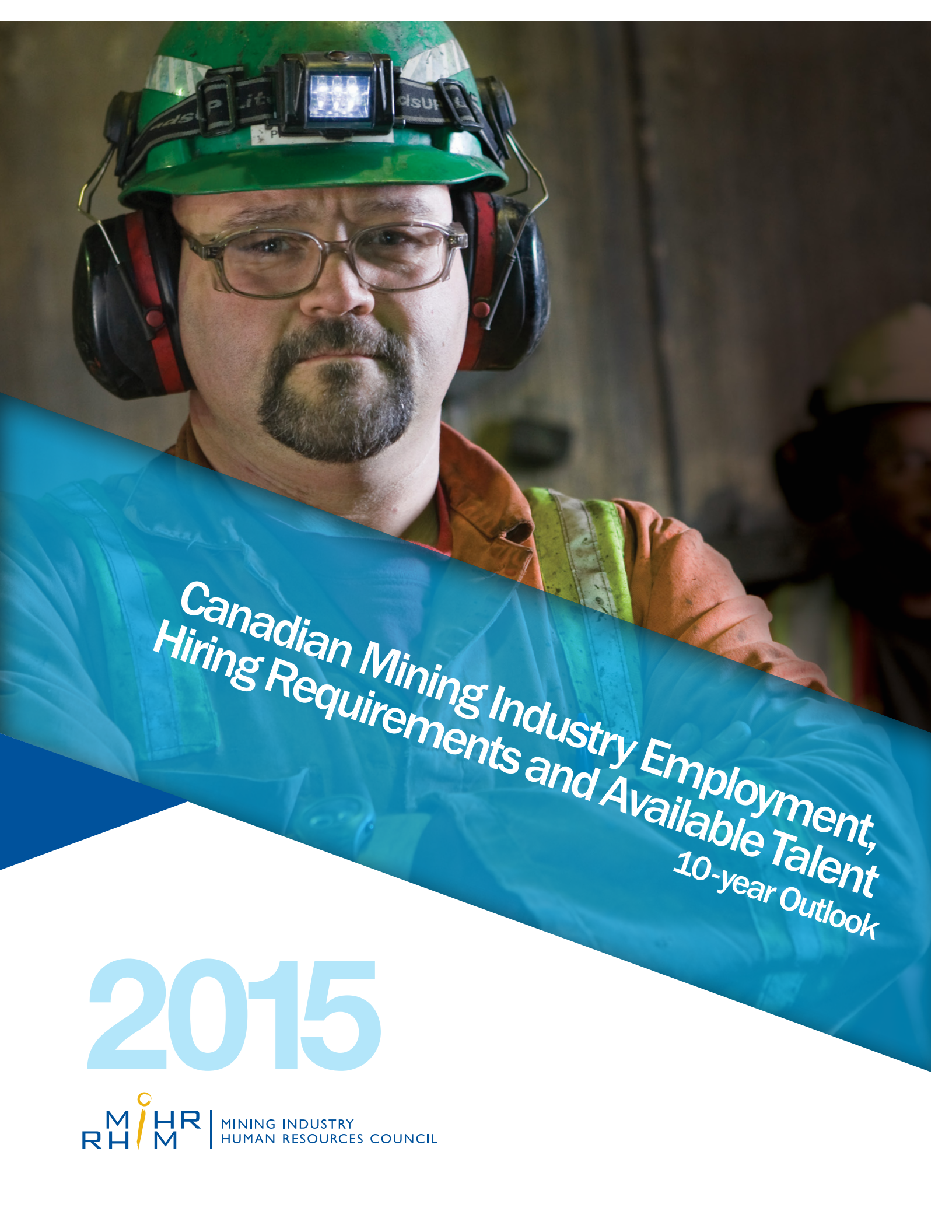
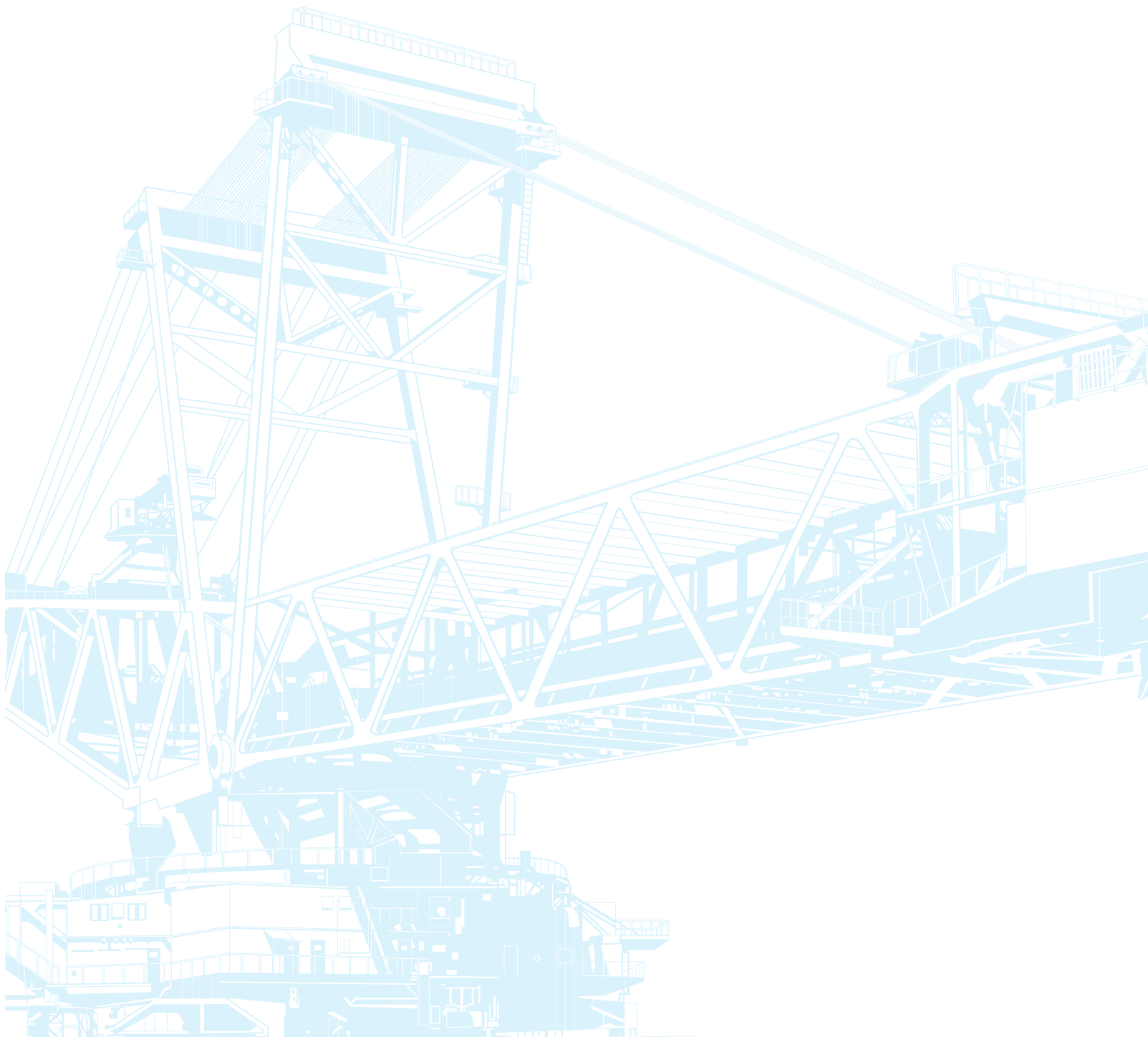




Canadian Mining Industry Employment,
Hiring Requirements and Available Talent
10-year Outlook

2015



Message from MiHR

MiHR's mission is to be the catalyst that drives collaboration among industry stakeholders to understand labour market trends, identify opportunities and develop solutions to HR challenges. This report, Canadian Mining Industry Employment, Hiring Requirements and Available Talent 10-year Outlook, addresses the first part of that mission statement – to help our sector better comprehend our current and anticipated labour market challenges.

Labour Market Information provides the necessary intelligence needed by individuals and organizations to make informed decisions. Whether you work for a mining or exploration company, contractor, supplier, government department, post-secondary educational provider, mining association, organized labour or are an individual looking for a career in the sector, having accurate and timely labour market information guiding your decisions is critical.

We have produced labour market reports annually since 2006. Whilst the overall picture hasn't changed substantially with regards to the hiring requirements - a difficult message to deliver in a time of lower commodity prices and subsequent layoffs - the issues causing the shortage have evolved, and are detailed in this report. The mining sector will continue to need to attract, recruit and retain talented people in the decade ahead.

On behalf of the MiHR Board of Directors, we would like to convey our appreciation to the members of the Labour Market Information Steering Committee who have worked diligently to guide this publication, review the findings and methodology developed for this report. We would also like to take this opportunity to thank the 27 mining companies who participated in the labour market survey and shared valuable data on their workforce.

The MiHR Council encourages your comments, questions and feedback on its labour market information program. Please take a moment to provide input using the feedback form in that back of this report or contact the Council directly.

For more information on MiHR and its programs, please view www.mihhr.ca.

Sincerely,



Ryan Montpellier
Executive Director,
MiHR Council



Ingrid Hann
Head of HR, De Beers Canada
Chair, MiHR Board of Directors



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The opinions and interpretations in this publication are those of the author and do not necessarily reflect those of the Government of Canada.

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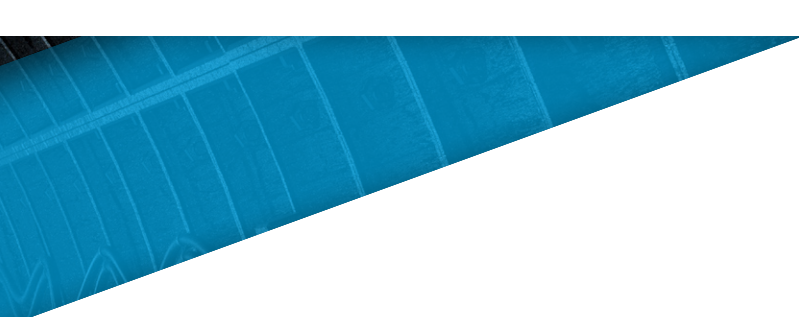
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INTRODUCTION

The flagging commodity supercycle has resulted in softening skills shortages and gaps reported by MiHR in previous years. But labour market pressures and significant hiring requirements persist for mining sector employers. Isolated workplaces, lack of workforce diversity and retirements continue to undermine an efficient labour market for the industry. However, this report also highlights some new factors that are influencing the constraints in today's mining labour market.



Over the past few years, the economic outlook for Canada's mining industry has cooled. With lower commodity prices and delayed projects, hiring pressures have subsided. However, despite these trends, Canada's mining industry is still faced with significant labour market challenges, gaps and pressures.

A number of factors are contributing to mining's ongoing labour market challenges — factors at play through the ups and downs of economic cycles. These include the following:

- job vacancies mismatched with the skills of people who are seeking work
- low levels of labour market participation among groups of potential workers
- complex patterns of educational attainment, skills requirements and unemployment
- a reliance on commuting workers
- lack of mobility among workers in some occupational groups
- older workers retiring
- gaps between the need to hire workers and new entrants to the pool of skilled workers.

This report provides analysis and forecasts of Canada's mining labour market. The Mining Industry Human Resources Council's (MiHR's) ongoing research has

continued to identify the human resources trends that challenge the mining industry. This outlook complements MiHR's previous research, while also expanding on key themes particularly relevant to the industry. Unemployment, labour productivity and labour mobility are among the topics that are explored in more depth.

MiHR has developed forecasts of employment, hiring requirements and available talent for Canada's mining industry over a 10-year horizon (2015-2025). The projected gaps between hiring requirements and available talent are provided for select mining-related occupations. In addition, for certain occupations, MiHR has extended its analysis to provide an in-depth discussion on each occupation's particular labour market issues and challenges.

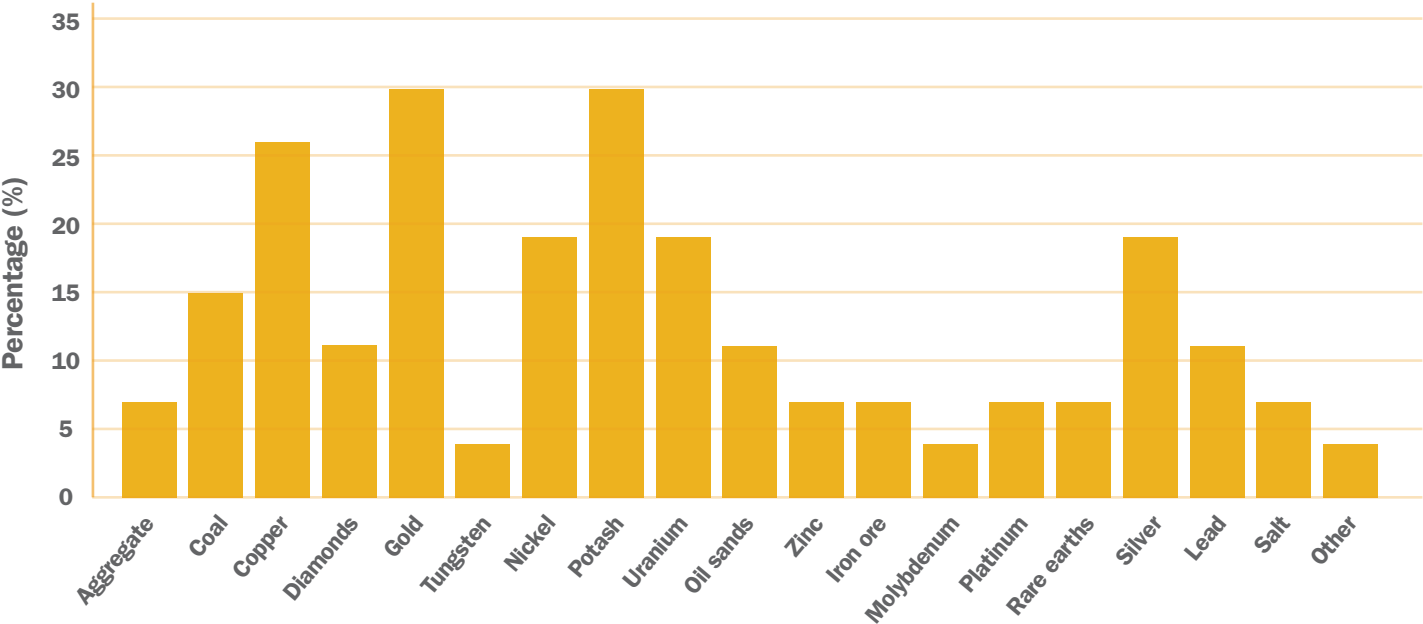
Report overview

This report is divided into seven main sections:

- **Section One:** provides a brief introduction and report overview.
- **Section Two:** discusses MiHR's definition of the mining industry and the list of data sources used in this report, and introduces MiHR's 2015 Employer Survey.
- **Section Three:** presents an economic outlook for Canada and the potential consequences for Canada's mining industry.
- **Section Four:** describes Canada's mining scene — including prominent sectors in Canada's mining industry, the distribution of operations across Canada, and factors such as historical output, productivity, spending and investment behaviour, and export activities.
- **Section Five:** examines Canada's mining labour market in more depth — covering topics such as unemployment, share of part-time workers, youth labour market trends and labour mobility, as well as workforce demographics including age and diversity.
- **Section Six:** presents MiHR's forecasts of employment, hiring requirements and available talent, and includes a focused analysis of certain occupations that exhibit various labour market issues.
- **Section Seven:** summarizes the report findings and draws conclusions about the major labour market issues and challenges in the mining industry.



Figure 1: MiHR’s 2015 National Employer LMI Survey: Which of the following commodities do your Canadian-based operation(s) explore for, mine or process?



Source: Mining Industry Human Resources Council, Employer LMI Survey, 2015

Industry definition and scope

MiHR defines the mining industry as including all phases of the mining cycle: prospecting and exploration; construction and development; extraction; processing; and reclamation, closure, care and maintenance. Forecasts presented in this report rely on data collected and aggregated through Statistics Canada — using Statistics Canada’s North American Industry Classification Codes (NAICS) and National Occupational Classification (NOC) codes to define the mining industry. Specifically, MiHR uses NAICS categories to describe four mining sectors: Mineral Exploration, Extraction & Milling, Support Services, and Fabrication & Manufacturing. Additionally, NOC categories are used to describe seventy (70) occupations that are relevant to Canada’s mining industry. A full description on the NAICS and NOC codes included in the forecasts are found in the Appendix.

Data sources

MiHR relies on a variety of data inputs, mining industry intelligence, and other information to produce labour market analyses and forecasting for Canada’s mining industry. First, MiHR uses data from Statistics Canada throughout its reporting and as inputs in its forecasts, including data that has been customized for MiHR’s definition of the mining industry. Other Statistics Canada information comes from the National Household Survey, the 2006

and 2011 Censuses, the Labour Force Survey, the Survey of Employment Payroll and Hours and Canada Business Patterns data.

This report utilizes additional information sources, including Natural Resources Canada, the Conference Board of Canada and the World Bank. These sources provide information on a wide range of themes that are relevant to the mining industry; they also provide labour market statistics, reporting on notable economic and labour force trends, and information on demographic factors that impact the mining labour force.

MiHR’s 2015 Employer Labour Market Information Survey

The National Employer Labour Market Information (LMI) Survey is used by MiHR as a set of primary data to support the interpretation of secondary data sources and the formulation of economic scenarios. This survey also provides context to the discussion of key labour market factors, gaps and frictions that are unique to the mining industry.

The online survey was distributed to a list of 67 employers, including mining, exploration, drilling and oil sands companies, and contractors who work in the industry. The survey consisted of 26 questions and covered matters such as the number, type and location of operations in Canada; the number of full and part-time employees; the number of vacancies and anticipated hiring requirements; employers’ expectations about retirements; workforce age structure; turnover rates and mobility factors; the occupations in the highest demand; and trends related to diversity.

Survey responses were submitted electronically to MiHR’s research team and the results were compiled and analyzed. The findings are presented throughout this report where appropriate, primarily in “call-out” boxes that support or contrast the interpretation of MiHR’s labour market analysis.

From the 67 surveys distributed, MiHR received a total of 27 responses, a response rate of 40 per cent¹. The survey sample represents mining employers covering approximately 76 different operations — including corporate offices, operating mines, mining contractors, advanced development projects, exploration sites and drilling companies. A total of nine provinces/territories are represented among the operations described including British Columbia, Alberta, Saskatchewan, Manitoba, Ontario, Quebec, Northwest Territories, Nunavut and Yukon. As shown in Figure 1, survey respondents explore for, mine or process 19 types of minerals.

¹Given the small sample size relative to the number of mining “establishments” in Canada as described in Section 4, MiHR draws no conclusions about the statistical significance of the Survey data. Nevertheless we believe, given the depth of coverage of our main industry stakeholder groups described here, valuable information can be gleaned from the analysis of the survey data.



ECONOMIC OUTLOOK

less than
50%

Less than 50 per cent of respondents expect that business conditions for their Canadian operations will improve.

Canada's overall economic performance has remained steady amid wavering global economic conditions over the last decade. According to Statistics Canada, real gross domestic product (GDP) has grown by about 2 per cent per year, since 2005. Over the decade, the global economy witnessed a deep recession in 2008-2009, followed by a European financial crisis and a dramatic decline in oil prices, and the falling value of the Canadian dollar in late 2014. While these events have primarily been spurred by global or external factors, each has implications for Canada's economy and the nation's mining industry.

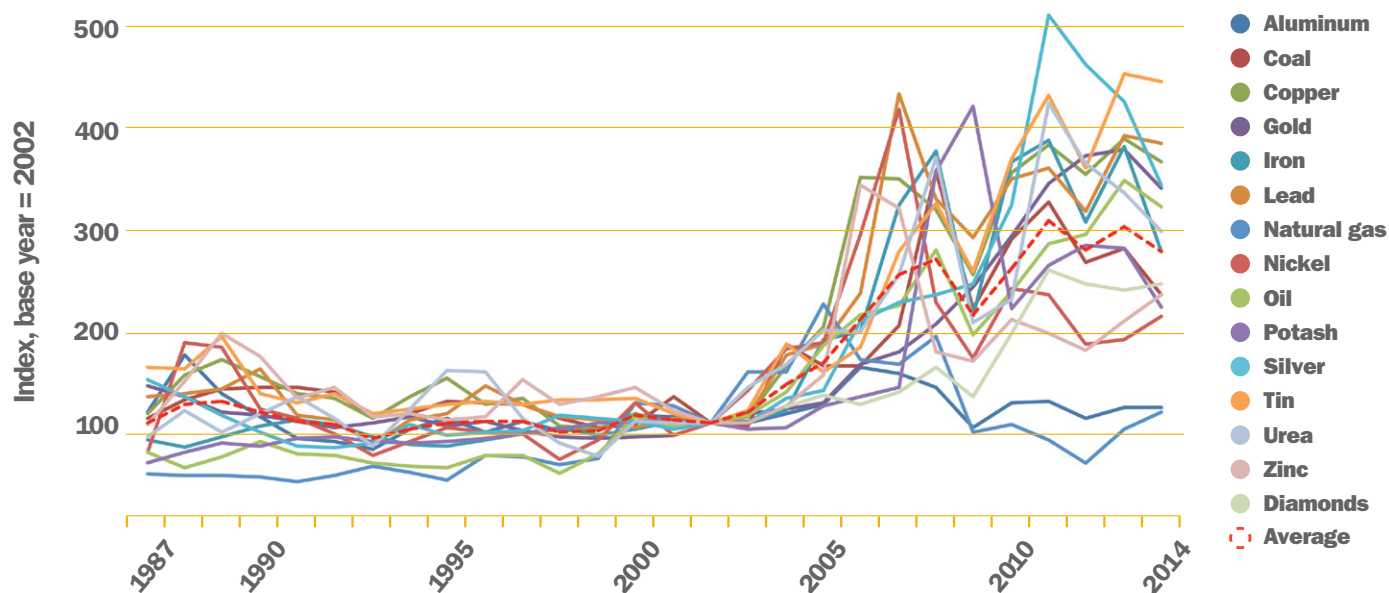
Overall growth in mineral prices: Mineral prices are one of the key determinants of

production levels, mining exploration and the viability of new mining development, in a particular region. Canada's mining industry oversees the discovery and production of a broad spectrum of minerals — each of which is subject to different economic drivers and market forces. Despite Canada's role as a mining industry leader on the global stage, it is still primarily a price-taker in the international commodities market — leaving industry and its production and employment levels still vulnerable to global economic challenges. The industry is particularly sensitive to both the ebbs and flows of global demand for mined commodities and to the speculative nature of commodity markets.

