

VANCOUVER AND THE MINERAL INDUSTRY: EXPLORING
OPPORTUNITIES TO THRIVE TOGETHER

by

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Executive Summary

The mineral industry, as defined by this report, encompasses the TSX & TSX-V capital markets, the mining sector and the financial services, consulting sector, suppliers, and supporting institutions/infrastructure linked to the activities of the mining sector. Vancouver's position as a host of a mineral industry cluster is enhanced by the presence of: A robust venture capital market; An enabling policy climate, and; Prestigious training institutions able to supply and attract qualified professionals. In addition, the city's connectivity and strategic location with respect to emerging markets, along with its high quality of life make Vancouver an attractive and competitive host to over 800 exploration companies and numerous other mineral companies.

Ensuring Vancouver remains an attractive destination for talented professionals is one of main challenges of continuing to attract and retain thriving companies within the cluster. The industry's main concerns in this area are the challenges posed by an aging workforce and the recruitment of youth and women. In addition to the industry's human resource challenges, the cost of housing and the access to public services and amenities affect the industry's ability to recruit qualified professionals. Two of the most important external factors influencing the relocation of head offices include market volatility and M&A activity. The mineral industry's ability to thrive under these conditions and turn threats into opportunities is key to their success. Hence, supporting the mineral industry cluster is a wise strategy for retaining mining head offices, as well as encouraging the growth and emergence of new local junior mining companies.

Thanks to the demand from rapidly industrializing nations the mineral industry has re-emerged from the economic recession with a renewed momentum. The B.C.'s mining renaissance has been met with the support and commitment of both federal and provincial governments. The relatively recent focus on green mining by the federal government and the industry represent an opportunity to promote both the mineral industry and emerging green technology industry in the City of Vancouver. Vancouver's pursuit of international recognition as the greenest City can also become a competitive advantage for those mineral sectors committed to sustainable practices. The City of Vancouver's goal of becoming a centre for green jobs can benefit from establishing closer relationships between the emerging green technology industry and the thriving mineral industry.

The following policy recommendation seek to assist the VEC to take advantage of the opportunities identified throughout this report, as well as collaborate with the industry and the other levels of governments to address the challenges posed by a thriving industry.

Policy Recommendations

Recommendations	Strategic actions
<p>1. Identify synergies between the mineral industry and green technology industry</p>	<p>Pilot project: VEC can broker a pilot project to cluster companies of both industries in a site within the False Creek Flats. The City of Vancouver can launch a proposal call for joint-initiatives between green technology and mineral industry companies to locate their head offices and light industrial uses at this site.</p> <p>Conference: A conference can help assess the level of interest and the type of incentives needed for the industries to capitalize on this opportunity. This conference should bring together industry leaders from the green technology and mineral industry to explore synergies between the industries.</p>
<p>2. Foster and celebrate green practices in the industry</p>	<p>Public recognition for leaders in green mining: An important step towards building a closer relationship between the City of Vancouver and the mineral industry is to celebrate the industry’s innovation and leadership in sustainable practices. The City of Vancouver should assess the virtues of organizing an award ceremony in order to recognize best sustainable business practices across industries. This ceremony can provide an opportunity to bring together leaders from diverse industries to share on their cutting-edge green practices.</p> <p>Advocate for the industry: VEC can advocate for solutions to industry’s issues and concerns at the provincial and federal level such as the streamlining of environmental assessment, permitting processes, as well as a provincial commitment to the Aboriginal treaty process.</p>
<p>3. Collaborate in the development of a comprehensive marketing strategy for the industry</p>	<p>Vancouver as the global capital of green mining & mineral exploration: VEC should collaborate with the mineral industry’s professional associations, higher-level education institutions, industry associations and high levels of government to develop a coordinated marketing strategy. The goal of this coordinated effort should be three-fold: a) to recruit qualified professionals for the mineral industry, b) to raise awareness around the importance of mining for everyday life, and c) to promote Vancouver as a global mineral exploration capital with strong commitments to green mining.</p>
<p>4. Continued support and further research</p>	<p>Office & industrial space: Researching the specific needs of the industry’s sub-sectors separately will allow VEC to better connect these companies with office spaces along the Broadway Corridor and the Canada Line Corridor. Furthermore, logging relocation decisions and triggers can also assist the City of Vancouver in assessing the demand for industrial space in Vancouver.</p> <p>Support R&D initiatives: VEC can also collaborate with higher-level education institutions to design R&D programs that are consistent with the industry’s commitment to sustainable mining practices, mineral/metal recycling and green mining solutions.</p>

Section I. Introduction

The City of Vancouver is globally recognized as a business leader in mineral exploration. It is estimated that British Columbia is home to over 1,200 mining companies¹; approximately 800 of those companies are headquartered in the City of Vancouver.² Mining head offices serve as industry anchors and catalysts for clusters. The amalgamation of local and international suppliers and service providers within Greater Vancouver continues to attract key industry players and investment to the region's metropolitan core. In mid 2011, the Vancouver Economic Commission commissioned a study to examine Vancouver's position as a host of the mineral industry cluster. This report seeks to identify synergies and areas of collaboration between the City of Vancouver and the mineral industry cluster.

In addition to this introduction, this report is comprised of four other sections. Section 2 provides a sector profile of Vancouver's mineral industry cluster and describes the key industry sectors and sub-sectors within the cluster. Section 3 analyzes Vancouver's strengths, challenges, threats and opportunities with respect to its position as a host to this industry cluster. Section 4 offers the concluding remarks of this research. Lastly, Section 5 presents policy recommendations regarding the Vancouver Economic Commission's role in supporting and collaborating with this thriving industry cluster.

Box 1. Research Methodology

This report is the result of a six-month qualitative research project. The findings contained in this report were generated from a literature review and 15 interviews with members of the industry. By providing a narrative to the success of the mining and mineral cluster in Vancouver this report aims to contextualize the many contributions this growing industry has had and continues to provide for the City of Vancouver. Although the cluster's effects and impacts cannot be confined to the boundaries of the City of Vancouver this project has chosen to focus on The City of Vancouver due to its importance as the headquarters of key sectors within the mineral cluster.

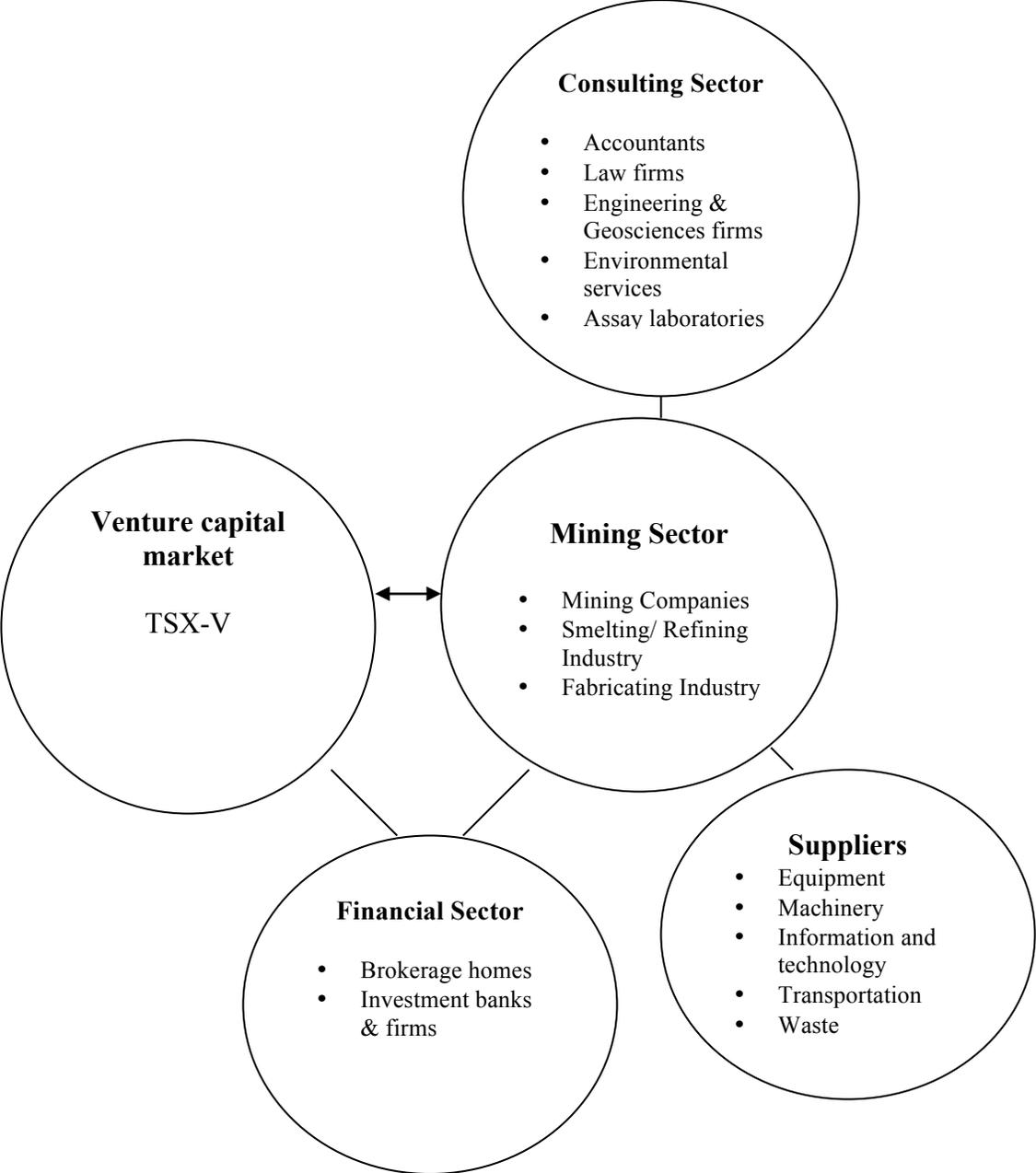
Section II. Vancouver’s mineral industry profile

