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ENGINEERING AND MINING JOURNAL

GLOBAL BUSINESS REPORTS

# Canadian Mining

*Canada produces more than 60 different commodities from hundreds of mines and thousands of quarries. Its mining expertise is legendary throughout the world. But can its limited worker pool and commercial resources keep pace with the current mining boom?*

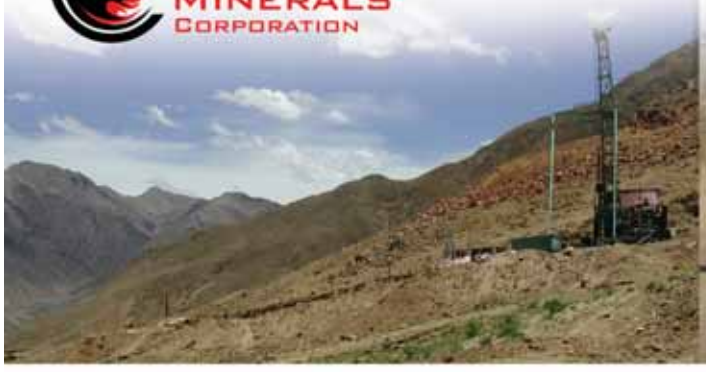
A REPORT BY GBR FOR E&MJ

SEPTEMBER 2006

# HUNTER DICKINSON INC.

RESPONSIBLE MINERAL DEVELOPMENT

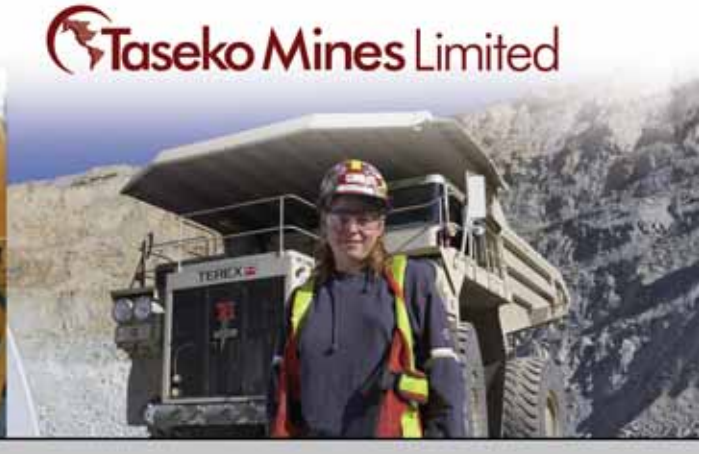
CONTINENTAL MINERALS CORPORATION



Northern Dynasty Minerals Ltd.

GREAT BASIN GOLD LIMITED

Taseko Mines Limited



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# Canada: The Big Picture

*Seasoned by the cyclical nature of metals and energy markets, Canadian miners and suppliers are making the most of the current boom at home, while strengthening their participation and influence internationally*

"Canada is the world's miner," said an enthusiastic Jon Baird, managing director of CAMESE (Canadian Association of Mining Equipment and Services for Export), an association that assists Canadian suppliers and providers of services to the mining industry to export their expertise worldwide. Though certainly proud, his bold claim is backed by facts. Canada's subterranean resources underpin this country's economic strength and the upward spiral that the global mining industry has been enjoying for the good part of the last two years has emphasized this.

Photo courtesy of: Nuna Group of Companies

Canada boasts a long history in mineral exploration and mining and has gained almost unmatched expertise in terms of skills, geological knowledge and adaptability to a wide range of climates. Long exposure to the dangers of mining's cyclical swings has forced the industry to become extremely technologically advanced and productivity driven. As a result of successes at home, Canada is also one of the leading exporters of a broad range of mining skills and services. Canada's mining companies and their supporting suppliers are some of the most active when it comes to investing in mineral exploration, mine development and resource production worldwide.

Despite its relatively small population of 32 million, Canada's gigantic land mass of 9.09 million km$^2$ qualifies as the second

largest country in the world following the break-up of the Soviet Union. The vast majority of this territory is sparsely populated. Concentrations are to be found in urban centers along a very thin strip on the 8,900-km-long southern border: 17 of Canada's 20 largest cities are less than a 90-minute drive away from the United States. In spite of this, Canada's economy is large enough for it to figure prominently in the G8. In this group of economic powerhouses, Canada is the only country to have run a budget surplus in 2004. It did so again in 2005 and expects to do so again in 2006. By then, it will be registering the country's ninth consecutive budget surplus. Real GDP growth in Canada exceeded 2.7% in 2005 and is forecast to reach 3.2% for 2006 as predicted by the Royal Bank of Canada.

The contribution of the mining industry to GDP may appear small at an official 4% (2004) but other statistics and factors have to be factored in. Minerals and metals have contributed that same average of 4% to GDP consistently over the last two decades according to the Mining Association of Canada (MAC). Gary Nash, assistant deputy minister for the Minerals and Metals Sector in Natural Resources Canada, said that compilation methods for these statistics omit imports of ores, ore concentrates and recyclables and their subsequent processing. These important value-adding processes carried out in Canada would boost the overall percentage contribution. Regardless of the debate over calculation however, Nash said that "based on our latest figures, the value of production is a little over $65 billion, which includes oil sands mining." The multiplying effects of the industry also hint at a greater role than the percentages suggest. For example, according to MAC, every $1 billion of mining, smelting or refining output creates direct demand increases worth $615 million and indirect demand increases worth $839 million.

Mining holds a similar importance in terms of its impact on employment. Roughly one of every 43 jobs in Canada is mining-related with about 370,000 people employed in the industry (2.3%). That proportion shoots up dramatically if you consider jobs exclusively within the goods-producing sector (one in 11), but what is perhaps more significant, considering Canada's topography, is that these jobs in the mining industry are provided all over the country as opposed to exclusively within urban centers. Because one cannot choose where resources are extracted, mining is one of very few industries that provides jobs in remote locations and hence, some decentralization. "We have something like 1,200 aboriginal communities within 200 km of a mine," explained Nash, emphasizing the importance of mining towards the economic integration of the first-nations people of Canada. Currently 5.3% of the total mining workforce are aboriginals and the proportion of workers among their ranks within the industry has increased 21.1% over the last 10 years.

Mineral investment in remote locations has also been one of the locomotives of infrastructure development to the furthest reaches of the country, together with the pulp and paper industry. To this day, it continues to contribute to the development of untapped areas such as the arctic reaches of the great North. Up there, diamond finds and their ensuing impact have generated further exploration interest and have advanced the case for better infrastructural access. Much

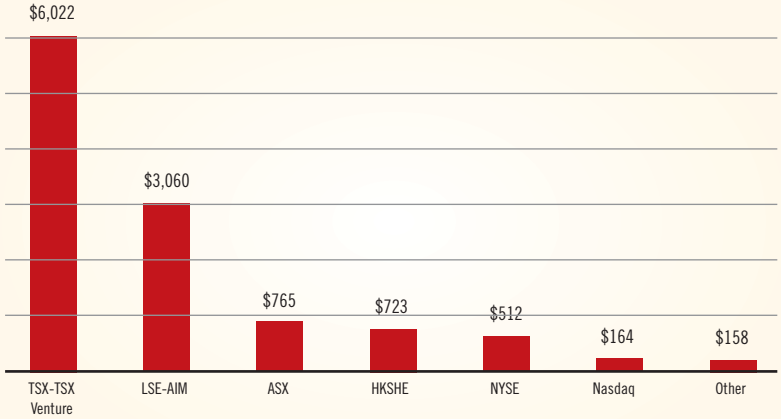
of Canada's transport infrastructure exists because of some historical mineral development and still relies on mining today. Whether imported or exported, mining goods account for roughly three quarters of all volume handled in the sea and river ports of Canada and provide for just less than two thirds of rail freight revenues.

It is the impact on trade, however, that best illustrates the paramount economic significance of mining on Canada. The minerals and metals industry makes up for a large portion of total Canadian exports, standing in 2005 at 14.77% with a monetary value of $64.3 billion. Given this proportion, it is easy to understand how much an increase in commodity prices as seen during recent years benefits the trade balance. Between 2004 and 2005, the balance of trade generated for mining and mineral processing products rose by 82.2% to $7.6 billion. Over the last five-year period, as shown in the the graphs on pg. 54, exports of minerals and mineral products grew from $50.3 billion to $64.2 billion thanks to the forementioned price effect and favorable supply-demand factors in most of Canada's markets. Sales to the EU and to other markets (outside of NAFTA, the EU and Japan) almost doubled in that time frame, allowing Canada to distance itself a little bit from its heavy reliance on the vagaries of her Southern trading partner.