Figure 2 depicts price indices for a number of commodities from 1987 to 2014. It shows that commodity prices have generally increased over time — covering an increasingly wide range.

As leading emerging economies, India, China, Brazil and other nations have undergone significant growth, resulting in a burgeoning demand for mineral and metals. This increased demand has fuelled an underlying shift in the overall demand for commodities and therefore, their prices. This spike in prices is often referred as the “commodity super cycle” for three main reasons: 1) it is demand-driven 2) it spans a much longer time period than regularly observed market fluctuations and 3) it involves a wide range of different commodities, primarily those used as industrial inputs and for urban development in emerging economies.² Figure 2 illustrates a sudden and protracted period of volatility in commodity prices beginning around 2005–2006. This cycle exhibits wider and more extreme changes through to 2013 than the price adjustments experienced over the previous 18 years.

Figure 2: Commodity price indices for various minerals (1987-2014)



Source: Mining Industry Human Resources Council, World Bank, 2015

²Please refer to <http://siteresources.worldbank.org/EXTPREMNET/Resources/EP150.pdf>

The sharp decline in oil prices: The provincial economies of Alberta, Newfoundland and Labrador, and Saskatchewan are strongly tied to oil markets. A steep decline in oil prices affects not only the local economies of oil-producing provinces but also the overall economic outlook of the country.

At this stage, it is difficult to predict the overall effect of oil prices on the Canadian economy. There is little doubt that the decrease in oil prices has contributed to the depreciation of the Canadian dollar and to cutbacks in employment for those involved in mining activities in the oil sands. The decline in oil prices has also created an element of uncertainty in struggling global markets. According to the World Bank³, there was slower than projected growth in major economies such as Russia, China and the United States in 2014.

The potential spill-over to other (non-oil sands) mining operations remains uncertain. On one hand, cheaper oil reduces the cost of inputs (including energy inputs) for an operation. However, production decisions are ultimately driven by the price of mineral being produced – this primarily determines whether mining operations can acquire the necessary capital and cover the margins on their activities.

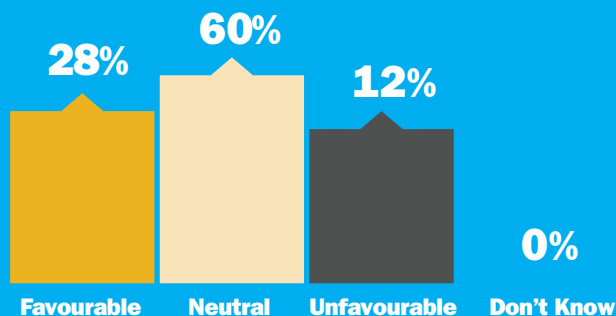
A weaker Canadian dollar: The recent depreciation of the Canadian dollar has also shifted the terms of trade for Canadian exporters. Canadian companies may realize an additional gain on their exported goods if they are priced in appreciating dollars (such as the US dollar in late 2014). Currently, it is not evident that mining operations will significantly

alter their production capacity or levels of employment in response to short-term movements in the exchange rate.

Instability and economic slowing in other parts of the world: The European Union is still struggling with the lingering effects of the debt crisis, as some regions have had record high unemployment levels. Other global factors, including the geopolitical situation in the Middle East, lower-than-expected demand from China, and volatility in currency markets, have slowed international markets and quieted investors. Ultimately, a cautious investment community has negative consequences for mining companies, who often rely on investors to leverage their project activities.

MiHR's 2015 National Employer LMI Survey asked survey respondents about the current state of business conditions for their operations in Canada. The majority of respondents stated that current business conditions were neutral or favourable for their operations in Canada — with close to 30 per cent indicating that business conditions were favourable. Only 12 per cent of respondents felt that business conditions for their Canadian operations were unfavourable.

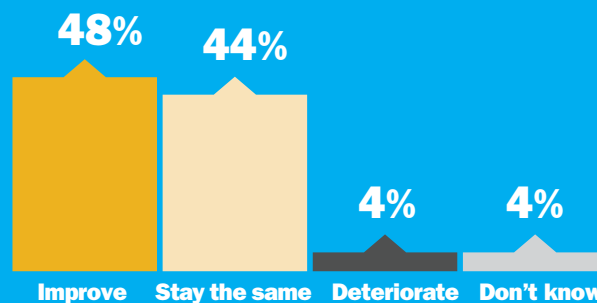
Figure 3: MiHR's 2015 National Employer LMI Survey: The current state of business conditions for your operation(s) in Canada is generally:



Source: Mining Industry Human Resources Council, Employer LMI Survey, 2015

MiHR's 2015 National LMI Employer Survey also asked employers about their expectations regarding future business conditions for their Canadian-based operations in the next 12 months. Almost half of respondents stated that business conditions will improve in the next 12 months, whereas 44 per cent indicated that they are expecting the business conditions to stay the same. Only a small portion of the respondents (4 per cent) expected business conditions to deteriorate in the next 12 months.

Figure 4: MiHR's 2015 National Employer LMI Survey: Over the next 12 months, business conditions for your Canadian-based site(s) are expected to:



Source: Mining Industry Human Resources Council, Employer LMI Survey, 2015

³Please refer to http://www.worldbank.org/content/dam/Worldbank/GEP/GEP2015a/pdfs/GEP15a_web_full.pdf



Canadian mining establishments vary widely in size of workforce

Canada’s mining industry is fuelled by the efforts of thousands of individuals and companies, spread over a wide range of organizational types and sizes. According to Canadian Business Patterns statistics —under MiHR’s definition of the mining industry — roughly 16,500 mining establishments were operating in Canada in 2013.⁴

Table 1 categorizes Canada’s mining establishments by the size of their workforce. About 46 per cent of all mining establishments in the country are identified as having “employees” — that is, they maintain employee payroll records — while 54 per cent are categorized as having an “indeterminate number of employees” — those that rely on contracted workers or that are predominately owner-operated or family-run businesses.⁵ The table shows that large numbers of establishments have relatively small workforces. More than half (58 per cent) of establishments with

employees have a workforce in the 1 to 4 range. At the same time, only about 4 per cent of establishments have workforces numbering 100 and higher; yet they account for roughly half the industry’s total employment. Overall, organizations of all sizes support the activities and competitiveness of Canada’s mining industry.

Table 1: Mining establishments in Canada, by employment size (2013)

Establishment Size	Number of Employers	Minimum Employment	Maximum Employment
1 to 4	4,404	4,404	17,616
5 to 9	1,086	5,430	9,774
10 to 19	805	8,050	15,295
20 to 49	665	13,300	32,585
50 to 99	253	12,650	25,047
100 to 199	113	11,300	22,487
200 to 499	107	21,400	53,393
500+	68	34,000	na
Total with employees	7,501	na	na
Indeterminate # of employees	8,874	na	na
Total, all sizes	16,375	na	na

Source: Mining Industry Human Resources Council, Statistics Canada, 2015
 Note: Table includes NAICS used under MiHR’s definition of the mining industry

⁴An establishment, as defined by Industry Canada: “is the level at which the accounting data required to measure production is available (principal inputs, revenues, salaries and wages)...Generally, the establishment corresponds to a plant, mill or factory. However, the establishment may comprise more than one plant if accounting records do not permit separate reports for each one. An establishment may also include ancillary or support units, such as sales offices or warehouses.” Note that the number of establishments in Canada’s mining industry was partially estimating by MiHR based on Canadian Business Patterns data

⁵Industry Canada defines “indeterminate [# of] employees” as “establishments with no or an indeterminate quantity of employees,” and notes that establishments in this category “do not maintain an employee payroll, but may have a workforce which consists of contracted workers, family members or business owners.”

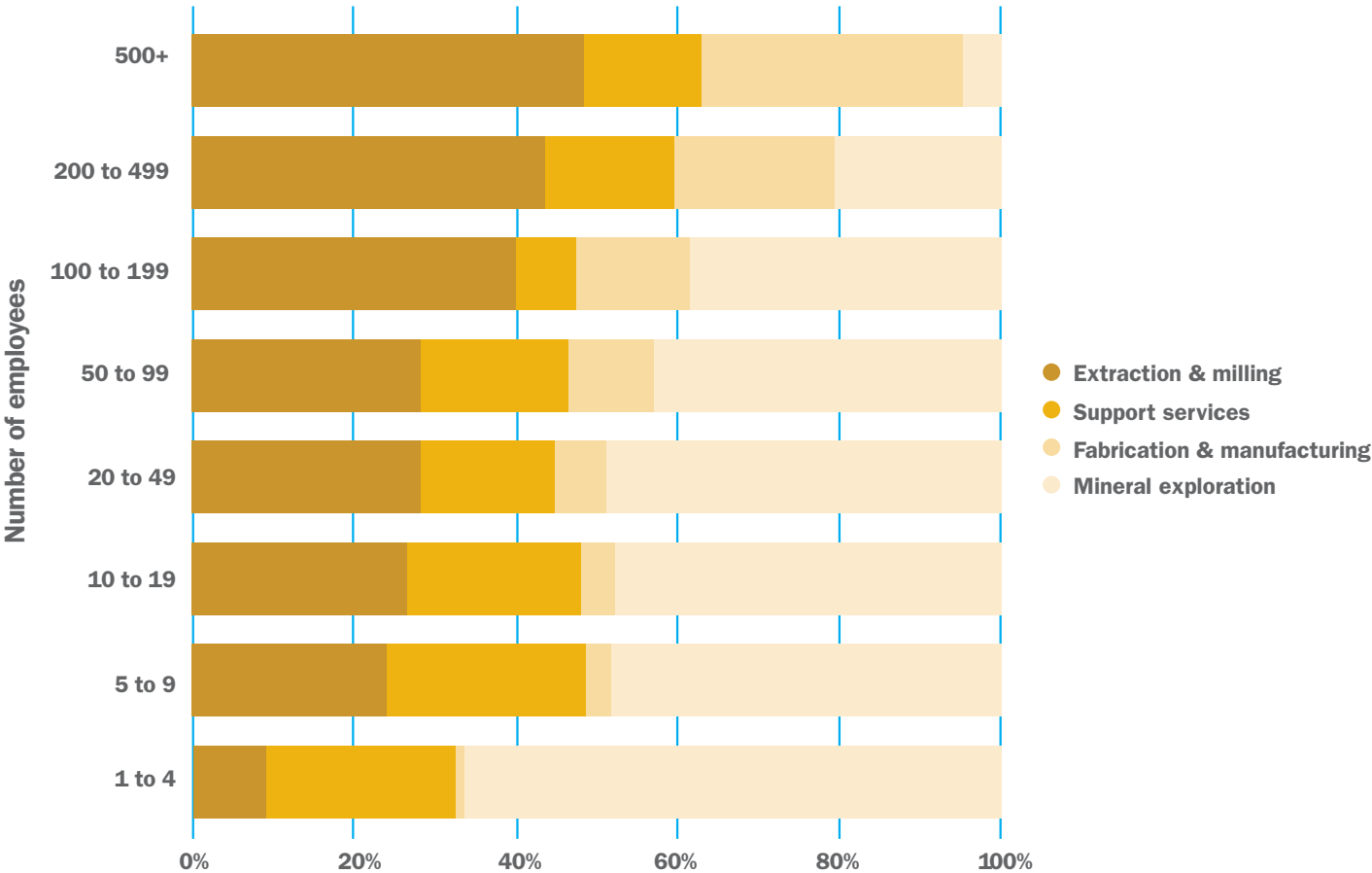
The organizational structure and size of mining companies is very much dependent on the sector and type of mining in which they are engaged. For instance, Figure 5 illustrates that exploration establishments tend to be smaller in terms of size of the workforce, while extraction and milling operations and fabrication and manufacturing establishments tend to support larger workforces.

Each sector is faced with unique labour market challenges stemming from these various organizational structures. For example, a small exploration company with 1 to 4 employees likely has different human resources challenges than a large mining operation with more than 500 employees. This type of context increases the value of the forecasts and findings throughout this report.

No two regions are the same

The mining industry extends to every region of Canada in one form or another. In each province, however, the industry's characteristics are unique — including in terms of size, employment, production levels, phase of development and the types of minerals sought. Some regions in Canada have minimal minable deposits or production; yet, their local economies still contribute to Canada's mining industry.

Figure 5: Employment size for mining establishments in Canada, by sector (2013)



Source: Mining Industry Human Resources Council, Statistics Canada, 2015

Figure 6 illustrates the geographical distribution of mining sector organizations across provinces, by the size of their workforce. Ontario has the most mining establishments, followed by Quebec and British Columbia. However, the larger establishments (by size of their workforce) also exist in other provinces. The smaller

establishments are mostly found in provinces with high populations and the largest urban centers in Canada (i.e. Ontario, Quebec and British Columbia). This outcome reflects the common behaviour patterns of exploration and mining support companies, which jointly represent about 90 per cent of

establishments with 1 to 4 employees, and about 92 per cent of owner-operated and family-run firms. It is common for companies in exploration and mining support to be based in the urban centres of Canada (e.g. Vancouver Toronto), while operating in other regions of Canada where mineral deposits exist. Meanwhile, extraction and

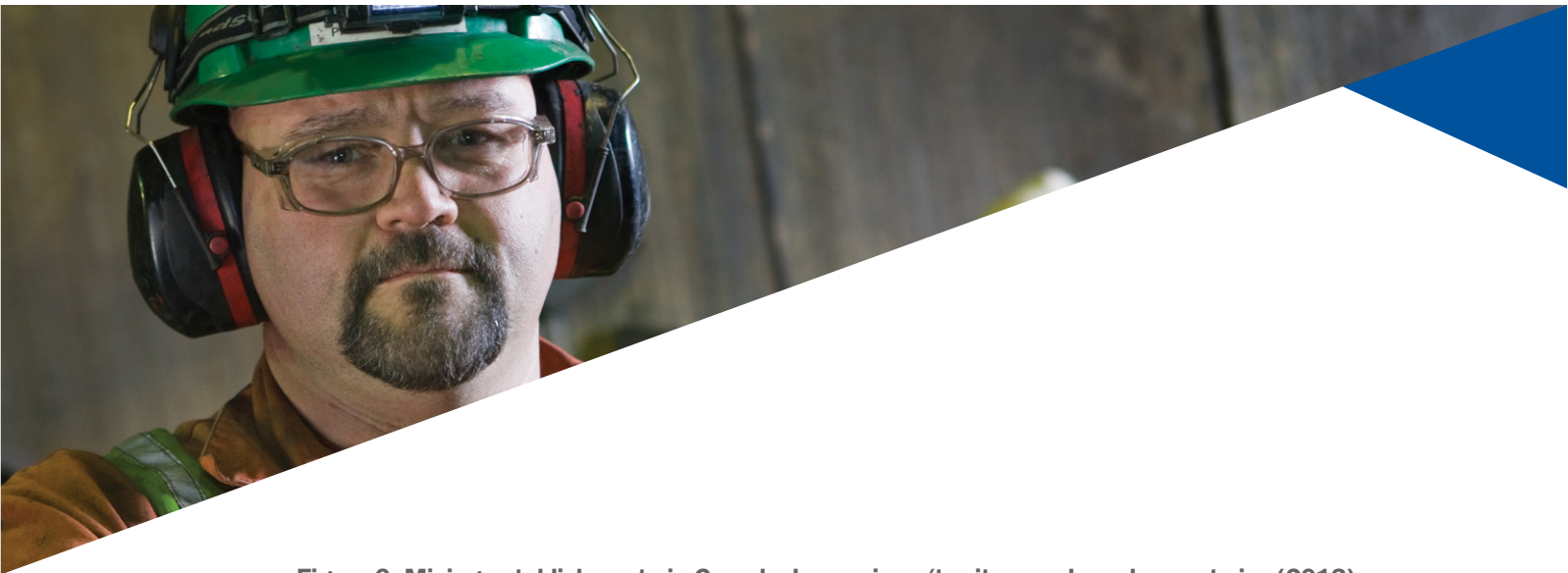
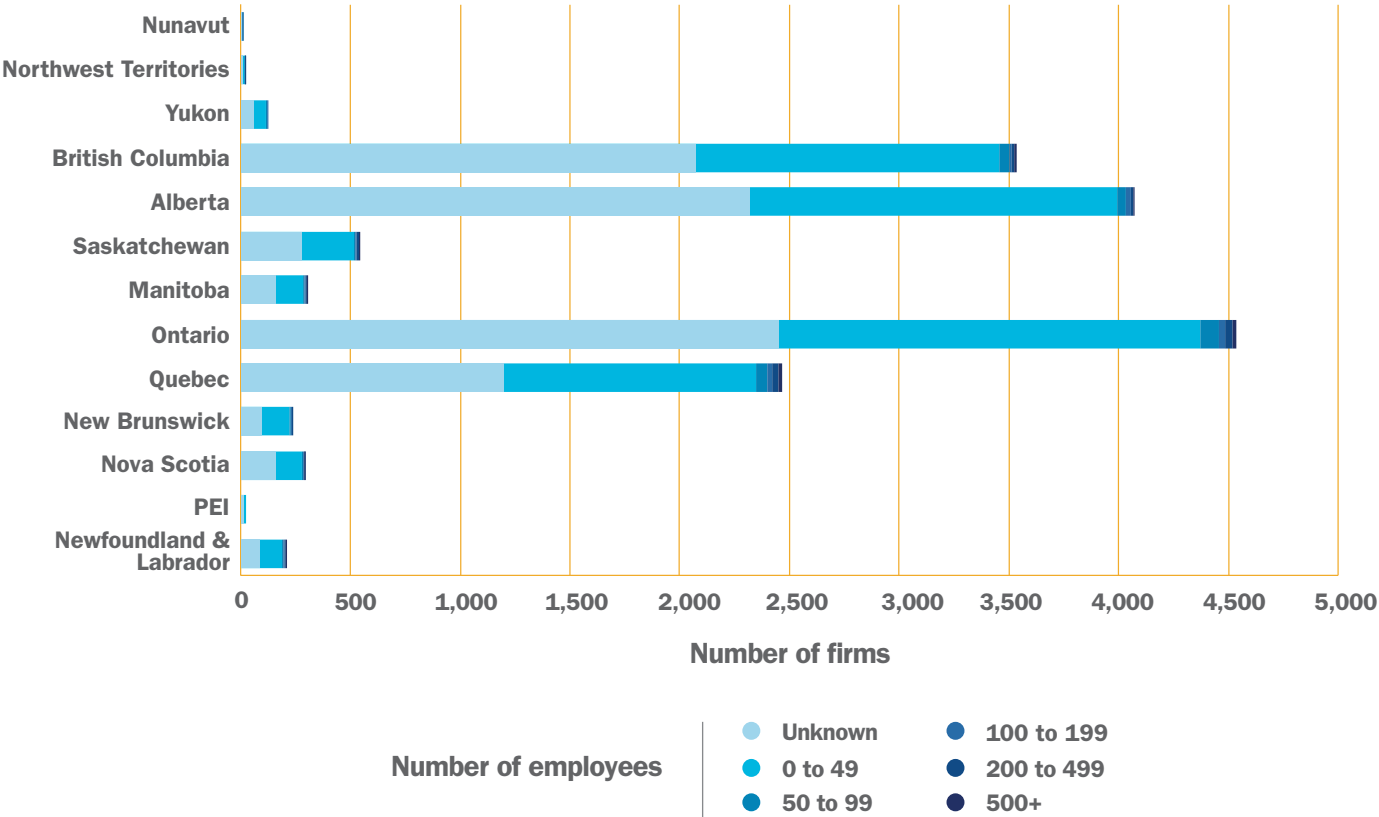


Figure 6: Mining establishments in Canada, by province/territory and employment size (2013)



Source: Mining Industry Human Resources Council, Statistics Canada, 2015

milling operations, which frequently employ hundreds of workers, are fixed and are rarely located close to urban centres.

