

Canada's territories

The Emerging North

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Cover photo: The Diavik Diamond mine, located 300 km northeast of Yellowknife, Northwest Territories. Courtesy of Diavik Diamond Mines.



TOWARDS YUKON'S NEXT CARLIN-STYLE DISCOVERY

Anthill Resources Ltd. is a well-funded private company engaged in the acquisition and exploration of, as well as investment in, mineral properties in Yukon and British Columbia, Canada.

The company is currently focusing on exploration of several Carlin-style gold targets within its flagship Einarson Project, situated in east-central Yukon. On its 2,400 square-kilometre Einarson Property, Anthill Resources successfully concluded an aggressive exploration project, progressing in a single season from reconnaissance-style greenfield exploration to identification and drilling of two significant gold targets.

Anthill Resources is also a significant shareholder of Yellowhead Mining Inc. [YMI-TSX] which is developing the Harper Creek Copper Project.

Exploration highlights of the Einarson Project, Yukon include:

- ▶ Multiple trends prospective for Carlin-style gold mineralization identified through drilling, surface mapping and silt geochemical sampling,
- ▶ Two hard-rock gold discoveries in favorable geological settings have been identified,
- ▶ 1,900-metre diamond drilling program has been completed, results pending,
- ▶ Grab samples of silicified carbonates grade as high as 87.2 grams/tonne (2.54 oz/ton) gold at the "D2" target). Strongly developed orpiment and realgar mineralization occur within this particular system, suggesting geological similarity to the Nadaleen Trend discoveries.
- ▶ Property-wide soil, regional and detailed stream sampling, geological mapping and detailed prospecting surveys have been completed.
- ▶ Several new targets identified during regional phase to be explored further in 2013.

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Canada's Emerging North

Underexplored, underdeveloped and undervalued



Rainbow over camp, Eagle Gold project. Photo courtesy of Victoria Gold.

Romantic notions of Yukon's famous gold rush remain in the minds of explorers who continue to hunt for some of the world's last major gold deposits. As the world becomes more accessible and its last corners are explored, there are very few virgin frontiers available. However, Canada's territories, comprising of Yukon, the Northwest Territories and Nunavut, provide grand opportunities and prospects for those willing to challenge one of the world's harshest climates.

The Canadian government has targeted resource development, particularly in Canada's territories, as a key priority. Conservative Canadian Prime Minister Stephen Harper's Economic Action Plan 2012 for Resource Development has vowed to open up the North. An exclusive interview with Minister Responsible for the North Leona Aglukkaq describes how the government is going about this (page 44).

In 2011, diamond production was up by \$40 million over 2010 in the three Canadian territories, while tungsten production increased by \$55 million from 2010 to 2011. In the Northwest Territories, mining's contributions, led by diamond production, exceed all other private sector contributions to the territorial GDP, accounting for 29%. The sole mine currently in production in Nunavut already accounts for 15% of the territorial GDP. Exploration expenditure, even in today's sensitive market, is set to increase by \$20 million in the Northwest Territories. Nunavut currently has eight potential mines that could develop in the foreseeable future, with the Northwest Territories containing a potential six.

These shining figures belie some of the key challenges of developing Canada's harshest and most underdeveloped physical environment. While some issues exist

throughout the industry; shortages of skilled labor, retention of staff, secure power supplies and a struggling junior market being chief among them, others are more unique to Canada's North.

Though Yukon appears the North's most developed mining destination, with over 100 years of mining experience, an infrastructure supporting its most developed areas and the country's highest rate of growth, there are still concerns. Eleven of 13 First Nations land claims have been settled, though concerns about the training and inclusion of Canada's original population still arise. Yukon's power supply, while adequate for the current production activity in the region, appears inadequate to supply another mine. Nevertheless, its government actively promotes its resources to the international investment community so that Yukon may well be the "emerging North's" source of greatest potential.

Nunavut, Canada's youngest independent territory, has a population of just over 33,000 and development which reflects the scarcity of population spread across 20% of Canada's land mass. With a territorial infrastructure that relies heavily on the changing of the seasons, the development of new projects and even basic exploration activity requires perseverance and determination. For example, roads do not connect any of Nunavut's communities. A population with relatively little mining experience also makes local skills and services a particular challenge. Nunavut has started to explore its mining potential; while heavily focused on iron, diamonds, gold, base metals and even uranium may soon have their day in the sun. The geological potential of these minerals is already attracting attention.

The Northwest Territories, with four active mines, may face the most challenges in

Canada's North. The population of 43,000 inhabits a land with diamonds, gold, base metals, and more diverse commodities such as bismuth, cobalt and rare earths. The current unsettled lands claims and regulatory framework in place has caused much frustration amongst the mining community currently active in, or looking to, the Northwest Territories. The great vastness of the Northwest Territories also faces infrastructure challenges and a lack of geological mapping.

With almost 1,700 juniors vying for investor dollars on the TSX-V, and purse strings tightening the world round, today's junior market has spread a gray cloud over 2011's booming Canadian market. With some in the industry stating that the market has hit rock bottom, others prefer to see the current market and the North's undeveloped potential as a time of great opportunity. In a period where quality projects and experienced managerial leadership struggle to weather the storm, the future of the junior market remains uncertain.

When examining Canada's great northern potential, one cannot forget the role played by aboriginals across the region. The First Nations, Métis and Inuit all have a significant part to play in the development of the North's mining industry. While correct terminology may be under dispute, the critical support that aboriginals bring to the industry is not.

Under the term "First Nations" are over 600 bands across Canada, yet the term "Inuit" also contains a number of other distinct groups under its umbrella. Any all-encompassing term is often subject to disagreement (the authors of this report have strived to use the correct usages wherever possible, but sincerely apologize for any disagreement that may occur).

Canada's North contains vast amounts of mineral wealth waiting to be developed. This is heavily reliant on three key factors: the current state of the junior market, the level of mapping and geophysical information available and engagement with the aboriginal groups.

Junior miners: "Armageddon or another day at the office?"

According to the Mining Association of Canada, the 2008 global recession has led to a substantial drop in the demand and prices for commodities. In turn, this decline reduced the value of Canadian mineral production, resulting in operations being shuttered or suspended at nearly 32 Canadian mines as of 2010. Many more have seen similar interruption or suspension to their operations since then. For those in the industry perhaps a little too focused on the "doom and gloom" sentiments of the current market, a deeper look can offer hope.

With 1,671 mining issuers listed on the TSX-V, or 58% of the world's publicly traded mining companies (between the TSX-V and TSX), many have argued that in a market where raising capital is arguably the greatest challenge many juniors currently face, such a high number of listings may be cause for worry. "While it is certainly more difficult for juniors to raise capital in this market environment, there are signs of hope," said John McCoach, president, TSX Venture Exchange.

Considering that 90% of all global mining equity financings were done on TSX and TSX-V in 2011, making up nearly 40% of the world's mining equity capital, the TSX-V does not seem like such a bad place to be. The exchange is seeing more sources of financing coming its way than its competing markets around the world. "The reputation of the Canadian junior market has changed dramatically over the last couple of decades. This more positive perception is evidenced in the increase in institutional investor participation in our market," said McCoach.

The role that the majors should play in this current environment appears to be on the minds of many of Canada's juniors as well. "For the majors to grow and make a significant difference to their bottom line they need to acquire. For mid-caps it is more financially viable to acquire assets rather than to explore, leaving the juniors as the only companies carrying out exploration," said Hugh Bresser, president and CEO, Overland Resources Ltd.

Those who have been in the industry through a number of mining cycles understand these periods and what must be done to ensure survival through another.



Raymond A. Hrkac, president and CEO, GGL Resources.

"Currently, the majors have few exploration staff; they are more focused on mergers and acquisitions. This worked when junior companies could secure exploration investment. The majors must now take a lead on some exploration for new deposits," said Raymond A. Hrkac, president and CEO, GGL Resources Corp., a veteran of the industry of over 55 years. This activity has not, however, been reflected on the Canada-based TSX-V quite yet. "We saw a fair number of mergers and acquisitions in the last quarter of 2011... Even though we have not seen a significant level of mergers and acquisitions in the last few months, that could change quite easily," said TSX-V's John McCoach.

"I know it is a difficult time to access capital and liquidity is not what it was a year ago, but we have been through market cycles before and we know the market will come back... There will be a continuing demand for commodities and there is no better place to participate in that than in the Canadian mining companies," said McCoach.

Mapping and geoscience

Canada's North still suffers from a lack of adequate surveying information. While Yukon is the most advanced of the three territories, there are still great voids in this information vital to the industry which must be tackled in order to further develop Canada's North.

"In the early 2000s it was identified that 80% of Nunavut and around 60% of the Northwest Territories were geoscientifically unmapped, and Yukon's quality of mapping was inferior to that of southern Canada," said Pierre Gratton, president and CEO of the Mining Association of Canada. "Geoscience is one of the basic building blocks of the minerals economy; new maps attract junior exploration companies. The lack of geoscience has been one of the reasons why mining growth in the North has been limited."

The matter is being addressed. Donna Kirkwood, director general, central and northern Canada branch, Geological Survey, Natural Resources Canada, said: "In some parts of the North, there were out-of-date geological maps and information; these were prepared by Geological Survey of Canada (GSC) in the 1950s and 1960s, and [these maps were in many cases] unreliable when deciding where to commence a northern exploration project... GSC initiated the five-year \$100 million [Geo-mapping for Energy and Minerals (GEM)] program in 2008 to carry out a survey primarily of the three northern territories and the northern areas of the provinces, and within these regions identify high-priority areas where we felt the geoscience was not up to modern standards and there was a good resource potential for mineral and oil and gas resources." The program is due for completion by March 2013.

Canada's northern aboriginals—emerging industry partners

Canadian aboriginals, divided into three predominant groups of Metis, Inuit and First Nations, have long been surrounded by the mining industry, but in some cases are only now beginning to take on significant engagement as partners in the industry. For any junior moving into Canada's North, understanding the political aspects of this engagement is key for a successful project.

Chief Simon Mervyn, Sr, of the Na-Cho Nyak Dun, Council of First Nations in Yukon, said: "The key topics of engagement [with the mining industry] have been cleaning up past environmental disasters that have been left by mining companies, ensuring that best mining practices are utilized in our traditional territory and ensuring that our First Nations are equal partners in any economic opportunities that are taking place in our traditional territories."

Clynton Nauman, president and CEO, Alexco Resource Corp., understands the importance of these relations. "It has been a particularly good relationship [with the Na-Cho Nyak Dun]... The Na-Cho Nyak Dun are actually participant in the two biggest contracts we have in the region; the mining and catering contracts in the district." These relations are not always clear cut. Nick Poushinsky at Stantec Consulting Inc. said: "The biggest challenge faced by Stantec's industry is not biophysical but it is the uncertainty and fluidity of the regulatory processes in the North. Related to the fluidity of the process is balancing the growing expectations of northern First Nation communities and their input in the process and decision making and resource management."



Clynton Nauman, president and CEO, Alexco.

In Nunavut, and to a lesser extent the Northwest Territories and Yukon, miners will typically be obliged to award a certain proportion of their contracts to aboriginal-owned corporations as part of commitments made in minerals rights deals.

SNC-Lavalin Group Inc. has worked on many of the northern mine sites, including Diavik, and moved early to build joint ventures with aboriginal corporations. "One of many highlights of [the Diavik] project was the development of an aboriginal joint venture and strong working relationship with Nishi Khon, and we are now carrying out spin-off work through this joint venture. In the early days of

northern project development, aboriginal and First Nations corporations were few in numbers. This has now changed with aboriginal and First Nations communities keen to participate in the development of responsible mining in Canada's North by working with companies to advance opportunities, education, and work skills for their people" said Dale Clarke, senior vice president, global mining and metallurgy for SNC-Lavalin. Working with First Nation groups goes beyond fulfilling their client's obligations, argues Clarke: "SNC-Lavalin wants to promote the advancement of First Nation education and economic development and we prefer to partner with a mining company who has the same mindset as ourselves where First Nation communities are concerned."

As development continues in the North, engagement and understanding are key.

Land claims and negotiations 101

"A hallmark of the North," said Tom Hoefler, executive director, Northwest Territories and Nunavut Chamber of Mines, "is land use planning, as access to land is the lifeblood of our [mining] industry... The land claims processes here now create a methodology for First Nations governments and public governments to collectively participate in managing resources in the North."



Dale Clarke, senior vice president, global mining and metallurgy, SNC-Lavalin.

This process has helped shape what the northern mining industry is today. There are many intricacies involved. "The regulatory framework for all three territories in the North has been driven by the requirements of the land claims. There is a risk of creating a patchwork quilt because of this. This is not the case in Nunavut where there is one land claim for the whole territory. In Yukon, final agreements have still to be achieved with 11 of the 13 First Nations. In the Northwest Territories there are four settled claims and three more pending," said John Donihee, barrister and solicitor with law firm McLennan Ross LLP.



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MINING IN CANADA'S TERRITORIES

"All land claims are different: in some, the crown manages the mineral tenures but you need to get a surface lease from the aboriginal group; in other cases the First Nations also own the mineral rights," said Christine J.S. Kowbel, a partner at Lawson Lundell LLP.

This has raised concerns with mining companies who have interests across the region, that worry about the effect of the regional and cultural differences in these negotiated agreements. Donihee said: "There can be some differences in land claims from one area to the next, creating difficulties for the mining industry. The federal government is responding by proposing changes to the Mackenzie Valley Resource Management Act [an Act to provide for an integrated system of land and water management in the Mackenzie Valley], which will simplify matters, particularly in land permits and water licenses."

Where there are still unresolved land claims issues, some would suggest that engagement with the mining industry and negotiations related to resource development, could be seen by some groups as a means of gaining political leverage as they finalize these settlements. Ken Armstrong, president and CEO of Strongbow Exploration Inc., which operates in the Northwest Territories, said: "There is always the underlying current of politics between First Nations governments and Canada itself which exploration companies can be drawn into."

Territorial governments are working towards settling these claims and creating a more predictable environment. Hon. Bob McLeod, Premier of the Northwest Territories government, said: "As we work to settle land claims across the territory we are also creating certainty for both aboriginal governments and industry. Clear guidelines assist all the players in ensuring and attaining meaningful engagement."

Aboriginal Corporations and Relations

Aboriginal corporations are quickly rising in the North, filling the labor voids and ensuring skills and training for their members, as

well as ensuring they have a significant role to play in the region's burgeoning mining industry. Miners must be well aware of the many benefits to be had by partnering with the local companies, a number of which are part of emerging aboriginal development corporations. "[Aboriginal corporations] are profit-making enterprises that have a huge social value providing job opportunities, job modeling, and an insight for northern [aboriginal] people entering and participating in the world of business, mining in particular," said Nick Poushinsky, senior principal environmental management - Canada, Stantec.

While some past cases have soured these partnerships, many mining companies are now ensuring they engage with local partners and good examples of partnership are emerging. Some suggest that more could be done though. "Yukon's government could do a much better job explaining the Self Government agreements and the cooperative nature of the Land Claims agreements to proponents," said Chief Mervyn.

Mining companies themselves proudly showcase their local engagement. "We canvas elders about their knowledge of the area to be aware and sensitive to any archeological sites and areas that are currently used... Working towards good community relations is not only the responsible thing to do as a company operating near the communities, but also it is important from a business perspective," said Brooke Clements, president of Peregrine Diamonds Ltd. in Nunavut and the Northwest Territories.

These partnerships can act as social permits. Chief Mervyn said: "We welcome industry and business to our traditional territory, we only ask that we be involved from the ground up in the development of projects and that our rights and titles be respected."

Roy Erasmus, Jr., president and CEO of Det'on Cho Corp. in the Northwest Territories, said that these corporations can and are providing key support to the industry: "Currently, we have 20 compa-

nies within the corporation coming under three core businesses: mining-related products and services, human resources, and property development and management.”

Services offered include catering and housekeeping for mines at Diavik and Snap Lake, as well as over 200 employees who operate the Diavik open pit. With a key concern of many mining companies in the region being a lack of skilled labor, as well as national predictions of a looming labor shortage, these corporations can be a key partner to the mining industry.

Robert Johnson, former general manager of Aboriginal Engineering Ltd., said: “Our workers take pride in their investment of cleaning up of the lands. Their parents saw the impact of mining to the environment; their children are now taking ownership of the work they do as it presents an investment by putting right the damage to the environment and reclaiming the land they believe they own. It also presents employment and training opportunities.”

