

Economic Impact Analysis

Mining Association
of British Columbia

October 2011





Photo & cover: Daniel Henshaw, courtesy of Imperial Metals Corporation

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Executive summary

Introduction

British Columbia's economy benefits from the direct expenditures of goods and services, employment of workers and the generation of tax revenues from the provincial mining industry. Mining provides jobs, pays salaries and generates value in British Columbia. However the economic contribution of mining is greater than these direct effects. Mining operators purchase inputs from suppliers and in turn these suppliers purchase goods from other companies. Employees spend wages at local businesses, whose owners in turn spend the proceeds on new supplies and other goods. Governments at the federal, provincial and local levels collect taxes on these activities.

Mining activity within British Columbia includes exploration activity, mine development, mineral production, and mine remediation. The industry produces metallurgical coal, copper, molybdenum, gold, zinc, silver, lead, aggregates and industrial minerals.

The Mining Association of British Columbia ("MABC") engaged PricewaterhouseCoopers LLP ("PwC") to quantify the economic contributions of the provincial mining industry to British Columbia's economy. This report uses data collected through PwC's latest annual mining survey, *Seize the Day, the Mining Industry in British Columbia 2010*.

Economic impact of BC's mining industry

The estimated economic impacts of mining industry expenditures of \$5.2 billion are estimated to be \$8.9 billion in total output. Expressed as a ratio, each dollar spent in the BC mining industry can be said to have generated \$1.73 of total impact (direct, indirect and induced). This represents gross spending by the mining industry in 2010 of an estimated \$8,933.9 million in output impacts. Total value added generated by the mining industry and its direct suppliers through spending is estimated to be \$4.7 billion. In 2010, this represented approximately 2% of British Columbia's provincial GDP.

Total tax revenue generated was approximately \$938.6 million with \$449.2 million in federal tax revenue, \$414.8 million in provincial tax revenue and \$74.6 million from municipal taxes generated through spending. In addition, \$364 million was reported as mineral royalties and mineral land taxes.

Direct, indirect and induced employment is estimated at 45,703 jobs and consists of the direct employment of 21,112 jobs of which 8,195 jobs represent employment at operating mines. Direct employment impacts also include jobs related to the exploration and construction phase when mining companies are highly labour-intensive as well as jobs involved with the transportation of mine output from the mine site. In 2010, the direct employment attributed to the mining industry and its suppliers was approximately 2% of British Columbia's labour force. The balance of employment is made up of indirect employment of 16,590 jobs and induced employment of 8,001 jobs.

The results of the economic impacts are summarized in the table below.

The direct effects include the economic activity of mine operators, companies providing support to mine operators, and transportation companies that carry mine output to purchasers. Indirect effects include the economic activity of suppliers, including suppliers of capital goods for mining operations. Induced effects measure the economic impact of spending of payrolls resulting from direct and indirect activity.

Table E1 Summary of the economic impact of the BC mining industry, 2010

Impact	Direct (\$ millions)	Indirect (\$ millions)	Induced (\$ millions)	Total (\$ millions)
Output	5,166.5	2,732.8	1,034.6	8,933.9
GDP	2,748.8	1,319.0	622.5	4,690.3
Taxes	495	253.3	190.3	938.6

Impact	Direct (No. of Jobs)	Indirect (No. of Jobs)	Induced (No. of Jobs)	Total (No. of Jobs)
Employment	21,112*	16,590	8,001	45,703

*Direct employment from operating mines as reported in the PwC 2010 mining industry survey was 8,195 and is included in the total 21,112 direct jobs.

1. Seize the Day, the Mining Industry in British Columbia, 2010, PwC.

Background and study purpose

Background

In British Columbia (BC), the exploration and mining industry is an important contributor to provincial economic activity and contributes positively to the economic and social development of communities throughout BC. Across the province, the mining industry supports associated industrial equipment, financial, transportation, technical and professional services industries. The mining industry also contributes to the sustainability of rural and northern economies, such as the Prince George area and Kootenays. The mining industry can also be a major driver of development and sustained economic activity in remote regions, where it offers employment, education, and economic growth opportunities that may have otherwise been absent.

Mining is increasingly recognized as a crucial provider of commodities contributing to the success of the economy. BC mining activity produces raw materials that are used throughout the economy and include metallurgical coal, metal ores and industrial minerals. Metallurgical coal, or coking coal, is a vital ingredient in the steel making process. Metal ores produced in BC such as copper, zinc, molybdenum and gold provide manufacturers with key inputs for a wide range of consumer and industrial products. Sand, stone and gravel provide the foundation for new construction and industrial minerals are important components of products including pharmaceuticals and automobiles. BC's mining industry works to promote health and safety, ensure the industry is environmentally responsible, and adopts the latest technologies in order to remain competitive on a worldwide basis. WorkSafeBC statistics for injuries occurring on the job show that the mining industry is considered as the safest heavy industry in British Columbia.

Figure 1.1 2010 BC mining survey participant locations



Source: 2010 Mining Survey

Study purpose

The Mining Association of British Columbia (“MABC”) identified the need to determine the economic contributions of British Columbia’s exploration and mining industry to the provincial economy and engaged PricewaterhouseCoopers LLP (“PwC”) to conduct the study. The purpose of this study is to estimate an independent and objective economic impact of the BC mining industry reporting on the direct, indirect and induced economic impacts in terms of output, GDP, employment, and government tax revenues.

PwC’s work on the study was led by its economics practice, which has conducted similar studies of other major industries. This study uses the aggregated results from PwC’s annual BC mining industry survey, *Seize the day: the Mining Industry in British Columbia 2010* (“2010 Mining Survey”), which includes the participation of 42 mining companies. The location of the mine operations are shown in Figure 1.1.

The scope of the study includes the analysis of the economic impacts and benefits produced by the mining industry and calculation of the economic impacts. The calculation of the mining industry impacts was conducted to determine the industry’s contribution to British Columbia’s output, GDP, employment and tax revenues.