Vancouver is considered the global capital of mineral exploration due to the high concentration of specialized services, suppliers and expertise available to exploration companies. Vancouver’s mineral industry cluster is comprised of the mining, consulting, and financial sectors among many others. The services offered by these sectors extend from developing geological surveys and encouraging exploration investment, to companies managing and overseeing mine closures. This report uses the term “mineral industry” to capture the wide range of activities, services, and economic sectors represented within Vancouver’s mineral industry cluster. For the purpose of this report, the cluster sectors have been classified into five broad categories. From transportation services to human resource management and public relations firms, the cluster encompasses a wider range of services and enabling actors that are not examined in this report. Figure 1 depicts the sectors and sub-sectors within Vancouver’s mineral industry cluster that are the focused of this industry profile.

This section provides an overview of the most important industry players within the City of Vancouver context. Hence, this mineral industry profile explores the following themes:

- A. Historical underpinnings of the mineral industry in Vancouver
- B. The mineral industry’s importance to B.C. and Vancouver
- C. Key sectors and sub-sectors within the mineral industry cluster

Figure 1. Vancouver Mineral Cluster Diagram



A. Historical underpinnings of the mineral industry

British Columbia (B.C.) alone is home to over 1,200 mining companies and an estimated 2,400 suppliers, consultants and contractors serving the mineral industry in British Columbia and the world over.³ The historical precedents for the mineral industry cluster date back to British Columbia's first gold rush in 1858. Mining is the second oldest industries in the province just older than the fur trade.⁴ In 1908, the industry's desire for innovation and entrepreneurial spirit gave rise to the Vancouver Stock Exchange (VSX). The founding of the VSX enabled the industry to raise funds for mining and mineral exploration in the province.⁵ Despite the merger of the Vancouver Stock Exchange into the Toronto Venture Exchange in 1999, Vancouver continues to be the world's centre for mineral exploration due to the local expertise in financing, managing and operating exploration companies. Consistently, Vancouver provides exploration companies with access to investors who understand the industry and support entrepreneurial ventures.⁶

In the 1960's, B.C.'s porphyry copper boom brought about a high concentration of geoscientists, mining companies and mining related professionals to the City of Vancouver.⁷ The ability to exploit B.C.'s porphyries copper deposits propelled exploration activity in the province.⁸ This type of copper deposit contains gold and other metals possessing both the scale and the potential for economic returns in line with senior companies' goals. The symbiotic relationship between the venture capital market and the mineral industry, as well as the availability of highly qualified and experienced professionals have historically underpinned the success and resilience of the mineral industry cluster.

B. Global leadership in Corporate Social Responsibility

CSR is defined as a self-regulated corporate policy through which companies integrate economic, social, and environmental considerations into their business models.⁹ The emergence of Corporate Social Responsibility (CSR) has also brought heightened expectations for the industry on the part of governments and investors. In recent years there has been a heightened awareness from both the industry and governments of the need for companies to earn the public's support for mining operations.¹⁰ In Canada, this vision has gained momentum

specifically in its application to extractive industries.¹¹ In 2009, Prime Minister Harper announced the Canadian government's action plan on 'Building the Canadian Advantage: A Corporate Social Responsibility Strategy' aimed at guiding the policies of Canadian Extractive Sector operating abroad.¹² Beyond a commitment to their individual CSR policy, mining companies have been mandated by government and expected by investors to provide leadership in areas such as sustainable mining practices and First Nation relations.

The B.C. mining industry is internationally recognized for its Health, Safety and Reclamation Code, as well as its continuously improving environmental management and reclamation practices.¹³ In May 2011, B.C. became the first Canadian province to adopt the Towards Sustainable Mining (TSM) protocol. TSM represents another set of industry guidelines seeking to move the mining sector towards adequate community consultation processes and sustainability practices. In contrast with other global standards and mining protocols TSM is an externally verified facility-level assessment tool designed and shaped by a multi-stakeholder community of interest panel.

In August 2010, B.C. became Canada's first province to share direct provincial tax revenue generated from new mines or mine expansions with First Nations.¹⁴ Thus far, two agreements have been signed with the Skeetchestn First Nations and the McLeod Lake Indian Band. TSM commits mining companies to respect aboriginal and treaty rights, and to acknowledge and respect social, economic and cultural interests of aboriginal peoples. An increased emphasis on risk management by the part of the industry has made the securing of a social license to operate an imperative for the industry. Although not perfect, there is an acknowledgement and willingness on the part of the industry to meaningfully engage the communities of interests affected by mining activity in the province.

Box 2. How does the mineral industry define sustainability?

Sustainable mining and mineral development is one that meets the growing needs of all communities while maintaining a healthy environment and vibrant economy for present and future generations (Mineral Association of British Columbia).

C. Economic impact of the mineral industry

C.1. British Columbia context

In 2008, more than half of the 25,800 jobs generated by the industry in B.C were in primary mining. Related exploration & development activities along with gas & oil extraction account for approximately 36% and 8.5% of job creation respectively.¹⁵ By 2010 the number of jobs created by industry rose to 28,400 including 8,195 jobs in primary mining.¹⁶ From 1990 to 2008, most of the industry's 37% employment growth has come from oil & gas extraction and related exploration & development activities.¹⁷ The importance of the mineral industry lie not just in the number of jobs it generates, but also on its \$691 million in contributions to both provincial and federal governments.¹⁸

Table 1. Regional distribution of employment in extractive industries (2008)

B.C. Regions	Forestry, Mining, Oil & Gas	All other industries
Northeast	17%	2%
North coast & Nechako	8%	2%
Kootnay	15%	3%
Cariboo	11%	4%
Thompson-Okanagan	17%	11%
Vancouver Island/Coast	17%	17%
Mainland/ Southwest	15%	61%

Source: Guide to B.C.'s Economy and Labour Market, <http://guidetobceconomy.org/major_industries/mining.htm>

In 2010, the average salary for a mining job was \$108,100.¹⁹ 'Canada Starts Here- BC Jobs Plan' has laid out strategies to build on the strengths of the mineral industry. The commitment to see 8 new mines operating in B.C. by 2015 further alludes to the momentum behind the mineral industry in the province.²⁰

C.2. Vancouver context

The City of Vancouver hosts over 800 mining headquarters representing over 60% of Canada's exploration mining companies.²¹ Mining companies are an important tenant group for

office space in downtown Vancouver. Exploration mining companies tend to be small with 3-6 head office staff members. Despite their size, the exploration work that these companies undertake involves numerous contract and consulting jobs on and off the mine site.