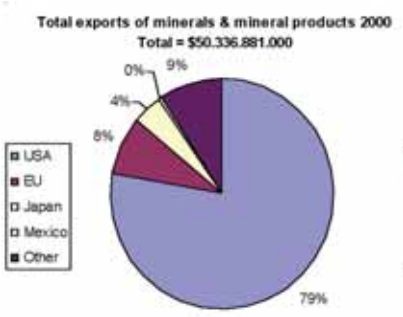
Substantial demand from Asia is likely to tilt that balance further. China and India are invariably mentioned as the major markets affecting worldwide demand for commodities and fuel the belief that the current price cycle is structurally different from previous peaks. Only time will tell whether this is indeed a structural shift in prices or merely a longer and higher peak in the recurrent history of commodity fluctuations. The fact remains that China and India will increasingly secure the commodities they need from an array of suppliers beyond the strategically located Australian market. This being said, free trade access to the U.S.—the largest consuming market in the world—has been one of the backbones of the development of the Canadian mining industry. America's appetite for resources has certainly sustained the industry on the north side of the border since its inception and the transport advantages are considerable given the sophisticated networks linking the two countries, be they rail, road or waterborne.

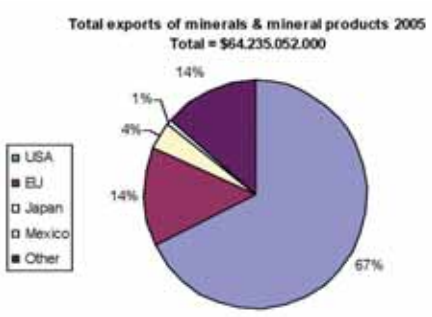
This symbiotic relationship is equally important when one considers the financial aspects of mining in Canada. Capital markets and the Toronto Stock Exchange in particular form an essential pillar on which the Canadian mining industry rests. With regards to mineral exploration and mining, the TSX is the most sophisticated exchange in the world and provides the most equity financing. This is true for Canada of course, but also for the rest of the world. Kevan Cowan, senior vice-president in charge of business development at the TSX, said that "although we're proud of our role in Canada in supporting the mining industry, we are positioning ourselves as the international mining exchange."

**Mining Financings (US$ Millions) 1st half of 2006**




Source: Gamah International, June 2006
Compiled by TSX Group




The statistics show that this is more than a mere declaration of intent. Worldwide, the TSX and the TSX Venture together raised more than 50% of global mine equity financing, with the closest competitor, the Australian ASX, standing at 17.9%. And though Cowan insists that "in terms of the mining sector we can confirm to you that there are much more funds available in Canada than in the United States," it is also true that proximity to such a huge pool of capital has facilitated the development of the mining niche that gives the TSX its strength. In a sense, because mining is so insignificant in relation to the rest of its national economy, the U.S. has gladly relinquished this focus to Toronto where mineral resources are better understood, analyzed and, ultimately, dealt with because of their economic importance. Nevertheless, Americans are active investors on the Canadian mining stock market and this symbiotic relationship gives the Toronto stock exchange even more muscle.

The enabling role of Canada as a source for mining finance takes on full meaning when considering the entrepreneurial spirit that permeates the junior sector in Canada. Gordon Peeling, president and CEO of MAC, explained what sets Canada apart from other countries with resource-based economies. Emphatically, he said, "no other jurisdiction has the same vibrancy and scale of activity in their exploration industry as Canada has." It is thus not surprising that Canadians are at the forefront of mineral exploration not only in their domestic turf but all over the world, where they are increasingly exporting their skills. Peeling illustrates the process: "The Canadian industry, over the last 10 or 15 years, has become a global industry. The industry has gone from being by and large an exclusively domestic-focused industry in the late 1980s to something that is active in over 100 countries and has upwards of 8,000 properties, with more than half of those located outside of Canada."

This has opened the door for the globalization of Canadian mining supply, equipment and services companies as well. Baird admits that "it is true that it is good strategy for Canadian mining suppliers to follow the mines. If you are selling to a Canadian company here, why not sell to them when they open a mine in another country? No doubt there is a correlation between what our mining companies are doing and what our suppliers are doing. Having said that, there are plenty of companies who want to grow beyond that stage; particularly the ones that

occupy niches, who have very specialized technologies, products or services." Canada offers deep pools of such companies.

A look at the range of skills and services offered within the annual compendium published by CAMESE should have mining professionals worldwide convinced that it would be wise to consider sourcing from Canada. After all, a mining industry of this size can only be developed if the entire pyramid of supporting industries exists as well. By the same token, a dynamic industry is bound to continue to drive innovation, creativity and technology forward in the years to come. In fact, according to Gordon Peeling, "to maintain the industry's prominent competitive position, companies have been investing a total of about $330 million per year in new technologies to make operations more efficient, from exploration to mining to mineral processing and metal production." A brochure published by Natural Resources Canada actually places R&D expenditure for 2004 at $505 million within the mining and mineral-processing sector, with spending intentions identical for 2005.

All in all, Canada mines more than 60 different commodities and/or minerals in over 200 different producing mines and more than 3,000 quarries and pits. In several of these, it produces enough volume to secure itself world leadership or a ranking within the top five providers. Because it is relatively new, says Nash, "a big story is currently diamonds. Our understanding is that we have moved Canada from no production at all a few years ago to being the third largest producer in the world, very close behind Russia in second position." Canada ranks as the first provider of uranium and potash with 29.2% and 32.4% of global production, respectively. It ranks third in titanium oxide (15.6%), nickel (12%), gypsum (8.7%) and primary aluminum (10%), even though that refers to refining imported bauxite ore, as none is mined in Canada. It ranks fourth in zinc (8.5%), asbestos (11.2%), cadmium (9.6%) and molybdenum (7.4%) and fifth in cobalt (9.7%). However, Canada also holds abundant reserves of coal, copper, iron ore, gold and a host of other minerals.

Bitumen extraction from oil-bearing sands has a lot in common with mining but touches upon the energy sector too closely to include it in this review. It is relevant, however, as a compiling factor to the huge human resources deficit that the industry faces now and in the future.

"If you have a no-growth scenario in the industry for the next 10 years, we would be around 70,000 people short. If you then project what would be a typical growth rate for the industry over the last few years or match it to the growth of the Canadian economy of about 3% per year, we are sure to be short of up to 84,000 workers by 2016," said Peeling— before adding that if you factored in the magnet labor effect of oil sands it would mean "maybe 47,000 more." The needs of exponentially expanding oil sands projects in earth-moving equipment and professions of all categories, from engineers to electricians and mechanics, are having a big toll on other mining sectors within Canada who are struggling to find efficient ways to address these issues.

Perhaps in fact, this is the threat that looms largest over an otherwise bright and brazen mining industry that is happily surfing the rising wave of commodity prices. Yet Canadians will continue to be the world's miners—and explorers—for many years to come and Canadian companies can be expected to increase their forays overseas.

# Canadian Service Providers Contribute to Industry Globalization

*Accustomed to competing globally without government trade protection, Canada's mine supply and service providers hold their own in a tough market*

Construction of the headframe and surface plant for Ivanhoe Mines'Oyu Tolgoi project in Mongolia. According to JS Redpath President and CEO George Flumerfelt, "Bearing the Canadian flag doesn't guarantee us success [in business], performance does." (Photo: JS Redpath Group)

Canada's long mining tradition has allowed a thriving cluster of supporting industries to flourish. The country is the breeding ground for a wide variety of companies closely or loosely allied to mining and they are increasingly contributing to the globalization of the sector. Canada has developed such a deep and rich supply pool because they have been forced to compete for decades at the highest level to supply a very demanding mining industry that is at once high-tech, safe and environmentally sound. "The industry has received no protection from outside competition for more than 60 years," said Jon Baird, managing director, Canadian Association of Mining Equipment & Services for Export (CAMESE). "As opposed to other resource-based markets, Canada has never imposed any tariffs on equipment supplies since World War II." He argues that the companies that have survived this competitive environment, supplying an advanced industry that demands the best, are indeed world-class.

Baird believes that the strength of Canadian suppliers lies precisely in their amazing diversity and in the breadth and depth of the supply on offer. "We are strong in most of the elements that make up the mining industry" Baird said, focusing on the collective. To drive the point home however, he reluctantly conceded that exploration must be the aspect of the mining industry that stands out most as statistics show that Canadians possess particular expertise in this field.

"Canada is home to half of the world's mining exploration companies," Baird said. "They are engaged in several thousand exploration projects in 100 different countries. So, if these exploration companies are good, who supplies them? The consulting geologists, the geophysicists, the drillers, and so on… They have to excel, too." Baird claims that it is hard to dissociate the quality of suppliers and providers of services from the leadership attained by the mining companies that they support, be it in exploration or in other aspects of mining. They form a symbiotic pyramid which also includes financing, legal and accounting aspects that are highly specialized. He insists Canada's biggest competitive advantage rests on the array of products and services available.

## Supplying Technology to the World

Though statistics to properly evaluate the suppliers industry are scarce, one can get a sense of the breadth and depth by looking at the compendium CAMESE publishes every year. As a membership association, it does not include everyone. Nonetheless, CAMESE represents 280 companies of different sizes that are active in no less than 42 sub-sectors. They provide goods and services for the entire gamut of mining activities: exploring for mineralization; assessing mineral discoveries; building, expanding and operating mines; processing, smelting and refining minerals and metals; closing depleted mine sites; monitoring environmental impact; transporting and providing logistical services; etc.