The mining industry must be aware of the aboriginal population in Canada’s territories. With 85% of Nunavut’s population being of aboriginal groups, along with 50% in the Northwest Territories and 25% in Yukon (according to Statistics Canada), the mining industry must engage with these local communities. These populations are some of the youngest in Canada, often closest to the mines and a key source of untapped labor, but some suggest that it is necessary for both industry and government to work together to ensure this demographic is properly prepared to enter the workforce. Chief Mervyn said: “First Nations are having great difficulty convincing governments that there is a need in Yukon for classes and skills to ensure our children have a balanced and adequate education and are better prepared to enter this workforce.”

George Mackenzie, president of the Tlicho Investment Corp., which has 32 companies under its umbrella and has provided key site services for Diavik Diamonds and Snap Lake, reminds those who come to the North that even within the same country, certain cultural differences must be understood. “We can service semi-skilled personnel to the mining industry; it is not necessary to go south for these skills, but southern companies must understand the aboriginal culture. Mining companies need cross-culture training. Tlicho is agreeable to mining companies developing, provided it is carried out in an environmentally sympathetic manner, such as [ensuring] the preservation of water,” said Mackenzie.

“The training and development of the Tlicho people over the last 20 years, from basic living to an industry leader, should be used as a model globally and championed by the corporations who put forward the financing for opening the mines,” said Robert Johnson.

As the territories’ mining industry continues to draw international attention, it will be this local engagement that may makes or breaks new projects. This will also carry over into the southern service sector seeking to set its footprint in the North. Christopher Reynolds, environmental services sub-sector lead, aboriginal partnerships at Stantec, said: “Stantec’s growth in the North will be via its partnership with First Nations communities and governments.”

“Sodexo has been heavily involved in the aboriginal aspect for many years with 35 active partnerships and we may very well be a pioneer in this marketplace in this regard. Some of our competitors have partnerships but no projects, whereas we have criteria in place to ensure our partnerships are viable and contain active projects,” said Ivor MacGregor, vice president, remote sites—western Canada, Sodexo Canada.

The skills and partners required by the mining industry are available, for those willing to reach out and engage them.



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The Northern Lights in a summer sky over the base camp for mineral exploration located at Eldorado Creek in the Klondike region of Yukon. Photo by Dave Delnea, courtesy of Klondike Gold.

When the Klondike gold rush began in Yukon in 1898, the resource potential of Yukon was largely unknown. Yukon now has more than 80 mineral resource deposits, 2,600 mineral occurrences, which cover only 3.6% of Yukon's total area, and has developed three major mines in five years (the only place in the Western world to have done so), making this an international destination for prospectors, miners and developers.

While Yukon is currently seeing what many have argued is its second gold rush, led largely by famous prospector Shawn Ryan, the most developed of Canada's territories also hosts noteworthy deposits of silver, copper, tungsten, molybdenum, nickel, lead, zinc, iron ore and coal. In 2011, exploration expenditure reached \$300 million, the highest ever seen in the territory, while 2012 is seeing more in-depth and detailed work done with some estimates stating that exploration expenditure will account for \$200 million in 2012.

With partially developed infrastructure, largely settled land claims, a government that is openly supportive of mining development and a mining framework which makes it the easiest of the three territories to operate in, the issue of power looms over the head of those hoping to advance their mines and remains the key focus of the mining agenda. A lack of skilled labor, complications related to short operating seasons and a lack of infrastructure in certain regions of the territory echo those across the North. Even with these

challenges, neighboring territories look to Yukon as a model to emulate. Tom Hoefer said: "The Yukon government was very aggressive about marketing themselves internationally, with the government taking the initiative to take trips to Europe and China in order to promote the territory's resources."

The government has also taken steps internally to boost the mining industry. "Yukon government has taken steps to help the industry: this includes the Yukon Mining Incentive Program which financially assists early stage grassroots exploration, and has led to a number of major recent discoveries, for example, the White Gold deposit," said Hon. Brad Cathers, Minister of Energy, Mines and Resources, Government of Yukon. "We are the only jurisdiction that has that stream-lined regulatory and assessment process and so we have the ability to review projects on their merits within a shorter time-frame than other jurisdictions. Our royalty system is clearly defined and legislated, placing us competitively within the Canadian jurisdictions for projects that achieve development."

China remains a growing presence in the North. Brent Thompson, senior vice president, mining and minerals, Tetra Tech said: "Tetra Tech work with clients to help them realize their projects; a good example is Yukon Zinc; we optimized their feasibility study and from that they secured financing from a Chinese partner to build a mine during the global financial crisis."

"A lot of our Chinese clients are seriously looking at getting involved in the North. One reason they are attracted to Yukon in particular is because of its location in relation to China," said Brian Abraham, Q.C., partner, Fraser Milner Casgrain LLP, referring to its strategic shipping transport route.

Certain concerns have arisen in Yukon's mining industry. Darcy Krohman, president and CEO at Precipitate Gold Corp., said: "It is not the lack of resource discovery that has resulted in many investors being weary of its environment, but amongst other reasons it is due to the industry being unable to keep pace with the demand, i.e. laboratory turn-around time affecting the limited four-month window to complete meaningful work."

There is also the matter of logistics. Many remote mining exploration sites in Yukon, even with its highly developed infrastructure, require air cargo solutions. The problem: privatized runways tend to be underdeveloped or not particularly well maintained which leads to higher operating costs. "There are only two paved runways in Yukon; we therefore have to have aircraft capable of landing on gravel runways. These gravel runways could be longer and are payload restricted. All of these things tend to increase the cost of providing a product because they restrict us from introducing new fuel-efficient aircraft as they cannot land on gravel runways," said Joseph Sparling, president of Yukon-based Air North. "We currently require fly-in capabilities as our camp is located on the side of the Nahanni Range road which services an operating tungsten mine to the north. The helicopter flies our crew and supplies in daily, flies them out, transports the rigs and so forth; a third of the costs at least goes towards supporting this fly-in," said Jim Pettit, president of Aben Resources Ltd.

With international eyes again focused on Yukon, one man can largely be credited with its revival.

Shawn Ryan: Yukon prospecting legend

To those outside of Yukon, Shawn Ryan is unlikely to be a familiar name. To those who currently have their sights set on Yukon, however, this humble prospecting extraordinaire may very well be responsible for shaping the current mining boom the territory is seeing. "Yukon missed out on the gold boom of the early 1980s, but was placed back on the map through the efforts of Shawn Ryan, prospector, and ATAC Resource's gold discovery, with Yukon's exploration expenditure now topping \$300 million per year. Yukon will not go back to the sleepy backwater that it once was," said Mark Fekete, president and CEO at Stakeholder Gold Corp.

Shawn Ryan, who was originally drawn to Yukon for commercial wild mushroom picking, has refined exploration techniques that have arguably largely driven this boom. "In 2001 we introduced our own deeper soil sampling technique ... This enabled us to better understand the terrain. Between 2004 and 2012 there have been 350,000 soil samplings on my various claim blocks; all these samplings were financed by junior exploration companies," said Shawn Ryan. Having now optioned out over 100 projects in the last seven years, it seems this man may have the Midas touch.

"The tool of soil sampling was not widely recognized to be as effective as it actually is for generating early-stage prospects; the main key is systematic data collection," said Isaac Fage, president, Ground Truth Exploration Inc. "We do not take credit for any discoveries he has made, but our data support work does provide important infor-



Shawn Ryan, prospector.

mation on the road to making discoveries, most notably being the White Gold/Golden Saddle deposit, and Coffee Gold in the Supremo-Latte zones."

"Shawn Ryan brought a lot of energy to Yukon; however many investors got into a situation where they lost a lot of money because they did not clearly understand what they were investing in, just that they were Shawn Ryan discoveries, or how Yukon exploration season works and this made Yukon less attractive," said James Corrigan, president, Stina Resources Ltd.

The interest gained by Ryan's work has also brought significant business to local Yukon support companies. "The White Gold project, which involved Shawn Ryan as prospector, started with [Great River Air] flying four soil samplers in a Cessna to and from the field site; the next year there were 20 men, requiring a bigger aircraft, and it has developed from there. Kinross now owns the property and we are supporting the 300 personnel purpose-built camp accommodation," said Eric Rieder, head pilot at Great River Air.

For cynics, one recent discovery has returned those wandering investor eyes back to Yukon. A Comstock-Shawn Ryan project, the QV property, is the latest find. "The continuous new discovery of ore-bodies in Yukon ... is a silencing response to any skeptics [of Yukon's continued potential]," said Shawn Ryan.

The regulatory framework

With a mining framework that is generally praised by those who operate in the territory, there are a number of key points that make Yu-



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"After working in many parts of the world, it is my view that the regulatory environment in Yukon is very good, easily understood, rigorous but with definitive timelines, and generally responsive to project pressures. Alexco would be the example of a company that was able to discover, prove a resource and move into a production within three years; there are very few places in the world where that can be done," said Nauman of Alexco.

The ongoing discussion of land claims has left uncertainty in neighboring British Columbia, but has been praised for its clarity in Yukon where 11 of 13 land claims settlements have been completed. "There is a major effort underway to reach an agreement [on outstanding land claims] but many are still in court. Until a land claim is settled, the environment is more difficult to work and deal in. Most of the First Nations are willing and eager to do business, but without the legal framework in place, both sides are unsure how to proceed," said Greg Fekete, partner, Austring, Fendrick and Fairman Mining Lawyers LLP. "Settling land claims eases and speeds up the socio-economic development process and overall efficiency. The settle-

ments allow them to establish programs, legal frameworks and infrastructures enabling growth and business developments."

The Yukon Environmental and Socio-economic Assessment Board (YESAB), and its subsequent Act (YESAA) have also helped create a more streamlined process in the territory. Since 2005 YESAB has carried out 1,600 assessments.

"We have developed our own regulatory process that is not part of the Canadian environmental assessment process. This is managed in Yukon for Yukon, which is a major improvement from the old system that was managed in Ottawa. This shift has played a huge role in allowing the mining industry to open up [in Yukon]," said Fekete.

"Important to the environment is the 2006 Yukon Mine Reclamation and Closure Policy; subsequent to that is the financial strategy delineating the financial and technical guidelines required for mine reclamation and closure. The Yukon government continues to work with the mining industry, providing companies with facilitators to assist them through the assessment and regulatory processes," said Premier Pasloski.

Land use planning is another key consideration in Yukon. "Trying to fill the gap of the incomplete Land Use Planning process is a challenge for all proponents of the in-

dustry... This process should be completed as soon as possible to assist the understanding of potential use, and acceptable thresholds in specific areas of Yukon; the Land Use Planning process would be a very useful tool for YESAB," said Stephen Mills, chairman, YESAB.

While the system may be a great improvement for those entering the mining sphere in Yukon, those who are more established face certain hurdles. "The current assessment legislation and guidelines in Yukon are not particularly well suited to the expansion of existing mines; they are effectively treated as brand-new projects creating a great deal of seemingly unnecessary additional work and permitting delays in order to clarify the exact scope of an expansion project versus pre-existing and pre-authorized facilities," said Scott Keesey, environmental manager at Access Consulting Group.

The Yukon staking system has also been a point of contention for some in the industry. "The system is a little antiquated. Arguably, it would be a positive step if we adopted British Columbia's online staking system," said G.C. (Carl) Friesen, vice president, Underhill Geomatics Ltd., Underhill and Underhill.

Overall, Yukon has proved it is taking the initiative to make its regulatory regime welcoming to the mining industry.

Infrastructure—I've got the power?

For a population of just over 35,000, Yukon boasts some of the region's most developed infrastructure. With 4,700 km of all-weather roads, 11 airports, comprised of 10 regional and one international, access to two ice-free ports and a territory-wide broadband telecommunications network, Yukon is prepared for the mining community. The one critical area to watch as Yukon's mining industry continues to develop, however, is power. With an aged power infrastructure, a grid that is currently running at near capacity, and no clear means of increasing this power supply, mines that are looking to come online in the near future face critical issues.

"The larger future mines are going to have to think about a source of energy, whether it be hydroelectric power or local LNG," said John S. Brock, president and CEO of Pacific Ridge Exploration Ltd., who are currently carrying out a drill program at their Mariposa project located in the heart of Yukon's gold district. "The strategic location of the [Freegold Mountain project] will become an increasingly important factor ... [Capstone's Minto mine] is about 30 km from us as the crow flies. There is another copper project to our east, Copper North's Carmacks property,

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which is in its final permitting stages. The electricity utility (Yukon Electrical Company) has plans to extend a spur line from Carmacks to that property which would give us an even closer conduit to grid power," said John Burges, president and CEO of Northern Freegold Resources Ltd.

"Lack of power is a major issue for Yukon; fortunately our properties are located near the Whitehorse to Dawson highway where we could potentially run a line to a power source, plus the second largest power plant in Yukon is on the western edge of our properties," said Tony Simon, president and managing director YES Exploration Syndicate.

The territory's energy provider and the Yukon government acknowledge this problem. "Yukon Energy has a small isolated grid but is striving to keep pace with the growing demands of the mining sector," said David Morrison, president and CEO, Yukon Energy Corp., who deal with all power issues related to the mines. "Our grid sales capacity is 400 gigawatt hours; with the developing mines it is projected that the grid would need 600 gigawatt hours by 2015 to keep pace with demand." Yukon Energy are currently working with the industry, examining different ways to approach this issue. "For the last 12 months we have been working towards our feasibility study and permitting. The road

infrastructure to the project was not an issue, but the key ingredient has been the need to provide 120 megawatts of electricity [to our Casino project]" said, Paul West-Sells, president and COO, Western Copper and Gold Corp. "We have been working with Western Copper and Gold that has the \$1 billion plus Casino project for which it will alone require 800 gigawatt hours; way beyond Yukon Energy's supply capacity... Yukon Energy and Western Copper and Gold are working together and sharing their expertise to determine if LNG is a feasible power supply solution ...," said Morrison of Yukon Energy.

The private sector has been helping to fill this gap. "[In Yukon] neither the transmission lines nor the power lines are substantial enough to support the mines. Most mines will bring in power. Due to the remote locations of many of these mines, they may not have a power source already in place and this requires services like ours to ensure the exploration sites and mines themselves remain linked up and supported," said Kevin Ross, general manager, NU-Line Powerline Contractors Ltd.

The government appears fully aware of this problem and is currently pushing ahead with a number of initiatives. "Short- to mid-term, we are moving forward with the independent power producers policy, with net

metering, and, as a transitional fuel, with the use of LNG; Yukon government is putting in place the legislation and regulations for LNG," said Hon. Darrell Pasloski, Premier of the Yukon government.

There is already exploration underway to confirm the plausibility of this initiative. "Along with three other First Nations and the governments of Yukon and Canada, we launched an LNG study to supply energy to the emerging mining market ...The partnership between the First Nations is called Dempster Energy Services...[If developed] our initial priority is the local market, but if there is enough energy to export we will consider this; China would be the obvious choice, given its role in production. Our project is driven by First Nations and is unlikely to see the same political problems plagued by the Gateway pipeline," said Ron Daub, executive director of the Vuntut Gwitchin, a Yukon-based aboriginal corporation.

Other means of tackling the power issue are also being explored. "Yukon Energy has been carrying out a resource planning exercise looking at various primary options: geothermal, biomass, small hydro, wind and LNG. Victoria Gold is the driver of our initiative, stating that it will require power by end 2014; we are endeavoring to work to this timeline," said Morrison.



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Photo courtesy of: Prophecy Platinum Corp.



Photo courtesy of: Yukon Zinc Corp.



Photo courtesy of: Selwyn Resources Ltd.

Geological Potential in Yukon

The Midas touch



Geologists examining strong realgar showing of drill target D2 at Anthill Resources' Einarson project, Yukon. Photo courtesy of Anthill Resources.

A record high exploration year in 2011 has led to extensive drill and follow up exploration work in 2012 as juniors clamor to define resources. With three active mines already online, and many more poised to join them, Yukon has a great deal to offer.

Gold

In an unsteady, global financial market, the high price of gold, the lifeblood of Yukon in many ways, has remained a source of security

for many. Continued demand, as well as the exciting Shawn Ryan discoveries, have ensured that Yukon continues to shine with gold.

A number of key mining projects, such as Kaminak Gold Corp.'s Coffee Gold project and Kinross Gold Corp.'s White Gold project highlight the emerging White Gold district along the Tintina Gold belt. Golden Predator Corp.'s Brewery Creek project is also another Yukon project aggressively moving towards production. Victoria Gold Corp. is slated to be the next mine to come online in Yukon.

