 million ounces of proven and probable gold reserves.

One month before the Barrick-Randgold announcement, the Ontario junior community received news of Great Bear Resources' high-grade gold discovery at the Red Lake camp, which spurred its share price from C\$0.50 in August 2018 to over C\$3.30 a mere two months later. Michael White, president and CEO of IBK Capital, the investment banking firm that brokered a C\$10 million private placement for the Vancouver-based junior, cited the discovery and financial transaction as an example of market revival, reflecting: "The public markets for mining and metals have gone through a period of contraction, but we see that coming to end and heading into a bull market."

If the mergers and discoveries in Q3 2018 were early indicators of a new upturn in the gold sector, tangible evidence came in the form of Ontario's first new high-grade gold mine in ten years, as Harte Gold opened its Sugar Zone gold mine in Northern Ontario on October 24. Stephen Roman, president and CEO of Harte Gold, suggested the opening of the Sugar Zone demonstrates that Northern Ontario is open for business: "We will revitalize the region and town of White River and employ hundreds of people," he stated.

A new provincial government focuses on collaboration

Kenora-Rainy River MPP, Greg Rickford, was sworn in on June 29, 2018, as the new

Minister of Energy, Northern Development and Mines, and Indigenous Affairs in Premier Doug Ford's Progressive Conservative cabinet of the Ontario government. Under the previous Liberal government these three responsibilities had been divided between individual ministers, and this perceived downgrading ruffled some feathers. However, Chief RoseAnne Archibald, leader of the Chiefs of Ontario, voiced her support for the incumbent minister, declaring him to be, due to his experience working with northern communi-

ties, by far the best choice to work with the indigenous peoples of Ontario.

In his interview with Global Business Reports, Minister Rickford underlined his commitment to move forward with a resource revenue sharing program intended to help northern towns and indigenous communities share in resource development. Sandra Gogal, partner at Miller Thompson and expert in Aboriginal and environmental law, explained how the program can benefit communities and mining companies alike: "This pilot project would see

ORMSTON LIST FRAWLEY LLP



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Drawing on our extensive experience with mineral resource companies and investors, we are able to guide our clients with efficient and effective legal advice in areas relating to corporate and securities laws, financings, business agreements and commercial litigation. Whether you are involved in early stage exploration or advanced project development, contemplating a strategic transaction or involved in a dispute, call on us to provide you with targeted, sophisticated advice that is built on our commitment to producing solutions.

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government sharing revenues with First Nations, with the aim of alleviating financial pressure on mining companies.”

The theme of collaboration is also evident beyond the traditional dynamic of mining companies, governments and local communities, exemplified by the Pan-Canadian SMR (small modular reactor) roadmap being developed between the Ontario government, nuclear energy giants Bruce Power and Ontario Power Generation, along with other provinces, territories and power utilities from across Canada. “The realization of an SMR industry in Ontario will provide sustainable and reliable power to Ontario’s remote communities and support vital industry that will create jobs and opportunities in the north,” noted Minister Rickford.

Recruitment: the scramble for talent and push for diversity

Even during the downturn, from the end of the ‘super cycle’ in 2012 until early 2017, there were over 1,000 unfilled jobs in Canadian mining operations as the sector struggled to attract quality talent regard-

less of the commodity cycle, according to Chris Stafford, president of executive search company C.J. Stafford & Associates. Stafford has been recruiting for the mining industry since 1981, and warned that the mining sector recovery, in the wake of retiring baby boomers, will pose a new set of challenges: “Mining Industry Human Resources Council (MiHR) predicts that over the next 10 years, 88,000 new workers will be needed to make up for 50,000 retirement exits, alongside other shortages.”

Stafford went on to note that the MiHR prediction was merely the baseline estimate, and considering current industry trends and forecasts, in an expansionary economic scenario, that figure could rise to 130,000: “The shortage is real and will continue to plague the industry unless it broadens its scope for hiring,” he said, suggesting that mining companies should embrace diversity, and spend more time with schools garnering the interest of students early in their education.

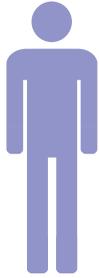
The Canadian Institute of Mining (CIM) was one of the first industry associations to have a Diversity and Inclusion Advisory Committee, and intends to lead by exam-

ple to support the push for diversity. CIM president elect, Roy Slack, emphasized the importance of CIM’s Mining 4 Society (M4S) initiative, put in place to enhance awareness of mining and increase mineral literacy. Rather than focusing on just recruitment, the M4S initiative aims to nurture a better public understanding of the sector: “Mining is essential for the quality of life we have today and our industry has made advances in terms of safety, environmental stewardship and working with indigenous peoples”.

Meanwhile, Cambrian College’s Mining Engineering Technology (MNTY) program is grooming the next generation of miners. INCO (now Vale) and Falconbridge (now Glencore) were founding partners of Cambrian College 50 years ago, and the institution continues to work closely with mining industry partners, particularly through its applied research division, Cambrian Innovates. Shawn Poland, vice president of Cambrian College, explained how SMEs can benefit from Cambrian’s R&D resources: “The companies working with us will still hold their IP, and look to us for real-world, real-time solutions for the challenges they are facing.” ■

ONTARIO: DEMOGRAPHIC DATA

Source: Statistics Canada



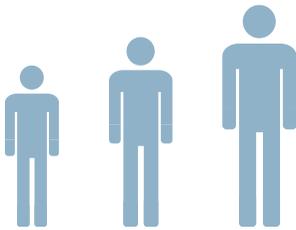
POPULATION (2018)
14,322,757



Aboriginal population (2016)
374,395



Immigrants (2016)
29.1%



Median age (2017)
40.6 years



Employment (November 2018)
7,284,000



Unemployment rate
5.6%



Life expectancy at birth (2013)
84.2 years (women)
80.1 years (men)



Home ownership rate (2016)
69.7%



Total vehicle registrations (2017)
12,273,788



Average weekly earnings (Sept 2018)
C\$1,025.45



Homicide rate per 100,000 population (2017)
1.4



Percentage of adults aged 25-64 with a college diploma (2016)
24.7%



Greg Rickford

Minister of Energy, Mines, Northern Development and Indigenous Affairs
GOVERNMENT OF ONTARIO

Ontario's flow-through share program for juniors exploring in the province offers a 5% tax credit for investors, which supplements the federal government's 15% tax credit and deductions.

On June 29, 2018, you were appointed Minister of Energy, Mines, Northern Development and Indigenous Affairs, assuming the responsibility for three distinct portfolios. What is the Ministry's strategy for dealing with this extra responsibility?

Our government is committed to making Ontario's government more efficient, affordable and responsible. I was honored to be named Minister of these three portfolios on June 29. It was a logical decision to group these three ministries together and it has allowed for our government to be more efficient and effective as we create unprecedented opportunity and growth in the north, work alongside Indigenous communities and get Ontario's energy system back on track.

You have mentioned that advancing the Ring of Fire is a priority. How do you intend to accelerate progress?

The Ring of Fire is an opportunity to support major economic development for communities in Northern Ontario. Our government is working with entrepreneurs, industry, municipalities and indigenous peoples to create unprecedented opportunities for jobs and prosperity in Northern Ontario.

Our government is prioritizing the north and we are working to unlock opportunity by focusing on reducing regulatory burden and delays to get projects up and running.

Bruce Power is exploring the application of small modular reactors (SMRs) for remote mining operations. How can cross-industry collaboration benefit economic development in Ontario?

The Ontario Government, Bruce Power and Ontario Power Generation are members of the Pan-Canadian SMR Roadmap Steering Committee, along with other interested provinces, territories and power utilities from across Canada. This collaborative project involves a variety of diverse and unique perspectives through engagement with industrial sectors (e.g., mining and oil sands), as well as indigenous communities. The realization of an SMR industry in Ontario would provide sustainable and reliable power to Ontario's remote communities, and support vital industry that would create jobs and opportunities in the north.

Mining is in the early stages of a promising upcycle, but funding for juniors has been hard to come by due to competition from cannabis companies and crypto-currencies. What can the Ministry do to nurture a

more favorable climate for investment in Canadian mining?

Toronto is the mining finance capital of the world and an attractive destination for juniors to do business. In 2017, the Toronto Stock Exchange raised C\$8.5 billion in new equity capital for mining. Companies are not only raising exploration funds here – they are also investing in Ontario-based exploration work. In 2018, mineral exploration expenditures are forecast to be C\$593 million – a projected increase of 13% from 2017.

Ontario actively promotes mining opportunities within the province as well as our government's support for the sector, which includes Ontario's flow-through share program, a tool for junior exploration companies exploring in Ontario to raise funds. The program offers a 5% tax credit for investors, which supplements the federal government's 15% tax credit and deductions.

How do you intend to further develop relations between indigenous peoples and the Ontario government?

We are working with all levels of government to ensure indigenous peoples share in the economic opportunities across Ontario. One of our government's commitments is moving forward with resource revenue sharing to help northern towns and indigenous communities share in resource development. Resource revenue sharing connects First Nations to the benefits of local development and regional economies.

How important is it for Ontario to foster and support a healthy mining industry?

Ontario is fortunate to be rich in mineral resources. Mineral production in Ontario supports 26,000 direct jobs and 50,000 mineral manufacturing and processing jobs. Ontario's mining industry is not only a major economic engine in the north, but it supports local economies across the province and is a key driver of the provincial economy as a whole. We are committed to supporting our mining industry, and we are committed to unlocking the incredible opportunities that exist in our northern regions.

Do you have a final message for our readers?

Ontario is a global leader in mining, and there is even more potential. Our government is investing in Ontario's north and our natural resources, creating unprecedented opportunities for jobs and prosperity. ■



Denis Frawley

Partner

ORMSTON LIST FRAWLEY LLP



The size of the financings completed by juniors is becoming healthier – raising enough money to cover substantial exploration over numerous phases of a project, rather than just enough to cover a few months of basic maintenance costs.



Can you give us an overview of Ormston List Frawley (OLF)'s services to the mining industry?

OLF has considerable experience advising small and mid-cap companies in the mineral resource exploration and mining sectors. We tailor legal solutions that reflect the nuances and necessities of the exploration and mining industry. OLF helps companies set up their corporate structures, manage private placements, provides on-going legal counsel on commercial, service and joint venture agreements, assists with transactions, equity and debt financings, including flow-through financings, and works with investors and promoters to develop their projects, whether those clients are public companies or private companies that want to become public or intend to raise capital. We have often helped negotiate reverse takeover agreements and other strategic transactions.

Has OLF noticed an improvement in the investment environment for juniors in the past two years?

Over the past two years, OLF has noticed a gradual improvement with regard to the mining industry: optimism has been growing and activity has been picking up. However, resource exploration and mining are not fly by night industries, and those who have spent time working with or financing these industries understand their cyclical nature. Over the past few years, investors have increasingly been open to considering new projects. The downturn made companies become leaner, more agile and more cost efficient, and these good business practices will carry through as conditions continue to improve.

The size of the financings completed by juniors is becoming healthier – raising enough money to cover substantial exploration over numerous phases of a project, rather than just enough to cover a few months of basic maintenance costs. For OLF in terms of practice, changes in Ontario to the Canadian securities laws for private placements have kept us busy, as the rules have increased pre and post-closing compliance requirements. These days, much of the capital for juniors is raised privately (and not through public offering) without significant involvement of the brokerage firms, so we have more work to do with clients to help ensure compliance.

How has the mining industry adapted to the impact of cannabis, blockchain and cryptocurrency companies?

Cannabis, blockchain and cryptocurrencies are like strong magnets that are pulling in a lot of attention. The cannabis boom in particular has drawn in a lot of capital, interest, focus and talent. Rather than trying to compete against such a strong wave, junior mining companies need to present themselves as attractive options for the investment of all the new wealth that is being created. Investors will want to diversify their holdings, and many of them here in Ontario have deep knowledge and expertise in the mining industry, so will be open to interesting opportunities.

What are some of the standout projects OLF has been working on recently?

Focusing on Ontario, for many years, OLF has been working with a client who owns almost all of the mineral rights for an area covering approximately 70,000 hectares, spread over 10 townships in Northeastern Ontario. The previous owner held the property for decades and conducted sporadic, private exploration. However, the mineral resource potential of the property was not well understood by the previous owner as the property was held for logging, and the owner's organization did not necessarily appreciate the opportunities that flowed from its ownership rights of most minerals found on the property. OLF represented our client when they acquired those properties and assisted with several related financings, including a very creative transaction to fund the purchase price by selling the forestry interests to a third party.

What makes the mining industry in Ontario an attractive prospect for investors?

Ontario is a tier one mining jurisdiction, where companies have direct access to the financial markets, to a developed service industry, and also to the latest technologies. The use of machine learning and AI are helping improve exploration efficiency and should help uncover new deposits and open up new possibilities in this mineral-rich region. There is a wealth of experience and expertise here, and in terms of capital markets this is really the best place to go in the world to be able to connect directly with investors and experts who have their fingers on the pulse of the mining industry. ■



Chris Stafford

President

C.J. STAFFORD & ASSOCIATES



The slowdown continued for five years until early 2017 but, even during these slow times, when it was thought there existed an abundance of available talent, there were over 1,000 unfilled jobs in Canadian mining operations.



Could you give us an update on the Canadian mining industry and how it is affecting your business?

We have been recruiting to the mining industry since 1981, have experienced all the cycles since, and witnessed firsthand the challenges that mining companies have in attracting talent. Our experience is that, no matter where we are in the commodity cycle, the sector has constantly struggled to attract quality talent. At the end of the ‘super cycle’ in 2012, we saw a prolonged downturn that continued for five years until early 2017 but, even during these slow times, when it was thought there existed an abundance of available talent, there were over 1,000 unfilled jobs in Canadian mining operations.

In the wake of retiring baby boomers, a recovery within the sector will pose a new set of challenges. We believe that the recruiting process of attracting and hiring talent will be redefined and that much of our time will be spent consulting with clients on their expectations of the recruiting process. It will be of prime importance to understand company culture and what makes “your” company better than the competition. The selection criteria may need adjusting and companies will need to respond to the needs and wants of the new hires.

Is there a shortage of skilled labor in the industry at this moment?

In my 35 plus years of experience, I cannot remember when there was ever an oversupply of talent for mining jobs across Canada and, with an aging population sapping its future workforce, this is not going to change anytime soon.

Mining Industry Human Resources Council (MiHR) predicts that, over the next 10 years, 88,000 new workers will be needed to make up for 50,000 retirement exits, alongside other shortages. And that is just MiHR’s baseline estimate, based on current industry trends and forecasts – in an expansionary economic scenario, the figure reaches 130,000. The shortage is real and will continue to plague the industry unless it broadens its scope for hiring. Recruiting will be very competitive for professionals, operators and for trades.

What is the reason for this shortage?

The looming skills shortage is exacerbated by the nature of the industry (and specifically the remoteness of many operations), the sector’s economic volatility and its sluggish embrace of diversity. Add to this the failure to integrate succession planning strategies, not recognizing the change in demographics in the talent market place, and lack of creativity when seeking to attract and recruit.

I firmly believe that creative hiring policies and clearly defined career paths should serve to attract talent. It would certainly help if mining companies spend more time with schools and on campus, garnering the interest of students early in their education, a practice that has proven effective in the past with Cominco. Industry also needs to emphasize the positives: high salaries, affordable housing, progressive careers, outdoor activities, clean air and safe communities.

Do you think that people now, especially millennials, are prepared to understand the mining cycle?

When entering the mining industry, millennials are aware of its ups and downs. Mining has an attraction that does not exist in many other industries: it is adventurous and often involves travel; it is culturally diverse, and it offers challenge on many levels. It also pays well, and the rule of thumb is that the farther north you go, the better the pay and the more responsibility you will have.

Another consideration when seeking work is that Canadian colleges and universities are educating students for both the domestic and global mining scene. This is beneficial since while one region or commodity may be inactive, it may not necessarily apply to other sectors.

How are new technologies and social media platforms affecting the business?

There is no doubt our business has been affected by such social networking platforms, but the impact has been minimal. However, we have witnessed mixed results with clients introducing online application systems that, in many cases, have limitations and fail to effectively connect with the target audience. ■

Glenn Mullan

President
PDAC



What are the goals for the PDAC Convention in 2019?

PDAC was phenomenal in 2018, with 135 countries represented, and this is in no small part to our convention planning team who do no rest on their laurels and are dedicated to constantly improve the event. The landscape for mining conventions and industry events is busy, and we are always looking at what is out there to make sure that the product we offer is well priced, attractive, and brings an ideal spectrum of participants. PDAC 2019 will showcase the latest trends, technologies, drill programs, discoveries, cases, springs, innovations and key themes of the industry.

Is there a particular geographical region that PDAC is focused on at the moment?

First and foremost, PDAC is a Canadian event and has been since its origin, and it will always maintain a strong Canadian focus. However, with Canadian PDAC members working in over 102 countries globally, it is natural that we extend our reach into as many of those countries as possible. To increase interaction and promote collaboration between mining jurisdictions around the world, PDAC created the International Mines Minister Summit,

for the most senior elected officials, which had 14 nations present in its first year, and 26 nations in 2018.

How does PDAC work to strengthen the alliance between North America and South America to develop their mining sectors?

Peru and other Latin American nations have sent large contingents to PDAC with great success. Ecuador is one of the important destinations for mining activities at the moment as there has been a change in policies and regulations, and companies from many countries have taken note. PDAC dedicated a day to doing presentations on Ecuadorian geological case studies, showcasing the potential of the region to significant foreign investors from countries such as China, Russia, USA, Canada and Australia.

PDAC tries to foster this environment, and promotes cross pollination, i.e. getting the members all in the same room and meeting their peers from other countries. We show how Canadian experience might be of benefit to Peru, for instance. We also try to introduce companies to many of the different brokerage houses and firms that are involved in financing mining projects. ■

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Roy Slack

President Elect
CANADIAN INSTITUTE
OF MINING (CIM)



How significant is the CIM membership and what do its members hope to achieve?

The CIM is the only national technical society for mining, and is made up of over 10,000 members, with over 30 branches, 10 societies and almost 140 corporate members. We are currently focusing on an initiative we call One CIM – how we can pull such a wide-ranging and complex organization together and coordinate more efficiently to create better traction. Each branch has different priorities and areas of focus, the three main ones being the dissemination of knowledge, networking, and enhancing public awareness about the industry.

What is the greatest area of focus for the CIM at the moment?

The “Mining 4 Society” (M4S) initiative has been in place for a number of years to enhance public awareness of mining and increase mineral literacy. This is accomplished through dedicated M4S shows, but also by working with schools, universities, and hosting technical sessions. Public

awareness is not just about recruiting people to come into the industry, it is focused on nurturing a better public understanding of what mining is all about. Mining is essential for the quality of life we have today, and our industry has made advances in terms of safety, environmental stewardship and working with indigenous peoples in recent years, but we also know we still have work to do.

What steps is the CIM taking to promote diversity?

Diversity is a big focus for the CIM, and we are proud to be represented by some of the top women in the mining industry such as Janice Zinck, Samantha Espley and Angela Hamlyn. CIM was one of the first industry associations to have a Diversity and Inclusion Advisory Committee. CIM works closely with a number of other diversity-focused organizations to not only increase the number and influence of women in our industry, but indigenous peoples and other under-represented population segments as well. ■

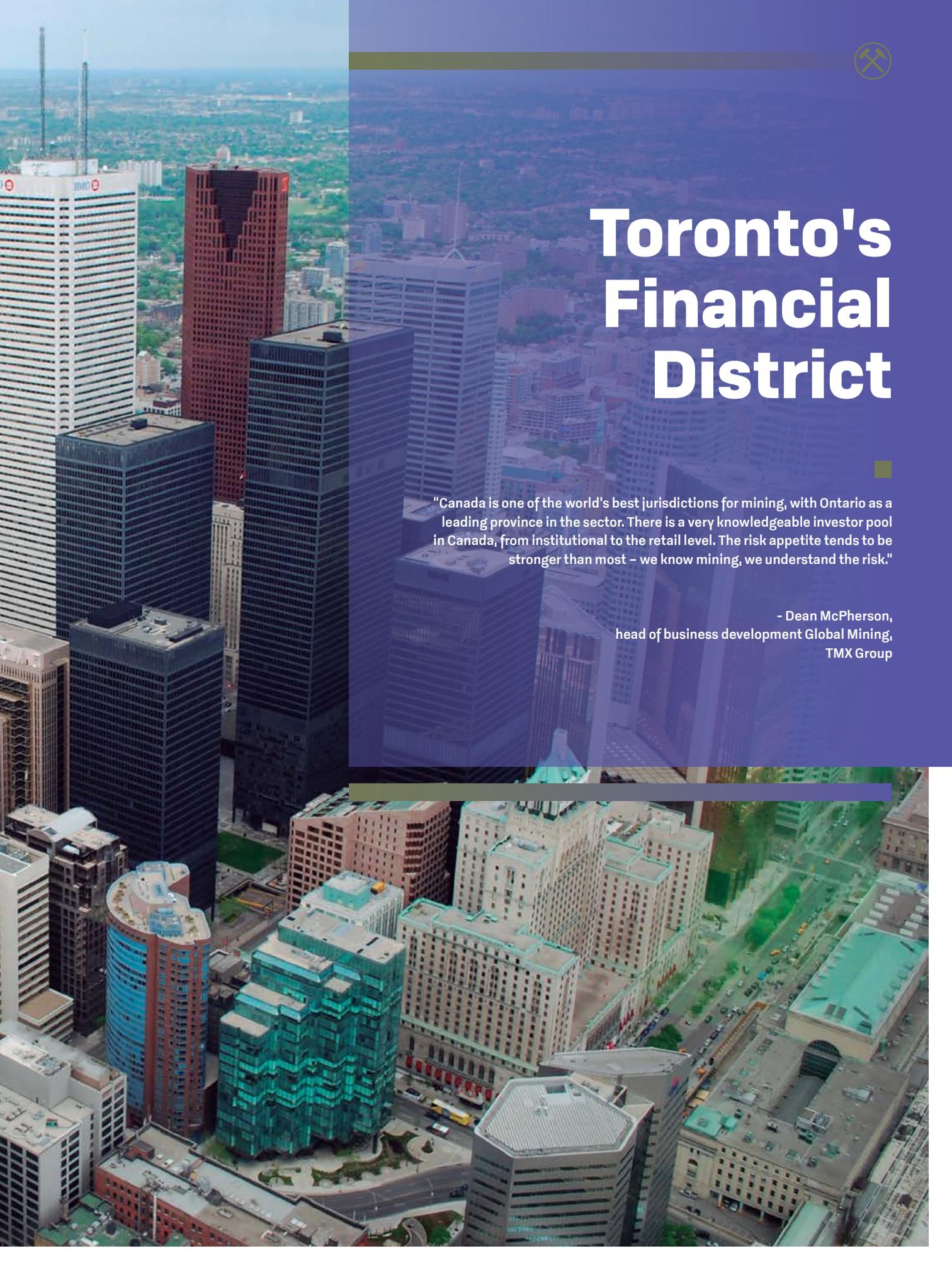




Toronto's Financial District

"Canada is one of the world's best jurisdictions for mining, with Ontario as a leading province in the sector. There is a very knowledgeable investor pool in Canada, from institutional to the retail level. The risk appetite tends to be stronger than most – we know mining, we understand the risk."

- Dean McPherson,
head of business development Global Mining,
TMX Group



Toronto: the World's Mining Financial District

The global investment engine of the industry

Toronto is the financial heart of the mining industry, spearheaded by the Toronto Stock Exchange (TSX) and TSX Venture, which together accounted for 59% of all global mining financings in 2017. Almost 56 billion mining shares were traded in 2017, with a total value of C\$206 billion, and there was tangible evidence of renewed investor confidence, illustrated by one of the largest mining IPOs in TSX's 165 year-history, as Nexa Resources raised over C\$730 million in Q4.

The attractiveness of Canada as a destination of choice to list companies in the mining space is also enhanced, in the case of exploration companies, by the country's FTS (Flow-Through Share) program. Introduced by the federal government in 1972, this is a tax driven structure that allows an individual or corporation to invest in a Canadian exploration company and receive the tax benefit from those expenses being spent on the ground for exploration. Rubicon Minerals utilized the FTS program to raise C\$10 million in March 2017, and C\$10 million in February 2018, to help fund exploration for their Phoenix gold project at the Red Lake Camp in north-western Ontario.

There are currently four ways companies can list on the Toronto stock exchanges: Capital Pool Company programs (CPCs), IPOs, dual listings and reverse takeovers (RTOs). Since the introduction and success of the CPCs, the Special Purpose Acquisition Companies (SPACs) concept was introduced – the TSX version of the CPC shell concept.

The Capital Pool Company (CPC) program introduces experienced investors to entrepreneurs whose growth and development-stage companies require capital and public company management expertise. Different to a traditional IPO, the CPC program enables seasoned directors and officers to form a Capital Pool Company with no commercial operations and no assets other than cash, list it on TSX Venture Exchange, and raise capital. The CPC then uses these funds to seek out an investment opportunity in a growing business. Dean McPherson, head of business development and global mining at the TMX Group, expanded on the benefits of the CPCs: "The CPC program has been a huge success for TSX, with 2,464 created since the start of the program, 87% of which have completed qualifying transactions. Currently, we have 78 CPCs trading on TSXV."

Dean pointed to the qualifying transaction made by Brazilian based company Sigma Lithium in May 2018 as a recent example of this alternative way to list.

The return to dual listings was another indicator of the global upswing: "Companies listed on the LSE or the ASX are looking to our Exchanges to access over US\$20 trillion in investor capital," continued McPherson. "The last time we saw any significant IPO activity was 2012, so there is a general enthusiasm returning to the marketplace."



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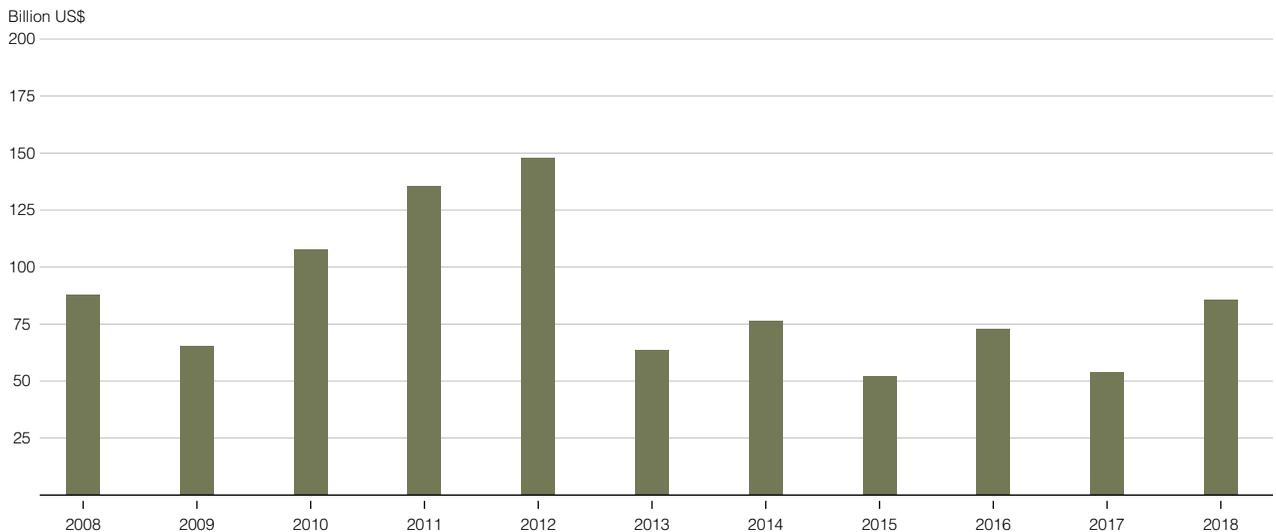
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The Conference format allows delegates to exchange ideas with the speakers during Q&A periods and receptions throughout the event.

MERGERS AND ACQUISITIONS SPENDING IN THE MINING INDUSTRY

Source: Bloomberg



The TSX and TSXV have been complemented by the rise of the Canadian Securities Exchange (CSE), which announced that the first half of 2018 was the strongest six-month period in its history, with significant increases in number of listings, trading volume and value traded compared to the same period in 2017. By the end of August 2018, the CSE had reached just under C\$2 billion in issuer financing, with the mining sector accounting for the second largest number of new issuers, behind the booming cannabis space, according to Richard Carleton, CEO of the CSE.

In 2019, the CSE plans to introduce a blockchain clearing and settlement system that will provide listed companies a venue to list and trade tokenized securities. As transactions occur on the exchange, they will be cleared and settled instantaneously, solving one of the challenges for junior and mid-size companies in terms of the non-dilutive effect it will have for existing shareholders. Carleton explained: “This will mean dealers will not have to fund open position during the settlement period that we currently have, which will reduce the friction that currently exists for companies paying dividends, royalty streams, splits or consolidation distributions to shareholders.”

Up in smoke: the legalization of cannabis

Despite the renewed sense of optimism surrounding the investment climate for mining, competition for funding has become fiercer than ever with the seismic impact of three new industries – cannabis, cryptocurrencies, and blockchain. Since cryptocurrencies peaked in January 2018, digital assets have crashed, losing around US\$600 billion in less than nine months. Bitcoin, the first decentralized cryptocurrency, fell from a peak of US\$19,650 in December 2017, to US\$3,750 in November 2018.

Cannabis, however, has gone from strength to strength, exemplified by the US\$3.8 billion investment made by Fortune 500 alcoholic beverage company Constellation Brands in Canadian

cannabis company Canopy Growth in August 2018. In November 2018 Canopy Growth, a company founded in 2014, had a market cap comparable to Barrick’s, highlighting the scale of the impact the cannabis industry has made.

GOING PUBLIC?

The Canadian Securities Exchange (CSE) is a service-oriented exchange suited for today’s mineral exploration companies – where access to public capital can now be leveraged within a streamlined listing environment with fixed fees.

The result?

A lower cost of capital for companies and a greater percentage of resources available to further exploration programs.

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CSE CANADIAN
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The Exchange For Entrepreneurs



Pat Dubreuil, president of Ontario-based junior Manitou Gold, which announced a C\$1.4 million equity financing in August 2018 following its 25% acquisition of the Goudreau-Lochalsh deformation zone (GLDZ belt) in 2017, believes it is a matter of time before investors come back to the commodity market. However, he is under no illusions as to where the attentions of

the market are currently focused: “During a recent TSX course I attended, around 80% of the 250 participants were from new cannabis companies to be listed on the stock exchange.”

Dean McPherson echoed this sentiment: “The uptick in mining financing has been slower for the junior sector given that new sectors, such as cannabis and blockchain, have caused a distraction and taken some of the risk capital out of the marketplace.”

Executive vice president of IBK Capital, Adam Schatzker, sees the capital created by cannabis, cryptocurrencies and blockchain companies as an opportunity rather than a distraction, recognizing: “Mining is notoriously cyclical and can actually benefit from the great wealth being created from these new industries... Years ago, the dot-com boom took investment away from the mining sector, which was later reinvested into juniors when equity metal market conditions improved.”

Denis Frawley, founding partner of Toronto law firm Ormston List Frawley LLP, likened the cannabis boom to a magnet, pulling in capital, focus and talent. He suggested that rather than trying to compete with the momentum of this new industry, junior mining companies should present themselves as attractive options for the investment of the vast amount of new wealth being created, explaining: “Investors will want to diversify their holdings, and many of them here in Toronto have deep knowledge and expertise in the mining industry, so will be open to interesting opportunities.”