Most of these companies compete in the global market and derive a substantial portion of their income from exporting their services. When mining started to become increasingly global in the early 1990s, suppliers from Canada were quick to enter the fray. By 1994, Canadian firms were already exporting mining-related products to 180 countries. By 1997, 30% of the total revenue from the sale of specialized mining services and goods was derived from exports.

Dux Machinery is a homegrown Canadian company based in the outskirts of Montréal that furnishes heavy equipment for underground mines. With more than 35 years of operations under its belt, Dux is a very established enterprise, but its history is representative of the entrepreneurial spirit characteristic of Canadian suppliers. Its founder was an OEM chassis manufacturer for well-known brands, who then used this experience to build equipment under his own brand name. Today they are a global company of undisputed repute, catering to the needs of the most demanding customers. "Believe it or not, we have more customers abroad than in our own market," said says Joe Abi-Saleh, Dux's general manager. "About 90% to 95% of our sales are exports"

Arkbro Industries also knows about humble beginnings. It started out as a machine shop in 1967, mainly serving the construction industry. "After building lots of parts to specs, we got involved in the mining game," said Evan Mamas, Arkbro Industries CEO. "Since the early 1980s, we have been offering our own product line of underground raise equipment and have been promoting these worldwide ever since." Arkbro now possess world-class manufacturing technology in a line of raise climbers and rack and pinion hoists.

## The Sudbury Connection

These paths to growth, from unrelated humble beginnings to a highly-specialized international sales focus, have been followed by many others. The rich cluster that can be found today in Sudbury can be traced back to when Inco and Falconbridge started outsourcing, explained Doug Nadorozny, Greater Sudbury Development Corp.'s general manager. "These mining giants used to do everything in-house, but as they looked for ways to be economical in periods of lean metal price cycles, they started shedding departments that focused on equipments, parts, services and many other activities outside of their core business of mining and processing," said Nadorozny. "It was a gradual evolution, but it gave birth to an incredibly rich and dynamic supply industry that is both innovative and competitive."

In fact, Swedish multinational Atlas Copco established a major sales office of its Construction & Mining division in Sudbury—neighboring Komatsu—where it can benefit from being in one of Canada's most prolific mining basins and be close to its main customers. The Exploration Products division is located two hours drive east of Sudbury in North Bay and incorporates a manufacturing site. Atlas Copco started getting serious about exploration supplies only in the late 1990s after a string of acquisitions, including those of two Canadian companies: JKS Boyles and Hobic Bit Industries. Jeff Hagar, general manager of this division in Canada, explained why it retains a specific strategic importance within the group's global outlook. "Canada has established a culture and an expertise in exploration drilling and there are a lot of Canadian contractors that work overseas but are based here. We have built relationships with those contractors, which can then be developed further in the local markets where they operate."

North Bay itself is indeed home to two large mining contractors that have each followed dramatically different growth patterns. The Redpath Group has grown from home soil, organically. Its internationalization process was mostly achieved working for Canadian companies who own mines abroad and a solid work ethic has cemented their exposure among some of the world's leading mining groups all over the globe. Interestingly, the company's President and CEO, George Flumerfelt, downplays the "national excellence" argument. "Our company and our country both have terrific reputations but at the end of the day, the owner wants the job done safely, on time and in a cost-effective way by whomever," said Flumerfelt. "It is a global business and bearing the Canadian flag does not guarantee us success, performance does."

North Bay neighbor Cementation, on the other hand, has been at the heart of a flurry of consolidations and was recently acquired by Murray & Roberts of South Africa. Involved in many engineering sectors, this multinational is the largest underground mining contractor in the world. "Mining companies, as is illustrated by the round of mergers we are seeing in Canada, are getting larger and the clients that we deal with are increasingly global," said Roy Slack, president of Murray & Roberts' North American operations. "They have operations in Africa, Asia and Australia and they're interested in what is best practice around the world. Being involved in a global company, we gain access to the deepest shafts [that are being sunk in South Africa] and the largest diameter raise boring [that is being drilled in Australia]. In short, we are privy to the cutting edge of front-end technology being used around the world." By securing a presence in this market, Murray & Roberts also gains access to a strategic and all-important set of mining clients. They will be sure to complement their portfolio with specific knowledge such as, perhaps, arctic capability.

It is clear that both for homegrown companies and for multinationals, the Canadian market offers an important springboard. The effects of the type of concentration seen in the supply industry trickles down to many aspects where it becomes a real catalyst for innovation. Technological developments, for example, blossom in this kind of competitive environment.

## Keeping Costs Down

Whether breakthroughs are concerned with a very small detail or with a more essential part of mining activity, they tend to be driven by the ever-important need to keep costs down. Efficiency is the name of the game in an industry that has little control over the price of what it produces. Safety is another driver for technological developments as is environmental responsibility. As Canadian mining companies continue to export the high standards they abide to at home, these three elements: efficiency, safety and environmental awareness are the watchwords of their suppliers.

Consider the case of a 10-man company from Burlington called Eco-Waste. It offers point-of-need waste solutions with a focus on remote locations that fit the cost-reducing requirements of mining companies. Steve Meldrum, Eco-Waste's CEO, claims that their solutions offer sizeable economic advantages beyond their obvious environmental aim. "In the case of the Teck Cominco Polaris mine [in Little Cornwallis Island in the Canadian high arctic], after decommissioning, they had a number of huge barges filled with glycol from their heating and cooling systems," said Meldrum. "Transportation and disposal was going to cost hundreds of thousands of dollars. So we sent up a liquid waste incinerator, which operated for 6 months straight and disposed of it on site."

Though highly specialized and very small, Eco-Waste is a prime example of the niche of excellence that can be attained in Canada. The mining industry's global nature will quickly catapult even a small company to international status.

It is such a hope that drives Accutron Instruments, a very small company from

Copper Cliff (Sudbury) whose research is centered, again, on a niche aspect of mining: the need to control airflow in underground mines. Of course, the primary concern for measuring airflow is safety. However, Accutron's Gilles Arsenault and Doug Maenpaa argue that there is a niche to be developed that can bring substantial economies to operations, particularly at a time of high energy prices. By accurately measuring airflow through the use of ultrasonic detectors, mines can run their sophisticated ventilation systems more efficiently and save on power bills. This is not a need that is well understood yet, but the gains are worthwhile and their research is now bearing fruit as Accutron's equipment is sometimes sold as a package with ventilation systems provided by large established companies.

In the field of electromagnetic airborne surveying, Canada has technological advantages that have attracted one of the largest geotechnical and geosciences multinationals worldwide, the Dutch company Fugro. "Traditionally, going way back to the roots of airborne geophysical surveying, it was an activity where Canada was at the forefront of technological development," said Gregory Paleolog, general manager for Fugro's Toronto office. He explained that Fugro came in at the end of 1999, taking advantage of a slump that put several companies in financial difficulties and acquired many of the Canadian-based companies that had market leadership in this field, thereby complementing Fugro's range of services significantly.

Geotech Ltd. is a much smaller rival that embodies this technological focus. COO Gary Handley said that technology developments are progressive, that they occur through step-by-step improvements of existing technologies. However, from time to time, given the right environment, bigger "leaps" in technology will occur. Canada's strength in electro-magnetics was the right environment and he believes that such a 'leap' has been achieved with the development of their latest system, known as VTEM (Versatile Time-Domain Electro-Magnetic System). "VTEM has revolutionized the airborne surveying industry by giving geologists the means to map to depths previously only achieved with ground surveys, with accuracies good enough to target drilling programs," said Handley. "By accurately mapping ore bodies at depths of up to 500 meters, it slashes exploration costs drastically." VTEM, argues Handley, is such a breakthrough that it has gained overnight popularity within the industry. Geotech flies its systems worldwide and have a hard time keeping up with demand. While in 2002, they only operated one system that flew about 10,000 km, in 2006, they now have eight systems available that have already covered 200,000 km in the first six months of the year.

Of course, the list of technological developments could go on forever. In Canada, the strength is the cluster. With 75% of Canadian suppliers of specialized mining products based in three provinces: Ontario, Québec and B.C., one can find companies leading their field in areas as varied as analytical laboratories, communication systems, geotechnical instrumentation, drilling equipment, hoisting equipment, ore handling equipment, mineral processing, software, gas detection, ventilation and many others. More than half of these companies derive 50% or more of their revenue from mining, which in turn enhances their dynamism, their competitiveness and their disposition to innovate.

## Toronto Provides Equity

Toronto and its all-important equity market, which acts as a crossroads for mining companies and financial firms, also plays a part in the composition of the service providers to be found in Canada. Because of the overwhelming importance of this country in terms of raising funds for mining projects worldwide, there is a disproportionately large demand for mining analysts, lawyers, auditors and consultants. These people need to assess mineral properties, give advice to retail and institutional investors, draft financial reports, assist in raising funds, etc.

Kevan Cowan of the TSX explained that its NI 43-101 instrument is now the global standard in technical disclosure for exploration and mining companies. "This has given Canadian engineering companies a chance to achieve international leadership in a consultancy role," Cowan said.