Consistent with the industry survey, mining activity is defined as the exploration for, and extraction and primary processing of, metals and coal. Primary processing includes processing of raw materials through to refined metals, but does not include fabrication. In addition, the survey data has been augmented by exploration activity information published by the Ministry of Energy and Mines.

1.3 Data collection, availability and reliability

The economic impact analysis of the BC mining industry is based on aggregated survey data from PwC’s 2010 BC mining industry survey. Additional material was collected through a review of data on exploration and mining activity published by the Ministry of Energy and Mines, and other sources.

Data sources include:

- BC Stats and Statistics Canada input-output multipliers
- Aggregated expenditure data from PwC’s 2010 Mining Survey
- Publications on exploration and mining from the Ministry of Energy, Mines and Petroleum Resources
- MABC reports and publications including, annual reports and Labour Market Task Force Reports
- Industry statistics were mainly sourced from Statistics Canada

1.4 Organization of the report

The remaining sections of the report are organized as follows:

- **Section 2** provides an overview of BC’s mining industry and current trends
- **Section 3** provides a description of economic impact methodology and provides the results of the economic impact analysis by category of expenditure, analysis of employment impacts, and regional impacts
- **Section 4** contains a summary table of the economic impact analysis

1.5 Restrictions and limitations

PwC has relied upon the completeness, accuracy and fair presentation of all information, data, advice, opinions or representations obtained from public sources and the Client (collectively, the “Information”). The findings in the Report are conditional upon such completeness, accuracy and fair presentation of the Information. PwC has not verified independently the completeness, accuracy and fair presentation of the Information. We are providing no opinion, attestation or other form of assurance with respect to our work and we did not verify or audit any information provided to us.

PwC reserves the right at its discretion to withdraw or make revisions to the Report should PwC be made aware of facts existing at the date of the report that were not known to PwC when it prepared the Report. The conclusions and recommendations are given as of the date hereof and PwC is under no obligation to advise any person of any change or matter brought to its attention after such date, which would affect the findings and conclusions and PwC reserves the right to change or withdraw the Report.

PwC understands this report will be made available to association members and to the general public. We do not accept responsibility for any losses arising from unauthorized or improper use of this Report.

Overview of the BC mining industry

2.1 About the industry

British Columbia's mines produce a broad range of commodities such as copper, coal, gold, silver, lead, zinc, sand and gravel, and over 30 industrial minerals. BC is Canada's largest producer of copper, the only producer of molybdenum and the largest exporter of coal. Exploration activity in the province is mainly balanced across its mining commodities. This is a reflection of the province's geological wealth and how mining is an essential part of the provincial economy. More than half of the Canadian exploration and mining companies are based in British Columbia, which has the world's largest concentration of exploration companies and mining professionals. In addition, British Columbia's resources are well positioned relative to the world market with readily accessible transportation infrastructure through its ports, rail system and highways, therefore making mine investment attractive in the province.²

The mining sector business cycle includes several distinct stages. The cycle begins at the exploration stage with the purpose of discovering mineral deposits with economic potential. The successful identification of these deposits can eventually lead to an operating mine although this process can take many years before being realized.

After a mineral deposit has been identified, tested, and assessed for its economic feasibility, a determination is made as to whether it is worth mining. If so, construction and development of the mine site begins. The construction phase may include building a mill or concentrating plant in addition to support facilities such as transportation infrastructure, tailing disposal facilities, power generating facilities, and office and lab facilities. For mine sites located in remote areas, facilities for housing and feeding the workforce may also need to be built. During mine development, the ore body is prepared for mining and depending on the characteristics of the deposit, can be mined from either underground or from the surface. Underground mines may require development of surface to ore body tunnels, ventilation shafts or creating other access to ore blocks.

Preparing the site for a surface mine may include stripping overburden and removal of waste rock.

After the mine site is prepared, mining operations begin and includes extraction and mining as well as processing and refining. The level of processing and defining on site will depend on the ore being mined and the facilities available at the mine site. Mine life can vary from a few years to several decades depending on the quality of the ore present and production rates.

To ensure mine output can be delivered efficiently for further processing, transportation routes are required. Because mines site are typically located in remote and sometimes inaccessible areas, construction of additional transportation infrastructure is sometimes required.

Mine remediation can occur throughout the mine life and can include such activities as grading and stabilizing the landscape, replacing topsoil, and regenerating plant matter. Mining companies can also commit to monitor environmental conditions in remediated areas for a period after the mine closure. In addition, long term water treatment may be required.

Figure 2.1 Mining Sector Business Cycle



British Columbia exploration and mine development

Over half of Canadian exploration and mining companies are based in British Columbia, which contains the world's largest concentration of exploration firms and mining professionals.³ As of July 2011, the BC Environment Assessment Office reports 3 metal and coal mining projects under the provincial review process, 22 in the pre-application stage and 1 project that completed the process in 2010.⁴ There are three new major metal mines in the construction phase: Copper Mountain outside of Princeton (now operating), New Afton copper-gold mine near Kamloops and the Mount Milligan copper-gold development project 155km northwest of Prince George, as well as a pipeline of projects including Red Chris, a copper-gold property owned by Imperial Metals Inc. Imperial is working towards development of a 30,000 ton per day open pit mine to commence operations upon completion of the Northwest Transmission Line (NTL). Provincial and Federal environmental approvals for the project have been received and Mine Act permitting through the Northwest Mine Development Review Committee is currently underway.

In addition, several requests for considerable mine expansion have been put forward. These include the Willow Creek Mine (Walter Energy), Endako Mine (Thompson Creek Metals), Mount Polley (Imperial Metals) and Huckleberry Mine (Huckleberry Mines, Imperial Metals). A number of other major development projects are close to the mine permitting stage and are expected to progress over the next few years. This level of activity illustrates continued strength in mine development in British Columbia.

BC mining industry suppliers

Mining industry suppliers are represented by the Mining Suppliers Association of British Columbia (MSABC), a partner of MABC. MSABC categorizes its 174 members into three categories:

- Suppliers (117),
- Contractors (25), and
- Consultants (32)

Of these, 69% are located in the Lower Mainland, 22% are located in other parts of BC and the remaining 9% are in other Canadian provinces or US states.