Financial services in the city

If the Toronto stock exchanges provide the platform for junior mining companies to raise capital, it is the financial service institutions in the city that orchestrate the transactions. Companies such as IBK Capital, Sprott Asset Management, Franco-Nevada, Dundee Corporation, and Mackie Research Capital, all headquartered in Toronto, provide the backbone of the financial district that anchors both the Canadian economy and the global mining industry. 26>>

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Dean McPherson

Head, Business Development,
Global Mining
TMX GROUP



The general sentiment is that the uptick in mining financing has been slower for the junior sector. As a result, many juniors are looking at alternate financing more aggressively.



59% of the global mining financings took place on Toronto Stock Exchange and TSX Venture Exchange in 2017. What trends can we expect to see within the resources sector in the coming year?

TMX Group's equity markets Toronto Stock Exchange (TSX) and TSX Venture Exchange (TSXV) are global leaders in the mining sector. In 2017, we saw a return to confidence within the industry, with tangible evidence. Q4 brought us one of the largest mining IPOs in TSX's 165 year-history, with over US\$730 million raised by Nexa Resources, a Brazilian company with a dual listing on the NYSE. Two other significant IPOs, Ero Copper and Titan Mining, also took place in 2017 in addition to the 10 we saw on TSXV.

Another indicator of the global upswing was the return to dual listings, where companies listed on the LSE or the ASX are looking to our exchanges to access over US\$20 trillion in investor capital. The last time we saw any significant IPO activity was 2012, so there is a general enthusiasm returning to the marketplace. Our partners in the US, Australia and Latin America also confirm the sentiment is global.

How has your partnership with the Santiago Exchange Venture (SEV) strengthened relationships with Latin America?

The relationship with SEV certainly continues to strengthen and, second to Canada, Latin America is our strongest market in terms of concentration of companies listed. Although our ties were always strong, the joint venture showed our commitment to developing capital markets in the region. Companies in Europe and Asia are constantly approaching us to explore the possibility of creating a similar model.

As the social aspect of mining becomes more important, it will be advantageous when communities can start acquiring ownership of mining companies existing within their society. There is intrinsic value in trying to build liquidity within our local market, by leveraging our expertise and our regulatory systems to encourage the development of capital markets in other countries. We are currently looking at ways in which we can expand and market the SEV joint venture.

How has the market responded to geopolitical rumors of trade instability?

We have experienced a few interruptions as the market tends to take a breather to digest geopolitical news, but we have not yet seen the market going dead. As the market gets used to interruptions in geopolitical issues, we experience an on-going pause and resumption.

What role are CPCs currently playing in helping juniors raise capital and what other models can juniors use to go public?

The Capital Pool Company program (CPC) has been a huge success for TSX, with 2,464 created since the start of the program, 87% of which have completed qualifying transactions. Currently, we have 78 CPCs trading on TSXV. We encourage the CPC as an alternative way to list and recently saw Sigma Lithium, a C\$130 million market cap company based in Brazil, do a qualifying transaction to list via the CPC route. Today, CPCs represent one of four paths companies can use to list on our exchanges. Since the CPC success, we have introduced Special Purpose Acquisition Companies (SPACs), which are the CPC shell concept, but on TSX. These options give us a unique advantage.

Are mining companies actively looking to other forms of financing, such as royalty deals?

We have seen many royalty deals take place in the junior space, but it varies. The closer companies are to production and development, the easier it becomes to attract investors. The general sentiment is that the uptick in mining financing has been slower for the junior sector given that new sectors, such as cannabis and blockchain, have caused a distraction and taken some of the risk capital out of the marketplace. Many juniors are feeling that stress and as a result, are looking at alternate financing more aggressively.

Do you have a final message for GBR's global investor readership?

Canada is one of the world's best jurisdictions for mining, with Ontario as a leading province in the sector. There is a very knowledgeable investor pool in Canada, from institutional to the retail level. The risk appetite tends to be stronger than most – we know mining, we understand the risk. ■



Richard Carleton

CEO
CANADIAN SECURITIES
EXCHANGE (CSE)

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We use our discretion to suggest which figures are not appropriate to be actors in the public capital market. However, our focus is not to pass judgment on a particular company, but to ensure the quality of the disclosure is as good and as frequent as it can be.

Can you outline the circumstances surrounding the creation of the CSE?

The Canadian Securities Exchange (CSE) was created using the communication technologies that had been invented since the beginning of the Toronto Stock Exchange (TSX), implementing a disclosure-based model as opposed to a business merit-based model for company regulation. Investors, both professional and retail, have incredible tools at their fingertips these days with access to news, analytics, peer-group review, financial review of companies and geological reports. We felt there was an opportunity to base an exchange model on the increased ability to provide continuous and instantaneous disclosure to the marketplace.

How does the CSE differ from other exchanges?

The philosophy underlying the organization is that markets were created to price risk above all, and the exchange acts a gatekeeper role as it decides which companies to admit. We pay attention to the people that are associated with the particular company and use our discretion to suggest which figures are not appropriate to be actors in the public capital market. However, our focus is not to pass judgment on a particular company, but to ensure the quality of the disclosure is as good and as frequent as it can be. This method increases efficiency, and reduces risk, legal and audit bills.

What would you say have been the main catalysts of the CSE's recent success?

The first half of 2018 was the strongest six-month period in the CSE's history, with trading volume, value traded, and number of listings all finishing markedly higher compared to the same period in 2017. At the end of August 2018, we reached just under C\$2 billion in issuer financing. The cannabis space has made up 60% of the new issuers, and mining has been the second most important sector.

Can you elaborate on the blockchain clearing and settlement system that the CSE will introduce in 2019?

The CSE's blockchain-based clearing and settlement system for listed companies will provide a venue to list and trade tokenized securities. The security itself will be represented by a smart contract and companies will create these by way of a prospectus with one of the provincial regulators in Canada. On the closing date, the book-runner will provide us with the shareholder information, and a smart contract will be created that represents all the attributes of that security. It will then go into storage and we will operate a system that is behind the securities industry firewall; essentially a private Ethereum-based network that has nodes for the transfer agents, dealers and custodians.

As transactions occur on the exchange, they will be cleared and settled instantaneously. This will mean dealers do not have to fund open position during the settlement period that we currently have, which will reduce the friction that currently exists for companies paying dividends, royalty streams, splits or consolidation distributions to shareholders. There are benefits to the company in terms of reducing costs of issuances, changing investor relations by understanding who shareholders are, and implications for proxy voting and shareholder communications. This would solve one of the challenges for junior and mid-size companies in terms of the non-dilutive effect it will have to existing shareholders.

What trends does the CSE expect to see in the mining industry in 2019?

The CSE's goal is to reduce the cost of public capital for all companies, and this is particularly apt in the mining space, given the resources we provide to companies to enter the public market and then ensuring they are the best they can be by assisting their continuous disclosure. Mining companies have struggled from a share performance perspective for a number of years, and now major deposits are starting to approach the end of mine life, making the timing of the CSE's blockchain-based system perfect to draw new investment. We hope the initiative of providing this clearing and settling facility will open up Canada for securities tokenization that will bring a new investment channel into the mining industry for years to come. ■

Mining the Universe of Junior Mining Companies

Dundee Goodman Merchant Partners is a Canadian-based investment firm that is seeking to partner with deeply discounted resource-based businesses. A team of capital markets and mining experts, led by Jonathan Goodman, the group understands how to carry out successful due-diligence and acquisitions.

The junior mining market is down significantly:

- ~76% decline since 2011 highs
- Senior companies need to acquire juniors to replenish reserves and to help meet their growth objectives.
- Many producing mining companies face a considerable declining production profile over next five years.

This presents a significant opportunity to take advantage of the value dislocation that is endemic in today's market. We are focused on best-in-class assets and capturing value in a market that has been overwhelmingly bearish on the junior mining industry.

Our key competitive advantage is our unique position to leverage our deep expertise and experience in financial investment, business management, and global mining operations to de-risk and develop early-stage projects.

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Michael White & Adam Schatzker

MW: President and CEO
AS: Executive Vice President
IBK CAPITAL CORP.



MW



AS

How important is mining for IBK Capital, and have the financial markets responded to renewed optimism in the sector?

MW: At least 90% of the work IBK Capital does is in mining and metals. Private placement financing is our principal business, and we also do advisory work, which includes M&A, divestitures and fairness opinions. The public markets for mining and metals have gone through a period of contraction, but we see that coming to end and heading into a bull market.

Can you expand on the potential of Great Bear Resources' Dixie property?

MW: Based on the results announced in August 2018, in addition to what we know about the Red Lake camp, it could become a multi-million-ounce deposit. A high-grade deposit of this size, concentrated in a near-surface, vertical shoot or hinge, is straight-forward to mine, and such a discovery could trade through C\$1 billion dollars in value. With all the options and warrants exercised, there will be about 45 million shares outstanding. A value of C\$1 billion with 45 million shares outstanding is a C\$22 stock. Since the announcement of the drill results at the Dixie project hinge zone, Great Bear's share price has risen from around C\$0.50 to over C\$2.00 in less than a month.

AS: Great Bear's team is very proficient from a structural geology perspective. They put everything in a 3D CAD program, and managed to map the vein system of the property very accurately. The first 10 holes that were drilled were to test the theory that their new interpretation was correct, and every hole hit, including one that was 10 meters of 16 grams per tonne (g/mt) of gold, which is really a significant, material hit. Great Bear has been systematically testing different parts of the limb, using oriented drill core in order to figure out how these veins sit in three dimensions. They also did step-outs of almost two kilometers along the limb, and throughout the drilling campaign the gold system has been hit every time. There is significant infrastructure in the area: a highway that goes across the north side of the property, power lines crossing the property, and the Red Lake mine less than 30 km away. Ru-

bicon has a mill nearby which is not fully utilized.

In 2018, IBK Capital completed two private placements for Cobalt Blockchain (COBC). How has COBC helped clean up the previously murky cobalt supply chain?

MW: Peat Resources acquired Belair African Metals and changed its name to Cobalt Blockchain (COBC). COBC is solving a serious problem in the cobalt industry today. Three years ago, Amnesty International put out a report that criticized OEMs for not having clarity into certain supply chains, especially cobalt, 60% of which comes from the DRC. We asked Belair (now COBC) if they could ethically mine and trace cobalt as they had been doing in tin and after some due diligence they said, "Yes, we can do that." COBC had been ethically mining tin for three years prior to this, using the ITSCI Program for Responsible Mining Supply Chains for tin, tantalum and tungsten.

COBC will be buying cobalt through joint ventures with legal, licensed, artisanal mining co-ops in the DRC. Some sites have up to 12,000 workers on them, and this workforce is supported by on-site geologists and security teams to ensure a safe environment, no child labor or illegal miners. All of the information is documented and put onto their blockchain application.

To what extent have cannabis, crypto currencies and blockchain affected the investment market for junior mining companies?

AS: Cannabis companies in the US are not public and cannot have bank accounts, therefore all transactions are cash-only, as it is illegal federally. Any cannabis company that does business in the US cannot be listed on the TSX or TSX-V, and this has helped the CSE (Canadian Securities Exchange) expand, as it has opened its arms to the new opportunity. Mining is notoriously cyclical, and it will benefit from the great wealth being created from these new industries. Years ago, the dot-com boom took investment away from the mining sector, which was later reinvested into exploration and mining juniors when equity metal market conditions improved. ■



Jonathan Goodman

Chairman and CEO
DUNDEE CORPORATION



Our goal at Dundee Corporation is to refocus our efforts in mining by establishing a merchant banking business, where we will bring together talented people with expertise in various fields under one roof.



Is Dundee Corporation currently looking for any M&A opportunities?

Dundee Corporation is in the deal stream and evaluates numerous potential opportunities each week. Our goal is to identify and focus on the promising transactions.

Can you give a brief background of Dundee Corporation and describe your relationship to Dundee Precious Metals (DPM)?

Dundee Corporation was founded in 1990 and at that time, the company had two businesses: merchant banking and investment management. As we grew, we added a third business to the corporation, real estate. The real estate business was called Dream and we spun this business off in 2013. I was with the company from 1990 to 2003, after which I left the corporation to start DPM. DPM was originally a mining investment fund, but we converted the company into an operating company with the purchase of two assets: Chelopech and Krumovgrad, both of which are now operating mines in Bulgaria.

How can Dundee Corporation serve the mining industry?

Many things go into a successful investment in the mining industry. It goes beyond just strong geology. Success in the mining industry requires synergies between engineering, design, development, construction and community relations.

Our goal at Dundee Corporation is to refocus our efforts in mining by establishing a merchant banking business, where we will bring together talented people with expertise in various fields including exploration and economic geology, mining engineering, project development and construction, financial analysis, corporate finance, CSR, environmental, and corporate governance. Having experts in each of these fields under one roof will give us an incredible competitive advantage. By signing confidentiality agreements with mining companies, we will be able to gain access to information not available to the public. Leveraging our in-house team will allow us to conduct deep-dive due diligence at unmatched levels. Ultimately, we expect this will result in Dundee and our partners having an advantage when determining whether or not a mining company represents a solid opportunity.

We consider ourselves a partner within the industry, which means that we do not want to own more than a 20% stake in a single company. And, we have no intention of running mining companies. However, we want to be assured that the companies we invest in are run by strong management teams and in certain cases, we will seek board representation.

Using this approach allows us to invest our capital alongside the capital of our partners. And when you take into consideration that a small number of mines – about 25% – are profitable during a mining cycle, this approach makes sense. It allows us to combine our technical acumen with a financial know-how to identify projects in countries and communities where it is easy to do business.

Crypto-currencies and cannabis have changed the investment landscape. What is your opinion about the current trends?

Securing investments for the long term into the mining sector is crucial to the industry's further development. Investing in the cannabis industry is still an experiment. We cannot predict the outcome yet, and there are still a significant number of cannabis companies with a large market cap, yet no revenue whatsoever. The mining industry has clearly lost investors – however, whether there is investment flowing into junior mining companies or not is not the issue for us. We do not need large investments into the whole sector, we simply need key investments into the right companies. I suspect the cannabis distraction will eventually come to an end and we will see some risk capital flow back into the junior mining sector.

What are Dundee Corporation's strategies and objectives moving forward?

Dundee Corporation has excellent skills and experience in mining investment. Our aim is to refocus our business on the mining sector. We have built a strong team with deep technical and financial expertise to help us achieve success. The market is currently at a low and there are significant assets which are trading at steep discounts and low valuations. We are focused on taking advantage of the numerous opportunities that cross our desks and we are here to invest and partner with like-minded companies. ■

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Dundee Corporation is one of the heavyweights of international mining finance. Founded by Ned Goodman, one of Canada's most successful investment leaders, Dundee has invested billions of dollars into the mining industry since being established in 1957. Jonathan Goodman, Dundee's current chairman and CEO, noted that as only 25% of mines make money during a mining cycle, investors need to be selective and analyze a variety of factors and data to determine whether or not an investment opportunity is solid: "Mining investment does not only require strong geology, but a company with a strong board. Mining is more than just drilling, it is a synergy between engineering, community relations and design," he added.

In 2016, Shaun Usmar decided to leave his role as senior executive VP and chief financial officer at Barrick Gold and establish Triple Flag Mining Finance. Triple Flag's first deal was a C\$250 million silver streaming deal with Milpo (now Nexa) on its Cerro Lindo mine, followed by bilateral deals with Steppe Gold and Nevada Copper, and more recently a C\$200 million deal to acquire an extensive royalty portfolio from Centerra. When asked how Triple Flag has managed to compete with established players in the financial services sector, Shaun responded: "We have experience and knowledge within the mining industry, with a large and sophisticated financial backer (Elliot Management Corporation) that enables us to offer beneficial

services at a competitive cost of funding to prospective partners."

Another new player making waves in the market is Cobalt 27, a company established with the aim of creating a platform that gives investors exposure to the electric vehicle (EV) space. After going public in June 2017, Cobalt 27 exercised 16 contracts and bought the world's largest physical position of cobalt outside of the Chinese government, worth over C\$300 million today. Since then, the business has evolved from a physical starting point into a royalty and streaming entity, highlighted by the C\$300 million deal which saw Cobalt 27 buy a percentage of the cobalt production from Vale's Voisey's Bay mine in Labrador.

Justin Cochrane, president and COO of Cobalt 27, is bullish about the fundamentals of cobalt and nickel: "For the rapidly increasing EV market, three times the amount of cobalt will be needed to service demand. For nickel, the market will have to double in size. I believe that analysts tend to underestimate how quickly people move from one technology to another, and the industry is most definitely moving towards sustainable EVs," he stated.

Finally, as CEO of Victoria Gold, Chad Williams, founder and current CEO of Red Cloud Klondike Strike, felt that there was a distinct lack of strategic advisory services dedicated to mining from a financial standpoint. Since its establishment in 2012, Red Cloud has helped over 400 mining companies raise funds, complete M&A transactions, and market assets, among a variety of other services dedicated solely to the mining industry. Despite entering the market at the start of a downturn, Red Cloud has increased its revenues by an average of 50% per year since its inception.

Williams divulged one of the tactics that has been successful for Red Cloud: "We often take shares in the companies we provide services for, as a form of compensation. This has been extremely lucrative, even in a challenging market," he explained. ■



TRIPLE FLAG
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We are miners first and foremost, who believe in the essential good that ethical mining provides society, backed by a single, well-funded and globally recognized private investor in Elliott Management Corporation. Primarily targeting gold, silver and PGM's with a secondary focus on high-quality base metal and bulk commodities, we look beyond the short-term volatility and often fickle public market view and sentiment of the commodity cycle.

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tripleflagmining.com



Shaun Usmar

CEO

**TRIPLE FLAG MINING
FINANCE**



The first challenge we had was to overcome the stigma that the segment is already well serviced through large publicly-listed royalty companies, and that private money could not compete with them. We have proven that this is unfounded.



What made you decide to leave Barrick and start Triple Flag Mining Finance?

In 2016, I decided to leave my role as senior executive VP and chief financial officer at Barrick Gold and establish Triple Flag, with the financial backing of Elliott, one of the world's largest, oldest and most successful investment firms. I wanted to assemble an experienced team and create a business that could act as a long-term funding partner for mining companies, while generating attractive through-the-cycle returns for our investor. Triple Flag is primarily targeting gold, silver and diamonds with a secondary focus on high-quality base metals and bulk commodities. We have approximately a 75-25 split between producing versus non-producing commodities. At this moment, the geographies we currently operate in are almost exclusively in the Americas and Australia, but we are active in most major mining jurisdictions, having invested in a Mongolian gold business, for example. Over the past two years we have analyzed more than 250 opportunities, closed six deals with two more likely coming up soon, representing total commitments approaching one billion dollars.

What scope of services does Triple Flag offer the mining industry?

The mining industry tends to go through cycles with regards to capital markets, and the current investment climate is not particularly constructive for mining. Triple Flag has been able to assist businesses with balance sheet repairs, acquiring properties, fund projects into production and help our partners' IPO. We have also been active in helping strategize M&A activities as part of a financing package. Triple Flag has been successful in acquiring around 40 dedicated streams, royalties and offtakes, which has been our primary focus. We aim to offer a very competitive, sophisticated and patient source of funding that is non-dilutive to equity investors at a time when traditional equity capital markets are unconstructive on the sector, thereby enabling businesses to grow their operations and portfolios and ensure sustainable capital structures.

Can you provide details of some of the financing deals TFMF has executed so far?

Triple Flag has concluded six deals over the past two years, amassing a portfolio of 34 mostly precious metal streams, royalties and offtakes, spanning the Americas, Australia and Mongolia, with a roughly 3:1 mix of cash generating to development stage assets by value. In the process, we have committed well over half a billion dollars.

Our first deal was a US\$250 million silver streaming deal with Nexa on their Cerro Lindo mine, where we successfully competed with all the major established streaming players. We also executed smaller bilateral deals with Steppe Gold and Nevada Copper. With Nevada Copper we worked with Pala and Red Kite to comprehensively recapitalize the business and ensure it was fully funded to production, with an executable mine plan and revamped management team. Steppe Gold completed a C\$25 million IPO in May 2018, and is making quick progression to become Mongolia's next gold producer.

Also, we concluded a deal with Blackstone to acquire a stream and offtake on Pretium's Brucejack mine, along with a diamond stream on Renard in Quebec, and recently helped the Stornaway team ensure they have sufficient liquidity as part of a broad funding consortium, to make sure they get through their crucial open-pit to underground transition. Finally, most recently, we concluded a US\$200 million deal with Centerra to acquire their extensive royalty portfolio, which includes quality royalties on assets like Fosterville and Young-Davidson, along with a silver stream on their Kemess project in British Columbia.

As a new company in the market, has it been a challenge for Triple Flag to find customers?

Fortunately, the entire Triple Flag team has great networks within the mining industry and we were fortunate to get access to deal flow from our inception. The first challenge we had was to overcome the stigma, amongst many investment banks and companies, that the segment is already well serviced through large publicly-listed royalty companies, and that private money could not successfully compete with them. We have proven that this is unfounded. ■



Chad Williams

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 CEO
RED CLOUD KLONDIKE STRIKE

“
 The number one challenge is that mining companies tend to be very technical, and a typical mining company presentation will be too extensive. We simplify marketing campaigns to stimulate a hand-to-wallet response from investors.

■ **What prompted you to create Red Cloud Klondike Strike (RCKS)?**

The idea for Red Cloud came to me while I was the CEO at Victoria Gold. Even though I came from the financial side of the business, I felt that my needs were not met with the traditional service providers, and there was a distinct lack of strategic advisory services in particular. I decided to create a new type of company, which in essence is a financial service platform for the mining industry. Mining companies need market exposure, and as Red Cloud is solely focused on the mining industry, the company has a deeper and broader reach when doing marketing. We also raise funds for mining companies, assist with M&A activity, provide research, and have a very good feel for the investor appetite for mining deals.

■ **How does RCKS differentiate itself from other players in the financial services space?**

We have helped over 400 different mining companies in the eight years since establishment. The company has over 25 employees and at any given time, we have approximately 30 ongoing clients. RCKS is very unique – you may find companies that offer some of the services we do, but not the full aggregate of services with an exclusively mining focus. RCKS is an extension of the mining companies and act as their bridge to the financial markets.

■ **Can you elaborate on how Red Cloud supports mining companies through different stages of their evolution?**

RCKS does not have a typical mining client. We get involved with clients at the very earliest stage: from idea conception, all the way through to production. We serve the full gambit from multi-million dollar mining companies looking for growth opportunities, to small-cap juniors at the start of their journey.

There are over 50 different ways in which RCKS can support its clients. From a marketing standpoint, we will sit down with the client’s management team to understand their vision, and then compare that vision with their marketing materials. The number one challenge is that mining companies tend to be very technical, and a typical mining company presentation will be too extensive. RCKS crafts and simplifies marketing campaigns to stimulate a hand-to-wallet response from investors.

■ **The investment climate for juniors is challenging. How important is it to find innovative ways to source funding?**

It is vital. RCKS launched a crowd-funding platform, which to this day, is still the only one of its kind in the mining sector. Innovation has been key to RCKS’s success, and a big feature of my career to date. I invented the streaming concept 15 years ago, and came up with the idea of crowd-sourcing exploration, which became the Goldcorp challenge and later the Integra Challenge.

The demographics within the mining industry are constantly changing, and I am encouraged by these changes to be innovative. RCKS is currently focusing a significant amount of its energy on millennials and transitioning away from baby boomers. To appeal to younger investors we are doing more social media work, videos and interactive marketing.

■ **How can a financial services firm focused on mining flourish during a downturn?**

We have a deep understanding of the cyclicity of the mining sector. In a perverse manner, when things become very negative, we become optimistic. As well as investing in our deals, we often take shares in the companies we provide services for, as a form of compensation. This has been extremely lucrative, even in a challenging market. I believe that when the market turns, RCKS will be in a very good position to take advantage.

■ **What are RCKS’s principal objectives moving forward?**

RCKS has been growing at a good rate, and in some instances, a rate that was perhaps a little too fast. Our revenue has grown by at least 50% every year since inception. We aim to continue growth on an upward trajectory, at a rate that is sustainable, and will continue to add quality clients to our portfolio. Growth is what we provide to clients, what we aim to achieve as a business, and what we can offer employees. RCKS has a very transparent and lucrative compensation scheme and corporate culture, and we have been fortunate to attract and retain quality talent. ■



Justin Cochrane

President & COO
COBALT 27

Under what circumstances was Cobalt 27 established?

Cobalt 27 is a battery metals streaming and royalty company established to provide exposure to the electric vehicle (EV) space. With 98% of global cobalt supply mined as a by-product of nickel and copper mining, pure cobalt-linked equity opportunities had been limited historically, prior to Cobalt 27's IPO in June 2017. Concurrent with the IPO, we exercised 16 contracts and bought the world's largest physical position of cobalt outside of the Chinese government. We bought almost 2,200 metric tons (mt) and have added over 700 mt since. It is stored in LME-certified and insured warehouses in Europe and the US, and is worth almost C\$300 million today.

How has Cobalt 27 evolved since the IPO?

We always planned to expand the business from a physical starting point of holding refined cobalt, into a streaming and royalty business. Cobalt is the by-product of copper and nickel production and is thus the perfect metal to stream. For example, Cobalt 27's US\$300 million acquisition of a 32.6% cobalt stream on Vale's Voisey's Bay mine is expected to deliver approximately 1.9 million pounds of cobalt per year (lbs/y) to Cobalt 27, to be settled in physical delivery for an initial 14-year mine life, beginning in 2021. We have also announced a US\$200 million cobalt-nickel streaming transaction on the Ramu mine in Papua New Guinea. This would result in attributable stream production of approximately 700,000 lbs/y cobalt and 3 million lbs/y nickel to Cobalt 27, and provide immediate cash-flow.

How does Cobalt 27 ensure that its inventory comes from a clean source?

The cobalt market is divided into two different segments – metals and intermediates. It is the intermediate products which are most often challenged with supply chain transparency issues related to non-ethically sourced cobalt from the DRC. Cobalt 27 owns cobalt metal which is largely sourced from major producers with

integrated refineries such as Vale, Glencore, and Sumitomo. For ethical reasons, we do not source cobalt from the DRC – there are significant sources of clean cobalt outside of the DRC that provide investors with plenty of opportunity to invest in ethically-sourced cobalt. Cobalt 27's pipeline is well in excess of C\$2 billion, made up of opportunities all outside of the DRC.

From a market perspective, do you see the fundamentals of cobalt and nickel evolving?

Every nickel project in the world has cobalt. From a supply perspective, if nickel production is enhanced, it will directly lead to enhanced production of cobalt. From a demand perspective, within every lithium-ion battery there is nickel, manganese and cobalt. The trend moving forward will be an increase of the nickel content within batteries and a decrease of the cobalt content, as nickel is cheaper. However, cobalt provides stability and longevity and is not expected to be replaced anytime soon.

Cobalt usage in lithium-ion batteries alone is expected to grow at an annual rate of 12% from 2016 to 2022, and the commodity's role in supporting energy-related technology advances is expected to continue to grow at an unprecedented rate. This projected growth in demand is coupled with the fact that cobalt supply will be constrained, given the lack of investment in new nickel projects. I believe that analysts tend to underestimate how quickly people move from one technology to another, and the industry is most definitely moving towards sustainable EVs. ■

TSX-V **KBLT** | OTCQX **CBLLF** | FRA **270**

COBALT27

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- 32.6% Cobalt Stream on Vale's Voisey's Bay mine beginning in 2021
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- Holds one of the world's largest stockpiles of refined cobalt
- Nickel and cobalt royalties, including a royalty on Dumont, the largest construction-ready nickel-cobalt project

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Global Reach

"Whenever we operate abroad, we remember we are guests in that country. We must be respectful of culture and traditions, without imposing our foreign ways of doing business. We believe in the philosophy of learning the way of the country, and listening to the concerns of the local community and governments."

- Rick Howes,
president and CEO,
Dundee Precious Metals

The Orchestrators of Global Mining

Ontario mining's international footprint

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Canada is home to 75% of the world's mining companies, many of which will never have an operation in the country. The TSX and TSXV, financial cornerstones of the mining industry, support a network of junior and mid-tier mining companies plying their trade in over 100 jurisdictions worldwide. Attracted by underexplored regions with high-grade mineralization and lower wage costs, Toronto is home to a plethora of companies attempting to reap the benefits and navigate the challenges that mining in foreign jurisdictions present.

Dundee Precious Metals (DPM), with current operations in Namibia and Bulgaria, and exploration in Armenia, Bulgaria and Serbia, epitomizes the global reach of mining companies based in Toronto. Rick Howes, president and CEO of DPM, adheres to a philosophy that respects cultural nuances when operating in foreign jurisdictions: "Whenever you operate abroad, it is important to remember you are a guest in that country. We must be respectful of culture and traditions, without imposing foreign ways of doing business." Praising the transparency of the Namibian government and the support it has given its mining industry by creating a regulatory framework that works for the sector, Howes suggested that modern mining practices can sometimes be applied with more ease in less developed jurisdictions: "The countries DPM operates in are sometimes more open to adopting Industry 4.0 mechanisms than some of the more established Western countries. Governments are open to new technologies and want to increase social responsibility," he affirmed.

Another company headquartered in Toronto with assets in Africa is Teranga Gold, the largest commercial producer of gold in Senegal. Two years ago, Teranga Gold was operating in a single jurisdiction with a single asset, but through the acquisition of Gryphon Minerals it brought in three projects in Burkina Faso, and three joint ventures: one in Burkina Faso and two in Côte d'Ivoire, which

Image courtesy of Jacobs, Mongolia Project.



enhanced Teranga Gold's West-African pipeline. Richard Young, Teranga's president and CEO, detailed how an organic growth pipeline will significantly increase its production: "Teranga Gold aims to expand its production capability from 200,000 ounces (oz) of gold per year, to 350,000 oz by 2020, and to over 500,000 oz within the next five years."

The Sabodala region in Senegal where Teranga Gold operates was one of the poorest areas in the country a decade ago, but recent government surveys show that today the area is one of the healthiest. Young attributes this success to an approach that has seen Teranga invest in youth education and training, local economic development, infrastructure, food safety and nutrition issues within the communities since 2010: "Most CSR programs in the industry are top down, but Teranga Gold implemented a bottom up approach. The local communities establish the priorities and develop the programs," he said.



The rise of mining in Mongolia

Mining in Mongolia accounts for over 10% of its GDP, half of its industrial production, and 40% of export earnings. The Oyu Tolgoi mining project, a JV between Turquoise Hill Resources (a majority-owned subsidiary of Rio Tinto) and the Mongolian Government, is the largest financial undertaking in Mongolia's history. A Foreign Investment Promotion and Protection Agreement (FIPA) was signed between Canada and Mongolia in September 2016, and in 2017, Mongolian private company Steppe Gold, with head offices in Toronto and Ulaanbaatar, was the first company to sign an MOU with the government for their Gold-2 program.

Founded in 2016, Steppe Gold acquired the ATO project from Centerra Gold, with the intention to grow the company through other acquisitions. In May 2018, Steppe Gold went public and raised C\$25 million with an IPO on the main board of the TSX. Aneel



Growth and innovation

Dundee Precious Metals operates an innovative gold mine in Bulgaria as well as a specialty smelter in Namibia. We are also nearing the opening of a second high grade gold mine in Bulgaria, the first to be built in 40 years. This, along with continued progress on our Timok gold project in Serbia, creates an exciting growth profile for our company.



Our success has been built through investing in sustainable business practices and developing strong stakeholder relationships with communities and governments. Our teams are leaders in applying innovation through technology, processes and systems to continuously improve and achieve our business and strategic objectives.