ACA Howe International Ltd. is one such company that has, by its own admission, a peculiar profile. "The path that A.C.A. Howe has chosen is kind of a strange one: we are a bunch of geologists and engineers that are typically working for other engi-

Sudbury, Ontario's famous Big Nickel monument, which commemorates the major role that nickel mining has played in the district's social and commercial development. Many of the world-class products offered by Sudbury's numerous industry suppliers came as a direct result of meeting local nickel mines' operational needs.

neers and geologists," said Felix Lee, ACA Howe International's operations manager. "The complex evolution of the industry and a crying need for more transparency with regards to disclosure of assets had them gravitating towards production of independent 43-101 reports." Lee emphasizes that this is now their bread and butter and that their biggest asset is the independence that allows us to put together and generate an independent opinion of a mineral property for clients. Nowadays, with expertise ranging across a wide array of mineral properties, they have managed to provide similar assessments for the AIM in London and the ASX in Australia.

While it arose to meet demand from the market, A.C.A. Howe's evolution was partly orchestrated to avoid head-on competition with larger, more traditional engineering firms that have chosen to involve themselves more heavily in mining. To illustrate this point, Lee mentioned a firm called Wardrop Engineering that was traditionally more into construction but is now heavily involved in the mining industry. As a result of the diversification of bona-fide engineering firms that have ventured into mining, the traditional target market has become more competitive and smaller engineering firms like A.C.A. Howe have chosen to become more specialized in exploration and appraisal.

The newly-appointed CEO of Wardrop, Shayne Smith, confirmed that deeper involvement in mining is one of the aggressive steps that they have taken in the last five years. It is part of what allowed them to triple the size of this company in the last eight years. "We have funded a lot of expansion with a view that over the next five or 10 years the mining markets are going to be very strong and there's going to be a great deal of demand for our services," Smith said. "We are building a capability that there's a global need for." In fact, Smith acknowledges that though Wardrop "had a real history of working internationally, mining definitely is by far a much more global business and from the instant that we started to create a nucleus of mining talent in our operations, it immediately became global."

## Transferring Technology Through Training

The rapid globalization achieved by mining companies and the supporting industries that supply them with goods and services has created an all-important dimension that should not be overlooked. That is the training of local work forces, which is both a need in terms of cost-efficiency and in terms of corporate responsibility.

Met-Chem is an engineering consultancy company with decades of experience in services. With beginnings in the treatment of iron ore, they have traditionally been servicing different aspects of the mining sector and focusing particularly on mineral processing. They went international in 1975 and have acquired vital knowledge about working abroad. "Working in different parts of the world is a continuous learning experience," said Subbiah Srinivasan, Met-Chem's vice president and managing director. He highlighted in particular that training had become, by force of necessity, a crucial aspect of the services that they offered.

"For example, the Rajmahal coal mine in Jharkhand [India] was located in a tribal area," said Srinivasan. "So, the labor force came from the tribes and some of them had difficulty reading and writing. We had to train about a thousand people in all aspects of mining, maintenance and operations." This was done in several steps that included bringing almost a hundred people to Canada to introduce them to Canadian mining methods and provide them with first hand exposure to how a Canadian mine is designed, managed and operated.

"The training program was very successful and the project, after we left, won five national awards for productivity, efficiency and quality," said Srinivasan.

Redpath's Flumerfelt concurs. They work on an array of international projects in very different parts of the world and he commented that an important part of Redpath's workforce—and that of its clients—is no longer Canadian. Increasingly, their clients choose to limit the number of expatriates working on a given project. "As a consequence, one of the keys to our success is in training national workforces: the better we are at training, the better we are at meeting our clients' requirements to lower costs," said Flumerfelt.

As the industry scrambles for human capital, this is more true now than ever. Chris Stafford has been running a mining-specific human resources company called C.J. Stafford & Associates for the last 25 years. He sees the unprecedented challenge the mining world is currently facing in terms of human capital as an important chance to make companies realize how important it is to incorporate human resources management into their strategies.

"After the Bre-X situation, for nearly 10 years, the industry seemed preoccupied with sustainability," said Stafford. "Yet in all the sustainability reports that were being issued, I don't think I ever saw one that included human resources in it. To be this short-sighted as to have left human resources out of the sustainability equation was a huge failure of the mining sector. These mistakes brought us to today's desperate situation." He acknowledges that this has changed a little, but companies are currently too busy because of the boom cycle.

"They don't have the time that it now takes to put energy into their recruitment process and that has allowed us to develop strategies for them and implement those strategies within a long-term framework," said Stafford.

C.J. Stafford & Associates is in itself yet another illustration of the range of direct and indirect opportunities the mining world creates for suppliers of goods and services. Canada's leading role in mining has been a solid platform on which an unbelievably diverse, dynamic and innovative group of suppliers has grown. The rapid internationalization of the industry that we discussed in the previous article of this survey has given Canada's miners an unprecedented chance to capitalize on their home strengths to compete abroad. Many have done so successfully, even if they might be only a small business preoccupied with a very specific niche of expertise. It is to be expected that the global mining world will continue to see in this pool of expertise an excellent place from which to source goods and services in the future.

# Exploration Trends and the International Presence of Canadian Mining Companies

*Skill, spirit, tradition—and access to financing—power Canada's global exploration ventures*

Photo courtesy of: Gitennes Exploration.

The mining industry is crucial to the Canadian economy. It displays world leadership in the production of several minerals and it mines for an incredible array of resources, ranging from diamonds to bitumen. Even though these premises establish Canada as a mining powerhouse, one could argue that what makes it distinct is the dynamism of its exploration sector, embodied particularly by its junior companies. A combination of entrepreneurial spirit, geological skills, mining tradition, adventurism, adaptability and access to finance makes Canada a truly world-class platform from which to explore for new deposits at home and develop mining operations overseas.

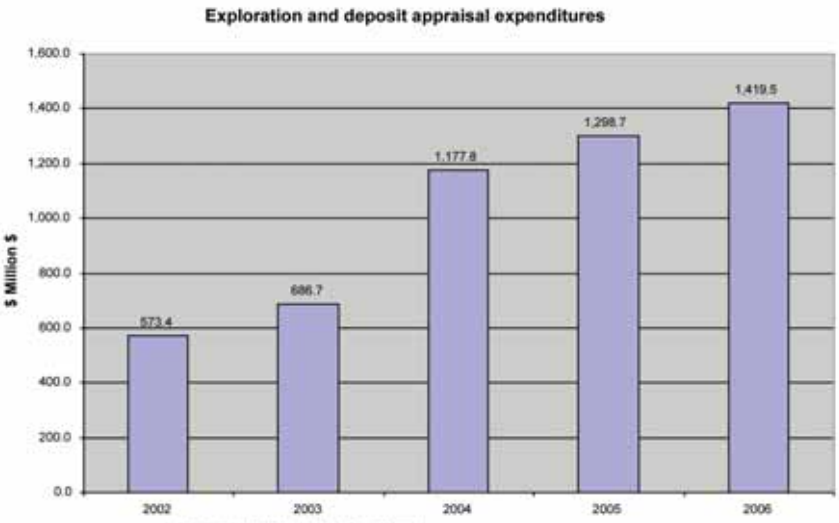
Each year in March, the Prospectors and Developers Association (PDAC) of Canada hosts the biggest convention of miners and explorers worldwide. The convention can serve as a sort of barometer: breaking all previous records, this year's attendance of 14,500 provides a clear indication that metal prices have resuscitated exploration. The mood of attendants, which the PDAC's Executive Director, Tony Andrews, described as "everybody jumping up and down going crazy" would instill a further sense of the magnitude of the shift.

The hard numbers tell the real story: 250% growth experienced between 2002 and 2006 (projected) in expenditures dedicated to exploration and deposit appraisal in Canada. Most consider 2002 as the period where the five-year trough engendered by events such as the Bre-X scandal of 1997 ended. Expenditures in Canada reached $573.4 million. Four years of continued growth later, Natural Resources Canada predicts that companies will spend $1,419.5 million in 2006, a number that could very well be surpassed by the year's end.

As a result of this upward cycle, which he predicts will be sustained for some years to come, Andrews insists that Canada right now is in a very strong position both domestically and internationally. "About 50% of the world's mining exploration project financing is raised in Canada and it is attracting 19% of all exploration expenditures on its territory, the highest of any country in the world," said Andrews. He explained that this illustrates Canada's global mining competitiveness. Whereas a little more than a decade ago there were few countries competing for exploration dollars and Canadians did not need to work all that hard, now there are a hundred countries all vying for a finite pool of exploration capital.

Some of the roots of this exploration excellence can be traced to very simple legislation that encourages and facilitates entrepreneurialism. Canada provides for "free-entry." Anybody with $25 in their pocket can acquire a prospector's license and stake claims on crown land (most of Canada is crown land, i.e. territory belonging to the Canadian people but administered by the government). Provided they do some work on it, after a period of time they have complete security of tenure. And if they find something exploitable then they can take it to a lease. Tacked on to free-entry is the assessment system, which obliges prospectors who have done work on a claim to disclose their findings to the government. This is then stored in a file which is available to the public that contains anything from reports on mineralization to drilling results or geological/geophysical maps. Additionally, the government maintains and updates a consultable geosciences database.