Suppliers of goods and services to BC's mining industry represent a diverse array of industry sectors. The majority of suppliers include: heavy equipment, transportation equipment, industrial equipment, engineering services, metal fabricating and machining, and water treatment. Contractors are represented by: blasting operations, construction services, professional services, and transportation distribution services. Multi-disciplined engineering services, construction management, human resource and management consultants and accountants make-up the majority of consultants to the industry.

In PwC's 2010 Mining Survey, mining companies were asked to provide information on the percentage of purchased goods and services obtained from British Columbia suppliers. Although the number of respondents reporting on this question was too low to extrapolate to the broader industry, the respondents indicated over two-thirds of purchases were obtained from local suppliers.

BC Government support

The government of BC supports mining exploration as an essential part of the provincial economy. British Columbia offers attractive tax rates and programs to the mining industry. The Mining Exploration Tax Credit Program and Exploration Investment Tax Credit provide incentives for investors to seek out BC as a destination to explore mining activities. Providing further incentive, the Mining Exploration Tax Credit has also increased to 30% for qualified mineral exploration undertaken in prescribed Mountain Pine Beetle affected areas of the province.

2.2 Industry trends

Commodity price trends

According to the 2010 Mining Survey, gross mining revenues in 2010 amounted to \$7.9 billion representing an increase of \$0.9 billion from the previous year. This has been fuelled by increases in coal and copper sales. Coal prices increased by 15% and remain the most significant component of provincial mining revenues representing approximately 51% of total net revenues reported by survey participants.

Coal, copper and molybdenum are expected to remain BC's top three most important commodities by value as can be seen in figure 2.2. Coal valued at \$4 billion continues to lead in terms of overall value. Nearly all of this production is exported outside of the province.

2. British Columbia Mines & Minerals Exploration Overview 2010, Ministry of Natural Resource Operations, Ministry of Forests, Mines and Lands

3. British Columbia Mines and Mineral Exploration Overview 2010

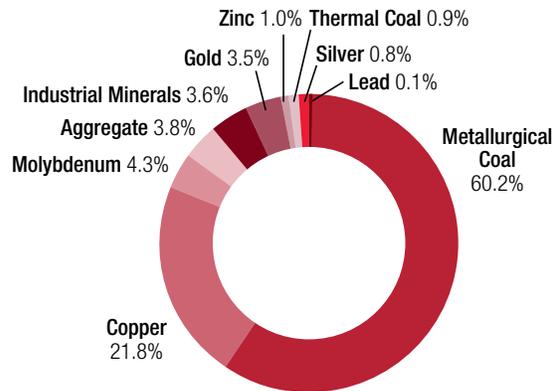
4. Information obtained from the Project Information Centre from the BC Environmental Assessment Office

BC mining exports

In 2010, more than half of BC's mining exports (metallic minerals and coal) were shipped to two countries—Japan and China. With China remaining one of the fastest growing markets and the world's largest single source of demand for minerals, demand for coal is expected to grow at rates observed prior to the global recession. A recovery in metallurgical coal will mainly be fuelled by high urbanization rates in China. BC mining exports to China have soared more than 12 fold since 2001, and will likely be a continuing source of demand for this commodity.

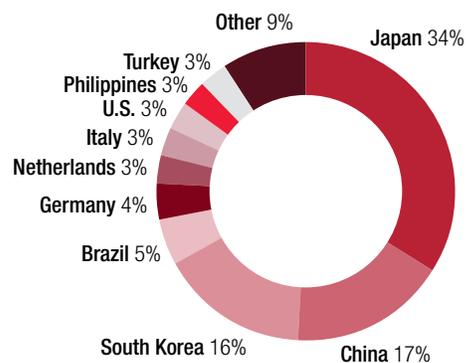
British Columbia has experienced strong recovery of the mining and mineral exploration industry and this growth is expected to continue into the future with world demand for commodities at record levels.

Figure 2.2 Percentage value of BC commodities to total, 2010



Source: Mining and Mineral Exploration in British Columbia, Overview 2010

Figure 2.3 BC mining exports (C\$) by market, 2010



Source: Industry Canada Trade Data Online (TDO)

BC's mining industry labour market

The most significant challenge to the growth of BC's mining industry over the next five years will be to avoid a labour shortage brought about as a result of an aging workforce and a decline in human capital. Labour shortages are anticipated to occur as a result of industry growth, baby boomer retirements, and competition from other industries and locations outside BC.

Recognizing the risks of a labour market shortage, MABC convened a task group of industry stakeholders to investigate this issue.⁵ In 2007, the BC Mineral Exploration and Mining Industry Labour Shortage Task Force, commissioned a labour market research study to investigate the labour market for mining. Results of the study indicate there will be nearly 15,000 mining-related job openings over a ten year period ending in 2017.⁶ It was determined that this shortage can be attributed to a significant reduction of workers and training programs that occurred during the 1990s. The following bar chart represents the top occupations facing the most challenges in recruitment and retention over a five year period (2008 – 2012).

In response to the results of the labour market analysis, the Labour Shortage Task Force developed a human resources strategy to address the forecasted labour market gap. The resulting strategy is intended to be implemented by industry firms, employment service providers and education institutions.

Strategic long-term human resource goals identified in the strategy from 2008 to 2012 include:⁷

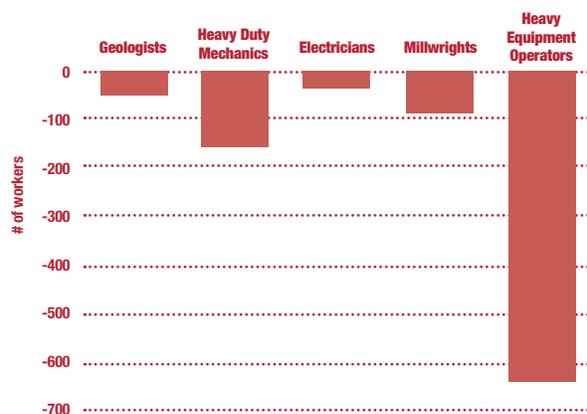
- **Image and career promotion** – work to improve the image of BC's mineral exploration and mining industry as a career option, and distribute career information to potential workers.
- **Attraction and recruitment** – work to increase individual employer capacity to attract and recruit workers from all available talent pools including Aboriginal people, immigrants, mature workers, women and young people.
- **Retention and turnover** – reduce industry turnover rate and increase industry and individual employer capacity to retain new and existing workers.
- **Education and training** – increase participation and completion of mineral exploration and mining education and training programs for high-demand occupations, and create a sustainable training delivery model.