We succeed because we care

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Waraich, director and executive president of Steppe Gold, expanded on its immediate priorities: “The aim is to have the mine fully built and start production by H1 2019. The ATO Project will provide an estimated 37,000 oz gold equivalent (AuEq) per year, at US\$333/oz cash costs from oxides.”

When asked about Steppe Gold’s longer-term ambitions, Aneel declared: “To become Mongolia’s largest mid-tier gold and mineral producer.”

Bayar Baatar, a Mongolian with a long history of studying and working in the Canadian mining industry, founded Canada Technology Mining Service (CTMS) to bring Canadian technology to Mongolia. Noting similarities in the geology and weather conditions, Baatar also cited a governmental initiative to attract new, more diverse streams of investment into the country as a driving factor behind increased activity with Canada: “Mongolia has adopted the third neighbor policy – a facet of foreign

relations referring to the development of relationships with countries other than Russia and China,” he explained.

Canada’s influence in Latin America

In Latin America, Canadian miners are the most influential foreign group within the region’s mining sector. Supported by bilateral trade agreements, institutions such as chambers of commerce, and a shared deep-rooted mining tradition, many of the mining producers and junior explorers active in Latin America are headquartered in Canada’s two major mining hubs – Toronto and Vancouver.

McEwen Mining has operations in two Latin American jurisdictions: open-pit gold and silver production and exploration at the El Gallo Complex in Mexico’s Sinaloa State; and the underground San José mine, operated by its partner Hochschild Mining,

located 20 km north of Goldcorp’s Cerro Negro project in Santa Cruz, Argentina. McEwen Mining is also the 100% owner of the Los Azules advanced-stage porphyry copper exploration project in San Juan, Argentina, one of the world’s largest undeveloped high-grade open pit copper projects, with a 10.2 billion pound (lb) indicated copper resource. Rob McEwen, president and CEO of McEwen Mining, expanded on his plans for Los Azules: “Currently, access to Los Azules is restricted to five months of the year due to high mountain passes and multiple river crossings. We are working on developing a route that will give us year-round access. This will transform the economics of the deposit. This route will be largely below the snow line and provide a low altitude power corridor to the project.” Also active in Mexico is Torex Gold Resources (TGR), which came into production in 2016 with a US\$800 million investment. TGR is the 100% owner of the Morelos

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gold property, an area of 29,000 hectares in the Guerrero Gold Belt, located 180 km southwest of Mexico City. In April 2018, TGR overcame an illegal blockade at their El Limón Guajes (ELG) mining complex that had lasted six months. Crediting the resistance of the local community that rallied against the blockaders, Fred Stanford, president and CEO of TGR, elaborated on one of the biggest challenges faced by Mexican miners: “Blockades such as this shut down Mexican mines for up to ten years. However, we were up and running again in 10 weeks, and still continued partial operations despite the blockade.”

TGR is developing its own innovative solutions to drive down costs and increase efficiency at its ELG operation. These include a 1.3 km long conveyor belt which generates its own energy, the Calix Filtration Plant – the biggest filtration plant in the world which uses dry stack calix, and *Muckahi* mining technology, that Fred Stanford has been developing for years and which Torrex Gold will be testing in Q1 2019. The *Muckahi* monorail conveyor system utilizes a slusher and transports the ore body continuously, requiring a drift half the size of the large trucks currently in use. Stanford believes the *Muckahi* technology is a game-changing innovation that can dramatically improve productivity: “The aim is to reduce the time necessary for the mining and transportation of the ore body to one third of the current time,” he stated.

Further south, Colombia is also attracting attention. Newmont Mining, the world’s second largest gold producer, acquired 19.9% of Vancouver-based gold junior Orosur Mining in September 2018, with the view to increase its shareholding to 75% in Orosur’s Anzá project. This followed Newmont’s 19.9% acquisition of Continental Gold in 2017, also active in Colombia.

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Building a Multi-Asset Mid-Tier Gold Producer in West Africa



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www.terangagold.com



Rick Howes

President and CEO
DUNDEE PRECIOUS METALS

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Krumovgrad is adding a 50% increase in gold production for DPM, to approximately 280,000 oz/y. Operating costs are about US\$400/oz cash cost, a solid position to generate significant earnings, growth and profitability.



Could you provide an update on Dundee Precious Metals' (DPM) operations in the Krumovgrad project and outline your time-frames for moving into production?

DPM has made significant progress in the Krumovgrad open-pit gold project in the southern part of Bulgaria. We went through an environmental permitting process in 2012/13, completed the concession agreement, and subsequently received our initial construction permit in 2016. We started to build in late 2016 and the project should be completed in Q4 2018, adding a 50% increase in gold production for DPM, to approximately 280,000 ounces per year (oz/y). Krumovgrad's operating costs are about US\$400/oz cash cost, a solid position to generate significant earnings, growth and profitability. We currently have about 2,200 employees, but once the construction of Krumovgrad goes through, we will increase that to about 2,500.

Which recent milestones have been attained at your Namibia operations, and what are you hoping to achieve in the coming years?

Namibia is a great country with stable politics that support mining investments. The government has been transparent and open to listening to the mining industry's needs in order to create a regulatory framework that works for the sector. DPM completed a five-year, US\$360 million investment to upgrade and modernize the smelter. Tsumeb is uniquely designed to treat high-arsenic concentrates without blending. An enclosed vessel for the furnace allows us to capture off gases and dust; we treat the former in a recently constructed state-of-the-art acid plant, and collect the latter through a baghouse system. Eventually the material is contained in a hazardous waste storage facility, without exposing people to the material.

The Tsumeb smelter is a stable operation, and DPM is still optimizing performance to increase the throughput to accommodate concentrates from our own Chelopech mine as well as third party concentrates from other mining companies. We are currently working at full capacity, but certainly have the potential to grow. Incremental capital costs are estimated at approximately US\$50 million, which will be funded from our own cash flow and will expand capacity by 50%, with payback taking place within a couple of years. We will make a decision on the expansion in due course.

What strategy has DPM followed in order to run successful operations in such varied environments, and where are you looking to explore next?

Whenever we operate abroad, it is important to remember we are guests in that country. We must be respectful of culture and traditions, without imposing our foreign ways of doing business. Krumovgrad is a classic example of this, where initially we planned to implement conventional, established mine technologies, such as the use of cyanide for extraction. The concerns of the locals against cyanide were quite strong however, so we re-designed the project without the use of cyanide, and eventually secured community support.

DPM has a strong focus on Eastern Europe, our exploration activity in Serbia is quite active through the Timok gold project, and we continue to explore in both Serbia and Bulgaria. We are also looking beyond those borders and recently completed a JV with Pershimex Resources, a junior Canadian explorer in Quebec. We are doing early stage exploration just north of Agnico Eagle's and Yamana's Canadian Malarctic mine.

DPM has a strong stance on the implementation of innovation. How quickly have you been able to apply Industry 4.0 standards in Bulgaria and Namibia?

Innovating or driving significant productivity improvements to generate long-term returns for all stakeholders is currently one of the industry's greatest challenges. Attracting capital interest into the industry is paramount, which makes innovation a strong focus for DPM. The countries DPM operates in are sometimes more open to adopting Industry 4.0 mechanisms than some of the more established Western countries. Governments are open to new technologies, want to develop their economies and promote well-paying jobs as well as increased social responsibility. At DPM we were one of the first in mining to move toward real-time monitoring and control of operations to improve safety and efficiency. Our entire underground operation is Wifi-enabled allowing us to take advantage of the rapid advancements in digital technology such as the IoT, Machine Learning and AI, virtual and augmented reality, and cloud computing. ■



Richard Young

President and CEO
TERANGA GOLD

Wahgnion is a fully permitted, high grade, open pit development project in Burkina Faso. Currently in construction, production at Wahgnion is expected to start before the end of 2019, increasing our overall production by 50%.

What have been the highlights at Teranga Gold over the last two years?

Two years ago, Teranga Gold was operating in a single jurisdiction with a single asset. Since then, we acquired a public company, Gryphon Minerals, which brought us three projects in Burkina Faso. We also entered into three joint ventures: one in Burkina Faso and two in Côte d'Ivoire. Teranga Gold has an organic growth pipeline that few companies in the mining industry can match. Teranga Gold aims to expand its production capability from 200,000 ounces of gold per year (oz/y), to 350,000 oz/y by 2020, and to over 500,000 oz/y within the next five years.

Teranga Gold is the largest commercial producer of gold in Senegal. Can you provide details of the Sabodala gold mine?

The Sabodala project currently has 2.5 million oz in reserves, and a mine life that extends to 2031, and we expect to be able to continue to replace and add new reserves. We are in the process of moving a local village, which sits on top of our largest deposit. Once the village has been relocated, we will be able to complete drilling activities on this deposit. Production at Sabodala is on track to surpass record levels for the third year in a row. A mature operation, Sabodala generates significant free cash-flow, which Teranga is using to reinvest in the business, such as the development of our second mine.

Can you elaborate on the acquisition of Gryphon Minerals in 2016 and how this expanded Teranga Gold's pipeline in West Africa?

Gryphon Minerals brought us three high potential assets in Burkina Faso, the most advanced of which is Wahgnion (previously known as Banfora), a fully permitted, high grade, open pit development project. Currently in construction, production at Wahgnion is expected to start before the end of 2019. Wahgnion is expected to increase our overall production by 50%.

Another exciting project part of the Gryphon Minerals acquisitions is Golden Hill, situated on the highly prolific Houndé belt in Burkina Faso. In only two years, we have discovered nine prospects and are on our way to an initial resource estimate for the project in January 2019. We have already secured US\$25 million to take the project through feasibility. Initially part of a joint venture, Teranga recently acquired 100% of Golden Hill.

The third asset from the Gryphon Minerals acquisition is the Gourma property, an early-stage exploration project, consisting of six contiguous exploration permits covering a total area of approximately 1,300 square km in eastern Burkina Faso.

Teranga Gold has four greenfield exploration permits in Côte d'Ivoire. Can you expand on the company's activities in this country?

Approximately 35% of the West African greenstone belt is located in Côte d'Ivoire and is very much unexplored. Teranga Gold entered the country in 2016 through its cornerstone investor, David Mimran, who had several early stage exploration properties. Already, we have made a discovery at one of them – Guitry. We expect to start drilling activities at a second property in 2019.

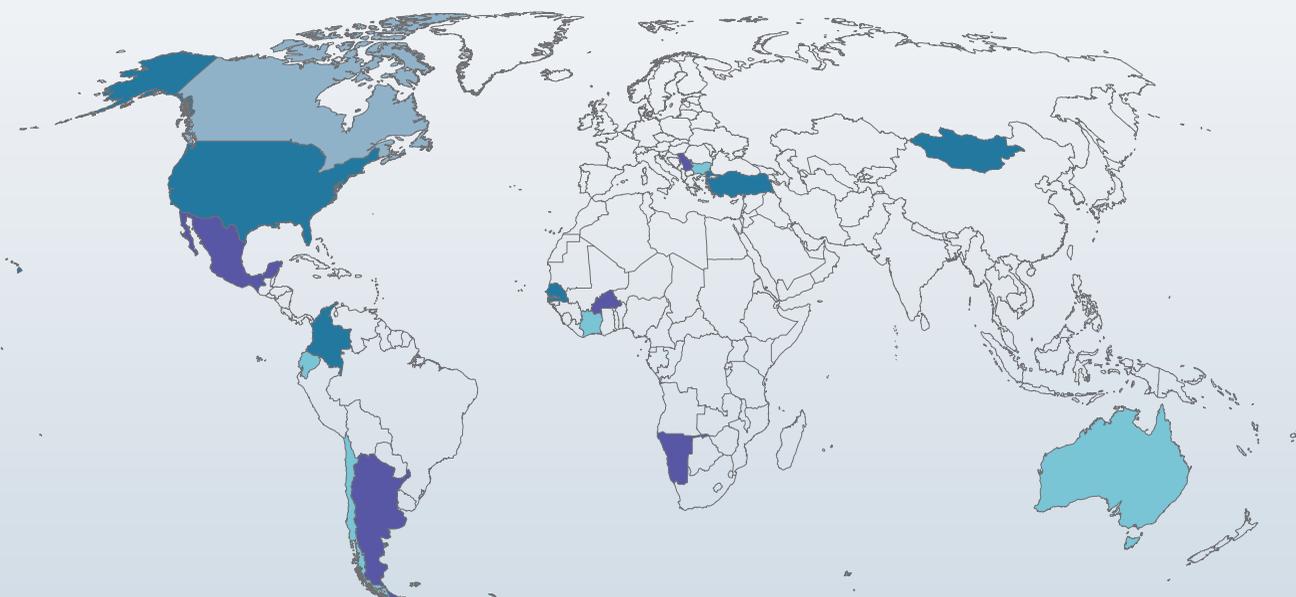
At the end of 2017, Teranga entered into a joint venture relating to a project called Afema, located in the southeast of Côte d'Ivoire. Two prolific gold belts, originating in Ghana, run through the Afema property.

How have Teranga Gold's CSR activities benefited local communities in Senegal?

Teranga Gold's mission statement is to share the benefits of responsible mining with all its stakeholders. Most CSR programs in the industry are top down, but Teranga Gold implemented a bottom-up approach. The local communities establish the priorities and develop the programs. Senegal's award-winning Sabodala Social Fund has empowered communities to select and implement sustainable projects of their choosing that will benefit their families over the long-term. Since 2010, we have invested in youth education and training, local economic development, and addressed food safety and nutrition issues within the communities. Once one of the poorest areas in the country a decade ago, recent government surveys show that today the area around Sabodala is one of the healthiest in Senegal. We have built medical clinics, supplied water and power infrastructure, and implemented a comprehensive market garden program, which is one of our most successful long-term socio-economic development projects for neighboring communities. ■

TORONTO'S GLOBAL REACH

Source: GBR



COMPANY	TICKER	COUNTRY	PROJECTS	MINERAL	STAGE
Adventus Zinc	TSX.V: ADZN / OTCQX: ADVZF	Ecuador	Curipamba project	Cu, Au, Zn, Pb, Ag	Exploration
Alamos Gold	TSX: AGI / NYSE: AGI	Mexico	Mulatos Mine; El Chanate; Esperanza	Au	Production; Production; Development
Alamos Gold	TSX: AGI / NYSE: AGI	Turkey	Kirazlı Gold project; Ađı Dađı; Çamyurt	Au; Au, Ag; Au, Ag	Development
Alamos Gold	TSX: AGI / NYSE: AGI	Oregon, USA	Quartz Mountain project	Au	Exploration
Antioquia Gold	TSX.V: AGD / OTCQX: AGDXF	Colombia	Cisneros	Au	Exploration
Aurania Resources	TSX.V: ARU	Ecuador	The Lost Cities project	Au, Cu, Ag	Exploration
Chilean Metals	TSX.V: CMX	Chile	Zulema; Pato Negro and Horlitos; Tierra de Oro	Cu, Au, Ag	Exploration
Dundee Precious Metals	TSX: DPM	Bulgaria	Chelopech mine; Krumovgrad project	Cu, Au; Au, Ag	Production; Exploration & Development
Dundee Precious Metals	TSX: DPM	Namibia	Tsumeb smelter	Cu	Production
Dundee Precious Metals	TSX: DPM	Serbia	Lenovac project; Timok Gold project; Tulare project	Au; Au; Au-Cu	Exploration
McEwen Mining	NYSE:MUX / TSX:MUX	Argentina	San José Mine; Los Azules	Au, Ag; Cu	Production; Study
McEwen Mining	NYSE:MUX / TSX:MUX	Mexico	El Gallo Mine; Project Fenix	Au	Production; Development
McEwen Mining	NYSE:MUX / TSX:MUX	Nevada, USA	Gold Bar	Au	Development
Peloton Minerals	CSE: PMC / OTCQB: PMCCF	Nevada, USA	Independence Valley; Golden Trail; Texas Canyon	Au, Ag	Exploration
Steppe Gold	TSX: STGO / FWB: 2J9	Mongolia	ATO Mine; Mungu Discovery; Uudam Khundii	Au, Ag	Exploration & Development
Superior Gold	TSX-V: SG	Australia	Plutonic Gold Mine; Hermes; Bryah Basin JV	Au	Production; Production; Exploration
Teranga Gold	TSX: TGZ / OTCQX: TGCDF	Burkina Faso	Wahgnion Gold project; Golden Hill; Gourma	Au	Development; Exploration; Exploration
Teranga Gold	TSX: TGZ / OTCQX: TGCDF	Côte d'Ivoire	Afema	Au	Exploration
Teranga Gold	TSX: TGZ / OTCQX: TGCDF	Senegal	Sabodala Gold Mine	Au	Production
Toachi Mining	TSX: TIM.V / OTCQB: TIMGF	Ecuador	La Plata	Au, Cu, Zn	Exploration
Torex Gold	TSX: TXG	Mexico	ELG Complex; Sub-Sill Underground Mine; Media Luna	Au	Production; Production; Exploration

This map includes those projects and companies mentioned in this editorial. It does not represent a complete list of exploration and production projects in the regions highlighted, and is intended for reference purposes only.

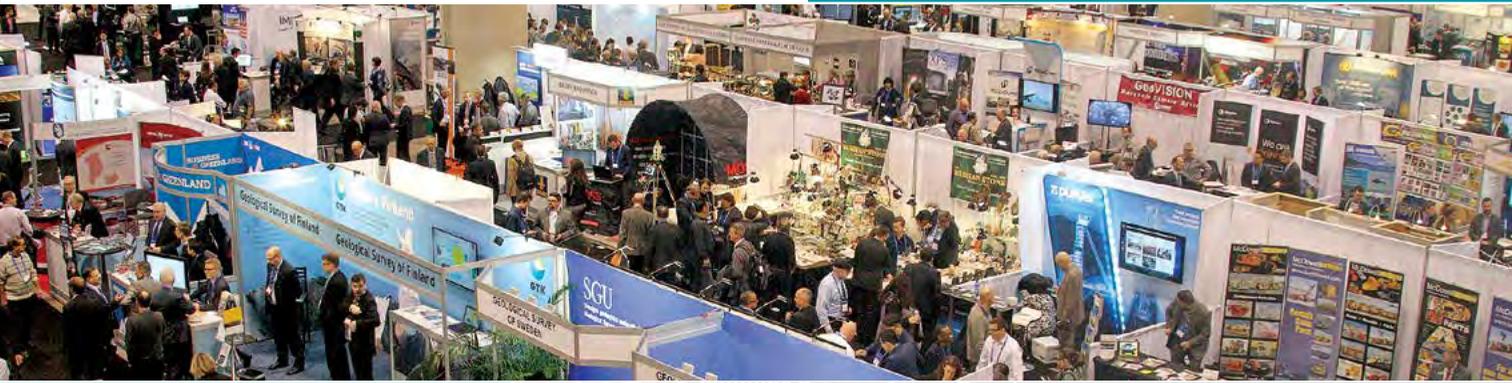


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Teck





Aneel Waraich

Director and Executive Vice President
STEPPE GOLD

Steppe Gold's priority is commercial production on the ATO heap leach project. We intend to show that we can build a mine, get into production, generate gold sales from oxides to fund expansion, and pay royalties to the government all in a very short timeframe.

Can you introduce Steppe Gold and explain the circumstances surrounding its creation?

Steppe Gold is a Mongolian private company founded in 2016, with head offices in Mongolia and Toronto. The company was started with an asset acquisition from Centerra Gold, which is based in Toronto but has been operating in Mongolia for almost two decades. Steppe Gold was established with the intention of acquiring the Altan Tsagaan Ovoo (ATO) project from Centerra, bringing it into production, and eventually growing the company production profile through other acquisitions. In May 2018, Steppe Gold went public and raised C\$25 million with an IPO on the main board of the TSX. We are the only mining company on the main board listing for 2018 and also the first listing for a Mongolian company on the TSX in almost a decade.

What attracted you to establishing Steppe Gold in Mongolia?

A Foreign Investment Promotion and Protection Agreement (FIPA) was signed between Canada and Mongolia in September 2016 and entered into full force in March 2017. The Mongolian government supports its mining industry significantly. In 2017, Steppe Gold was the first company to sign a memorandum of understanding (MOU) with the government for their Gold-2 program. The government is focused on increasing gold production from primary sources and we are currently the next gold producer within the country.

What is the current status of Steppe Gold's flagship ATO project?

ATO is an advanced stage project with a low capital cost of US\$20 million, and is focused on deep drilling to develop the sulfide resource, as well as mining the oxide. Oxides have a mine life of approximately five years, but oxide operations can fund exploration for sulfides as well as a good percentage of the project development. The aim is to have the mine fully built and start production by H1 2019. The ATO project will provide an estimated 37,000 ounces gold equivalent per year (oz/y), at US\$333/oz cash costs from oxides. The Stage 2 drilling program, focused on ATO-4 and the Mungu trend, returned very high grades including the first visible gold for the asset.

How does Steppe Gold intend to move forward with the Mungu discovery?

Centerra completed a full feasibility study, drilled 67,000 meters, did 20,000 meters of trenching and obtained all permits as well as a mining license. During these activities, their exploration team discovered the Mungu discovery which is only 0.5 km away from the ATO project's pipe 4. When Steppe Gold took over, we decided to deconstruct the project into smaller segments and focus on the oxides first, to get into production in the shortest time possible. We will then move towards building a much bigger production facility, which is a stage 2 carbon in leach (CIL) and flotation plant.

Can you elaborate on Steppe Gold's regional consolidation opportunities?

Steppe Gold has aggressive plans to grow the company. In 2017, we acquired an additional exploration-stage mineral property called the Uudam Khundii (UK) project. The UK property comprises an exploration license covering 14,400 hectares, in a first of its kind, 80-20 joint venture with the provincial government of Bayankhongor, and we are assessing another 200,000 hectares for further acquisition in the same province. Neighboring our UK project, Erdene Resources recently put out strong results based on their drilling. Significant ground work has been done on the UK project already, and drilling operations will commence in 2019. We have the ability to run parallel paths on a few different projects and we are very excited for what is to come.

What are the main priorities for Steppe Gold in the next 12 months?

Steppe Gold's priority is commercial production on the ATO heap leach project. We intend to show that we can build a mine, get into production, generate gold sales from oxides to fund expansion, and pay royalties to the government all in a very short timeframe. We also want to delineate a much bigger resource on sulfides, including Mungu, which will significantly increase mine life and production capacity. It is also an objective to start drilling operations at the UK project and we hope to see exciting results. The main aim is to become Mongolia's largest mid-tier gold and mineral producer. ■

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However, the mining industry in Colombia has not received widespread governmental support, with the ban of mining activities in the so-called *páramos* (a variety of alpine tundra ecosystems) being a particular blow. On top of this, some regions have suffered from artisanal mining and violence, and the mining community was rocked again in September 2018, when two separate attacks resulted in the death of precisely four Continental Gold workers.

Antioquia Gold, a Toronto-based company whose Guaico mine sits 55 km northeast of Medellín, has not experienced any safety issues at its operations, citing the favorable location of its flagship Cisneros project: “Infrastructure, access and safety are superb, especially because we have several players in the area, such as AngloGold Ashanti, B2Gold, Red Eagle, Colombian Mines, Arcturus Ventures and CuOro,” said Gonzalo de Losada, president and CEO of Antioquia Gold.

Of all the Latin American countries, Chile perhaps is the most mature mining jurisdiction, accounting for around 40% of the world's total copper mine capacity. Toronto-based junior Chilean Metals has a dual focus, with assets in Chile and Nova Scotia. While appearing to be a curious combination at first, Terry Lynch, chairman and CEO of Chilean Metals, compared the geology of the two locations at either end of the Americas, as they both sit on continental shelf plates.

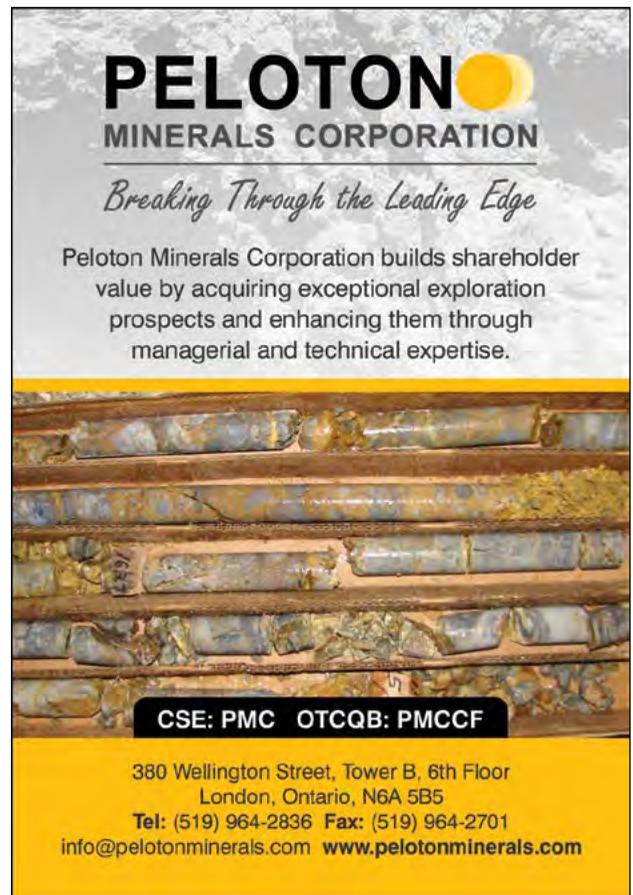
Chilean Metals sold its Copaquire project to Teck for C\$3 million in 2015, keeping a 3% royalty, which Lynch believes, considering the scale of Teck's nearby Quebrada Blanca operation, has the potential to finance his company moving forward: “Cash-flow from that will be useful to fund future exploration for Chilean Metals and provide dividends to its shareholders.”

Ecuador: the new hotspot of world mining

For many years, Ecuador remained relatively underexplored, particularly in comparison to its Andean neighbour, Peru. However, the Ecuadorian government has started to support its emerging mining sector with gradual improvements to the fiscal policy to attract direct investment, culminating in the complete removal of the windfall tax in August 2018. The government has also decreased royalties on mining projects and granted automatic approval of up to 40 exploration drill pads for any new mineral concessions issued. Glenn Mullan, president of PDAC, noted how Ecuador has garnered the attention of the global mining community: “At PDAC 2018, a day was dedicated to presentations on Ecuadorian geological case studies, showcasing the potential of the region to significant foreign investors.”

Christian Kargl-Simard, president, director and CEO of Adventus Zinc Corporation (AZC), was given a global mandate to find the next world-class base metal deposit, with a particular focus on zinc. Backed by two major royalty companies and two private equity groups, AZC spent one year looking extensively at over 220 zinc related opportunities globally, which was whittled down to a short-list of six opportunities. Of these six projects, AZC executed on its Ecuadorian target, the high-grade copper-gold-zinc Curipamba project, in partnership with Salazar Resources, providing AZC with first-mover advantage in Ecuador for making new discoveries. “We strongly believe that the best bang-for-your-buck in exploration right now is in Ecuador,” declared Kargl-Simard, before expanding on the reasoning behind investing in the Curipamba project: “The Curipamba project fits all of our M&A objectives. We were looking for an existing 10 million-mt resource that was

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already economic and with the potential to at least double in size. In addition, the transaction structure supports a rate of return (ROR) much greater than 15% with long-term prices, including the cost to acquire the asset,” he said.

Few junior companies can claim to have a background as intriguing as Aurania Resources. While researching the historical archives of the Ecuadorian gold mining industry in the late 1990s, Keith Barron, Aurania’s founder and CEO, found documentation that proved the existence of the gold producing mines, Logroño de los Caballeros and Sevilla del Oro, that are now lost somewhere in the Cutucu mountain range. Years later, in the Vatican library, he found descriptions from 1627 of how to get to the lost city of Sevilla del Oro.

Barron has a history of success in Ecuador, having co-founded Aurelian Resources in 2001, which made the Fruta del Norte gold discovery in 2006 that was sold to Kinross Gold in 2008 for C\$1.2 billion –the mine is now under construction by Lundin Gold. He

insists that Aurania’s Lost Cities project is not a treasure hunt, but the story of a respected management team with world class discoveries already under their belts: “We are conducting a methodical and logical exploration project and we use modern geological, geochemical and geophysical exploration techniques in a geographical area of high discovery potential,” affirmed Barron.

Meanwhile, Toachi Mining was founded by industry heavyweights Laurie Curtis and Jonathan Goodman, who created the company from the restructuring of Ferrum Americas Mining when the opportunity to invest in the La Plata project in Ecuador was identified. Alain Bureau, president and CEO of Toachi Mining, likened La Plata, a polymetallic VMS (volcanogenic massive sulphide) project to Agnico Eagle’s flagship LaRonde mine in northwestern Quebec.

Praising the Ecuadorian governments’ introduction of fast-forward permits for scout drilling, Bureau continued: “A streamlined permitting process is particularly vital for junior companies, who cannot afford to lose momentum.”

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When Superior Gold purchased the Plutonic Gold operation in Western Australia for US\$30 million from Northern Star in 2016, its leadership team and investors were delighted with the transaction, considering the infrastructure there today would have a replacement value of approximately US\$2.5 billion, according to Superior Gold’s CEO, Chris Bradbrook. Having produced more than 5.5 million oz of gold since 1990, the Plutonic Gold mine is the sixth largest historical producer of gold in Western Australia, and has provided Superior Gold with cash flow since being acquired in 2016: “Up until the end of Q2 2018, Plutonic has generated over US\$34 million for Superior Gold in terms of cash flow from operations,” said Bradbrook.

Asked to elaborate on the reasoning behind a mining company with assets in Australia being headquartered in Toronto, Bradbrook responded: “Superior Gold’s immediate strategy is simple: mine the mine in Australia, and mine the market in North America.”

Closer to home, Peloton Minerals is focused on three Carlin-style exploration targets in Elko County, Nevada. The targets are located on the same trend as the Long Canyon project, acquired by Newmont for US\$2.3 billion, and Ted Ellwood, president and CEO of Peloton Minerals, believes the area has district-scale potential: “We strongly believe there is a gold trend of significance there, and the Nevada Geological Society supported this idea at their symposium in 2015.”

Kinross Gold has entered into a joint venture agreement with Peloton Minerals to explore its Independence Valley project, and the drilling program is expected to start in 2019. ■



Keith Barron

Chairman and CEO
AURANIA RESOURCES

“

In Ecuador the risk has been eliminated as proven by large mining companies investing heavily in the region, in addition to governmental reforms such as the abolition of the windfall tax. Only 6% of Ecuador has been explored.

”

What were the reasons behind Aurania Resources' shift in focus from Switzerland to Ecuador?

Aurania Resources was established in 2013 and our first focus was a uranium and gold project in Switzerland. We raised C\$1 million for exploration, but the gold asset was primarily to be used as a property of merit to obtain an IPO listing. The idea was to have a company up and running for the time when the moratorium came off to acquire new land in Ecuador. This happened in March 2016, and we immediately acquired 208,000 hectares in concessions. Today, Aurania Resources is a junior mining exploration company focused on Ecuador's prospective areas for gold, copper, and other metals.

You have a long history of exploration in Ecuador. How has this shaped the direction of Aurania Resources?

I first came to Ecuador in 1998, and in 2001 I privately co-founded Aurelian Resources which was listed on the TSXV in 2003 and made the enormous gold discovery of Fruta del Norte in 2006. Aurelian was sold to Kinross Gold in 2008 for C\$1.2 billion. In 1998 I was living with a professor and we started researching the historical archives of the gold mining industry in the country. We found documentation that proved the existence of the Logroño de los Caballeros and Sevilla del Oro gold producing mines, that are now lost somewhere in the Cutucu mountain range. Years later, in the Vatican library, we found descriptions from 1627 of how to get to the lost city of Sevilla del Oro.