Legislation extends into financial incentives that exist to boost fundraising for mineral exploration. "The Investment Tax Credit for Exploration (ICTE)—otherwise




**Source**: compiled from statistics from Natural Resources Canada. **Notes**: Exploration and deposit appraisal activities include only the search for and appraisal of deposits and do not include work for extensions of known reserves

known as the "super flow-through" system—has been very effective at encouraging investors to return to the mineral sector and to put their money into high-risk ventures," said MaryAnn Mihychuk, PDAC's Director of Regulatory Affairs. The mechanism behind the ICTE is quite simple: prospecting companies are allowed special tax benefits that flow through to the purchaser of the share thereby creating a win-win situation where both investors and exploration companies benefit. Its validity has recently been extended.

Canada's competitiveness lies partly in this favorable legal environment, but its real asset is its people. Centuries of mining history have provided a fertile ground for the emergence of skills that permeate throughout different sub-sectors. The Toronto Stock Exchange's Kevan Cowan asserts that Canada got into the game very early with public finance to fund early stages of exploration activities, so there is a long tradition. "When you do that for such a long period of time, you are then able to develop all the expertise needed to support it: the TSX, the investment bankers, the analysts, the lawyers, mining engineers and technical specialists," said Cowan.

"This community of experts in Canada is second to none in the world. It offers a pool of talent of real breadth and depth." Ronald Thiessen, said president and CEO of Hunter Dickinson, adding that "because we have the expertise, it is logical that the markets look for the local experts to tell them where to invest money. Now that mining is an international game, funds all over the world are looking to Canadian experts to advise them."

## Global Growth Based on Flow-Through

To understand the internationalization of the Canadian mining industry, one only need look back to the mid to late 1980s. "The legislation allowed individuals to play the game, not just big companies," Andrews said. When the flow-through program started to be used extensively, a lot of junior companies emerged and provoked a huge spike in exploration expenditure (1987 and 1988 were both record years, unmatched to this day). This led to results while the big companies reasoned that their better strategy was to let the juniors focus on prospectors' work. Indeed, they were more nimble, possessed less aversion to risk, advantages that the seniors did not have. Rather than spending huge amounts of money on exploration, which led to overhead on their balance sheets, the senior companies figured that in many cases it would be better to lean on such dedicated juniors and get involved at a later stage when real financial muscle is required to develop known deposits into mines. In fact, the same holds true today; according to NRC, about 58% of total exploration expenditure in 2005 was spent by juniors .

As many as 600 Canadian companies are conducting an estimated 3,500 exploration and mining projects in 100 countries. This photo of junior miner Entree Gold's mining camp in Mongolia illustrates the frequent contrast between local culture and modern exploration technology.

A few years later, the end of the Cold War brought about a new world order. Many mineral-rich developing countries transformed their economies, became more stable and opened up to foreign investment. Alamos Gold's President and CEO, John McCluskey recalls that "mining laws changed in 1993 and it marked the beginning of a massive wave of foreign investment in Mexico." The same applied in many other countries. When that happened, "the Canadian juniors were poised and ready and the financing system here as well" said Andrews. In short, the well-oiled mechanisms that they had applied at home could now be extended to a much larger playing field. Nowadays he estimates that Canada has something like 600 companies working on about 3,500 projects in 100 countries. The NRC states that in 2004, about 43% of all exploration programs in the world were undertaken by Canadian companies .

With a presence so overwhelming, it is hard to pinpoint areas where Canadians thrive most. Peter Guest is President and CEO of Mediterranean Resources, a company whose involvement in Turkey gives it a heavily-tinged European shareholder base though it is listed in Canada. According to Guest, "Canada is time-zone driven which is why you see [Canadian companies] everywhere in North, Central and South America." While this may be true, it hasn't limited involvement to other parts of the world. For example, the NRC's Gary Nash anticipates that "Canadian [mining] companies in Africa alone are in the process of investing anywhere up to $6 billion with plans to spend another $17 billion over the next five years." In fact, Canadians are often at the forefront when it comes to bringing mining to countries that had no previous history of it. Tiomin Resources is a company with heavy titanium investments in Kenya. Jean-Charles Potvin, its president, chairman and CEO recalls that "at the time [of our initial investment] there was no environmental law in Kenya. We were the 'seed' that pushed that law ahead. It took three years but you could argue that the reason Kenya has an environmental law today is Tiomin."

In China, 21 of 39 foreign companies who have mineral exploration programs are Canadian and one of them in particular, Eldorado Gold, is expecting a major part of its growth to stem from its developments and acquisitions there. Niger was a virtual unknown to the mining world as only French nuclear group Cogema operated

In the volatile environment of shifting politics and mineral resources policy, country risk is a critical factor in obtaining project financing—even when the risk may be more perception than reality. Shown here is a tree-planting project sponsored by gold miner Crystallex in Venezuela.

there. Canadians such as North Atlantic Resources and Northwestern Mineral Ventures are now securing large land positions with an aim to be strategically placed when the country's uranium potential is fully unlocked. "I really believe that you find great deposits in unknown territories," said Marek Kreczmer, Northwestern Mineral Ventures president and CEO. "In known mining camps, properties are either of poor quality or grossly overpriced. I like to develop large area-plays, go into virgin territories and be ahead of people." Nevsun Resources is one of only a handful of companies that follows a similar strategy in Eritrea, a country not a single miner could have situated only a decade ago. If Mongolia is on the mining map today, it is also largely because of Canadians. Ivanhoe Mines' Oyu Tolgoi project is poised to be one of the world's largest copper-gold development projects. In fact, it spurred an 'exploration rush' of sorts that had several other companies such as Entrée Gold stake claims in its vicinity.

"I think the industry in this country has moved offshore and I cannot see it coming back," said Joseph Conway, president and CEO Iamgold Corp., a mid-tier gold producer. "Our companyis now in South America and in Africa, but as we evolve we will likely go elsewhere as well, as long as there is stability, receptive governments and local communities that are welcoming." The last part of his comment is conditional and very revealing of relatively new dimensions that the industry has to face.

## Operating Abroad

Corporate governance is an issue that older generations of miners perhaps understood less. With internationalization and an increased focus on the environment, "the 'above ground' issues have become more complicated than the 'below ground ones" said Andrews without a trace of irony.

This is true in Canada, but perhaps more acutely so abroad where the 'country-risk' factor that Conway alludes to plays a part in the financial valuation of a project. When the Ecuadorian government ran into a tussle with U.S. oil company Occidental Petroleum this year, the shares of nearly all mining companies present in the country took a plunge, irrespective of the quality of their relationship with the government. Todd Bruce, Crystallex President and CEO—a gold company operating in Venezuela—said that "the fascinating thing about Venezuela is the difference between perception and what we experience on the ground as a company." Because of the negative political relations between President Hugo Chavez and the U.S., a lot of distortion occurs. A few months back, when the government announced changes to the mining laws, it was widely interpreted as a move to nationalize projects. Bruce said that the effect was immediate and he "had to counter the negative perceptions by arranging one to one conferences or phone calls with investors to take them through what the government had actually done and how the media was portraying it." The damage to share prices, in any case, was already catastrophic.

Of course, not everything is based on erroneous perception. Companies in Mongolia went through a share price meltdown after the government unexpectedly slapped a massive windfall tax on mining output. In the Democratic Republic of Congo, the world's largest and highest-grade copper/cobalt project—Tenke Fungurume—has remained undeveloped for years because of safety and infrastructure issues. Paul Conibear, President and CEO of the minority partner in the venture, Tenke Mining Corp. and he explained that when he was appointed in 1999, "we literally had to sit on the assets and try to minimize our costs because it was really uncertain how long the war would last." He said that investor interest was always there because of the quality of the deposit, but that explaining the risk was an utmost priority when making presentations.

Examining core samples for gold at a North Atlantic Resources exploration project in Mali.

## Problems Not Limited to the Developing World

Country risk, perceived or real, can explain why Canada still drains most of the world's exploration expenditures. Some say that even the U.S. is not necessarily a good choice for mining investments despite the obvious economic and political stability. We have heard many a Canadian complain of the 'mining-unfriendly' nature of many states. The O.T. Mining Corp. is exploring for gold in the historical mining district of Butte, Montana, since 1987. Though it acknowledges that this has changed, O.T. laments the amount of time lost during years of confrontation between the mining world and politicians. A similar cry is heard from Formation Capital, an emerging cobalt producer active in Idaho. Mari-Ann Green, chairman and CEO, says that "it has been an incredible money-consuming and time-consuming permitting process. Out of $34 million spent on developing the project, $14 million alone were for permitting, largely due to red tape. The upside, she says, is "that the truth of the matter is that once you have a permit, it is yours to keep."