The variety of legal, accounting, geological, engineering and environmental consulting firms, analytical laboratories, equipment and service companies servicing these mining companies generate high-paying jobs and contribute to the economic vitality of Vancouver’s downtown. The 2010 Compensation Survey Results published by the Association of Professional Engineers and Geoscientist in B.C. (APEGBC) presents evidence that engineers and geoscientist receive higher salaries when they work in mining and mineral exploration vis-à-vis other industries with the exception of management consulting.

Table 2. APEGBC Member Compensation Survey (2010)

Industry	Mean	Median	Lower -Upper percentile
Engineering consulting*	\$87,661	\$80,000	\$54,000 - \$130,000
<i>Mining</i>	\$99,020	\$89,500	\$61,120 - \$158,400
Geoscience consulting*	\$89,227	\$75,000	\$60,000 - \$150,000
<i>Mineral exploration</i>	\$98,109	\$72,000	\$47,000 - \$198,600
Primary & Resource Industries*	\$112,669	\$100,000	\$63,200 - \$170,000
<i>Mining</i>	\$117,564	\$100,000	\$65,910 - \$195,100
Construction & Manufacturing	\$88,848	\$82,100	\$52,050 - \$36,090
Management Consulting	\$148,718	\$109,000	\$55,500 - \$248,000
Utilities & Communications	\$92,384	\$90,000	\$59,000 - \$127,750
Government	\$89,833	\$88,000	\$63,700 - \$120,000
High tech	\$91,018	\$87,000	\$56,000 - \$137,000
Others	\$87,524	\$80,000	\$52,720 - \$135,000

Source: 2010 Compensation Survey Results, Association of Professional Engineers and Geoscientist in B.C.

Although there is no comparable data on the compensation received by other professions by industry type, recruitment and human resource companies agree that Vancouver’s mineral industry is a competitive employer, which provides attractive compensations to draw high quality talent to the City of Vancouver.²²

D. The mineral industry cluster

The coalescence of key expertise and specialized services make Vancouver one of the few global centres where an entire mining venture can be assembled in one place. The Vancouver industry cluster is comprised of the following sectors:

D.1. Mining sector

Environment Canada defines mining as the activities associated with the mining, production, refining and fabrication of mineral and metal ores.²³ It follows that the mining sector is comprised of 3 main sub-sectors: a) mining companies, b) smelting and refining industries, c) metal fabricating industries.

a) **Mining companies:** Mineral extraction and concentrating companies explore for, and develop metal, non-metallic mineral and coal deposits.²⁴ The expansion or contraction of mining companies' investment in exploration, development, and production is closely linked to mineral prices, access to financing, new mineral discoveries and the policy climate.²⁵ The Mineral Economics Group classifies mining companies in three categories depending on the way in which they derive their revenues: exploration, mid-tier, and senior.²⁶

Table 3. Mineral Economics Group Classification of mining companies

Category	Definition	Vancouver-Based Bxamples
Junior or exploration	Often venture capital companies whose principal means of funding is equity financing. Exploration companies have no producing mines and they have little to no revenue. ²⁸	Bear Creek Mining Kiska Metals Zincore Minerals NovaGold Resources
Mid-tier	Tend to be exploration companies that decide to develop one of their exploration projects. These companies get funds from their operating revenues and/or through public equity financing. ²⁹	Eldorado Imperial Metals First Quantum Quadra FNX Mining
Senior	Large companies that fund their own exploration and development programs. Generate revenues from the production and sale of mining commodities. ³⁰	Teck Resources Goldcorp PanAmerican Silver

- a) **Smelting and refining industries:** These industries employ extractive metallurgical processes to separate a metal from its ore. Aluminium smelter Rio Tinto ALCAN-BC located in Kitimat, B.C. produces aluminium from bauxite ore.²⁷ Teck Resources Trail Operations also operates a lead-zinc smelter, which processes mineral ore coming from B.C., Alaska and other US states.
- b) **Metal fabricating and semi-fabricating industries:** These industries manufacture and process ferrous and non-ferrous metals to produce semi-finished or semi-fabricated products for use as inputs in other industries.

Despite not being directly involved in primary mining there are other mineral companies that are important players within the mineral cluster. This is the case of Vancouver-based Silver Wheaton, the world's largest silver streaming company. Silver Wheaton negotiates the purchase of all or part of a mining company's silver production at a fixed price.²⁸ The silver sold by streaming companies is often purchased from mining companies whose main operations produce silver as a by-product.²⁹ Hence, streaming companies do not need to invest in exploration, development, and mine maintenance. Silver Wheaton's business model has allowed it to "avoid variations in operating costs, reducing downside risk, while providing the upside of significant leverage to the price of silver."³⁰

Box 3. Mineral Exploration & the company business model

The Hunter Dickinson Group (HDI) is a successful example of the *company business model* in Vancouver. Under this business model a common management team is responsible for creating and servicing several exploration companies. The company's in-house engineers, geologists and other specialists provide professional capabilities to drive their business success. As HDI companies mature they often engage their own independent management team and operating capabilities, as was the case for Taseko Mines Limited.

D.2. Venture capital market and financial services

The TSX-Venture Exchange (TSX-V) is a subsidiary of the TMX Group (TMX), which also owns the Toronto Stock Exchange (TSX). The TSX-V head office is located in Calgary, with regional offices in Vancouver, Toronto and Montréal. The TSX-V is co-regulated by the Securities Commissions of Alberta and British Columbia.³¹ The City of Vancouver alone is home to 60% of the top 100 junior mining companies trading in the TSX-V making it a major

financial centre for mineral exploration worldwide.³² In 2011, the TSX and TSX-V raised one third of the world's total mineral exploration funding, the most of any other exchange.³³ The mining sector is the mainstay of the venture capital market. In 2011, the mining sector was responsible for 57% of all market capitalization in the TSX-V.³⁴ The high concentration of junior mining companies has turned Vancouver into a strategic location for brokerage firms & investment banks. The sustained growth in the junior mining sector worldwide has significantly boosted trading and underwriting activity for local Vancouver brokerage firms. International firms like Canaccord Financial and Global Securities have their roots in financing mining companies in the Vancouver Stock Exchange. Other financial players within the mining and mineral industry include TD Canada Waterhouse and BMO Nesbitt Burns.

Box 4. Global Securities, a Vancouver-based brokerage house

In 1987, Global commenced business as the brainchild of its chairman and founder Art Smolensky. Subsequent to the sale of a successful photographic company that he had established 14 years earlier, Mr. Smolensky founded Global Futures Corporation in 1986, and established Global Securities in the following year. The two sister companies merged under the Global Securities umbrella in 2009 to become one of the largest independent investment dealers in B.C. Global's experience with investing in junior mining companies is a major draw for many of its investors. Some of the services offered by Global include Public Offerings & Private Placements, Capital Pool Companies, Mergers and Acquisitions, Take-Over Bids, Fairness Opinions and Corporate Reorganizations.

D.3. Consultants & contractors

While most of the Vancouver mining companies are small ventures, as a collective they support a large number of local and international consultants and contractors based in Greater Vancouver. A selection of the most important players within this sector of the industry is presented below.

a) Accounting firms

Accounting firms provide mining companies with assurance/audit, tax and advisory services (e.g. due diligence, valuations, internal controls and risk assessments, business performance reviews, sustainability and cost control). International accounting firm giants, such as KPMG, PwC and Deloitte have regional offices in downtown Vancouver with satellite offices

located throughout B.C. For these firms Vancouver is seen as a great place to learn more about junior mining and North American business practices. In Greater Vancouver, accounting firms are increasingly expanding their advisory services and moving towards consolidation as their main growth strategies.³⁵ Due to heightened awareness by investors, governments and industry associations mining companies have an increased responsibility towards developing sustainable operational and strategic approaches to their operations. Sustainability and climate change have emerged as a key service area for accounting firms serving the industry.³⁶

a) Engineering, geophysical, and environmental services

Environmental services are often designed to satisfy federal and provincial legislation and regulations. Due to the jurisdictional specificity of these services boutique environmental consultancy firms are common fixtures within this segment of the industry. Hemmera is an example of a boutique environmental consultancy that provides specialized services for Western Canada. Wardrop, Rescan, Golder Associates, and AMEC are examples of the global engineering, consulting, planning, and facilitation companies located in the Lower Mainland. The services offered by these companies include waste management, ground engineering, feasibility studies, environmental, and social assessments. As sustainability becomes a major concern for governments, the general public, and the resource-based industry worldwide, global consulting firms have sought to expand their expertise in this area. Vancouver-based environmental consultants service multiple sectors outside the mining industry such as land development, transportation, and the energy sectors. The dynamism and expertise exhibited by these companies has also contributed to establishing Vancouver as a major centre of excellence in terms of environmental management practices and policies.

