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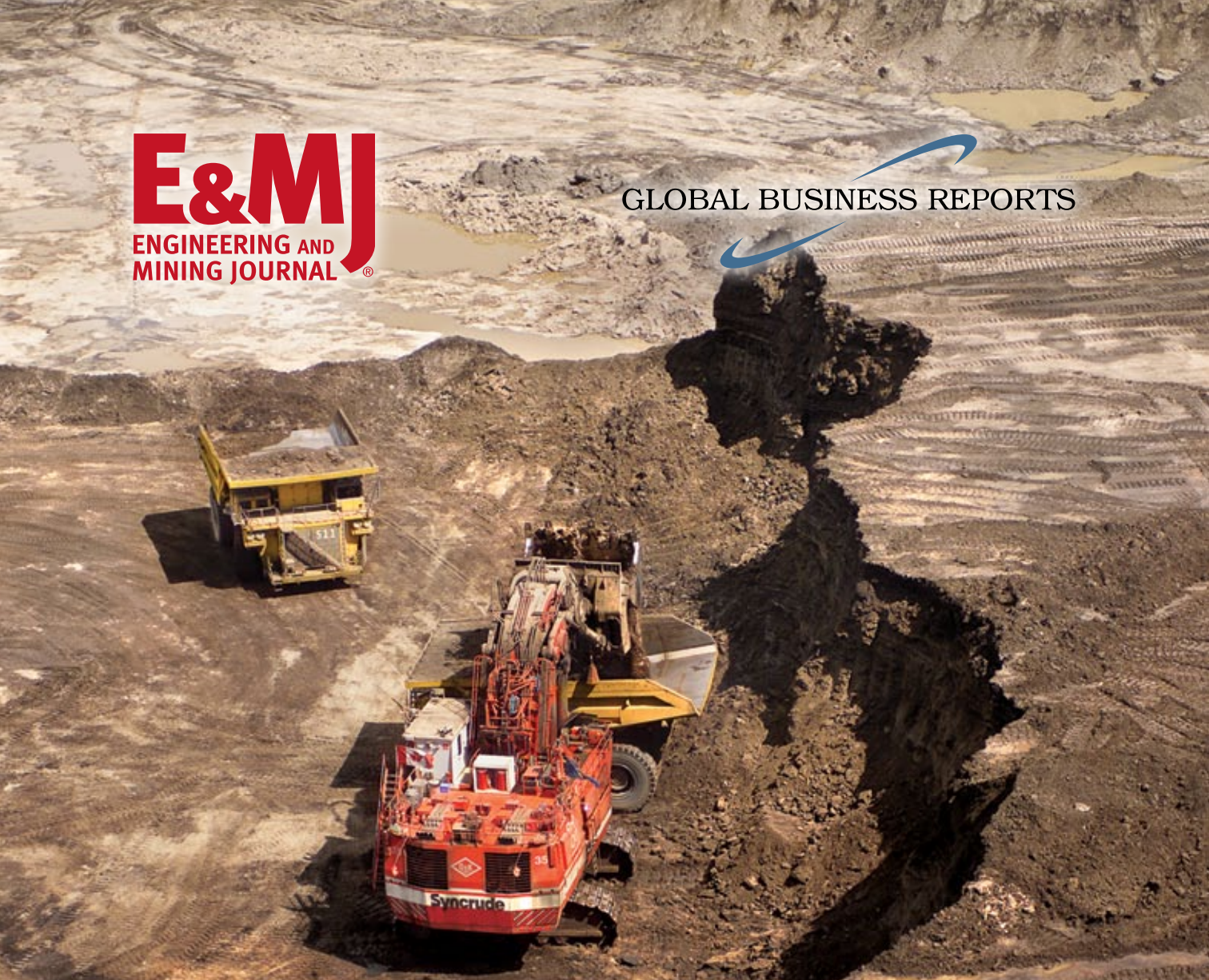
GLOBAL BUSINESS REPORTS



Mining in Alberta

The Potential of the Wild Rose

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A REPORT BY GBR FOR E&MJ

APRIL 2012

Alberta: an Overview

From furs to oil, the development of the New West

Between the 18th and the 19th centuries, the economy of the region we now know as Alberta depended almost solely on the tastes in headwear of wealthy European gentlemen. The region was the theater of a heated commercial rivalry between the Hudson Bay Co., the North West Co., and independent local fur traders. European headwear fashion of the time required men to own tall felt hats; Canadian beavers were heavily hunted in Alberta, together with many other species. When the first coal deposits were developed commercially, following the expansion of the railway towards Western Canada, Albertan wildlife must have felt relieved.

Coal was the focus of Alberta's mining operations for more than a century, from the 1860s until 1967, when Great Canadian Oil Sands Ltd opened the first oil sands mine. From that moment on, oil sands mining began playing an increasingly pivotal role in Albertan industry. Taxi drivers in Calgary and Edmonton claim that Alberta could be the biggest oil producer in the world; a somewhat more conservative picture sees Alberta's deposits as the third largest in the world, after Saudi Arabia and Venezuela. A substantial part of these resources are in the form of oil sands deposits, 20% of which, according to figures published by the Ministry of Energy of Alberta, are mineable.

The fact that oil sands, according to the Canadian Association of Petroleum Producers (CAPP), account for 170 billion of Canada's 175 billion barrels of oil reserves could alone explain why Alberta has been so focused on this particular sector over the past decades.

If one also considers the increasing global demand for oil and the royalties the industry brings to the provincial coffers, it becomes even easier to understand why the mining of oil sands continues to dominate the Albertan mining industry.

However mining in Alberta is not limited to oil sands. Coal still plays an important role, with giants such as Teck Coal Ltd and Sherritt International Corp. actively involved in the province, and an increasing number of Asian players are looking at Alberta's coal resources. Albertan coal is mainly thermal, but there are nonetheless interesting projects based on metallurgical coal.