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* See NI 43-101 technical report, May 2011 for full resource and reserve disclosure



John McConnell, director, president and CEO, Victoria Gold.



Core shack at Eagle Gold project. Photo courtesy of Victoria Gold.



MingAn Fu, president, Anthill Resources.

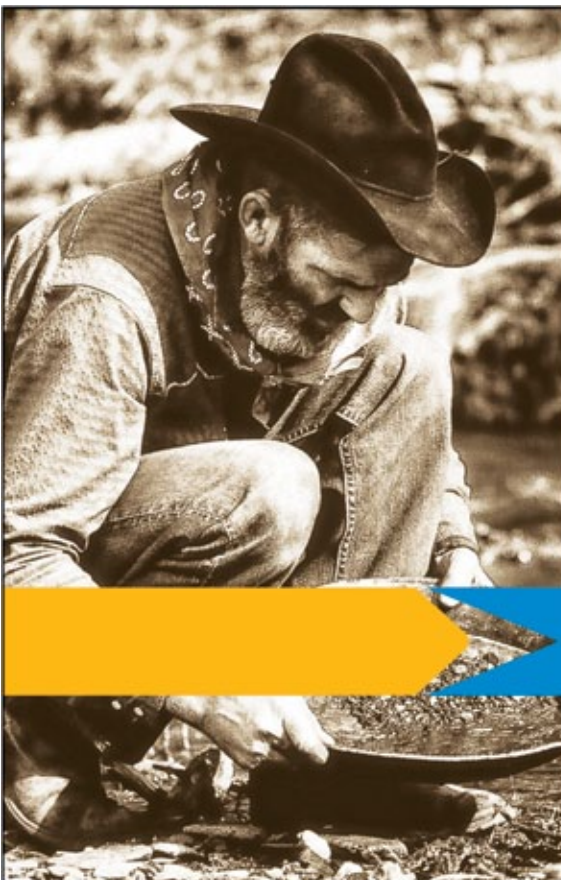
"The [Eagle Gold] project is a simple open-pit valley leach operation that will produce over 200,000 oz/y of gold and at current gold prices will have a cash flow of \$250 million per year. Capital cost is modest at under \$430 million; the project will employ 350 to 400 people and will prove a very significant economic development for Yukon... We expect permits to allow start of construction by early 2013. The construction time period is two years, which will have us in full production by 2015," said John McConnell, director, president and CEO, Victoria Gold.

Comstock Metals Ltd.'s QV property is another Shawn Ryan find that has recently caused renewed excitement in the territory. "The QV property is an extension of the Golden Saddle deposit, confirmed by a magnetic high geophysical signature coming across the river onto the QV grid. We carried out subsequent work on the QV grid... and the theory that the mag anomaly extended onto the QV property was

confirmed by the trench results [of Shawn Ryan], not drill results, which are classified as the number-one in the district compared to the trenches of Golden Saddle and Kaminak," said Rasool Mohammad, president and CEO.

Comstock has just completed its financing for the QV property. "Drilling could commence in 2012, but if not, will definitely commence in 2013 with a minimum target of 5,000 m drilling," Mohammad said.

MingAn Fu, president of Anthill Resources Ltd., is an example of the increasing Chinese interest in Yukon. He is a Canadian immigrant who has worked in the mining industry in China for over 15 years focusing on precious metals. Anthill Resources is currently exploring for gold and copper; they have a drill program in place for 2,000 m in 2012. "After a year of surface work we did in 2011, we have identified six gold targets, three lead-zinc targets and one copper



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Geology of high-grade grab samples, orpiment and realgar showing. Photo courtesy of Anthill Resources.

target. Within this last year we have identified very favorable geology settings, structure, and Alcott rock samples ranging from 2 g/mt to above 10 g/mt," said Fu.

Currently seeking an investment partner, Fu considers Yukon "virgin land." "The overall infrastructure in this part of Yukon is pretty poor, but we are hoping our neighboring companies will make good discoveries as well, and in the future we could maybe combine forces and change the infrastructure," said Fu.

Western Copper and Gold Corp.'s Casino project is another significant project currently making headway in Yukon. Aimed to complete a prefeasibility study in 2012, the company will submit its permit application in the first half of 2013. "The main economic impact of Casino will be an increase of 20% in Yukon's GDP, which is remarkable. Perhaps more significant is that the project will require a construction force in excess of 2,000 and a full-time labor force of 400 to 500 during operation in addition to service jobs created to cater to the project. Over the 23-year mine life of Casino, the projected input to the Canadian economy will be \$9.8 billion," said West-Sells.

Others, like Kestrel Gold Inc., are hunting for the source of gold in the area. "These properties are situated along ridges that have long been rumored to be the source of the Klondike placer gold. If you look at the creeks surrounding the King Solomon Dome and in particular Dominion Creek, they are extremely rich placer gold streams. The type of gold that has come from the creeks on either side of the Dome it is very similar in its chemistry, suggesting a common source. The amount of placer gold taken from the Klondike region has been estimated at around 20 million oz and there has been a relatively miniscule amount of gold that has been hard-rock mined in the area," said William A. Taylor, vice president of exploration.

Other aspects of Yukon's geology also contribute towards making the territory an unusual and exciting gold destination. A wide diversity of geological attributes are present, and methods of exploration have adapted in kind.

"There are many different sources of Klondike gold in Yukon throughout the Tintina gold belt. The area is unique in Canada and the glacial limits stop just east of where our claims are. As the area is unglaciated, you can collect a soil sample from the surface and it represents a bedrock source," said Gary Freeman, president and CEO of Ethos Gold Corp., a junior company that, until recently, had a large focus on its Betty Project, located along the strike of the Kaminak property and just over the claim boundary from Western Copper and Gold's Casino property.

Klondike Gold Corp. has the Lone Star project, which showcases the uniqueness of Yukon properties. "There is something very special about the property; it has produced more gold per square yard



Rob Carne (left), president, discusses project geology with company prospectors. Photo courtesy of ATAC Resources.

than any other place in the world," said Erich Rauguth, president and CEO, Klondike Gold. They will be undertaking their drill program in 2012. Also a local resident in Yukon, Rauguth understands the need for balanced development. "You have to get people on board that are interested and knowledgeable about development, which is not the case in many mining companies. It is our social responsibility to hire the locals, and be aware of their concerns, wherever it is we operate."

Another unique project, ATAC Resources Ltd. has the Rackla Gold Project, Canada's only Carlin-style gold project, similar to those seen in Nevada. "Carlin-type deposits can occur anywhere... the deposits can be any rock with exceptional amounts of calcium carbonate, typically in limestone, though this is not always constant," said Rob Carne, president of ATAC, who now has more than 40 years of exploration geology on his resume. Having drilled 30,000 meters in 2011, their aim is now to develop a maiden resource and they are currently focusing on resource delineation and expansion of three areas of interest they have within the project.


Constantine Metal Resources Ltd. is another highly active gold focused junior in the territory. "[Having] staked 5,000 claims over an area of 1,000 sq km, and followed up silt anomalies by carrying out soil sampling [we are now trying] to determine if an ore body was present in the soils... We now have three project areas with well defined soil anomaly grids with very high gold-in-soils, brand new and ready to be drilled which we plan to commence summer 2013," said Darwin Green, vice president of exploration.

Aben Resources, which also have operations in the Northwest Territories, are moving its Justin Gold property ahead. "We had to apply for a number of permits this year going into the drilling season and we got our last one, a five year, class 3-exploration permit, within a few months of applying, proving that the system is timely," said Jordan Trimble, corporate development and communications.

While these exploration activities can appear to move quickly, they can also still be done on a budget in the North. "At our primary project, Red Mountain, we drilled 12,000 m in two short seasons and went from a grassroots project, to an inferred resource estimate of 127 million mt grading 0.48 g/mt, approximately 1.95 million oz of contained gold. This inferred resource was achieved with a very limited budget of just over \$5 million. The long mineralized gold intercepts is what has allowed us to add significantly to our resource with a minimal amount of drilling and in turn will give AM Gold's Red Mountain a competitive advantage in a crowded junior exploration marketplace as the project advances," said John Fiorino, CEO, AM Gold Inc.

While these examples showcase some of the current activity in Yukon, there is an older gold tradition still operating.

 A close-up photograph of a person's hands, wearing an orange hard hat and a metal watch, holding a large amount of dark, greyish-brown soil or rock fragments. The soil appears to contain small, light-colored mineral grains.


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Paul West-Sells, president and COO, Western Copper and Gold.

Placer mining

Images conjured of the Klondike gold rush often include panning for gold, rough-and-tough explorers and sour toes. The modern face of placer mining is much more advanced. These small placer mining operations tend to be predominantly owner-operated. According to the Klondike Placer Miners' Association (KPMA) there are about 100 KPMA private self-funded members within a small industry (if compared with the junior exploration sector).

"For the number of operations, placer miners would overwhelmingly be the largest group, but the total placer mining production

for 2011 was only 45,000 oz gold... The resident Yukon geologists and exploration people who have serviced Yukon for many years have worked side-by-side with placer miners. Hard rock mining in Yukon is in its infancy compared to placer mining," said Stuart Schmidt, president of KPMA and owner of Schmidt Mining Corp. "Arguably, within the territory the general public is friendly towards placer mining; however, from a regulatory viewpoint it is becoming more difficult to operate. Placer miners operate in rivers and streams that are under regulatory control so it is difficult to move the location of mining without falling foul of the regulations. KPMA is concerned about the future of placer mining, but to be a placer miner you have to be an optimist."

Silver

The Selwyn basin, which hosts the majority of silver exploration and Yukon's single producing silver mine, can be described as a late Precambrian-Devonian depositional basin. Characteristics of this area include steeply dipping complex veins and faults which can be up to several meters wide. Currently accounting for 7% of exploration activity in Yukon, silver continues to be a strong focus.

Alexco's Bellekeno silver mine is in itself an incredible story. Originally established with no resource in 2006, they are now look-

ing at a potential 60 million oz of silver. "The Bellekeno silver mine is unique; the type of mineralization that you see here is polymetallic comprising predominantly lead with associated silver, and zinc. The District, which is about 30 km long, is one of the highest-grade silver districts in the world... Apart from argentiferous (silver bearing) lead minerals, the district also hosts numerous occurrences and deposits containing silver sulfosalts and in some cases, native silver," said Nauman of Alexco. "Our guidance [for production] is 2.2 million oz/y to 2.5 million oz/y and we are on track for that. We have two additional mines that we are going to be putting into production in 2013 and within the next two years we will be at about 5 million oz/y."

Silver Predator Corp., of the Predator group, is currently in the early exploration phase in the Plata District, said to have similar silver, lead, zinc, gold mineralization to Keno Hill silver camp.

Copper

Though internationally known for its significant gold resources, copper is arguably the second most active commodity currently in Yukon and one that investors will be watching closely. Copper reached a four-month price high in September and continues to look promising.

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Sally Eyre, president and CEO, Copper North Mining.

Capstone's Minto mine is forecast to produce 38 million lb of copper in 2012. "In the early part of the year we were transitioning from the main pit and processing low-grade material until we came into the next high-grade pit, which occurred at the start of the second quarter," said Cindy Burnett, vice president, investor relations at Capstone Mining Corp. A Yukon success story, it is an example of flaws still present in Yukon's regulatory framework, that can, however, be overcome. "Current Yukon permitting regulations do not accommodate quick development stages of a mine; Yukon government is aware of this and changes to permitting regulations are being considered for permitting to become a more dynamic regulatory process. Once in place, Yukon could become Canada's next mining center," said Darren M. Pylot of Capstone Mining.

Copper North Mining Corp. is another of the significant projects waiting to come online. "The Carmacks Copper Project is a copper-oxide deposit that will be mined and processed as an open-pit heap leach solvent extraction and electrowinning (SX/EW) operation with a target production of 30 million pounds of copper cathode per year over its seven year mine life. The project has good infrastructure: there is road access and the power will be



Drills at Minto mine. Photo courtesy of Capstone Mining.

supplied from the Yukon power grid. Subject to permitting, the Carmacks Copper Project is expected to be in production by 2016 enabling Copper North to be a near-term copper producer" said Sally Eyre, president and CEO, Copper North Mining.

Zinc

Active exploration for lead and zinc in the late 1960s led to the staking of the Selwyn (Howards Pass) district in 1972. Recent exploration initiated in 2005 increased the indicated resource to 154.4 million mt at 5.35% zinc, 1.86% lead and the inferred resource of 231.5 million mt at 4.54% zinc and 1.42% lead, making this potentially the largest zinc deposit in the world.

The third of Yukon's producing mines, Yukon Zinc Corp. is an example of increasing Chinese interest and investment in Canada. "In March 2012, the Wolverine mine reached commercial production achieving 60% of its design capacity, 1,020 mt/d; we plan to reach full capacity of 1,700 mt/d by the end of 2012 or early 2013. Wolverine has a mine life of nine years, and has five metals: concentrates of lead, zinc, copper, silver, and gold," said Jing You Lu, chairman and CEO. "China lacks natural resources and we see Chinese investors coming to North America to secure these. An illustration of



Robert Boyd, president, CEO and director, Endurance Gold.

Yukon Zinc's commitment is the Wolverine mine project; Yukon Zinc would like to thank the mining fraternity for its support in achieving this," said Lu.


Rare earths

Rare earths can be found in Yukon as the global market seeks out alternative sources following China's export restrictions. Canada's southern neighbor, the United States sourced 79% of its rare earth mineral supplies from China as recently as 2010. Though rare earths are fairly abundant in the earth's crust, discovered minable concentrations remain scarce.



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* Inferred category. Based on resources estimated at 0.4% NiEq cut-off and 100% metals recoveries. July 2011 NI 43-101 Technical Report by Wadding Engineering. Commodity pricing used in this technical report was obtained from the LME three year trailing average ended July 6, 2012. Platinum \$1,587.87/oz, Palladium \$581.28/oz, Nickel \$9.48/lb, Copper \$3.56/lb, Cobalt \$16.25/lb and Gold \$1,377.87/oz. The PEA is preliminary in nature, that it includes Inferred Mineral Resources that are considered too speculative geologically to have economic considerations applied to them that would enable them to be categorized as Mineral Reserves, and there is no certainty that the PEA will be realized. A mineral reserve has not been estimated for the project as part of this PEA. A mineral reserve is the economically mineable part of a Measured or Indicated Mineral Resource demonstrated by at least a prefeasibility study.

Endurance Gold Corp. is currently in its very early stages, but demonstrates further potential in Canada's North. "[Rare earth] projects in North America that are well advanced or coming into production are dominated by light rare earths; the projects in Canada are mainly heavy rare earths. The global need for rare earths, especially heavy rare earths, is escalating because of their value in clean technology," said Robert Boyd, president, CEO and director, Endurance Gold. "Currently, we do not have a resource at Bendito; it is an exploration project which is a soil anomaly rock sample and trenches that indicate grade ore waves of high percentage rare earth of which 11% is heavy rare earth compound, and on top of that the medium-to-light rare earth is 11% neodymium, which is in high demand and commands a higher price. We now need to drill to establish a resource."

As of 2011, China still had the largest rare earth reserves in the world, more than four times that of the United States. As the demand for rare earth minerals continues to increase, new deposits will likely play a continually important role.

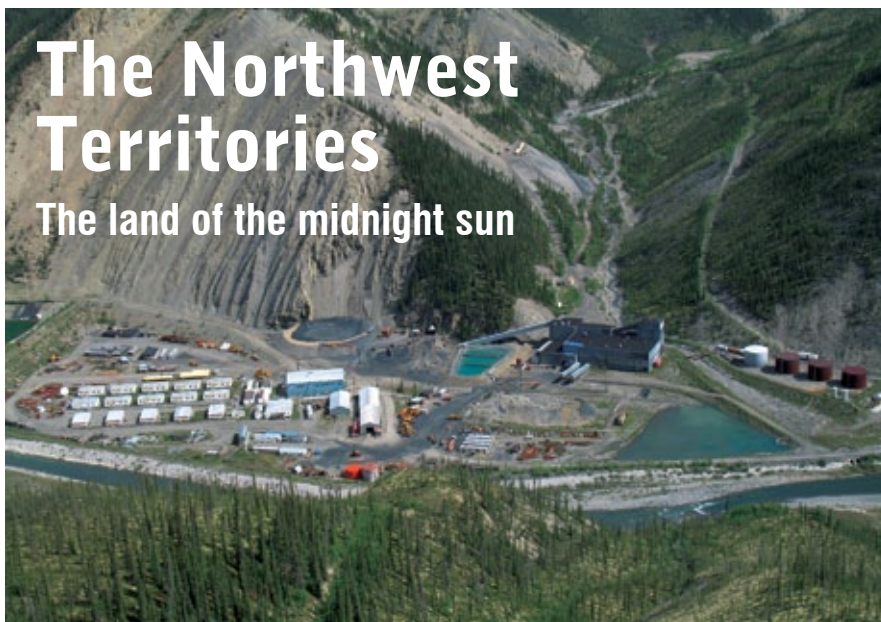
Platinum

South Africa is undeniably the world's platinum hub, accounting for more than 70% of global production. Yet continued labor unrest could make other regions look more attractive. Yukon, while not holding the same vast reserves, offers some opportunities.