b) Legal services

National and international law firms advise mining companies in matters related to mergers and acquisitions, public and private securities offerings, joint ventures, corporate reorganizations and mining legal agreements. Legal outsourcing or off-shoring is an emerging industry trend among mining companies.³⁷ In general, boutique law firms are not prominent players within the mining and mineral industry. As a transnational activity, mining projects involve several parties and therefore large teams of lawyers are often required to work on these

deals. Mining companies tend to contract out most of their legal dealings to established legal firms. Most mining companies have an assigned ‘general counsel’ as staff or member of their board. Typically, a general counsel at a mining company assesses what issues require specialized legal advice, as well as approving the quality and adequacy of the work done by the contracted legal firm. Consistent with the federal and provincial regulations, as well as the industry’s interest in sustainable practices, legal firms offer specialized services regarding sustainability and climate change regulations and opportunities.

c) Assaying laboratories

Assay laboratories are a crucial sector within the mining and mineral industry. Their services range from analytical data to metallurgy services. B.C. is considered “the assay capital of the world” hosting over ten commercial laboratories.³⁸ Currently, Greater Vancouver hosts head offices for world-leading laboratories: SGS North America, ALS Minerals, ACME Labs, and Inspectorate. From 1895 to 1995, The Ministry of Energy, Mines and Petroleum Resources in British Columbia established and ran a one-of-a-kind provincial Assayers Certification Program.³⁹ Since 1995, the British Columbia Institute of Technology (BCIT) has delivered the certification program. The establishment of government-industry-educational institution partnerships is a key characteristic of the B.C. assaying sector. The existence of a highly qualified local workforce has also contributed to Greater Vancouver’s appeal as a strategic head office location for assay laboratories.

Box 5. SGS: A world leader in inspection, verification, testing, and certification

SGS has been active in Canada for over 65 years. In Vancouver, SGS has established a reputation as a market-leading testing and consulting laboratory specializing in exploration, metallurgical, mineralogy and water treatment services. Prompted by B.C.’s mining renaissance, SGS is expanding and consolidating its Greater Vancouver operations into a multi-service laboratory in the City of Burnaby, B.C. by 2012. The new 63,000 square foot laboratory will house SGS’ Minerals and Agriculture business lines. The state-of-the-art facility will increase SGS local capabilities and increase the client’s speed-to-market. Locating this new facility close to a main Sky-Train station, SGS is consistent with its corporate sustainability strategy. SGS’s ambitious growth strategy for its Lower Mainland operations also includes more than doubling the number of employees from 120 to 250 within the next three years.

D.4. Suppliers

Suppliers provide IT, building materials, machinery and equipment to mining companies. With the exception of IT services, most industry suppliers are located outside of the City of Vancouver. In general, the offices and warehouses of industry suppliers are based in B.C. mining communities, particularly in the interior and Northern B.C. The cost and limited availability of industrial space within the City of Vancouver has meant that suppliers based in the Lower Mainland tend to be located in the municipalities of Delta and Surrey.

Box 6. Mineral Industry suppliers with Vancouver-roots

Falcon Equipment Limited has been a proud supplier of cranes, hooklifts, forklifts, pickers, conveyers, remotes, plows, sanders, dump bodies and street sweepers for Western Canada since 1988. In 2005, FALCON Ltd. expanded to supplying the rail industry through its sister-company, Falcon Shuttle Rail Inc (FSR). FSR has since expanded its reach nationally with representatives in Eastern Canada. Two years later Falcon Ltd expanded operations to Northern British Columbia's industrial hub in Prince George. Source: www.falconequip.com/

BioteQ is a Vancouver-based water treatment company that applies innovative technologies and operating expertise to solve challenging water treatment problems in the resource and power generation industries. The company was founded in 1998 as Biomet Mining. Since securing its first commercial contract in 2001, BioteQ has successfully commercialized its water treatment technologies, and secured contracts with the world's leading mining companies, utility operators, and regulators to build and operate industrial water treatment plants. Source: www.bioteq.ca

Finning International has operated in Vancouver since 1933. American entrepreneur Earl Finning founded Finning Tractor & Equipment Co. Ltd.¹ This small venture served as the sole distributor for Caterpillar Tractor products and services in B.C. and it would later grow to become the world's largest Caterpillar equipment dealer. Currently, Finning's operating units are located in Canada, South America and the UK. Source: www.finning.ca/

Section III. Vancouver's position as host of a mineral industry cluster

The City of Vancouver is globally recognized as a global business leader in exploration mining. Approximately 800 mining companies are headquartered in the City of Vancouver, most of which are junior mining companies.⁴⁰ The amalgamation of local and international suppliers, service providers and other auxiliary companies within Greater Vancouver continues to attract key industry players, expertise, skilled labour and investment to the region's metropolitan core. Section II provided the context for the following pages by highlighting the various sectors, sub-sectors and players within the cluster. This section focuses on examining Vancouver's position as a host of the mineral industry cluster. Due to the sheer number of junior mining companies and their influence in Vancouver's cluster, this analysis examines mining companies in more detail than other sectors. Section III therefore examines:

- A. Strengths - Five key factors helping Vancouver attract and retain mineral industry companies
- B. Challenges - A scan of the issues affecting the city's ability to host a growing mineral industry cluster
- C. Threat – A segment outlining the two main external factors influencing head office relocations
- D. Opportunities – An examination of key areas where the Vancouver Economic Commission collaboration with the industry and higher levels of government can help strengthen the mineral industry cluster.

“British Columbia is internationally recognized as a centre of technical excellence in mineral exploration and development.” Gavin C. Dirom, President & CEO of the Association for Mineral Exploration British Columbia.

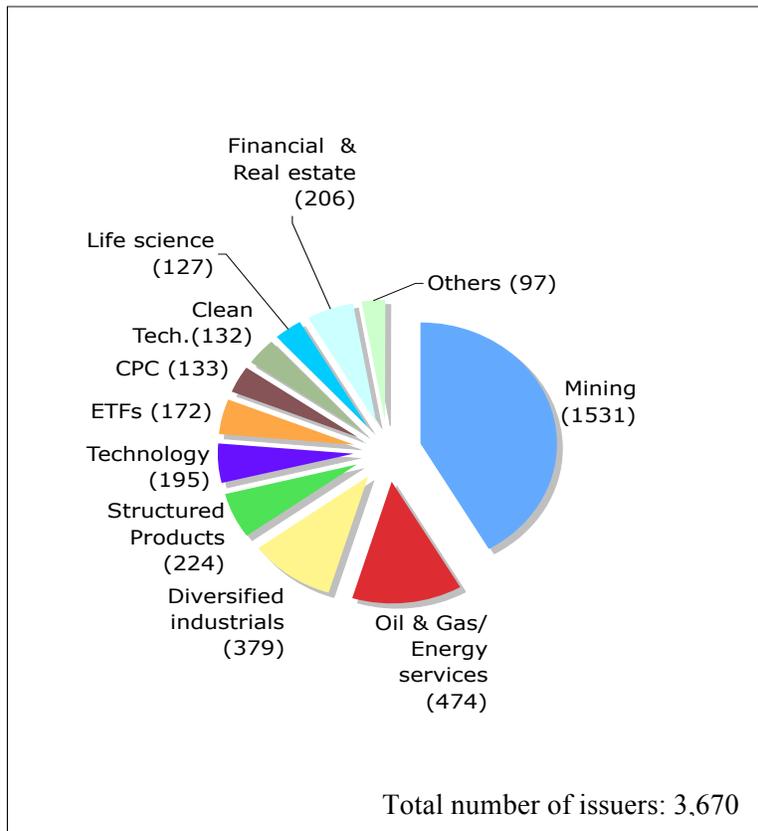
A. Strengths

Vancouver attracts companies who operate inside of B.C. as well as those who have their main operations outside of B.C. Junior companies enter and exit the industry regularly due to the fact that only 1 in 10,000 exploration projects ever go on to become a producing mine. In any given time the number of juniors operating in B.C. vis-à-vis those whose main operations are located elsewhere varies. This section describes the five main factors attracting both types of mining companies to the City of Vancouver.