Political and legal risks aside, managing community relations is also increasingly becoming of the essence. Gabriel Resources, for example, can attest that their gold development project in Romania is largely delayed due to issues of this nature. In this regard, miners complain incessantly of disruptive NGO involvement. Often, they claim, NGOs play on emotions to ensure their own survival. As opposing development projects becomes their 'raison d'être,' many abuses are committed in the name of defending communities who actually welcome projects for the economic benefits they represent. Jean-Charles Potvin cynically points out that "in Kenya, there are 3,500 western NGO's, which is the most of any country in the world. If you ask a Kenyan what kind of job he/she wants to do as they graduate, they'll tell you they want to work in an NGO."

These 'modern' issues set new standards and Canadians feel better positioned than most to remain leaders in international mining investment. Because of the commitment they have shown to environmental responsibility and the experience they have in dealing with native communities back home, miners feel they are well-prepared to tackle issues of this nature abroad and to help advance standards in far-off markets. Additionally, they have the right 'brand name'. On a national level, they point to the absence of a colonial past or to the positively neutral stance attached to Canada's foreign policy that makes them welcome in most jurisdictions. On a more personal level, Kreczmer highlights the fact that Canada is a country of immigrants. "I think we are all comfortable dealing with people of other cultures and we tend be more accepting and more understanding," Kreczmer said. His comment was echoed by many of the companies interviewed in the preparation of this article. On a financial level, Canadians can tap into their home finance base of Toronto. Jonathan Goodman, President and CEO of Dundee Precious Metals, reminds us that "Canadians have been able to bring capital financing to places that do not have it naturally."

# Base Metals—Back to the Basics

*Canadian base metal production—with the exception of copper—declined last year, but the falloff in output generally was balanced by higher metals prices*

Exploration drilling under way in the Sudbury Basin, Ontario, Canada.

In 2005, nickel did not quite live up to its outstanding performance of 2004: a small decline in volume (174,500 tons, representing a -1.6% change) was offset by a slight value increase ($3.30 billion, a 2.4% change). Nickel remains the leading Canadian mineral measured by output value. Zinc suffered a steeper downward trend over the same time period; 623,100 tons were produced, representing a -15.1% change over the previous year. Again, the sharp decrease was balanced by good prices and the value loss only represented a -0.2% change over 2004 at $998.2 million. On the other hand, 2005 was a good year for copper with increases in value to $2.455 billion (a 20.9% change) and volume: 570,600 tons (4.8% increase). Notwithstanding the numbers achieved last year, Canadians are worried about a trend that indicates dwindling levels of their base metal reserves.

The summer soap opera in Canada's metals world was the merger story surrounding two major multi-mineral companies, Inco Ltd. and Falconbridge Ltd; a storyline that goes a long way in exemplifying this reduction in reserves. And, like any good soap opera, the conclusion is still not in sight despite many twists in the plot. At the time of writing, it seems clear that Falconbridge will be acquired by Xstrata, the Swiss-based plc who already own a 20% stake since August 2005. Its Sudbury neighbor, however, will still have to wait to know its final fate. Arizona-based copper giant Phelps Dodge, who hoped to gobble up the merged entity, seem poised to content themselves with the purchase of Inco, though several other potential acquirers have emerged. They are now ramping up their offers but the stakes are rising fast. Phelps Dodge has been in contention since it shouldered Inco's bid for Falconbridge. Vancouver-based Teck Cominco, an early bidder (for Inco), has patiently waited for the announced Inco-Falconbridge wedding to fail at the altar. Now that it has, the company has moved back in with an improved offer. In the latest round, Companhia Vale do Rio Doce (CVRD), a diversified Brazilian mining company who leads the world in iron ore production, has thrown in a chip of its own. Analysts expect that it may not end there and speculate that new players might yet invite themselves to the table.

Whatever the final outcome, Derek Pannell, CEO of Falconbridge, had already announced before this saga played itself out that it would "change the face of the Canadian mining industry." Indeed, those Canadians who had dreamed of a homegrown powerhouse to emerge from this and take its place among the mining world's select few have seen their nationalistic hopes dashed. The synergies Inco and Falconbridge would have benefited from in Sudbury, where their smokestacks dominate the landscape, will never see the light of day. These synergies formed the central argument behind the desperate attempts by the Falconbridge board to have their shareholders subscribe to the Inco offer over Xstrata's.

Just over a year ago, Noranda completed a takeover of Falconbridge that gave birth to Falconbridge Ltd. As companies generate cash, Pannell explained, they seek to reduce risks associated with growing their asset base. "As you merge companies, the first thing that tends to get cut is the exploration budget. In the last ten years this has eroded the number of projects available, due to consolidation and cash conservation. The shortage of projects that we are facing today can be attributed to a lack of exploration during mergers." While this explains the frantic dash for existing assets, people are worried about this "lost decade" and its effect on Canada's base metals reserves. In a November 2005 speech in Ottawa, the Vice-Chairman of Scotia Capital, John Eby, gave a stern warning to his mining audience: "Unless new discoveries are made, reserves for many base metals may be significantly depleted in less than a decade; this may lead to the closure of Canadian smelters and refineries and the loss of part of our infrastructure advantage."

Nickel production will not decline soon but this is almost exclusively due to the ore that will to come from Inco's Voisey's Bay mine, which is often referred to as the lone bright spot in a decade that has seen few big deposits discovered. In fact, more than half of its output (50,000 t/y average over its expected 30-year mine life) will represent a net increase in Canadian production, with the other half replacing exhausted mine production. Beyond Voisey's Bay, few other prospects quell worries over declining reserves.

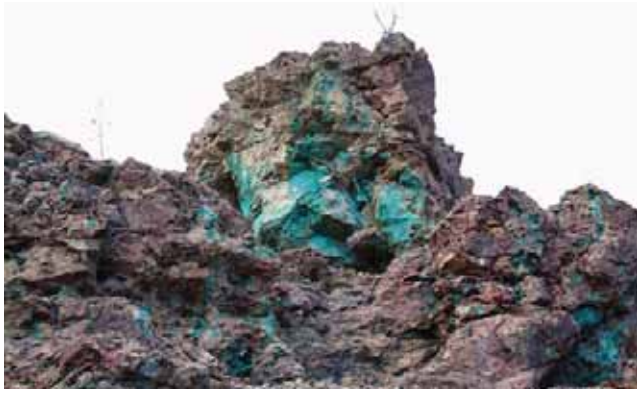
Not everything is bleak; metal demand and a sustained price environment have fueled initiatives that could easily turn this picture around. The examples that follow are all illustrations of successful exploration, development and expansion paths from companies across Canada that embody this reversing trend.

FNX Mining provides a good illustration of an emerging producer of nickel, copper, cobalt and precious metals. Terry MacGibbon, president and CEO, is a former employee of Inco who has intimate knowledge of the Sudbury basin, which he calls "the 'Palm Springs' of mining." In 2001, he identified five properties—all historical producing mines which Inco had labeled as non-core—and saw that they possessed not only good exploration potential but also excellent near-term mining potential. Five years later, FNX has two mines in production and two more are coming on stream over the next two years. Following the familiar philosophy

that the best place to find an ore body is next to an existing mine, they have additionally discovered a deposit behind their Levack property which will potentially be their fifth mine.

MacGibbon said, "We exemplify what a small entrepreneurial company can do; big companies do big things very well and small ones like us do smaller things well. Inco saw that these were small operations but that collectively they could add up to something significant." A careful strategy was required and FNX was successful partly because it was able to reduce risk. Construction costs remained low because of the existing infrastructure and ore processing was secured through a contract with Inco, which agreed to buy the run-of-mine production to feed its mills and smelters. The third element came through a partnership with Dynatec. Dynatec is a large mining contractor that was looking to enter into ownership of mining assets. Bruce Walter, president and CEO of Dynatec, explained that "what we were looking for were opportunities to leverage our mining and metallurgical expertise. Our relationship in Sudbury with FNX was the first major step in that direction and it was a perfect example of our strategy in action. FNX was an exploration company; Dynatec had the mining expertise…so we struck a partnership to secure the deal with Inco."

The industry hailed FNX's model and it was soon emulated by First Nickel. Elizabeth Kirkwood, president and CEO, is not shy about admitting that she "saw what FNX was doing and their success and figured it could be repeated." She knew a geologist at Falconbridge who directed her to a property where the strategy would fit. She negotiated with Falconbridge and struck a deal. In 2005, her company brought the Lockerby mine into production while simultaneously building up a portfolio of properties with exploration potential. Wallbridge Mining has comparable faith in Sudbury's igneous complex but has taken a more grassroots approach. They have secured a very large land holding position, backed by joint ventures with Falconbridge and Lonmin plc (a British-South African platinum miner) on several of their properties and hope to be well-positioned for future developments in the area.



Copper-stained breccia outcrop at Vancouver-based Redhawk Resources' Copper Creek Cu project in Arizona.

Neighboring Falconbridge's Raglan mine in Québec is the Raglan South nickel project. Canadian Royalties, the exploration company that runs it, has delineated a number of deposits and progressed to the point where it is now preparing feasibility studies. Nuinsco Resources is also bringing good nickel prospects to the market in its properties in Thompson,

Manitoba. As a pure exploration company they have had a streak of geological successes both in Canada and abroad. They now carry an incredibly diversified portfolio of properties and mineral interests, ranging from base metals to uranium and precious metals. Ironically this limits their ability to access proper finance. As their CEO, Warren Holmes, explained, "it is easier to promote a single-mineral company." Though it will take some restructuring of the company, Holmes says he "thinks somewhere we have a nickel-producing company within Nuinsco."