The risk in Alberta is that the two established industries of oil sands and coal might overshadow the province's small but exciting hard-rock mining sector. "Alberta is a great place to be, with huge potential for a number of minerals," said Brian Testo, President and CEO of Grizzly Discoveries Inc., an Edmonton-based junior focused on potash and diamonds.

This perception is shared by Brad Anderson, executive director of the Alberta Chamber of Resources. "Alberta has the resource potential for junior companies, the government is open to dialogue and juniors know they will encounter political stability in the province when it comes to developing or exploring for resources," said Anderson.

Potash, iron ore, industrial minerals, diamonds, lithium, and uranium hold particular potential in Alberta. A number of junior companies and an expanding service sector, primarily clustered around Edmonton, are working their way towards the development of these resources. Albeit less profitable than the oil sands, mineral mining in Alberta is driven by the passion of a solid group of people who firmly believe in the province's mineral potential and seize every opportunity to promote it. The pioneering projects of companies such as Grizzly Discoveries, Channel Resources Ltd, Pacific Potash Corp., Lithium Exploration Group Inc. and DNI Metals Inc. are opening the way for Albertan mineral mining to emerge in an otherwise oil-focused jurisdiction.

Legislature Building, Edmonton, Alberta. (Photo courtesy of the Government of Alberta).

The energy divide

There is no doubt that the Albertan mining industry contains a divide, with oil sands (and, to a lesser extent, coal) on one side and hard-rock mining on the other. Although open-pit oil sands operations use a similar extraction process to any other open-pit operation, it is extremely rare for an oil sands-focused company to branch out into other minerals in the same way that, say, a gold producer may pick up a rare earth project. It is similarly unusual for a hard-rock mining company to delve into oil sands.

This divide can be attributed to several factors. Most importantly, perhaps, is the geological make up of the different deposits. Oil sands occur in sedimentary formations. Several such formations exist in Alberta, the largest (in terms of deposits) being the McMurray Formation: a Cretaceous-period layer of shale, sandstone and bitumen. Hard-rock deposits, in contrast, primarily occur in igneous or metamorphic formations.

These separate areas of focus provide a compelling reason for the lack of overlap, yet by no means the only one. Pierre Gratton, President and CEO of the Mining Association of Canada, believes that some hard-rock miners may disassociate themselves from oil sands for a far more subjective reason. "Oil sands operators are miners. Everything about it is mining. Where some might disagree probably lies in mining culture, where hard-rock mining and exploration is seen as riskier and therefore the top of the hierarchy," said Gratton.

With the Albertan oil sands due to attract almost half of the total investment directed at the Canadian mining sector over the next five to 10 years, however, an excess of romanticism on the part of certain hard-rock purists will not diminish the undeniable importance of oil sands for the industry.

The Regulatory Framework

Alberta — one of the most favorable mining destinations around the globe

In the 2011/2012 Fraser Institute's Annual Survey of Mining Companies Alberta was ranked as one of the world's most attractive jurisdiction for mineral exploration and development. Rather than an acknowledgment of the province's developing mineral industry, the survey indicates praise of Alberta's attractive regulatory framework and taxation system.

The province offers a 10% personal income tax, a 10% corporate tax, no sales tax, and no capital tax. Oil sands royalty rates are linked to the fluctuation of the Western Texas Intermediate (WTI) price per barrel, ranging from a minimum of 1% to a maximum of 9% on gross revenue, and from a minimum of 25% to a maximum of 40% on net revenue. Coal royalty rates vary according to the type of product extracted, with a fixed C$0.55/mt rate for sub-bituminous coal, and two rates for bituminous coal: 1% of mine mouth revenue before mine payout, and the same 1%, but with an additional 13% net revenue, after mine payout.

While an ad hoc royalty scheme is being developed to cover those mining projects that are not yet in the production stage, the conditions in which junior companies operate are considered ideal. "An important advantage for small miners is the all map-staking systems offered by the province; much easier and quicker to use than the traditional staking, used in other provinces… For instance, Ironstone picked up eight townships of land in Alberta, amounting to roughly 75,000 hectares for application fees of just C$5,000, whereas in Ontario an investment of C$40,000 is needed just to stake our much smaller property," said Barry Caplan, President and CEO of Ironstone Resources Ltd, a junior company working on promising iron ore and vanadium deposits in north-western Alberta.

Alex Walsh, CEO of Lithium Exploration Group, a company focused on lithium-rich brines, praised the province's stability. "Alberta offers an extremely stable environment for junior companies: unlike in other jurisdictions, in this province companies can invest with a certain degree of security, because the business processes are straightforward and the rules are clear," said Walsh.

Another significant advantage is Alberta's focus on sustainability and social responsibility. According to Les Sawatsky, principal director of engineering at the Calgary office of Golder Associates Inc., a global engineering and environmental consultancy, the strict but straightforward environmental regulations implemented by the provincial government represent an important advantage for the sustainable development of the mining industry. In this context, it is also fundamental to note the government's role in funding bodies such as Alberta Innovates – Energy and Environmental Solutions (AI-EES), whose mandate is to promote environment-related technological advances in the sector.

Minister's Comments

by Hon. Ted Morton, Minister of Energy, Alberta

Alberta's background in oil and gas is what makes it attractive to junior companies; in the first four decades juniors drove the development of the oil sands. Our government has always had a partnership approach towards industries that, despite not playing such a pivotal role for the Albertan economy as the oil sands do, share our goals of wealth creation and job creation. This approach is reflected in a number of policies that facilitate the their job.

Our regulatory regime, although not as good as I would like it to be, if compared to other regimes is much more time-efficient and straightforward; we are constantly investing in infrastructure, making the job of junior companies much easier… Furthermore, as a province focused on the energy sector, we are very familiar with and welcoming towards foreign investment. There never has been enough capital to fund the development of the amount of resources we have in Western Canada, and in Alberta in particular. This dynamic represents an added value for those companies that want to come and invest in Alberta's resources. Right now, we have a set of priorities, from market diversification to power transmission issues, which have been our main focus during these first months. We are also looking at other issues more directly linked to mining, such as a potential re-shaping of the Alberta Geological Survey; I believe that later on this year we will be able to look into these and to assess what needs to be done.