A.1. Robust venture capital market

Mining companies are the mainstay of the TSX and TSX-V exchanges representing 41% of all issuers.

Figure 2. TSX and TSX-V issuers base (Dec. 2010)



Source: TSX 2010, Mining Presentation. www.tmx.com

The symbiotic relationship between the venture capital market and the mineral industry, specifically as it relates to raising funds for exploration companies, underpins Vancouver's position as a global centre for mineral exploration. The boom of the B.C. mining industry during the 1960s attracted and produced the necessary expertise and human resources to lay the foundation for an industry cluster. The ability and success of the TSX-V's at raising funds for exploration companies is derived from the existing community of expertise supporting the growth of small venture companies.⁴¹ The Toronto Venture Exchange (TSX-V) is regarded as the most liquid and best-regulated exchange for early-stage investments in the world.⁴² Paul Bourque, Executive Director of the British Columbia Securities Commission describes the key three factors influencing the success of the venture exchange:

- Undisputed world financing capital for junior mining companies: Both TSX and TSX-V attract 58% of the world's mining companies due to its availability to raise over a third of the world's public equity financing for these companies.⁴³
- Growing small ventures: TSX-V is the world's most successful public venture capital market at growing small companies. Currently, 1 in 5 of Canada's big companies listed in the TSX are graduates of the TSX-V.⁴⁴
- Supportive regulatory regime: The "exempt market" allows start-up and nascent businesses to raise funds from investors under exemptions from the usual prospectus requirements.

A.2. Policy climate

Over the past decade, the B.C.'s provincial government has pursued an aggressive taxation policy that has reduced corporate income tax from 16.5% in 2001 to 10% by 2011.⁴⁵ Provincial support for the industry has come in the form of the following incentives, policy schemes and recent initiatives.

a) Business incentives: Some of the attractive exploration incentives offered to mining companies and their investors include:

- *Private-Placement Exemptions* - Under given circumstances, the B.C. Securities Commission exempts individuals and companies from the requirement to register as a seller of securities and as a prospectus (trader).⁴⁶

- *Mining Flow-through Share Tax* - By issuing flow-through shares, a B.C. mining, oil or energy company can help finance its initial exploration expenses.⁴⁷ Investors pay for the company's shares, while the company agrees to transfer 20% of eligible mining expenditures to the investor. This program has been extended until December 31, 2013.
- *Mining Exploration Tax Credit* – This provincial tax credit allows mining companies to claim up to 20% of the net qualified mining exploration expenses or 30% for exploration in prescribed Mountain Pine Beetle affected areas.⁴⁸

b) Low energy cost and stable energy supply: Consistently low charges for electricity and natural gas make B.C. a cost-effective mining jurisdiction. B.C. hosts mining operations with the lowest operating costs in North America.⁴⁹ With the participation of the Mining Association of British Columbia, BC Hydro Power Smart has established energy saving programs specifically geared towards mining companies.⁵⁰ Power smart programs for the mining industry include support for new plant design, energy studies, project incentives and hiring an industrial energy manager.

c) Accessible geological data and information management system: The provincial commitment to answering the emerging information needs of the mineral industry resulted in initiatives such as:

- *Mineral Titles Online British Columbia* - This unique registry allows for real time title information and acquisition from anywhere in the world via the Internet.⁵¹
- *British Columbia Geological Survey (BCGS)* - This free access, internet-based geological database of B.C.'s mineral resources and mineral potential is recognized as one of the world's best.⁵² BCGS's content incorporates the suggestions made by the industry through GeoscienceBC.
- *GeoscienceBC* – This not-for-profit, industry-based organization provides geological surveys of B.C. by leveraging geological funds and directing them to projects identified by the mineral exploration sector as priorities.⁵³

A.3. Top quality training institutions & qualified professionals

Higher Education Institutes such as the University of British Columbia, British Columbia Institute of Technology and Simon Fraser University offer globally renowned industry-specific programs that supply a qualified local workforce for the industry. Partnerships between government, industry and education institutions have contributed to the development of targeted training and student recruitment strategies. Examples of these partnerships and collaborations include:

- *B.C. Assayers Certificate Program*: This program was founded in 1895 by the Ministry of Energy, Mines and Petroleum Resources in British Columbia as a response to the industry's need for trained assayers. Since 1995, BCIT coordinates the delivery of this one-of-a-kind program.
- *Workforce Exploration Skills Training (WEST)*: The B.C. Aboriginal Mine Training Association developed the WEST program with the Northwest Community College's School of Exploration & Mining located in Smithers, B.C. to promote training agreements and opportunities for aboriginal peoples across southwest B.C.⁵⁴

A.4. Strategic location and transportation system

Vancouver has positioned itself as North America's gateway to Asia, particularly for accessing markets in China and India. Vancouver's time zone represents one of its key advantages when doing business in North America, and more recently, for growing mining jurisdictions in Chile, Peru and Argentina.⁵⁵ Vancouver's world-class rail, airport, roads and ports provide a highly efficient supply chain for B.C.'s natural resource-based industries. For those companies whose main operations are located within B.C. Port Metro Vancouver and Port Prince Rupert provide crucial advantages. In 2010, mining related materials made up approximately 46% of total bulk cargo and 31% of overall volume at Port Metro Vancouver.⁵⁶ More recently, the Northwest Transmission Line Project is set to encourage mining and exploration activity in Northern B.C..⁵⁷ The Vancouver and Abbotsford international airports

also contribute to making Greater Vancouver a competitive location for companies requiring national and international staff mobility.

A.5. High quality of life

An exceptionally high quality of life and beautiful landscape help attract qualified and experienced international and national talent to the City of Vancouver. The concept of quality of life is highly subjective. Companies, governments and organizations use different definitions and look at a diverse set of factors influencing people’s quality of life. The Economist Intelligence Unit has consistently ranked Vancouver as one of the most liveable cities in the world.⁵⁸ Mercer, a global leader in human resource consulting, outsourcing and investment services, ranked Vancouver fifth place in its latest 2011 Quality of living survey. The Federation of Canadian municipalities considers different factors when assessing quality of life at a municipality level.⁵⁹ Although a subjective concept, Vancouver’s quality of life is a competitive advantage over other cities worldwide.

Box 7. Factors included in defining and measuring “quality of life”

Mercer’s Quality of living survey	Federation of Canadian Municipalities’ Quality of life reporting
<ul style="list-style-type: none">○ Consumer goods○ Economic environment○ Housing○ Medical and health considerations○ Natural environment○ Political and social environment○ Public services and transport○ Recreation○ Schools and education○ Socio-cultural environment	<ul style="list-style-type: none">○ Local Economy○ Natural Environment○ Personal Goals and Aspirations○ Fairness and Equity○ Basic Needs○ Social Inclusion

B. Challenges

Worldwide growing and rapidly urbanizing countries like China and India continue to fuel the growth of the mineral industry. B.C.'s vast deposits of metallurgical coal, copper, molybdenum and zinc create an ideal scenario for growth within the mineral industry. Vancouver's competitive advantage in transportation and spatial location provide B.C. based companies with a competitive edge to access booming markets. The coalescence of all these factors is poised to benefit Vancouver as new junior companies enter the industry and mid-tier companies continue to grow and consolidate. Growth among the junior and mid-tier mining companies is often associated with growth in other sectors associated with the industry. Vancouver's ability to accommodate and support the growth of the industry raises question about human resources, urban affordability and office space concerns. This section examines these three challenges in detail.