Copper output is forecast to be lower in 2010 than it was in 2000. Zinc mine output was already down over the last couple of years and refined zinc metal production also decreased last year. As far as these two metals go, some positive news comes from the expansion initiatives described below, but otherwise prospectors believe that much more exploration needs to be carried out.

Aur Resources is an established mid-tier producer whose growth will somewhat attenuate the effect of declining reserves. Though its Québec Louvicourt mine is in the process of closure, its copper/zinc Duck Pond deposit is scheduled to produce 18,600 t/y of copper in concentrates as of next year. Aur also has two operating mines in Chile and is currently generating a solid cash-flow stream that puts it in a perfect position to look for acquisition opportunities. Even so, Aur's President and CEO, James Gill, said that "we are going to double our copper production organically in the next few years anyway without buying anything so we do not feel pressure." Canada's third largest producer of copper and zinc metals, HudBay Minerals, is also expanding. Its 777 mine in Flin Flon Manitoba, which started operations in 2004, is due to achieve full production capacity this year.

At the other end of Canada, in the northwestern part of BC, a copper/gold porphyry deposit called Red Chris impatiently awaits the government's decision to extend the province's power grid. Without it, bcMetals cannot proceed to build its mine. Ian Smith, president and CEO, said that construction would only take 22 months. Paradoxically, he reflects that, "unlike the last bull run, to say that a 50,000 t/y copper concentrate operation is the largest in North America ready to go says a lot about where the industry is." As Smith pointed out, during the last bull market, once Chile's Escondida mine was ready to come on line prices were forced down quickly. This time around, it appears the stickiness in copper supply will not be resolved for some time as there are no "elephants" nearing development.

Eby has warned of the danger of dwindling reserves and stressed the importance of further exploration. Already we can see a reverse trend when compared with the last decade that indicates that the mining community is paying heed to his message. According to Natural Resources Canada, exploration expenditures for base metals was up to $300 million in 2005 and expected to be at $384 million in 2006, thereby climbing up to second place behind the precious metals group. If prices continue to remain high for a few years, as they are expected to, there is no reason why this trend should not continue and reverse the negative forecasts. The examples above provide encouraging signs that palpable results in exploration and development can easily be achieved in a country with an environment so favorable to mining.

# Coal: Coming in from the Cold

*Production dropped slightly in 2005, but value skyrocketed*

Canada produced 65.3 million metric tons (mt) of coal in 2005, mostly from the provinces of Alberta and British Columbia. This was a slight decrease in volume from 2004 (-1% change) but it represented a whopping 45.9% spike in value. Almost all the coal produced in Canada is produced by two companies, with a very clear divide between metallurgical coal and thermal coal.

In a major deal struck in 2003, Luscar, Teck Cominco and Fording merged their metallurgical coal assets into one company, Elk Valley Coal Corp. (EVCC). EVCC now operates six mines, five of which are in British Columbia and one in Alberta. The close proximity of the assets should allow for many operating synergies in years to come as the partnership gels. Together, the mines produce about 25 million metric tons of high-grade metallurgical coal per year destined for the international steel market, making it the second largest operation in the world with about 20% of the international supply of seaborne metallurgical coal. Since earlier this year, as part of the multi-step agreement penned in 2003, Fording Canadian Coal Trust, an open-ended mutual fund trust, owns 59% of EVCC and the remaining 41% is owned by Teck Cominco, which also manages the assets. EVCC's mines can produce metallurgical coal for another 30 years at current rates.



As part of the same deal, all thermal coal assets of Fording were purchased by a conglomerate called the Luscar Energy Partnership (LEP), formed approximately two years earlier to buy Luscar Ltd., Canada's largest coal producer based on tonnage. Luscar mines roughly 40 million metric tons of thermal coal for electricity generation. As opposed to metallurgical coal, only a marginal portion (3%) is exported. The LEP was formed through an agreement between Sherritt International and the Ontario Teacher's Pension Plan Board, an investment corporation responsible for administering one of the largest pension funds in Canada. Together, they found the perfect synergy to perform this two-part rounding up of Canada's thermal coal assets.

Sherritt International is a diversified resources company with a long and rich history. Its roots were in the hydrometallurgical refining of ore, a process it pioneered as early as 1947. Today, aside from its dominant position in Canadian thermal coal, Sherritt also has substantial interests in nickel and cobalt that leverage on complementarities between its laterite mining operations in Cuba and its refining capabilities in Fort Saskatchewan, Canada.

Jowdat Whaeed, president and CEO of Sherritt International, explained the underlying principles that have been driving the company forward. "Our company has been based upon using innovative technology to be able to take something which otherwise would not have had value and convert that into a world-scale resource." Sherritt began looking for opportunities in the North American energy market to apply that philosophy. "We then started wondering: 'How do we participate in [the power] industry?' We looked around and we found that the better and cheaper way to participate was by acquiring as much as we could of the resource going into the most competitive power production in North America. That was coal."

A few years after entering the coal business via the acquisition of first Luscar's, then Fording's thermal coal assets, Sherritt sees two main directions for the future. As Waheed explained, "one part is really just supplying utility coal to the power industry, which is more often than not an 'annuity' kind of business. For the bulk of the coal assets, both above ground and underground as well as coal-bed methane associated with it, we are working intensively to deploy them as energy in the form of syn-gas." The idea is to leverage Alberta's unique position, which Waheed calls a "powerful symbiotic arrangement." In short, the state possesses virtually unlimited cheap energy locked up in the form of coal and vast reserves of upgradeable oil in the form of oil sands. The upgrading process is highly energy intensive and this is where Sherritt intends to apply its technology-driven philosophy. Waheed said "Sherritt expects to arrive at a decision in the next 6 to 9 months to seek a large commercial-scale *in situ* gasification operation based upon coal exclusively. That kind of an operation can fundamentally alter the energy complex in Alberta and our company expects to be at the forefront of it."

Despite the dominance of these two players in the coal industry in Canada, new players are emerging, and smaller ones are jostling for a position. The global landscape presently offers good incentive to do so. International supply and demand forces have provoked a massive 45.9% growth in the value of coal pro-

duced in 2005 in spite of a 1% drop in volume compared to 2004. In 2004, Canadian coal production was at a total of 66 million mt, of which 26 million mt were exported. Of those exports, 92.3% was coking coal for the steel industry for which international contract prices ranged between $120 to $125/t.

Emerging PCI (pulverized coal injection) and coking coal producer Pine Valley Mining has been knocking at the industry's door with a feasible deposit since 1998. They finally came on stream in 2004, just as the price resurgence allowed them to secure the necessary financing to build their Willow Creek mine. The former president and CEO, Graham Mackenzie, explained that this first step will soon be followed by an aggressive expansion scheme. "The original permit allows us to mine and sell 900,000 mt/y. In order to realize the economies of scale needed for a modern mine, we are looking to expand that to 2.2 million mt/y." In parallel, Pine Valley is also looking to quickly ramp up some of their satellite deposits to reach a higher output volume. Their most urgent focus, however, is to better utilize their metallurgical coal assets, away from the less valuable PCI coal.

With a similar strategy of presenting an alternative source of quality metallurgical coal from Canada, Hillsborough Resources has recently taken steps to consolidate several northeastern BC properties. Hillsborough's origins were in contracting, though they began mining when they sought to revive operations at the historical Quinsam underground thermal coal mine on Vancouver Island. With this facility supplying thermal coal to the local cement industry, Hillsborough now looks to the future with two projects. The forementioned first project contemplates merging the northeastern BC coal basin assets of Hillsborough, Northern Energy and Mining Inc. (NEMI) and Anglo Coal Canada, a subsidiary of London-based Anglo American plc, into one metallurgical coal company with the power to carve itself a place in the global market.

David Slater, president and CEO of Hillsborough, had the following comment. "[EVCC] controls 20% of the metallurgical coal market worldwide and in Canada, they represent about 95% of the production but that is all going to change." Turning this consolidation into mining operations will require heavy capital resources and this is partly why Hillsborough sought a 'big brother' with the necessary financial means, and are thus working alongside Anglo American.

The second project consists of transforming thermal coal from its Wapiti property (not far from the Tumbler Ridge area where the metallurgical assets lay) into energy on site. Though the process has nothing in common with gasification, the idea is similar to that of Sherritt's in Alberta, whose aim is to extract the most value possible out of thermal coal. A deal has been struck with BC Hydro for the supply of power. If everything goes according to plan, the mine and the power facility will be in operation by 2010.

All of these developments point toward a dynamic playing field in the Canadian coal sector. Due to the sustainable international demand for metallurgical coal, experts believe that prices will remain high, making financial markets much more receptive to new coal initiatives. Look for more attempts to break into the two-player landscape of Canadian coal in the future, be it through new mines or through innovative energy developments.