Each province and territory has a distinct mix of mineral resources that follow from their underlying geologies. Figure 7 shows the types of minerals that were produced

(in value terms) in each province and territory in 2013. Certain minerals are found across multiple regions, while others are exclusive to one or two provinces or territories. For example, in 2013, gold and silver were produced in 11 provinces and territories. On the other hand, diamonds are primarily produced in the Northwest

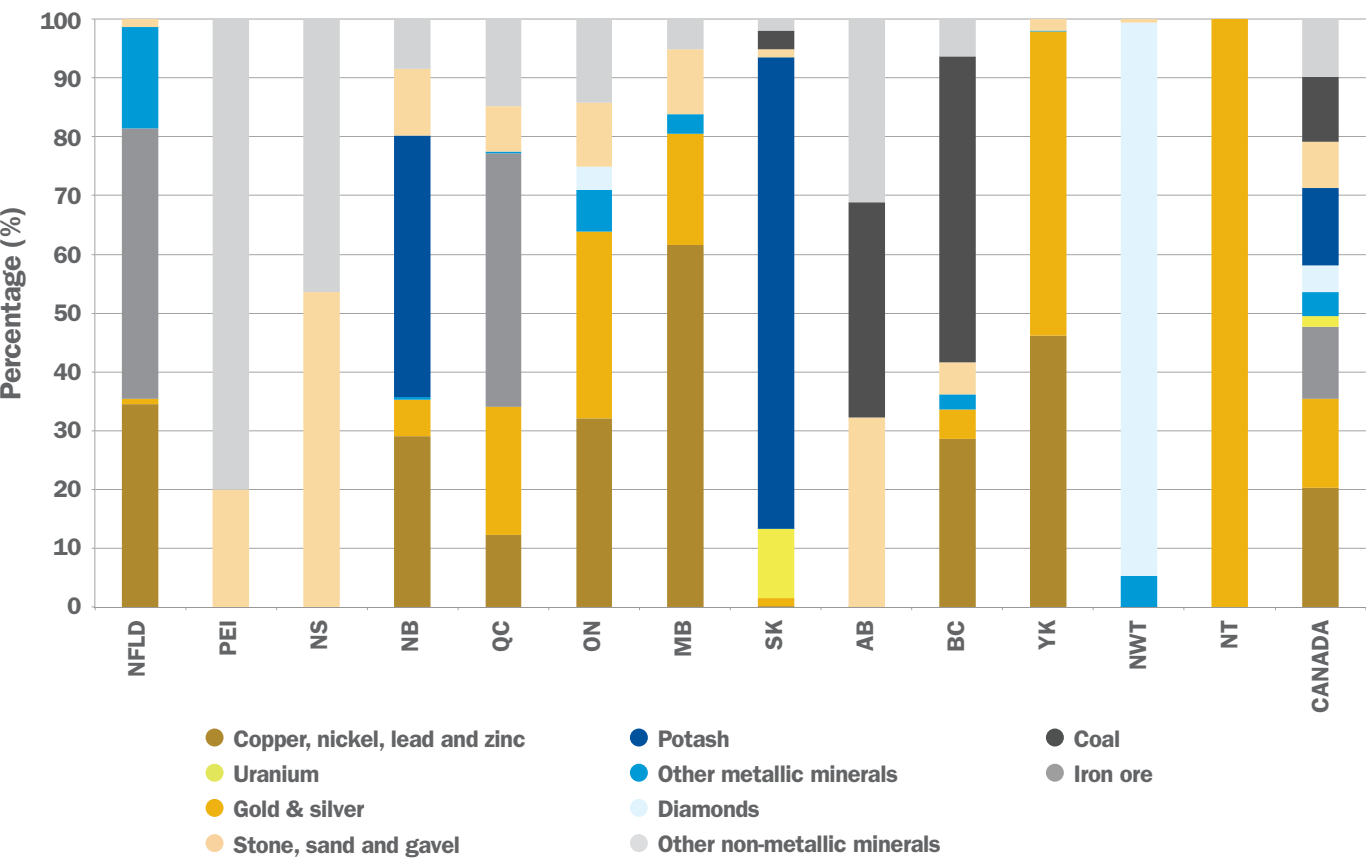
Territories, potash mines are located mainly in Saskatchewan, and coal deposits are found primarily in British Columbia and Alberta.



Each region's unique mix of mineral deposits results in different economic drivers, customers and markets, which can impact mining development and labour force requirements. From province to province, there are typically one or two

minerals that are central to the region's mining scene. However, the portfolio is relatively diversified at the national level, with each major mineral group represented in Figure 7.

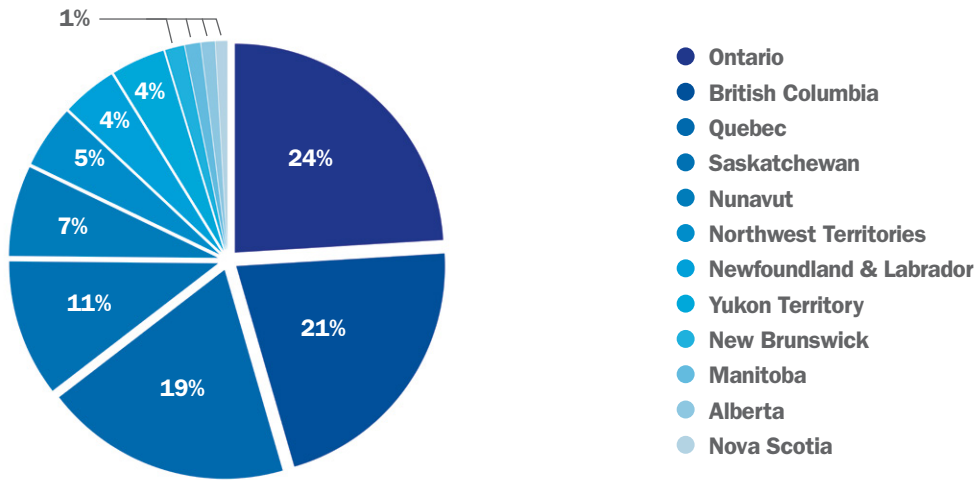
Figure 7: Mineral production value, by mineral type and province and territory (2013)



Source: Mining Industry Human Resources Council, Natural Resources Canada, 2015
 *Some of the production values were estimated, as the underlying data was suppressed and confidential

The geographic pattern of spending on mineral exploration is shown in Figure 8. This graph shows that 75 per cent of exploration spending occurs in Ontario, British Columbia, Quebec and Saskatchewan, in descending order.

Figure 8: Percentage of total exploration spending by province and territory (2014)



Source: Mining Industry Human Resources Council, Natural Resources Canada, 2015

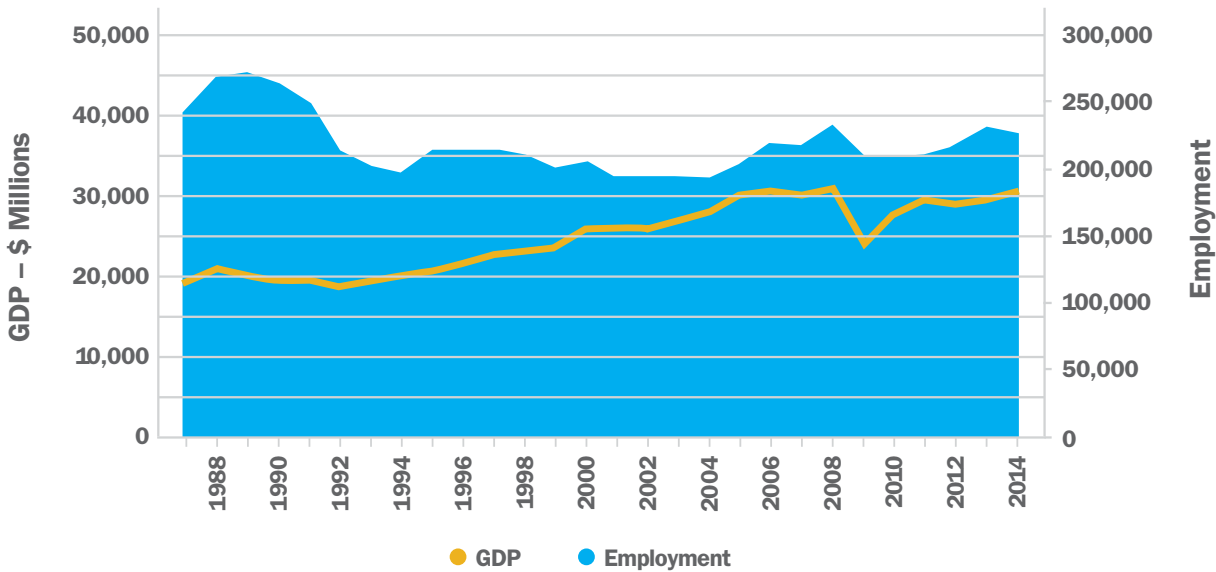
Mining growth over three decades

Canada’s mining industry has grown in each of the last three decades. Figure 9 illustrates steady increases in real GDP for mining— even with the significant economic turbulence that suppressed growth in 2008-2009. Employment in Canada’s mining industry, however, does not show a similar pattern over the same time

period, although employment levels have increased slightly above the early 2000s, despite the drop between 2008/9. Many factors underlie the growth in real GDP and employment in Canada’s mining industry, as shown in Figure 9. For instance, investment in exploration activities, capital investment (e.g. machines, equipment and buildings),

labour productivity, and the changing demand for Canadian minerals are among the variables that impact expansion (or contraction) of the industry and its need for workers. The specific trends in these areas – and their effect on the growth of Canada’s mining industry – are discussed in this section of the report.

Figure 9: Real Gross domestic product (GDP) and employment in Canada’s mining industry (1987-2014)



Source: Mining Industry Human Resources Council, Statistics Canada, 2015



Canada’s exploration spending has cooled

Just as today’s mining operations were initiated with mineral exploration, future mining projects will also depend on the discovery and exploration of new mineral deposits. As such, current exploration activities are an indicator of upcoming mining development.

Currently, Canada’s exploration sector is experiencing a period of contraction. As shown in Figure 10, spending in the sector has slowed every year since 2011. If this

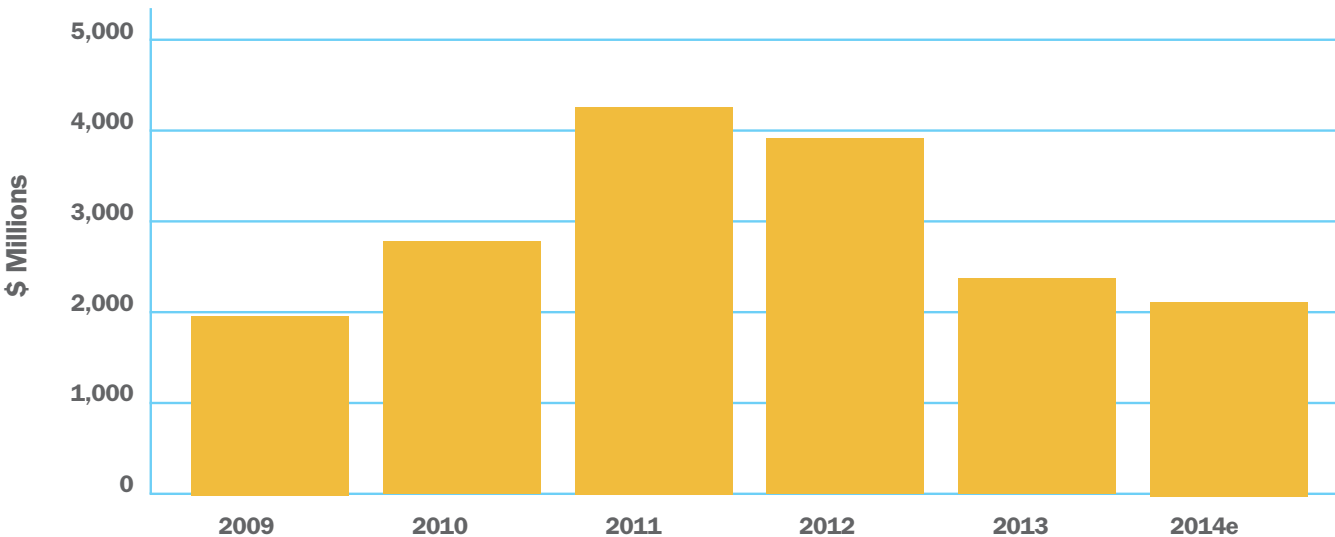
trend of reduced exploration continues over a long-enough period, it could potentially have a dampening impact on later stages of the mining cycle (extraction, milling and fabrication activities) – and ultimately the future of mining development in Canada.

The slowdown in the exploration sector is attributed to weakening commodity prices and a cautious investment community. Junior companies have particularly felt the impact and many are challenged to raise the necessary capital to advance their exploration activities. As illustrated in

Figure 11, junior companies accounted for 37 per cent of spending in 2014 – marking a steady decline from 57 per cent just five years earlier.

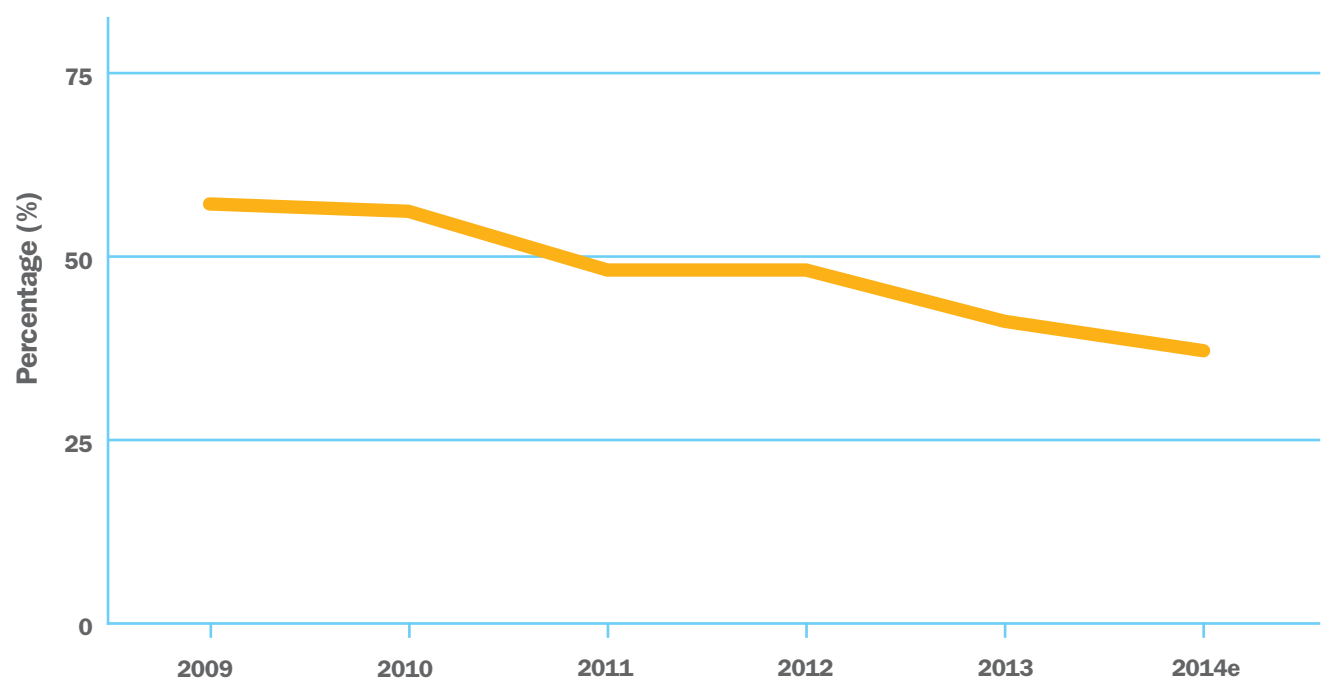
Given that the activities of junior mining companies are especially sensitive to market conditions and prices, junior company spending indicates the mood among investors. For instance, the recent drop in spending by juniors is a signal that investors are not convinced that current mineral prices deliver a sufficient return on their investment; thus, exploration efforts stall until the prices increase.

Figure 10: Exploration plus deposit appraisal expenditures (2009-2014)



Source: Mining Industry Human Resources Council, Natural Resources Canada, 2015

Figure 11: Share of exploration expenditures from junior companies (2009-2014)



Source: Mining Industry Human Resources Council, Natural Resources Canada, 2015

Annual investment in extraction capital has risen significantly since the mid-2000s to reach historic highs — peaking at roughly \$13.7B in 2012.

\$13.7 Billion

Investment in extraction capital has surged

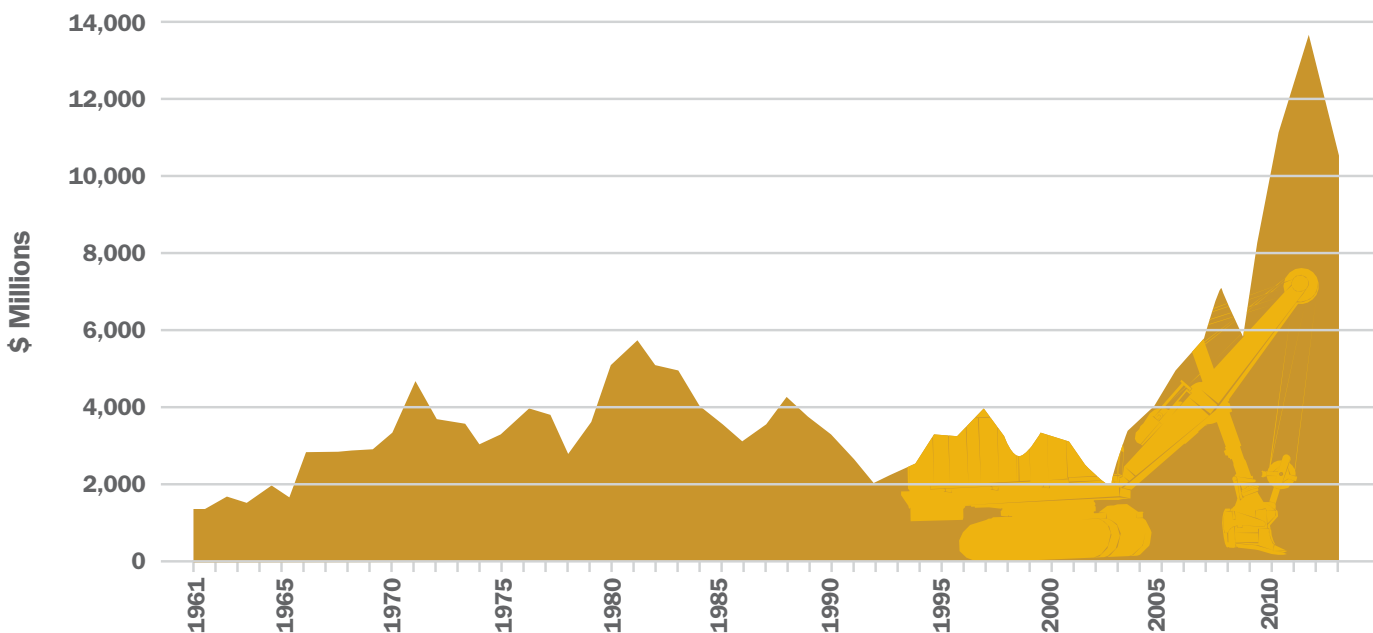
Mining extraction capital refers to the fixed assets — the buildings, machinery and equipment — that are used in mineral extraction operations. The mining industry naturally uses significant capital inputs in its production process, together with

extensive labour inputs (i.e. workers). In the last decade, however, mineral extraction operations in Canada have utilized more capital (in value terms) than ever before.

Figure 12 shows that annual investment in extraction capital has risen significantly since the mid-2000s to reach historic highs

— peaking at roughly \$13.7B in 2012. While a portion of this investment is to replace assets that have depreciated, the latest surge has boosted the overall stock of capital utilized in the mining industry.