John Lee, chairman of Prophecy Platinum Corp. said: "The metallurgical study [at our Wellgreen property] in May showed very promising initial results of recoveries of practically all the metals listed in this project, including copper, nickel, platinum, palladium, gold, and cobalt... The project is deemed to be highly prospective in its economic viability; the PEA is only preliminary and much work has yet to be done. The Prophecy team and the board of directors feel that Wellgreen is a viable project that can be taken into production; all the ingredients are there... According to pre-feasibility studies, a production decision will be made in 2016. Construction will take two and a half years: 2019 would be an envisaged production year having carried out an economic study; secured equity; have permitting in place; and sourced the right people and partner." As the demand for platinum increases, the price of platinum is expected to continue to rise making this a commodity to watch in the near term.



There is 4 km of underground workings from when the project was previously explored and mined. They allow year round drilling and access to massive sulphides. Photo courtesy of Prophecy Platinum.



The Northwest Territories

The land of the midnight sun

An aerial view of the Prairie Creek mine in the Northwest Territories. Photo courtesy of Canadian Zinc.

Distancing itself from its damaging Giant mine era, now synonymous with environmental catastrophe, the Northwest Territories is now one of the largest diamond producers in the world and proving a shining example of environmental innovation and local engagement initiatives. Home to the world's first government-sponsored diamond certification program, this territory has long been distinguished around the world. Still a home to a thriving industry, the territory currently faces a number of regulatory hurdles, which have, in part, led to a distinct drop in recent exploration activity. With key diamond mines expected to shut down over the next decade, and mining majors BHP Billiton and Rio Tinto's future diamond interests unclear, the government of the Northwest Territories is trying to diversify its mining activity from the diamonds that helped create the world standard.

The mining industry has long been the backbone of the economy. Creating more than 2,600 direct jobs, it has an annual economic impact of over \$750 million. With a potential six mines poised to come online in the foreseeable future, a mineral development strategy is currently being pushed through to move the territory into the future.

Facing the same labor shortage as the rest of Canada, the government of the Northwest Territories is also trying to develop a skilled workforce in partnership with local First Nation governments. "As land claims are settled and self-government agreements implemented, First Nation governments are taking on greater responsibility. The federal government has also implemented new pro-

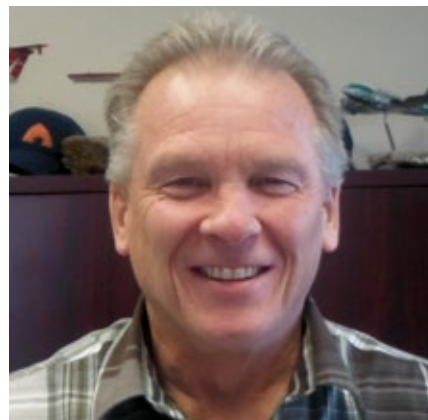
grams and initiatives towards the development of the Northwest Territories labor market. Industry, employers, education systems, training providers and communities all have a role to play—we all must work together," said Hon. Bob McLeod, Premier of the Northwest Territories government.

The regulatory regime

One critical area of concern in the Northwest Territories is the mining framework. While devolution has made Yukon an attractive mining destination, the Northwest Territories are still working towards this. Unsettled land claims have also added to complications and an air of uncertainty in the territory.

"The main issue is that most of the regulatory authorities established in the Northwest Territories were set up with agreements with the First Nations and their land claims. There was some compromising on the regulatory environment and as a result we have a plethora of bodies that make it difficult to get through the system for smaller companies," said Neil McCrank, Q.C. counsel of law firm Borden Ladner Gervais LLP. "Neither Nunavut nor the Northwest Territories have devolution, although they are working towards it, and it will make quite a difference on the assumption that the territorial government can take over that responsibility. The federal government has been reluctant to move until it can be sure there is a provincial government that will provide enough bases for it to occur in a healthy way."

"A current focus is on the regulatory environment, as it is critical to have a certain type of, and efficient regulatory system in



Gary Vivian, president, Aurora Geosciences.

place if you want to attract investment and maintain a healthy industry," said Hoefer at the Northwest Territories and Nunavut Chamber of Mines. "The Northwest Territories' targeted devolution for January 2014 will present an opportunity to improve the efficiency of its regulatory system," said McCrank.

"The most interesting challenge over the last 20 years has been the permitting process and within the last five to seven years, it has become much more difficult... Hiring can also be a problem in the small northern communities. There often is not a lot of capacity to do work. This becomes a real problem when you commit to hiring locals and the skills are simply not there," said Gary Vivian, president, Aurora Geosciences Ltd.

The territorial government is pushing ahead with the changes. "We are working with our industry and government partners to improve our regulatory regime to facilitate investment that will generate jobs and responsible economic growth, while ensuring environmental stewardship remains paramount," said Premier McLeod. "Going forward there will be some challenges with the proposed regulatory reform; not all the aboriginal governments are supportive of the reforms. These reforms will enable us to improve both the timing and thoroughness of the process, and not jeopardize the balance between the environment and resource development. We are encouraging and anticipating development in the Northwest Territories."

"All mining companies are aware of the rules in the Northwest Territories that they negotiate Impact Benefit Agreements with the aboriginal governments in tandem with Socio-Economic Agreements, ensuring that we all benefit from the development... Devolution, energy, and regulatory reform are underway, and we guarantee that looking forward things will improve as a result of these three factors," said Hon. Michael

Miltenberger, Minister of Environment and Natural Resources, government of the Northwest Territories.

Infrastructure

With only eight road networks throughout the territory, for those whose activities extend past these, infrastructure is of critical importance. "The vast geography of the Northwest Territories does not have the transportation infrastructure that the southern jurisdictions have," said Hon. David Ramsay, Minister of Industry, Tourism and Investment and Ministry of Transportation for the government of the Northwest Territories. "It is an area of great concern to us... With the advancement of resource development in the central Mackenzie and the number of large companies involved, we will see the progression of the Mackenzie Valley Highway all-weather road infrastructure imminently in the central Mackenzie. Meetings are being held with the companies involved in the central Mackenzie to discuss a plan to advance all-weather roads in the Sahtu. The Department of Transportation is also looking at extending the seasonal road from north of Yellowknife into the Slave Geological Province; an important area for the development of further mines as we need to diversify our mining portfolio."

"The government of the Northwest Territories is building a bridge at the Mackenzie River, which will bring great improvements to the transport here," said William E. Cole, general manager, central and western Arctic, Manitoulin Transport Inc. "We are looking forward to the completion of the bridge and the non-interrupted service it will bring. This will benefit mining clients as they will not have to pay that extra charge that is associated with the helicopter transport. The roads themselves are quite frankly excellent and well maintained." A unique northern innovation, ice roads which have been in place since 1982 help ensure that those across the territory have critical supply routes in place, if only for an average of 67 days per year, between February and March. The roads, which stretch 600 km, 87% of which is based on frozen lakes, offer access to the Jericho Diamond mine, the Lupin mine for which it was originally built, Diavik Diamond mine, Tyhee Gold, and Snap Lake.

In 2011 alone, 6,832 northbound truckloads hauled 239,000 mt of goods to its northern recipients. The future of this northern lifeline though, is threatened due to change in the environment.

"Our firm became involved in 2001 and that was when there was a recognition that low volumes were increasing and the sea-

sons were shortening due to climate change and so there might be a point when they would not be able to get all their supplies in a single winter season," said Ed Hoeve, project director, Northwest Territories and Nunavut, Arctic region, engineering practice, EBA Engineering, a Tetra Tech company. "We have seen climate change impact upon transportation and infrastructure first. Another job that the EBA is soon to implement is the seasonal overland route; this is one adaptation solution by putting the first 150 km of the ice road on land, which is quite critical. So both in the degradation of the highway and northern airstrips we see vulnerability to settlements due to climate change. The Northwest Territories however are far more vulnerable to climate change, due to a warm climate and the large amount of permafrost."

Speaking more broadly about the North's infrastructure concerns, Premier McLeod said: "A strong relationship with the federal government is key to addressing these infrastructure issues. The federal government still retains responsibility and authority for new roads in the Northwest Territories and plays a very important role in infrastructure development both here and across the country. Therefore our relationship with the federal government is very important to us and we work hard at it, both individually and pan-territorially."



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Photo: Thor Lake, NWT



Photo: Kugaaruk, Nunavut



Photo: Ice Road, NWT

Mining Activity in the Northwest Territories

A rare diversity: It is not all about diamonds



Exploration base for the Providence Greenstone belt gold property, electric fence enclosed PGB zip camp. Photo courtesy of GGL Resources.

In the last decade Canada has rocketed onto the world diamond scene, from zero production in 1998 the country has grown to become the world's third largest producer by value. The Northwest Territories is at the very heart of that revolution, playing host to three of the nation's four diamond mines, however, the territory has faced delays resolving long running legal issues, facilitating new investment and capitalizing upon the successes of the past decade. As the price of uncut diamonds plummets, the race is to diversify the territories' mining sector and capitalize upon the Northwest Territories' nickel, rare earths, zinc and tungsten potential.

Diamonds

The modern mining industry in the Northwest Territories is heavily based on diamonds. The future of this industry in the Northwest Territories, however, remains unclear. In its wake though, unique environmental innovations and local engagement have still made it a territory to look to as an inspiration in many respects. Currently, the territory hosts three operating diamond mines, including international mining house De Beers' Snap Lake mine, with the Gaucho Kue soon to come online.

Rio Tinto's Diavik Diamond's mine and BHP Billiton's Ekati diamond mine combine to help rank Canada as the world's third largest diamond producer. Rio Tinto and BHP have indicated they may be interested in selling off their diamond assets to focus on commodities more core to the companies, adding a degree of uncertainty to the industry.

"Rio Tinto's recent announcement of a strategic review in no way reflects its lack of confidence in the diamond market; the reality is, diamonds are just one part of its large portfolio of resource assets," said Niels Kristensen, president and COO, Diavik Diamond Mines.

Rio Tinto's Diavik Diamond Mines has been a unique northern innovation in many ways. Located in the middle of a lake, the diamond pipes are located in deep water, making this an expensive and complicated project. Now entering the underground mining stage, they have transitioned from

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Duane Gingrich, vice president, projects and operations, mining and metals, AMEC.

the original open pit operations. "In April 2012 the first 1 million mt ore at the underground operation was achieved; the next 1 million mt will be realized within six months. For the next few years the bulk of operation will be underground. The fourth kimberlite diamond pipe is currently undeveloped, accessible via open pit mining," said Kristensen.

Bringing unique innovation to the North, Diavik has now introduced wind technology at its site, a first in Canada's North. "Historically, to supply the mine with energy we have hauled 60 million to 80 million liters of diesel annually via

the ice road over a six-week period, a very costly and environmentally unfriendly exercise. Diavik has approval from Rio Tinto for \$30 million to install four wind towers each extending to over 100 meters high generating 9.2 megawatts at peak, which will satisfy around 10% of our site energy requirements. The four turbines are now operational and supplying power to Diavik. This source of energy for a mining operation is unique; the units are designed to generate at -40 C°."

DeBeers has now developed two diamond mines in northern Canada; Snap Lake in the Northwest Territories and Victor in Ontario, and are at the permitting stage for a third mine; Gacho Kue in the Northwest Territories.

The construction of Snap Lake helps outline northern challenges with a combination of local and southern solutions; "The logistics were the key challenge of the [Snap Lake] project. There was a window of only 100 days to transport in a year's worth of supplies via an ice road, coordinating with three other mines for space on the road. What fails to be delivered has to be flown in. The second year was very challenging; we had the shortest ice-road on record of six-weeks duration. To compensate AMEC worked

with the other companies in the area and between us commissioned Hercules airplanes to fly in equipment during the summer," said Duane Gingrich, vice president, projects and operations, mining and metals, AMEC Plc.

These operations continue to draw southern companies, ready to support the industry. "Rescan Environmental Services began working in the Northwest Territories in the 1980s, working on projects for BHP Billiton and eventually took on the Ekati diamond mine project in 1992, carrying out the first licensing and permitting of a diamond mine in Canada; our relationship with Ekati is still ongoing," said Clem Pelletier, CEO, Rescan Environmental Services Ltd.

Diamonds will remain a key driver of the Northwest Territories mining industry for the foreseeable future, but other commodities are starting to also gain attention in the territory and abroad.

Tungsten

North American Tungsten Corp. Ltd.'s Cantung mine is the fourth mine in operation in the Northwest Territories, providing 4% of the world's tungsten. As China continues to restrict tungsten exports, this mineral becomes more critical for the construction of

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"Historically, recycled tungsten has taken up some of the deficit between supply and demand; and counts for some 35% of the overall worldwide supply. This however has now reached its maximum limit. The DLA (Defense Logistics Agency) in the United States stockpiles virtually every element on the periodic table. Traditionally they have had a significant stockpile of tungsten, which they have auctioned off to industry over the last 15 years, equating to some 3% of the overall world's supply. I believe that future auctions will be put on hold... Combine this with the recycling ceiling, other than North American Tungsten there is very little additional western mining production," said Stephen Leahy, chairman and CEO at North American Tungsten.

Speaking of their Cantung mine, Leahy said: "Cantung is a mine that has never been drilled out, and we currently estimate that it has three more years mine life; however, recent exploration should lead us to new areas and zones that previously were thought not to exist, but grade will be the key. ... Drilling and production continues, and in the last 18 months we have invested over \$30 million in the Cantung mine."

Rare earths

With only two initial companies looking at rare earths in Canada's North as recently as 2007, this number has been said to now be as high as 170. "China's restrictions on rare earth exports received a great deal of media publicity because they are strategic and vital to so many new technologies and that China was virtually the only primary source of supply. This publicity generated a great deal of investor interest allowing companies like Avalon to raise the capital to move development stage projects forward. A speculative bubble developed in 2010 that created a stampede of new entrants into rare earths exploration but interest has cooled dramatically over the past 12 months leaving only the most advanced companies such as Avalon still active," said Brian Chandler, COO, Avalon Rare Metals Inc.

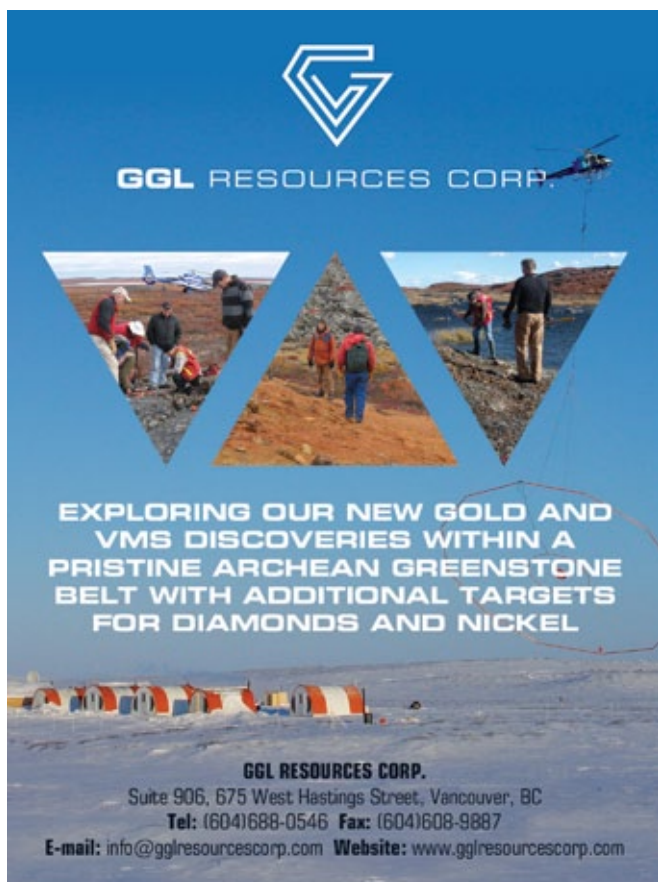
For those seeking other sources, the Northwest Territories again holds promise. "Avalon is in position to become one of the first large scale producers of Heavy Rare Earth Elements (HREE) products outside of China. A pre-feasibility study was completed on Nechalacho in 2010 and subsequently updated in June 2011. A definitive feasibility study is presently being prepared by SNC-Lavalin which is targeted for completion in the second quarter of

2013. Avalon is fully-funded to complete the feasibility study and is presently working with financial advisors to arrange the \$1 billion in capital that will be needed to build the operation. We expect to develop the project in partnership with at least one user of rare earths. Full-scale construction is scheduled to begin in 2014 with initial production targeted for late 2016. First deliveries of product to market would be in 2017," said Chandler.