When the land in Ecuador came available in 2016, we made sure that we acquired as much land as possible in the areas outlined by the archival maps and documents. The Lost Cities project is not a treasure hunt, but the story of a respected university professor and two PhD geologists with world class discoveries already under their belts. We are conducting a methodical and logical exploration project and we use modern geological, geochemical and geophysical exploration techniques in a geographical area of high discovery potential.

What has been the extent of Aurania Resources' exploration activity thus far?

We finished an airborne survey in 2017, which yielded very high-grade copper on surface in proximity of two of our main magnetic targets; but that is just the start and we have many targets to still investigate.

How is Aurania Resources approaching CSR in southeastern Ecuador?

We have a very good corporate social relations team, consisting of eight members, of which half are people from the area. We will continue to be careful and considerate to the environment as well as the communities. I have recently established a private foundation called Step Forward, which is going to be used for health and education initiatives. Walking through the property, we realized that the animals in the area have been hunted to extinction. Through a community survey, we established that most families only get two meals of protein a week as there are no more resources left in the area. Aurania Resources aims to assist the communities by providing them with training and education which will empower them to create business opportunities, such as waste removal services or sustainable food generating programs. There is a significant amount of mineral wealth in the area, and it is important that the local community share in this wealth. Aurania Resources currently employs 70 people, of which only three are expats.

Do you believe mining in South American jurisdictions carries risk for investors?

There is a significant amount of concern about South American risk. In the case of Ecuador the risk has been eliminated and this has been proved by large mining companies entering the region and investing heavily, in addition to governmental reforms such as the abolition of the windfall tax in August 2018. Only 6% of Ecuador has been explored, yet the country has very prospective ground and there are significant opportunities. The territory Aurania Resources operates in has not seen any exploration activities since the Spanish conquerors invaded in the 1600s. We believe that we will find the lost cities in time, and until then we will continue methodical exploration activities and move forward on potential projects. ■



Ted Ellwood

President and CEO
PELTON MINERALS



We look forward to Kinross' plans for a 2019 drill program at our Independence Valley project. In addition, we will be updating the technical reports on Golden Trail and Texas Canyon in Nevada.



Where has Peloton Minerals focused its attention in recent years?

For the past five years we have been focused on Nevada, USA, primarily in Elko County. We strongly believe there is a new gold trend of significance in that north-eastern corner of Nevada, where the Long Canyon Project was discovered and taken over by Newmont in 2011 for US\$2.3 billion. Peloton Minerals has three Carlin-style exploration targets along that new trend in Nevada, one of which, the Independence Valley Project, is now subject to a joint venture with Kinross Gold. On that project there is an extensive amount of geologic mapping, soil geochemistry sampling, and geophysics conducted by Kinross in late 2018, with the aim of designing and budgeting a 2019 drill program.

What is the status of Peloton Minerals' other projects in Nevada?

Our two other projects in Nevada, the Golden Trail Project and the Texas Canyon Project, have new or updated 43-101 technical reports being prepared to consolidate the considerable data we have on each. Two years ago we conducted an airborne survey over a large section of northeastern Nevada using hyperspectral imaging, which uses UV light to determine the type of mineralization that is at the surface. The Texas Canyon Project came from that airborne survey and Golden Trail was expanded from 300 acres to 900 acres due to alteration anomalies identified on, adjacent to the original claims.

How does Peloton Minerals' business model differ from other junior companies?

Our difference is largely in project selection, in that we are strictly looking for projects that we feel a major mining company would want to get involved with after we have assembled the package and added initial value through solid technical, geologic and geophysical work. It is a very strict focus and once we have the current Nevada projects further along, we will then look to expand further by adding projects either in Nevada or other countries.

Can you tell us more about the other two projects that you have in the US and Ontario?

The River Stage property near Rainy River, Ontario, is in probably the most underexplored greenstone belt of Ontario. There is a lot of activity in the area, with New Gold recently bringing a new 2,000 mt/d gold mine into production. Our property is very early stage but in a promising area.

The Montana property was acquired prior to our present focus, but we think it is a perfect project for a small to mid-sized company looking for near-term production potential, and we are actively looking for a partner on it. It hosts two past-producing gold mines with the old shafts about one kilometer apart. Through geophysics we have largely concluded that these mines were operating on the same vein system, which extends beyond the shafts for some distance. So, there is some size potential, and from a production view there are custom mills nearby.

What do you see as the benefits of trading on the CSE?

One thing that stands out about the CSE from an issuer standpoint is that it treats the listed companies like customers, even though they are an exchange with necessary regulations. At the CSE, they go out of their way to look at the challenges that issuers are facing and provide a service that helps companies build and grow. The CSE does not charge tremendous fees that some other regulators charge, and as a small company this is crucial.

What is the main focus for Peloton Minerals over the next 12 months?

We look forward to the results of Kinross's fieldwork on our Independence Valley project and their plans for a 2019 drill program. In addition, we will be updating the technical reports on the Golden Trail and Texas Canyon Nevada projects with a view toward discussing potential joint venture partnerships on those.

As I mentioned, the Long Canyon Project in that area was taken over for US\$2.3 billion. Our three projects nearby are much earlier stage but the geologic model is not unsimilar. Our focus is in moving those forward as a group with one or the other occasionally taking the lead. Much like our company name Peloton, and the fluidity of a peloton in a bicycle race. ■



Fred Stanford

President and CEO

TOREX GOLD RESOURCES

Can you give us an overview of Torex Gold Resources?

Torex Gold Resources is a single asset gold producer in Mexico, which started production at the end of 2015 after an \$800 million USD investment. We are 100% owner of the Morelos Gold Property, an area of 29,000 hectares in the highly prospective Guerrero Gold Belt. We currently produce around 1,000 ounces per day (oz/d). This is probably the biggest investment ever made in Guerrero state. Additionally, we have ramped up production capacity, which we expect will reach 14,000 tonnes per day (mt/d) by the end of 2018.

The Company's principal assets are the El Limón Guajes (ELG) mining complex, comprised of the El Limón, Guajes and El Limón Sur open pits, the El Limón Guajes underground mine including zones referred to as Sub-Sill, El Limón Deep and 71, and the processing plant and related infrastructure, which has been in commercial production since April 2016. The Media Luna deposit, an early stage development project, is also in Torex Gold's pipeline. The Morelos Gold property remains 75% unexplored, and has huge potential.

Torex Gold's innovative conveyor belt system transports the ore whilst saving energy costs. Can you expand on this technology?

The conveyor utilizes a 400-yard vertical line which is 1.3 kilometers long and is supported by the cables that generate power. The power generates potential energy, rather than kinetic energy, and this is used for operating various mine activities. The mechanism for generating this energy is simple: when you put the ore on a 30-degree angle, gravity pulls down the motor and in turn generates energy. This is done in the Calix Filtration Plant – the biggest filtration plant in the world which uses dry stack calix.

Can you give us details of Muckahi, the underground mining technology Torex Gold has been developing?

I have been working on the Muckahi mining technology for years, and Torex Gold will be testing it in Q1 2019. The aim is to reduce

the time necessary for the mining and transportation of the ore body to one third of the current time. The equipment is a mono-rail, conveyor system that utilizes an old-fashioned slusher. After blasting, 50 tonnes of ore are loaded onto the end of the conveyor, and then transported from one 100-meter long monorail system to another. The machine disperses loads and has two rails performing at the same time.

The current method of driving a 50-mt truck down a single lane, requires a drift twice the size as the Muckahi system, and is significantly less productive. Rubber-tired equipment can only drive on a 7.5-degree ramp, and therefore cannot be used on a steep conveyor. Torex Gold's Muckahi technology will use ramps four times as steep, climbing at 30 degrees, generating energy as it goes up and down.

Moving forward, what are the key objectives for Torex Gold?

When ramped up fully, we expect ELG to reach a production of 14,000 mt/d. Additionally, we would like to have a production capacity of 850 mt/d at Sub-Sill. Torex Gold is an ambitious company with objectives on various fronts. Unlike traditional mining companies, we are developing the completely autonomous Muckahi mining system, which could become a ground-breaking technology. We believe it could be used in underground mining jurisdictions globally. ■

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Chris Bradbrook

46
CEO
SUPERIOR GOLD



Although this is a production success story, we also have outstanding exploration potential to achieve non-dilutive growth. We are in a brownfields area, with all of the infrastructure already in place.



Can you provide an overview of Superior Gold?

The Plutonic Gold operation in Western Australia is Superior Gold's flagship asset. The opportunity to purchase that asset from Northern Star came in early 2016. The mine was attractive to us as it had been in continuous production since 1990 and had produced more than 5.5 million ounces (oz) of gold, making it the sixth largest historical producer of gold in Western Australia. We purchased the mine from Northern Star for US\$30 million, which was an excellent price, because the infrastructure there today would have a replacement value of approximately US\$2.5 billion.

What have been the production figures from the Plutonic Gold operation since Superior Gold acquired it?

Plutonic Gold comprises of three core components: the Plutonic mine, which is an underground operation that produces 75,000 to 80,000 ounces of gold per year (oz/y). Plutonic is a true mining hub, even though it is very remote: there is an airfield, a camp, two mills, a tailings facility, and a gas power plant. Located 65 kilometers southwest of Plutonic underground, we have the Hermes open pit, which yields 25,000 to 30,000 oz/y. Lastly, we have an 80% stake in the Bryah Basin joint venture with Alchemy Resources, hosting our Hermes South deposit. In 2017, Superior Gold's first full year of production, we produced over 80,000 oz of gold. In 2018, we aim to reach 100,000 oz.

How has Superior Gold been financing its operations so far?

Superior Gold raised C\$16 million privately in October 2016, which enabled us to make the first C\$12 million payment to Northern Star. We then raised C\$32 million in February 2017 through Superior Gold's IPO, and paid Northern Star the balance, issued shares, and deposited C\$20 million in the bank. We then built a second mine with cash flow from operations, named Hermes, which meant we never had to raise money again since going public.

We pride ourselves on being a business first and a gold company second. We initially began operating the mine with C\$20,000, and up until the end of Q2 2018, Plutonic has generated over US\$34M in terms of cash flow from operations.

What is your view of the investment climate in the Canadian mining sector?

Nothing stays up or down forever. With the downturn in the sector, North America was hit the hardest, but when it picks back up, the returns will be significantly more substantial. Australian mining companies are mostly domestic-based and are good at generating cash, thus they stay relatively unaffected by the market. Back in Canada, we are seeing the use of new technologies in the sector, creating new opportunities that were not there previously. This will hopefully help bring investors back into the sector. Superior Gold's immediate strategy is simple: mine the mine in Australia, and mine the market in North America. Finally, from an M&A perspective, we will continue to focus on projects with outstanding economics in Canada, Australia, and the United States.

What is the long-term strategy for Superior Gold?

We will continue to focus on organic growth. Plutonic has been underexplored for many years, and when we begin drilling, we expect to find much more gold. Additionally, we currently have excess mill capacity. The main mill can take 1.8 million tonnes of ore per year (mt/y), and now with the Hermes mine we have filled it to capacity. As a result, our strategy is focused on filling the mill with the best possible grade. However there is another mill on-site, which can process 1.2 million mt/y. At its peak, the Plutonic mine could produce in excess of 300,000 oz per year, with both mills running.

Do you have a final message for Global Business Reports' investment audience?

There are very few companies of Superior Gold's size, in terms of market capitalization, who are in possession of a world-class asset with the financial capability to grow through its own resources. Although this is a production success story, we also offer unique value as we also have outstanding exploration potential. We have the potential to have non-dilutive growth, as we are in a brownfields area, with all of the infrastructure already in place. ■



Christian Kargl-Simard

President and CEO
ADVENTUS ZINC

A healthy ecosystem relies on junior exploration and entrepreneurship, but the traditional models of raising funding through the institutional and retail markets have really suffered, and juniors need to be creative.

What were the circumstances surrounding the creation of Adventus Zinc Corporation (ADZN-V) in 2016?

While working as an investment banker in mining for 10 years in Toronto, I formed a strong relationship with Altius Minerals, which continues to be Adventus' largest shareholder. In its over 20-year history, Altius has generated over C\$200 million cash proceeds from project generation, from which they have developed the world's premier non-precious metals royalty and streaming business, in addition to continuing a large project generation business. Altius and I worked together to create a company focused on base metals and in particular zinc, because we viewed an underinvestment in the metal over the last few decades, and the lack of a vehicle that focuses on exploration and with the capital to move projects forward.

How has Adventus structured the financing of its operations?

Altius provided Adventus' initial projects in Ireland and Newfoundland, and we brought on other strategic investors, including Greenstone Resources, Resource Capital Funds, and a number of other successful resource sector investors. Today, the cornerstone shareholders own around 60% of Adventus stock. In July 2018, Wheaton Precious Metals was the lead order in a C\$10 million financing, resulting in a 9.99% ownership interest in Adventus and some ROFR/ROFO rights on future precious metals royalties and streams in Ecuador – Wheaton's first equity investment in many years.

Adventus' financial model is a hybrid; a public company backed by two major royalty companies and two private equity groups. There is still money to be found in the mining sector. A healthy ecosystem relies on junior exploration and entrepreneurship, but the traditional models of raising funding through the institutional and retail markets have really suffered, and juniors need to be creative in the way they source investments.

Can you expand on your global strategy for exploration?

Adventus' business model was to utilize its earlier stage exploration assets in Ireland and Newfoundland to go public, and then use this as a platform to evaluate opportunities globally, in order to build a portfolio

of more advanced exploration and development base metal assets.

We came up with a shortlist of six global opportunities, and executed on our Ecuador push, with Salazar Resources Limited (SRL-V). CEO Fredy Salazar is the former head of Newmont's exploration team in Ecuador and Northern Peru, and has been the leader of the most successful exploration team in Ecuador over the past 30 years. Members of the Salazar team have been instrumental in the discovery of over 29 million oz of gold, along with copper and silver. The Adventus-Salazar partnership provides a first-mover advantage in Ecuador for making new discoveries, alongside the advance of our high-grade copper-gold-zinc Curipamba project.

Why did Adventus choose Ecuador as its country of focus?

We strongly believe that the best bang-for-your-buck in exploration right now is in Ecuador. It has similar geological potential to its neighbors in the Andean belt, but has been underexplored. The Curipamba project fit all of our M&A objectives. We were looking for an existing 10 million mt resource that was already economic and with the potential to at least double in size. The Ecuadorian government has been extremely supportive of the burgeoning mining sector – every year there have been positive improvements to the country's fiscal policy, such as the complete removal of the windfall tax in August 2018. The government has also decreased royalties on mining projects and granted automatic approval of up to 40 exploration drill pads for any new mineral concessions issued.

What is the timeline for the development of Curipamba?

The Curipamba deal was finalized in October 2017, and will require Adventus to complete a US\$25 million investment over five years to earn a 75% interest. The project covers 22,000 hectares, most of which has been unexplored and is of huge potential. Adventus' existing mining permit at Curipamba allows us to build a 1,000 mt/d open pit. At that rate, we could be operating with ore feed in excess of 10% Cu equivalent for at least the first five years of mine life, which would be exceptional. We are evaluating whether to apply for a 2,000 mt/d, medium-sized mining permit, which could further improve economics. ■





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- Denis Frawley,
partner,
Ormston List Frawley LLP



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Nevertheless, high labor costs, social sensitivities and bureaucratic hurdles from a federal and provincial level make it challenging to move projects forward and transition from exploration to production. Stephen Roman, chairman, president and CEO of Harte Gold, lamented the ever-increasing permitting requirements: “The new Ontario Mining Act of 2013 was a major blow to exploration and development due to punitive new rules. For instance, to permit our bulk sample took three years.”

A dearth of new greenfield deposits in Canada, combined with the impact of the downcycle and mineral prices that have still yet to fully recover, have forced mining companies to focus on the development of brownfield projects.

Glencore's Kidd operation in Timmins, the deepest base metal mine in the world with a maximum depth of almost 10,000 feet, celebrated its 50th year of production in 2016, and recently extended its life-of-mine (LOM) expectancy to early 2022. Glencore also announced it will move ahead with the C\$700-million Onaping Depth project in Sudbury, and expects to reach full production at the deposit, located 2,500 meters beneath the Craig mine in Onaping, by 2025.

In March 2018, Vale announced it will spend C\$760 million over the next four years to expand its historic Copper Cliff operation in Sudbury. With six mines, a mill, a smelter, a refinery and nearly 4,000 employees, Copper Cliff is one of the largest integrated mining complexes in the world. Vale says it is doubling its exploration budget in the Greater Sudbury Area to C\$42 million.

In gold, another historic producer is Barrick's Hemlo mine, located 350 km west of Thunder Bay, which has been in operation continuously for more than 30 years, producing more than 21 million oz of gold. Production is due to rise from 196,000 oz in 2017 to 200,000-220,000 oz in 2018. However, the open pit section of the mine is due to operate until 2021, with the focus then shifting completely to the underground operation.

Diamonds are a millennial's best friend

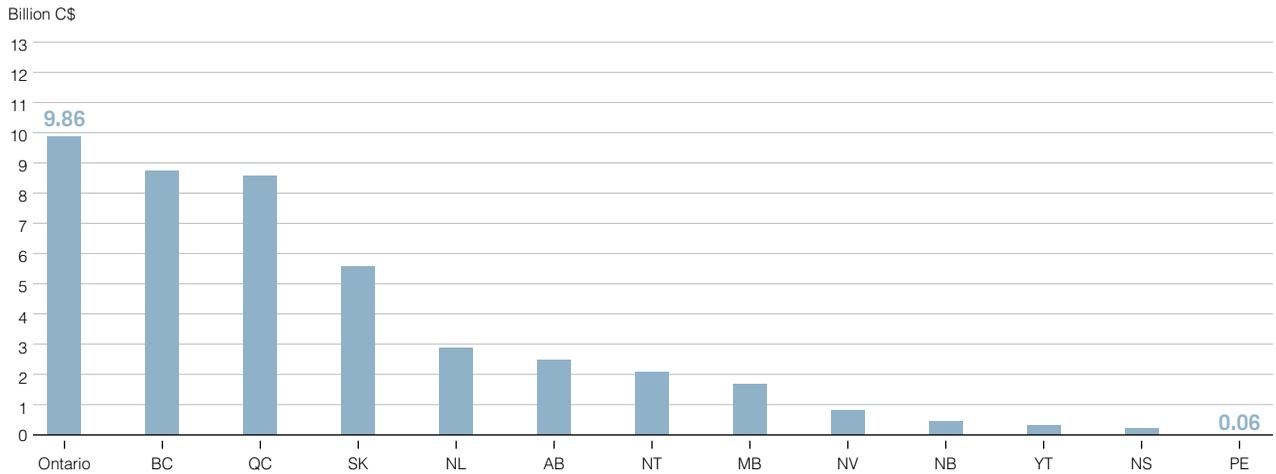
De Beers, the world's leading diamond company, 85%-owned by Anglo American, announced it will not extend the life of Ontario's first diamond mine, the Victor mine located in the James Bay Lowlands of northern Ontario. Mining and processing activities are due to be completed in Q1 2019, before moving into the formal closure phase. De Beers will have contributed C\$6.7 billion cumulative GDP impact for Ontario during the life of the Victor mine, according to Kim Truter, CEO of De Beers Canada. Reflecting on the legacy of the Victor mine, Truter noted: “The Victor mine has been a wonderful success story for De Beers, exceeding all expectations in terms of the life of the asset, the quality of the diamonds and revenue generated for all stakeholders.”

To enhance its Canadian portfolio, De Beers acquired the Peregrine Diamond business in September 2018, which includes the Chidliak resource on Baffin Island and other assets in the Northwest Territories. Initial engagement with the government and locals has begun, with the permitting and environmental baseline study phase to follow, which is expected to take two to three years to develop.

De Beers' Insight Report of 2018 states that two thirds of diamond sales now come from consumers aged between 21 and 39 years old; the Millennial and Generation Z age brackets. The diamond jewelry market grew in 2017 as demand reached a new record high of

VALUE OF CANADA'S MINERAL PRODUCTION PER PROVINCE, 2017

Source: Natural Resources Canada & MNM



US\$82 billion on the back of growing popularity from a younger demographic. Explaining how De Beers has evolved to cater for the changing market, Truter pointed to innovations such as the De Beers' Lightbox jewelry brand, the move to track diamonds using blockchain technology, and an increased online presence.

Mid-tiers add Ontario assets to their international portfolios

Over the past century, the Timmins area has produced more gold than any mining camp in Canada. It is in this district that McEwen Mining acquired the Black Fox project in October 2017. Rob McEwen, chairman and CEO of McEwen Mining, expanded on the potential of the project, which sits on what is known as the 'Golden Highway': "Our 2018 exploration budget at Black Fox is C\$15 million. To date, the drill results have been most encouraging. Not only have we identified numerous new zones of mineralization on the property, we are also seeing a continuation of the mineralization to depth in the mine. Our exploration program has increased our resource ounces and the grade."

One of the major success stories of recent years in the Ontario mining community is Alamos Gold, ranked in a recent BMO study as the second fastest growing gold producer in the world between 2014 and 2018. Formerly a single-asset producer from its Mulatos mine in Mexico, Alamos merged with AuRico Gold in April 2015, and acquired Richmond Mines for US\$630 million in November 2017, adding the Young-Davidson and Island Gold mines in Ontario to its portfolio. John McCluskey, president and CEO of Alamos Gold, reflected on the enviable position the company has established: "We have a debt free balance sheet, a great pipeline of growth projects, and strong long-term production from our North American assets that has set us up to prosper when the cycle turns."

2018: the boom year for palladium

Palladium is a precious metal with industrial qualities, so that 80% of its consumption is from the automotive industry. With demand being driven up by the move from diesel to petrol and hybrid ve-

hicles, and producers in South Africa scaling down operations and announcing cutbacks due to the decreasing price of platinum, of which palladium is often a by-product, the price of palladium has more than doubled from its low of US\$473/oz in January 2016, to over US\$1,140/oz in October 2018.

North American Palladium (NAP) advertises itself as the only pure play palladium producer, after Stillwater Mining was bought out by

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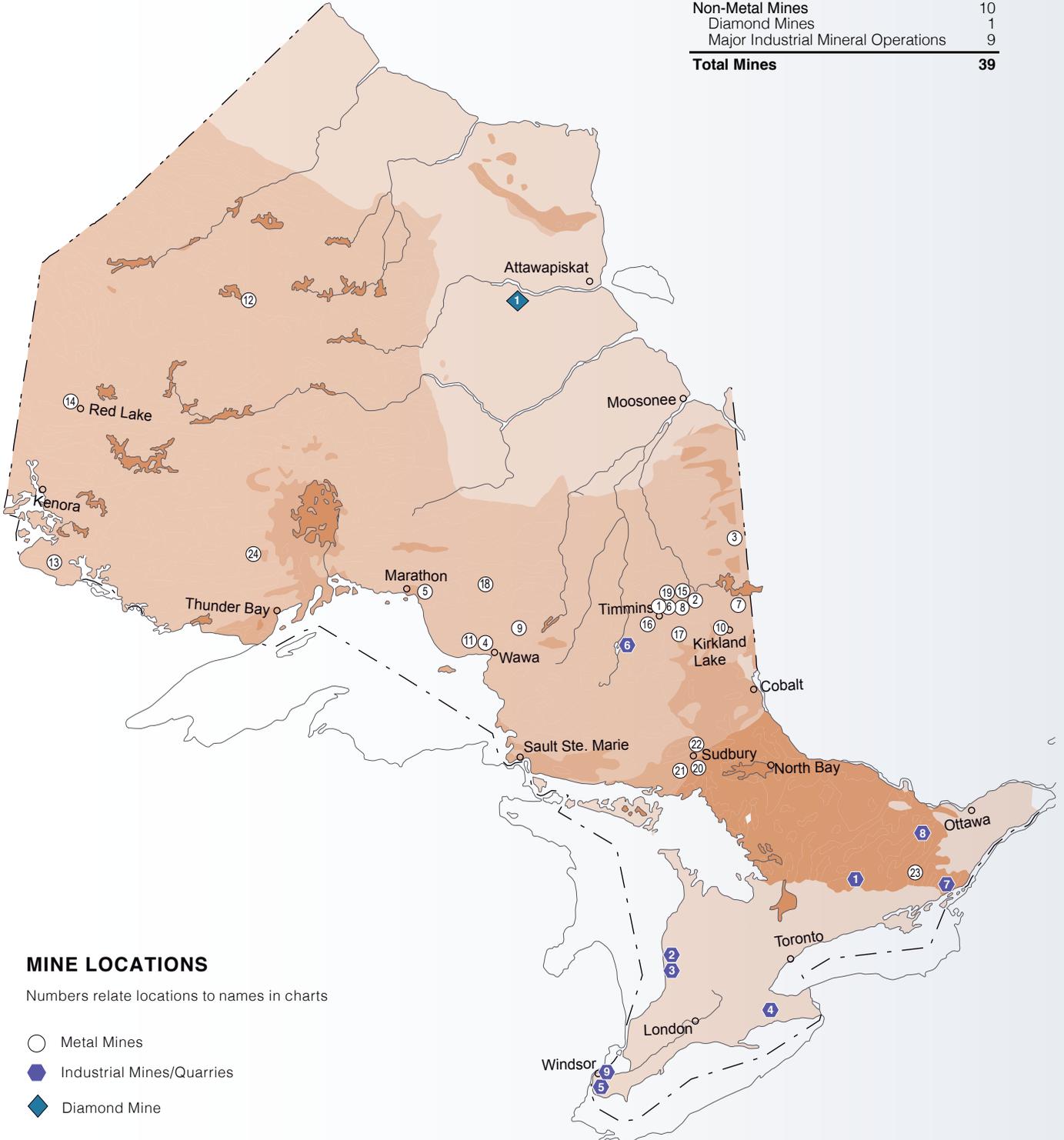
www.alamosgold.com

MINING OPERATIONS MAP

Source: Ontario Mining Association

Number of Mines in Ontario

Metal Mines	28
Gold Mines	18
Base Metal Mines	9
Iron Mines	1
Platinum Group Metal Mines	1
Non-Metal Mines	10
Diamond Mines	1
Major Industrial Mineral Operations	9
Total Mines	39



MINE LOCATIONS

Numbers relate locations to names in charts

- Metal Mines
- ◆ Industrial Mines/Quarries
- ◆ Diamond Mine

GOLD MINES

<i>Name</i>	<i>Company</i>
1 Bell Creek Mine	Tahoe Resources Inc.
2 Black Fox Mine	McEwen Mining Inc.
3 Detour Lake Gold Mine	Detour Gold Corp.
4 Eagle River Mine	Wesdome Gold Mines Ltd.
5 Hemlo Mine	Barrick Gold Corp.
6 Hollinger Mine	Goldcorp Inc. – Porcupine Gold Mines
7 Holloway – Holt Mine	Kirkland Lake Gold Ltd.
8 Hoyle Pond Mine	Goldcorp Inc. – Porcupine Gold Mines
9 Island Gold Mine	Alamos Gold Inc.
10 Macassa Mine	Kirkland Lake Gold Ltd.
11 Mishi Gold Mine	Wesdome Gold Mines Ltd.
12 Musselwhite Mine	Goldcorp Inc.
13 Rainy River Mine	New Gold Inc.
14 Red Lake Gold Mines	Goldcorp Inc.
15 Taylor Mine	Kirkland Lake Gold Ltd.
16 Timmins West Mine	Tahoe Resources Inc.
17 Young – Davidson Mine	Alamos Gold Inc.
18 Sugar Zone	Harte Gold

BASE METAL MINES

19 Kidd Creek Mine	Glencore PLC
20 Sudbury Operations: Morrison Mine	KGHM International Ltd.
21 Sudbury Operations: Coleman Mine Copper Cliff North Mine Creighton Mine Garson Mine Totten Mine	Vale S.A.
22 Sudbury Operations: Nickel Rim South Mine Fraser Mine	Glencore PLC

IRON MINES

23 Tomclid Iron Mine	Ferromin Inc.
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PLATINUM GROUP METAL MINES

24 Lac des Iles Mine	North American Palladium Ltd.
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DIAMOND MINES

1 Victor Diamond Mine	De Beers Canada Inc.
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MAJOR INDUSTRIAL MINERAL OPERATIONS

1 Blue Mountain Operations (nepheline syenite)	Unimin Canada Ltd.
2 Goderich Brine Field (salt)	Compass Minerals Canada Corp.
3 Goderich Mine (salt)	Compass Minerals Canada Corp.
4 Hagersville Mine (gypsum)	CGC Inc.
5 Ojibway Mine (salt)	K+S Windsor Salt Ltd.
6 Penhorwood Mine (talc)	Imerys Talc
7 St. Lawrence Mine (wollastonite)	Canadian Wollastonite
8 Tatlock Quarry (calcium carbonate)	OMYA Canada Inc.
9 Windsor Brine Field (salt)	K+S Windsor Salt Ltd.



John McCluskey

President and CEO
ALAMOS GOLD

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As good as Richmond's valuation was, it did not begin to fully reflect its potential. Since finalizing the transaction, the ore body has continued to grow right across the board, and the reserve grade has improved from 9.2 g/mt to 10.7 g/mt.



What have been the corporate highlights at Alamos Gold in recent years?

Alamos Gold has really progressed in the last few years, illustrated by a recent BMO study on gold production, which ranked us as the second fastest growing gold producer in the world between 2014 and 2018. Over that four-year period, we went from producing 140,000 ounces (oz) in 2014 to an estimated 500,000 oz in 2018. Additionally, we have increased reserves from 1.7 million oz to approximately 10 million oz over the same time frame.

How has Alamos Gold's M&A activity helped diversify its asset base and increase production?

Mining companies typically do not make acquisitions during a downturn, but Alamos Gold is different in this respect. We wanted to diversify our portfolio, and transition from being a single-asset producer in Mexico, to a mid-tier mining company with producing assets in a variety of good jurisdictions. We focused on Canada, and subsequently merged with AuRico Gold in April 2015, which brought in the Young-Davidson mine. In November 2017, we completed the acquisition of Richmond Mines for US\$630 million, which brought in the Island Gold mine. Of the approximately 500,000 oz of gold Alamos Gold will produce in 2018, around 200,000 oz will come from Young Davidson, 100,000 oz from Island Gold, 160,000 oz from Mulatos, Alamos Gold's first producing asset in Mexico, and the remainder from the El Chanate mine, also located in Mexico.

Can you expand on the Richmond transaction?

Richmont had a decent valuation considering what the market conditions were, but as good as the valuation was, it did not begin to fully reflect the potential. Since finalizing the transaction in November 2017, the ore body has continued to grow right across the board, and the reserve grade has improved from 9.2 g/mt to 10.7 g/mt. Since the start of 2017, approximately 150,000 oz have been produced from Island Gold and we have still seen the reserve grow from 750,000 oz to 960,000 oz as of the middle of 2018.

How have you managed to increase mine life at Mulatos?

We have had a lot of exploration success in Mexico. Mulatos was originally contemplated as a 10,000 tonne-per day (mt/d) operation with initial production in 2005 and a seven-year mine life. Through various expansions and productivity improvements, Mulatos now operates at a throughput rate of 20,000 mt/d and still has an eight-year reserve life. Through exploration, we found several satellite systems, including La Yaqui, containing 700,000 oz of higher grade reserves, and another deposit called Cerro Pelon, containing 170,000 oz of reserves, which we are currently working on bringing into production.