Figure 12: Annual investment in mineral extraction capital (1961-2013)



Source: Mining Industry Human Resources Council, Statistics Canada, 2015

Higher capital intensity in mineral extraction

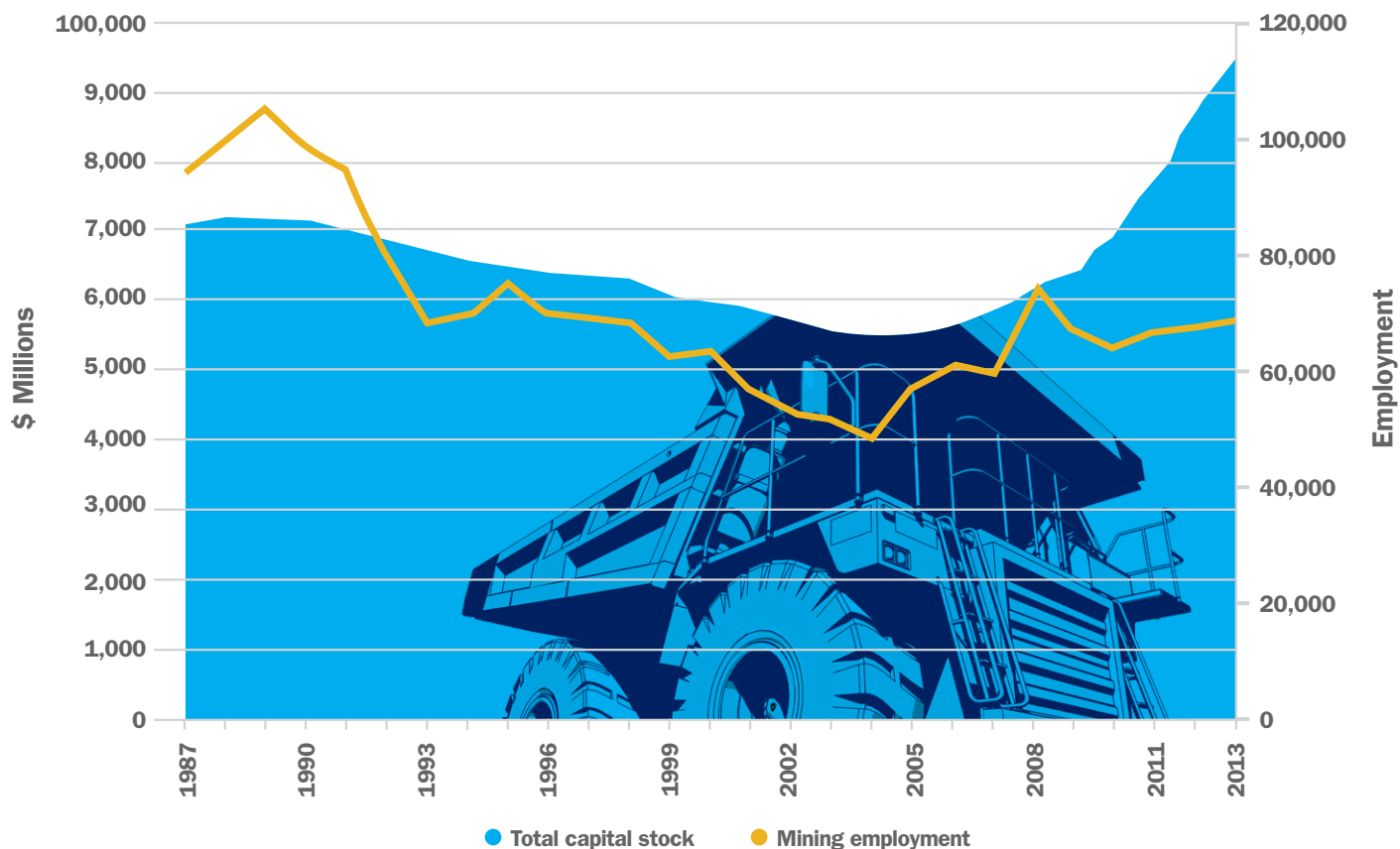
Due to a jump in annual investment over the last decade, the capital dollars spent per worker has also increased. Figure 13 compares the value of capital stock and the number of employees in mineral extraction over the past three decades. The growth in capital stock has greatly

outpaced employment growth since the mid-2000s, indicating a trend of capital intensification in mineral extraction over the last decade.

This trend further suggests that the workforce's interaction with capital has also changed over the past decade, with the higher ratio of capital dollars to workers. With larger-scaled and more

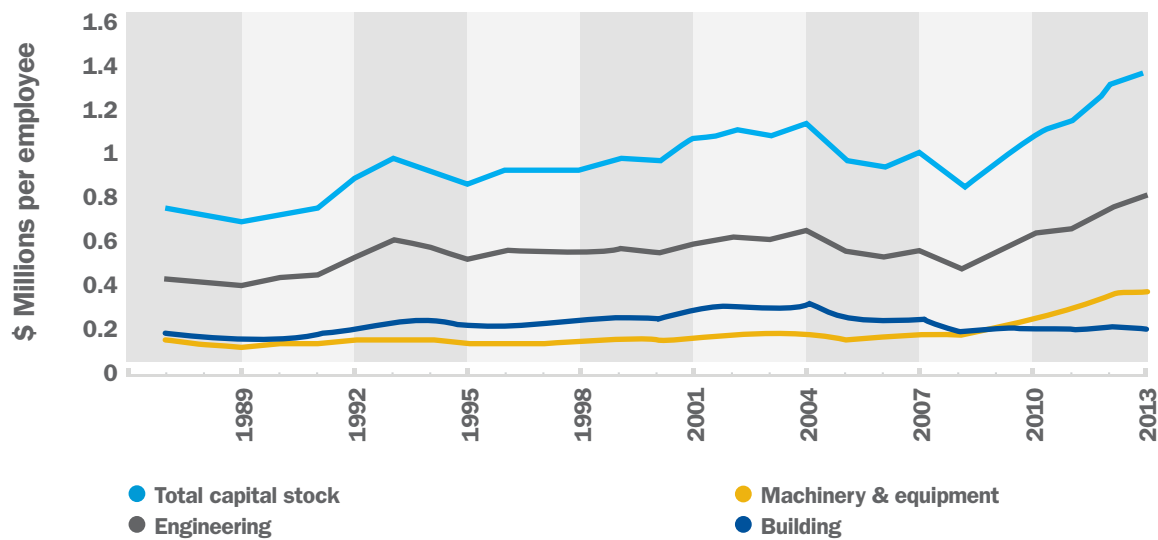
sophisticated equipment, companies may require workers who possess updated skills. As Figure 14 shows, machinery/equipment and engineering investments have accounted for the most significant increases in capital dollars per worker, while the value of buildings per worker has remained relatively unchanged.

Figure 13: Stock of fixed capital and employment in mineral extraction (1987-2013)



Source: Mining Industry Human Resources Council, Statistics Canada, 2015

Figure 14: Capital-to-worker ratio in mineral extraction (1987-2013)



Source: Mining Industry Human Resources Council, Statistics Canada, 2015

Labour productivity has increased

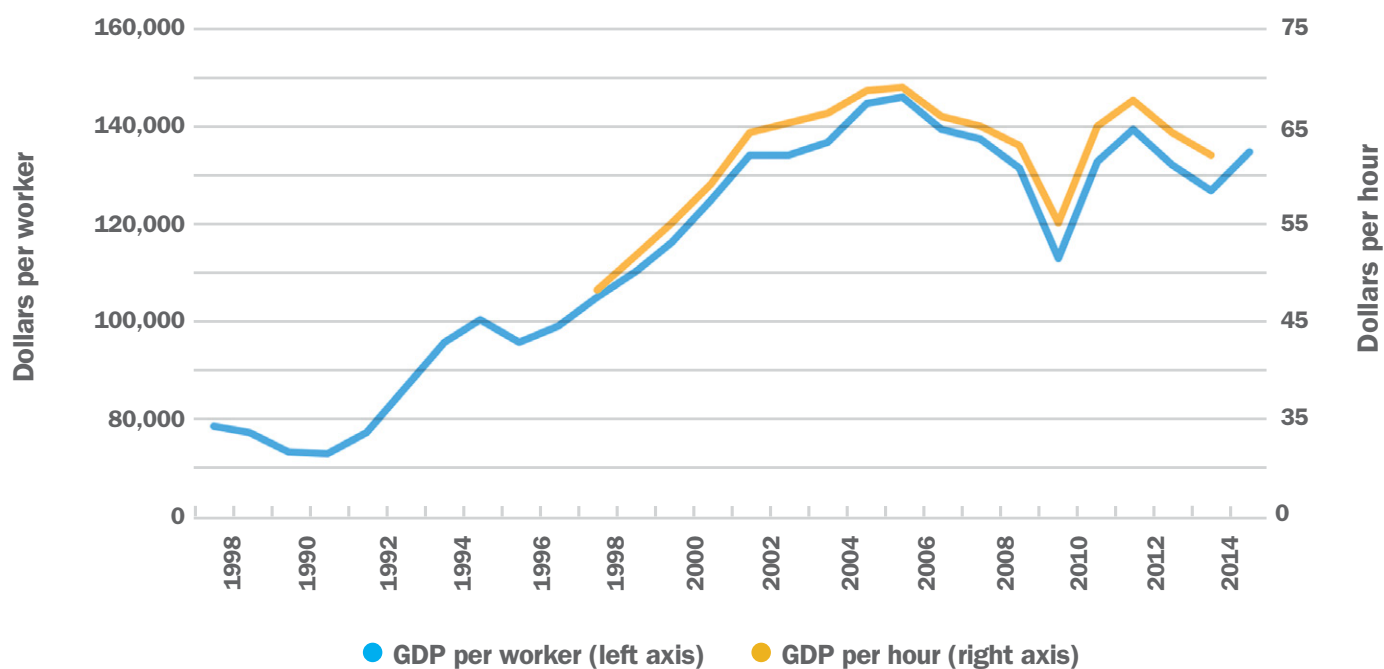
Labour productivity describes the value of output that is produced for every input of labour. This measure indicates how labour is being used to produce output over time; it is commonly expressed as real GDP divided by the number of hours worked, or the value of output per hour of work.⁶ Many factors can influence labour productivity: the skills and composition of the workforce;

the arrival of new technologies; and additional capital in the form of larger-scaled machines and equipment. Each of these factors can affect the manner in which workers are utilized and how they interact with the capital inputs in the process.

Figure 15 illustrates two measures of labour productivity: real GDP per worker from 1987 to 2014, and real GDP per hour worked from 1997 to 2013. The

figure shows that labour productivity has increased from previous decades. While the cause of this increase is difficult to quantify — or even specify — the effect echoes a combination of factors; these include increased and larger-scaled capital, evolving technologies and even hyper-increases in mineral prices. Ultimately, the output per unit of labour has generally risen, notwithstanding the global economic challenges of the late 2000s.

Figure 15: Measures of labour productivity, Real GDP per worker and Real GDP per hour worked in mining (1987-2014)



Source: Mining Industry Human Resources Council, Statistics Canada, 2015

⁶For a more detailed description of productivity and labour productivity, see *Productivity: What Is It? How Is It Measured? What Has Canada's Performance Been Over the Period 1961 to 2012?* by Baldwin, Gu, Macdonald and Yan (2014) (Catalogue no. 15-206-X)

Average hours worked stable over two decades

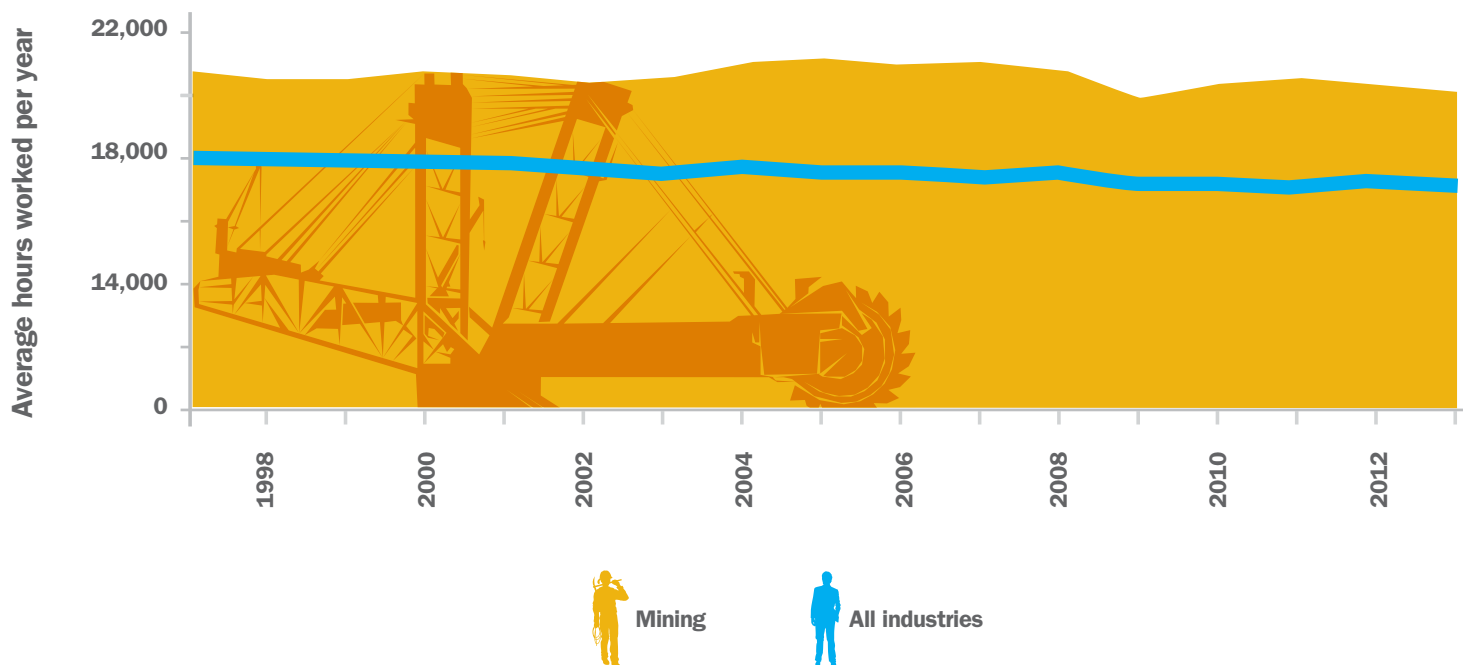
The total number of worker hours can also influence an industry's overall output, such that growth in output is further driven by workers contributing more hours than before. An industry's "total worker hours" is equivalent to the average hours worked, multiplied by the number of workers. These measures may vary over time and by

industry. In the case where the total worker hours has increased over time — either because the number of workers or the average hours have increased — the level of real GDP is also expected to increase (assuming labour productivity remains constant).⁷

There is little to suggest that the increase in real GDP in the mining industry (shown in Figure 9) is the result of workers working

longer hours over time. Figure 16 shows that the average worker hours in mining have remained roughly consistent for nearly two decades — at 2,040 hours worked per year on average. In addition, the average hours worked in all industries are shown to be declining slightly — averaging about 300 hours fewer than for employees in the mining industry.

Figure 16: Average hours worked per year, all industries and the mining industry (1997-2013)



Source: Mining Industry Human Resources Council, Statistics Canada, 2015

⁷GDP can be described as: $GDP = (GDP/Hours\ Worked) \times Hours\ Worked$, where $(GDP/Hours\ Worked)$ refers to labour productivity. Therefore, if labour productivity remains constant, then an increase in hours worked must also increase GDP.



Many destinations for Canada’s mining exports

Canada’s mining industry depends greatly on export revenues generated from international trade. For mining employers, securing demand for their mineral products — through an established and diverse network of trading partners —helps them support and build the capacity of their workforce. According to statistics from Industry Canada, the value of Canada’s mining exports totalled \$66 billion in 2014 — or about 13 per cent of all industry exports in Canada. As shown in Figure 17, the value of mining exports has increased above the levels that existed from 2005 to 2008. The figure also shows that the export value flattened from 2012 to 2014, after peaking in 2011.

Figure 18 shows the major origins and destinations of Canada’s mining exports in 2014. The “origin” (left column) is shown by province and the “destination” (right column) illustrates the range of international buyers of Canadian mining exports. The primary province of origin is Ontario, accounting for 45 per cent of mining exports, followed by Quebec (24 per cent) and British Columbia (13 per cent).⁸ The primary destination is the United States, with 44 per cent of Canadian mining exports destined for the U.S. — the largest share by a significant margin. The United Kingdom follows, with 16 per cent of Canadian mining exports.

While Canada’s mining industry depends greatly on exports to the U.S., its portfolio of international partnerships is relatively diverse. In comparison to mining’s 44 per cent figure, the U.S. market accounts for 77 per cent of exports for all industries in Canada.

Among the leading export routes (in terms of value of exports) are the following:

- 1. From Ontario to the United States
- 2. From Quebec to the United States
- 3. From Ontario to the United Kingdom
- 4. From Saskatchewan to the United States
- 5. From Ontario to Hong Kong

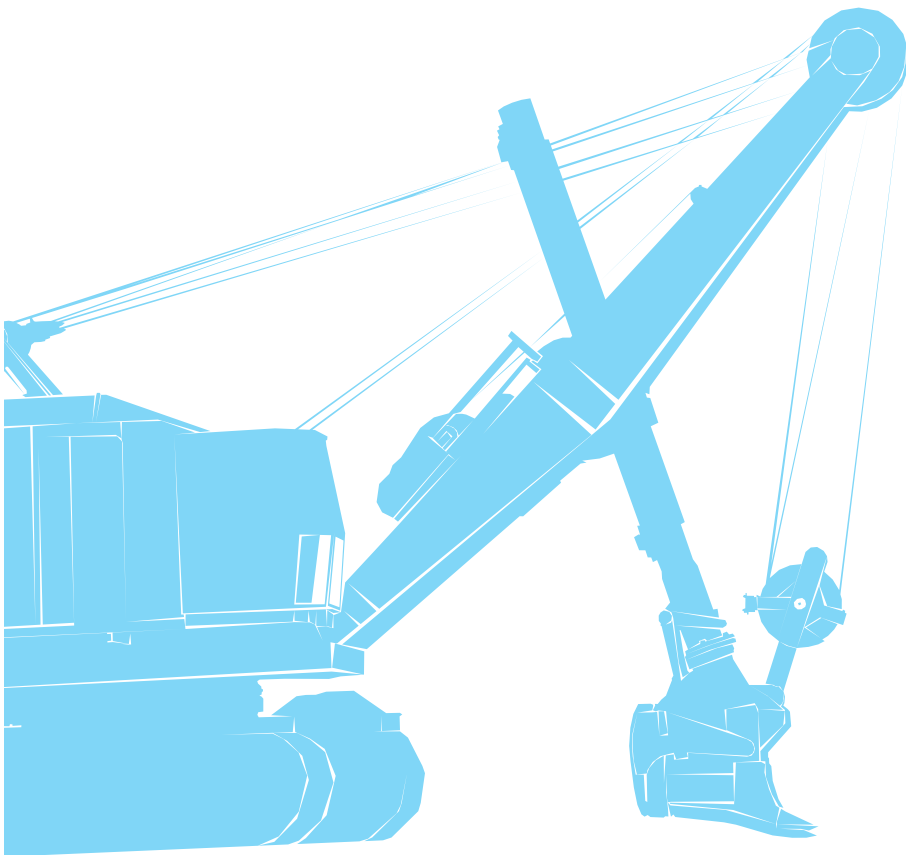
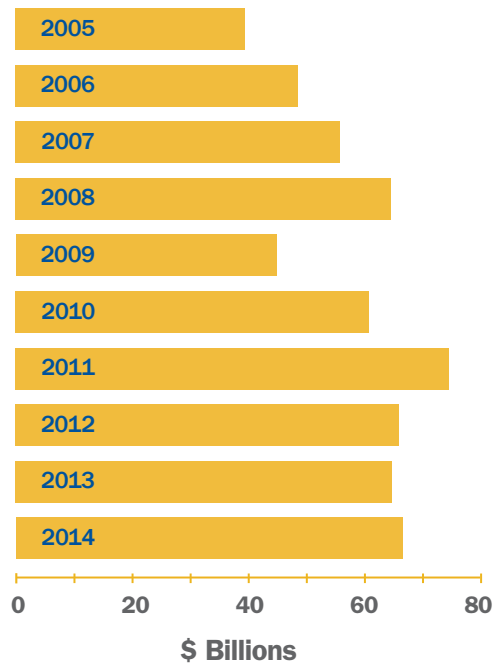


Figure 17: Canadian mining exports, by value (2005-2014)

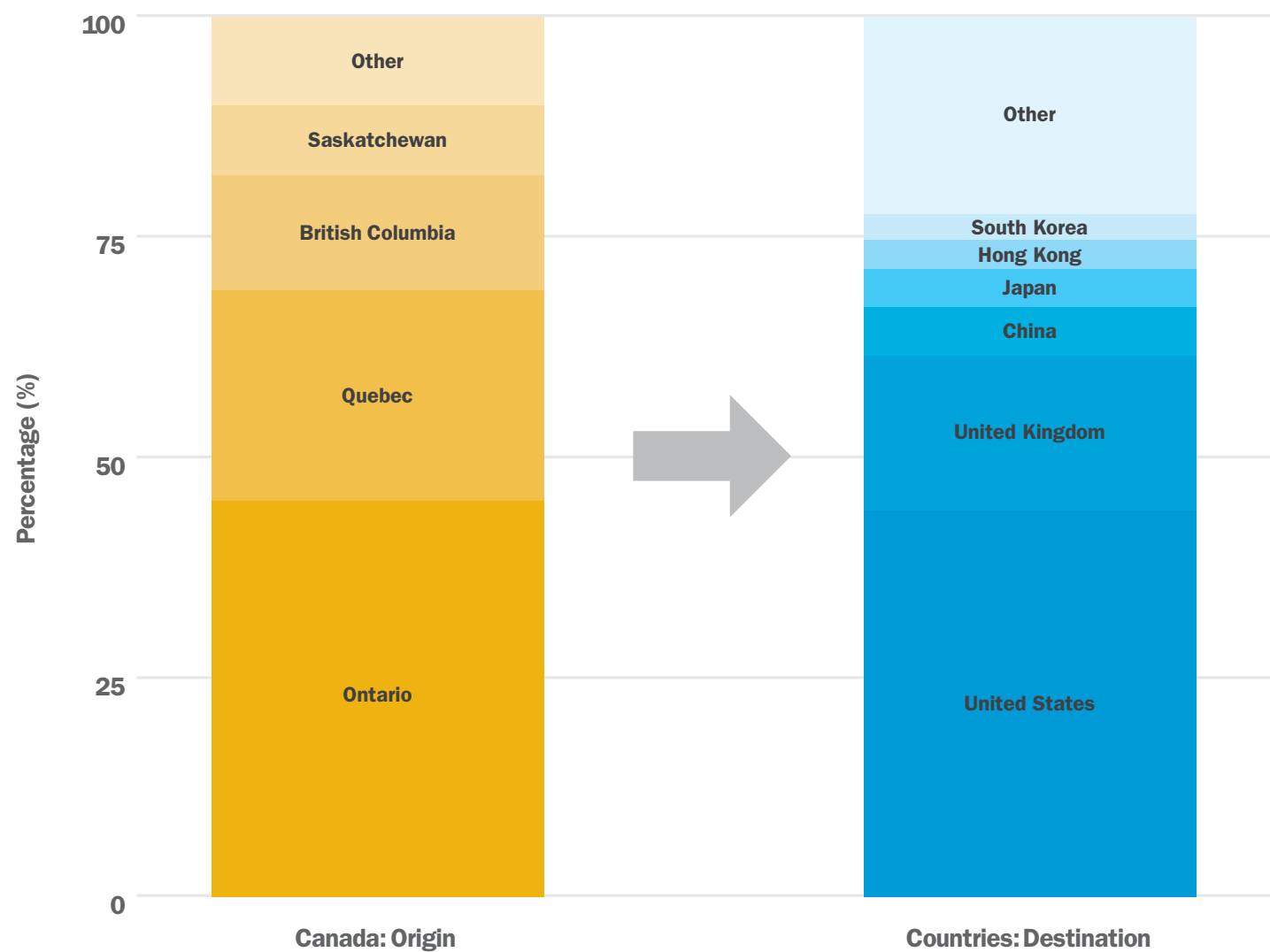


Source: Mining Industry Human Resources Council, Industry Canada, 2015
* Includes NAICS codes 212, 213, and a part of 331, according to MiHR’s definition of the mining industry

⁸Ontario is also the primary origin of exports for all industries in Canada (39 per cent), followed by Alberta (23 per cent) and Quebec (14 per cent).