Gold

While diamonds have historically driven the Northwest Territories mining industry, there has been little focus on gold in the territory. This, however, is starting to change. As the financial crisis in Europe continues, and the future of the dollar remains unclear, gold continues to be a commodity of choice. As of September 2012, spot gold was headed for its largest quarterly gain since the second quarter of 2010, which has kept investor eyes on this shining commodity.

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will be to take the NICO deposit into mine production. We have invested US\$100 million in this deposit," said Robin E. Goad, president and CEO of Fortune Minerals Ltd.

Other juniors also have an eye on the territories gold potential. "Our main focus is the PGB property with the primary focus on gold, volcanic massive sulfide deposits (VMS), diamonds and nickel in that belt. We have developed drill targets on three of our gold discoveries, and made two new discoveries of VMS deposits. In 2008 we invested \$1.5 million in a successful airborne VTEM survey designed to discover massive sulfides," said Raymond A. Hrkac, president and CEO, GGL Resources.

As with other key commodities, the speed of development and advancement of gold projects is going to rely heavily on ensuring the Northwest Territories keeps moving towards a more investment-friendly environment.

Zinc

Zinc has a long history in Canada's North. Arguably leading the way in post-war resource development, neighboring Nunavut had two lead-zinc mines in production; Nanisivik and Polaris, both of which closed in 2002.

The Northwest Territories is also home to significant lead-zinc deposits and as the

territorial government seeks to diversify away from diamonds, they are receiving significant attention.

"The Prairie Creek mine project is arguably one of the highest-grade base metal deposits in the world with a combined zinc-lead grade of over 22% on average together with 5 oz or 6 oz silver per mt. The ore body is large and only partially drilled, and has significant exploration potential. Canadian Zinc Corp. believes that when Prairie Creek goes into production, it will have a mine life in excess of 20 years. The principal reason for it not being in production sooner is due to its remote location in the Mackenzie Mountains in the Northwest Territories," said John F. Kearney, chairman and president, Canadian Zinc Corp.

Also unique to this particular project is the mine training initiative it partnered with the federal government. "As part of the job opportunity and training initiatives, we have negotiated with the federal government, under the Human Resources and Skills Development Canada program, funding of a program to develop the skill set of the local aboriginal communities to enable them to participate in the mine project; Canadian Zinc and the Mine Training Society of the Northwest Territories are involved in the training program," said Kearney.

Innovation in mine training may very well prove to be a key factor in ensuring the next generation of miners can seize the opportunities present in their territory.

Nickel

While still a relatively small player in the Northwest Territories mining industry, nickel can still have a part to play in its development and diversification. Ken Armstrong, president and CEO, Strongbow Exploration, said of their Nickel King deposit: "A NI 43-101 compliant resource estimate was 11 million mt at 0.4% nickel, with a further 33 million mt at 0.36% nickel. The density of drilling has thus far been insufficient to determine the full extent of mineralization along the entire strike length, although today all holes have encountered mineralization within the entire 2,600 m." This project has been put on hold due to the price of nickel, though it remains a strong asset.

Other nickel properties are undertaking similar moves, with Kalgoorlie Mining, (formerly US Nickel), currently focusing instead on their Bullant gold project in Australia and seeking to divest themselves of their Snowbird nickel project.

Nickel, which has been on a downward price trend for almost five years, is not expected to see this improve until 2013.

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Nunavut

Canada's last frontier



A drill being set up at the Ulu project in Nunavut. Photo courtesy of Elgin Mining.



Dianne Lapierre, manager of environmental assessment and regulation, Department of Economic Development and Transportation, Government of Nunavut.

The territorial symbol of Nunavut is the inukshuk. Meaning "in the image of man," these stone figures stand vigil on Nunavut's vast tundra and treeless horizons, helping to guide those traveling through the territory. That these lonely figures are often the only sign of human influence for huge distances perfectly embodies both the scale and the emptiness of the land. However, although this may be Canada's most remote region, it also contains some of the most favorable under-explored geology of the country.

Nunavut is a territory of superlatives. As Canada's youngest territory, Nunavut was originally part of the Northwest Territories and operated under the same mining framework as the territory until its separation in 1999 through the Nunavut Land Claims Agreement Act. As Canada's largest, and northernmost territory, it is also a territory of highly underdeveloped mineral wealth. With Canada's smallest population, infrastructure is often scarce, forcing companies to rely heavily on sea and air to transport goods. With the least amount of mapping of any province or territory in Canada, it remains one of the country's most challenging regions; though one that offers those willing to tackle its higher risk for some of the world's largest and last undeveloped deposits.

As a result of the 1999 Land Claims Agreement, Nunavut enjoys a unique status in Canada; it is the only territory or province to have completely settled all indigenous land and mineral claims. "Nunavut is [not] one entity, but two; the Nunavut Land Claims deal for Inuit only, which is held in Nunavut Tunngavik Inc. (NTI), and the public Nunavut Government which operate like a territorial government for all Nunavut residents" said Cathy Towtongie, president, NTI.

Under this framework, firms wishing to explore or mine on Inuit land need to reach an Inuit Impact and Benefits Agreement (IIBA): "under NTI there are three regional Inuit associations responsible for negotiating an IIBA for surface land; Inuit, via the regional association, will receive royalties from a mine and benefit in terms of employment and business opportunities."

NTI has a pro-mining policy and Towtongie advocates mining's role in the economic advancement of the Inuit people, but she retains a cautionary note. "We do not expect the mining industry to take away the wealth of our lands without the Inuit benefiting... The challenge is achieving the right balance between the two."

mental assessment and regulation, Department of Economic Development and Transportation, Government of Nunavut.

Yet events in the past year have sent mixed signals for the future. In 2012, the Hope Bay mine closed its doors and Agnico-Eagle announced that it would be closing Meadowbank three years earlier than planned due to "persistently high costs" (according to a press release). While these events have left the industry cautious about



Photo courtesy of Agnico-Eagle Mines Ltd.

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their expectations in Nunavut, a number of other players have opted to push through with major operations. Construction at Mary River by Baffinland Iron Mines Corp., as well as the planned development of their Meiladine mine, could see the territories' GDP surge by 17% in 2013 and 14.2% in 2014 according to some estimates. The construction industry in Nunavut is also expected to benefit, with estimates that it will grow by 22.7% per year between 2012 and 2016.

Most recently, the Nunavut government has also clarified their stance on uranium development, providing a degree of confidence for the territory's three uranium developers: Areva Resources Canada Inc., Forum Uranium Corp. and Cameco Corp. In June 2012, the territory announced it is in favor of uranium mining, dependent on a number of conditions. "Nunavut is a great frontier, has massive resource opportunities, and is under explored. The challenges are its remoteness; detailed and logistical long-term planning is key to any operation; safety awareness and having accessibility to medical attention; and the bar for project economic viability is very high, therefore it is necessary to find rich deposits," said Bruce A. Counts, president and CEO, Bluestone Resources Inc., a diamond and copper-focused exploration company in Nunavut.

The mining framework

International mining houses and juniors have long had their eyes on Nunavut yet, as the territory continues to develop its mining policy, the business environment is less a staid certainty than a dynamic learning experience for all involved: companies, government, and Inuit peoples.

Hon. Peter Taptuna, Deputy Premier and Minister of Economic Development and Transportation, Government of Nunavut, said, "in the last 10 years the Nunavut government has achieved great success of attracting major mining companies to the ter-

ritory bringing more secure investment. Most of the developments are on Inuit-owned lands, and the company that advocates any project must negotiate before commencing production Impact Benefit Agreements with the Inuits, monitored by NTI. The regional Inuit Associations endeavor to negotiate contracts with developing service companies."

Lapierre, whose Mineral and Petroleum division at the Department of Economic Development and Transport represents territorial government interests at the environmental assessment stage, explained the permitting system in the territory: "the Nunavut Land Claim has established institutions of public government, one of which is the Nunavut Planning Commission. Currently there are two land use plans and the commission must determine whether any proposed project conforms to one of these. It is a bit of a piecemeal system at this point, but the commission is developing a Nunavut-wide land use plan. Once this happens, it will be clearer: every project will go to the planning commission for review and then onto the Nunavut Impact Review Board (NIRB) if it conforms to the plan. At the moment, projects in jurisdictions not under the current land use plans go to other authorizing agencies, such as federal or regional Inuit for land access, and the Water Board for a water license in order to be referred to the NIRB".

"When projects are referred to NIRB, the Review Board determines whether or not it requires further review. This process is all set out in Article 12 of the Land Claim. In the Review Board's screening, it determines whether a project can go ahead with or without terms and conditions, whether it must be referred to a full review with a more detailed regulatory procedure, or whether it should be rejected altogether. If the Board recommends a review, this goes to the Federal Minister of Aboriginal Affairs, who makes a final decision on whether to conduct one, and what type [of review it will be]," said Lapierre.

While there have been concerns about processing and permitting time, there appears to be a generally favorable view of the current regulatory framework present in the territory. "We believe Nunavut is a favorable jurisdiction for doing business, and we have not had any real problems with the regulatory system we operate under there. We have a very good relationship with all of the regulators responsible for issuing permits necessary to conduct our work. What we have seen in some cases though is limited capacity and overextended regulators. There are many projects coming down the line in Nunavut, and this is a recent phenomenon, but the regulatory capacity has not increased to meet the increased needs of industry. The federal government is working hard to improve inefficiencies in the regulatory procedures. We are confident that the federal government is aware of these concerns and are pleased to see the Senator and MP from Nunavut working hard to make the territory a place that welcomes investment and responsible development," said Brooke Clements, president of Peregrine Diamonds.

The relative youth of Nunavut's mining industry, and indeed Nunavut itself, is confirmed by Adrian Fleming, CEO, Prosperity Goldfields Corp. (PPG). "Nunavut is still finding its feet in the mining space. The permitting requirements and turnaround time for actually getting the permits are slower there, which might be function of the difficulty in finding people up there to do the administrative work that is necessary for this industry."

Beyond the general issues of over-stretched regulators and waiting times, more specific issues have also arisen. Steve Potts, vice president of exploration, Commander Resources Ltd., for example, discusses water licensing. "Dealing with water license regulations, as part of your land use permitting, can be challenging. Nunavut's permitting is a bit more onerous than Yukon's, because it follows the Northwest Territories', which is



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Suzanne Paquin, president and CEO, Nunavut Eastern Arctic Shipping (NEAS).

based on a federal system.”

The territory will soon be introducing a more streamlined regulatory system, something that many will welcome. “There will be one clear land claim-based regulatory system in Nunavut when the proposed Nunavut Planning and Project Assessment Act is approved. Nunavut has a simpler situation to the Northwest Territories; it has one territorial government and Inuit people with a common language and culture,” said John Donihee, barrister and solicitor with McLennan Ross.

Transport and power

For a territory that has a humble population of just over 33,500, spread across an area of over 1.8 million km sq, infrastructure may be the greatest hurdle to those wishing to develop their resources in the territory. Perhaps reassuringly, the government acknowledges this issue, yet their description of the problem also emphasizes its scale.

“Currently, there is insufficient energy infrastructure to manage the significant projected growth of mining in Nunavut... Nunavut has the longest coastline in Canada, yet has only one incomplete marine facility, a deterrent to investors. In the south it takes seven years for a mine to develop into production; in Nunavut there are still undeveloped identified resources from the 1930s. The lack of infrastructure in Nunavut, the cost of shipping fuel to mine sites, and the shortage of skilled personnel are major concerns for mining companies; arguably, an impediment on developing a resource discovery,” said Hon. Peter Taptuna. While infrastructure is one key consideration in Nunavut, the other is the weather. There are few other international mining destinations that are so heavily restricted by the length of the exploration season and remote location. Patrick Downey, president and CEO, Elgin Mining Inc. explained that “in Nunavut there is world-class resource potential, but it has

to be understood by investors that this is a remote area with a limited time frame each year in which to explore. Whatever deposit is found it is essential that it has the grade and size to support the logistics and capital required to develop the deposit.”

In the words of seasoned explorer Jon North, whose firm Northquest Ltd. recently announced an intersect of 164 m at 5.9 g/mt gold on their Pistol Bay project, “working in the Arctic is like a military operation without the shooting; it is all about logistics.”

Richard Mazur, president and CEO, Forum Uranium Corp. further emphasized the “high effort, high reward” nature of Nunavut exploration. “Exploration in northern Canada is expensive. It is remote, and in most cases you need a helicopter to get there, which often sees costs increase exponentially. It takes a lot of perseverance and funds to operate in Canada’s North but the rewards can also be significant.”

Shipping is crucial in Nunavut, as no roads link the territory’s 26 settlements to each other or the outside world. However, with much of Nunavut located inside the Arctic Circle, even waterborne transport comes with its own unique set of challenges. Goods are brought to the north during the sealift season, when the pack ice has retreated. Most explorers will have to factor the sealift into their

plans and developers will find that they have to ship nearly all materials to site during the two to four month summer window.

“Sailing schedules have to be very strategically planned. Each vessel covers on average about eight communities per sailing, and we have four ice class vessels each performing at least three sailings per year,” explained Suzanne Paquin, president and CEO of northern sealift specialist Nunavut Eastern Arctic Shipping (NEAS) Inc. It is not just the seasons that make shipping difficult in Nunavut. “There are no port facilities (in the territory) so we anchor offshore. We are fully functional and supply our own loaders, barges, lighting, generators, and portable office to affect the cargo offload. Loading onto barges offshore can be dangerous and difficult when there are severe weather conditions. On a first sailing there are occasions when ice has to be cleared from the shore to enable the discharge of cargo. Iqaluit has a 35 ft tide allowing us only two to four hour windows per day to operate. The North is desperate for marine infrastructure but there is no consensus about what form this should take or who will pay for it,” said Paquin.

Due to the short time frame, challenging conditions and limited availability of ice class ships and people, shipping in Nunavut is expensive. Paquin argues that explorers

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and miners should consider sealift at an early stage in order to optimize their operations. "On occasions we act as a consultant as part of mine planning; our input would include scheduling the delivery of equipment as well as the all-round turnkey solutions for the mine. NEAS carried out all the mobilization for the Baffinland mine site for Milne Inlet and Steensby."

Miners are even more reliant on waterborne transport than explorers in the Arctic and Subarctic. Montreal-based Fednav Ltd. own the largest fleet of ice class bulk carriers in the world, including a number of icebreakers. "We have operated for over 50 years in the Arctic. Fednav has been involved in every single major Arctic project, including the Distant Early Warning (DEW) line sites, Cominco Ltd.'s Polaris zinc mine (76°N), Nanisivik zinc-lead mine at Pond Inlet (72°N), and Maarmorilik zinc-lead mine in Greenland (70°N)," said Thomas Paterson, senior vice president, ship owning, Arctic and projects. "Mines in the Arctic have to get their product to market on time just like mines in the south and they need to be able to rely on their shipping provider. Because ice class or polar class bulk vessels are so uncommon and expensive to build, companies with large fleets are more attractive as they can offer good back up in the event of a problem." Mines in the North either ship their product year round (though there may be fallow periods to allow for hunting and animal mating seasons) or stockpile ore and wait for the summer season.

At Teck Resources' Red Dog mine, 68°N in Alaska, zinc concentrate is stockpiled for a hundred day shipping window. Vale's Voisey



MV Avataq anchored and discharging cargo onto the barges in Iqaluit. Photo courtesy of Nunavut Eastern Arctic Shipping (NEAS).