Can you elaborate on Alamos Gold's assets in Turkey and their timeline for development?

The 100% owned Kirazlı, Ağrı Dağı and Çamyurt gold development projects are located in Çanakkale province on the Biga peninsula of northwestern Turkey. The Kirazlı project is our first focus, and represents a significant near term source of low cost production growth. In January 2017, we obtained the forestry permits and in July we were granted the GSM (Business Opening and Operation) permits for Kirazlı. This is the first project we intend to move into production in Turkey, having previously performed economic and environmental studies. In late 2017 we started construction work and are currently in the process of building infrastructure into and around the site, including a new road, a power line, and a water reservoir.

What are the main ambitions for Alamos Gold in the next two years?

Unlike many companies in the gold space right now, Alamos Gold has a deep pipeline of projects to develop. We have a debt free balance sheet and strong long-term production from our North American assets that has set us up to prosper when the cycle turns. By the second half of 2020, Alamos Gold will be producing over 600,000 oz of gold per year. We are going to be one of the go-to names in the space, which is what we set out to achieve when we decided back in 2014 to transform the company from a single asset producer into a strong, diversified mid-tier gold producer. ■

Rob McEwen & Nathan Stubina

RM: Executive Chairman and Chief Owner
NS: Managing Director, Innovation
MCEWEN MINING



RM

RM: There is only one gold stock in the S&P 500 index, which is Newmont, and its market cap only represents a tiny 0.07% of the value of all the companies in the index, so there is essentially no ownership of gold shares in America when we look at the broad market.

Could you explain why McEwen Mining wishes to be included in the S&P 500 and what the strategy is to attaining this goal?

RM: 80% of the market value of all public companies in America are represented by the S&P 500 companies, and there is only one gold stock in the index, which is Newmont. Its market cap as a percentage of the market value of all the companies in the S&P 500 is only a tiny 0.07%, so there is essentially no ownership of gold shares in America when we look at the broad market. The capital markets have changed dramatically in the last 15 years, with an explosion of ETFs, index funds, and computerized trading — they represent more than 50% of all the daily trading in the US right now. Crowd psychology is affecting the market and will continue to do so.

Some 99% of all publicly-traded producing gold mines in the world are ineligible for the S&P 500, since they have to be incorporated in America. McEwen Mining is a Colorado-incorporated company, and we are going to have to do some M&A in order to qualify for the S&P 500. We will need to be producing a minimum of 600,000 ounces (oz) to qualify, and have a four-year pipeline to take us up to 1 million oz/y. We would also require a mine-life average in excess of nine years, and operate at the bottom-half of the cost curve.

What traits does McEwen Mining look for in potential M&A agreements or investment opportunities, such as the recent Great Bear Resources investment?

RM: Great Bear Resources has an interesting project with impressive drill intercepts over a large area, which reminded me a bit of the Red Lake mine. Over time, I expect gold is going to go up dramatically against the dollar, which is why I wanted to be in a dollar zone, in an area with prolific deposits, and in the largest market for gold shares.

Could you provide a brief update on your current operations at Black Fox and Lexam?

RM: Our 2018 exploration program at Black Fox is US\$15 million. We are very pleased with the results. It has generated a number of new deposits that look ame-

nable for production in the next couple of years. Lexam VG was purchased in April 2017. It is a brownfield situation with a resource base of approximately 2 million oz to Goldcorp's future Century Pit. We are working to permit one of Lexam's properties and process the ore at the Black Fox Mill.

Could you describe the drone technology being developed by McEwen Mining, the Aeronautical Institute, and the University of Toronto?

NS: The three entities are working in collaboration on a UAV (drone) project to measure fragmentation and particle size distribution in real time. This technology also has hyperspectroscopical abilities, in order to pick up textures and grades much finer than the human eye can perceive.

Which other forms of innovation is McEwen mining currently exploring and implementing?

NS: McEwen Mining is in the process of testing the advantages of ore sorting, using samples from Black Fox. With ore sorting, one should be able to improve operating margins. McEwen Mining also hosts bi-monthly "Lunch and Learn" events where we invite speakers to present innovative ideas and technology to open minded thinkers in the industry. These sessions are filmed by the CIM and available online for viewing for the benefit of the entire industry.

RM: We consider any topic that would add value to our operations. At our Fenix project in Mexico we want to use an open pit as a tailings disposal site. It would improve our reclamation work dramatically and reduce capex.

Which milestones would you like to achieve in the next two years with McEwen Mining?

RM: The four big milestones are: extend our average mine life to nine years, see Gold Bar successfully commissioned and operating as planned in Q1 2019, develop the northern road into Los Azules to provide 12-month access, and add additional production and resources via M&A that moves us closer to our goal of qualifying for S&P 500 Index. ■



Stephen G. Roman

Chairman, President and CEO
HARTE GOLD CORP

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The Harte property covers a greenstone belt that dates back to the same volcanic event that created the Hemlo deposit. This proximity to an enormous, high grade gold deposit really sparked my interest in taking on management of Harte Gold.



Could you describe the reason you joined Harte Gold and highlight the landmarks achieved within the Sugar Zone property?

The Harte Gold property in White River, Ontario is very well located between a number of producing gold mines, including the large Barrick-controlled Hemlo mine. The Harte property covers a greenstone belt that dates back to the same volcanic event that created the Hemlo deposit. This proximity to an enormous, high grade gold deposit really sparked my interest in taking on management of Harte Gold. The property had very little exploration done over the years due to poor access and heavy bush. I knew it would be a big challenge but decided to take it on.

After building the operating team and stabilizing the financial condition of the company, we started negotiating to buy back the 51% that was owned by Corona Gold. It took 18 months to finalize the deal and consolidate the interest of the Sugar Zone property 100% under Harte Gold. We were then able to raise money and develop the project.

Which are your major targets for the Sugar Zone property?

The mine is now ready to start commercial production. We have all the infrastructure on site, with a processing plant now completed. So, we will transition from being an explorer/developer to a producer. When I took over, we had a market cap of C\$1 million. Now we have a C\$250 million market capitalization with strong growth potential. Exploration is still a strong focus for Harte Gold. The original 150,000 ounces that were inferred at the Sugar Zone when we took over have been increased to 1.5 million ounces, and we expect to have another resource update. The deposit has grown tenfold since we took over and continues to grow.

What capacity can you mine daily with your current permits?

Our permitting allows us to mine 540 tonnes per day (mt/d), although we can mill at a rate of 800 mt/d. Once we start operating, we will look to expand the underground capacity. We have completed a

preliminary economic assessment (PEA) that shows we can ramp up to 1,400 mt/d. This expansion will require additional permitting.

How have infrastructure and connectivity evolved since you took on the Sugar Zone property?

When we first took on the project there was no infrastructure. We used to fly in with a float plane, boat across Dayohessara lake, climb up the ridge and get to the original Sugar Zone outcrop. After a period of time using planes and helicopters to get to site, we managed to connect a number of old logging roads around the north end of Dayohessara lake, but the time of travel from White River to site was around three hours. We then applied to build our own road from the highway into the site, which took two years to permit, but we completed it and now have excellent access to the mine site from the main highway.

Ontario is ranked as one of the top ten mining destinations in the world. Would you agree with this in terms of 'ease of doing business'?

The most recent Fraser Institute study explores how the mining industry in Canada has been severely impacted by politics and policies over the last few years. It has become extremely difficult to move projects forward in this country. Though there are federal challenges, from a provincial standpoint, the liberal government that was in power for 15 years heavily debilitated the mining industry — bureaucracy increased and the amount of permits required for a new project kept expanding. The new Ontario Mining Act of 2013 was a major blow to exploration and development due to punitive new rules. For instance, to permit our bulk sample took three years! This is a junior that has to raise money from the market, keep people employed and keep the project moving forward. This is why a lot of explorers have left the province. Junior explorers are highly motivated, but when they cannot continue exploring and operating, then the majors' resources will inevitably decline. Instead of helping juniors do their job, what has been happening is the opposite. ■

PALLADIUM PRICE EVOLUTION [From January 1, 2016 to December 20, 2018]

Source: APMEEX



GOLD PRICE EVOLUTION [From January 1, 2016 to December 20, 2018]

Source: APMEEX



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Sibayne Gold. Re-capitalized in 2015 when Brookfield Asset Management (BAM) acquired 92% of the business, NAP is now focusing on its single producing asset, the Lac des Iles mine north of Thunder Bay, Ontario. The site is currently processing over 6,000 mt/d, with the intention to double capacity to 12,000 mt/d in 2019, and NAP has managed to reduce its underground mining costs to less than C\$40 per tonne delivered to surface. Jim Gallagher, president and CEO of NAP, revealed that the move to a variation of sub-level cave mining called sublevel shrinkage mining ('SLS') has been a catalyst for NAP's change in fortune: "Due to this change in method, we are now able to go back to the upper part of the mine which was historically mined out, but now provides an economically viable resource."

Canada's newest gold mine

One of the companies to have made the transition from explorer to producer is Harte Gold, whose Sugar Zone property in White River, Ontario, was officially opened on October 24, 2018. Located between a number of other producing gold mines, including Barrick's Hemlo operation, the Sugar Zone asset is Ontario's first new high-grade gold mine in over ten years. Stephen Roman, chairman, president and CEO of Harte Gold, is in a confident mood: "When I took over, we had a market cap of C\$1 million". In early December 2018, the company was worth C\$212 million.

The Harte Gold leadership team was joined by Ontario premier Doug Ford and the Minister of Energy, Northern Development and Mines, and Indigenous Affairs, Greg Rickford to cut the golden tape and officially open the mine that has been years in the

making. Roman thanked the town of White River and the Netmizaaggamig Nishnaabeg and Biigtigong Nishnaabeg First Nations for their continued support, and spoke of how the Sugar Zone mine will revitalize the community in northwestern Ontario. ■

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Kim
Truter

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CEO
DE BEERS CANADA

“
The most exciting focus for De Beers Canada is the Peregrine acquisition. The permitting and study phase will take another two to three years, and once the environmental baseline study has been completed we will be able to develop the project further.

Can you provide an overview of De Beers' current footprint in Canada?

De Beers has been in Canada for 50 years and currently owns four assets in the country. We have two in the Northwest Territories – the Snap Lake mine and the Gahcho Kué mine, and in Ontario we have the Victor mine. The Victor mine and Snap Lake mine began operating in 2008, with Gahcho Kué opening in 2016. To enhance De Beers portfolio in Canada, we recently acquired the Peregrine Diamond business, which includes the Chidliak resource on Baffin Island, and other assets in the Northwest Territories.

What have been the highlights from the Victor mine in its 10 years of operations to date?

The Victor mine has been a wonderful success story for De Beers, exceeding all expectations in terms of the life of the asset, the quality of the diamonds and revenue generated for all stakeholders. Globally, it has been the most consistent mine De Beers Group owns. Along with this, it has an excellent safety record: it is the safest mine that Anglo American owns. The mine recently won the prestigious John T. Ryan Award for national safety back to back in 2015 and 2016, followed by the John T. Ryan Eastern Region Award for 2017.

Its contribution to the Northern Ontario economy is significant: it is estimated that De Beers Canada will contribute C\$6.7 billion cumulative GDP impact for Ontario during the life of the Victor mine. A proportion of the cost of building Victor was establishing a power line that runs 400 kilometers up the coast of the James Bay region. De Beers Canada employs many people from the First Nations communities, who have benefited from training, employment, business contracts, infrastructure, and various taxes and royalty payments.

How is De Beers preparing for the closure of the Victor mine in 2019?

The final closure plans have been submitted and accepted, and the reclamation process has been underway for several years, even though the mine is still operating. Reclamation involves shaping the contour of the land to make it look natural, then covering that shape with the original musk egg (the nutritious material that we separated and stockpiled at the beginning of the operation) and finally planting as many indigenous species of trees and plants as possible. We have planted 500,000 trees so far, and have our own greenhouse on the property to stimulate growth, in partnership with the University of Alberta and a number of local northern Ontario businesses.

De Beers' Insight Report of 2018 states that two thirds of diamond sales now come from consumers aged 21-39 years old. How is the market changing in this respect?

The diamond jewelry market grew again in 2017, as demand reached a new record high of US\$82 billion. The way that people view diamonds now has changed significantly: Millennials and Generation Z, those aged between 21 and 39 years old, have now entered the market with a non-traditional approach. Many buy for themselves as an assertion of individuality and class. Where and how they buy is also different, as the online market has grown significantly, and in this respect De Beers Group has also evolved to catering for the changing market.

What are the expected milestones that De Beers hopes to achieve in the next two years?

The most exciting focus for De Beers Canada is the Peregrine acquisition, which was completed in September 2018. We have started to engage with the government and the communities in the area in order to understand their aspirations. The permitting and study phase will take another two to three years, and once the environmental baseline study has been completed we will be able to develop the overall project further.

De Beers Group has done some hugely innovative things in the past year, which in many ways has taken the company to a different level. Lightbox was a very bold move for us, and Peregrine was our first acquisition in years. Globally, De Beers Group has also announced its interest in tracking diamonds using blockchain technology, to track the diamond from point of origin to the consumers. We are the first diamond company to use blockchain technology for this reason. ■



Jim
Gallagher

President and CEO
**NORTH AMERICAN
PALLADIUM**

The global stock of palladium has been in deficit for several years now, with producers in South Africa scaling down their operations and announcing cutbacks due to the decreasing price of platinum.

How has North American Palladium evolved in recent years?

North American Palladium (NAP) today is very focused on its single producing asset, which is the Lac des Iles mine, north of Thunder Bay, Ontario. The company has certainly faced challenges over the last few years, but for the last six quarters, we have returned to profitability. NAP has fundamentally changed the mine from an engineering point of view and from a team and a leadership point of view, which has been a large part of the turnaround.

NAP's underground mine is now producing at over 6,000 tonnes per day (mt/d), which makes it one of the larger mines in the province, and this amount has been supplemented by some of the low grade stock from surface, to increase production at the mill to over 12,000 mt/d. In addition to the increase in production, NAP's unit costs have decreased. We are now one of the lowest cost mines in Canada, mining underground for less than C\$40 per tonne delivered to surface.

Can you expand on the transaction that led to Brookfield Asset Management (BAM) acquiring 92% of North American Palladium in 2015?

NAP was re-capitalized in 2015. Brookfield Asset Management (BAM) took over the company, after having previously stepped in with a substantial loan in 2013. BAM has a fund that looks for distressed assets with high potential in various business segments, and then has the means and expertise to turn their fortunes around. BAM look for significant equity and value increase, and do not hold on to companies for too long. In the case of NAP, BAM is now looking into a strategic process which may include the sale of the company.

How have you managed such significant increases in productivity?

NAP made the decision to move away from the large blast hole mining that was starting to create some ground problems from seismic rock burst issues, to a variation of sub-level cave mining called sub-level shrinkage mining method ("SLS"). The bulk of NAP's production now comes from the SLS zone. The shrinkage comes from the fact we are operating under an

existing mine, and we are minimizing the cave by introducing waste from the surface. It has become much more productive, more reliable, and has a lower unit cost. Due to this change in method, we are now able to go back to the upper part of the mine which was historically mined out, but now provides an economically viable resource.

Can you elaborate on NAP's claim to be the only pure play palladium producer in mining?

Almost all of the palladium in the world is produced as a byproduct from mining other minerals and metals. The Russians are the biggest producer, with Norilsk having the largest deposit, producing around 40% of the world's palladium, as a byproduct of nickel and copper. The South Africans also produce a high percentage of the world's palladium, largely as a byproduct from platinum mines. The only other pure producer in the world was Stillwater Mining in Montana, but they were bought by Sibanye Gold, from South Africa.

How do you see the fundamentals of palladium as a metal of the future?

Palladium is a precious metal, but it is very industrial, with 80% of its consumption coming from auto sales. Auto sales around the world have grown at around 2% year on year over the last decade, with the Chinese market being a catalyst. The move away from diesel engines, that tend to use platinum in catalytic converters, is another factor driving up the price of palladium, which is used more in gasoline and hybrid engines. The global stock of palladium has been in deficit for several years now, with producers in South Africa scaling down their operations and announcing cutbacks due to the decreasing price of platinum.

What are the key objectives for NAP moving forward?

The other positive part of NAP's story is the exploration potential in the region within 50 kilometers of Lac des Iles. The Sunday Lake property, which NAP optioned from Transition Metals and Impala Metals, has had very promising drill results, and we will continue to pursue this. ■





Exploration

"From a provincial standpoint, the liberal government that was in power for 15 years heavily debilitated the industry – bureaucracy increased and the amount of permits required for a new project kept expanding. The new Ontario Mining Act of 2013 was a major blow to exploration."

- Stephen Roman,
chairman, president and CEO,
Harte Gold Corp



Exploration in Ontario

The hunt for the next world class deposit

As impending mine closures for the major players approach, the eyes of the junior community are widening with an acute sense that new greenfield projects of substantial proportions and quality will have to be found, or acquired, in the near future. In a tier one jurisdiction with little threat of political instability halting production, the prospect of a high-grade discovery in Ontario is tantalizing for all involved in the industry.

The Ring of Fire has yet to catch light, as the two proposed 300-km all-season roads necessary to access the remote Eagle's Nest project became caught up in lengthy First Nations consultation. However, a turning point came in 2017, as Noront Resources changed its approach, deciding to make the indigenous peoples proponents of the access roads, enhancing their participation in the environmental assessment (EA) process. Regarding the construction timeline, Alan Coutts, CEO of Noront Resources, expects EA work on the roads to be completed by the beginning of 2020, with construction due to start immediately afterwards: "Construction will start on the Eagle's Nest mine once the permitting process is finished and physical construction of the roads has begun," he said.

High-grade discoveries at Red Lake

The Red Lake Gold Camp, northern Ontario, is home to Goldcorp's Red Lake mine, one of the largest gold camps in Canada and the world. It is also the location of a hive of exploration activity, as a variety of juniors jostle for a share of the spoils in a district that has produced over 29 million ounces (oz) of gold since 1949.

Vancouver-based junior Great Bear Resources (GBR) caused a stir in the Canadian mining community in August 2018, when results of its high grade gold discovery in the famous Red Lake Camp in Ontario included 16.35 meters of 26.91 grams per tonne (g/mt) gold and 7 meters of 44.47 g/mt gold. Since the announcement of the drill results at the Dixie project's Hinge zone, GBR's share price rose from C\$0.50 to C\$1.80 in less than a month.

Toronto-based investment banking firm, IBK Capital, orchestrated a C\$10 million private placement for GBR on August 24, 2018, which included a C\$4.8 million investment from Rob McEwen. Michael White, president and CEO of IBK Capital, is bullish about the potential of the discovery: "A high-grade deposit of this size, concentrated in a near vertical shoot or hinge, is straight-forward to mine, and such a discovery could easily trade through C\$1 billion dollars in value," he proclaimed.

Another junior with lofty aspirations to become Canada's next iconic gold company is Pure Gold Mining (PGM). Like GBR, PGM has

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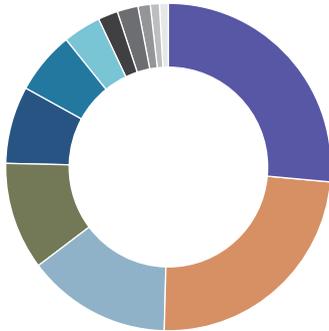
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EXPENDITURES IN EXPLORATION AND DEPOSIT APPRAISAL (2018 estimates as of October 2018)

Source: Natural Resources Canada



	C\$ million	% of total
● Quebec	623,1	26,4
● Ontario	567,5	24
● British Columbia	335,5	14,2
● Yukon	249,4	10,6
● Saskatchewan	187,2	7,9
● Nunavut	143,9	6,1
● Northwest Territories	86,2	3,7
● Newfoundland and Labrador	48,3	2
● Manitoba	47,7	2
● Alberta	33,3	1,4
● New Brunswick	20	0,8
● Nova Scotia	17,7	0,7
Canada total (rounded)	2359,8	100

also acquired land at the Red Lake Camp, assembling 100% ownership of over 47 square km of contiguous mining claims. Its Madsen mine asset has produced 2.5 million oz of gold, making it the second largest historic gold producer in Red Lake. Darin Labrenz, CEO of PGM, reflected on the quality of the Madsen asset: "There is a global scarcity of quality projects. Pure Gold Mining has one of them, sitting in a strong, stable mining jurisdiction, that has witnessed over 100 years of mining activity."

The third junior vying for success at the Red Lake Camp is Rubicon Minerals. A former producer, Rubicon successfully came through a Companies' Creditors Arrangement Act (CCAA) bankruptcy protection process in late 2016, raising C\$45 million while in bankruptcy protection. Utilizing the Flow-Through Share (FTS) program, Rubicon managed to raise C\$10 million more in March 2017, and another C\$10 million in February 2018. George Ogilvie, president and CEO of Rubicon, detailed the infrastructure at the Phoenix gold project, and the tax advantages Rubicon's context offers its shareholders: "Rubicon has mine infrastructure which is fully built and permitted, with a working mill, tailings pond, a 200-man camp on-site, and with the benefit of C\$687 million worth of tax-loss pools. If the Phoenix gold project went to commercial production, we would defer paying taxes on any profits, and the tax-loss pools could also be advantageous if we were to look at M&A activity at a later stage."

Ogilvie pointed to the personal investment he made of C\$650,000 into Rubicon Miner-

als as tangible evidence of his belief in the project.

On the west side of Red Lake, Toronto-based junior West Red Lake Gold Mines owns a 3,100-hectare land package consisting of three properties with a 12-km strike length on the Pipestone Bay St Paul Deformation Zone (PBS zone). West Red Lake's

Rowan mine property is owned and operated in a 60/40 JV agreement with Goldcorp, giving them a direct link to the major player in Red Lake. Jon Kontak, president and CEO of West Red Lake, believes the company is

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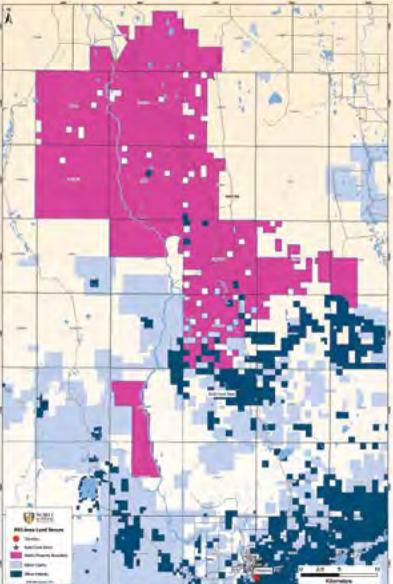


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Chris Taylor

President and CEO
GREAT BEAR RESOURCES



There is a cyclical rotation and money made in other industries is now returning to the mineral resource industry, especially to the gold sector. People are starting to realize that gold is undervalued, and interest is returning.



Can you give an introduction and brief overview of Great Bear Resources?

Great Bear Resources (GBR) is a Red Lake gold explorer. What differentiates us from competitors in the market is that we have a very tight share structure, with 35 million shares outstanding making it 47 million shares fully diluted. We are working in the Red Lake district and all our projects are 100% owned with no royalties, which is a great advantage. We are also fully funded, with a C\$12 million financing closed in September 2018. We have been very fortunate to keep finding high-grade gold near surface at a significantly well mineralized zone just outside of Red Lake.

How did Great Bear Resources manage to attain such quick funding in the current market?

GBR obtained exceptional results, which contributed significantly to the company attaining quick funding. It has been decades since a discovery of this size and quality in the Red Lake district. The high-grade underground material found at the main Red Lake gold mine, as well as subsequent discoveries, such as the Gold Eagle deposit that was sold to Goldcorp for C\$1.3 billion in 2008, combined with GBR's exploration results, led to the company attracting significant investment.

Rob McEwen has a significant background with Goldcorp at Red Lake, and when he saw the results of GBR's discovery, he was very quick to get involved. With his experience in the area, we were very pleased to have him come on board as a shareholder.

Can you elaborate on the South Limb Zone discovery as well as the potential of the Dixie project?

The Dixie property covers approximately 10,000 hectares and straddles the hinge of a major regional fold in a group of greenstone rocks. We have made three back to back high-grade gold discoveries of which the first one was in September 2017. We had 10 meters (m) of 16 grams per tonne (g/mt) of gold, which came out of the Dixie limb target. The Dixie limb target is a continuously mineralized geological zone which has approximately 500 m of drilling opportunity, and we also have step-outs of this limb for approximately 2 km. Not one drill hole has failed to hit gold at the Dixie limb. In September 2018 we again caught the market's attention by intercepting 26 g/mt over 16 m, and 15 m vertically below where we intercepted 68 g/mt over 7 m.

More recently we have drilled the south limb zone, which is a series of high-grade, Red Lake style quartz gold bearing veins. These veins reach up to 40 m in width and appear to have the opportunity for several km of strike length. We have only drilled along a couple hundred meters, hitting gold-bearing veins in each hole with a mineralization result as high as 346 g/mt gold over 0.5 m. More drilling is required in all the zones, but all seem to have significant large-scale potential.

How do you see the fundamentals of gold moving into 2019 and beyond?

There is a global demand for gold which cannot be 100% satisfied. We are starting to see interest rates increase again and gold will be worth more in the near future than it is now. There is a cyclical rotation and money made in other industries is now returning to the mineral resource industry, especially to the gold sector. People are starting to realize that gold is undervalued, and interest is returning.

What are Great Bear Resources' principal objectives in the next 12 months?

GBR would like to provide the general market with an understanding of the scope and the quality of the mineralization system that we have in the Red Lake district. We aim to have approximately 65,000 m drilled on the project by September 2019, which will give the market a good idea of the deposits we have. If you are interested in putting your money into a high-quality resource investment, GBR presents an excellent opportunity as we are the 100% owner of our projects without having any royalties, we have a very tight share structure and we do not have to go back to the market to materialize the benefit of our current program. ■

Darin Labrenz

President and CEO
PURE GOLD MINING



Could you provide a brief background of Pure Gold Mining as well as your outlook for the Madsen gold project?

Pure Gold Mining was formed in 2014 with the acquisition of the historical Madsen mine in Red Lake, Ontario. In September 2018, we announced an updated Preliminary Economic Assessment that showed a 14-year mine life, producing 911,000 ounces of gold. It is one of the lowest capital intensity projects coming through the global pipeline at present. There is a low initial capital expenditure of C\$51 million over 12 months for pre-production construction, because of the existing mill and underground access, with near-term mining production. We are on target to finalize a Definitive Feasibility Study (DFS).

You continue to explore and want to expand through satellite deposits Russet South, Wedge and Fork. What is your vision in terms of project scalability?

Pure Gold Mining announced an initial resource at two new satellite deposits, Russet South and Fork, near to the Madsen mine and mill complex in Q4 2017. We subsequently discovered the Wedge deposit through an extension of the geological model at Madsen. We continue with an aggressive exploration program which aims to grow these satellite resources to allow for scalability of our operations. We are now completing engineering studies and an updated mineral resource report on the satellite deposits.

What objectives do you wish to attain in the next two to three years?

We want to bring Madsen into production and generate positive cash flow. We will continue to enhance shareholder value and remain open-minded about future acquisitions in the Canadian, high-grade, underground geological environment for sustained growth. ■

George Ogilvie

President and CEO
RUBICON MINERALS



A lot has changed at Rubicon Minerals in recent years. Can you give us an update?

The last couple of years have been tumultuous but optimistic for Rubicon. In late 2016, we successfully came through a CCAA bankruptcy protection process and raised C\$45 million while in bankruptcy protection. From that, we were able to pay a portion of our creditors, and the company was restructured.

Starting in early 2017, Rubicon decided to do 18 months of exploration on the Phoenix gold project in the Red Lake gold camp to better understand the structural geological model and put out a new NI 43-101 Mineral Resource Estimate, which was completed in April 2018. At a 3 gram per tonne (g/mt) gold cut-off grade, we have in excess of 1 million ounces (oz) of resources within the deposit, which is a significant step up from the approximately 400,000 oz which the 2016 NI 43-101 seemed to show.

At what stage do you envisage the Phoenix gold project becoming viable?

Approximately 230,000 oz of the resource are in the measured and indicated categories, and we want this number to exceed the 500,000 oz threshold. Reaching this target could potentially provide a commercially viable mine, independent of the price of gold.

What advantages does Rubicon Minerals have over juniors at an earlier stage of exploration?

Rubicon has mine infrastructure which is fully built, permitted, with a working mill, tailings pond, a 200-man camp on-site, and with the benefit of C\$687 million worth of tax-loss pools. Rubicon has an MOU and exploration agreements with the indigenous groups of Red Lake, and once the feasibility study is at an advanced stage, consultations with regard to the impact benefit agreement (IBA) could meaningfully advance.

Why should investors consider Rubicon Minerals to be an attractive proposition moving forward?

Rubicon has more than 28,000 hectares of land in Red Lake – approximately 40% of all the claims and concessions in the area, second only to Goldcorp. Located in a tier 1 jurisdiction, Red Lake is a world-renowned gold mining camp, in a unique situation where the mine infrastructure is already built. If you look at infrastructure on site, the tax-loss pools available and the cash in the bank, the conceptual value of Rubicon Minerals even without a mine, in terms of its break-up and salvage values, is roughly C\$80 million. ■

Pat Dubreuil & Richard Murphy

PD: President

RM: CEO

MANITOU GOLD



PD



RM

PD: There is a saying: 'the best place to find a new mine is beside an old mine.'

How did Manitou Gold acquire 25% of the Goudreau-Lochalsh Deformation Zone within 18 months?

RM: Manitou Gold's 25% acquisition of the Goudreau-Lochalsh deformation zone (GLDZ belt) has been a rapid and strategic implementation. In 2016, Pat Dubreuil was trying to secure the purchase of the Edwards and Cline mines located on the GLDZ, near Dubreuilville, Ontario. He happened to approach one of Manitou Gold's directors who then brought the opportunity to my attention as CEO.

The western 10 kilometers of the belt represent around 50% of the total of the GLDZ, and that area is completely owned by Alamos Gold – who acquired Island Gold in November 2017 through their takeover of Richmond Mines. A private equity group owns another 25% on the east end of the belt.

In 2017, we identified and purchased four very important old mining patents consisting of over 160 acres adjacent to two past producers: the Edwards and Cline mines. Following this deal, we went on to purchase another set of claims known as the "RockStar" property, totaling in excess of 7,000 acres, from Argo Gold in April 2018. Manitou Gold now controls the remaining 25% of the land along the Goudreau-Lochalsh deformation zone. The entire strike of the zone is well over 20 km long.

What makes the Goudreau Belt an attractive investment opportunity?

PD: Alamos Gold's exploration activity is quickly proving up 2 million ounces (oz) of defined reserves in the area. They have been consistently producing 100,000 oz/y and have become one of the lowest cost producers in Ontario. Their drilling program and budget over the next 18 months has increased from C\$12 million at the start of the year, to C\$20 million currently, due to their excellent drilling results.

How are you financing your activities?

RM: Manitou Gold announced a C\$1.4 million equity financing in August 2018. We will be careful with this investment. We currently have two teams of geologists on the Goudreau properties working within budget and will continue with this strategy until the end of 2018. As the market picks

up at the start of the upturn, and in addition to the fact that we are fully permitted for the next three years, we are positive on garnering significant interest for the project. We have attained letters of support from investment banks in Toronto to raise C\$30 million under the specific business plan we have put forward.

Have the trends towards investment in cannabis and crypto-currencies affected the junior mining industry?