Figure 18: Origin and destination of Canadian mining exports, by value (2014)



Source: Mining Industry Human Resources Council, Industry Canada, 2015
 * Includes NAICS codes 212, 213, and a part of 331, according to MiHR's definition of the mining industry.

Summary of Canada's mining scene

Canada's mining industry has the following key characteristics:

- is multifaceted and supports a wide-range of activities and organization types
- extends to every region of Canada
- is unique in every province
- has had real GDP growth over the last three decades
- has had employment growth over the last decade (but not historically)
- has slowed in exploration (juniors are challenged to fund projects)
- has reached an historic high in annual investment of extraction capital
- has an increased capital to worker ratio in extraction
- has realized gains in labour productivity compared to previous decades
- has a diverse set of trading partners (beyond the U.S.) for mining exports



CANADA'S MINING LABOUR MARKET ANALYSIS

approximately

35%

Approximately 35 per cent of the mining industry workforce is employed in extraction & milling.

Mining employment is volatile

The size of employment in Canada's mining industry is particularly sensitive to economic cycles and tends to fluctuate over time. Figure 19 shows the percentage change in the mining workforce over the last three decades, as compared to the Canadian workforce as a whole. The intense swings in mining employment certainly have repercussions with respect

to the resources the industry commits to adjusting its workforce and hiring patterns from year to year.

Extraction and milling jobs drive employment

MiHR estimates that the Canadian mining industry directly employed 220,000 people in 2015, a 3 per cent decline from 2014. Figure 20 shows employment in

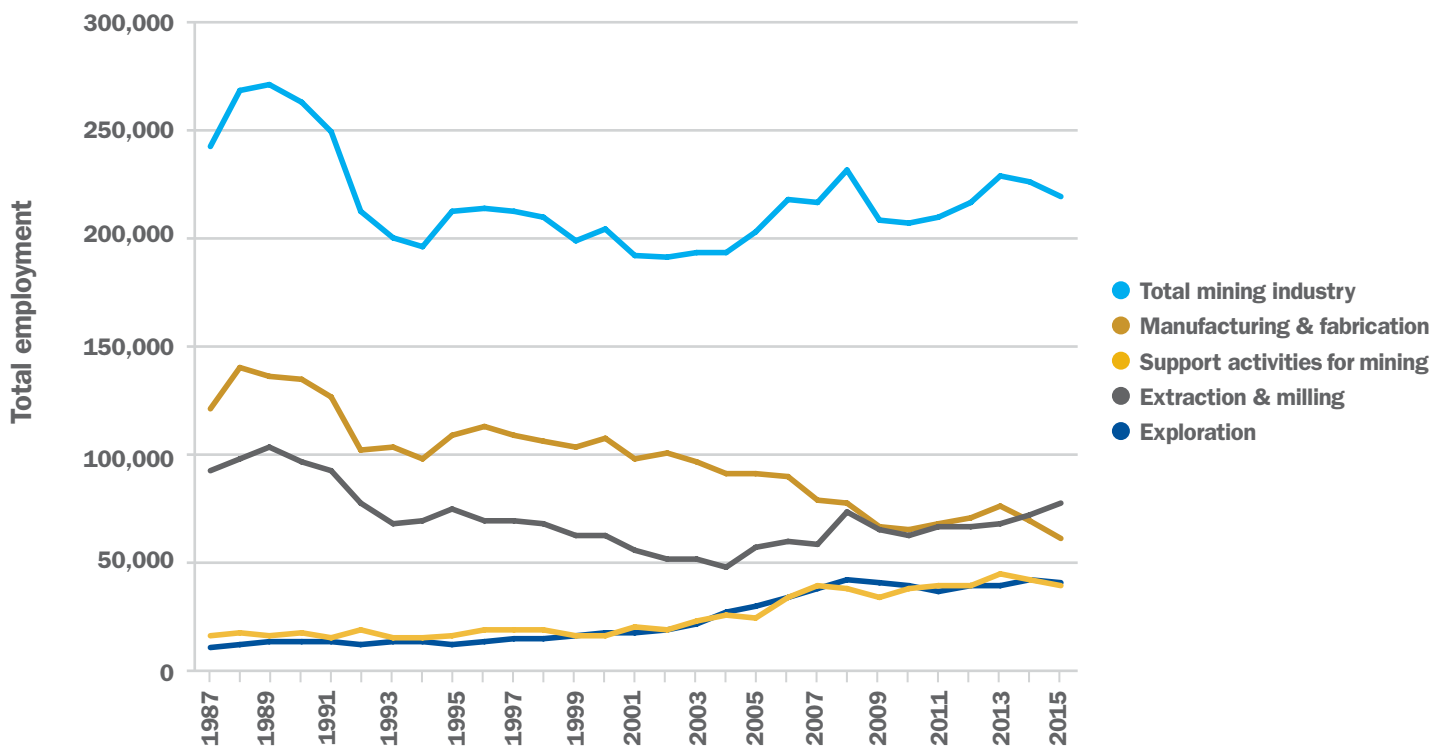
Canada's mining industry by sub-sector from 1987-2015. According to MiHR's estimate for 2015, approximately 35 per cent of the mining industry workforce is employed in extraction & milling, followed by fabrication & manufacturing (28 per cent) and support activities for mining (18 per cent). The exploration sector employs 19 per cent of the total mining labour force.

Figure 19: Annual percentage changes in employment, mining workforce and Canadian workforce (1988-2014)



Source: Mining Industry Human Resources Council, Statistics Canada, 2015

Figure 20: Employment by sub-sectors in mining (1987-2015)



Source: Mining Industry Human Resources Council, Statistics Canada, 2015

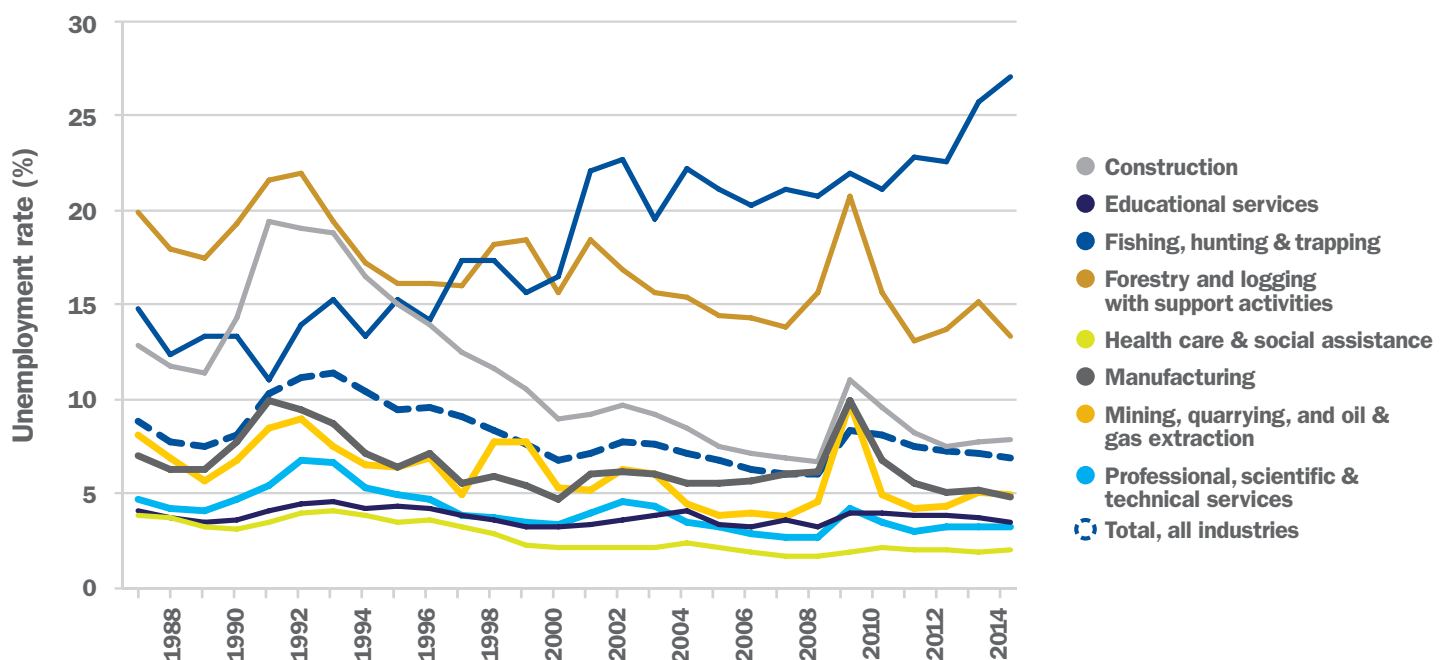


Lower unemployment rates in mining

Figure 21 shows unemployment rates in a variety of Canadian sectors. With the exception of a spike in 2009, unemployment rates in mining, quarrying, and oil and gas extraction have been consistently lower than the average for the overall Canadian labour force. Furthermore, unemployment among workers in the industry is lower than in other sectors with which mining companies compete for skilled workers, such as construction and forestry.

With the exception of a spike in 2009, unemployment rates in mining, quarrying, and oil and gas extraction have been consistently lower than the average for the overall Canadian labour force.

Figure 21: Unemployment rates in various industries (1987-2014)



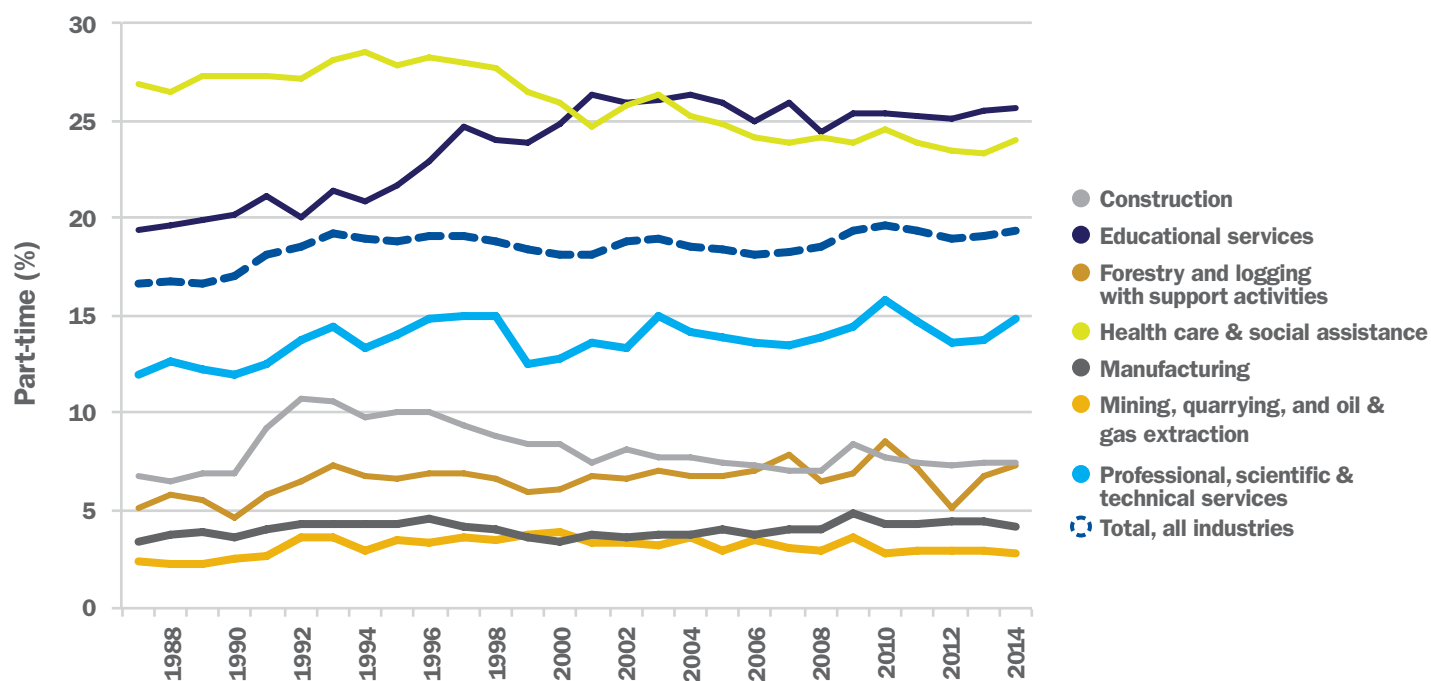
Mining jobs are full-time jobs

According to CIBC Economics, a key indicator of employment “quality” is the distribution of full- and part-time positions.⁹ Figure 22 shows the share of part-time employment in various industries from 1987 to 2014. The share of part-time jobs in mining, quarrying,

and oil and gas extraction has consistently been below 5 per cent over the period and well below the average across all industries in Canada (between 17 and 19 per cent). These percentages suggest that when new jobs are created in the mining industry, they are primarily full-time positions. Furthermore, other industries that compete

with mining for skilled workers, such as construction and forestry, have significantly higher levels of part-time employment and more variability over time in their use of part-time workers.

Figure 22: Share of part-time employment in various industries (1987-2014)



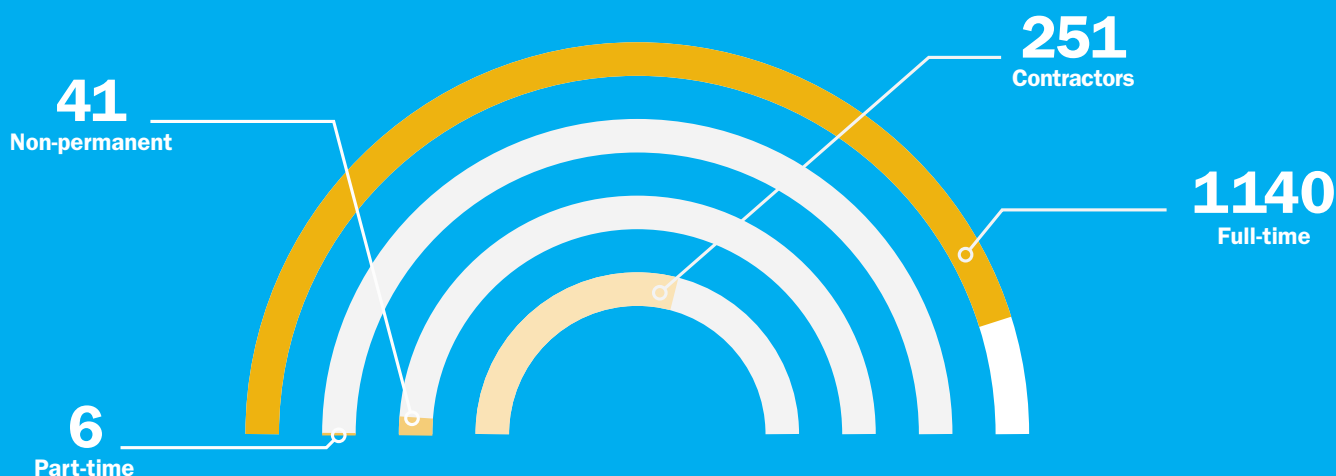
Source: Mining Industry Human Resources Council, Statistics Canada, 2015

The share of part-time jobs in mining, quarrying, and oil and gas extraction has consistently been below 5 per cent.

⁹ http://research.cibcwm.com/economic_public/download/eqi_20150305.pdf

MiHR's 2015 National Employer LMI Survey asked respondents about the total number of people working on their sites in various employment categories. The survey results indicate that most of the workers on the sites are permanent, full-time employees.

Figure 23: MiHR's 2015 National Employer LMI Survey: How many people work at your site in the following categories?



Source: Mining Industry Human Resources Council, Employer LMI Survey, 2015

Challenges for younger workers

Workers in younger generations naturally tend to experience greater unemployment and higher rates of part-time employment than members of older generations. As Figure 24 shows, unemployment rates are highest among younger workers (15- to 24-year-olds) in the sectors of mining, quarrying, and oil and gas extraction (NAICS code 21), as well as in the Canadian labour market, overall.

In mining, quarrying, and oil and gas, unemployment rates have generally been lower in both age categories, given that unemployment in the mining industry is lower compared to the overall Canadian labour market. However, the unemployment rate among 15- to 24-year-olds in mining is shown to fluctuate greatly — from a rate that is comparable to all 15- to 24-year-

olds, to one that is favourably low for the age category. As a result, younger generations have found themselves in a shifting state regarding their employment prospects in the industry.

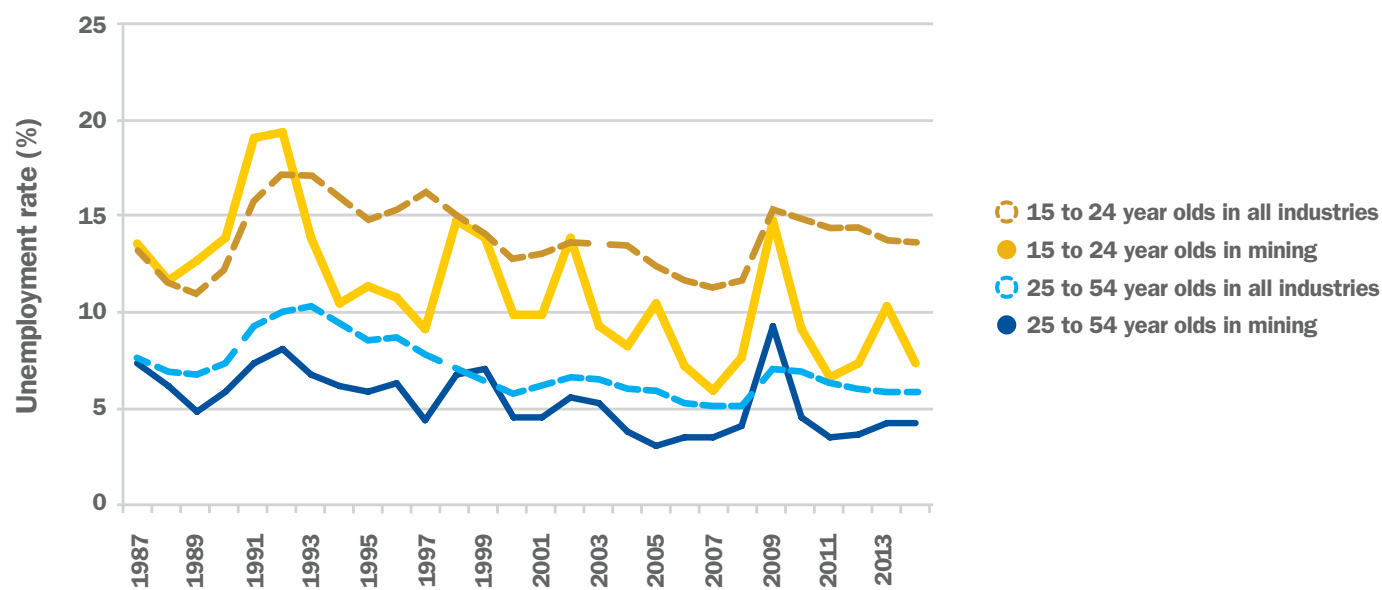
Employment outcomes for younger workers seem more sensitive to economic cycles and they are among the first to be unemployed during an economic downturn. This pattern — especially in a highly cyclical industry like mining — could discourage younger job seekers from pursuing mining careers.