Bay mine, on the other hand, is serviced year round by Fednav's Umiaq 1. "Umiaq 1 was built in 2006 and is the largest and most powerful icebreaking bulk carrier in the world; it can break through 50 ft ice ridges and shear zones. This ship was built, and is used, specifically for Vale's Voisey's Bay nickel mine, making 12 voyages per year to ship nickel from Voisey's Bay to Quebec".


Unlike most seaborne mineral transportation, shipping contracts for northern mines are typically ultra long-term, reflecting the vast capital expenditure and limited utility of ice class vessels. "We have been operating Red Dog for 23 years... Long-term contracts are often necessary as Fednav commits to build a ship to accommodate the customer's needs," said Paterson.

Due to the absolute lack of ports, explorers and miners in the North will often look to their freight contractors to provide innovative stevedoring solutions. Madeleine Paquin (sister of the aforementioned Suzanne Paquin) is president and CEO of publicly-listed Logistec Corp. Logistec has been called upon to provide transloading at some of Canada's most remote mine sites. "At its testing phase of extraction, Logistec loaded Baffinland's iron ore onto barges (from a specially constructed floating dock) to be fed to the mother vessel a little further into the water, where it was deeper... Our solutions are customized on the basis of where, and with what, we are working, and on required volumes," said Paquin. Giving an example of a Quebec iron ore mine, Paquin explains that "this was a case where there was no dockside capability to handle the large vessels that would be used to carry the iron ore to China. We used the available dock and a transshipment service through a self-unloader. We had a big conveyor system where several loads of iron ore were put into the temporary vessel, which then fed into a larger ship anchored at sea."

While such innovative loading solutions can meet one-off and short-term requirements, Paquin argues that "transshipping is not a long-term solution. Ideally you want to build a dock which negates its need; this can be done, but it is more costly. You have to pick where the water depth is, and run your barges there... Logistec is first and foremost a cargo handling company, but we are always interested in long-term projects that need capital investment and we are prepared to invest in ports ourselves. We like long-term contracts where we can bring specialized, custom-built solutions."

After transport, power is the second major infrastructure challenge in Nunavut. "We cover the single largest service area in Canada (2 million sq km) and overcome many challenges related to climate, geographical location, and aging infrastructure" observes director of engineering at territorial government owned Qulliq Energy Corp., Stephen Kerr.

Nunavut miners have to invest in power generation capacity and endure increased costs as a consequence of operating so far from the grid. QEC hope to work with new miners to reduce costs though Kerr acknowledges that this is not always easy: "few of the major finds are in close proximity to an existing community, where the potential to supply both the community and mine site (from one generation plant) are economically viable... This makes it difficult to tap into these potential energy opportunities. We have talked to a number of players regarding potential synergies, including a prospective mine outside of Rankin Inlet. Ideally, we can figure out a way to build a power plant near this community and take advantage of a mutually beneficial situation, that would be a win-win-win scenario for QEC, the community, and the developer."



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Mining and Exploration in Nunavut

What is actually going on up there?



Geologist mapping on the Baffin Island gold belt. Photo courtesy of Commander Resources.

Nunavut is a territory rich in commodities, chief among them gold, diamonds, uranium, iron and other base metals. Although it currently has only one active mine, there are a potential for eight more in the near future, though these will be heavily dependent on more attractive market conditions and infrastructure development. Since 2003, Nunavut has led the three territories in terms of exploration dollars spent, with early projected estimates of \$568.6 million in 2012, yet real dollars spent is likely to be much lower.

Gold

The most active commodity in Nunavut, there are no less than five advanced gold exploration projects currently underway in the territory, as well as Nunavut's only active mine. "All gold deposits currently being explored or developed in Nunavut are Archean lode gold sheer zone type gold deposits, and compare favorably with any other area globally," said John Williamson, president, CEO and director, North Country Gold Corp.

Agnico-Eagle's Meadowbank gold mine, located near Baker Lake, has in many ways acted as a testing ground for those considering mineral development in Nunavut. With a mine life expected to take it to 2017, the company's largest gold producer has been open since 2010 and has already seen a significant write-down in 2012, driven largely by high operating costs. With gold reserves of 2.2 million oz at 24 million mt at 2.8g/mt the mine is dependent on sealift by barge from Hudson Bay to Baker Lake for the transport

of bulk supplies and heavy equipment and already contributes 15% of the territory's GDP. The mine is estimated to produce 295,000 oz of gold in 2012, averaging 308,000 oz/y in 2013 and 2014. The Meliadine gold project, also under the Agnico-Eagle umbrella, remains in its early stages.

The other key gold project that exists in the territory is Newmont Mining Corp.'s Hope Bay project. In 2012, the company announced it was putting the project on hold while it is under review. Though there is currently care and maintenance funding for the site, the project was not included in

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Adrian Fleming, CEO, Prosperity Goldfields.

Newmont's 2017 strategic growth plan and there will likely be no advancement on this project in the near term.

Adrian Fleming, CEO of Prosperity Goldfields understands the challenges present working in the remote regions of the territory. Speaking on the company's Kiyuk Lake project, he said: "Unfortunately, in Nunavut there are no roads, so we are restricted to going in by plane. This being more remote, we are going to need more total ounces and better grade to make it a mine here."

Prosperity Goldfields expect at least two more years of drilling to define their resource.

There are three other advanced gold



Deposit No. 1 of Baffinland/ArcelorMittal's Mary River high-grade iron ore property. Photo courtesy of the Department of Economic Development and Transportation, Government of Nunavut.

projects currently active in Nunavut: Sabina Gold and Silver Corp.'s Back River project, North Country Gold's Committee Bay and Elgin Mining's Ulu mine.

North Country Gold's flagship project, Three Bluffs, located in the Committee Bay greenstone belt, has been the exclusive focus of the company for the past two years. Developed from a grassroots find to its current status of 1.5 million oz gold at an average grade of 5.31 gold g/mt., president, CEO and director of North Country Gold John Williamson is understandably proud of his company's holding. "Outside of Meadowbank and Meliadine gold deposits, Three

Bluffs is arguably the most advanced gold project in the eastern Arctic. The threshold for majors to be interested in a Nunavut gold project is when the 2 million oz mark is eclipsed; we anticipate achieving this in 2012 or 2013, at which time we will actively look at other major participants, or decide to go it alone."

One of the territory's most unique projects, Patrick Downey, president and CEO of Elgin Mining discussed the resurrection of the historic Ulu gold project. "The Lupin mine was originally owned by Kinross and pioneered many areas such as ice road haulage, and narrow underground mining. A very famous Canadian mine, it ran for 21 years and produced almost 3.5 million oz of gold, closing only due to the price of gold at the time. The original owner, Kinross Gold, left the mine infrastructure and mills in place, as it was believed the price of gold would again increase."

Purchasing both the Lupin gold mine and Ulu gold project in 2011, Elgin commenced drilling in November 2011 with the aid of 3.3 million liters of fuel remaining on site from previous mining activity. "A zone near the existing underground infrastructure and the first phase returned excellent results. Elgin is now actively starting on a plan to commence production in 2015," said Downey.

Sabina Gold and Silver were actively drilling at their Black River project in summer 2012, with the pre-feasibility study anticipated to be completed in mid-2013. Pending positive results, a full bankable feasibility study would be completed in 2014, according to Rob Pease, president and CEO.

Without such advanced projects, it would be tempting to argue that the high operating costs of the region make early-stage exploration from smaller juniors slightly less than feasible. Yet the presence of such juniors renders this assumption obviously fallacious.

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"In Nunavut there are no road systems outside towns, except those put in for specific reasons, so for 95% of the territory you are operating a fly program," said Jason Brewster, CEO of early-stage explorer Anconia Resources Corp., acknowledging the difficulties of the territory.

However, for Brewster the opportunities that Nunavut presents more than outweigh the costs of operating in the territory. "Exploration costs in Nunavut are only perhaps 50% higher than in northern Ontario, in a place like the James Bay lowlands... There are not many brand new exploration plays to be found in the south, but in Nunavut they are all over the place, and lots of people are sniffing around... the opportunities up there are incredible," he said.

The upside potential of backing an exploration project that could pan out into a whole new camp, not just a single mine, also helps win investment, argues Brewster. "You cannot discount the romance aspect of being able to go out, stake ground and talk about a story that has not been kicking around the market for 50 years.

"We went public last summer with the MARCE and ZAC properties. These are base metal assets with significant geophysics and surface occurrences, both previously held by Comaplex before reverting back to prospec-

tors who knew us personally. The ZAC property had been drilled in the past with some success; the MARCE property never had, but it did have some fairly stunning surface sampling results, up to the range of about 20% zinc, 8% copper and 800 g of silver. The two properties are 18 km apart from showing to showing, and as VMS targets often occur in groups we flew some geophysics to see if there was a trend between them. The results were encouraging enough for us to stake all the ground; we now have a land position of around 107 sq km. Last year we returned to perform surface work, primarily on the MARCE, and significantly improved Comaplex numbers: we got 10.6% copper, 34% zinc, 19.2 g of gold and 2,100 g of silver. This level of gold and silver is not typical of VMS deposits, so there may have been a secondary event there," said Brewster.

Uranium


Urged by NTI in 2011 to review the uranium policy, in spring 2012 the government of Nunavut reaffirmed their uranium policy and clarified their support for responsible development of the commodity. The NIRB will be the lead regulatory agency to review any uranium development submissions.

International uranium producer Areva, which is already in production at its Mc-

Clean Lake site in Saskatchewan, is the most advanced of the three uranium projects currently underway in Nunavut. The Kiggavik project currently has its environmental impact assessment underway and set to be completed by 2014. "Following the final development decision, obtaining licenses and permits, we aim to begin construction in 2017 or 2018, which we expect to last for three or four years. Operations themselves should last approximately 14 years given current resource estimates, and then there will be a five to 10 year period of decommissioning. In parallel, we are continuing exploration, anticipating that the resources at the site could extend the mine life to 25 years," said Barry McCallum, manager of Nunavut Affairs, Areva.

Turqavik-Aberdeen is a new, 100%-owned exploration project located approximately 85 km west of Baker Lake. Owned by international uranium producer Cameco, it is still in early stage exploration and neighbors both the Kiggavik and Thelon Basin projects.


The location of these projects makes mining junior Forum Uranium's Thelon Basin property particularly attractive to investors. "The investment in Nunavut is in such a perfect, strategic location. Between







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PRODUCTION, DEVELOPMENT AND GROWTH



Elgin Mining is a Canadian based company focused on production at the Bjorkdal Gold Mine in Sweden, which has produced 1,060,000 ounces in the last 24 years, and the exploration and development of the Lupin gold mine and Ulu gold project, both located in Nunavut Territory, Canada. In addition, Elgin's portfolio includes a 35% interest in Auracle Resources, which is exploring the Mexican Hat property in Arizona, and an exclusive right and option to earn a 60% interest in Lincoln Mining's Oro Cruz (California) and La Bufa (Mexico) gold projects. Elgin Mining also selectively reviews opportunities to add advanced stage development projects to its portfolio. The Company has a strong balance sheet, generates significant cash flow from gold sales, and remains un-hedged. Elgin Mining's shares are traded on the Toronto Stock Exchange under the symbol ELG.

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Conducting ground magnetics, Chidliak project. Photo courtesy of Peregrine Diamonds.

[Forum, Areva and Cameco], we have essentially acquired the whole prospective geological belt in the area, where I believe the first uranium processing facility outside of Athabasca will be built. The Athabasca Basin is certainly very unique in its high grades, and the Thelon Basin is probably the best equivalent to Athabasca in the world," said Richard Mazur, president and CEO, Forum Uranium.

With the government's recent affirmation of support for the uranium industry, as well as Areva's continued progress and development, uranium will be one commodity to keep an eye on in Nunavut.

Diamonds

Nunavut has two advanced diamond exploration projects that, along with a few other juniors, could see a strong focus shift on to them as the neighboring Snap Lake and Diavik mines are set to wind down over the next decade.

Peregrine Diamonds may soon be leading the way. Their flagship Chidliak project was discovered in 2007, in the Nanuq diamond district on South Baffin Island. "Since [2007] we have found 61 kimberlites at Chidliak and seven pipes have economic potential. Peregrine Diamonds is currently advancing this project towards



Matt Manson, president and CEO, Stornoway Diamond.

development," said Brooke Clements, president of Peregrine Diamonds.

On September 5th 2012, Peregrine announced it had completed an option deal with De Beers where De Beers has the exclusive right, until December 31st 2013, to enter into an earn-in and joint venture agreement with Peregrine on a 50.1% De Beers to 49.9% Peregrine ownership basis. If a joint venture is formed, De Beers will undertake mineral exploration and development work potentially leading to the completion of a bankable feasibility study and, if warranted, the construction of a diamond mine.

Shear Diamond Ltd.'s Jericho mine in Nunavut has felt the commodity price crunch in the diamond market this year and has put their diamond mine, which functioned from 2006 to 2008, on hold only months after it restarted its operations. Citing weak world diamond prices, the company has said it will continue to look at diamond resources at Jericho's pit and other nearby properties.

Stornoway Diamond Corp., which has exploration activities at its Qilalugaq and Aviat projects, has opted to focus its current operations elsewhere, if only in the short term. Focusing instead on its Renard Diamond project, which the company is currently developing into a mine in Quebec, its Nunavut projects have taken a secondary focus. Explaining this decision, Matt Manson, president and CEO said, "Nunavut is a very aspirational part of the world and its government is receptive to mining development, although its permitting regime is still evolving. The greatest challenge that the mining industry has working in Nunavut and the Northwest Territories is cost control and human resources. We are still very keen on Nunavut as a diamond exploration destination [though]; once Renard is producing, development in Nunavut will follow."

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Commander Resources, though focused on gold and copper, has followed a similar suit. "It is incredibly expensive to work in Nunavut right now... Money goes a lot further in the South than in the North, where it can cost, for example, \$1 million just to put a camp in, and you have to organize a sealift to bring supplies. Logistics have easily made up a third of our expenses," said Steve Potts, vice president of exploration, Commander Resources. Until diamond prices begin to increase, and infrastructure develops, it is likely that diamond activities in the territory will remain short of their full potential.

Iron and base metals

Having spent the past few years being driven largely by the industrial demands in China, the iron ore market has seen a recent downturn of prices, the lowest since October 2009. While this may result in slower development of a number of ambitious projects around the world, Nunavut houses two of Canada's most intriguing developments, which have the potential to drive development of the territory.

The Nunavut Impact Review Board is currently reviewing Baffinland Iron Mines' Mary River mine, which, if approved, would be the largest industrial development in the North to date. The potential \$4 billion project would require extensive infrastructure; including a call for a 150 km railway from the mine to a port to be built at Steensby Inlet, with nine icebreaking freighters running year round. The mine would require 950 employees to run it, and 3,000 for the initial construction phase. The significance of this project is also seen in the support services it has engaged. "Mary River became a linear project with roads and railway development and by 2008 it was the largest single project for Knight Piésold in Canada. Our involvement has continued with assisting the client with project permitting and securing approvals," said Richard Cook, senior environmental scientist, Knight Piésold Ltd.

China-backed base metals producer MMG Ltd. is currently filing plans to build two mines in Nunavut over the next six years. Having recently submitted a project proposal for the Izok Corridor project; comprising the Izok Lake and High Lake deposits; it is possible that production could begin as early as the last quarter of 2018. The Izok Corridor is expected to produce 180,000 mt of 12% zinc in concentrate, as well as 50,000 mt of 2.5% copper in concentrate per year once in production.

The current interest in iron in Nunavut is also showcased by West Melville Metals Inc.'s Roche Bay project at their Fraser Bay

property, who have recently made a deal where they may acquire up to 70% of the project from Roche Bay Plc. "The real bonus in this property is that there are areas with a very high grade of greater than 60%, which qualifies it as potential direct ship ore (DSO)," said Rory O. Moore, president and CEO. Their second property in Nunavut, Sabina Gold and Silver sold their silver-rich zinc deposit, the Hackett River property, to Xstrata Zinc Canada Plc. for \$50 million and a significant silver royalty share on future production. "Xtrata Zinc is doing a lot of work on Hackett River right now and have stated that they will be entering the permitting process similar to us this year. They are expecting to be in production in 2018... The Hackett River royalty is a real bucket of value in a non-core asset for the company," said Pease of Sabina Gold and Silver.

Transportation costs will factor significantly in the operating expenditure of any iron ore mine, regardless of its location. As Baffinland's Mary River plans demonstrate, in Nunavut it is likely to also be a significant capital expenditure item; the railway and port form nearly three quarters of the total \$4 billion development tab.