PD: During a recent TSX-course I attended, around 80% of the 250 participants were from new cannabis companies to be listed on the stock exchange. This illustrates the current level of interest and activity in the sector and reflects the number of new TSX-V listings. However, as in the past, bubbles inevitably do collapse and investors return to the basics. We believe it is just a matter of time before the investors come back to the commodity market. Several of the majors are mining old deposits and do not have replenishment resources in place.

Manitou Gold is positioning itself to be an incredibly attractive investment option for a major company looking to acquire a deposit with huge potential in a safe and productive jurisdiction. Both the Kenwest and Goudreau properties offer this upside.

Would you like to add a final message about Manitou Gold and the exploration potential in Ontario?

RM: Manitou Gold can deliver our shareholders an awful lot of value on the front end, through the discovery phase and initial resource identification. That is our specialty – to get through to a PEA or scoping study level, from resource to reserves. However, when it comes to mine permitting, financing and development, we would like to bring in other experts to take this next step.

PD: Ontario is one of the best mining districts. It is the largest mining province in Canada and is very investor-friendly. Both projects are adjacent to past producing mines, and in re-emerging gold belts. There is a saying: "the best place to find a new mine is beside an old mine", and we have absolute confidence that Manitou Gold's properties can host world-class deposits. ■



Vance White

President & CEO
**NOBLE MINERAL
 EXPLORATION**

The sheer size of our land package at Project 81 lends itself to the project generator model, coupled with the fact that it has been an under-explored area.

Can you provide an introduction to Noble Mineral Exploration?

Noble Mineral Exploration (NOB.V) is a junior exploration company holding the wholly-owned exploration and development property, Project 81, in excess of 79,000 hectares of mineral rights in the Timmins/Cochrane area of Northern Ontario. Upon this package, we plan to generate joint venture exploration programs. We refer to this business model as a project generator, and we have a full and complete compilation of all of the historic data. Spruce Ridge, MacDonald Mines, Orix Geoscience, CGG Geoscience and BECI Exploration Consulting are Noble's current strategic partners.

Can you elaborate on Noble's principal asset, Project 81?

The property hosts a number of zones that have historical exploration identifying nickel and gold mineralization, as well as results from drilling conducted by the company in 2012 and 2018. Glencore's Kidd Creek mine, which has produced over 150 million tonnes since 1963, lies only 3 km south of Project 81. These very large volcanogenic massive sulfide (VMS) deposits occur in clusters which lend themselves to the opportunity for satellite deposits, and these satellite deposits could host between 30 to 50 million tonnes, with an institutional value of well over C\$1 billion. So far other VMS deposits of significance have not been found close to the Kidd Creek mine, mainly due to a lack of modern, systematic exploration.

Considering its proximity to Kidd Creek, why did the Project 81 area go unexplored for so long?

The entire land package was and still is privately-held, principally for its timber reserves. Inco had carried out drilling in the 1960s, but the property did not receive the focus and attention it merited due to a mix of market conditions and changes in ownership. After acquiring the property, we decided to carry out a number of modern geophysical surveys to get the property ready for when the financial markets turn around.

How has Noble positioned itself to advance exploration?

We are in the process of bringing in option and joint venture partners to de-risk the early stage exploration. As well as providing Noble with additional leverage, wherein we take large share and warrant positions, our partners are carrying out the exploration expenditure, and earn directly into target areas. Spruce Ridge, for example, elected to earn into 1,500 hectares and brought in a financing partner to go ahead with the early-stage exploration on targets that have been identified. Inco created a 500-meter drill hole that graded an average of between 0.25% and 0.30% nickel, but was never analyzed for cobalt. However, these very large deposits, similar to the Dumont deposit in Quebec, lend themselves to very large tonnage, low grade nickel, but with cobalt as a by-product.

What are the benefits of the project development business model that Noble utilizes?

The sheer size of our land package lends itself to the project generator model, coupled with the fact that it has been an under-explored area. The advantage to Noble by taking back those large share positions, is that it provides alternative liquidity opportunities if it chooses to sell the positions, but at the same time, should they hit, the share price will increase significantly and value will be created without great initial capital expenditure, all the while Noble would retain a direct interest in the find.

What is the strategy for Noble moving forward?

We are aiming to bring in five to seven new JV partners who will put exploration dollars into the program over the course of the next 24 to 36 months, in the order of C\$10-15 million, which would give a good shot of finding something significant. This is being initiated at the Crawford Township property by Spruce Ridge, and we expect that the Carnegie Township should follow soon after.

The recent announcement of the Barrick-Randgold merger is an example of the industry taking action as many large deposits reach the end of their mine life. We want to position Noble to take advantage of this opportunity. The majors and mid-tier mining companies need to start replenishing their resources, and in turn the price of gold will increase, as happens in every upcycle. Project 81 has huge potential, and investors could stand to make substantial returns. ■



The Aston Bay property in Nunavut hosts the Storm Copper project and the Seal Zinc prospect, with mineralization suggesting the potential for hidden Congo-style copper (as found at Kamo-a-Kakula) and Polaris-size zinc deposits.

- Thomas Ulrich,
 president and CEO,
 Aston Bay



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well positioned for when market conditions improve: “When capital starts to flow into the sector, we believe it will be a matter of time before we realize value for the property,” he said.

The best place to find a new mine is in the shadow of an old one

Continuing the theme of juniors focusing exploration on gold-rich, past producing areas, Manitou Gold is also following the adage that

‘the best place to find a new mine is in the shadow of an old mine’. Its acquisition of 25% of the Goudreau-Lochalsh deformation zone (GLDZ belt) came in two separate transactions: the purchase of four mining patents in 2017, consisting of over 160 acres of unexplored land adjacent to the past producing Edwards and Cline mines, followed by the purchase of Argo Gold’s RockStar property, totalling in excess of 7,000 acres, in April 2018.

Pat Dubreuil, president of Manitou Gold, sees Alamos Gold’s success in the GLDZ belt as an indication of the potential for world-class deposits there: “Alamos Gold’s exploration activity is quickly proving up 2 million ounces of defined reserves in the area. They have been consistently producing 100,000 oz of gold per year and have become one of the lowest cost producers in Ontario.”

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Creating value through the project generator model

With mineral prices stuttering and a lack of capital flowing into the junior space, the traditional junior business model of raising money for drilling activities is increasingly spurned in preference of a project generator model. One company following such model is Noble Mineral Exploration (NME), holding the Project 81 property, consisting of over 79,000 hectares of mineral rights in the Timmins/Cochrane area of Northern Ontario, located only 3 km north of Glencore’s famous Kidd Creek mine. Due to the size of the land package NME owns, it has been able to develop its assets with strategic partners such as Spruce Ridge, MacDonald Mines, Orix Geoscience, CGG Geoscience and BECI Exploration Consulting.

Vance White, president and CEO of NME, expanded on the type of mineralization in the vicinity of Project 81, and its potential: “These very large VMS (volcanogenic massive sulfide) deposits occur in clusters which lend themselves to the opportunity for satellite deposits, and these satellite deposits could host between 30 million and 50 million mt, with an institutional value of well over C\$1 billion.” Meanwhile, Toronto-based junior Orefinders was founded in 2012, an inopportune time for any company to enter the mining market. Stephen Stewart, Orefinders’ CEO, revived the company’s fortunes by shifting its focus from a single-asset junior into a project generator, acquiring two properties in 2018: the Knight project in the Abitibi region, which led to the spin-off company Power Ore, and the

Anaconda's strategy is to grow in Atlantic Canada, essentially acquiring near term gold assets, ultimately with a path to production. Ideally, we can leverage our current infrastructure, but we are trying to focus more on buying ounces versus building ounces.

- Dustin Angelo,
president and CEO,
Anaconda Mining



McGarry property, also situated within the Abitibi Greenstone Belt. When asked the reasoning behind such a strategy, Stewart declared: "The best time to drill is in a bull market and the best time to buy is in a bear market."

Canadian exploration beyond Ontario

Toronto is renowned for the global reach of its mining industry, but is also home to a number of junior companies with operations in other Canadian provinces. Some of the provinces outside of Ontario, while serving up logistical challenges, offer the benefit of under-explored land that often comes at a cheaper premium.

In late 2016, Black Widow Resources rebranded to BWR Exploration, shifting its attention away from Ring of Fire targets in Ontario and towards the Little Stull Lake gold project in Manitoba, which was acquired from Puma Exploration. Neil Novak, president and CEO of BWR Exploration, expanded on the reasoning behind the change of direction: "We targeted projects that have historical resources on them and that needed further exploration to bring them along the exploration cycle from historical resource to a maiden compliant resource."

Neil intends to prove this area of NE Manitoba, adjacent to the Ontario border, is an emerging gold camp of high potential: "The aim is to work over a few years with definition and delineation drilling to approach the 1 million-oz range," he said.

Anaconda Mining is not a typical junior mining company, producing an average of 15,000 to 16,000 oz of gold per year, which translates to an average of C\$20 million to C\$25 million in revenue. The Point Rousse project in Newfoundland, Anaconda's flagship asset, has been under development and in operation for ten years, with mill capacity to process 13,000 to 14,000 mt/d. Dustin Angelo, president and CEO of Anaconda Mining, divulged on the next steps for the advanced-stage junior: "We are in the transition to move to our Stog'er Tight mine, and recently found another discovery, Argyle, located approximately 4.5 miles from our mill."

One of the benefits of mining in Nunavut, the northernmost Canadian territory, is the amount of land available to explorers. Aston Bay is the 100% owner of the one-million-acre Aston Bay property on Somerset Island, Nunavut, situated high in the Canadian Arctic. Aston Bay is

exploring areas that have similar geology to the Central African Copper Belt and Teck's successful past-producing Polaris Zn-Pb mine. Thomas Ullrich, president and CEO of Aston Bay, believes there are very few places in the world that contain geologic conditions that allow for these types of deposit: "The mineralogy, zonation, grade and structural setting for both Storm Copper and Seal Zinc are similar to sediment-hosted copper deposits such as Kamo-Kakula as found in Congo, as well as zinc deposits such as Polaris, located just 200 km to the north." ■

BWR EXPLORATION

Little Stull Lake Gold Project

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Neil Novak

President and CEO
BWR EXPLORATION

What have been BWR's major developments in recent years?

BWR experienced some difficulty in raising funds for our Ontario projects, including one close to the Ring of Fire. Market conditions did not seem favorable to early stage projects, while negotiations between the regional government and First Nations groups had stalled. We thus made the corporate decision to move on to friendlier jurisdictions in Canada. We targeted projects that have historical resources on them, to bring them along the exploration cycle from historical resource to a maiden compliant resource. We acquired an interesting nickel-copper project in Quebec with a small historical resource outlined in 2015, and we were also introduced to a project in Manitoba – the Little Stull Lake gold project.

What is the status of Little Stull Lake in Manitoba?

In 2018, BWR acquired the project from Puma, knowing it would be at least a full year of negotiations to get permission from the various proponents to commence an exploration program that included diamond

drilling. The provincial government and the two local First Nations communities are working on ways to resolve the permitting problem. This involves creating synergies between BWR and the communities. I expect final agreements to be made by early 2019.

Where is funding for the project coming from?

BWR has engaged a Montreal based group to look for sources of financing. The nature and location of the project allows BWR to access flow through funds from investors that are looking for tax relief; Manitoba has one of the highest incentives in Canada. Certain charity type flow-through funds have requested and require assurance that BWR can spend the funds within the tax year that the tax credit is applied to. On this note BWR needs the comfort that the work permitting process with the communities and the provincial government is going to happen in a timely manner.

Once we have exploration funds in hand, we plan to replicate the findings of the Westmin historical resource, which will encourage

Alan Coutts

President and CEO
NORONT RESOURCES



Progress at the Ring of Fire has not been rapid in recent years. What has Noront Resources focused on in the last years?

Noront Resources has been working on the consolidation of the region. In 2015, Cliffs Natural Resources made its properties available for acquisition and, with the help of Franco-Nevada, Noront Resources bought out these properties for C\$27.5 million. The properties had undergone extensive work and were worth approximately C\$500 million, but due to a combination of factors, we were able to buy them for a fraction of this value. In 2016, we also bought out MacDonald Mines' assets in the Ring of Fire.

As a group, we believed that the Ring of Fire was the next emerging mineral district in Canada with the potential of approximately 15 mining projects over a series of decades. We decided to acquire as many assets and equity interests in the district as possible.

What have been the major developments with regard to the all-season access roads to the Eagle's Nest deposit?

Noront's terms of reference for Eagle's Nest included two 300-kilometer access roads,

which meant that we had an obligation to consult with numerous First Nations. We felt this was completely unmanageable and we went back to the government to discuss a change. We suggested making the First Nations the proponent of the access roads to the Ring of Fire, enhancing their participation in the environmental assessment (EA) process on their traditional lands. This approach was accepted in 2017, the model was changed, and this became a fundamental turning point. We hope to have the EA work completed on the roads within a year and a half and then there will probably be a two and a half year building period.

Do you think the recent government change will help accelerate the development of the Ring of Fire?

Greg Rickford used to be the Canadian Minister of Natural Resources under the Harper government, and then went on to serve on the board of Noront Resources before deciding to run provincially. He thus understands completely what our project is about, what the deliverables are, and what the next steps are. His significant knowledge and history of

additional investment into the project. BWR has little doubt that such additional exploration will result in larger findings than what the historical results suggest. The aim is to work over a few years with definition and delineation drilling to approach the 1 million ounce range, that will make this project an eye catcher and prove that this area in north-eastern Manitoba is an emerging gold camp.

What are BWR's immediate objectives moving forward?

BWR's immediate goal is to get the work permit issued that will allow us to do initial exploration and validation on the Little Stull Lake project, drilling in the order of 20 short test holes, replicating historical results near surface. Then, as the project matures, we will design a follow-up program that tests the depth and strike potential of the West Zone. We aim to raise C\$1 million for the project, which can be from the Flow-Through Program. We hope to start drilling activities in early in 2019 at the latest. The Little Stull Lake gold project has outstanding potential, and in my opinion it can turn into a world class gold deposit. ■

working with First Nations' groups is also of great advantage.

Noront Resources is searching for a Northern Ontario city to host its C\$1 billion ferrochrome production facility. At what stage is the bidding process?

Noront's first chromite project sits adjacent to the Eagle's Nest deposit, which means that developing infrastructure benefits both assets. We believe that the Black Bird chromite mine will initially be producing approximately 750,000 mt/y, which is sufficient to meet half the demand of the US stainless steel market. Four cities in Ontario bid for the location of the chromite facility, and we received outstanding bids from Sudbury, Timmins, Thunder Bay and Sault Ste Marie. One of the main criteria is a brownfields industrial site, as repurposing infrastructure makes sense from both an environmental and capital point of view. The shortlist has been narrowed down to Timmins and Sault Ste Marie. ■

Terry Lynch

Chairman and CEO

CHILEAN METALS

Can you provide an overview of Chilean Metals and its move into Nova Scotia?

We have two major businesses: one in Chile and one in Nova Scotia. What brings them together is the fact that they are on continental shelf plates. In the next months, we intend to spin out the Nova Scotia side of the business into a separate vehicle. Nova Scotia is the current focus due to its cheap exploration rates and high potential. It is a misunderstood jurisdiction and we believe it will become a significant player in the marketplace. Minotaur Exploration came up with the concept of exploring Nova Scotia in much more detail, due to it being the least explored crustal fault in the world. Minotaur did a regional program in 2007, spending C\$8 million, and identified a number of great targets that still need to be followed up. Due to market conditions, the core of these properties found their way into Chilean Metals' hands, and we have just started to explore them. The main focus is on our Bass River project, where there is an iron play with high levels of cobalt.

How do you see the current financial climate for juniors?

The smart money has started to come in, and this is always the first step in a turnaround. They know prices have bottomed-out and there is future funding to come. Caution is still evident, but if you have a good project, particularly in cobalt or gold, there is the chance for multiple returns. Crypto-currencies are a different animal, as they appear to be an anathema to precious metals, which

have always been seen as a bastion of safety. However, blockchain technology in general has a more sustainable future and I see it greatly benefiting mining.

Can you tell us more about your Chilean assets?

Chile is very important to us. We have two core projects there: Zulema and TDO. Zulema, a big track of land approximately the same size as Toronto, has been the focus for the last 18 months, and we have made progress in our exploration. We have found some promising high grade copper gold lenses. We are getting back to basic science there: taking information from the drilling, doing new magnetics, setting up the IP and conducting surveys. We are hoping to advance exploration at Zulema in Q2 2019. In Chile we are exploring the option of partnering out, as the projects are massive for a micro-cap junior.

Can you expand on the transaction that saw Teck purchase the Copaquire asset in 2015?

Chilean Metals sold the Copaquire project to Teck for C\$3 million and kept a 3% royalty. Teck acquired Copaquire initially as a land-banking exercise. They were already in the permitting process of QB2, and to do any work at Copaquire would have needed an extensive and expensive reworking of permitting. Now, they are in the phase where they bought out their minority partner and are looking for a new partner to come in for QB2. ■





Engineering and Construction

"Our clients tell us they want local labor but international best practices in terms of performance and safety. Separating people from the hazards is the next step from a safety standpoint, through remote operation and the development of processes."

- Roy Slack,
president,
Cementation



Fortifying the Foundations

The EPCM companies building the mines of the future

The lack of new projects during the downturn forced engineering firms to reevaluate their approach, downsize, merge and innovate to enhance their capabilities and become leaner, more agile entities. However, the challenging conditions did not mean doom and gloom for all companies, as a broad spectrum of EPCM players from large multinationals to new players in the market proved that adversity can create its own set of opportunities.

Multi-disciplinary EPCM group DRA Global has established itself as a more agile alternative to the blue-chip engineering and project delivery companies, according to Wray Carvelas, DRA's CEO and executive director. Since 2016, acquisitions such as the Met-Chem business in Montreal

and more recently Perth-based engineering company, Minnovo, have strengthened DRA Global's platform in francophone Canada, francophone Africa and Australia, enhancing its open-pit mining capabilities. It has also allowed DRA to re-domicile its corporate holding company to Perth, in a strategic move to extend client-facing capabilities to ASX clients, complementing the Toronto and Montreal offices which cater for TSX clients.

DRA offers the full life-cycle of services to its clients – from concept study through to commercial operation. Against this backdrop, it is advancing towards the digital mine: "DRA is investing in the transition towards predictive maintenance and prescriptive optimization of mine facilities, the

backbone of which is MOMS (Mine Operations Management System)," explained Carvelas.

Another South African to have made a positive impact in the Ontario mining industry is Justin Taylor, president of engineering firm Halyard, who established the Toronto-based company in 2012 to focus on smaller, fast-tracked projects. Halyard has grown from one employee to a workforce of 22 people in its six years since creation, having worked for mining companies such as Harte Gold, Alamos Gold, Stornoway Diamond and Agnico Eagle.

Halyard won the EPCM contract for Harte Gold's Sugar Zone property, Ontario's newest gold mine, a fast-tracked project that took 15 months from beginning to comple-

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tion. Since then, based on the delivery success of the initial project, Halyard has been asked to be involved in the expansion of the Sugar Zone mine. Taylor elaborated on the agility that Halyard can offer its clients: “We believe the large EPCM firms struggle to deliver smaller capital projects (below C\$60m) in a fast-tracked and efficient manner and this is the space we operate in.”

Cementation, recipients of the gold award in the Mining and Natural Resources category as one of Canada’s Safest Employers for 2017, has developed a safety culture that permeates through the organization, assured Roy Slack, president of Cementation Canada. Slack recognizes that innovation is more than just a cost saving measure: “When you talk about innovation, it is not necessarily automation, but different processes that take people away from the face or away from the greatest risk. Separating people from the hazards is the next step from a safety standpoint, through remote operation and the development of processes.”

Engineering giant Jacobs acquired CH2M Hill for US\$3.27 billion in December 2017, and has seen double-digit pro forma revenue and profit growth since the merger came into effect. In September 2018, it was announced that Sirius Potash will continue to move forward with their Wilton project, and Jacobs was awarded the material handling facility (MHF) construction contract, due to start by Spring 2019.

Jeremy Okolisan, VP of business development for the Americas for Jacobs MM&T (Mining, Minerals and Technology) division, intends to leverage the experience of Jacobs Connected Enterprise (JCE) in sectors such as aerospace, to provide innovative solutions to the mining industry: “We want to adapt and bring these technologies into the mining sector, particularly in the areas of automation, control systems, monitoring and cyber security,” he said.

DMC Mining Services, in operation since 1980 as a mining contractor, pledges to ‘build mines of the future’. In February 2018, DMC was awarded a contract to develop a 1,600-meter shaft and two smaller ones for UK-based Sirius. The driverless shaft sinking unit will be one of only six globally, the first being the SBR (Shaft Boring Roadheader) at the Jansen potash project in Saskatchewan. Graham Buttenshaw, president of DMC Mining, elaborated on the technology: “Instead of having people down the hole drilling, blast-



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we were all in on it together.**



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Jeremy Okolisan

Vice President Business Development
JACOBS

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The mining industry is known as a late adopter of various technologies, but Jacobs is looking to change this, particularly in the areas of automation, control systems, monitoring and cyber security.



How has the US\$3.27 billion CH2M Hill acquisition enhanced Jacobs' capabilities?

Jacobs officially acquired CH2M on December 18, 2017, creating a US\$15-billion professional services leader focused on delivering innovative solutions for a more connected, sustainable world. Jacobs formed an Integration Management Office (IMO) in August 2017 to begin integration planning. Jacobs has three lines of business: Aerospace, Technology, Environmental and Nuclear (ATEN); Building, Infrastructure and Advanced Facilities (BIAF); and Energy, Chemicals and Resources (ECR).

Many people are not aware of the number of mining and minerals projects Jacobs has executed in the past and is currently involved in. Jacobs' Mining, Minerals and Technology business unit is a key part of the company's industrial projects portfolio, supported by more than 4,000 of Jacobs' staff and craft personnel globally.

Within the mining industry, which areas are currently driving business growth for Jacobs?

The mineral side of mining, such as processing phosphates, sodium bicarbonate and potash, continues to grow. There has been a huge uptake in sodium bicarbonate, particularly in trona in Wyoming. Meanwhile, Jacobs Engineering South Africa (JESA), Jacobs' joint venture with OCP, continues to deliver phosphate projects, as well as other industrial and infrastructure programs. Most recently, Jacobs received the EPC contract for Sirius Minerals' new materials handling facility (MHF). Other commodity markets continue to recover, with increased interest from the lithium and gold markets in recent months.

Will the innovation developed by Jacobs for other business sectors be introduced to the mining industry?

Jacobs Connected Enterprise (JCE) is the company's movement to solve clients' toughest problems by combining digital savvy with human ingenuity. Today, Jacobs is applying digital intelligence lessons learned from its work in the aerospace, advanced facilities and nuclear defense industries and adapting them for other sectors, including mining. The mining industry is known as a late adopter of various technologies, but Jacobs is looking to change this, particularly in the areas of automation, control systems, monitoring and cyber security. An example of this is our use of virtual reality to perform

design and safety reviews on an iron ore project in Western Australia.

Can you expand on the EPCM contract Jacobs is working on for Oyu Tolgoi?

In 2016, Jacobs was awarded the EPCM contract for the Oyu Tolgoi Underground Project, which will be delivered over a five to seven-year period. As the EPCM contractor, Jacobs' is delivering the technical solutions for the underground scope, including the materials handling systems for the mine and associated underground infrastructure, as well as all surface infrastructure. In addition, Jacobs is implementing the modifications to the concentrator and managing a number of engineering services providers (ESPs) across the globe. The project will be one of the highest capacity block caving operations, transporting treated ore from a depth of more than 1,400 meters, by a combination of high capacity incline conveyors and hoisting systems.

By applying the company's relationship-based approach, Jacobs is working collaboratively with the Oyu Tolgoi team, key suppliers and construction contractors to deliver a project all stakeholders are proud of. The Oyu Tolgoi Underground Project is the most recent example of Jacobs' continual involvement in developing and delivering the world's largest and most complex underground mines, from South America to Australia, Africa and now, central Asia.

What is Jacobs approach to working with indigenous peoples?

Jacobs has long-standing relationships with First Nations communities, and the company's teaming arrangements across Canada can vary from the traditional arrangement, to legally forming a new company as an LLP. Jacobs recently established a new LLP with the Shxw'ow'hamel First Nation in British Columbia, with both parties having equal representation on the executive committee. The intent of this partnership is to deliver solutions that contribute to sustainable communities through water, environmental and engineering projects.

In northern Ontario, Jacobs has recently been assisting a mining company with use of a software tool for documenting communications with communities. Jacobs also continues to support the Ontario Mining Association (OMA); the company is a member of the OMA Environment Committee and recently joined the OMA Indigenous Relations Committee. ■

Wray Carvelas & Pierre Julien

WC: CEO & Executive Director

PJ: Executive Vice President Americas

DRA GLOBAL



WC



PJ

What have been the main milestones for DRA Global in the last two years?

WC: DRA Global has focused on a robust internationalisation and growth strategy. We have concluded transactions such as the acquisition of Met-Chem in Montreal in 2016, which has given us an excellent platform in francophone Canada and francophone Africa, and also enhances our open-pit experience. Also, in August 2018 DRA Global acquired Minnovo in Australia, which has allowed us to re-domicile our corporate holding company to Perth. This further advances on our global ambitions and extends our capabilities in Perth for ASX clients, also complementing our Toronto and Montreal offices that cater for TSX clients.

What range of solutions do you provide?

PJ: DRA Global's expertise includes the complete project life cycle and project development from pit to port, through mining, mineral processing, plant optimisation, operations and maintenance and related water, energy, and infrastructure requirements. We deliver comprehensive and tailored solutions across all knowledge areas including overall project management, planning, cost control, safety management, quality assurance, procurement, logistics management, construction management, commissioning and commercial operations.

Can you highlight some of DRA Global's key projects within the mining industry?

PJ: Currently, the key Americas project for DRA Global is a large engineering contract for the C\$1 billion Nemaska Lithium project in Quebec. Other key projects include a study for Steppe Gold in Mongolia, basic engineering services for Moblan Lithium in Quebec and basic engineering services for ArcelorMittal in Mexico. Our team of diamond processing experts have been contracted by Stornoway to provide engineering and field support services for their processing plant at Quebec's first diamond mine. Additionally, we are involved with a number of advanced studies for a major private equity firm which has assets in Nevada. In Africa, DRA Global recently completed the engineering, procurement and construction management for JSE-listed Pan African Resources' Elikhulu gold tailings re-treatment facility in Mpumalanga, South Africa. And in Guinea, DRA Global has successfully completed the development of a process and port facility and associated infrastructure for bauxite export by Alufer Mining. DRA Global has also been awarded the front-end engineering design (FEED) contract by Hasting Technology Metals for the Yangibana rare earths project in Western Australia.

Can you elaborate on DRA Global's areas of innovation?

WC: We have a group of specialists focused on digital transformation. We understand this has the potential to change safety outcomes, enhance performance and ultimately unlock opportunities. We continue to move towards real-time mine optimization and asset management, from mine design to operational excellence. DRA Global is investing in the transition towards predictive maintenance and prescriptive optimization of mine facilities, the backbone of which is MOMS (Mine Operations Management System), which is being used successfully across a number of our operations.

PJ: The Nouveau Monde Graphite project is one of DRA Global's important areas of innovation as it is the first time we have worked on a fully electric open pit mining project. All electric ore and tailings transportation require unique mining solutions which challenge conventional mine development and planning. Another area of innovation is in DRA Global's mineral operations business – we operate 18 mineral plants in Africa and the Middle East.

What differentiates DRA Global from other EPCM companies?

WC: Clients recognise the value of our comprehensive knowledge and broad experience in EPCM, EPC and hybrid contracting solutions. DRA Global operates more than 30 facilities worldwide and we understand what it takes to design and operate world class facilities. We design plants that are simple to operate and easier to maintain. We understand our client's requirements and we own the full outcome of every project and operation that we deliver.

PJ: We apply our knowledge and experience of operations to our designs and to our delivery. We strike a balance between a small footprint and operability of the mine. DRA Global likes to challenge conventional wisdom. We take the partnership much deeper with our clients, we have a vested interest in developing innovative contract solutions that align our teams with the owner's team. ■



Roy Slack

President
CEMENTATION CANADA

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We are trying to build the mines of the future with the procurement strategies of the past. We have to be innovative in more than just equipment, but also in how we train people and how we do business.



Cementation has just celebrated its 20th anniversary. What have been the highlights from its Ontario operations in the last 12 months?

Onaping Depth is an iconic project for Cementation which is just starting. We initially won the contract in 1999, but the project never got board approval from Falconbridge at that time. It is a deep, challenging project, and we have started raise boring the pilot for the shaft, the design work has moved forward, and we will begin sinking soon.

Cementation has also begun work for Kirkland Lake Gold, working on a deep, design-build, greenfield shaft, for which we are overseeing both surface and underground construction. We are also doing the last leg of the Young Davidson shaft, a very unique bore hole hoisting project – using a raise bore hole instead of drilling and blasting a shaft.

Cementation has been named Canada's safest employer in the natural resources sector. Is the target of zero harm really achievable?

The way we define Zero Harm is having no injury that would impact your quality of life. If we are running 20 projects and have two lost-time injuries for the year, that means no injuries took place at 18 projects, and a number of those have been incident free for years. If zero harm can be achieved at one mine site, we must believe it can be achieved at all.

The next step for Cementation is to separate people from risk. When you talk about innovation, it is not necessarily automation, but different processes that take people away from the face or away from the greatest risk. Performing shotcreting remotely instead of bolting and screening is an example of this. At Cementation we have developed an excellent culture within the company. The upturn has caused a significant increase in activity in the past 12 months, and the challenge is to make sure the safety culture permeates through the whole organization as we bring more people on board.

How have Cementation's joint venture partnerships with First Nations groups helped solidify its footprint in Canada?

In Canada Cementation works coast to coast to coast. Our work includes ongoing development and production at Hope Bay for TMAC on the Arctic coast of Nunavut, and underground development at the Diavik diamond mine in the Northwest Territories. These projects have been developed through our alliance with the Kitikmeot. Kitikmeot Cementation is a partnership that was developed in 2005, and has been a model for indigenous collaboration. Cementation currently has 12 operating JV partnerships with First Nations groups across Canada.

Can you expand on Cementation's *Best for Project* philosophy?

The *Best for Project* philosophy is all about putting what is best for the project before profit. An example of this is Young Davidson, where we performed the feasibility study, priced out a traditional shaft, but then realized by utilizing bore hole hoisting we could cut the capital in half – saving the client a significant amount that would have been paid to Cementation. Our engineering group performs permanent plant design for mine owners, using the Best for Project blueprint. In addition to creating greater value, we feel this approach also helps eliminate adversarial relationships on projects.

What are the next steps the mining industry must take to evolve?

To paraphrase Tolstoy, "everyone wants change, but nobody wants to change" – that has summed up the mining industry in the past with regard to innovation. Today there is more of an appetite for change, but Canada needs to invest more. We are trying to build the mines of the future with the procurement strategies of the past. We have to be innovative in more than just equipment, but also in how we train people and how we do business.

At Cementation we are working to define our service model internationally – our clients tell us they want local labor but international best practices in terms of performance and safety. Separating people from the hazards is the next step from a safety standpoint, through remote operation and the development of processes. Cementation is evolving from an EPC model to "EPD" model – Engineer, Procure and Deliver: using lean systems for performance management, and integrating engineering as a continuous part of the cycle, not just the front end. ■



Justin Taylor

President
HALYARD

Why did you decide to leave a large EPCM and create Halyard Inc. in 2012?