Members of younger generations are also more likely to work on a part-time basis. As a person advances through their working years, part-time positions are often the vehicle for acquiring the on-the-job skills and experience that allow them to negotiate for permanent, full-time

work. As Figure 25 shows, about half of 15- to 24-year-olds in the overall Canadian labour force are part-time employees. The part-time rate is significantly lower for 25- to 54-year-olds (at 12 per cent). The difference among age groups is not as substantial in the mining industry: roughly 6 percent of 15- to 24-year-olds in extraction & milling are working part-time, compared to roughly 2 percent of 25- to 54-year-old workers in mining. This finding further supports the conclusion that mining occupations are naturally suited to full-time work.

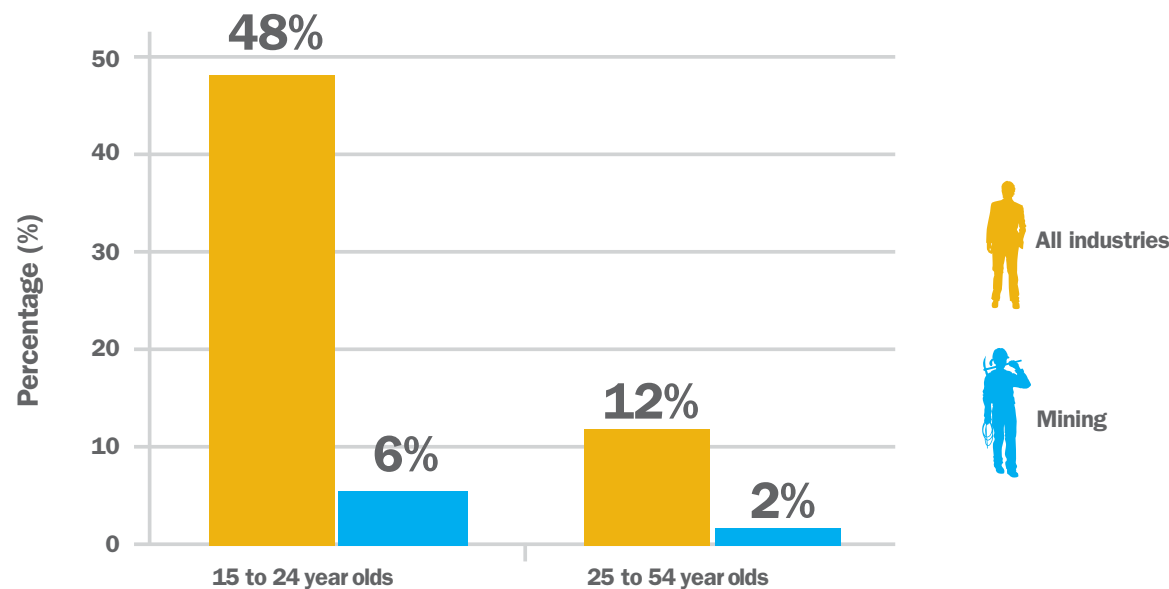
The tendency of the mining industry to create full-time, permanent jobs and the higher participation of younger age groups in part-time employment may further limit opportunities for young workers to participate in the industry.

Figure 24: Unemployment rate (mining, quarrying, and oil and gas), by age categories (1987-2014)



Source: Mining Industry Human Resources Council, Statistics Canada, 2015

Figure 25: Share of part-time employees in mining, quarrying, and oil and gas, and in all industries, by age categories (2013)



Source: Mining Industry Human Resources Council, Statistics Canada, 2015



Tighter labour market for mining related sectors

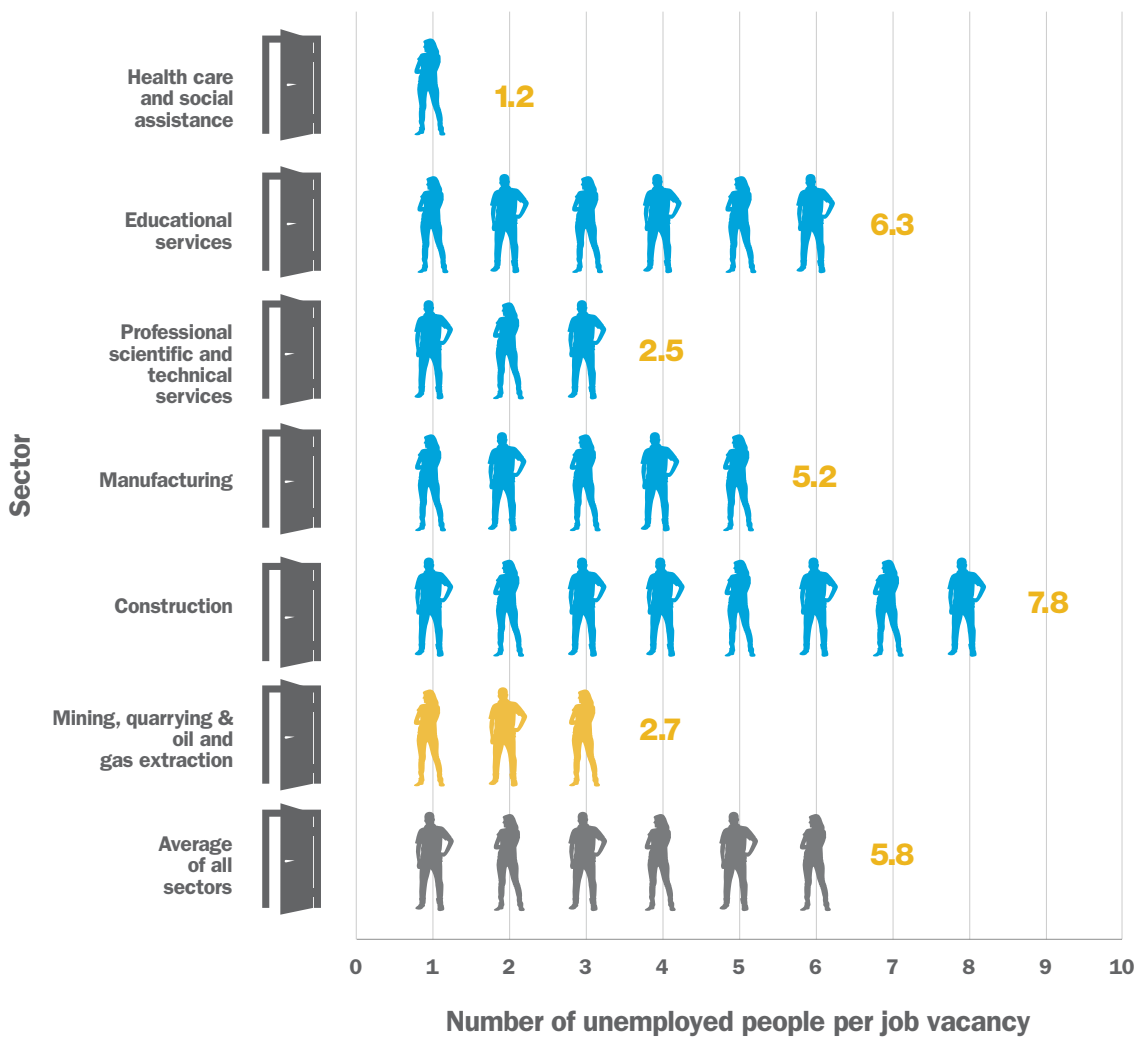
A “tight” labour market describes a situation in which the number of available jobs is high, relative to the number of people available to fill them. Such tightness can result from a shortfall of available workers or from a robust demand for workers (or a combination of both factors). In either case, employers’ demand for workers has outpaced supply – likely

causing wages to rise and unemployment to fall, as employers become more willing to pay for their labour inputs.

Figure 26 displays the ratio of unemployed to job vacancies for various industries. This measure is just one gauge of labour market tightness, since it compares the number of people actively looking for work with the number of openings available. Thus, in the tightest markets, there are fewer unemployed people for every

vacancy.¹⁰ Figure 27 shows that smaller ratios – and accordingly, greater market tightness – exist in the industries within MiHR’s definition of the mining industry (highlighted yellow) – as compared to all industries. Furthermore, the tightness of the labour market in mining, quarrying, and oil and gas extraction is significantly higher than for industries such as construction, which competes for many of the same skilled workers.

Figure 26: Unemployment to job vacancies, three-year average (2011-2013)



Source: Mining Industry Human Resources Council, Statistics Canada, 2015

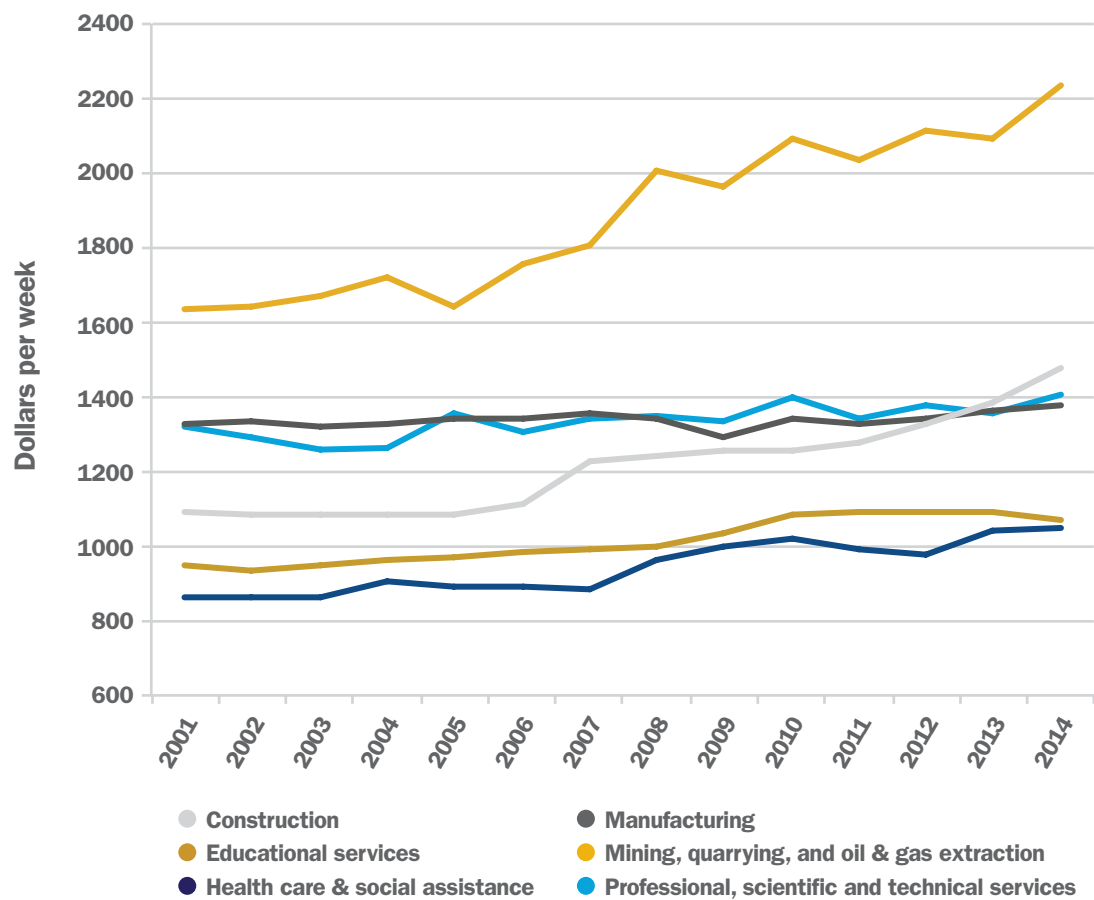
¹⁰ Note in all labour markets at any particular time, there are a positive number of unemployed people. This phenomenon is known as the “natural” unemployment rate.

As noted, a tight labour market is often associated with upward pressure on wages and salaries, as employers compete with one another and with other sectors for a limited supply of skilled workers. Figure 27 shows data from Statistic Canada’s Survey of Employment, Payrolls and Hours (SEPH)

for full-time salaried workers in mining, quarrying, and oil and gas extraction, over the past 14 years. This figure indicates that average weekly earnings in real dollars (exclusive of benefits, overtime and bonuses) for full-time employees in mining are higher than in manufacturing and

construction, for example. Furthermore, the gap between the average earnings of mining employees and those of the other sectors has increased over time.

Figure 27: Real average weekly earnings (full-time, salaried employees) excluding benefits, overtime and bonuses (2001-2014)



Source: Mining Industry Human Resources Council, Statistics Canada, 2015

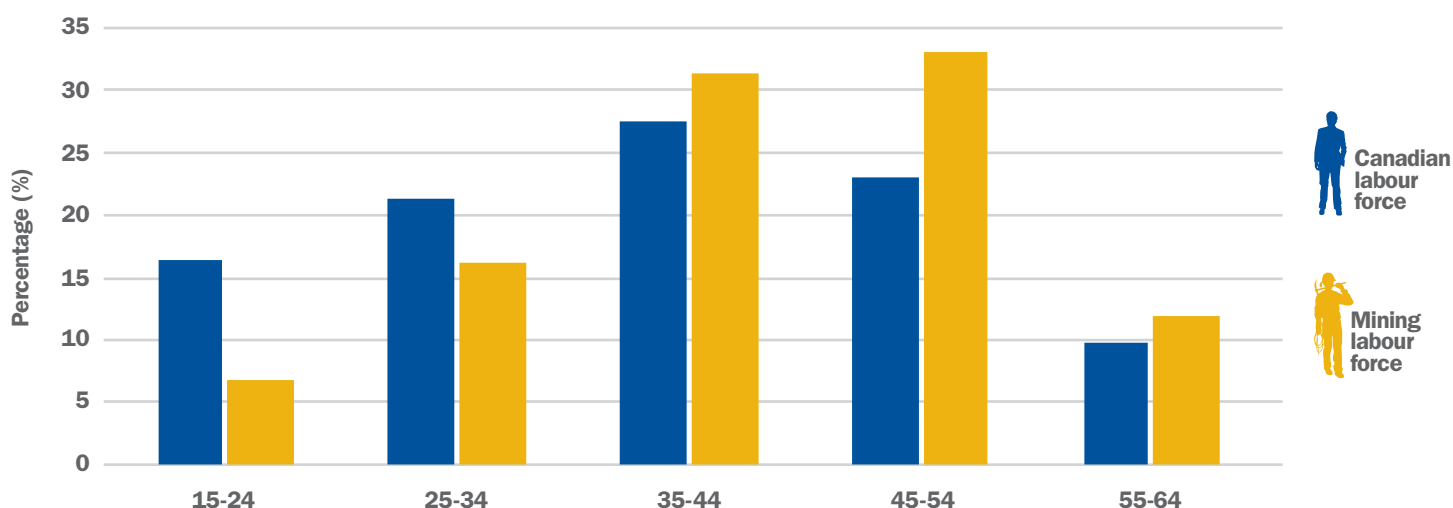
Younger workers are making a comeback

For nearly a decade, MiHR's research has consistently shown that the mining workforce is relatively older than the overall labour force in Canada. Figure 28 shows the age structure of the mining labour

force, according to MiHR's 2005 report, *Prospecting the Future*, as well as the age structure for Canada's overall labour market. In that year, a greater percentage of the mining labour force was in the older age categories, compared to the youngest age categories. This characteristic has

been a major concern for the mining industry; as older workers approached retirement, their skills and experience were being passed on to fewer younger people – who were generally participating less in the mining industry.

Figure 28: Age structure of the workforce, all industries and mining (2001)



Source: Mining Industry Human Resources Council, Statistics Canada, 2015

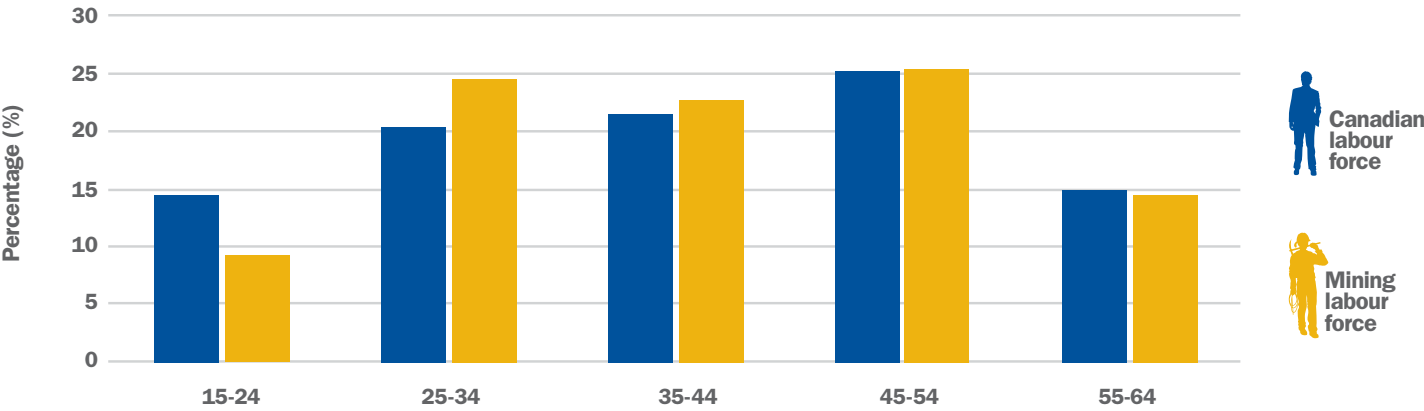
Since the release of *Prospecting the Future*, however, the mining industry is showing signs of attracting more young people. According to Figure 29, the share of 25- to 34-year-olds in the mining labour force was 24.7 percent in 2011 – a jump of almost 10 per cent from 2005. This percentage was also higher than the rate of participation for younger workers in the overall labour force. Meanwhile, the share of 45- to 64-year-olds in the mining labour force had decreased to 40 per cent by 2011, down from 45 per cent at the time of *Prospecting the Future* and roughly on par with the overall labour force.

10%

The share of 25- to 34-year-olds in the mining labour force was 24.7 per cent in 2011 – a jump of almost 10 per cent from 2005.



Figure 29: Age structure of the workforce, all industries and mining (2011)



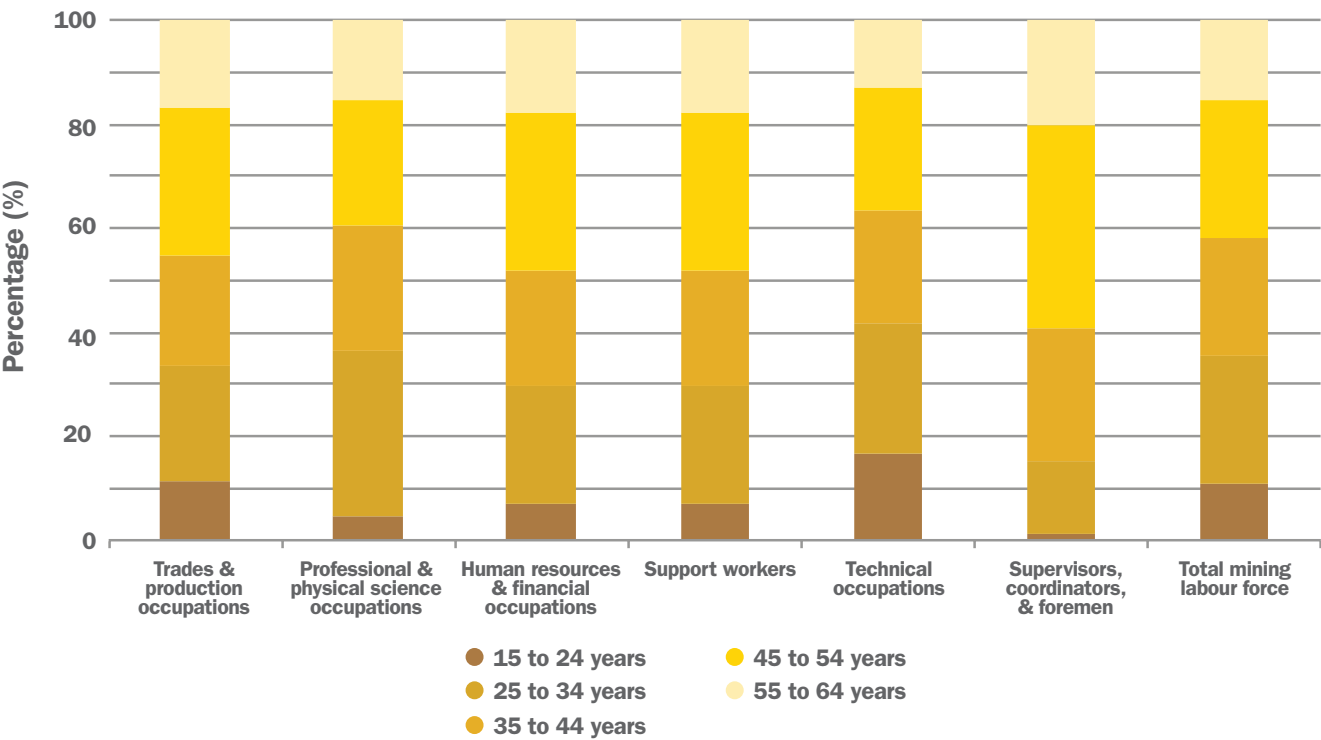
Source: Mining Industry Human Resources Council, Statistics Canada, 2015

Despite this noticeable shift toward younger workers, the mining workforce still faces challenges associated with an aging workforce. A younger workforce highlights the need for mining employers to invest in additional training and development programs, to offset the loss of more seasoned, experienced workers.