Discordant voices

Not everyone in Alberta is entirely satisfied with what the provincial government is doing to foster the development of the mining sector. Some of the most authoritative voices in the mineral mining industry lament that, despite its excellent regulatory process, Alberta is still strongly biased in favor of the oil sands industry to the detriment of hard-rock mining. "Alberta has been left behind in many respects, for example in the lack of a provincial tax incentive program. Therefore, exploration companies that need a substantial initial investment to get their projects started have been finding it difficult to operate here, despite our excellent tax and royalty regimes... Another issue is the lack of governmental investment in geosciences; a technical and scientific support vital for exploration companies," said Michael Dufresne, principal and consultant at Apex Geoscience Ltd, an Edmonton-based geological consultancy.

The issue of government-funded geosciences is deeply felt in the industry. The story of the Alberta Geological Survey is revealing; the survey used to be an example of excellence in the field of geological mapping, producing cutting-edge reports on the province's lesser-known mineral wealth. At present, its resources have been almost completely re-focused on the energy sector, with the Coal and Mineral Development branch of the Ministry of Energy undergoing an important series of changes to fill the gap.

Alberta arguably retains an oil-centric mentality, in spite of its efforts to present itself as a mining jurisdiction. Jody Dahrouge, President of the Edmonton-based consultancy Dahrouge Geological Consulting Ltd, also remains very critical of the current Albertan situation, especially with regard to the province's environmental regulations. "Without the energy sector, this province would not be scoring that high in the Fraser Institute ranking... The Land-Use Framework is resulting in many properties with mineral potential being set for expropriation, especially in the Athabasca Basin region. This was probably implemented as a response to the increasing media attention around the environmental impact of oil sands; nonetheless, it does not solve the problem, since the lands being expropriated have virtually no oil sands potential... One of the causes of this situation might be that Alberta does not want the uranium industry to develop within its borders, or, more generally, the message conveyed may be that metallic mineral mining is not welcome in this province," said Dahrouge.

Jody Dahrouge, President, Dahrouge Geological Consulting Ltd.

Walsh is similarly disillusioned about the sector. "There has been little interest on the government's part to invest massively on promoting the mining industry, because the oil and gas industry provided Alberta with all the economic wealth and stability it needed," he said.

Alberta is undou btedly a favorable environment for investment, but the impression is that there is still important work to do when it comes to mining outside of oil sands and coal. Yet the enthusiasm of junior companies and the mineral resources of the province suggest that in the future the Wild Rose will bloom to its full potential.

The Elephant in the Room

Albertan oil sands: Mining for oil

At the Suncor oil sands mine, huge 240 to 380 tonne trucks deliver about 500,000 tonnes of oil sand per day to the ore preparation plants. (Photo courtesy of Suncor Energy Ltd).

Nearly 80% of the oil sands resources in Alberta, according to figures published by the Ministry of Energy, are buried deep underground and only recoverable through in-situ methods, but the remaining 20% is located within 75 m of the surface and is accessible via traditional open-pit mining.

At the time of the first commercial development of an oil sands mine (in 1967 by the company now known as Suncor Energy Inc.), the province was so focused on conventional oil production that the idea of mining for oil seemed a hazardous bet. This attitude is recalled by Adrienne Nickerson, director of operations for Canadian Oil Sands Ltd, the primary shareholder (36.74% interest) of Syncrude Canada Ltd, who explains how the oil sands industry "developed decades ago when everybody thought it was something closer to fiction than to reality".

Today, oil sands mining is definitely a reality. According to Martyn Griggs, manager for oil sands at CAPP, around 850,000 barrels of oil are mined every day, which makes for roughly 50% of the total Canadian oil sands production. The vast majority of operations are controlled by six companies: Suncor Energy, Imperial Oil Ltd, Shell Canada Ltd, Total E&P Canada Ltd, Canadian Natural Resources Ltd, and Syncrude (itself controlled by a consortium of companies, namely Canadian Oil Sands, Suncor, Imperial Oil, Sinopec Ltd, Nexen Inc., Nippon Oil Corp., and Murphy Oil Corp.).

Despite many of these companies' operations already being well established, there are new projects on the rise. The Kearl mine, for example, owned by Imperial Oil, will be one of Canada's largest open-pit mines.

"We are expecting an initial production of 110,000 barrels per day (bpd), and when full production is reached by 2020, we are expecting a rate of 345,000 bpd, which is also the mine's license capacity. Kearl can count on resources amounting to 4.6 billion barrels, and an expected life of 40 to 50 years," said Pius Rolheiser, senior public affairs advisor for Imperial Oil. As a side effect, new operations in oil sands mining will represent an important opportunity for local mining contractors such as KMC Mining Corp., Graham Group Ltd and North American Construction Group Inc., that play an essential role in laying the groundwork for producers to operate. Contractors are involved in operations ranging from the removal of overburden, through to the stock-piling and replacement of reclamation material.

Progress in the sector is also good news for industrial material suppliers such as Hammerstone Corp., as Terry Owen, President and CEO of Hammerstone, explained: "the demand for aggregates coming from the oil sands industry is extremely high and is going to continue to increase even more over the next decade."

The race for technological primacy

Since the mineable resources are both finite and already largely allotted, competition among companies exists more in technological advances than leases and production.

Jim Kresta, area team leader of research programs at Syncrude, explains how technological developments in oil sands mining are essential for a more efficient and sustainable process. "Syncrude has a C$60 million research and development budget and more than 50% is devoted to environmental research covering reclamation, tailings, and treating water for re-use within our process... Currently, water capping of fluid fine tailings is a technology of prime importance to us and the industry... Syncrude is also carrying out research on better ways of separating the oil from the sand in order to achieve a higher recovery rate and a higher efficiency," said Kresta.