I decided to leave the security of a big firm in 2012 to establish my own business to focus on smaller, fast-tracked projects – an area I had gained a substantial amount of experience in whilst at my previous jobs. Since then, we have organically grown the company from one person to 22 people over six years. We are a multi-disciplinary engineering firm which offers a full spectrum of engineering services to our clients.

What have been some of the standout projects for Halyard to date?

Halyard's biggest contract to date has been the EPCM for Harte Gold's Sugar Zone project which is currently in operation. The Sugar Zone project was a fast-tracked job and from beginning to completion it took us 15 months to achieve production. Based on the delivery success of the initial project, which comprises of an 800 mt/d concentrator, a water treatment facility and a paste plant, we have been asked to be involved in the project's expansion.

In addition to Harte Gold, Halyard has also executed projects for juniors and mid-tier clients like Alamos Gold, Hudson Bay Minerals, Canada Fluorspar, LNS Greenland, Coeur Silvertip, Dominion Diamond, Stornoway Diamond and Agnico Eagle.

How does Halyard differ from other engineering firms in the mining sector?

Halyard is driven by the need to actually implement projects, whereas many other players in our space stick to purely consulting work and studies. On the other end of the spectrum, we believe the large EPCM firms struggle to deliver smaller capital projects (below US\$60m) in a fast-tracked and efficient manner. We are still a relatively unknown entity in the market as we have only been around for six years, but from day one we have focused on building a strong track record and credibility. Halyard is technically strong, agile and has an efficient low cost structure.

Does Halyard operate globally, and are there any regions the company is looking to expand into?

Whilst we are not limited to any geographic location, we will go where the projects take us. Halyard has done work throughout Canada and North America and we have delivered a project in Greenland, where we built a ruby processing plant. Going forward, we would like to consider executing projects in Latin America. However, in the short term our focus is to build our business in Toronto and establish a good foundation here first. We are also looking at diversifying into other market sectors which share similar technologies and processes to the mining industry.

What are Halyard's main objectives moving forward?

Throughout the ebbs and flows of the market we have always managed to stay busy and stay profitable. I believe that, as long as we can continue to be involved in good projects, we will be able to continue this upward trajectory. Similar to our competitors, we want to attract the best people. Halyard's objective is to grow its workforce from 22 to about 30 people by 2020, and increase our revenue by the same margin within this timeframe. We must manage our internal growth while maintaining the highest technical standards and client service. We want to prove that we are the best company in our market segment and that we can deliver on our promises. ■



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Mark Fulcher

Operations Manager

ANDEAN DRILLING SERVICES

For the next five to eight years there is definitely a niche market for what we do. Long-hole drilling is a very specialized task, and we really focus on having the best people.

What is the history of Andean Drilling Services as an underground advisor and contractor?

Today, one of our main clients is Alamos Gold at their Island Gold operation in Ontario, where we have a long-hole contract, but the company started in 2014, initially working at the Santander mine for Trevali, where we were contracted to be Trevali's Canadian operations representation in Peru. We were in charge of putting the right team in place to make sure we could implement safe operating procedures and de-risk the mine. Also with Trevali, we have worked on the Caribou mine in Canada as consultants, on and off, for the last three years. Meanwhile, we expanded to Africa last year, where we act as the principal mining advisors for Trevali at the Rosh Pina operation in Namibia.

What are the main services you offer?

We are an underground long-hole contractor, and we manufacture our own rigs in Canada. We drill holes anywhere from two inches to 30 inches in diameter, and with lengths up to 100 meters. We do the drilling and the blasting, as well as the secondary ground support, with the installation of cable bolts. We also provide manpower: in Namibia, for instance, we have filled the positions of principal mining advisors and superintendents, drillers and trainers. In Canada we work as a specialized, niche player in long-hole drilling, but in Peru we have a wider range of services, including lateral development.

What trends do you see in terms of the use of equipment?

In Canada, we use many jacklegs and still produce air-powered equipment, because it is cost effective and gets the job done. In Peru, some companies tend to buy the biggest and most expensive equipment, and the operators are not trained to handle such machines. In Canada, the captain, or the superintendent, is a miner, but in Peru you have an engineer filling that position, and often that person does not have a lot of hands-on experience.

In mines applying sub-level caving, you need to use a remote drill when drilling into previously blasted ground. There is only a small handful of drills that will drill on remote data. These, by Sandvik, are already in use in Canada, Chile, Mongolia and other countries. Moving forward, in Peru I would expect to see more Cubex ITH drills in operation. Right now you have 20-meter stopes in Peru, which is the depth a Simba can drill. In Canada, you can drill up to 50 meters accurately with a Cubex drill, and with that you cut your development needs by half. At Andean we are definitely the experts in in-the-hole drilling (ITH) using Cubex. Andean also offers 24-inch canister drilling for production slots and this can also be done in lengths of 50 meters.

Do you plan to become a more integrated contractor, or stay as a niche player?

Looking at the future, we will have to grow and use more technologically advanced drills, but for the next five to eight years there is definitely a niche market for what we do. Long-hole drilling is a very specialized task, and we really focus on having the best people. Our main competitors in Peru are JRC and IESA. In Canada we compete with Major Drilling, Machines Roger and Boart Longyear. A next stage for Andean is exploration drilling, because our team has a lot of experience in that business. We are pursuing contracts in Canada, Peru, and Mexico.

What is your plan for the next months, in Canada and abroad?

In Canada we are really focused on the Alamos Gold operations. On the manufacturing side of things, we are building two new pneumatic air drills that we are going to take to Peru to show that it is the best drill you can use for 2.5 to 3-inch holes. Meanwhile, in Ontario, around the area where we operate, there are many gold mines starting up as well. Right now we have a team of 20 highly-specialized people and in January 2019 we are adding 15 more. In a couple of years, I would like to have a strong presence in Canada, Peru and Mexico, covering all aspects of drilling. ■

Image courtesy of Superior Gold



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ing and repairing walls, it grinds its way down [...] There will be fiber optic cables going down in Sirius, with all of the work completed at surface. We are pulling men out of harm's way."

The services that support the industry

Since winning a five-year contract with Vale in 2015, Sudbury-based NATT Safety Services has focused on providing the full safety package as a turnkey operation – supplying rescue teams, developing rescue plans, performing hazard assessments and providing training. Mark Arnold, general manager of NATT Safety Service, divulged on the philosophy driving business growth: "We take care of our client's health and safety, so they can focus on their core business", he declared.

The mining industry contributes to over 30% of all business for Golder Associates, which provides consulting, design, and construction services in earth, environment, and related areas of the industry. As mining companies become more aware of water management issues across the entire mine site, and energy reduction becomes an increasing priority, David Brown, principal of Golder's mine environment division,

commented on the company's intention to expand its presence in Ontario and across Canada: "We are starting to see upticks in the market and thus we are also in the process of attaining more staff to meet the industry demands," he said, continuing: "We would like to expand our integrated mine water management and treatment, and climate change and carbon emission reduction services."

Finally, Geotech has been serving mining clients for over 35 years, with a head office in Aurora, Ontario, complemented by offices in Australia and South Africa, and strategic alliances in China, Kazakhstan and Russia, supported by its aviation company, Geotech Aviation, with a fleet of 22 aircraft northeast of Sudbury. Specialized in technological innovation for airborne geophysical surveys, mapping and geophysical exploration, Geotech's brand was built upon its main products, the VTEM (Versatile Time Domain Electromagnetic) system and later the ZTEM (Z-Tipper Electromagnetic) system.

Paolo Berardelli, VP of Geotech, expanded on the success of the ZTEM technology: "It has grown into a major player in the market, and we have assisted mining companies in discoveries in porphyry copper, gold, and more challenging IOCG and SEDEX deposits," he said. ■

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James Siddorn & Gary Poxleitner

JS: Principal Structural Geologist
GP: Principal Mining Engineer
SRK



JS



GP

Could you provide an overview of SRK in Ontario and its focus in the province?

JS: With 45 offices worldwide, SRK has always had a local focus with a global footprint. We have about 25 employees in Toronto, with 165 in Canada and 300 in North America. Our main focus in the province is on mine engineering, resource geology, and structural geology, and within the structural geology team we focus specifically on helping companies understand what controls the distribution of their mineralization.

GP: A big part of the work that SRK does in Ontario is assisting in mine-related studies, mine design, ore extraction, new material handling practices, rock mechanics, and ventilation, to help companies in the drive to get deeper into mines. Ontario has some of the deepest mines in the world, and the trend in addressing the related challenges is to move away from diesel equipment and towards electric vehicles.

What are the greatest needs the industry is facing at the moment?

GP: The low commodity prices of recent years forced mining companies to focus on cost saving measures rather than expansion, and SRK has assisted in maximizing operational proficiency and production. Once a company identifies an exploration target, we evaluate its economic viability and look at what the best way to extract the ore will be. SRK has recently worked with Vale at their Copper Cliff mine and KGHM's Victoria and Podolsky deposits in this regard.

JS: SRK's early exploration structural geology work focuses on trying to locate new deposits for companies, which can be done at a very early stage with limited data. We help clients decide how to drill their targets or expand their deposits and accompany them from mine start-up through to mine closure. We are now also making progressively more use of machine learning. I think globally we see a very large demand for tailings engineers.

What does SRK look for when adding a new business unit to its portfolio?

GP: SRK tends to merge rather than acquire, so we look to develop partnerships rather than just amass assets. SRK has recently merged with the mine simulation

company, Labrecque Technologies, based in Sudbury. Once a mine has been designed, Labrecque Technologies' software simulates processes that help clients accurately predict mine production and work out how best to equip their operations to maximize profitability. In 2016 we also merged with MVS (Mine Ventilation Services), based in California, which boosted our service offering in the ventilation space.

Last time we met you wanted to leverage geo-environmental and water management expertise from BC to tackle initiatives in Ontario. Has this evolved?

JS: Our Canadian geo-environmental group is our largest in North America, with 75 members. In Ontario, we currently have one senior and one principal consultant addressing water management and geo-environmental issues and would like to expand these services. Our strategy for Ontario also involves strengthening our underground mining engineering team in Toronto and increasingly advising financial institutions and banks. In Sudbury, our focus is on expanding our resource geology team. Whereas in Toronto we have several geologists and a few engineers, in Sudbury we have many engineers and a few geologists. We would like to create a better balance between the different groups and will continue looking for highly-qualified consultants to join our Ontario geo-environmental team.

What is the vision for SRK Canada in the next months?

GP: One of our main goals for 2018 was to build a mine simulation team, which we have now accomplished. The other is to grow a rock mechanics group in Ontario to complement the strong groups already existing in Vancouver and Denver. SRK Canada also intends to increase its presence in the Quebec market, and we have been making inroads by employing more French speaking professionals in our Sudbury and Toronto offices. We are seeing more women entering the mining industry too and continue to hire women with substantial industry experience. Further afield, South America is an area of key strategic interest for us, with rising commodity prices increasing mining activity in countries such as Peru and Chile. ■

Image courtesy of Cementation



David Brown

Principal - Mine Environment Division
GOLDER

Can you describe Golder's footprint in Canada and elaborate on the relevance of the mining industry for the company?

Golder has always been focused on mining, and the industry contributes at least 30% to the company's overall business. We have offices, both financial and industry-driven, in Vancouver, Toronto and Montreal. We also have a presence in major mining districts with offices in areas such as Sudbury, Thunder Bay, Val d'Or, Saskatoon, Calgary, Northwest Territories, Yukon, and Newfoundland and Labrador.

What focus areas are currently driving growth for Golder across Ontario?

Ontario has a very mature market and Golder's first office was established in Toronto. Recently, as a result of the development within Northwestern Ontario, we are growing our office in Thunder Bay. We are seeing upticks in the market and are growing our team to meet the industry demands. Innovation and efficiencies in how we do work are also main drivers, and we continue to expand specialties that will add value to our work – including broadening our water treatment, water management, climate change and carbon emission reductions teams.

What has triggered the water and environmental-focus trends in Ontario?

Mining projects have always been very complex and the more mature and knowledgeable the markets become, the more community and regulatory engagement is involved. There is a clear trend and expectation for sustainable development, which is becoming significantly more entrenched in how mining companies operate. Most mining companies are becoming more strategic in considering costs in their business, including developing better water management across the entire mine site and more innovative approaches to energy. Moreover, closure is a strong focus of Golder's work, to help mining companies conclude operations responsibly with a keen eye to risk management. Closure has evolved over the years and the expectations from communities and governments as to what a closed mine should look like, has led to the industry finding new solutions, and potentially even seeking beneficial reuse and development options for mine sites.

In terms of innovation, are there any new technologies being developed by Golder?

Technology once thought as groundbreaking is now a part of our everyday operations. For example, we have used drones to safely complete surveys of abandoned underground workings. We are also testing the use of drones to do water sampling. The drones can hover over pit lakes or reservoirs and take samples at different depths. We have managed to do water sampling with drones up to 30 meters in depth.

What is Golder's vision and objectives for the next three years?

Ontario has a very large local market, in addition to Toronto as the global mining finance capital of the world, and Golder will continue to be a leader in providing quality service to that market. The province provides us with a huge opportunity to be innovative, grow our expertise and grow our team. We look forward to capitalizing on the opportunities that the Ontario market presents. ■





Technologies and Innovation

"Sudbury is home to the world's most vibrant mining technology cluster in the world. This is attributed to a variety of reasons including our long-standing history and continued investment in operating mines in Ontario. In addition, Sudbury has world-class academic institutions, and engaged government across all levels that provide funding opportunities."

- Don Duval,
CEO,
NORCAT



Disrupting the Industry

The innovations changing the way we mine

On September 12th 2018, Barrick Gold announced it will eliminate the executive role of Chief Innovation Officer as part of a broad decentralization push. Whilst adding that it will continue to work on innovation, this news is in line with the trend of major mining companies opting to rely on the service industry for the development and provision of new technology.

In the face of more difficult financing conditions, and with commodity prices suffering, mining companies have had to look for innovative new methods to drive down costs and increase productivity. The epicenter of this wave of innovation can be found in the small mining town of Sudbury, Northern Ontario. World-renowned as the service and supply hub of Ontario mining, Sudbury is also home to a plethora of SMEs and organizations spearheading a technological revolution that is changing the way we mine.

A trip to the NORCAT Underground Centre at the Fecunis mine in Onaping, Ontario, allows visitors a snapshot of the future, nurturing a robust innovation ecosystem that supports approximately 60 mining technology projects per year. "NORCAT is the only non-profit regional innovation center in the world that has an operating mine designed to enable start-ups, SMEs, and international companies to develop, test, and showcase new and innovative technologies

in an operating mine environment," commented Don Duval, CEO of NORCAT.

The unique facility anchors one of the world's leading advanced manufacturing and mining technology clusters and represents a "one-stop shop" ecosystem for the future technologies and innovations that are poised to transform the global mining industry.

One of the mining tech companies to have tested its products at the NORCAT Underground Centre is Maestro Digital Mine, who provide a complete automation network backbone and rugged IoT devices for underground mines. "Recognizing the industry's growing demand for data, and the challenges that many of our customers encountered with connecting ventilation solutions to their networks, we identified a gap in the market," said Michael Gribbons, co-founder of Maestro.

Creators of the Plexus PowerNet, the world's first powered coaxial gigabit network, Maestro Digital Mine have installed products in over 100 mines globally. Acknowledging that it has taken time to educate the mining community, Gribbons has noticed an acceleration in the uptake of digital connectivity solutions in the last 12 months: "Five or six years ago, companies did not put gas sensors in the mines, whereas today it is commonplace," he stated, continuing: "This momentum will continue to

gain traction with the growing need for mining companies to reduce costs and become more productive".

Centric Mining Systems provides enterprise solutions software to mining companies worldwide, with offices in Sudbury and Perth, Australia. Recognizing that automated systems and technologies need to work in unison, Centric's technology unifies data streams into a single view and uses analytics and predictive analytics to interpret data. Utilizing WipWare fragmentation data, integrated with power consumption and recovery data from the mill, Centric has created an AI system then generates workable scenarios of information. Chris Novak, CEO of Centric, explained: "We discovered that we could tune the drill and blast processes to optimize power usage in the mill and recovery, all based on fragmentation. By taking those four verticals: drill and blast, fragmentation, milling and grinding, and recovery at the processing plant, we could generate entirely new answers."

Another company investing in innovation to drive down costs is global consulting firm SRK, which recently acquired Sudbury-based mine simulation company, Labrecque Technologies. Gary Poxleitner, SRK's principal mining engineer, explained how this partnership can help customers visualize mining operations and plan accordingly: "Once a mine has been designed,

Labrecque Technologies' software simulates processes that help clients accurately predict mine production and work out how best to equip their operations to maximize profitability.”

The solution currently driving business growth for NSS Canada (formerly Northern Survey Supply) is MOSS – Miner Operated Survey Systems, a hardware/software solution created by Bernie Smith at Glen-core, and then developed in partnership with Leica, Precision Mining Systems and Autodesk. MOSS allows for millimeter accuracy, whereas traditional mine survey methods give an accuracy of around 1 to 3 feet. Bruno Lalonde, general manager of NSS Canada, expanded on the benefits of this technology: “MOSS reduces the overbreak percentage from 30% typically, to under 10%,” he said, continuing: “A 1% overbreak can cost up to US\$500,000 in material handling, so MOSS offers its users vast savings both in time spent and economically, as well as a quick return on investment.”

Tom Palangio, president of WipWare, the North Bay-based producer of photo-analysis systems and software, believes that

competitive necessity drives innovation in Canadian mining: “An ounce of gold is worth the same throughout the world, but if operating costs abroad are cheaper, domestic companies need to find a way to leverage to survive”, he stated.

WipWare has created non-disruptive methods of measuring granular sizes in real time to help mining operations optimize processes. Tom explained how ‘machine vision’ allows companies to allocate resources to tasks that require human talent: “WipWare looks at repetitive, boring, sampling jobs within the industry, where people can be freed to do more important jobs if a machine can monitor results for them.”

Noticing the high rate of failures of pipes and fittings transporting slurries and different abrasive materials in the mines, David Dillon, founder of Dura 21, began creating machinery and coatings to dramatically extend their service cycle. Dura 21’s technology, developed at NORCAT and supplied to clients such as Vale at their Copper Cliff mine, claims to outperform comparable products by as much as 20 times. Dillon gave an example of the cost-saving potential of Dura 21’s solutions: “The installation

of one Dura 21 product prolonged the life-cycle, and it was estimated that the facility had saved C\$130,000”.

Industry 4.0 applications transforming mines

Some of the technology being introduced at mine sites has the potential to transform multiple industries, and in the case of MIOTY – “my Internet of Things” – the technology could transcend business and be integrated into smart cities, according to Albert Behr, the founder and CEO of Behr Technologies Inc. (BTI). MIOTY is a telegram splitting technology, designed to be interference immune, that was created by the Fraunhofer Institute of Germany. BTI is the Toronto-based tech firm leading the charge as the official licensee of MIOTY technology. “MIOTY legitimately has the chance to be the next Wi-Fi for the industrial and commercial Internet of Things”, declared Behr.

MIOTY was announced as the European Telecommunication Standardization Institute (ETSI) standard in June 2018, having

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Image courtesy of Maestro Digital Mine

previously been tested in the NORCAT Underground Centre in Sudbury, providing 100% coverage of the entire mine, including coverage of the circular part of the drift that had never previously been accessible. In September 2018, BTI shipped its first commercial products to companies in Germany, Mexico, Namibia, the US and Canada.

Another example of innovation is Peytec, a company founded by Peyman Moeini in 2011 while still at university. Peytec initially designed artificial intelligence (AI) software for the medical industry, before transitioning to heavy industry after the company noticed fundamental problems with indoor tracking systems that Peytec's IoT tagging technology could resolve. Peytec has worked with Kirkland Lake Gold, installing robust electronic tags that track the muck pile from the point of blasting, identifying whether ore has been mixed in with the muck pile. "Peytec's technology, in the form of tags, provides indoor location tracking, sensing and wireless communication, which tracks piles along each process to identify potential mistakes. Mine workers receive the information on a handheld mobile device and everything is interconnected through IoT testing," explained Moeini.

The innovation affecting the mining industry is not just coming out of start-ups and SMEs, but established multi-nationals such as PBE Group, which has been providing innovative safety and productivity solutions to the mining market for 48 years. PBE's technologies include monitoring and control systems, tagging and tracking, and communication systems, an example of which is PBE's Proximity Alert System (PAS), which reduces the risk of injury by combining and implementing equipment, personnel and vehicle detection technology. Dr. Wisam Farjow, PBE's vice president of systems engineering, gave his thoughts on the importance of interoperability in a mining context: "Having an interoperable network is essential within the mining industry as it allows for a broad range of subsystems to be interlinked to one communication system, resulting in broader engagement, improved communication and better operating excellence."



As the transition towards the digital mine advances, cybersecurity is becoming increasingly essential. Montreal-based SIRCO has been around for 27 years, and specializes in traditional investigations, undercover services, computer forensics and cybersecurity. Claude Sarrazin, SIRCO's president, revealed that during penetration testing, the first step in evaluating cybersecurity, SIRCO manages to penetrate the systems of its clients in 96% of cases. "Security issues, whether internal or external, do not go away. You need to address them,

and although they are not always high on the list of companies' priorities, it is vital you stay on top of them before they turn into a major issue," added Sarrazin.

Nuclear giants move into the mining space MIRARCO (Mining Innovation Rehabilitation and Applied Research Corporation), the largest non-profit applied research firm in North America, recently signed a C\$1 million memorandum of understanding (MOU) with Bruce Power for the development of small modular reactors (SMRs). Vik Pakalnis, CEO of MIRARCO, said that

“THE FIRST GIGABIT NETWORK PROVIDING BOTH DATA AND POWER USING CONVENTIONAL COAXIAL CABLE.”



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Vic Pakalnis

President and CEO
**MIRARCO MINING
INNOVATION**

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Doug Morrison

President and CEO
CEMI



What is the strategy to become established not only as a center of excellence, but as a mining service provider?

MIRARCO is a non-profit entity focused on mining research that is wholly owned by Laurentian University. The last five years in the industry were the worst I have ever witnessed in my 40-year career, but the times are finally turning. The sector is adopting sophisticated new technologies from alternate verticals to increase safety, productivity, and sustainability. Our strategy is to remain strong in our two fundamental pillars — ventilation and rock mechanics, while maintaining leadership on mining safety, which is an important part of the Canadian brand. We will also continue forming international alliances and partnerships. Our current strongest target is Latin America, particularly Chile, Colombia, Peru and Mexico.

MIRARCO secured a C\$1 million investment with Bruce Power for the development of small modular reactors (SMRs). How will these aid the industry?

High energy costs are the number one problem for mining in Ontario, especially

in remote areas. Northern operations are not on-grid, and are therefore forced to use diesel generators as the only reliable source of power, producing a high level of greenhouse gas emissions. The cost of running diesel generators is C\$0.32/kilowatt-hour (kWh), which can go up to C\$0.78/kWh in arctic operations due to the unreliability of diesel fuel supply. SMRs will be able to produce energy at a cost lower than C\$0.15/kWh with zero greenhouse emissions.

It will be six years before we can place SMRs on-site. MIRARCO is currently involved with three nuclear companies to carry-out the process: Bruce Power, Ontario Power Generation (OPG) and the Canadian Nuclear Laboratories in Chalk River. The latter are going to build a number of prototypes, from over 140 different designs developed in different parts of the world.

How is MIRARCO assisting the underground mining sector in terms of ventilation technology?

The mining industry is leading the way in terms of safety. Reducing diesel particulate matter (DPM), which is a carcinogen, is paramount to mining operations. Com-

What is the mandate of the Centre for Excellence in Mining Innovation (CEMI)?

CEMI's original mandate was to improve the performance of the mining industry, working on improving heat and rock stress, mine safety and productivity, ore discovery and environmental performance. Initially we worked a lot on exploration and geology, as well as geotechnical problems related to seismicity activity in deep mines. Over time we have evolved to trying to deliver commercially viable innovations in collaboration with service and supply companies.

What are the major stumbling blocks for innovation to become commercial?

Mine managers are focused on their bottom line, making sure they hit the safety and production targets. Many investors are primarily interested in the return on investment, based on operational costs and production targets, not the technologies necessary to achieve these targets. One of the phases of the innovation process is to make sure that it actually works in a functioning operation and this takes time and money that detracts from

operational performance. As mines are increasingly more constrained to meet production targets, there is even less time and money available for them to spend on an operational pilot of a new technology.

CEMI wants to help the industry build the mines of the future. Can you expand on that?

Most of the industry currently thinks if they can make our current fleets of vehicles operate autonomously all will be well, but I disagree. The current ore transport platform of LHDs means 80% of the energy we use goes to move the equipment, only 20% to move the ore. Yet, our job is to move ore, not operate equipment. It is essential that we adopt a systems approach to innovation if we are to make the transition from batch processes to continuous processes. There has been an over-emphasis on cost and we seem to have forgotten that the most valuable asset we have is time, and the mining industry squanders a great deal of it.

The Japanese kaizen philosophy adopted by the automobile industry is a method of con-

panies are shifting towards electrification throughout the industry, and MIRARCO is actually working on a filter that can remove all diesel particular matter from the air. We are currently trying to commercialize the product in collaboration with our partners from the UK and Germany.

You signed an agreement for the creation of the China-Canada Center for Deep Mining Innovation in 2017. What are both parties looking to achieve with it?

The Chinese are certainly moving at the speed of light and have secured the financing needed to move forward with our collaboration. China is anxious to start with some rock mechanics and mining in high-stress ground projects, and the objective is for both countries to learn from each other. They are interested in learning about our hydro-fracking technology, as well as the remote mining that we implemented in the Sudbury basin. There is a myth that Chinese technology is not up to speed, but the reality is that the equipment in their labs is even better than ours, so we will certainly benefit from them. In other areas, such as geology and mine safety, they will learn from us. ■

tinuous incremental improvements to the flow of the process – even looking to save five seconds of wastage. Right now, the mining companies are spending time working on the automation of large vehicles, when continuous mining systems should be the priority. Just because you have one single wonderful piece of technology does not mean it is going to fit into ‘a system’ and if it cannot fit into a system, it is not going to be adopted.

How long will it take before fully automated mines become commonplace?

When the next transformation will be complete depends, in my opinion, on when it begins. I started my career in Northern Ontario just before the last big transformation of the industry in the early 1980s. At that time every mine was running jacklegs, stopers and slushers – all compressed-air, hand-held equipment. Within a span of five years it was all gone, and we started using the kind of equipment that we still use today. When the next transition does start, I believe it will happen just as quickly, driven by the superior economic performance of the new system. ■



Don Duval

CEO
NORCAT

What is NORCAT’s scope of work?

Founded in 1995, NORCAT is a private, non-profit organization that had the primary focus to address the economic development opportunities in Northern Ontario, initially through the provision of skilled labor training. We then expanded into supporting the entrepreneurial community through programs, services and resources. NORCAT is structured into five primary business units: Training and Development, the NORCAT Underground Centre, our Regional Innovation Centre, the NORCAT Studio, and our Advisory Services practice. NORCAT is also working with partners to launch a venture capital fund to provide equity investment in early stage tech companies. Meanwhile, the NORCAT Studio is developing and launching creative learning technologies to address the ever-changing future of work and learning, using artificial intelligence, virtual reality and avatar-based simulations.

How does the NORCAT Underground Centre at the Fecunis Mine drive technology development in mining?

NORCAT is the only non-profit regional innovation center in the world that has an operating mine designed to enable start-ups, SMEs and international companies to develop, test and showcase new technologies in

an operating mine environment. This unique facility represents a one-stop shop ecosystem to see and touch the technologies that will transform the global mining industry. In addition, this unique facility provides hands-on, experiential training for the development of our future mine workers.

Companies come from around the world to use the underground mine: for example, Bort Longyear has established its North American headquarters for diamond drill development, testing, and innovation at NORCAT.

NORCAT won the De Beers Canada Indigenous Partnership Award in 2018. What are the reasons behind this achievement?

Across Canada there is a growing skilled labor shortage in the mining industry, and many of these mines, especially in Ontario, are located in areas with a high population of indigenous peoples. NORCAT has made a strong, deliberate effort to partner with various First Nations to identify opportunities to deliver training and development programs to prepare them for these jobs. Among others, NORCAT has a strong partnership with the Aboriginal Women in Mining group in Northern Ontario and the Labrador Aboriginal Training Partnership in Newfoundland.

What makes Sudbury such a vibrant hub for mining innovation?

Sudbury is home to the world’s most vibrant mining technology cluster in the world. This is attributed to a variety of reasons including our long-standing history and continued investment in operating mines in the province of Ontario. In the last 15 to 20 years, mining companies have gradually outsourced their R&D activities, creating a strong and growing entrepreneurial startup community to build solutions. In addition, Sudbury has world-class academic institutions, strong and engaged government across all levels that provide funding opportunities.

What are the main objectives for NORCAT in the next 12 to 18 months?

NORCAT’s priorities are to continue to grow our skilled labor training and development business across multiple sectors, build and deploy an early stage venture capital fund, expand the NORCAT Underground Centre to cement our role as the global destination for future mining technology, and continue to develop creative learning technologies. ■

Michael Gribbons & David Ballantyne

MG: VP & Co-Founder

DB: VP & Co-Founder

MAESTRO DIGITAL MINE



MG



DB

Could you give us an overview of Maestro Digital Mine and the circumstances surrounding its creation?

MG: When Maestro first started, we were mainly focused on ventilation monitoring and controls for the underground mining sector. Recognizing the industry's growing demand for data, and the challenges that many of our customers encountered with connecting our ventilation solutions to their own networks, we identified a gap in the market. Working with customers, we created a solution to extend communications to where it is needed the most, the last mile to the face. We subsequently rebranded the company as Maestro Digital Mine, which has helped us expand our reach. Since our beginning, we have provided Industrial Internet of Things (IIoT) solutions to the global mining industry. Today, Maestro Digital Mine provides a complete mine ventilation and automation network backbone and rugged IIoT devices designed specifically for underground mines.

What are the benefits of using copper cables to get data from the mining face, instead of fiber?

DB: Fiber optic cabling presents a number of challenges to the underground mining industry. Extending fragile, fiber optic cable to the active headings where the data is needed is problematic due to the nature of the drill and blast cycle, with the cable being damaged. The dusty, wet environment of a typical hard rock underground mine makes splicing and repairing in the field extremely difficult.

MG: Maestro Digital Mine is the inventor of the Plexus PowerNet, the world's first powered coaxial gigabit network. The system is based on flexible coaxial cable that simplifies the installation and maintenance of the network, while enabling high band width, low latency data and power down the same copper cable. The termination process now becomes easy and cost effective, utilizing tools which have been in use since the late 50s. Since its release, more than 15 mines across Canada, Africa, Mexico, Sweden, Spain and the USA have installed the Plexus PowerNet and Management Software.

Apart from Plexus PowerNet, which products are current driving growth for Maestro Digital Mine?

DB: Maestro Digital Mine's first focus was in mine ventilation, and our Vigilante AQS has always been a huge seller. The Vigilante AQS is our third generation mine air quality monitoring solution with flexible integration options to any SCADA, PLC, DCS, PLS or HMI system. Our strategy is to provide the complete automation package – the entire digital solution on every mine level.

Have you seen an uptake in the adoption of this technology in the last 12 months?

MG: The uptake has been gradual, but has accelerated significantly over the last 12 months. Five or six years ago, companies did not put gas sensors in the mines, whereas today it is commonplace. It has taken time to educate the mining community, but our efforts have accelerated through collaboration as we now have installations in more than 100 mines globally. We have just completed a new development project for a UK based company that sells internationally for the road tunneling business, and their first large scale project is in Turkey. This in turn will help expand Maestro's technology on a global scale.