Figure 30 shows a breakdown of age structure in Canadian mining, on a broad occupational basis. Thirty-one percent of the workers employed in professional and physical science occupations in mining are between the ages of 25 and 34, compared to 24 per cent in the overall mining labour force. A younger workforce in technical and

professional occupations in mining brings a unique set of HR challenges. Although a majority of these younger workers are highly skilled, they still lack the depth of workplace experience and knowledge of their predecessors.

Figure 30: The age structure in Canada’s mining labour force, by occupational categories (2011)



Source: Mining Industry Human Resources Council, Statistics Canada, 2015

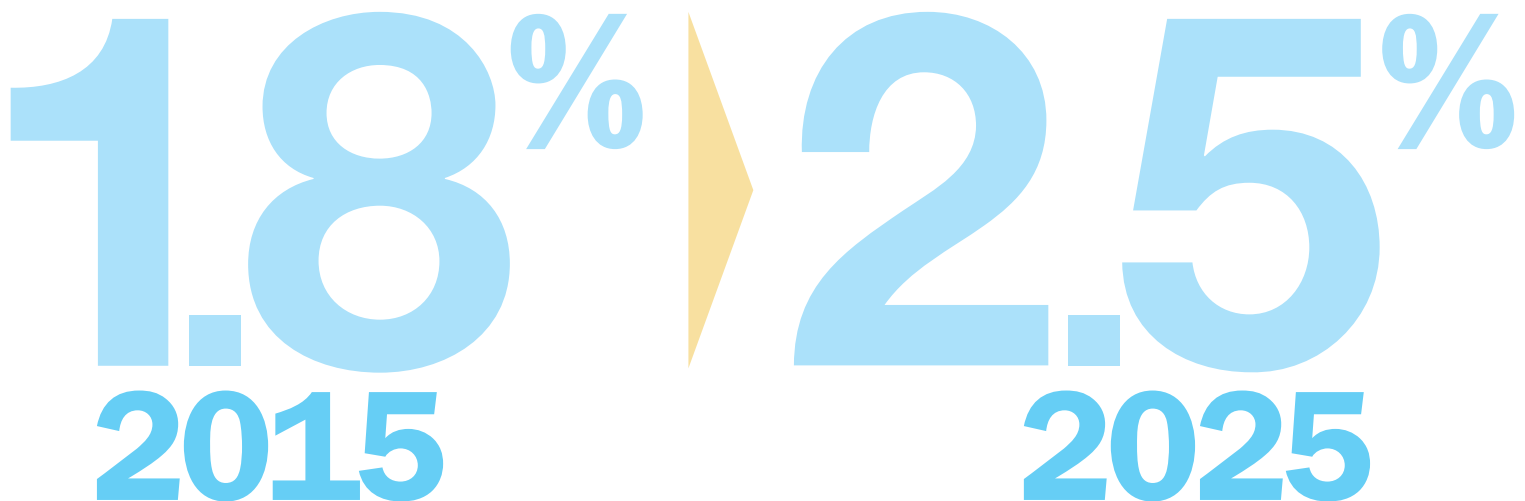


The retirement crisis isn't over

Although the share of young workers has risen in Canada's mining labour force, retirement behaviour of older workers continues to present challenges for mining industry employers. In 2011, about 40 per cent of Canada's mining labour force was between the ages of 45 and 64 (See Figure 29); individuals in these age categories are among those more likely to retire in the coming decades, although this behavior is not standard, across all occupations and all levels of education.

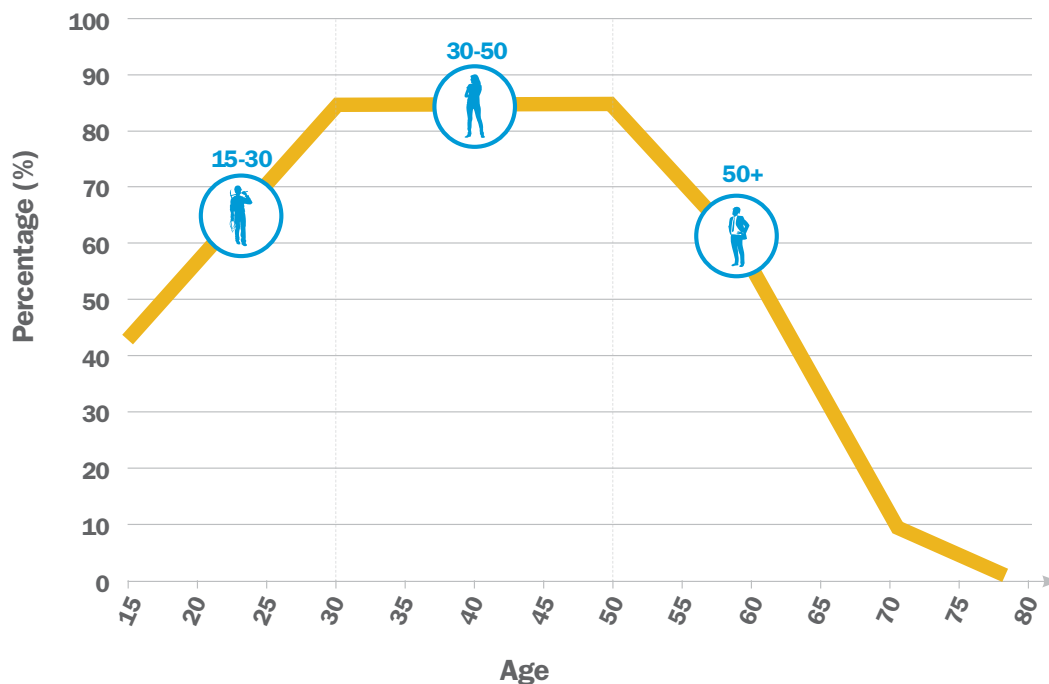
Figure 31 charts labour force participation of Canadians, by age, in 2011. As shown, people between the ages of 15 and 30 steadily increase their participation in the workforce. Between the ages of 30 and 50, labour force participation remains constant at approximately 85 per cent, on average. Then, at around 50 years of age, participation begins to noticeably decline — falling year-over-year toward zero. This pattern captures the retirement behaviour

of most Canadians. According to Statistics Canada's Labour Force survey, the median age of retirement for Canadians working in the private sector was 64 in 2014. Based on MiHR's projections, the annual retirement rate among the mining industry workforce will rise from about 1.8 per cent in 2015 to 2.5 per cent by 2025.



The annual retirement rate among the mining industry workforce will rise from about 1.8 per cent in 2015 to 2.5 per cent by 2025.

Figure 31: Labour force participation rate in Canada, by age (2011)

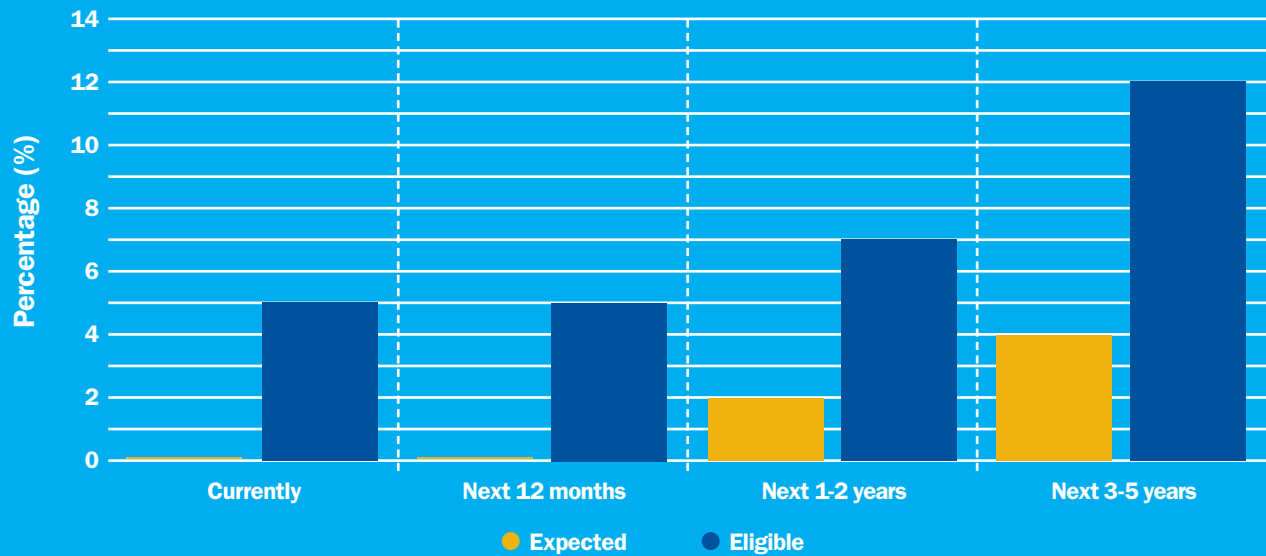


Source: Mining Industry Human Resources Council, Statistics Canada, 2015

MiHR’s 2015 National Employer LMI Survey asked employers to state the average age of their current permanent employees, as well as the average age of retirement in their organization. Respondents reported an average employee age of 41 and an average retirement age of 62. This is a full two years younger than the median retirement age among workers in the private sector in Canada.

As illustrated in Figure 32, survey respondents were also asked to share their perceptions of the retirement prospects of their permanent workforce. Respondents reported that the percentage eligible to retire will gradually increase from today’s rate of 5 per cent to 12 per cent in the next 3 to 5 years.

Figure 32: MiHR’s 2015 National Employer LMI Survey: What proportion of your organization’s permanent (full time and part time) workforce is, or will be, eligible for retirement in the following time frames? And what proportion is expected to retire?



Source: Mining Industry Human Resources Council, Employer LMI Survey, 2015

Diversity in mining’s workforce

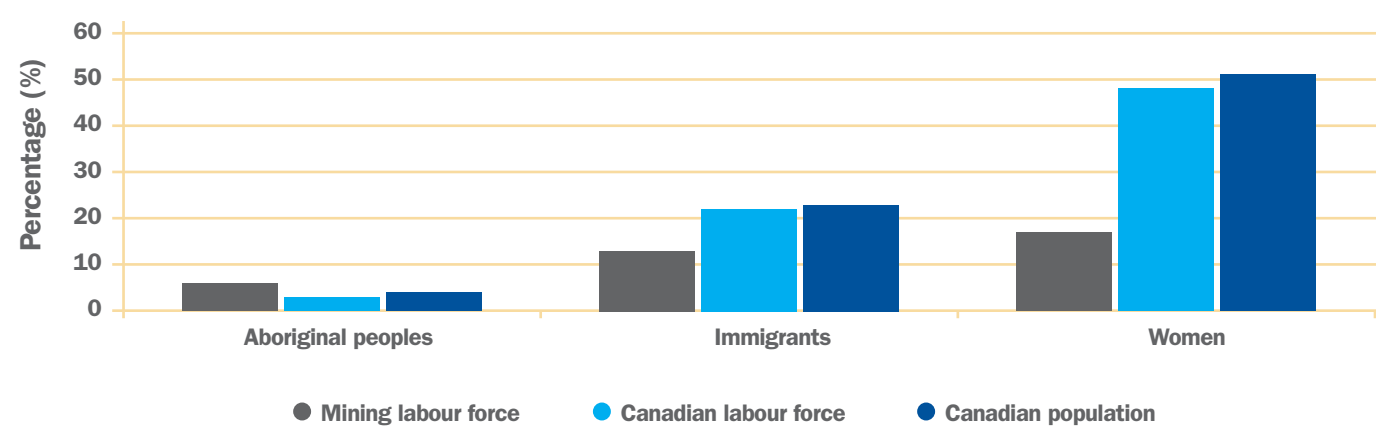
Diversity in the labour force describes the extent which workers can be distinguished by visible and invisible differences. An apparent shortfall or mismatch in diversity in a workforce can point to missed opportunities, and even a malfunctioning labour market, especially if an under-represented group has the necessary skills and experience that would benefit the industry.

MiHR examines three groups that are relevant to diversity in the mining

industry: Aboriginal peoples, women and immigrants. These groups are examined because their presence in the mining labour force does not match the overall labour force or the population in general. This mismatch may indicate that each group faces additional challenges, including systemic barriers, to increased participation. Figure 33 uses two benchmarks — the share of (1) the overall labour force and (2) the general population — to assess how well a particular group is represented in the mining labour force.

As shown in the figure, women and immigrants are under-represented in the mining industry. Aboriginal peoples, on the other hand, are well-represented, but their participation is still limited by a number of factors discussed in this section. These mismatches alone are not enough to verify that these diverse groups are missing opportunities; further investigation reveals that each diverse group also possesses comparative advantages —such as experience level, skills and other attributes — that make their absence a loss to the mining industry.

Figure 33: Diversity in Canada’s mining labour force (2011)

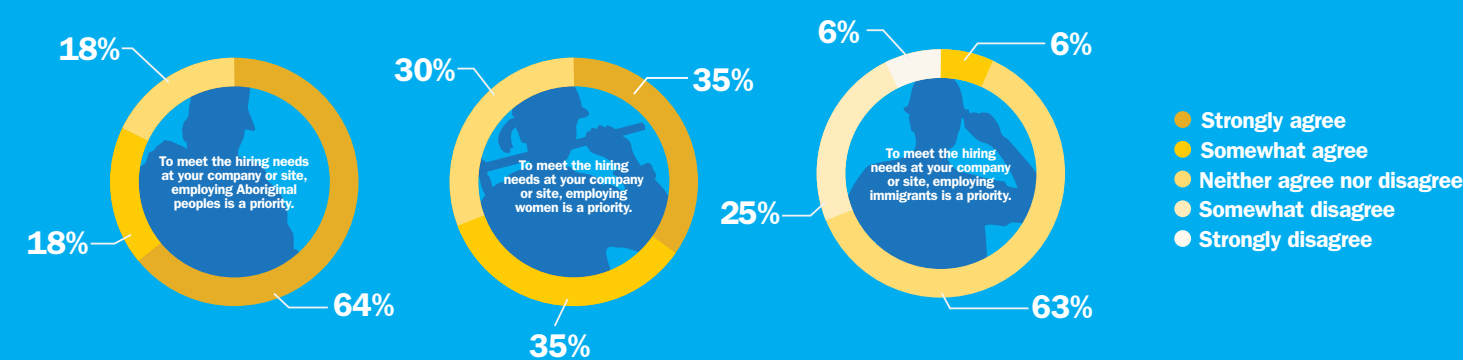


Source: Mining Industry Human Resources Council, Statistics Canada, 2015

MiHR’s 2015 National Employer LMI Survey asked employers to evaluate the priority they place on various diverse groups to meet their company’s hiring needs. The results are varied for Aboriginal people, immigrants and women, as shown in Figure 34. Among these groups, employers reported the strongest agreement that Aboriginal peoples were a priority and most agreed that women were a priority; however, employers did not necessarily agree (and some disagreed) that immigrants were a priority.

The emphasis on Aboriginal peoples is not surprising, as mining operations are frequently located close to Aboriginal communities and/ or on traditional lands. From this perspective, Aboriginal participation is an obvious benefit to the mining industry. At the same time, there are nearly thirteen times as many women, and nearly six times as many immigrants in Canada’s population as Aboriginal peoples — showing that these groups offer significant opportunities for the mining industry to strengthen its labour market diversity on all fronts.

Figure 34: MiHR’s 2015 National Employer LMI Survey: Please indicate the extent to which you agree or disagree with the following statements



Source: Mining Industry Human Resources Council’s Employer Survey, 2015

Many Aboriginal peoples are not participating in the labour force

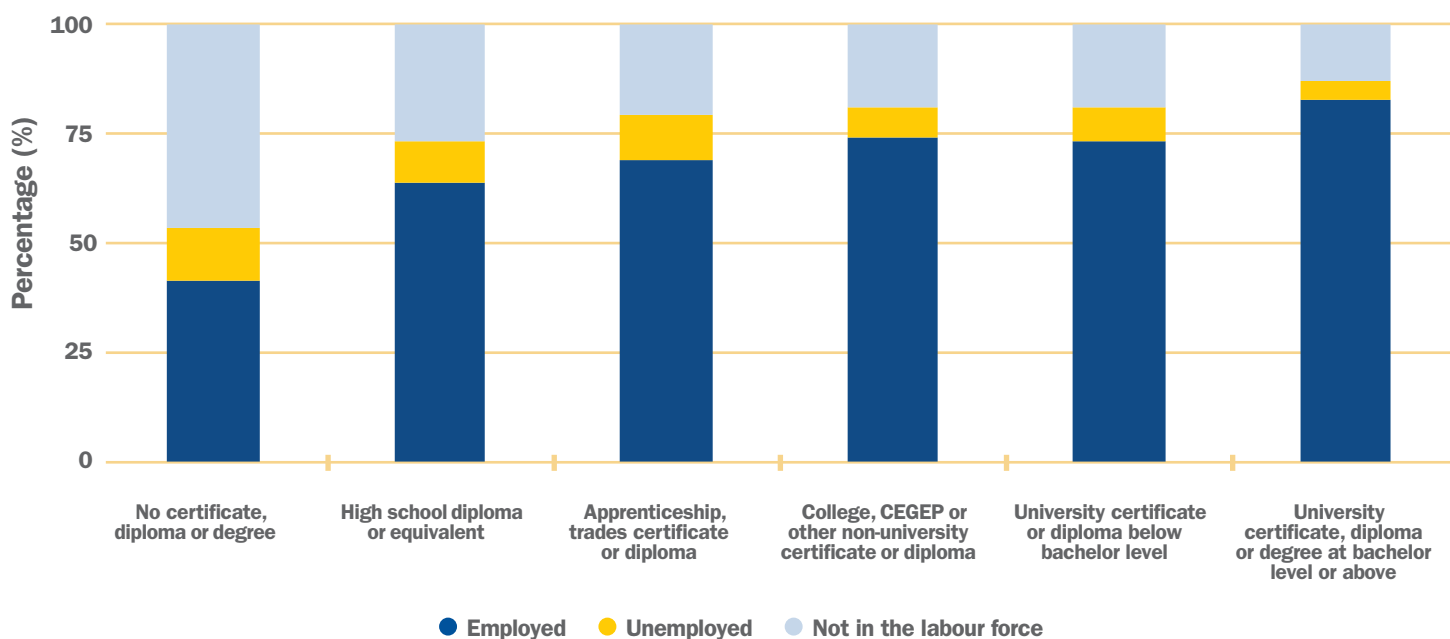
A significant number of Aboriginal peoples in Canada do not participate in the labour force. According to Statistics Canada, labour force participation among the Aboriginal population (ages 25 to 64) was roughly 72 per cent in 2011 — compared to 81 per cent among the non-Aboriginal population. In approximate terms, more than one out of four Aboriginal people of working age are not participating in the labour force. Given that Aboriginal

populations tend to live close to mining operations, their non-participation has the deepest impact on employers looking to hire a local workforce.

Educational attainment is one factor related to labour force participation; those with no certificate, diploma or degree are less likely to participate in the labour force. Equally, participation is significantly boosted among those with a certificate, diploma or degree. Figure 35 demonstrates this pattern for Aboriginal peoples in Canada.

Clearly, when a significant number of people in a demographic group do not possess a certificate, diploma or degree — the overall participation rate for that group is diminished. Approximately 30 per cent of Canada's Aboriginal population (ages 25 to 64) have not acquired these education credentials — significantly greater than about 12 per cent for non-Aboriginal people. A similar pattern for educational attainment emerges in Canada's mining labour force.

Figure 35: Labour market outcomes among Aboriginal peoples in Canada, by educational attainment (2011)



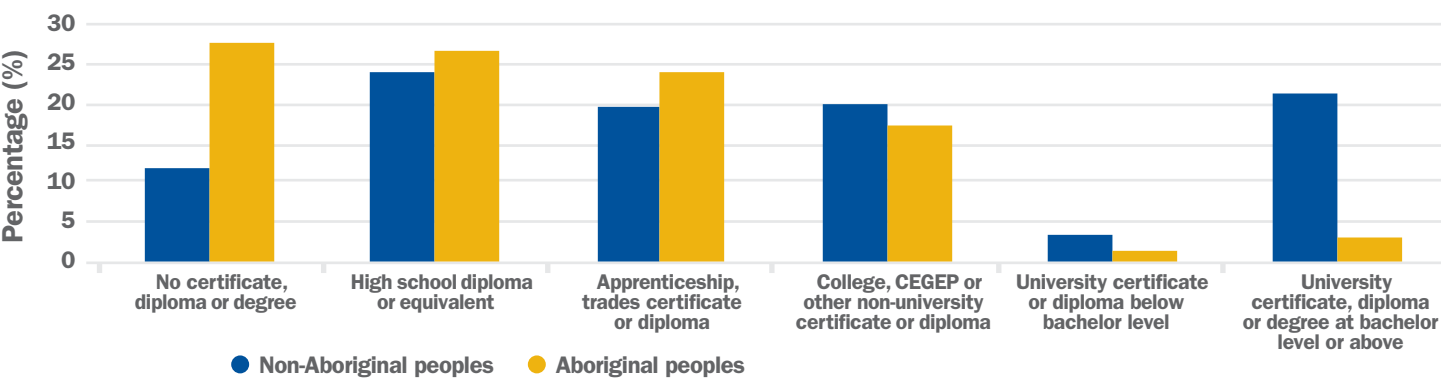
Source: Mining Industry Human Resources Council, Statistics Canada, 2015

As shown in Figure 36, the proportion of Aboriginal peoples without a certificate, diploma or a university degree is considerably greater and the share of persons with a university degree is

substantially lower than for non-Aboriginal members of the workforce. Even though Figure 36 reports on those who are in the Canadian labour force as a whole, it points to the overarching profile for Aboriginal

peoples with a degree of attachment to the mining industry, which in turn has an impact on their participation in the mining labour force.