B.1. Human resource issues

a) Aging workforce

At the heart of the impending skilled labour shortage lie the expected high levels of employee retirements within the next decade; higher mineral prices resulting in extended mine life and; the renaissance of mining in the province. Half of Canada's mining workforce is eligible to retire by 2021. Availability of labour is the most pressing concern of over 50% of the Top 100 mining companies listed in the TSX-V.⁶⁰ This statistic is particularly significant given that 61 of these junior companies have their headquarters in B.C.⁶¹

The experience of Teck's Highland Valley Copper mine is a case in point, as approximately 400 employees will be eligible for retirement within the next couple of years.⁶² As the mine seeks to modernize its flotation system another potential 500-construction jobs will be created over a two-year period.⁶³ Despite skilled labour shortages being more acute in trades and heavy machinery occupations, administrative support, technical, and professional occupations will experience shortages by 2017.⁶⁴

b) Recruitment challenges

In addition to an aging workforce, the Mining Industry Human Resource Council has identified

recruitment and retention challenges caused by an under-representation of women, aboriginal peoples, new Canadians and youth within the industry's workforce. Recruitment for industry-specific programs is a challenge exacerbated by the industry's cyclical nature. The cyclical nature of the industry causes the supply of qualified people to be either behind or ahead of the business cycle. When commodity prices are high, enrolment in mining-related programs is high and vice-versa, however the lead time for students to pass through schools often means recent graduates enter the workforce during a 'down' cycle in commodity prices and the subsequent downturn in mineral exploration activity.

Although senior and specialized staff recruitment is done internationally, technical and administrative positions are often recruited locally at the site or in the host region. Vancouver is a source of highly qualified senior and managerial staff. Given the global reach of the industry, Vancouver-trained industry professionals exhibit a high level of mobility across borders making it increasingly challenging to retain skilled labour during down cycles in exploration activity. Federal and provincial strategies addressing the impending labour shortages in the mineral industry are forged in collaboration with the public and private sector. In 1996 the Mining industry Human Resources Council (MiHR) was founded as the national sector council for the Canadian minerals and metals industry. The council has since researched, developed and implemented human resource solutions tailored to the industry's needs.⁶⁵ In 2007, the B.C. Labour Market Partnership Program established the B.C. Mineral Exploration and Mining Industry Labour Shortage Taskforce to develop an industry-wide human resource strategy.⁶⁶

Box 8. Mining occupations experiencing most significant shortages

- Geologists
- Mining Engineers
- Heavy-Duty Equipment Mechanics
- Accountants
- Electricians (surface)
- Metallurgical Engineers
- Millwrights
- Maintenance Supervisors
- Chiefs, Managers & Superintendents
- Mechanical Engineers
- Mining Supervisors

Source: 2008 Labour Market Taskforce Report

B.2. Urban affordability

The industry's recruitment challenges have subsequent impacts on business growth in city or corporate based roles. Attracting and retaining new talent from other Canadian cities, provinces and foreign countries to Vancouver is a challenge exacerbated by urban affordability issues that include:

a) High housing cost

Most consulting firms recruit qualified and experienced workers within the mining and mineral industry during the boom times. Consulting firms and other ancillary firms are also highly sensitive to the industry's cyclical changes. Access to affordable and adequate housing for all demographic groups (single, married, married with kids, retired, young, middle-aged and senior) is a significant issue facing the recruitment of industry professionals. The ability of current residents to stay in the city as their phase of life changes is greatly impacted by the housing options they face. The average cost of a home in Vancouver, as of August 2011, was \$778,545.⁶⁷ Vancouver's average home price is significantly higher than in Toronto (\$451,663) and Calgary (\$394,251).⁶⁸ Higher residential densification may be required to accommodate the growing workforce needed to support prosperous companies within the City of Vancouver.

b) Access and availability of public services and amenities

In order to continue attracting professionals living outside the city bounds, improving the access to and quality of public transit are crucial. According to Statistics Canada's most recent report on commuting work patterns, the average work-commuting time for Vancouverites using public transit (45 minutes) almost doubles that of those driving to work (25 minutes).⁶⁹ Supporting the growth of the downtown economy and successful industries located therein will require further improvements in the current public transit system. Aging medical infrastructure and a shortage of medical professionals are also areas where improvements might give Vancouver a competitive edge on other cities in terms of recruitment of skilled professionals.

The availability of convenient and affordable childcare within reasonable proximity to home and/or the workplace, remain important push/pull factors for new hires. Table 5 shows that only 15% of children under the age of 14 have access to a licensed childcare space. Childcare

availability is an area where improvements are necessary if Vancouver is to attract and retain young talented professionals. The cost of childcare in Vancouver ranges from \$32 to \$75 per day (for children aged between 0 to 5 years of age).⁷⁰ These ranges are below the childcare cost in Toronto (\$35-\$91.00 per day).⁷¹ More research is needed to examine the relationship between childcare cost and the median/ average household income, as well as the actual demand for childcare spaces in Vancouver.

Table 4. Childcare provision in the City of Vancouver

Age group	Children population	Number of spaces	Percentage
0-12 years	63,720	10,957	17%
0-14 years	73,920	10,957	15%

Source: City of Vancouver, Child and Childcare Services.

B.3. Office space

a) Downtown-bound companies

Downtown Vancouver has one of the lowest commercial vacancy rates in North America at 3.8%.⁷² Eighty-seven percent of tenants of office space in downtown Vancouver are small to medium size businesses occupying spaces under 5,000 square feet (sq.ft.).⁷³ Although, Vancouver’s 800 exploration mining companies occupy relatively small office spaces, the sheer number of mining headquarters and the office space occupied by other auxiliary sectors makes the mineral industry an important tenant group of prime downtown office space. Junior mining companies tend to have 3-6 staff members and often share office space and administrative staff with other exploration companies in order to benefit from economies of scale. For most mining companies with less than 20 staff members, availability of office space is not a significant issue as the majority of office space stock is geared towards companies of this size.

The office space stock in downtown Vancouver is less adequate in supporting the mid-to-large companies that require continuous space in the 30,000 to 50,000 sq.ft. range. To expand, most mining companies are looking to higher rent premiums and a limited number of vacancies in triple-A buildings. In the long-term, the ability for successful corporations to expand is further compromised by residential development, which threatens to diminish the stock of available space in the downtown. The average gross rent for Class-A office space has increased all across

Canada.⁷⁴ In the winter of 2011 multinational real estate firm, Newmark Knight Frank Devencore published a report on office space in Canada using 2010 data. Table 4 shows Vancouver is the second most expensive office space market in Canada just behind Calgary.

Table 5. Office space market in mayor Canadian cities (2010)

City	Downtown office space stock (Class A & B)	Average \$ per sf* (Class A building)	Average \$ per sf* (Class B building)	Vacancy rate
Vancouver	20,063,939 sf	\$50.94/sf	\$39.64/sf	4.2%
Ottawa	17,843,860 sf	\$45.82/sf	\$33.18/sf	4.1%
Toronto	61,037,936 sf	\$43.68/sf	\$34.86/sf	6.9%
Calgary	35,299,615 sf	\$54.65/sf	\$42.37/sf	8.0%
Montreal	46,055,162 sf	\$38.42/sf	\$28.06/sf	8.0%

* This includes estimated asking face rate plus total real estate taxes, operating expenses and in-suite power

Source: Real Estate National Office Market report. Ottawa: Winter 2011, Newmark Knight Frank Devencore

b) Companies with industrial and warehousing needs

Real estate specialists have recently forecast the relocation of cost-conscious downtown tenants to inferior class buildings or suburban spaces.⁷⁵ Most commonly, head office relocations outside Vancouver's downtown core have been associated with the high cost and limited availability of commercial space in the area.⁷⁶ High metal and mineral prices have hallmarked not only the renaissance of mining in British Columbia, but they have also prompted the expansion and consolidation of other companies associated with the mining industry. Thus, industry segments that require larger head offices, warehouses and laboratory spaces have tended to relocate outside the downtown core. In 2011 both ACME Labs and SGS have announced plans to expand and amalgamate all their lower mainland operations into new head office sites in South Vancouver and the City of Burnaby respectively. Some of the factors influencing a company's decision for relocation to suburban areas are:

- Availability and lower cost of land
- Accessibility to public transit
- Adequate infrastructure such as electrical power supply
- Length of re-zoning processes
- The developments of Abbotsford and Bellingham airports

C. The threat of head office relocations

Head office relocation can threaten Vancouver’s position as host of a mineral industry cluster. Conducive fiscal policy, a supportive business environment, well-developed business support services, proximity to internationally recognized education institutions, and the ability to supply or attract professionals are all factors within which governments and policy can play an influential role in retaining companies. Other factors influencing relocations are external or less responsive to government policy. This section examines both sets of factors at length.