A geologist logs core at a copper-gold prospect in the Rocky Mountains. (Photo courtesy of Apex Geoscience Ltd).

In spite of the tough competition, companies have realized that a concerted approach produces better results in the long run. There are a number of consortia, such as the Oil Sands Leadership Initiative (OSLI) and the Canadian Oil Sands Network for Research and Development (CONRAD), which allow oil sands companies to share ideas. The government plays a considerable role in this common effort, promoting technological advances in the industry through agencies such as the AI-EES. "The basic idea is that if companies want to be competitive, they need new technology... . The real challenge for the next 20 to 30 years will be to make products competitive from an environmental perspective," said Dr. Eddy Isaacs, CEO of AI-EES.

Something on which all the players in the industry concur is that it is impossible to separate technological development from economic efficiency and environmental sustainability.

Coal

The revival of an industry

CN handles primarily metallurgical coal, used for steel production offshore, primarily in Japan, as well for utilities in North America and abroad. Windy Point, Alberta. (Photo Courtesy of CN).

Coal was the first commodity to be mined in Alberta and today the province's reserves, amounting to 37 billion mt, account for 70% of Canada's total coal reserves. Coal is the second most important industry in the province, after the oil sands, but the gap between the two is yawning, as the analysis of provincial revenues demonstrates: in 2011, the government collected almost C$28 million in coal-originated royalties, a number that fades in front of the C$3.7 billion resulting from oil sands projects for the fiscal year 2010/2011.

Despite this discrepancy, the Albertan coal industry is very active. Global players have important assets in the province: Teck Coal owns and operates the Luscar and Cheviot metallurgical coal mines, composed of the Cardinal River operation, while Sherritt International, the largest thermal coal producer in Canada, operates six active mines.

Smaller players have also thrived in the Albertan coal scene. Grande Cache Coal Corp., for instance, a Calgary-based coking coal

Grande Cache Coal's plantsite. (Photo courtesy of Grande Cache Coal Corp).

producer recently acquired by a consortium composed of Japanese company Marubeni Corp. and Hong Kong-based company Winsway Coking Coal Holding Ltd, has a yearly production of 3.5 million mt and controls 100 billion mt of reserves. A particularly interesting story in the provincial coal industry is that of Coalspur Mines Ltd. The company's Vista properties, located near Hinton, were explored and abandoned in the 1980s when the price of coal plummeted. Coalspur is now developing these properties, and plans to reach a peak yearly production of 11 million mt of export thermal coal. By then, the company's Vista properties will be the largest export thermal coal mines in North America, an ambition Coalspur is already facilitating by securing its passage to the Pacific and to Asian markets through a deal with Canadian National Railway and the purchase of port capacity on the western coast. "Coalspur Mines is looking especially at the Asian Pacific market; the need of coal of those countries is increasing, and we want to provide them with high-quality thermal coal," said Dermot Lane, Coalspur's vice president for development.

The coal rollercoaster goes up again

In the Albertan mining sector, a few notions are widely agreed upon; one of them is the future growth of the coal industry. This growth will be largely fuelled by a combination of internal and external factors.

Internally, coal is the key commodity needed to fuel the sustained demand for energy in the Albertan and Canadian markets. In Alberta alone, according to the provincial government, coal-fired plants generate 45% of consumed energy.

Externally, developing economies, in particular Brazil and China, are increasingly looking towards Alberta's resources to accommodate their mounting demand for coal.

The need for coal-generated energy has helped diversify the coal sector: energy providers such as TransAlta Corp. and Maxim Power Corp. own coal mines that fuel their plants, and other companies are developing new resources thanks to innovative approaches.

Swan Hills Synfuels LP, for instance, applies in-situ coal gasification technology to its coal deposits which are too deep to be mined via traditional methods, converting the resource into syngas.

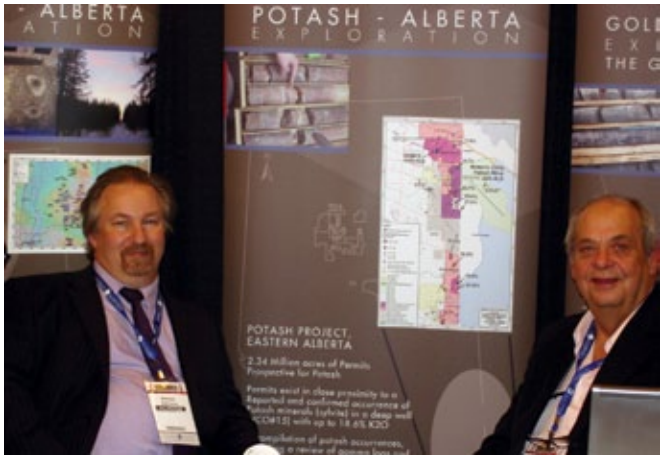
Alberta's mineral wealth

Potential and passion

Aerial photo of Ironstone Resources' winter 2011 drilling camp. (Photo courtesy of Ironstone Resources).

When compared to other Canadian jurisdictions, Alberta's mineral resources do not seem particularly extensive. Yet the province has strong potential for uranium, potash, lithium, diamonds and magnetite. Industrial minerals, such as aggregate, limestone and frac sands are already an important reality in Alberta, driven by their use in the oil sands industry. While Alberta has not yet fully developed its mineral potential, this does not mean that the sector is immobile. On the contrary, the industry is alive, with a handful of juniors passionately exploring Alberta's underground.

Ironstone Resources' Barry Caplan has set clear objectives for his company. "Our current NI 43-101, incorporating 2008 and 2011 drilling, reports a compliant resource of 557 million mt of iron (33%) and vanadium (0.20%) as indicated, and 87 million mt of iron as inferred. We will be returning



Mike Dufresne, principal & consultant, Apex Geoscience Ltd. and Brian Testo, President & CEO, Grizzly Discoveries Inc.