Advanced Explorations Inc. already have a feasibility study and six years of baseline environmental work under their belts on their



John Gingerich, president and CEO, Advanced Explorations.

Roche Bay project, located on the Melville Peninsula on the Nunavut mainland. "The project is adjacent to a deepwater harbor and does not carry the capital expenditure of a railway or pipeline... The low capital expenditure and operating expenditure nature of the Roche Bay project makes us very competitive, with an estimated production cost of initially \$49/mt compared to our competition at a minimum of \$60/mt. Once we have expanded and optimized production to 8 million mt/y, we are confident our costs will be below \$40/mt, making us globally competitive," said John Gingerich, president and CEO, Advanced Explorations.

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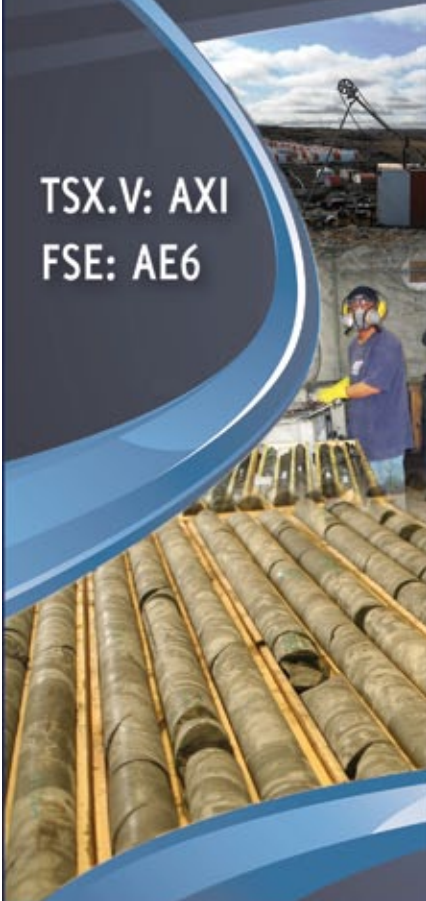


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The Roche Bay project will still have to contend with the North's big freeze. "Short term, we are looking at a five to six month shipping window of ice-free conditions using a conventional fleet; this window can be extended by utilizing ice class ships with strengthened hulls.

"We are watching with interest the outcome of Baffinland's request for 365 day shipping access. Currently, our shipping window is adequate, but as the Roche Bay project develops we would have to review our strategy and consider an expanded window, similar to that of the Mary River iron ore project," said Gingerich.

Advanced Explorations has a 659 million mt NI 43-101 complaint resource in the inferred and indicated category at Roche Bay, the grade is relatively low (24.6% to 26.3% Fe) but, as Gingerich argues, "iron ore is not all about grade; it is about the logistics as well."

In September 2012 Advanced Explorations announced drill results from its Tuku 1 prospect, 65 km to the north of the Roche Bay property. The company has brought in 465 million mt inferred at Tuku and the grades are substantially higher: 31.1% Fe with 50% plus highlights. "Drilling is currently being carried out indicating Mary River-type grades and this will have a significant impact on the economics of the project," said Gingerich. The Roche Bay feasibility study, based on a 5.5 million mt/y operation, concentrating to 66% Fe, indicates a \$1.2 billion capital expenditure with a freight on board (FOB) cost per tonne of \$49 for a net present value (NPV) of \$642 million. The above numbers are based on a diesel-fueled power plant, but Gingerich is actively exploring switching to LNG which will yield significant environmental rewards and "save us a minimum \$8 per/mt in operating expenditure versus diesel."

"The three critical factors for new (iron ore mines) are having the potential for at least 500 million mt, being open-pittable and being close to a potential port," said Gordon McKinnon, president, CEO and director, Canadian Orebodies Inc.

Canadian Orebodies owns Nunavut's southern most exploration licenses, on the Belcher Islands. Iron ore was mined on the islands in the 1950s and Canadian Orebodies "went to the Belcher Islands knowing there was something there, but started afresh... Our total land package is now over 39,000 hectares; the historic resource is on Inuit-owned land but the blocks to the north and west, which we believe to be its extension, are on municipal land, and so are claims we could stake.



Gordon McKinnon, president, CEO and director, Canadian Orebodies.

"We made an aggressive start to our drilling campaign, as there is a bit of a race in iron ore, especially in Canada, to reach production. We drilled just over 9,100 m and 64 holes last year, beginning with very wide-spaced drilling and narrowing the area down as assays came in. We then infill drilled the area in phase two, to establish a 43-101 resource of 230 million mt indicated and 289 million mt inferred, both at just over 35% Fe; besides DSO projects, this makes us the highest-grade 43-101 iron ore project in Canada."

As ever, location dictates infrastructure and infrastructure dictates cost and therefore viability. "Being on one of the most southern islands in Nunavut and sitting at tidewater gives us our biggest advantage over other projects there. The island has no permafrost and is much closer to major infrastructure. There is the potential for deepwater ports on the island—this will be decided by port and shipping studies as part of the preliminary economic assessment we hope to reach later this year. As we are only 100 km from the Quebec shore, another possibility would be to put the entire infrastructure there, barging all the ore over for processing... we could apply for funding from the Quebec government under Plan Nord," said McKinnon.

Nunavut clearly has significant potential, but it will be the most northern of challenges, those of infrastructure and development, as well as current market conditions, that will determine this territory's pace of growth.

While this area holds great potential for the mining industry, it also holds true for the Nunavummiut. "Through wage economy, particularly driven by the development of the mining industry, we see a great chance to improve their, and their communities', quality of life," said the Hon. Peter Taptuna.

The Service Sector

Uncovering the North with innovative solutions



Caribou at a northern mine site. Photo courtesy of Rescan Environmental Services.

The service sector can well be considered the backbone of the mining industry; this holds particularly true in the North where the experience in, and knowledge of, the particularly harsh conditions can either make or break a project. As prominent southern firms begin to ascend to the North, an increased focus on growth in this region is clear. "As the mining and mineral sectors have become very prominent in Canada's North, they have become more of a focus for us," said Daniel Maguire, CRM, senior vice president, natural resources, mining practice leader, Aon Reed Stenhouse Inc.

The local competition, however, remains strong. "We are seeing Canadian companies moving in from the South, as well as international companies coming in, but we have been here for 25 years. We are familiar with the climate, the logistics, the players involved, and the deposits," said Gary Vivian, president, Aurora Geosciences; the only company that offers professional services in geology and geophysics based and operating in the North.

This increased competition also requires local capacity, which may not always be available in remote locations. "The distances travelled are far greater than what we are used to and some of the communities we go to have difficulty supporting and housing our crews on larger projects," said Kevin Ross of NU-Line Power Contractors.

While the service industry is more robust in some territories than others, increasing southern support and expertise help ensure that nothing is impossible in the North.

Transport and logistics: sea, sky and so much snow

With a land area that spans nearly 3 million km sq (including northern regions of a number of other provinces), and the lowest population rates in Canada, transport can be one of the greatest hurdles of the industry. Luckily, local and southern transport and logistics companies maintain that "can-do" attitude and engage some of the most creative solutions around.

Of the three territories, Nunavut is the most reliant on sea cargo and transport to supply their exploration and production, with the mining industry as its largest driver. With strategic connection to the international ports in Montreal ("some of the best consolidation ports in the world," according to Heather Stewart, president,

Braden-Burry Expediting (BBE Ltd.) and Vancouver, sea transport to Nunavut remains one of the key means of equipment and supply transport for the mining industry.

Yet even when supplies make it to the coast, further innovation is often necessary to take it to site. "It is not always easy to predict when the ice will move in as there have been so few years of trending," explained Stewart.



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MINING IN CANADA'S TERRITORIES



Kitnuna CAT Train Operations. Photo courtesy of Kitnuna.



Staff at Mary River. Photo courtesy of Knight Piésold.

"In the harshest temperatures, we often get requests from mining or exploration juniors to transport equipment and materials to their sites. The only access to their land is by ice and by snow and we have, for many years, with companies such as Newmont, provided this service since the initial exploration. Kitnuna Corp. [has] invested in specialized equipment to transport these goods to mine sites. We have fuel tanks on skis, cargo sleighs, low ground pressure equipment and so forth. Kitnuna have also built ice strips capable of handling Hercules aircraft," said Kitnuna's spokesperson.

Due to the remote locations of many projects and the lack of road infrastructure,

which varies by territory, many in the industry rely heavily on air transport for their activities in the region. The amount of activity in each territory is often a mirror of the industry itself; in which case, not all news is good. "There has actually been a real downturn in air transport [in the Northwest Territories]," said Myles Cane, vice president and general manager, Summit Air.

In Yukon new routes could potentially open up to support the mining industry. "Air North is endeavoring to reintroduce scheduled flights to Mayo and Watson Lake... The mining activity in the area could lead to the viability of chartered/scheduled flights to

Mayo and Watson Lake [in the near future]," said Joseph Sparling, president of Yukon-based Air North.

"Business certainly has grown in the last three years. Last year was an all time record for exploration in Yukon, but I think this year we will see a drop of about 40%," said A.A. (Arden) Meyer, general manager, Trans North Helicopters, discussing what is now the second highest year on record for exploration dollars spent in Yukon.

Operating throughout the region, the vast stretches of land require advanced planning and a particular focus on fuel supplies and timing. "Relying heavily on fuel being flown



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Sirovision is a geology / geotechnical mapping and analysis system that generates accurate, scaled 3D images of rock faces from stereo photographs taken in open-pit and underground environments. Photo courtesy of CAE Mining.

in for our planes, we need a good runway that allows us to bring in an adequate supply of fuel to do our work. In many areas, we need to bring in fuel from other locations, which quickly increases a project's cost," said Adam Shales, sales and marketing manager, Vancouver, Fugro Airborne Surveys Corp.

As exploration continues in Canada's most untouched regions, transport and logistics will remain a vital factor to success and development.

Caribou crossing? Environmental and social considerations

There are a number of unique environmental, geological and social considerations in the territories, which for many juniors used to operating in other regions offer a steep learning curve. Predominant amongst these are the issues of the shifting state of permafrost, water, local engagement and consultation, with the service industry playing a critical role in this.

"The collection of traditional Inuit knowledge became very important in terms of understanding the historical trends of numbers and distribution of important wildlife species, such as caribou, as well as marine mammals from the marine and shipping aspect of the project. From this historic data, we supported [Baffinland iron mines] to formulate a comprehensive traditional knowledge study [in the Mary River area]. This took three intense years of study on Baffin Island and arguably is the most comprehensive and far-reaching geographically in Canada," said Richard Cook, senior environmental scientist, Knight Piésold, giving some idea of the care and effort that must be taken.

This local engagement and the potential subsequent social contract have also gained a newfound importance in the North. "Offering First Nation and community consultation is a strong asset of ours, and is one of the services that differentiate us from other environmental consultancies. We understand that the success of the project, whether it is for a mine, energy, port or other infrastructure project, depends on this foundation of community engagement," said Scott Weston, sector leader, mining, Hemmera Inc., an environmental consultancy.

Local training can also contribute. "CAE Mining has developed extensive training systems including e-learning tools, instructor-led training and equipment simulators for the training of operators. These products represent a step-change in the tools available to train new operators and enhance the performance of existing operators. We believe these products and services can play a big role in the engagement and training of [First Nations] workers as the minerals industry expands in northern Canada," said Scott Perry, CAE Mining Inc.'s general manager for North America.



Devon and Bridgette McCaw, owners, McCaw North Drilling and Blasting.

Environmental considerations and protection can prove challenging, but manageable, in the North as well. "The Snap Lake piling project in 2010 was very difficult. We started a curtain grout project that was five meters from Snap Lake, so if anything leaked into the water they were going to shut the whole project down; this was all on our shoulders. We were drilling primaries, secondaries, tertiaries and were grouting with all of our equipment covered in tents to avoid oil leaks... Our closest holes were actually five meters from the water, but we were successful in maintaining a green operation and completed project on schedule," said Devon R. McCaw, owner of Northwest Territory based McCaw North Drilling and Blasting Ltd.

With arguably some of Canada's purest water, maintaining its quality is a key concern for mining operations and local communities. "We have built up a specialist and comprehensive knowledge

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Jeremy Haile, president, Knight Piésold.

of hydrology, such as baseline stream-flow measurements. This is a real challenge in the north as the major run-off is in the summer when the snow melts and temperatures are above freezing, but it is necessary to maintain stream gauges and sampling throughout the year," said Jeremy Haile, president of Knight Piésold.

"We are seeing increased interest in energy-efficient technologies and methods in particular, which are extremely relevant to northern Canada. The further north you go, you see power sources predominantly turn to diesel, requiring more efficient technologies," said Greg Rasmussen, process manager, mineral processing, Xstrata Technology Canada, Xstrata Ltd.



Greg Rasmussen, process manager, mineral processing, Xstrata Technology Canada.

The lack of northern labs is something that has proved challenging across the region. "Rescan has found it a challenge to handle and expedite samples to laboratories in Vancouver. Two laboratories opened in Yellowknife, but were not supported by the mining industry due to contractual arrangements with laboratories in Vancouver and Canada's North still lacks sufficient laboratories," said Clem Pelletier, CEO, Rescan Environmental Services.

Predominant labs around the country are aware of this issue and are tackling it head on. "SGS is looking at on-site mobile laboratories from an exploration viewpoint as a means of limiting or reducing the clients' costs," said Jake Lang, manager of metallurgy, metallurgical operations, SGS Canada Inc. Others are introducing or expanding into new technologies. "Innov-X answers challenges of the remote locations, addressed via our technology and services. For example, instead of shipping samples to a lab elsewhere to wait for answers you can test right there," said Cindy Collins, general manager, Innov-X Canada Inc., which provides portable XRF and XRD technologies to a number of industries, mining chief among them.



Clem Pelletier, CEO, Rescan Environmental Services.

Yukon's Great River Air has made a traditionally southern service local. "We have invested in aerial imagery, unique north of 60, including high resolution photography which is IT focused; a niche service that has stimulated much interest," said Eric Rieder, head pilot, Great River Air.

"We are adopting some ground-breaking technology for new mineral advancements, rare earths technology and process development, and are becoming more involved in advanced technologies such as autoclave leaching which is a high pressure oxidation process ... We are developing a team-focus around specialized gold processing looking at refractory gold, and double refractory detoxifi-



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Jake Lang, manager of metallurgy, metallurgical operations, SGS Canada.



Bathymetry surveying. Photo courtesy of Rescan Environmental Services.



Grant Pearson, vice president business development, Nuna Logistics.

cation work for cyanide downstream processing," said Lang of SGS Canada.

How to build a mine in Canada's North

Canadian miners are known as some of the most adept in the world. Engineering, procurement and construction management (EPCM) firms and those that support construction services are no less talented and have even been exporting expertise gained in the North to international mining destinations around the world.

Many of these companies have started by recognizing that Canada's territories

need their own solutions, rather than simply borrowing and importing from other jurisdictions. "We began by manufacturing core boxes; we heard that companies were having to go down to British Columbia to get them, and the demand was just too high to keep up in Yukon," said Alan Lebedoff, CEO, ALX Exploration Services Inc., a young Yukon entrepreneur who has seen his business grow tenfold and now offers a number of other key support services to the industry with a vision to move into northern British Columbia and Alaska.

In the Northwest Territories, similar entrepreneurs have now reached a point where,

having filled the initial gap, can now start to look abroad. Mongolia appears to be a common international skills export destination. Ivo Mitev, owner and general manager of Midnight Sun Energy Ltd., explained that "our expansion has included exporting our specialized equipment for diamond drilling to Mongolia, Australia, and various locations in South America. A need was identified in the diamond drilling industry for a generator that was light, extremely portable, and robust. A prototype was built with skids to enable towing by a snowmobile. The generator was designed to accommodate easy transportation by helicopter or airplane."



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MINING IN CANADA'S TERRITORIES



Yukon Energy Mines & Resources Minister Brad Cathers, Yukon Premier Darrell Pasloski and Yukon Economic Development Minister Currie Dixon (L to R) during a visit to Victoria Gold's Eagle Gold Project, August 2012.

"We have taken the lessons learned in northern Canada to other countries, for example Mongolia where the winters are just as harsh as Canadian," said Robert C. Stanlake, president, mining and metals, of AMEC, the international firm who provided EPCM services for Canadian diamond mines including Ekati, Snap Lake and Diavik.