Moving forward, what are the objectives for the next 12-18 months for Maestro Digital Mine?

MG: Our key objectives are making sure we drive down component costs by optimizing our products and increasing production efficiency whilst maintaining the highest quality and safety standards. We recently deployed an enterprise resource planning (ERP) system to support our increased production requirements. In addition, we are in the development process of upgrading and redesigning the Vigilante AQS to support additional connectivity technologies such as Wi-Fi, Bluetooth and LTE communication.

The industry is embracing digital connectivity solutions, and this momentum will continue to gain traction with the growing need for mining companies to become more productive. The mining industry tried to increase production by increasing the size of machinery which in-turn requires larger development drifts. In many cases, this did not increase productivity. The real increase in productivity levels will come with the help of digital solutions such as the innovations provided by Maestro Digital Mine and other innovative digital thinkers in this vertical. ■



Chris Novak

CEO

CENTRIC MINING SYSTEMS

The Digital Mine is not a technological accomplishment, it is a mindset that uses knowledge as opposed to pre-conceived notions to make decisions.

With a rapidly evolving mining landscape, which are Centric Mining's key targets moving forward?

Our mission is to actually define what the 'Digital Mine' is and deliver clarity to the industry on the matter. It is great to witness all the momentum around it, and how we are starting to acknowledge that there is a different and more innovative way of doing things. Centric Mining will help drive the industry towards that digital transformation.

The acquisition of data, the generation of knowledge, and then creating opportunity through that knowledge is gaining a lot of traction. The mining industry has come through quite a slump over the last five years, which is no surprise as commodity prices have been very challenging. The industry has realized that perhaps the way we have run our business needs to change. The Digital Mine is not a technological accomplishment, it is a mindset that uses knowledge as opposed to pre-conceived notions to make decisions. This will allow us to face future downturns in a completely different way.

Could you describe Centric Mining System's key regional targets and the relevance of Ontario for your operations?

Centric Mining Systems has started to target multiple regions. Africa is a very strong focus for us, with gold and copper performing well. There is a lot of activity, particularly in Western and Southern Africa. We have also recently placed a strong emphasis on Asia, Russia, and Europe. We still have a base to build in these areas, which is why we believe there are many opportunities for growth, regardless of the distance. We do foresee a lot of activity in these areas within the next couple years, and we will continue to increase our presence in Australia, which is where we started. The province of Ontario holds some of our oldest customers and we continue to welcome new ones in the gold, platinum, and palladium sectors.

Many companies are struggling to process Big Data. How can Centric Mining Systems assist clients in turning this information into knowledge?

The processing of Big Data is a challenge faced by the whole industry. Taking that vast quantity of data and creating usable knowledge from it is what we call knowledge management. For the last few years, Centric Mining Systems has been working hard to convince the industry that there is value and purpose in improving the way data is collected. Now the opportunity exists to demonstrate to the industry that the time and money used for collecting this data can pay off. At the same time, the more data is collected, the more questions are generated. Now that we have laid the groundwork, we need to help them clear the fog by using analytics and predictive analytics to interpret the data. We fully intend to take a leadership position on this and define what digital mining really is.

Could you highlight an example of how knowledge management has helped one of your clients?

A strong example is one of our customers using the WipWare Software, which aligns with our approach. Centric has integrated the WipWare fragmentation data with power consumption and recovery in the mill data. An artificial intelligence (AI) system then generates workable scenarios of information. What we discovered through this is that we could tune the drill and blast processes to optimize power usage in the mill and recovery, all based on fragmentation. By taking those four verticals — drill and blast, fragmentation, milling and grinding, and recovery at the processing plant — we could generate entirely new answers. We want to extend that concept across the value chain, from pit to port. With so much potential knowledge embedded into it, there really is no limit. We are looking at knowledge management in the entire execution model.

Which are Centric Mining Systems' ideal clients?

Historically, we were competing a lot with very large organizations, but there has been a lot of amalgamation going on in the technology sector. Many companies that were operating years ago have disappeared. As a company, we tend to focus more on the small and medium-sized mining organizations. They make decisions faster and tend to be much more willing to adopt cultural shifts required to transition into knowledge management. ■



Frank Saunders

Vice President

BRUCE POWER

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Power price using SMRs is expected to be less than diesel, and the cost reduction is expected to be more pronounced the further north you go in Canada.

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Can you provide an overview of Bruce Power and its significance as Ontario's largest provider of power?

Bruce Power is the only private nuclear power provider in Canada. We have eight operating units, supplying power to over 30% of the Ontario grid, from the Bruce Nuclear Generating Station on Lake Huron, near Kincardine. Ontario has one of the cleanest electrical grids from a carbon perspective in the world, as nuclear energy makes up the majority of Ontario's power supply. Ontario's energy is approximately 50 gram carbon equivalent per kilowatt – to put that in perspective, the carbon footprints of California and Germany, both famous for clean-energy initiatives, are several times higher than Ontario's.

What prompted Bruce Power to move into the mining industry?

Two of the eight units on site have already been refurbished and Bruce Power is currently investing approximately C\$13 billion to refurbish the remaining six of the units on site, which will support operation to the mid 2060s. In the meantime, we also need to consider how nuclear units could provide additional low carbon electricity production in other jurisdictions and applications.

We started looking at small modular reactors (SMRs) in that context, and through our examination we realized that this technology could be applicable to heavy industries like mining. The current reactors were designed to satisfy large grid demands, and were not commercially viable for small non-grid connected loads, as is normally the case in mining operations that would likely require less than 40 megawatts (MW). However, the technology has evolved and the industry now has designs under development for power demands that range from 2 to 300 MW. Some of these designs are close to regulatory maturity and allow a degree of simplicity and transportability not seen in the power industry to date.

Can you expand on the memorandum of understanding (MOU) that Bruce Power signed with MIRARCO?

In April 2018 Bruce Power and MIRARCO signed a C\$1 million MOU, that will enhance strategic research opportunities, including the long-term potential for

SMRs to generate clean, low-cost and reliable electricity in rural and remote regions. The MOU with MIRARCO is a two-way education process – both parties need to understand each other's industries intimately to be able to make the most of the technology. Bruce Power is also setting up a new innovation center, the Ontario Nuclear Innovation Institute (ONII), to focus on development of new technologies as well as innovation within the current industry, and to fully understand environmental issues such as climate change.

How safe is nuclear power, and more specifically, how safe are SMRs?

SMRs are based on much simpler technology that utilizes passive safety features to ensure the risk of accidents or the spread of contamination is prevented. Even at Bruce Power's current reactors that have been adapted and enhanced over the years, we no longer predict that there would be any need to evacuate the public in a major accident. Safety has always been a concern from a public and corporate point of view. Nuclear power is the safest way to generate energy in the world, but negative perceptions still exist. We are working to correct these perceptions and demonstrate to companies and communities that SMRs do not pose a threat to their investments. For example, some new designs calculate a risk of release frequency at about three times in 10 billion, or very close to zero.

What are the main benefits of SMRs in a mining context?

There are terrific advantages to providing power via nuclear SMRs. The volume of fuel needed to produce power is vastly less than that of diesel powered machines, thus significantly reducing the shipping requirements. The price is expected to be less than diesel currently is, and the cost reduction is expected to be more pronounced the further north you go in Canada. Because of the new regulations coming in all over the world regarding diesel emissions and the harm diesel nanoparticle matter can cause mine workers, in addition to the high ventilation costs in underground mines, mining companies are already looking for alternatives. Besides, SMRs allow for a short decommissioning schedule, unlike traditional reactors, which is also beneficial. ■

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this initiative could provide a transformational solution to current power challenges, considering the cost of running diesel generators is C\$0.32/kilowatt-hour (kWh), which can go up to C\$0.78/kWh in Arctic operations due to fuel supply unreliability. “SMRs will be able to produce energy at a cost lower than C\$0.15/kWh with zero greenhouse emissions,” stated Pakalnis.

Ontario’s robust nuclear industry provides 60% of the province’s energy supply and supports over 60,000 jobs. The two powerhouses that provide the vast majority of this energy are Bruce Power and Ontario Power Generation (OPG). Speaking of the advantages that SMRs can provide the mining industry, Frank Saunders, vice president of Bruce Power and president of the Ontario Nuclear Innovation Institute (ONII), commented: “SMRs will be able to create significantly more clean power at less cost than current options, which could open up new avenues for mining companies in terms of the scale of their operations.”

Jeff Lyash, CEO of Ontario Power Generation (OPG), suggested the vocal opposition to nuclear power is based on dated information. The portable SMRs currently being designed for mine sites will store waste within their impenetrable shells, before being taken back to one of OPG’s 10 nuclear stations in Canada after deployment. Underlying the importance of governmental acknowledgement on the substantial impact nuclear power can have on reducing greenhouse gas emissions cost effectively, Lyash continued: “The nuclear industry has an extremely strong safety record, the environmental footprint is significantly small, and it produces most of the greenhouse gas-free electricity in the world.”

OEMs making the transition from diesel power to battery electric vehicles

In a similar vein to the automotive industry, mining equipment is rapidly making the transition from diesel-powered machinery to battery electric vehicles (BEVs). Increasing global emissions standards, the heightened awareness of the threat Nano diesel particulate matter (nDPM) poses to mine worker’s health, in addition to the economic and safety benefits electrical equipment provides, are all factors contributing to an industry-wide push to electrify mining.

In the move away from diesel-powered machinery, Sudbury-based equipment manufacturer, Marcotte Mining, and global technology powerhouse, Siemens, have teamed up to integrate electric drive technology into Marcotte’s RAM40 carriers. Alicia Woods, general manager of Marcotte, divulged: “We partnered with Siemens with over 900 electrical-drive trucks operating in open pit mines globally to develop our first battery electric vehicle (BEV).”

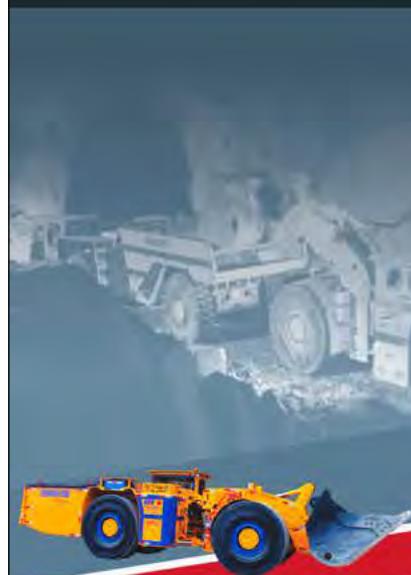
In February 2018, Sudbury-based RDH Mining Equipment was acquired by SMT Scharf AG from Hamm, Germany, subsequently creating RDH-Scharf. Gustavo Portalier, CEO and MD of RDH-Scharf, accredits the Canadian-German alliance for enlarging the company’s global footprint and potential to take on more projects, as well as increasing its product line. RDH-Scharf is extending its regional targets by introducing battery technology with CODELCO in Chile, and Portalier insists that the adoption of BEVs must be a wholesale change: “There is no point in having one battery-operated machine when there are another 10 working with diesel in the same project. This is a change that must happen from the start”, he reflected.

Global OEM from Finland, Normet, restructured the company on July 1, 2018, separating into four distinct, regional sales areas – APAC, EMEA, North America and Latin America. Normet announced that its net sales were up 24% in the first half of 2018 compared to the same period of 2017, partially due to the upturn in the mining market, an increased presence in the tunnelling market, and a more streamlined, focused international structure, according to Randy Ouimet, director of Normet Canada. On the innovation front, Normet intends to electrify its trademark wet shotcrete equipment: “Normet is developing products that will enable us to spray headings more robotically. Right now our machine sprays somewhat robotically, but this will be brought to a total robotic perspective.” stated Ouimet.

Another OEM to undergo significant structural changes recently is global giant Epiroc, which listed on the Stockholm Stock Exchange as a separate entity to Atlas Copco on June 18, 2018. Epiroc collaborates with customers in more than 150 countries, had revenues of US\$3.7 billion in 2017, and employs more than 13,000 professionals

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Image courtesy of Pure Gold, Jumbo Drilling

globally. Epiroc has already achieved over 50,000 hours of automation and interoperability – the ability of different information technology systems and software applications to communicate, exchange data, and use the information that has been exchanged – in Canada to date.

Jason Smith, general manager of Epiroc Canada, hopes to see the introduction of Epiroc's second generation of BEVs in Canada in 2019. Regarding their development timeline, Jason commented: "The first prototypes of the generation 2.0 BEVs are expected to be coming off our production lines in Q4 2018, with trials beginning in Europe together with our development mining partner".

Boart Longyear has been providing drilling services, drilling equipment and performance tooling for mining and drilling companies for 128 years. When asked about Boart Longyear's innovative products, president and CEO Jeff Olsen pointed to the MDR700 underground coring mobile drill rig, which utilizes Boart Longyear's underground exploration LM700 feed frame technology, and the MDR500 mobile underground diamond drill rig: "It leverages an LMi (linear matrix inequality) power and control interface, and comes equipped with 500 meters of on-board rod storage (NQ rods), making it a self-sufficient mobile drill rig," explained Olsen. When it comes to mining at depth, South African company New Concept Mining (NCM) is leveraging its experience to provide a range of solutions that include pre-stressing units, rockbolts, areal coverage, monitoring and warning devices. "Canada's mining industry is now moving into deeper mining environments, whereas South Africa has experience in deeper mining since the 1970s," elaborated Heinrich Greeff, NCM's managing director for Canada. NCM currently supplies support to the world's three deepest mines,

all in South Africa – Mponeng, TauTona, and Sebuka. "This enables us to bring very mature and developed knowledge of down support products for dynamic environments into the Canadian market," affirmed Heinrich. The company will soon be absorbed by Epiroc, who announced the acquisition in November 2018.

Remote operations

As remote, tele-operated technology helps remove workers from the dangers of underground mining, how much distance could feasibly be placed between the operator and the mine site? This question was posed to Gabriel Janakaraj, VP of special projects at Hard-Line: "We currently have a tele-op system set up between Australia and Canada, though we could essentially operate from the moon to Canada and vice versa."

Hard-Line's technology allows clients to control their operations remotely through an Operator Control System that can be placed anywhere in the world.

Another company that deals in teleoperations is Penguin ASI. Greg Baiden, co-founder and CTO of Penguin, has a track record in the industry for mining innovation projects having completed studies for NASA and the Canadian Space Agency (CSA) for mining on the moon. While noting that changing the conservative culture of the mining industry is a lengthy process, Dr. Baiden believes that when the technology is mature enough, the transition to fully tele-operated mines will not take long: "When one major company makes the investment to run in total tele-operation, they will make such a vast profit, that other companies will have no choice but to follow," he said. ■



Jason Smith

General Manager
EPIROC CANADA

Canada is playing a big role in our battery electric vehicles (BEVs) development. Epiroc's current battery equipment has more than 50,000 hours of actual in-production experience in Canada alone.

What is the significance of Epiroc's footprint in Canada?

Epiroc is a leading productivity partner for the mining, infrastructure and natural resources industries. With cutting-edge technology, we develop and produce innovative drill rigs, rock excavation and construction equipment, and provide world-class services and consumables. In June 2018, Epiroc listed on the Stockholm Stock Exchange as a separate entity to Atlas Copco. Epiroc supports and collaborates with customers in more than 150 countries, has revenues of US\$3.7 billion (2017), and globally employs more than 13,000 employees.

In Canada, we have our main warehouse and head office in Mississauga and our largest workshop and support facility is in Sudbury. Beyond these, we have 15 other strategic locations across Canada. We employ 460 people in our Customer Centers with a further 190 people working in our two manufacturing facilities in North Bay and Langley, where we produce drilling and exploration consumables, as well as ground support products.

We cover all seven Epiroc Mining and Construction Divisions here in Canada within the Customer Center. We are excited at the level of interest and collaboration we currently have within the industry surrounding our automation, interoperability, zero emission vehicles and even our mechanical hard rock cutting solutions.

What were the main reasons behind the restructuring, and what has changed with the new branding?

Before the creation of Epiroc, mining represented between 25% and 30% of Atlas Copco's portfolio. In January 2017, it was announced that Epiroc would be listed separately, as a standalone entity with its own CEO and board, to focus on the mining, infrastructure and natural resources industries. The decision was taken to become increasingly focused and an even better supplier to our industries. This more focused approach has aided technological development and streamlined communication.

How is Epiroc positioning itself in the move away from diesel and towards battery electric vehicles (BEV)?

Epiroc's future range of BEVs is one of the brightest lights in our portfolio constellation, and Canada is playing a big role in what we are developing. Epiroc's current

battery equipment has more than 50,000 hours of actual in-production experience in Canada alone. The first prototypes of the generation 2.0 BEVs are expected to be coming off our production lines with trials beginning in Europe together with our development mining partner. In addition, we in Canada are in discussions with various mining organizations to see if further trials and deliveries can happen within our industries in 2019 and then hopefully rapidly ramping up beyond 2019.

Can you give some examples of the latest technologies being developed by Epiroc?

Epiroc launched its Mobile Miner hard-rock cutting machines early in 2018. We have three major projects around the globe at various maturity stages. The 55V machine should start cutting in Sweden soon and our 22H has achieved good results during ongoing trials in South Africa together with Anglo American. Then, we have our 40V that will start trials in Sweden in 2019, and we continue trials at Hecla's Lucky Friday mine in the USA. Our findings and achieved performance to date are very exciting and we are currently collaborating with some Canadian customers to explore potential local opportunities. Also, we have various underground mines, and soon a surface mine, already operating our automated Epiroc equipment.

Epiroc is at the cutting-edge of mining innovation. Automation, interoperability, emission-free vehicles and digitization are all priorities. The Mobilaris Mining Intelligence software, acquired through our part ownership of Mobilaris, has proven to be a great-automated tool, providing a real-time 3D visualization of the operations by linking directly to our Certiq onboard monitoring solution. This has added many benefits and capabilities to our customers' operations.

What are your objectives in Canada over the next 18 months?

The battery technology is an evolution in the mining industry. Together with other technologies, we are driving forward the ongoing development of our Epiroc facilities and skills to support these changes. We also plan to invest further in our Sudbury facilities to offer greater support levels to our Canadian and regional customers when it comes to remanufactured components for our machines. ■



Gustavo Portalier

COO and Managing Director
RDH-SCHARF

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There is no point in having one battery-operated machine when there are another 10 working with diesel in the same project. The change towards electric technology must happen from the start.



Will RDH-Scharf's direction change due to the acquisition by SMT Scharf, and what are your targets for the next couple of years?

The acquisition itself will not be changing the intrinsic fabric of the company, we will simply have a larger footprint and the potential to take on more new projects, as well as grow our product line. The market is picking up again, and RDH-Scharf is extending its regional targets by introducing battery technology with CODELCO in Chile. Currently we have battery electric equipment in North America, Asia and Africa, but Chile is also a market we could see ourselves growing in.

Our current revenue streams are 50% North American (Canada and US), and 50% overseas. We want to increase operations in our own backyard, so that the national market can ramp up to 80%. RDH-Scharf is looking for technicians to join our 50-person team at the moment, and we would also like to extend our position in the Quebec market. With the current landscape, skilled labor is hard to come by.

SMT Scharf is trying to move its monorail technology into the mining realm, could you explain how that will work?

SMT Scharf operated within the coal mining industry for a long time, but the commodity is in decline. Although Poland, Russia and China remain strong markets, Germany's last coal mine closed in December 2018 and the market will not be rising. This is why they want to explore the possibility of moving the monorail technology into hard-rock mining. We have an external R&D group working in Germany, analyzing the market and the machines being used at present, to determine how we can replace them. The objective is to use the technology to help extracting the product, with cleaner energy.

What is the relevance of integrating battery power for the mining industry moving forward?

RDH-Scharf is the pioneer when it comes to battery technology. We started working on it eight years ago and were the first to introduce it to Latin America. All of our technology is developed in-house: the system, the programming and the integration.

If you look at current operations, mining is moving deeper underground all the time. Ventilation issues and further shaft sinking become more of a challenge with every meter drilled. Costs are exponential and companies are in serious need of alternate solutions to continue working. The alternative is to be cleaner, and this is where electric technology is indispensable. It will even help operators with heat and vibration. Battery electric technology is particularly relevant when a new mine is opened, or when a new level is built. There is no point in having one battery-operated machine when there are another 10 working with diesel in the same project. This is a change that must happen from the start.

Why should potential clients opt for RDH-Scharf over other service providers?

We are an established company with more than 30 years in supplying equipment and services to the global mining and construction industries. We offer one of the broadest mobile product lines in the industry and can provide a complete fleet of underground mobile equipment. We also offer high customer benefits: modular design, individualization possibilities, fast delivery times, maintenance-friendly equipment, a favorable price to performance ratio and competitive total cost of ownership (TCO).

Do you have a final message for the audience of Global Business Reports?

I have worked for RDH for over 13 years and I love the equipment we sell. I am proud when I go to a worksite and I see our equipment working underground. I know the value our products bring to our customers and the commitment our organization makes to ensure our customers' needs are met.

Indeed, it is this focus on meeting our customers' needs that pushes us to improve our products through step-by-step modifications and through ground-breaking advances such as our battery electric powertrain technology. I know that the equipment we are making is doing good for the world: improving work conditions, reducing environmental impacts, and enhancing our clients' bottom line. ■

Jeff Olsen

President and CEO
BOART LONGYEAR



What is Boart Longyear's market footprint?

Boart Longyear is the largest global provider of drilling services, drilling equipment and performance tooling for mining and drilling companies. We also have a substantial presence in aftermarket parts and services, energy, mine dewatering, oil sands exploration, production drilling, and down-hole instrumentation. Drilling operations make up about 70% of our business, with the other 30% coming from the supply of products such as drills and tools.

How did you navigate the downturn?

2016 was the bottom of the cycle and things have gradually improved since then. I do not believe we will see the extreme growth rates that we saw during the super-cycle, but that is a good thing. Sustainable, sensible growth would be more beneficial to the industry in the long run. There was a lot of debt on the balance sheet when I was appointed CEO in 2016, after large capital expenses on inventory. In September 2017, we recapitalized the business, shored up the balance sheet and reduced the debt substantially, whilst focusing on attaining greater efficiency and productivity.

Can you give some examples of Boart Longyear's innovative solutions?

One example is the MDR700, an underground coring mobile drill rig which utilizes Boart Longyear's underground technology like the LM700 feed frame. The MDR700 offers wide drilling angles, advanced mobility, engineered safety controls, and is easy to setup, operate, and maintain. The MDR500 mobile underground diamond drill rig is another standout product. It is designed exclusively for our Boart Longyear drilling services team, and comes equipped with 500 meters of on-board rod storage (NQ rods), making it a self-sufficient mobile drill rig. We have some very innovative surface drill rigs, such as the LF160, a rod handling rig that was introduced in 2017. Our XQ Rod is double-threaded, which makes it more user-friendly in modern mining where rod handling requires for light, yet robust, rods for deep mines. Boart Longyear also offers down-the-hole information products, such as the TruScan XRF core scanning tool, which is calibrated to every specific ore body. It has been very popular with juniors, who can be quicker to adopt new technologies than some majors. ■

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Alicia Woods

General Manager
MARCOTTE MINING



Could you provide a brief background of your history with Marcotte Mining?

Marcotte was launched by my grandfather and his sons in 1979, originally as a rebuild shop. It later designed and manufactured its own fleet of equipment using the Minejack carrier platform. Since I rejoined the team in 2015, we focused on regaining our market-share as market leaders on innovation and new technology. Marcotte works with clients around the globe, but our strongest market share remains within Canada and the US.

Who are some of your key partners?

ENS industrial is a key partner that assists Marcotte in Western Canada, while we help them with the East side. We also teamed up with KGHM, a mining company that has a manufacturing division in Poland, Zanam; and with Siemens, with over 900 electrical-drive trucks operating in open pit mines globally, to develop our first BEV.

Could you highlight your flagship product and describe the way in which you designed it?

Our flagship carrier is the RAM 40. We created it with the vision to become leaders into the future. We knew people were moving to Tier 4 engines, with a strong push towards battery electric. So we engaged all our employees, mining companies as well as industry experts, to receive feedback throughout the whole process of concept and design. We are proud of the result.

In which way is Marcotte helping women feel like they belong to the industry?

As a woman, at times you have to work twice as hard, but the opportunities within the industry are incredible. Being underground for up to 12 hours as a female can be challenging, even when it comes to basic needs, such as using the toilet. Having to take off full body overalls is unreasonable, which is why I also launched my Covergalls brand, which designs work clothes for females. If you can get women outfitted in a safe and proper workwear, they no longer feel they are an after-thought. We are trying to stray away from defining women and their positions in the industry as 'non-traditional', and making them feel like they belong in the sector. ■

During our research, we speak to business leaders across the value chain to gain a qualitative understanding of the state of the mining industry based on their experiences. Through what amounts to several hundreds of conversations, we compile a database of valuable knowledge on a range of important topics. In these pages, please find a brief selection of quotations that we feel best summarize some of the challenges the mining community should expect to encounter going forward, the opportunities to find success, and also thoughts we found to be motivational. Thank you to all of the individuals that took the time to share their insights with us, and we look forward to continuing to learn from you in the years to come.

"As the social aspect of mining becomes more important, it will be advantageous when communities can start acquiring ownership of mining companies existing within their society. There is intrinsic value in trying to build liquidity within our local market, by leveraging our expertise and our regulatory systems to encourage the development of capital markets in other countries."

**- Dean McPherson, head of business development
Global Mining, TMX Group**

"The last five years in the industry were the worst I have ever witnessed in my 40-year career, but the times are finally turning. The sector is adopting sophisticated new technologies from alternate verticals to increase safety, productivity, and sustainability."

**- Vic Pakalnis, CEO,
MIRARCO**

"Having the support of our First Nations partners in any mining project helps smooth the path to success. This requires the proponent, the government and the First Nations work cooperatively with a common view to develop a project in an environmentally sustainable manner, and one which respects aboriginal rights. Moving towards development, as opposed to litigation or opposition, will see all parties benefit and generate wealth."

**- Sandra Gogal, partner,
Miller Thompson LLP**



"The Mining Industry Human Resources Council (MiHR) predicts that over the next 10 years, 88,000 new workers will be needed to make up for 50,000 retirement exits, alongside other shortages. And that is just MiHR's baseline estimate, based on current industry trends and forecasts – in an expansionary economic scenario, the figure reaches 130,000. The shortage is real and will continue to plague the industry unless it broadens its scope for hiring."

**- Chris Stafford, president,
C.J. Stafford & Associates**

"As a woman, there are certainly challenges, and at times you have to work twice as hard, but the opportunities within the industry are incredible. We are trying to stray away from defining women and their positions in the industry as 'non-traditional', and making them feel like they belong in the sector."

**- Alicia Woods, General Manager,
Marcotte Mining**

"The mining industry tried to increase production by increasing the size of machinery, which in turn requires larger development drifts. In many cases, this did not increase productivity. The real increase in productivity levels will come with the help of digital solutions."

**- Michael Gribbons, VP and co-founder,
Maestro Digital Mine**

"To paraphrase Tolstoy, 'everyone wants change, but nobody wants to change', and that has summed up the mining industry in the past with regard to innovation. Today there is more of an appetite for change, but as a country, Canada needs to invest more. We are trying to build the mines of the future with the procurement strategies of the past."

**- Roy Slack, president,
Cementation**

"The most valuable asset that we have is time and the mining industry squanders a great deal of it. It is essential that we adopt a systems approach to innovation if we are to make the transition from batch processes to continuous processes".

**- Doug Morrison, President and CEO,
CEMI**





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WEBSITE

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Alamos Gold	alamosgold.com
Anaconda Mining	anacondamining.com
Antioquia Gold Inc	antioquiagoldinc.com
Argo Gold	argogold.ca
Aston Bay	astonbayholdings.com
Aurania Resources	aurania.com
Batero Gold Corp	baterogold.com
Boart Longyear	boartlongyear.com
Bolat	bolat.ca
Bruce Power	brucepower.com
Behr Technologies Inc.	behrtechnologies.com
BWR Exploration	bwrexploration.com
Cambrian College	cambriancollege.ca
Canada Technology Mining Service (CTMS)	ctms.mn
Canadian Securities Exchange	thecse.com
Cardinal Mining Equipment Group	cardinal.mediaconcepts.ca
Cementation	cementation.com
CEMI, Centre for Excellence in Mining Innovation	cemi.ca
Centric Mining Systems	entricminingsystems.com
Chilean Metals	chileanmetals.com
CIM (Canadian Institute of Mining)	cim.org
CJ Stafford and Associates	cjstafford.com

This list intends to include just a representative sample of companies operating in Ontario's mining sector, and as such it should not be considered a guide to take investment decisions.

COMPANY/ INSTITUTION

WEBSITE

Cobalt 27 Capital Corp	cobalt27.com
Conquest Resources	conquestresources.com
De Beers Canada	canada.debeersgroup.com
DMC Mining Services	dmcmining.com
DRA Global	draglobal.com
Dundee Corporation	dundeecorp.com
Dundee Precious Metals	dundeeprecious.com
Dura 21	dura21.com
Eastmain Resources	eastmain.com
Epiroc	epiroc.com
Generic Gold	genericgold.ca
Geotech Ltd	geotech.ca
Global Atomic Corporation	globalatomiccorp.com
Golder Associates	golder.com
Great Bear Resources	greatbearresources.ca
Groupe Sirco	groupesirco.com
Halyard	halyard.ca
Hard - Line	hard-line.com
Harte Gold Corp	hartegold.com
IBK Capital	ibkcapital.com
IONIC Engineering	ionic-eng.com
Itergy	itergy.com
Jacobs	jacobs.com
Maestro Digital Mine	maestrodigitalmine.com









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COMPANY/ INSTITUTION

WEBSITE

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McEwen Mining	mcewenmining.com
Miller Thompson LLP	millerthomson.com
MIRARCO	mirarco.org
MOAG Copper Gold Resources	moag.ca
Murenbeeld	murenbeeld.com
NATT Safety Services	nattsafety.com
New Concept Mining	ncm.co.za
Noble Mineral Exploration	noblemineralexploration.com
NORCAT	norcat.org
Normet	normet.com
Noront Resources	norontresources.com
North American Palladium	nap.com
Northern Survey Supply	nsscandada.com
Ontario Power Generation	opg.com
Orefinders	orefinders.ca
Ormston List Frawley LLP	olflaw.com
Orvana Minerals	orvana.com
PBE Group	pbegrp.com
PDAC	pdac.ca
Peloton Minerals Corporation	pelotonminerals.com
Penguin Automated Systems	penguinasi.com

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COMPANY/ INSTITUTION

WEBSITE

Peytec	peytec.com
Pure Gold Mining	puregoldmining.ca
RDH-Scharf	rdhscharf.com
Red Cloud Klondike Strike	redcloudks.com
Rubicon Minerals	rubiconminerals.com
SAMSAA, Sudbury Area Mining Supply and Service Association	samssa.ca
SRK Consulting	srk.com
Stans Energy	stansenergy.com
Steppe Gold	steppegold.com
Superior Gold	superior-gold.com
Symboticware	symboticware.com
Teranga Gold	terangagold.com
Toachi Mining	toachimining.com
Torex Gold Resources	torexgold.com
Triple Flag Mining Finance	tripleflagmining.com
TMX Group	tmx.com
Ubique Minerals	ubiqueminerals.com
UDMN	miningdeep.ca
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