- **Sustainability** – create and sustain a business model for implementing and evaluating the human resource plan with the ability to respond to changing circumstances and priorities.

An important issue for the industry is the representation of women in mining and exploration. Results from a 2010 national report, *Ramp Up: Women in Mining*, determined that women represented 14.4% of employees in mining and exploration.⁸ This was reported as the lowest percentage of women among primary industry categories in Canada.

Since the study, the percentage of women in the mining industry nationally has been increasing but is reported to remain below the overall labour force average of 47.4%. Through the Task Force, MABC is supporting a comprehensive survey of women in BC's mining industry with results expected in 2011. The results of the study are intended to educate the industry on the challenges facing women and the opportunities that are available to them in the mining industry.

Figure 2.4 Labour Supply and Demand Gap for Selected Occupations, 2008–2012



Source: Labour Shortage Task Force, 2008

5. The BC Mineral Exploration and Mining Industry Labour Shortage Task Force was supported by MABC, the Association of Mining Exploration BC (AME BC), the Province of BC, and Service Canada. The Task Force brought together senior business leaders, employee representatives, industry associations, training and education providers, Aboriginal representatives and government agencies.

6. Roslyn Kunin & Associates, BC Mining Labour Force Study, prepared for the BC Mineral Exploration and Mining Industry Labour Shortage Task Force.

7. British Columbia Mineral Exploration and Mining Industry Human Resources Strategy 2008-2012, BC Mineral Exploration and Mining Industry Labour Shortage Task Force, June 2008

8. Ramp-UP: A study on the status of women in Canada's mining and exploration sector, Women in Mining Canada, 2010



Photo: Daniel Henshaw, courtesy of Imperial Metals Corporation

3. Economic impact analysis

3.1 Economic impact methodology

This study uses BC's input-output accounts to estimate how mining industry activities have impacted the provincial economy in 2010. The input-output approach was selected because of its widespread use, and ability to facilitate comparisons with economic impact studies of other industries. The fundamental philosophy behind economic impact analysis is that changes (increases or decreases) in expenditures are multiplied through the economy. An increase in spending on some goods and services generates a need for additional goods and services and by using this approach it is possible to track this cascading effect through the economy. In addition, using the input-output accounts, the appropriate economic impact multipliers were developed and applied to arrive at the economic impacts of the activities of BC's mining industry.

Economic impacts may be estimated at the direct, indirect and induced levels.

- **Direct impacts** – are changes that occur in “front-end” businesses that would initially receive expenditures and operating revenue as a direct consequence of the operations and activities of a business. For the mining industry, these include activities directly attributable to mining such as output of mining companies, including the transportation of mine output from the mine to the purchaser.
- **Indirect impacts** – arise from changes in activity for suppliers of the “front-end” businesses (mining suppliers) such as contractors and other companies providing inputs (goods and services) to mining companies.
- **Induced impacts** – arise from shifts in spending on goods and services as a consequence of changes to the payroll of the directly and indirectly affected businesses (in other words, these are impacts arising from the changes to the wages and salaries of those employed in the direct and indirect industries). These include spending by mining and supplier employees on consumption items of which a portion can be attributed to the mining industry.

Estimating direct, indirect and induced economic impacts are generally done through the use of input-output multipliers. The most commonly used of these measures are output, Gross Domestic Product (GDP), employment, and government tax revenues. Each of these measures is described below.

- **Output** – represents the total sum of all economic activity that has taken place in connection with expenditures made through the BC mining companies (i.e., revenues). This is the broadest measure of economic activity.
- **GDP** – the “value added” to the economy by an industry. Since the GDP figure captures the difference between the value of output and the value of intermediate inputs, it represents the unduplicated total value of economic activity that has taken place. The GDP impacts in this report represent the value added to the economy as a result of the expenditures of mining companies in BC.
- **Employment** – the number of additional jobs created as a result of the expenditures made by mining companies in BC.
- **Government Tax Revenues** – arise from personal income taxes, indirect taxes less subsidies (e.g. sales tax), corporate income taxes and is measured as the total amount of tax revenues generated for each level of government (municipal, provincial and federal). By definition, government tax revenues generated using the input-output approach does not include royalties collected.

The economic impacts presented in the following section represent impacts generated in the year 2010.

3.2 Estimated economic impact of BC's mining industry

The direct, indirect and induced economic impacts presented in Table 3.1, are based on the mining industry's expenditures in the amount of \$5.2 billion.⁹

The estimated total output of \$8.9 billion is made up of \$5.2 billion in direct impacts (the value of expenditures reported by BC mining companies in the 2010 Mining Survey), indirect impacts of \$2.7 billion and \$1.0 billion in induced impacts. As a result, expenditures can be said to have generated \$3.7 billion in impacts through spending on mining projects. Contribution to GDP is estimated at \$4.7 billion and consists of \$2.7 billion in direct, \$1.3 billion in indirect, and \$622.5 million in induced impacts. In 2010, the mining industry and its suppliers contributed approximately 2% to provincial GDP.

Estimated local, provincial and federal tax revenues generated is approximately \$938.6 million. This consists of \$495 million in direct, \$253.3 million in indirect, and \$190.3 million in induced impacts. Tax revenue generated using the input-output approach does not reconcile with the direct tax payments reported in the 2010 Mining Survey.