The Susan Lake Gravel Pit, the largest open-pit gravel operation in Canada, is one of the pits operated by Athabasca Minerals Inc. (Photo courtesy of Athabasca Minerals Inc).

this winter to drill another 30 holes in Clear Hills, hoping to add another 100 million mt. Ironstone Resources' goal is to bring our compliant resource up to 1 billion mt of iron and vanadium," said Caplan.

An innovative approach and a clear vision are key to survival in the Albertan mineral industry. Brian Testo "Griz" of Grizzly Discoveries gave a number of reasons for his company's staunch commitment to his native Alberta. "Independently conducted studies prove that potash is actually present in Alberta, especially in areas close to the Saskatchewan border. We came to the conclusion that there are at least half a dozen wells in Alberta that might produce economically valid potash ranging between 15% and 25% K_2O, grades similar to those of the deposits in Saskatchewan," said Testo.

Lithium Exploration Group and Channel Resources are two juniors focused on lithium-rich brines. This industry could be made particularly cost effective by setting up partnership schemes with oil companies that use in-situ techniques, as Alex Walsh, of Lithium Exploration Group, explained: "The oil and gas sector is extremely receptive to companies such as the Lithium Exploration Group, that attempt to extract valuable minerals from the same water they have to dispose of. This leads to the assumption that Lithium Exploration Group might never have to drill a single well to extract its resources".

The buzzword in the Albertan mineral sector is diversification. Knowing they can count only on their own resources to sustain themselves, the path chosen by many juniors is to dilute risk over multiple projects and commodities. "Our projects are diversified and well-conducted, which minimizes the risk for investors, since there is always a second option in case the first one does not turn out to be successful," said Testo, describing Grizzly Discoveries' strategy.

Ironstone Resources is looking at gold potential in addition to its core focus on iron ore and vanadium, and Channel Resources is working on lithium, borates, and potash. DNI Metals' project in Alberta is intrinsically diversified: the company is working on a rather unique deposit of polymetallic black shales containing 22 different elements including molybdenum, nickel, uranium, specialty metals and rare earth elements.

Uranium is a commodity that lingers in the Albertan mining panorama without ever materializing completely. The Athabasca basin encroaches into Alberta from Saskatchewan, and companies such as CanAlaska Uranium Ltd are exploring the area. However, reserves are less extensive than in the neighboring province and Edmonton seems to be less friendly towards this resource than Regina. This combination thwarts the efforts of companies investing in the area and is a source of frustration for geologists such as Jody Dahrouge, of Dahrouge Geological Consulting, a passionate advocate of the development of the uranium industry in the province.

Cinderella Minerals: the overlooked role of essential industrial minerals

Industrial minerals are indeed the Cinderella of the mining world: not as precious as gold or diamonds, yet of key importance and, unlike other commodities, demand for them rarely drops. In Alberta, in particular, industrial minerals are heavily used in the oil sands industry. Companies such as Heemskirk Canada Ltd provide the industry with the aggregates used in a number of processes, but the main use of aggregates is in oil sands mining. The trucks used in these kind of operations can move as much as 400 mt of material and can weigh more than 600 mt when loaded, requiring stable mine roads. Hammerstone, an Albertan company in the industrial mineral business, focuses precisely on the construction of heavy haul mine roads, offering crushed limestone originally extracted from reserves in excess of 750 million mt. The importance of aggregate materials in the construction of haul roads should not be underestimated: a well-built road "translates into significantly reduced vehicular rolling resistance which is turn translates into lower road maintenance, improved truck productivity, reduced truck frame stress, tire wear and maintenance, lower fuel consumption and lower emissions," said Terry Owen, President and CEO of Hammerstone.

Athabasca Minerals Inc. is a company whose core business is the management and development of gravel pits, with an average of 7.5 million mt of material moved per year. The company has brought the diversification mantra to a new level. "We diversified from the aggregate business and acquired large mineral permits throughout northern Alberta," said Shaun Parsons, vice president for exploration and development.

"We are currently developing a silica sand resource producing frac sand, a product with enormous market potential. Once this has been achieved, we will turn our attention to the development of our salt deposit, then we will make a decision regarding our next step," said Dom Kriangkum, President and CEO of Athabasca Minerals. The uniqueness of the company is further emphasized by Don Hruba, CFO. "It is somewhat unusual for a junior exploration company to generate cash flow from a related business division… Long-term, we aim to continue our involvement with public pit management, and to also provide private pit management services to companies with aggregate resource holdings. Significantly, we anticipate further business expansion from continuing to explore for, locate, develop, and then operate Athabasca-owned aggregate and other mineral resource properties," said Hruba.

Hammerstone Corporation's limestone quarry, located in the heart of the Athabasca oil sands, is the leading producer of 100% crushed limestone aggregates in the region. (Photo courtesy of Hammerstone Corp).

In a jurisdiction so heavily focused on energy, diversification seems to be the key for small companies to survive. Alberta has the potential, and its mining community the passion, for this industry to develop in the future, provided the province manages to shift some of its attention from the oil sector to hard-rock mining.

The service sector

A new service hub?

KMC Mining PC5500 loading overburden in to a Cat 793 at an oil sands site. (Photo courtesy of KMC Mining).

Traditionally, Alberta has never held the same depth of companies that more traditional mining hubs such as Toronto or Vancouver can provide. Yet the oil sands boom is changing that. Though Calgary still remains more energy focused, Edmonton increasingly offers a service sector that can turn its hand to hard-rock mining as well.

Global network, local expertise

For most of the companies with an office in Calgary, the oil sands industry is the market of choice. From engineering and construction to environmental consulting and tax advisory or legal practices, there is a wide range of services available to the industry. Fraser Rowe, general manager of Runge Mining (Canada) Ltd, an Australian company that couples traditional consulting services with software products and training courses, has a very clear view of the role Calgary should play. "This city could and should become a major hub for mining services: not only for the oil sands industry, but also for the coal sector in Alberta and British Columbia, for diamond operations in the Northwest Territories, and for the potash and uranium industries in Saskatchewan," said Rowe.