"We have expanded into Mongolia by setting up a majority Mongolian-owned company; our past Nunavut experience is good preparation for the challenges faced in Mongolia," said Grant Pearson, vice president business development, Nuna Logistics Limited, Nuna Group of Companies.

Pelly Construction Ltd., who brought their Yukon expertise to Antarctica for an infrastructure project for the British government in the past, also understands the intricacies of Canada's North. "One of Pelly's most challenging projects was building some of the infrastructure for tailings for the Faro mine, which at the time was one of the biggest lead/zinc mines in the world. We built two large dams; special care had to be taken as there was intermittent permafrost. A stream had to be relocated from its original valley up onto the hillside in a permafrost area, and to avoid the permafrost thawing most of the excavation work was

carried out in freezing winter conditions. To insulate the permafrost it was back-filled with a 4 m thick gravel thermal barrier. This work was carried out 30 years ago, and is still in place," said Keith Byram, president, Pelly Construction.

Others have brought their international expertise and instead applied it to the North. "Our underground planning tools are a de facto standard for the design and scheduling of underground mines using the sub-level cave and block cave mining methods around the world, and are used by mines of this type in northern Canada. Without sophisticated planning tools, it can be very difficult to accurately calculate the development timing and production build-up for caving operations," said Perry of CAE Mining.

These harsh conditions require absolute precision, not only for budgetary reasons, but safety as well. "From an engineering perspective, we have to design projects to ensure they are built to last in the climate up here. In a remote location, you cannot be 99% sure about your design, because that 1% of uncertainty or error can ruin your budget for the year," said Steven Meister, regional director, Arctic, for Williams Engineering Canada Inc.

Those with extensive experience in the North also have a deeper understanding

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of the intricacies involved with design and construction. "Northern Canada has difficult soil conditions: it is a frozen desert with saturated soils and when heated the ground often becomes unstable; this has to be accommodated in foundation design," said Duane Gingrich, vice president, projects and operations, mining and metals AMEC.

Adding to the challenge, certain factors of northern mining are in an almost constant state of flux. "The type of permafrost up here is very susceptible to temperature change because it is hovering just below freezing. For the mining companies, the permafrost shift is certainly a challenge," said Shaun Rudolph, president, Cobalt Construction Inc.

These challenges demand adaptive solutions. Brent Thompson, senior vice president, mining and minerals, Tetra Tech said, "climate change, especially in the North, necessitates the evolution of new technology to keep pace with these changes, such as new technology for tailings dams, winter roads, and design solutions accommodating the reduction in permafrost level."

The vast majority of new mine projects come with a utility or transport infrastructure element but in the North, the weighting is likely to be far higher. "Infrastructure components of a mining development in the North can account for 50% or more of the



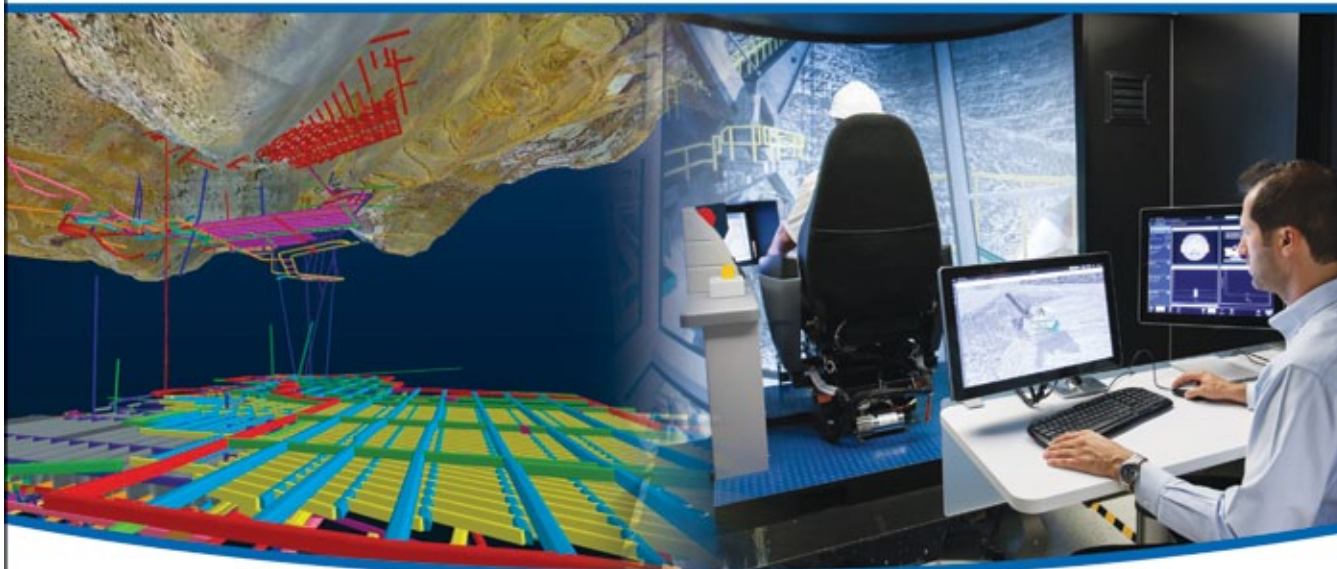
A dozer carries out reclamation work. Photo courtesy of Cobalt Construction.

capital expenditure of a project," said Dale Clarke, senior vice president, global mining and metallurgy at the 30,000 person strong EPCM firm SNC-Lavalin. For large, multi-disciplined engineering houses such as SNC-Lavalin, this represents a significant opportunity. "We can bring teams from our other sectors such as infrastructure and power to support," observed Clarke.

The infrastructure-heavy nature of mining in extreme locations such as the North provides a gateway for companies not traditionally associated with mill or geotechnical design. The 45,000 person EPCM firm AECOM Ltd. "is the world's leading infrastructure

company covering rail, roads, airports, ports, water distribution, water treatment, power distribution and transmission" and its looking to the North as part of its efforts to build its mining practice in the Americas. "Six years ago the company decided to diversify; mining and oil and gas are the two growth areas. Our diversification started in Australia with mining where we have built up a considerable business, and have now extended this mining service offering in North America," said Lou Bruno, vice president, mining, AECOM. "We are leveraging our infrastructure ability to accommodate the needs of exploration companies who are carrying out

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Lou Bruno, vice president, mining, North America, AECOM.

mining projects in increasingly remote areas that have no infrastructure," Bruno said.

Engineering capacity has been in a short supply globally during the commodity super-cycle and smaller miners have often struggled to secure EPCM contractors on terms that they consider acceptable. Bruno, however, looks to target these companies along with the majors such as Rio Tinto and BHP who the company already services: "AECOM provide the client with a full service offering covering the whole lifecycle of a project from permitting and social issues through the early studies, and on to the execution stage; a service offering especially appreciated by the junior companies. AECOM's environmental service offering gives it the opportunity to enter at the early phase of a project."

Yet the ability to provide such services and technologies is only half of the challenge; providing them to the sites themselves also requires unique solutions, often with some local help and guidance. "While most of Xstrata Technology Canada's key technologies are built abroad, every time we have a project in the North, the equipment must be assembled on the ground, as close to site as possible. We often seek local skills to help fulfill these gaps, particularly in very

remote locations," Greg Rasmussen, process manager, Xstrata Technology Canada. This has also meant in some cases adapting current technologies to northern mining operations, one challenge of which can be communications. "Prior to our involvement in underground mining, the systems were a completely different model, brand and type of equipment and were unable to communicate to the surface, which created logistical and safety issues; [we] recommended a seamless communication system between the two locations. Open-pit mining presents communication challenges; the deeper the mine the more of a shield is created to communication at surface, and [we] created a solution providing booster systems to allow operations in previous non-communication areas," said Danny Cimon, president of Danmax Communication Ltd., a company that deals with security and telephone systems.

These modifications also extend to the software used to design mining operations. "An example of where modifications have been made is with our tools and consulting used to predict what will occur into the future on the mine sites: when to drill; what explosives to use; and what fuel usage is required. Predicting when it is going to be used then translating that into when it is going to be delivered via ice roads that are only open for three months of the year is a dilemma; our software has been adapted to accommodate this ice road anomaly," said Fraser Rowe, general manager of Runge Mining (Canada) Ltd. "In the North, you need to almost specialize equipment, and you need to maintain it. For example, [our employees create] special wraps for the drills; without the years of experience these guys have, you cannot operate in these conditions," said Devon R. McCaw, of McCaw North Drilling and Blasting. "At Snap Lake, we had to build tents onto our equipment to keep it warm as we drilled in -60°C weather," McCaw said.



Nanisivik mine remediation, Nunavut. Photo courtesy of AECOM.



De Beers' Snap Lake diamond mine, located 220 km northeast of Yellowknife. Photo courtesy of AMEC.

"Heating equipment has to be applied to the water for drilling to prevent freezing; and mobile equipment has to be of the correct category for extreme cold conditions," said John A. Versfelt, chairman, president and CEO, Cabo Drilling Corp. Chad Koshlay, technical services representative at explosives manufacturer Dyno Nobel Inc., agrees with the need to adapt.

"We have modified our detonators and packaged products to accommodate the

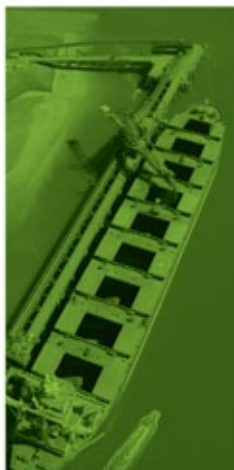
extreme cold conditions of the North. The new system we are promoting combines improved loading techniques and Titan® XL 1000, which has effectively eliminated the difficulties harsh permafrost conditions at Meadowbank present, but the blasting requirements differ at every operation. The local geology at each mine differs greatly across regions; at the diamond mines, the waste rock is a hard dense granite, which hosts the softer spongier



Danny Cimon, president, Danmax Communication.

kimberlite ore, for example. These geology changes require different approaches to blasting." This kind of care must also be shown to other types of equipment in the field. "[Problems arise] when systems are mothballed and become frozen; re-starting them can be an issue with melting ice. Danmax' recommendations to the client would be to remove the communications equipment for the period of inactivity," said Cimon.

For those exploring and developing in Canada's North, the established and developing service sector can let them focus on the more unique northern challenges.



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Some final thoughts



Wildlife tracking at Eagle Plains, northern Yukon. Photo courtesy Great River Air.

As Canada's North is poised to experience an overall growth of 3.6% in 2012 and 5.4% in 2013, the mining industry can expect to continue to play a large part in this, but for those still newer to the region, guidance is key. From those who have extensive experience working in the North, some helpful insights, advice and cautions, can help ensure success in Canada's last "elephant country."

MingAn Fu of Anthill Resources reminds international readers why Canada itself remains one of the most appealing mining destinations in the world. "Canada is a very politically stable country, which is why [I have] decided to give up everything [I have] in China, and to give everything [I have] into [my] Canadian projects... Canada is a very safe country to invest in."

While the regulatory framework clearly varies between the different territories, it nonetheless remains the most critical aspect to be aware of for those willing to risk the cold in any. "While some people are chiefly concerned with changing Arctic conditions; receding permafrost for example; those are

things you adapt to, you learn to live with and manage. The greater problem that I see is the regulatory environment that the governments prescribe. Combining this difficult regulatory environment with the challenge of raising money in the current markets, it is very easy for companies to shift their interest to another part of the globe," said Glen Wonders, general manager, mining, Allnorth Consultants Ltd.

"As with any other regulatory systems, there are structures and parameters that one must follow, but these are not too problematic if done correctly," offers Greg Fekete of Austing, Fendrick and Fairman.

Being proactive can also help ease through the challenges that remain in the system. "We have outlined to the federal government the challenges of working in Yukon; they have acknowledged our concerns,



Greg Fekete, partner, Austing, Fendrick and Fairman Mining Lawyers.

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Alan Lebedoff, CEO, ALX Exploration Services.



Brent Thompson, senior vice president, mining and minerals, Tetra Tech.



Ivor MacGregor, vice president, remote sites—western Canada, Sodexo.

An abridged interview with Leona Aglukkaq, MP for Nunavut, Minister Responsible for the North and CanNor and the country's first Inuit cabinet member.

Can you give us a brief overview of CanNor?

The existence of CanNor is a testament to the importance this government places on the economic future of the North. In all of Canada, there are regional development agencies. For whatever reason, the three territories did not have an equivalent agency to focus on development in the North. Since the Prime Minister announced the establishment of CanNor, we have been rolling out operations in Yukon, the Northwest Territories and in Nunavut.

Is infrastructure the responsibility of the federal government in the territories or should the territorial governments and the private sector be taking the lead?

Our government has been partnering with the private sector, the territorial governments and the indigenous groups of the North. Infrastructure has to be a joint initiative. We recognize that infrastructure is necessary not only for the success of mines in the north but also for other ventures as well. Going forward with this partnership approach allows all parties to create something beneficial to everyone. The industry can really contribute to the development of overall infrastructure in these areas.

What is the federal government doing to improve training in the three Northern territories?

Our government has made significant investments in training and skills development. This includes adult basic education, direct involvement, visits from the Prime Minister, and various resources related to skill training. We recognize the importance of the participation of Northerners in economic development opportunities, and training is a necessary first step. The territorial government has also done great work related to training and employment. After the establishment of the mining projects in Baker Lake, the unemployment rate dropped from 65% to 4% due to these local training and hiring initiatives. The benefits of these projects extend beyond just local employment opportunities and into the betterment of the communities and our projects as a whole.

assuring us of their support," said Jing You Lu of Yukon Zinc. Tied up with these regulations is the settlement of land claims; one of those paradoxical issues that can be both a major hurdle and an opportunity for mining companies to showcase the benefit they bring to local communities. "Before complete regulatory certainty and a positive investment environment can be achieved in the territories, land claims must be settled; then rationalization of the legislative framework that is imposed on the mining industry should follow, whilst ensuring institutions are not created that cannot respond to the mining industry's needs in a timely fashion," said Donihee of McLennan Ross.

While often a challenge to achieve, local hire initiatives and a social permit can bring extensive benefits to a project. "It is always a win for a company to have local support as there are so many good projects out there that, without a community's support, will never succeed. Companies will learn quickly that north-

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ern businesses have much to offer,” said Alan Lebedoff, CEO, ALX Exploration Services.

“A mine cannot be developed in a district without understanding what it means to the local communities. Elgin Mining and its fellow mining fraternity strive to conduct business in a manner with least effect and maximum benefit to the local communities. Arguably, mining companies should look beyond the usual CSR initiatives, such as sponsorship, and look at CSR initiatives that are sustainable having a positive impact on the local community,” said Downey of Elgin Mining.

This may also increase a project’s chances of success from a regulatory and permitting perspective. “Our operation has a lot of local content; this year our staff consist of approximately 75% First Nations; and many of our suppliers are also based in Yukon. This makes governments more favorable to mining projects that subcontract us,” said Rudolph of Yukon’s Cobalt Construction.

Though perhaps standard practice and knowledge, a recognition of the respect earned by some of the North’s original occupants, and for the environment itself, can ensure success. Brent Thompson of Tetra Tech said, “It is essential that business in the North is conducted in an environmentally sensitive fashion and that First Nations’ culture is acknowledged.” This acknowledgement and respect serves another purpose; forming a good opinion of the mining industry in the minds of the people that may well support and drive it in the future. “By 2015 the First Nations workforce will be 50% to 60% at all entry-level positions in Canada’s North and it is important that everyone operating in Canada’s North be aware of this,” said Ivor MacGregor, vice president, remote sites–western Canada, Sodexo, which has more than 418,000 employees around the world focused on site maintenance and support.

While the market may not be at its peak, with junior companies especially feeling the investment pinch, the future of commodities and continued demand is extremely promising. “Companies that can hang in there and spend their money wisely maintaining and acquiring good unique properties with upside potential, will be successful,” said William A. Taylor of Kestrel Gold.

“Remain encouraged, in spite of the current lull in the junior exploration market and their problems of raising capital on the markets, there are offshore investors looking at the resources of Yukon, the Northwest Territories, and Nunavut, to replace operations that have gone offline elsewhere around the world. There is tremendous resource potential in Canada’s North,” said Pearson from Nuna Logistics, who under the Nuna group of companies, have been involved in almost every northern mining project since the diamond industry developed in northern Canada.


For those who look to Canada’s North, the future remains bright; and it is not just the midnight sun.



The Sheba vein system at King Solomon. Photo courtesy of Kestrel Gold.



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