Table 3.1 Summary of the economic impact of the BC mining industry

Impact	Direct (\$ millions)	Indirect (\$ millions)	Induced (\$ millions)	Total (\$ millions)
Output	5,166.5	2,732.8	1,034.6	8,933.9
GDP	2,748.8	1,319.0	622.5	4,690.3
Taxes	495	253.3	190.3	938.6
Municipal	37.3	21.2	16.1	74.6
Provincial	223.2	103.4	88.2	414.8
Federal	234.5	128.7	86.0	449.2
Impact	Direct (No. of Jobs)	Indirect (No. of Jobs)	Induced (No. of Jobs)	Total (No. of Jobs)
Employment	21,112*	16,590	8,001	45,703

*Direct employment from operating mines as reported in PwC's 2010 mining industry survey is 8,195 and is included in the total direct jobs of 21,112.

Government tax revenues generated using the input-output approach does not include royalties collected. However, mineral tax and mineral land taxes collected by the Province of British Columbia for the year ending March 31, 2011 were reported as \$364 million. Also not included is the one-off port fee of approximately \$200 million reported by one mining company in PwC's 2010 mining survey. In addition, the input-output approach includes personal income taxes (which were not reported in the 2010 mining survey). Thus, government tax revenues reported in this study should be interpreted as conservative and include impacts from personal income taxes, indirect taxes and corporate income taxes.

Direct employment from industry expenditures has been estimated as 21,112 jobs of which 8,195 are employed as part of the operating phase of the mining companies and is equivalent to the number of direct payroll employees reported during 2010. The majority of the remaining direct employment impacts are accounted for during the construction and exploration phase of a mine when mining companies are highly labour-intensive. These include construction workers contracted to work on the mine site. Direct employment impacts also include the labour from the transportation of mine output to a purchaser as these are considered support activities to mining companies. Indirect employment is estimated at 16,590 jobs and induced employment of 8,001 jobs for a total estimate of 45,703 direct, indirect and induced jobs.

9. It should be noted that total expenditures reported in the 2010 mining survey were not used to calculate economic impacts in this report. This is because although some line items are considered an expense on mining company financial statements, not all items should be used to calculate economic impacts. For example, depreciation, interest and asset retirement obligations (ARO's) are not included in the economic impact analysis. In addition, tax payments reported on financial statements would be captured through the multipliers used to run the economic impact analysis and are reported as an output or impacts on government tax revenues. Therefore, total expenditures used in the economic impact analysis will not reconcile to total expenditures reported in the 2010 Mining Survey.

Table 3.2 Economic impacts of operating expenditures

Impact	Direct (\$ millions)	Indirect (\$ millions)	Induced (\$ millions)	Total (\$ millions)
Output	2,254.4	1,199.9	495.8	3,950.1
GDP	1,552.5	658.5	316.5	2,527.5
Taxes	260.8	143.3	90.0	494.1
<i>Municipal</i>	<i>23.6</i>	<i>11.6</i>	<i>7.4</i>	<i>42.6</i>
<i>Provincial</i>	<i>110.3</i>	<i>60.9</i>	<i>40.9</i>	<i>212.1</i>
<i>Federal</i>	<i>126.9</i>	<i>70.8</i>	<i>41.7</i>	<i>239.4</i>
Impact	Direct (No. of Jobs)	Indirect (No. of Jobs)	Induced (No. of Jobs)	Total (No. of Jobs)
Employment	8,195	6,763	3,429	18,387

3.3 Estimating economic impacts by category of expenditure

To conduct the economic impact analysis, mining expenditures reported in the survey were separated into six categories:

1. Operating expenditures
2. Capital expenditures
3. Outward transportation costs
4. Exploration and development expenditures
5. Expenditures of environmental control and public interest
6. Other expenditures

Operating, capital and outward transportation expenditures generated the most economic impact to the province. Details of the economic impacts generated by each category are provided in the following tables.

Operating expenditures

Operating expenditures include spending that is required when a mine is in operation. These include production materials and supplies, treatment and refining charges, professional and technical services including contract work, salaries and benefits, education and training, and the total cost of electricity purchased including water rental fees.

The economic impacts for operating expenditures are presented in Table 3.2.

The estimated economic output generated from operating expenditures is nearly \$4 billion, of which more than 40% or \$1.7 billion was generated through spending on mining activities. Contribution to GDP is estimated at \$2.5 billion and consists of \$1.6 billion in direct, \$659 million in indirect, and \$317 million in induced impacts. Approximately \$43 million in municipal, \$212 million in provincial and \$239 million in federal taxes are generated through operations. An estimated 18,387 jobs have been created by operating spending and consist of the direct employment of 8,195 jobs (the number of employees reported in the 2010 mining survey), indirect employment of 6,763 jobs and induced employment of 3,429 jobs.

Table 3.3 Economic impacts of capital expenditures

Impact	Direct (\$ millions)	Indirect (\$ millions)	Induced (\$ millions)	Total (\$ millions)
Output	1,544.3	717.1	248.5	2,509.9
GDP	593.4	311.9	144.8	1,050.1
Taxes	118.1	49.6	47.1	214.8
Municipal	7.6	4.1	4.1	15.8
Provincial	60.0	18.4	22.3	100.7
Federal	50.5	27.1	20.7	98.3
Impact	Direct (No. of Jobs)	Indirect (No. of Jobs)	Induced (No. of Jobs)	Total (No. of Jobs)
Employment	3,896	4,579	2,143	10,618

Capital expenditures

The economic impacts for capital expenditures, including construction materials, are based on the 2010 survey data where it appears this was an active year in terms of construction (\$1.5 billion in 2010 versus \$1.06 billion in 2009). Therefore, the direct impacts generated from the capital expenditures are likely not a reliable point of reference for examining trends in output, GDP or employment. During the construction phase of a mine, companies are highly labour intensive. However, once the mine is in operation, the total number of workers required reduces. The economic impacts for capital expenditures are presented in Table 3.3.

Capital expenditures include the purchase of lands and mining rights, expenditures on all buildings and other surface construction (including tailing dams), machinery, equipment, construction materials, and mine shafts and underground work.