Brent Thompson, senior vice president of mining division at Wardrop, a Tetra Tech company.

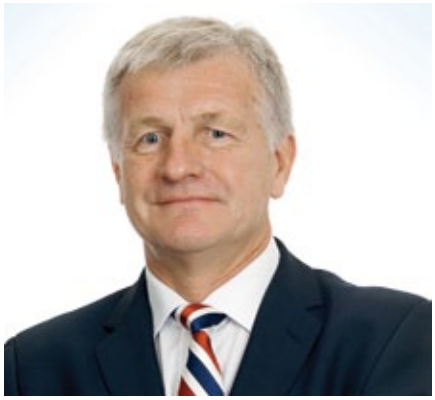
International firms are flocking to Calgary because they see the huge opportunities represented by the local resource sector. Many of them base their strategy on a blend of global presence and local expertise, in a way that can help address the local human resource shortage, while at the same time providing more effective solutions to their clients. This is the model advocated by companies such as PricewaterhouseCoopers LLP or Société Générale Canada when it comes to financial services, AMEC plc or Ausenco Ltd in the realm of EPCM, Golder Associates or Snowden Group when it comes to consulting, and SGS Canada Inc. in lab testing and verification. Companies of this kind usually build an experienced local team to maintain a relationship with their clients, but at the same time take advantage of their global networks of offices to address any kind of problem.

In a way, this is also what the Tetra Tech family of companies is doing. The group recently acquired Wardrop Engineering Inc., the Alberta-based EBA Engineering Consultants Ltd, and Fransen Engineering Ltd. Through these companies, Tetra Tech is now servicing the Albertan resources sector, combining its international network with their local expertise, and integrating their service offering. "Tetra Tech has more than 13,000 employees with a contingency of more than 600 employees in Alberta divided between Tetra Tech Wardrop, EBA Engineering Consultants, and Fransen Engineering. Together, we offer a diverse range of services: civil engineering, transportation planning, environmental services including environmental permitting, and oil sands services such as tailings management," said Brent Thompson, senior vice president of Tetra Tech Wardrop's mining division.

The alternative model is the one followed by local companies that base their appeal on long-term relationships with their clients and on a deep knowledge of the local industry. Norwest Corp., a Calgary-based company that offers technical and consulting services covering the whole span of mining projects, follows this pattern despite having offices in the US and China. Steve Cameron and Joe Aiello, respectively senior vice president and managing director at Norwest, explained how the company bases its appeal on the ability to establish long-term, strong relationships with clients, servicing them from the inception to the closure of their projects. Canadian law firms such as Gowling Lafleur Henderson LLP or Fraser Milner Casgrain LLP base their strength in their understanding of the local industry, and other smaller players such as Salman Partners Inc., a Canadian investment dealer focused on providing independent research, are proud of the relationships it has built and of its local and independent character.

An interesting explanation of the 'glocal' (global and local) model is presented by Zimi Meka, CEO of Ausenco: "19% of the global exploration spending takes place in Canada; 22% in Latin America, including Mexico, while Australia is at 12%, Africa at 9%, and Asia at 6%. Projects come from exploration… By diversifying geographically and entering those markets where important activity is being carried out, we managed to spread our risk," said Meka.

Given the focus placed on sustainability and environmental issues, it is hardly surprising that environmental consultancy services are some of the most requested in Alberta. Companies historically engaged in this side of the industry, such as Golder Associates, have a significant presence in the province, but also companies originally designed to work on different aspects ended up diversifying their offering to include environment-related services. Norwest is an example of this trend, having worked with Suncor on the first successful remediation



Peter Madden, President of oil sands, natural resources Americas, AMEC plc.

of a tailings pond. "Effective planning for mine closure begins during the very early stages of project development and continues through to the final days when the land is returned to its former use," said Aiello.

Also Tetra Tech, in Alberta, is increasingly placing its focus on environmental issues. "Tetra Tech is planning to expand its involvement in the oil sands tailings and water management sectors," said Brent Thompson of Wardrop, a Tetra Tech company.

Health and safety are other major concerns in the industry. Peter Madden, President for oil sands natural resources Americas at AMEC, emphasizes the relevance of safety for the international EPCM firm. "Why would a client give us a multi-billion dollar asset to look after, if we were not able to look after the most important asset of all, which is somebody's life? Safety is a behavior-based culture that has to be embedded and communicated from the management level, by establishing high standards and setting an example. This attention to safety is something that helps us meet the standards set by our clients, with whom we share the best practices that we implement," said Madden.

Also Dan Klemke, President of Edmonton-based KMC Mining, emphasized the importance of safety at the workplace. "Senior management should set the framework and the example, but this should also be followed through into the workplace with a responsible behavior by employees, so that the safety culture can run throughout the company," said Klemke, whose company works primarily with the oil sands industry as a mining contractor.

The service sector in Calgary is also trying to address the industry's perennial human resource shortage. Not only recruitment companies, but also global consultancies such as Deloitte are helping clients to find solutions to these issues. Chris Lee, partner, energy and resources industry leader for the firm, believes that "there will be an explosion of technology solutions to ease the labor problem" in the province.

"Another way of easing the human resource issue is by relying on our global network. Thanks to improved technology and communication systems, we often work on projects together with other offices around the world," said Madden of AMEC.

For major EPCM firms such as HATCH Ltd, their ability to implement an efficient work-share system among offices around the globe is not only a way to address the labor issue, but also becomes a competitive advantage. The other side of the coin is framed by Dan Klemke, of KMC Mining, who explains that in an international industry such as mining, even companies with strong local roots such as his own have to compete for skilled professionals on a global basis.