C.1. Internal factors

The literature on business relocation argues that as a strategic decision, head office relocation often involves considering key factors such as those described in Table 6.

Table 6. Key factors influencing a company’s head office location

Factors	Specific considerations	Does Vancouver have a competi-
Fiscal incentives	• Corporate tax advantages	yes
	• High purchasing power	yes *
	• Attractive personal taxes	yes
Soft factors	• Quality of life	yes
	• Personal preference of the CEO	n/a
	• Image of host country and/or city	yes
Human resources	• Supply of qualified managers	yes
	• Ability to attract qualified managers	yes *
	• Presence of top international schools	yes
	• Labour availability	yes*
Business environment	• Support of authorities	yes
	• Well-developed business support services	yes
	• Stable business environment	yes
Infrastructure	• Information & communication services	yes
Spatial location	• Proximity to main operation/production site, investors or future interests	yes
	• International accessibility	yes

Yes = Strong Competitive advantage

Yes* = Competitive advantage, yet experiencing challenges

Strengthening Vancouver's competitive advantage is the best strategy to foster the emergence of new companies, as well as retain and attract mineral industry head offices. The role the City of Vancouver can play supporting the existing competitive advantages of the city are significant and can take different forms depending on the key factors one seeks to influence:

- **Fiscal incentives:** The type and level of fiscal incentives required by the industry are under the jurisdiction of the provincial and federal governments. The role of the City of Vancouver is limited in this area.
- **Soft factors:** The image of Vancouver influences the type of ventures hosted in the city. Vancouver's goal to be the greenest city in the world can help draw companies with strong commitments to sustainable practices.
- **Human resources:** Current initiatives promoted by the industry and government include cooperation with educational institutions and professional associations. The support of the City of Vancouver in the industry's recruitment strategies can benefit both parties by attracting international professionals and ensuring the supply of a local qualified workforce.
- **Business environment:** The supportive provincial policy climate and the existence of a strong and well-developed mineral industry cluster paint a positive picture for the prospects of the industry. Closer collaboration between the City of Vancouver and the mineral industry can contribute to this enabling environment.
- **Infrastructure:** Addressing concerns with availability of public amenities and services is a key area to attract and retain qualified professionals.
- **Spatial location:** Understanding the type of companies attracted to this location is important for the City of Vancouver in terms of developing a targeted marketing strategy for investors and companies. Vancouver's competitive advantage is its proximity to the Chinese and Indian markets, as well as its proximity to emerging mining jurisdictions in North and South America.

C.2. External factors

Independent from internal factors, there are external factors associated with head office relocation where municipal-level government and policy are not as influential. In 2011, BHP

Billiton relocated its Canadian head office from Vancouver to Saskatchewan. On explaining its rationale behind the move, BHP Billiton said: “This relocation will be phased over the coming months and reflects the company’s commitment to establish a premier potash business managed from Saskatchewan, near its flagship potash development project.”⁷⁷ Thus, business strategies addressing growth opportunities, a company’s new direction, opening new markets and downsizing are key external factors in relocation decisions. Market volatility, as well as merger and acquisition activity lay outside the influence of municipal policy. However, the mineral industry has adapted well to thrive under these conditions. The industry’s ability to turn threats into opportunities is key to its success.

- **Market volatility:** Although volatile global financial markets affect the ability of junior companies to raise money to fund their exploration projects, high commodity prices continue to provide incentives for the industry to grow. In fact, a recently published report by Price Waterhouse Cooper (PwC) argues that market volatility is now a new norm for mining companies. It is in volatile times that the strength and value of the clustering of companies becomes more evident.
- **Merger and acquisition activity:** In 2010, Canadian exploration mining companies were at the centre of mergers and acquisition activity worldwide. Mergers and acquisitions (M&A), joint ventures and strategic alliance have become the most common strategies for growth within the industry.

Despite high market volatility, the positive outlook for the mineral industry has remained, in particular for junior mining. Past research has found that despite turnover and migration of head offices due to M&A activity in any industry, the highest degree of head office growth in any given North American city is the result of the expansion and consolidation of small local companies.⁷⁸ Supporting the mineral industry cluster is a wise strategy for retaining mining head offices, as well as encouraging the growth and emergence of new local junior mining companies and other companies. Teck Resources, Silver Wheaton, The Hunter Dickinson Group and Hemmera are cases in point of small local ventures turned industry leaders and innovators.

D. Opportunities

Over the past couple of years the mineral industry has re-emerged from the economic recession with a renewed momentum. The following pages will examine the opportunities created by the industry's renaissance.

D.1 British Columbia's mining renaissance

Due to their positive growth projections and the rising value of minerals and metals, mineral exploration and mine development are considered key economic drivers in B.C. Preliminary estimates for 2011 exploration expenditures (\$463 million) show a 35% increase from 2010 numbers (\$341 million).⁷⁹ The rising demand for coal, minerals and industrial metals resulting from rapidly urbanizing countries like China and India, as well as record prices in precious and base metals, has contributed to the resurgence of both mining and mineral exploration in the province. The growth and success of the industry have been met with the support and commitment of both federal and provincial governments. The 2011 BC Job Plan set out an ambitious goal of ensuring 8 new mines and 9 expansion permits are in placed by 2015.⁸⁰ Furthermore, the province has also committed to streamlining the environmental assessment and permitting processes that apply to new and expanding exploration projects and mine developments.

Box 9. Major mining operations in British Columbia

- 10 major metal mines
- 10 major coal mines
- 35 major industrial mineral mines
- 2 smelters
 - Rio Tinto Aluminium Smelter
 - Teck Trail Zinc Smelter & Refinery
- 5 Major mine expansions
 - Gibraltar
 - Endako
 - Mt Polley
 - Highland Valley Copper & Huckleberry
- 2 major mines in construction (In-production date)
 - New Afton (Mid-2012)
 - Mt. Milligan (2013)

At the federal level, the development of R&D initiatives such as the CANMET Mining and Mineral Sciences Laboratories (MMSL) is another initiative targeted to foster a cutting-edge mineral industry. CANMET-MMSL provides quality research and sound scientific advice to the mineral industry, and provincial and federal government departments.⁸¹ Teck’s Highland Valley Copper mine is British Columbia’s first demonstration site of green-mining techniques under MMSL’s Green Mines-Green Energy Program.⁸² The Vancouver Economic Commission (VEC) can harness this renewed interest from provincial and federal governments to support Vancouver-based companies striving to become greener enterprises.

D.2. Green mining

Green mining is about “finding innovative ways to minimize waste, transform it for other uses, and leave behind only clean water, rehabilitated landscapes and healthy ecosystems.”⁸³ In 2009 Canadian Ministers endorsed the Green Mining Initiative (GMI). The Green Mining Initiative focuses on issues such as water quality, waste management and site rehabilitation.⁸⁴ The objective of this initiative was threefold: a) to improve the mining sector’s environmental performance, b) to ensure the international competitiveness of the industry and; c) to create green technology opportunities for Canadian businesses.⁸⁵

Table 7. Mined minerals/rare earths essential for emerging green technologies

Mined raw-material	Emerging Green technology uses
Antimony	Antimony Tin Oxide, flame retardant, micro capacitors
Cobalt	Li-ion batteries, synthetic fuels
Antimony	Thin layer photovoltaics, IC, WLED
Germanium	Fibre optic cable, IR optical technology
Gallium	Displays, thin layer photovoltaics
Platinum	Fuel cells, catalysts
Indium	Catalysts, seawater desalination
Niobium	Micro capacitors, ferroalloys, high-speed low alloy steel
Palladium	Permanent magnets, laser technology
Tantalum	Micro capacitors, medical technology

Source: Georghiou L.; Varet, J. & Larédo, P. ““Breakthrough technologies for the security of supply of critical minerals and metals in the EU economy: Synthesis Report.” Blue Skies Project. January 13-14, 2011. Brussels.