# Iron Ore: A New Iron Age

*Canada's three pure producers—IOC, QCM and Wabush—are focused on ramping up activities on the expansion, development and exploration front*

Officially, iron ore has been mined for and smelted since 1737 along the St. Lawrence River. In the first two decades of the 19th century, furnaces fed on local ore were more formally established near Niagara Falls, marking the birth of a steel industry that is concentrated to this day around Hamilton, on the northern shores of Lake Ontario.

The industry is heavily concentrated; only three companies—Iron Ore Co. of Canada (IOC), Québec Cartier Mining Co. (QCM) and Wabush Mines—produce iron ore in Canada. Together they account for 90% of production with the rest from by-products of base metal mines. On a world ranking, iron ore does not give Canada the same preeminence as other minerals. The country only ranks ninth in terms of production and fifth in exports. Over the last two years, global prices have risen to historical levels. As a result, the value of production reached $1.5 billion in 2005 (a 13.5% increase over 2004) and offset the small decline in output volume (28.3 million mt or a -0.9% change). The value of iron ore exports shot up by 71.2% in 2005. Unsurprisingly, the industry is now focused on ramping up activities on the expansion, development and exploration front.

IOC is the largest producer of the three. Rio Tinto became its main shareholder six years ago and today it owns 58.72% of the shares and Mitsubishi Corp., the second largest shareholder, controls 26.18%. Its Carol Project facility in Labrador includes a mine with 1.4 billion mt of known reserves, a concentrator with capacity of 17 million mt/y and a pellet plant capable of transforming iron concentrate into 13 million mt/y of pellets. To maintain leadership and grow beyond its current capacity, IOC is investing in two areas: It will overhaul its rail transport capacity along the 418-km railway between the mine and its deep water port of Sept-Îles, Québec. At the same location as the port, IOC will modernize an existing pellet plant to give itself a further 4 to 4.5 million mt/y capacity, thereby maximizing value-addition.

The growth mode which Canadian iron ore companies are currently enjoying represents a real shift. Not long ago they were closer to survival mode. Guy Dufresne, president and CEO of QCM, gave a measure of the turnaround that they have experienced. "When I came here in 1992, the company had very high debt, no pellet plant, we were in deficit and the mine plan was supposed to end in 2000. Now, we have no debt, we have bought a pellet plant and we have a mine plan up until 2026 with some reserves to go beyond that."

The boom cycle certainly helped but it only came about recently and has not shaken off a propensity to be careful. Dufresne explained that his company has a natural disadvantage because of the low iron grade of its ore. Compared with ores found in Brazil or Australia with iron content ranging between 60% and 65%, QCM's ore is about 30% which "condemned us to excellence." Wherever it can, QCM

seeks efficiency. Dufresne claims to have the most efficient pellet plant in the world, stating that "our design capacity is 6 million tons and we are achieving 9.5 million tons without additional capital expenditures." In equipment management, at mining and transport operations, similar efficiencies are sought as competitiveness is even more of the essence due to the fact that much of Canada's iron production is exported.

Elsewhere, exploration companies are frantically trying to take advantage of this rare window of opportunity to bring projects forward. At the far northern reaches of the arctic, Baffinland Iron Mines is attempting to develop Canada's highest-grade deposit. The world-class reserves are well-known and, at 68% iron content, they are nearly pure hematite. Nobody has been able to develop them due to major logistical complications that drive the capital expenditures required for such a venture to astronomical figures. Baffinland has embarked on a mission to create a conglomerate of strategic partners capable of surmounting these challenges—that would include, among other things, bringing ice-breaking ship companies into the calculation to solve the transportation equation. The road ahead is still long, however, and it seems a big bite to take for such a small company.

Consolidated Thompson-Lundmark Gold Mines (CLM) is closer to achieving its goal of creating a mine a mere 10 km away from QCM's Mont-Wright mine. They have recently concluded a feasibility study and are now working in fast-track development mode to bring their Bloom Lake deposit into production by the end of 2008. CLM's development is interesting, explains its president Richard Quesnel: "We are one of the very few operators in iron ore to follow the old cliché of developing a property from the ground up." He says that as a "junior company, poised to become a mid-tier that is not integrated vertically and that trades publicly," CLM is a bit of an oddity. Indeed, both Wabush and QCM are owned by steel players and IOC by an iron mining giant. CLM's mine contains roughly 640 million mt of indicated reserves at 30% iron grade and expects to produce 5 million mt/y of concentrate.

How much more activity this price cycle will bring remains to be seen. Should it be sustained, others may be tempted to emerge as new entrants in a picture which veterans have dominated for such a long time.

# Diamonds: A New Facet of Canadian Mining

The Misery open pit at BHP Billiton Diamonds'Ekati diamond mine in the NWT.

In 1998, BHP brought Ekati, Canada's first diamond mine, into production. In early 2003, Rio Tinto followed with the Diavik mine, a 60:40 unincorporated joint venture with Aber Diamond Corp. Their combined output may represent as much as 9% of world supply by volume. Canada has already risen in the rankings to become the world's third largest diamond producer behind Russia. On July 1, 2006, Tahera Diamond brought its Jericho discovery into production and De Beers will bring two more mines on stream within the next two years. Their newly appointed CEO, Jim Gowans, believes that Canada "will be a major player in the diamond mining world for a long time to come," adding that it is "definitely one of the growth vehicles for our company." It is significant, of course, to hear this comment from De Beers. As opposed to the other mining companies involved earlier, who are multi-mineral giants, the South African company is solely focused on diamonds and has its finger on the pulse (some would say that it is the heart) of the industry worldwide.

Gowans admitted that "it was bit of a psychological blow not to have the first diamond mine out of Canada," especially when one considers the fact that De Beers has spent about $1.3 billion so far, without a return. The returns, however, are now on the horizon. Construction has commenced both at Snap Lake and at Victor, which should start producing in the fall of 2007 and the fall of 2008, respectively. Both of these will make a significant impact on De Beers' output—about 15% of worldwide production for the company will come from these two mines—and on Canada's ranking as a diamond producer. After that, a whole pipeline of discoveries follows, the most significant of which are in the Ghacho Kué and Fort-à-la-Corne properties.

These results really hammer in the perception that Canada is the new emerging diamond player. Dozens of exploration companies (more than 70 of them based in Vancouver alone) that are active in several provinces and territories are trying to play a part. In 2004, exploration expenditures by diamond companies alone reached $260 million, emphasizing the costly logistical difficulties of finding an economic diamond-bearing kimberlite above the Arctic Circle. Tahera's mine is significant in encouraging smaller players as Peter Gillin, chairman and CEO, explained. Because the "Jericho kimberlite is comparatively small it was below the threshold of De Beers, Rio Tinto or BHP's standards." It has followed its own path from exploration to production and now has an operating mine to warrant its efforts thereby proving that entrepreneurialism pays even in the most inhospitable environments. Tahera struck a deal with De Beers at the Muscox kimberlite adjacent to Jericho that might beef up its operations further. Gowans explained that the initial discovery had been made by De Beers but not estab-


Photo courtesy of: Nuna Group of Companies

The A-154 Dike at the Diavik mine, owned by Rio Tinto and Aber Diamond Corp.

lished as a priority for development. An agreement was therefore struck to farm it out, which he said "was a combination that really worked for both of us as for Tahera it could mean doubling their resources."

Even though they are the most numerous, not all exploration is carried out by small venture companies. Eira Thomas, CEO of Stornoway Diamonds and credited with finding the Diavik deposit, is often referred to by her peers as the diamond lady. A recent move by her company to acquire both Ashton Mining and Contact Diamond was labeled an attempt to establish a mid-tier player that would not need to necessarily follow the traditional path of giving up discoveries to the big boys or to follow a Tahera-like path of concentrating initially on small deposits. As the race heats up for new discoveries, positioning is indeed going to be crucial.

Diamonds may act as the crucial catalyst to opening up a whole new frontier in the Canadian arctic. Over its 40 years of exploration in the North, De Beers has gathered a massive database of primary geological information that will have multiplying effects on the development of the whole region. Gary Nash hammered in the point: "The Canadian North is still basically untapped. Diamonds are just the tip of an iceberg. We have a number of other deposits that have not been exploited yet, sometimes due to economics, sometimes because of concerns over the environment, climate or shipping issues."

Mervyn Hempenstall is president and CEO of the Nuna Group, a service company with highly specialized arctic capabilities. He believes that it was a gold mine that opened the door to the North. "Echo Bay's Lupin mine was instrumental in opening up the areas north of Yellowknife and the development of the diamond mines because the ice road that was built [to the site] became an important supply line and made diamond exploration less expensive in that area." By the same token, with logistics greatly improved and more geological information to bear, the diamond mines may now open the door to a whole new untapped potential for base metals, gold, silver, uranium and other minerals in that same region.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For more information regarding the Canadian mining industry, Global Business Reports recommends consulting the following websites:

*www.nrcan.gc.ca/mms*
*www.mining.ca*
*www.pdac.ca*
*www.camese.org*
*www.tsx.com*
*www.cim.org*
*www.infomine.com/countries/canada.asp*