Most companies identify university recruitment and internal training as two of the most effective ways to attract and retain the best and brightest minds. "We support new graduates in choosing their career path with cross-sector training. We offer career-enhancement programs for professionals, specifically tailored to their technical background, and we invest a considerable amount of time and effort in leadership training," said Steve Cameron, of Norwest.

Fraser Rowe, general manager Canada, Runge Mining (Canada) Ltd.

Companies such as Runge and Micromine Ltd, both Australian companies with a strong presence in Western Canada, are providing the sector with much-needed software tools. Micromine focuses almost exclusively on this type of product, offering traditional consulting as an additional service in Europe and Asia. "We aim at covering the whole lifespan of mining operations: the Micromine and Geobank products are specifically aimed at exploration, mine planning, and development, while the Pitram software comes in at the production stage," said Colin Smith, regional manager, North America, at Micromine.

For Runge, software solutions represent a successful development of its original advisory core, today making up 50% of its business. The company also focuses on education and training, offering a wide range of courses, with an eye to non-miners. "Our most popular course is a small but highly entertaining course called Mining for Non-Miners. In this course we educate people who are new to or are approaching the industry for the first time and lack the understanding of the basics of mining.... One area we are getting significant traction with this course is with First Nations groups. First Nations groups in Canada want to get involved in mining, but probably do not have the right tools and knowledge to engage effectively with the industry," said Rowe, Runge (Canada)'s general manager. The 'glocal' mantra applies also to financial and law firms that work with the resources sector. "The strength of Fasken Martineau's business plan lies in our blend of local and global; we understand the local industry, and we have extensive expertise in the local industry, but at the same time we have an international projection. We opened a representative office in Beijing specifically with the aim to make contacts and identify inbound opportunities from China," said Greg Powers Q.C., partner in the Calgary office of Fasken Martineau DuMoulin LLP, a Canada-based law firm that deals with the mining industry through a global industry group.

The international dimension of the industry is particularly strong given the reach of Canadian mining companies. "Canada is a leading player in the global mining industry, and Canadian companies are leading the way in many jurisdictions around the world," explains Josh Lewis, partner in Fasken Martineau's Vancouver office.

Edmonton, where the geological things are

While Edmonton maintains its oil sands capability, it is also easy to find geologists working on hard-rock mining projects. Geological consultancies are particularly interesting: companies including Apex Geoscience, Dahrouge Geological Consulting, and Moose Mountain Technical Services provide advice to all the players working in the Albertan mining sector, and often throughout Canada and abroad.

Apex Geoscience works with Grizzly Discoveries, DNI Metals, and a number of other promising juniors. The company is planning to open an office in Lima, Peru, and works on projects in North America, Africa and Asia, and can count on experienced people such as Roy Eccles, author of a number of studies when he worked with the Alberta Geological Survey. Diversification is key to the company. "We are a multi-commodity consulting firm: a lot of our expertise is in gold and diamonds, but we have a great deal of experience in base metals, and in Alberta our work has focused on industrial minerals such as lithium, potash, vanadium, magnetite, iron, and gravel," said Michael Dufresne of Apex Geoscience.

Jody Dahrouge leads Dahrouge Geological Consulting, another Edmonton-based company that works in North America, Colombia, Eastern Africa, and China, offering software support as well as traditional consulting. In a sector based on professional enthusiasm, Dahrouge defends the role of consultants as honest advisors, even when bearers of bad news. "We are known for our honest approach; for example, when a project no longer warrants exploration we advise our clients when they should stop investing their money; whereas geologists, after investing time and energy on a project, often cling to it, perhaps retaining unrealistic expectations and hopes. We believe that it is better in the long term, for us and for the client, to recognize when it is time to move on," said Dahrouge.

Corporate Social Responsibility

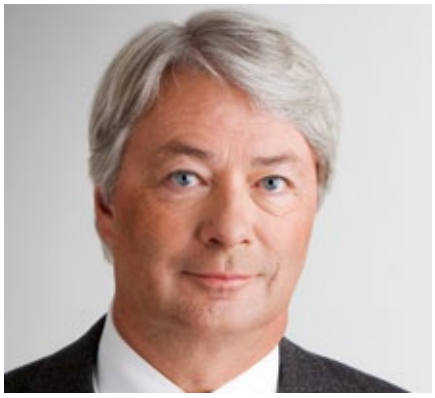
The clean side of a perceived dirty world

Bison grazing on reclaimed land. (Photo courtesy of Syncrude).

Corporate social responsibility is a game often played under contrasting perceptions. The Albertan oil sands industry is a prime object for attacks for its impact on the environment, both from within and without the provincial borders. The industry recognizes that environment-related technological improvements need to be pursued relentlessly. However, it is also embarking on a massive public relations campaign to showcase its achievements and debunk some of the myths about the impact of oil sands on the environment.

"What makes this industry sustainable is ultimately technology, and communicating the value and effect of complex technological processes to the general public is never easy… Imperial Oil and the industry in general, are working hard to try and correct some of the misinformation being circulated about the oil sands. There are quite a few notions about the industry that are as widely accepted as they are unfounded: for instance, although it is often heard that the oil sands impact an area the size of England or Florida, the total area currently impacted by oil sands operations is not even the size of Calgary," said Pius Rolheiser, senior public affairs advisor for Imperial Oil.

In the oil sands sector, there are a number of environmental issues: water usage, reclamation, emissions, and tailings management are the main concerns, and companies are studying and developing innovative solutions to tackle them. Water is processed in a number of ways to be re-



Greg Powers Q.C., partner in the Calgary office of Fasken Martineau DuMoulin LLP.

used. Solutions such as hydro transport, developed in Syncrude's Edmonton R&D center, allow for a reduction of the temperature (from 80°C to 40°C) needed in the process, and others, such as the paraffinic froth treatment used by Imperial Oil, result in substantially lower emissions. In reclamation, the TRO technology, developed by Suncor, is exemplary; converting fluid fine tailings into solid terrain and allowing for a faster reclamation process.