After all, green technologies provide innovative solutions for greener and more energy efficient waste management treatments, mine reclamation strategies, and water treatments to name but a few. Consistently, the development of green technologies requires large amounts of mined minerals, metals and rare earths. Table 8 shows the essential mined minerals for emerging green technologies identified by the latest European Union report on “Breakthrough technologies for the security of supply of critical minerals and metals in the EU economy.” Recent geological surveys of the Rocky Mountain ‘Carbonatite’ Belt point to over 90 occurrences of ultramafic associated nickel, as well as alkaline rock associated rare metals.⁸⁶ B.C.’s high potential for discovering rare earth elements and metal deposits has triggered multiple early stage exploration activity in the Rocky Mountain Belt.⁸⁷ Burgeoning new markets and emerging uses of minerals/metals in green technologies contribute to an optimistic forecast for the industry. Finding funding synergies that allow closer collaboration between Vancouver’s green technology and mineral industry can prove greatly beneficial.

Table 8. Companies exploring for rare earth elements/rare metals in British Columbia

Exploration focus	Company name
Rare Earth Elements	<ul style="list-style-type: none"> o Arctic Star Exploration o Bolero Resources o Canadian International Minerals o Commerce Resources o Critical Elements o Eagle Plains Resources o Electric Metals o International Montoro Resources o Northcore Resources o Orange Minerals o Rara Terra Minerals o Spectrum Mining
Rare Metals	<ul style="list-style-type: none"> o Commerce Resources o Critical Elements o Rara Terra Minerals o Taseko Mines

Source: Rocky Mountain Rare Metal Belt Website. “New British Columbia Ministry of Energy and Mines Release: Specialty & Rare Metals in British Columbia, Canada” Last updated on November 12, 2011.

Currently, Vancouver hosts mineral industry companies who are globally recognized by their practices in sustainable resource management. Vancouver's pursuit of international recognition as the 'greenest city' can also become a competitive advantage for those mineral sectors committed to sustainable practices. Engaging a thriving industry is important due to their potential for job creation and the amount of expertise they attract and the resources mobilized within Vancouver. The City of Vancouver's goal of becoming a centre for green jobs can benefit from establishing closer relationships between the emerging green technology industry and the thriving mineral industry. The Vancouver Economic Commission can play a pivotal role by identifying potential synergies between both industries.

Section IV. Conclusion

Vancouver is set to benefit from high mineral and metal prices, as well as the positive outlook on exploration expending worldwide. Vancouver's challenge is to promote and accommodate the growth of mid-size and senior companies, while continuing to strengthen its advantages as the world's junior exploration capital. Working in collaboration with industry leaders, federal and provincial governments, education/training institutions and other stakeholders to address the industry's challenges can strengthen Vancouver's position as a global capital of junior exploration mining.

At the municipal level, VEC can lead conversations on the need to balance competing land uses to address the limited availability of mid-size office spaces in the downtown area. Investing in improved public infrastructure and amenities can provide added value for Vancouver's office space, as well as, help attract qualified professionals. The industry's leadership in corporate social responsibility, as well as their commitment to green mining can be harnessed to turn Vancouver into the greenest mining & mineral exploration capital of the world. Canada's Green Mining Initiative provides Vancouver with a framework for linking the mineral industry with the emerging green technology industry. This is a golden opportunity to strengthen the industry, while also capitalizing on the industry's commitment to green mining.

Section V. Policy Recommendations

VEC can play an important role in harnessing the industry's commitment to green mining practices through tangible policy initiatives that help identify synergies between the mineral and green technology industries. This section suggests four main action areas to assist VEC in assessing the level of interest and type of opportunities that can be created by linking these two industries.

Policy Recommendation 1. Identify synergies between the mineral and emerging green technology industry

PILOT PROJECT

The False Creek Flats have been identified as a site with the potential to be the centre of green technology jobs in Vancouver. VEC can broker a pilot project to cluster companies of both industries in a site within the False Creek Flats. The City of Vancouver can launch a proposal call for joint-initiatives between green technology and mineral industry companies to locate their head offices and light industrial uses in this site. Allowing the mix of office space on top of the light industrial use will serve as an incentive for these partnerships. Given that fostering collaboration between these industries is in line with federal and provincial initiatives, VEC should collaborate with these levels of government to secure the incentives necessary to get the industries to participate in this project. Although only one proposal will be selected, all proposals should be presented back to the industry leaders and government representatives, as they will signal avenues and opportunities for them to explore in the future.

CONFERENCE

In order to assess the level of interest and the type of incentives needed for the industries to capitalize on this opportunity VEC should organize a conference that brings together industry leaders from the green technology and mineral industry to explore synergies

Policy Recommendation 2. Foster and celebrate green practices in the industry

PUBLIC RECOGNITION TO LEADERS IN GREEN MINING

An important step towards building a closer relationship between the City of Vancouver and the mineral industry is to celebrate the industry's leadership, and innovation around green and sustainable practices. Currently, there are a number of ceremonies that VEC could collaborate with such as:

- AMEBC's Awards for Excellence in Social and Environmental Responsibility and Award for Excellence in Leadership and Innovation in Mineral Exploration Health and Safety.
- MABC's Mining and Sustainability Award

The City of Vancouver should assess the virtues of organizing a separate award ceremony in order to recognize best sustainable business practices across industries. This ceremony could provide an opportunity to bring together leaders from diverse industries to share on their cutting-edge green practices.

ADVOCATE FOR THE INDUSTRY

VEC can advocate for solutions to industry's issues and concerns at the provincial and federal level such as the streamlining of environmental assessment, permitting processes, as well as, a provincial commitment to the Aboriginal treaty process.

Policy Recommendation 3. Collaborate in the development of a comprehensive marketing strategy for the industry

GLOBAL CAPITAL OF GREEN MINING & MINERAL EXPLORATION

VEC should also collaborate with the mineral industry's professional associations, higher-level education institutions, industry associations and higher levels of government to develop a coordinated marketing strategy to promote jobs within the mineral industry. The image and reputation of Vancouver influences the type of ventures hosted by the city. Vancouver's goal to be the greenest city in the world can help draw companies with strong commitments to sustainable practices. The 2011 AMEBC Annual Round up Conference gathered over 8,200 participants from all over the world. Collaborating with AMEBC in future conferences is a valuable opportunity to expose a captive audience to the City's support for green mining and mineral exploration.

Furthermore, this comprehensive marketing strategy should address the lack of public awareness around the importance of mining for everyday life, as well as its importance for emerging green technologies. VEC can start a conversation with the industry's professional associations, as well as education and training institutions on potential joint-programming opportunities to promote and celebrate green mining. Ideally, VEC will negotiate the integration of well-established initiatives into this comprehensive marketing campaign. Some examples of these current initiatives are:

- AME BC Speaker Series: Three times a year a breakfast or lunch event provides a networking and educational opportunities for those involved or interested in mineral exploration.
- BC Mining Week Community Fair: Once a year, school boards, industry associations and the provincial government design a week-long joint-program to celebrate and raise awareness of the importance of mining for British Columbians.
- High school career fairs, university recruitment fairs and career workshops: These events are often organized in collaboration with professional associations to link future employers with current students.

Policy Recommendation 4. Support further research into the industry

OFFICE & INDUSTRIAL SPACE

In order to identify the factors influencing the relocation decision among different industry sub-sectors VEC should conduct periodic exit interviews with relocated companies (E.g. Engineering firms, mining companies, suppliers, etc.). Researching the specific needs of the industry's sub-sectors separately will allow VEC to better connect these companies with office spaces along the Broadway Corridor and the Canada Line Corridor for example. Furthermore, logging relocation decisions and triggers can also assist the City of Vancouver in assessing the demand for industrial space in Vancouver.

SUPPORT R&D INITIATIVES

VEC can also collaborate with higher-level education institutions to design R&D programs that are consistent with the industry's commitment to sustainable mining practices, mineral/metal recycling and green mining solutions.

Glossary

Private-Placement Exemptions: Under given circumstances, the BC Securities Commission exempts individuals and companies from the requirement to register as a seller of securities and as a prospectus (trader).

Porphyry copper deposits: These copper ore bodies, typically contain between 0.4 and 1 % copper with smaller amounts of other metals such as gold, molybdenum and silver.

Primary Mining: Extracting metals, non-metallic minerals and coal from the ground.

Silver Streaming: A streaming company makes an agreement with a mining company to purchase all or part of their mineral/metal production at a low, fixed, predetermined price.

Smelting: It is the metallurgical process employed to separate a mineral from its ore. The impurities from a metal ore are separated through the use of high temperatures and chemical reducing agents.

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