The estimated economic output generated from capital expenditures is \$2.5 billion, of which more than 60% can be said to have been generated through direct spending on mining activities. Contributions to GDP are estimated at \$1.05 billion and consist of \$593 million in direct, \$312 million in indirect, and \$145 million in induced impacts. Approximately \$16 million in municipal, \$100 million in provincial and \$98 million in federal taxes were generated through capital investments. An estimated 10,618 jobs were created by capital spending and consist of the direct employment of 3,896 jobs, indirect employment of 4,579 jobs and induced employment of 2,143 jobs.

Outward transportation costs

The economic impacts for outward transportation costs are presented in Table 3.4.

Outward transportation expenditures include the transportation of ores and concentrates to the free on board (fob) point of delivery, including costs of company-operated carriers and duty and brokerage fees paid.

The estimated economic output generated from outward transportation costs are \$1.8 billion, of which nearly half or approximately \$813 million can be said to have been generated through indirect and induced spending on mining activities. Contribution to GDP is estimated at \$766 million and consists of \$392 million in direct, \$264 million in indirect, and \$110 million in induced impacts. Approximately \$11 million in municipal, \$75 million in provincial and \$80 million in federal taxes are generated through these investments. An estimated 11,146 jobs are supported by outward transportation costs and consist of the direct employment of 5,606 jobs, indirect employment of 3,881 jobs and induced employment of 1,659 jobs.

Table 3.4 Economic impacts of outward transportation costs

Impact	Direct (\$ millions)	Indirect (\$ millions)	Induced (\$ millions)	Total (\$ millions)
Output	974.3	613.3	199.4	1,787.0
GDP	392.4	263.5	109.9	765.8
Taxes	84.4	46.3	36.0	166.7
Municipal	4.2	3.9	3.0	11.1
Provincial	39.4	18.9	17.0	75.3
Federal	40.8	23.5	16.0	80.3
Impact	Direct (No. of Jobs)	Indirect (No. of Jobs)	Induced (No. of Jobs)	Total (No. of Jobs)
Employment	5,606	3,881	1,659	11,146

Table 3.5 Economic impacts from exploration and development activity

Impact	Direct (\$ millions)	Indirect (\$ millions)	Induced (\$ millions)	Total (\$ millions)
Output	202.8	105.8	43.5	352.1
GDP	97.7	45.3	24.8	167.8
Taxes	16.4	7.3	8.1	31.8
<i>Municipal</i>	<i>1.0</i>	<i>0.7</i>	<i>0.7</i>	<i>2.4</i>
<i>Provincial</i>	<i>7.8</i>	<i>2.7</i>	<i>3.8</i>	<i>14.3</i>
<i>Federal</i>	<i>7.6</i>	<i>3.9</i>	<i>3.6</i>	<i>15.1</i>
Impact	Direct (No. of Jobs)	Indirect (No. of Jobs)	Induced (No. of Jobs)	Total (No. of Jobs)
Employment	1,943	705	369	3,017

Exploration and development

According to respondents of the 2010 Mining Survey, exploration and development expenditures increased twenty fold since 2001, totalling \$203 million. However, reported results from the survey may understate actual total expenditures as results do not account for many junior companies, individuals solely involved in exploration activities in BC, and many exploration activities of mining companies domiciled outside of the province. The government of British Columbia estimates total mineral exploration expenditures of \$322 million in 2010.¹⁰ Since economic impacts are based on survey results, reported impacts as a result of exploration and development activity are conservative.

The economic impacts from exploration and development activity are presented in Table 3.5.

Expenditures from exploration and development activity include greenfield exploration, exploration of properties under development as well as the development and new exploration on producing properties. Greenfield exploration activities include all exploration expenditures incurred in searching for and delineating mineral deposits on properties where no production is taking place. This includes airborne, surface and underground

exploration costs. Development on non-producing and producing properties includes work done to outline and gain access to ore and prepare it for production. For producing properties, this also includes all exploration expenditures incurred in searching for and delineating additional mineral deposits.

The estimated total economic output, value added GDP and employment generated from exploration and development activities are \$352 million, \$168 million and 3,017 jobs respectively.

Environmental control and public interest

Environmental control expenditures include reclamation programs, beautification of the areas surrounding the operation, and other similar programs undertaken for the benefit of the public, rather than adding to the operational efficiency of the mine. Also included in this category are waste permits for water, sewage, air, tailings, and refuse.

Public interest expenditures include charitable grants and donations, the cost of in-house company research, and payment to outside organizations.

The economic impacts related to environmental control and public interest are presented in Table 3.6.

The estimated total economic output, GDP and employment generated from environmental control and public interest activities are \$123 million, \$66 million and 527 jobs respectively.

Table 3.6 Economic impacts for environmental control and public interest

Impact	Direct (\$ millions)	Indirect (\$ millions)	Induced (\$ millions)	Total (\$ millions)
Output	70.1	35.2	17.3	122.6
GDP	41.7	14.5	9.7	65.9
Taxes	5.7	2.4	3.2	11.3
<i>Municipal</i>	<i>0.3</i>	<i>0.3</i>	<i>0.3</i>	<i>0.9</i>
<i>Provincial</i>	<i>2.1</i>	<i>0.9</i>	<i>1.5</i>	<i>4.5</i>
<i>Federal</i>	<i>3.3</i>	<i>1.2</i>	<i>1.4</i>	<i>5.9</i>
Impact	Direct (No. of Jobs)	Indirect (No. of Jobs)	Induced (No. of Jobs)	Total (No. of Jobs)
Employment	140	241	146	527

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Table 3.7 Economic impacts for all other expenditures

Impact	Direct (\$ millions)	Indirect (\$ millions)	Induced (\$ millions)	Total (\$ millions)
Output	120.6	61.5	30.2	212.3
GDP	71.2	25.3	16.9	113.4
Taxes	9.6	4.3	5.7	19.6
Municipal	0.5	0.5	0.5	1.5
Provincial	3.6	1.6	2.7	7.9
Federal	5.5	2.2	2.5	10.2
Impact	Direct (No. of Jobs)	Indirect (No. of Jobs)	Induced (No. of Jobs)	Total (No. of Jobs)
Employment	1,332	421	255	2,008

Other expenditures

This category is a catch-all item in the mining survey and no additional details were provided by mining companies as to what types of expenditures these encompass. It is likely that the jobs created from this category include various types of contractors working on mine sites.