Tailings impoundments can sometimes be seen as an opportunity. Titanium Corp. is a company whose innovative business plan is based on the development of technologies to recover bitumen, solvents, and heavy minerals such as titanium and zircon from tailings impoundments.

Ironstone Resources is an example of how technology can make hard-rock mining operations more sustainable as well: the company is looking at ways to capture and commercialize C02, and is developing methods to collect and re-use the water contained in extracted iron ore.

First Nations come first

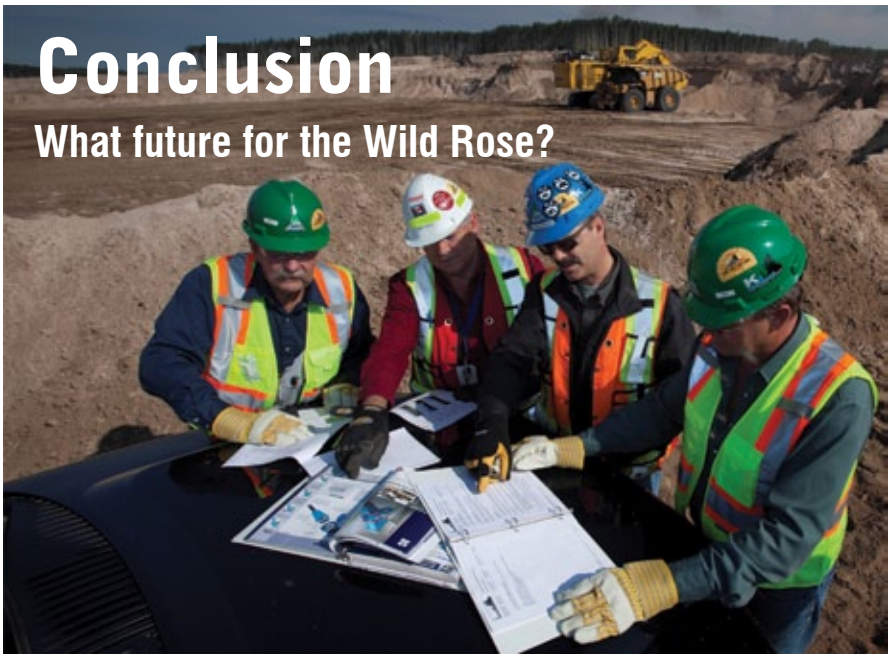
Alberta, unlike other provinces, bases its relations with the aboriginal population on an all-encompassing treaty, which, among other things, provides for official avenues of consultation whenever a mining project affects lands where First Nations communities reside.

Dermot Lane, vice president for development at Coalspur Mines Ltd, explained how his company is "particularly aware of the importance of community relations: prior to starting our feasibility studies, we went to speak with the local communities, and we made sure we had their support as we move towards operation."

Similarly, Ironstone Resources' Barry Caplan argued that "at Ironstone Resources, we always try to be much more careful and considerate towards the environment and the local communities than what the rules and regulations compel us to be."

Dom Kriangkum, President and CEO of Athabasca Minerals, explained how, when his company moves into an area, it always employs locally and consults with the communities, whose approval is indispensable to carry out any operation.

Pius Rolheiser of Imperial Oil is particularly proud of the relationship the company has managed to create with the communities living close to the Kearl mine: Imperial made key amendments to its original project after being advised by local communities, especially with regard to water management.



Conclusion

What future for the Wild Rose?

Imperial Oil's Kearl Plant under construction -- the project is progressing on schedule for a late-2012 start-up. (Photo courtesy of Imperial Oil).

Pierre Matuszewski, CEO of Société Générale Canada, firmly believes in Canada's mineral potential, explaining that every province and territory is touched by mining. Alberta is no exception: oil sands are the focus around which everything revolves, but other commodities are available for exploration and development. Economics support the growth of the oil sands industry, with huge reserves and an upwardly-trending oil price making the opportunities hard to resist.

Although the province does not yet enjoy quite the same reputation for hard-rock mining as some other jurisdictions, a favorable regulatory framework, combined with the evident passion, vision and tenacity, could make Alberta a significant hard-rock mining jurisdiction. "Despite the fact that Toronto and Vancouver are still the main mining centres in Canada, Alberta, and Calgary, are emerging as good alternatives," said John Bothwell, President, Calgary Mining Exploration Group. Nonetheless, both hard-rock mining and oil sands are facing obstacles to their continued progress.

For the oil sands industry, there is a structural problem: mineable resources are less extensive than those deeper than 75 m underground, meaning that the in-situ side of the sector will progressively grow, leaving mining behind. This transformation will not only affect the way the market is shaped, with the proliferation of junior oil companies, but will also determine a series of changes in the service sector, since the technologies and extraction processes are very different.

The second major problem has to do with how public opinion perceives the sector. The attention of international media and environmental groups is focused on oil sands mining companies, tailings management in particular. The industry is working to address these concerns, developing innovative, cleaner technologies, and stressing the importance of sustainability and community relations. On the hard-rock mining side, challenges stem primarily from the fact that Alberta as a province is almost exclusively focused on the energy industry. This results in the widespread perception that the government is following a clear policy of placing constraints on the mining industry.

The industry as a whole is affected by a larger problem: a serious labor shortage that is worrying companies both on the production and service side. Miners are working closely with academic centers and high schools to attract bright young local minds to the sector, and are always trying to convince foreign professionals to come to Alberta.

Yet for all these challenges, Alberta also presents some significant advantages: an extremely competitive tax and royalty scheme, a clear and straightforward permit system and the proximity to key Asian markets on the Pacific make the province an extremely attractive destination for investors and prospective miners. , the Fraser Institute's Annual Survey of Mining Companies ranked Alberta as the best and third best mining jurisdiction respectively in its 2010/2011 and 2011/2012 surveys.