The economic impacts for all other mining expenditures are presented in Table 3.7.

The estimated total economic output, GDP and employment generated from other expenditures are \$212 million, \$113 million and 2,008 jobs respectively.

3.4 Direct employment impacts

Employment impacts are calculated as the number of jobs supported as a result of the expenditures made by the 42 mining companies who completed the 2010 mining survey.

An estimated 21,112 direct jobs are supported by industry expenditures and can be broken down as follows:

- Operating expenditures account for 8,195 jobs, which are the number of employees during the operating phase of mining. This is equivalent to the number of direct payroll employees reported during 2010.
- Outward transportation costs account for 5,606 jobs. This is the creation of labour resulting from the transportation of mine output to a purchaser. These are mostly contractors working for companies that provide support services to mine operators.
- Capital expenditures account for 3,896 jobs. These include construction workers contracted to work on the mine site during the construction phase of a mine, when mining companies are highly labour-intensive.
- Exploration and development expenditures account for 1,943 jobs and represent the number of additional workers employed during the exploration phase of mining.
- Environmental controls and public interest costs account for 140 jobs and represent the labour generated to assist in environmental and waste management efforts.
- Other mining expenditures account for 1,332 jobs. As this is a catch-all item in the mining survey and no additional details were provided by mining companies, it is likely that jobs supported by this category include various types of employees and contractors working on mine sites.



Photo: Daniel Henshaw, courtesy of Imperial Metals Corporation

Table 3.8 Economic impacts from BC mining industry operations, 2010

(number of jobs)	Direct	Indirect	Induced	Total Employment Effects
Outward Transportation Costs	5,606	3,881	1,659	11,146
Capital Expenditures	3,896	4,579	2,143	10,618
Operating Expenditures	8,195*	6,763	3,429	18,387
Exploration & Development Expenditures	1,943	705	369	3,017
Environmental Control and Public Interest	140	241	146	527
Other Expenditures	1,332	421	255	2,008
Total	21,112	16,590	8,001	45,703

* The number of employees reported in the 2010 Mining Survey.

Indirect employment impacts arise from changes in activity for suppliers of the “front-end” businesses who provide inputs to mining companies such as mining suppliers, contractors, consultants and other companies. Some examples include: employees of parts and services suppliers, blasting operations, and human resource and management consultants.

Induced impacts arise from changes to the wages and salaries of those employed in the direct and indirect industries. These include consumption spending by employees of mining companies and mining suppliers as they receive incomes associated with the direct and indirect activities. This consumption causes additional economic activity that can be attributed to the mining industry.

Employment comparison with other industry sectors

Table 3.9 Employment comparison of major BC industries, 2010

Impact	Employment '000s	Share of Provincial Total %
Mining (direct employment)	21.1	0.9%
Forestry and logging (plus support services)	16.8	0.7%
Professional, scientific and technical services	168	7.4%
Agriculture	29.6	1.3%
Total provincial employment	2,274	100.0%

Source: Statistics Canada, Labour Force Survey

Economic activity generated by the mining industry is estimated to support 21,112 direct jobs. With approximately 2.3 million people employed in BC at the end of 2010, the estimated total employment impacts of 45,703 jobs represent 2% of total BC employment. Table 3.9 compares the employment contributions of the BC mining industry against other BC industry sectors. The comparison indicates that in 2010, the mining industry generated more jobs than the forestry and logging sector.

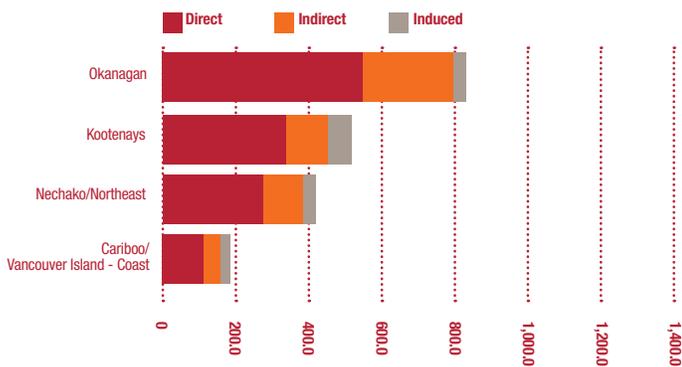
3.5 Regional economic impacts

Using the same input-output methodology, regional economic impacts were calculated using expenditures reported in the 2010 mining survey. The survey reported expenditures broken down by economic region for the following categories: capital expenditures, exploration and development expenditures, and wages and salaries. As such, regional impacts are only reported across these three categories.

Output is the broadest measure of impacts and represents the total sum of all economic activity that has taken place in connection with expenditures made through BC mining companies (i.e., revenues). Therefore, this section focuses solely on output impacts to BC. In 2010, the mining industry and its suppliers generated approximately \$8,993.6 billion in total outputs based on the expenditures reported in the 2010 Mining Survey. On average, each company generated an estimated \$213 million in direct, indirect, and induced output impacts in 2010. This is important from the perspective of regional economies as many or most mines are located in remote and rural locations. As mentioned previously, while it is not possible to quantify the proportion of spending that occurs locally, positive spending and employment impacts do occur.

The following diagram illustrates the direct, indirect and induced output impacts of capital expenditures (\$millions).

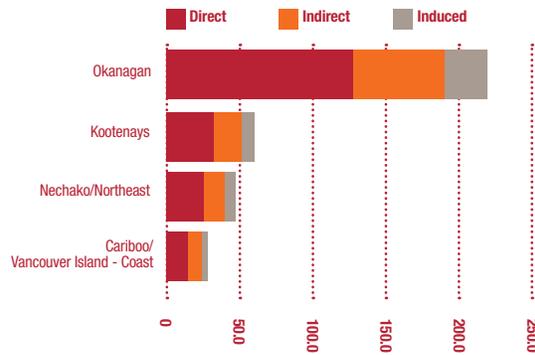
Figure 3.1 Output Impacts by Economic Region Capital Expenditures



Total output impact generated from capital expenditures are approximately \$2 billion. The direct output impacts generated from capital expenditures total approximately \$1.3 billion with the majority of impacts (71%) in the Okanagan and Kootenays.¹¹

The following diagram illustrates the direct, indirect and induced output impacts of exploration and development expenditures (\$millions).

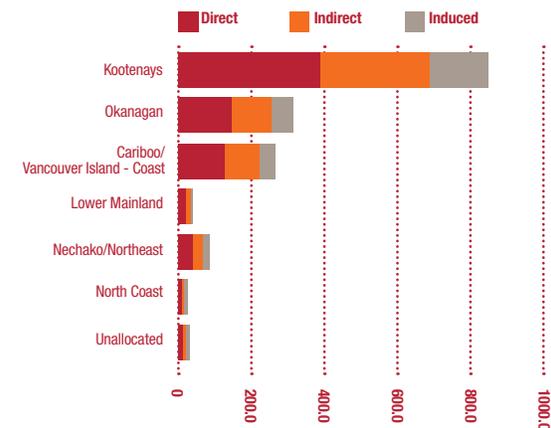
Figure 3.2 Output Impacts by Economic Region Exploration & Development Expenditures



The total output impacts generated from exploration and development total approximately \$352 million. Direct output impacts are approximately \$203 million with the majority of impacts (63%) taking place in the Okanagan.

The following diagram illustrates the direct, indirect and induced output impacts of expenditures related to wages and salaries (\$millions).

Figure 3.3 Output Impacts by Economic Region Wages & Salaries Expenditures



The total output impacts generated from wages and salaries total approximately \$1.6 billion. Direct output impacts generated from wages and salaries are approximately \$734 million with the majority (74%) of impacts in the Okanagan and Kootenays.

11. Capital expenditures reported in the 2010 Mining Survey do not include the cost of construction materials and therefore the direct output impact will differ by that amount. Expenses related to construction materials (including machinery and equipment) are \$292 million. When adjusted to include construction materials, direct output impacts are \$1,544 as reported in Figure 3.1 above. However, the survey does not allow for a regional analysis of this adjustment.



Photo: Daniel Henshaw, courtesy of Imperial Metals Corporation

4. Summary table

\$ millions	Outward Transportation Costs	Capital Expenditures	Operating Expenditures	Exploration & Development Expenditures	Environmental Control and Public Interest	Other Expenditures	Total
Direct Effects							
Output	\$974.3	\$1,544.3	\$2,254.4	\$202.8	\$70.1	\$120.6	\$5,166.5
GDP	\$392.4	\$593.4	\$1,552.5	\$97.7	\$41.7	\$71.2	\$2,748.8
Employment	5,606	3,896	8,195	1,943	140	1,332	21,112
Municipal Taxes	\$4.2	\$7.6	\$23.6	\$1.0	\$0.3	\$0.5	\$37.3
Provincial Taxes	\$39.4	\$60.0	\$110.3	\$7.8	\$2.1	\$3.6	\$223.2
Federal Taxes	\$40.8	\$50.5	\$126.9	\$7.6	\$3.3	\$5.5	\$234.5
Indirect Effects							
Output	\$613.3	\$717.1	\$1,199.9	\$105.8	\$35.2	\$61.5	\$2,732.8
GDP	\$263.5	\$311.9	\$658.5	\$45.3	\$14.5	\$25.3	\$1,319.0
Employment	3,881	4,579	6,763	705	241	421	16,590
Municipal Taxes	\$3.9	\$4.1	\$11.6	\$0.7	\$0.3	\$0.5	\$21.2
Provincial Taxes	\$18.9	\$18.4	\$60.9	\$2.7	\$0.9	\$1.6	\$103.4
Federal Taxes	\$23.5	\$27.1	\$70.8	\$3.9	\$1.2	\$2.2	\$128.7
Induced Effects							
Output	\$199.4	\$248.5	\$495.8	\$43.5	\$17.3	\$30.2	\$1,034.6
GDP	\$109.9	\$144.8	\$316.5	\$24.8	\$9.7	\$16.9	\$622.5
Employment	1,659	2,143	3,429	369	146	255	8,001
Municipal Taxes	\$3.0	\$4.1	\$7.4	\$0.7	\$0.3	\$0.5	\$16.1
Provincial Taxes	\$17.0	\$22.3	\$40.9	\$3.8	\$1.5	\$2.7	\$88.2
Federal Taxes	\$16.0	\$20.7	\$41.7	\$3.6	\$1.4	\$2.5	\$86.0
Total Effects							
Output	\$1,787.0	\$2,509.8	\$3,950.1	\$352.1	\$122.6	\$212.3	\$8,934.0
GDP	\$765.8	\$1,050.0	\$2,527.6	\$167.7	\$65.9	\$113.4	\$4,690.3
Employment	11,146	10,618	18,387	3,018	526	2,008	45,703
Municipal Taxes	\$11.2	\$15.9	\$42.7	\$2.5	\$0.9	\$1.4	\$74.6
Provincial Taxes	\$75.3	\$100.7	\$212.1	\$14.3	\$4.6	\$7.8	\$414.8
Federal Taxes	\$80.4	\$98.3	\$239.3	\$15.1	\$6.0	\$10.3	\$449.2

* values may not add up due to rounding

4.1 Estimated per-dollar economic impact of the BC mining industry

Based on the input-output modelling methodology and using the expenditure data from 2010 Mining Survey, each dollar spent in the BC mining industry can be said to have generated \$1.73 of direct, indirect and induced output impacts. Gross spending by the mining industry was estimated to be \$8,933.9 million of output impacts in 2010.

Table 4.2 Estimated per-dollar economic impact of the BC mining industry

Impact	Direct	Indirect	Induced	Total
Output	1.00	0.53	0.20	1.73
GDP	0.53	0.26	0.12	0.91
Federal Taxes	0.05	0.02	0.02	0.09
Provincial Taxes	0.04	0.02	0.02	0.08
Municipal Taxes	0.01	0.00	0.00	0.01

Note that by definition, the impact of \$1 of spending equates to \$1 in direct output.