Figure 36: Highest level of educational attainment in Canada’s mining labour force, Aboriginal and non-Aboriginal peoples (2011)

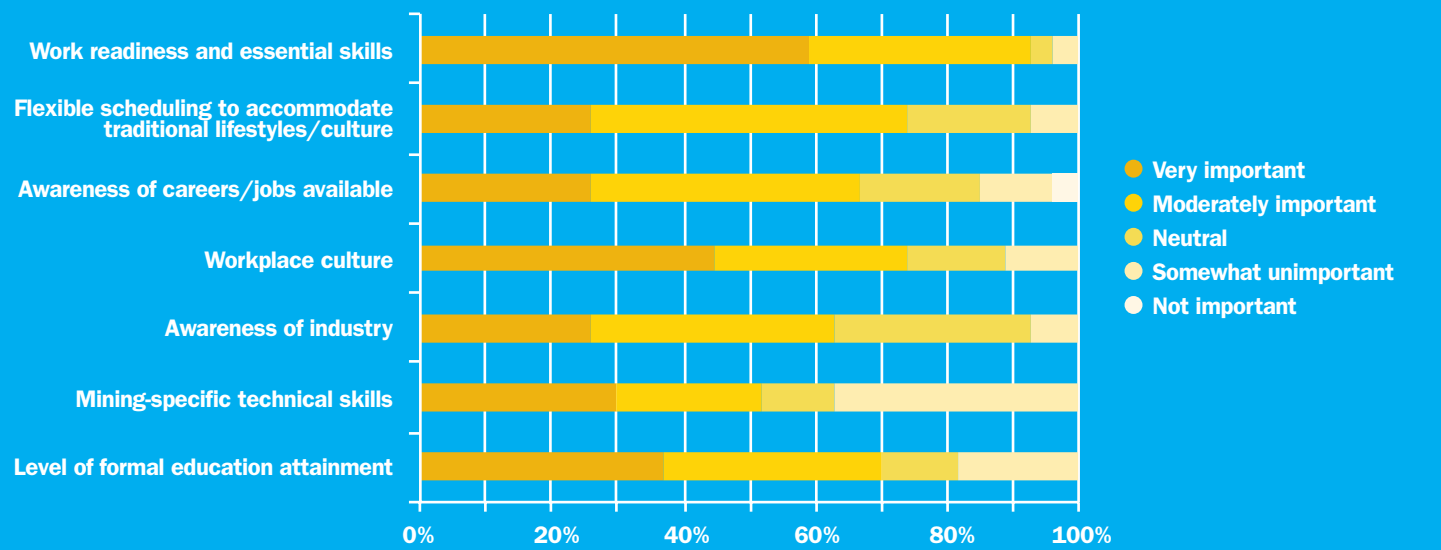


Source: Mining Industry Human Resources Council, Statistics Canada, 2015

MiHR’s 2015 National Employer LMI Survey asked employers to evaluate various aspects of the Aboriginal workforce and to indicate the level of importance of each aspect in facilitating employment in the industry. A summary of responses is provided in Figure 37. Employers emphasized “work readiness and essential skills” as an important

factor in facilitating Aboriginal employment in the industry. Meanwhile, “mining-specific technical skills” were noticeably less important among the employer responses. “Essential skills” refer to those foundational skills (such as literacy and numeracy) that enable a person to participate and function in the labour force.

Figure 37: MiHR’s 2015 National Employer LMI Survey: For each of the following factors, please indicate your opinion about the level of importance in facilitating employment of Aboriginal peoples in the mining industry



Source: Mining Industry Human Resources Council, Employer LMI Survey, 2015

Women are less likely to be in trades and production occupations

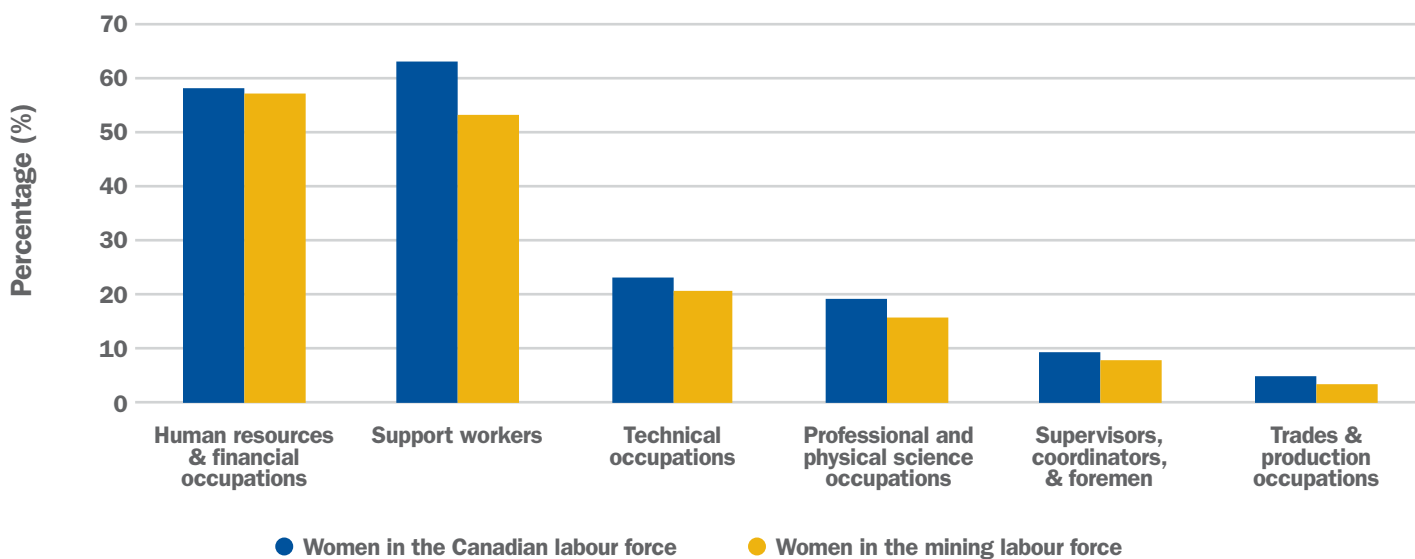
Women are commonly recognized as being under-represented in the mining industry; they comprise half of Canada's population and about 48 per cent of the country's labour force. Yet, in the mining labour force, women represent a modest 17 per cent. Their participation level also varies for different types of occupations.

Figure 38 shows the percentage of females in mining-related occupations (grouped into broad occupational categories); the figure reports on women in all industries, as well as the mining industry. In both cases, "trades and production occupations" show the lowest levels of female participation — at 5 per cent in all industries and 4 per cent in mining. On the other hand, women represent over half of the workforce in "support workers" and in "human resources and financial occupations." This pattern suggests that barriers may limit female participation in

certain occupations, notably, the "trades and production occupations." However, this trend is apparent in all industries —indicating that these barriers may be universal.



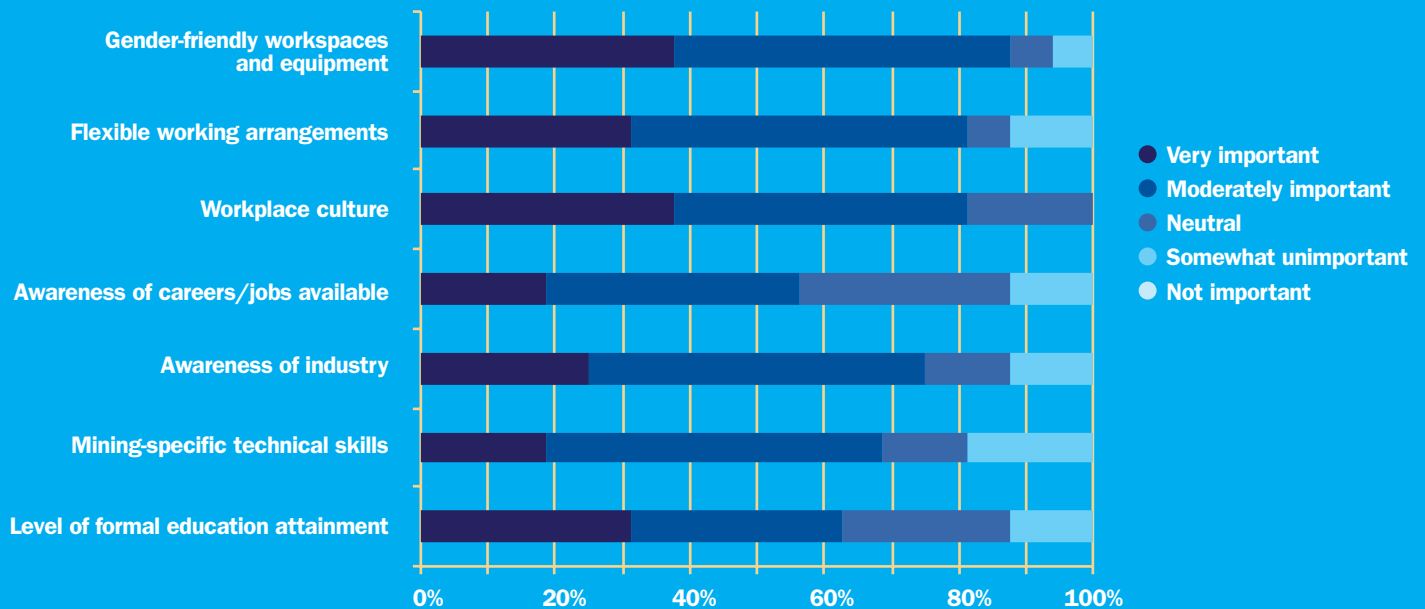
Figure 38: Percentage of women in various occupational groups, for all industries and the mining industry (2011)



MiHR's 2015 National Employer LMI Survey asked employers to evaluate various aspects of the female workforce and to indicate the level of importance of each in facilitating employment in the industry. A summary of responses is provided in Figure 39. "Workplace culture" and "gender-friendly workplaces and equipment" were noted as being

important factors to facilitate female employment in the industry. These factors are among the potential barriers for women, not just in the mining industry, but in particular mining occupations such as trades and production occupations.

Figure 39: MiHR's 2015 National Employer LMI Survey: For each of the following factors, please indicate your opinion about the level of importance in facilitating employment of women in the mining industry



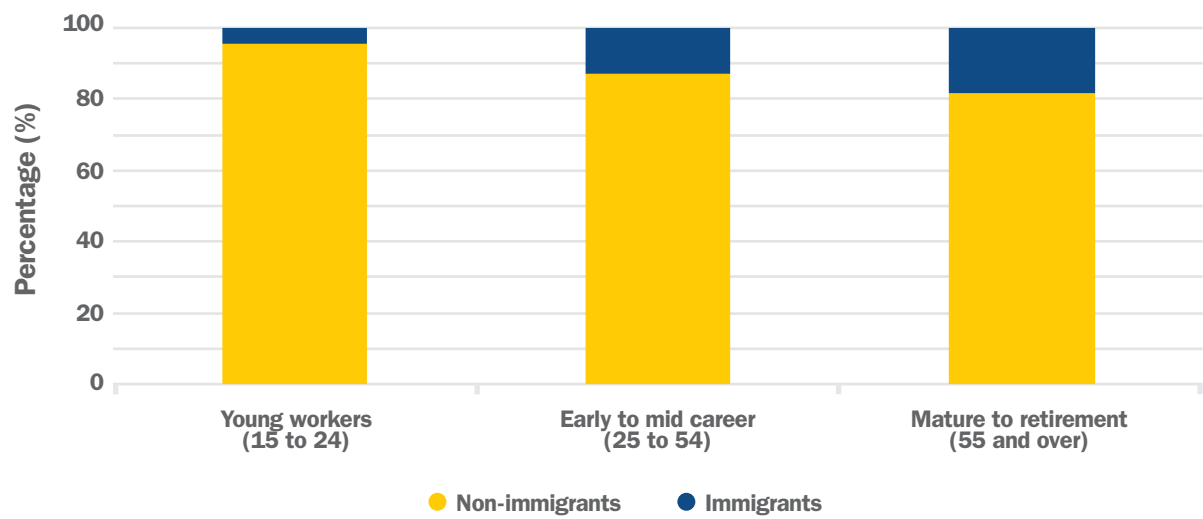
Source: Mining Industry Human Resources Council, Employer LMI Survey, 2015

Immigrants are older and tend to be university educated

Figure 40 illustrates the percentage of immigrants (in various age categories) in the mining labour force. As shown, immigrants in the industry tend to be older and in the mature stage of their careers — and therefore, are among the experienced base of workers in mining. Additionally, immigrants in the industry are likely to have a university education, as shown by Figure 41. This figure also shows that the percentage of immigrants without a certificate, diploma or a university degree is lower than for Canadian-born workers.

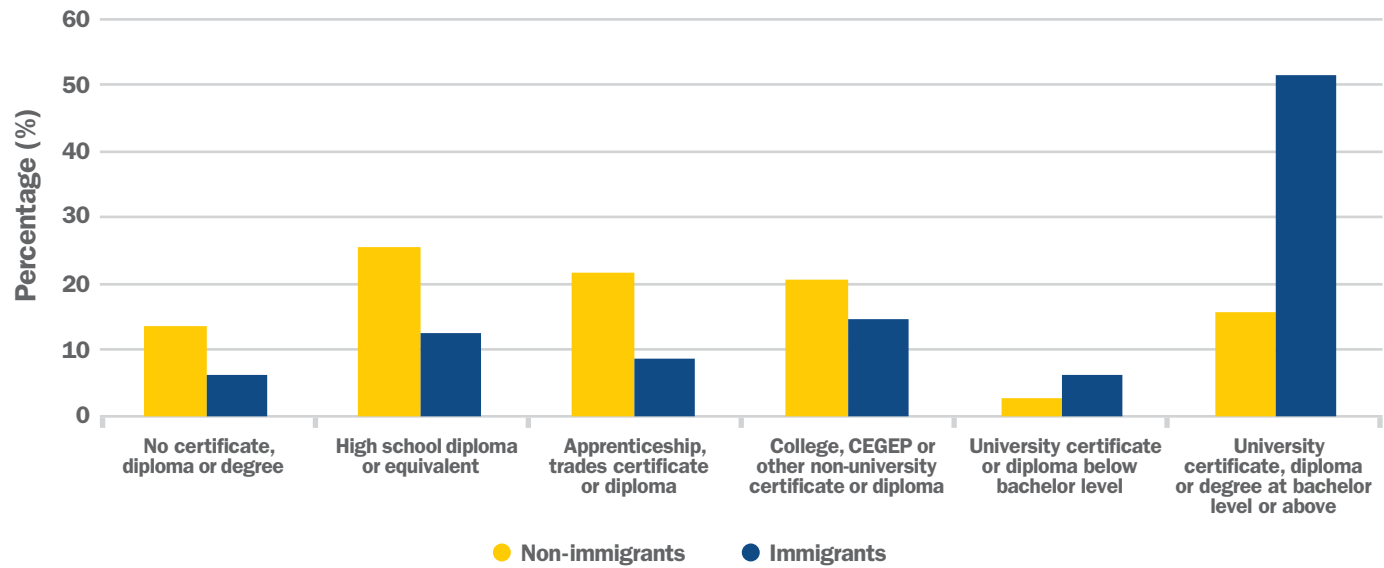
The percentage of immigrants without a certificate, diploma or a university degree is lower than for Canadian-born workers.

Figure 40: Percentage of immigrants in the mining labour force, by age (2011)



Source: Mining Industry Human Resources Council, Statistics Canada, 2015

Figure 41: Educational attainment among immigrants and non-immigrants in the mining industry (2011)



Source: Mining Industry Human Resources Council, Statistics Canada, 2015

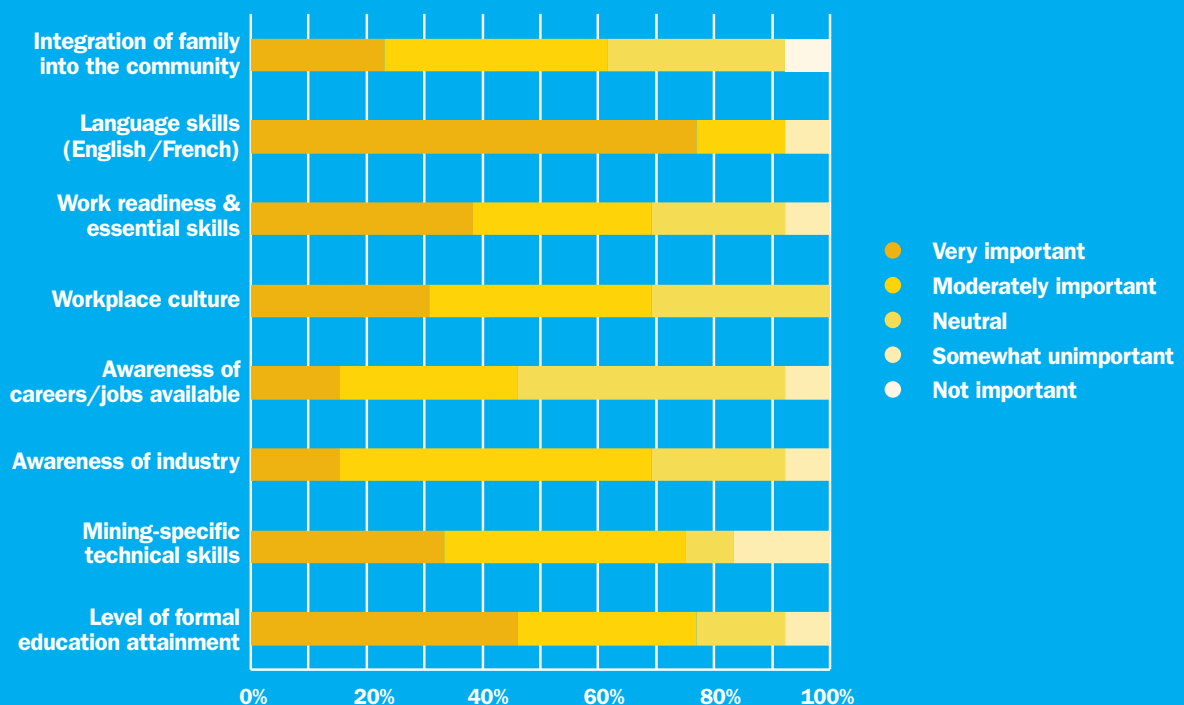


MiHR's 2015 National Employer LMI Survey asked employers to evaluate various aspects of the immigrant workforce and to indicate the level of importance of each in facilitating employment in the industry. A summary of responses is provided in Figure 42. A large proportion of employers cited "language skills (English/French)" as relatively important to facilitating employment among the immigrant community. Also, unlike the other factors, none of the respondents indicated that "workplace culture" was not important; in fact 70 per cent rated this factor as moderately to very important.

"Awareness of careers/jobs available" and "awareness of the industry" were reported as moderately important-to-neutral. As Figure 33 illustrates, the mining industry has traditionally

underperformed in attracting immigrants — which may be attributable to the fact that many newcomers tend to move to and settle in urban centres. In 2011, 92 per cent of newcomers settled in Census Metropolitan Areas (CMAs). Newly arrived immigrants also state that the presence of family or friends is one of the most common reasons for choosing to settle in more urban regions. Furthermore, MiHR's analysis of the employment patterns of immigrants already working in the mining industry found that a greater number are employed in fabrication & manufacturing operations; these operations are also more likely to be located close to urban and semi-urban areas, compared to extraction and milling, or exploration sites.

Figure 42: MiHR's 2015 National Employer LMI Survey: For each of the following factors, please indicate your opinion about the level of importance in facilitating employment of immigrants in the mining industry



Source: Mining Industry Human Resources Council, Employer LMI Survey, 2015

Focus on labour mobility

Labour mobility is a central theme in Canada's mining industry. Mining operations often exist in remote parts of the country and in areas with extremely low populations. Industry employers are often challenged to deal with a limited supply of locally available people who are work-ready. It is common for employers to source workers from other regions of Canada,

especially if the surrounding population does not have the critical mass to support a local labour market. As a result, the mining workforce is, by necessity, a mobile group. In this report, MiHR has broadened its analysis of labour mobility to underline its significance in Canada's mining industry.

Labour mobility is categorized by two separate phenomena:

1. **The commuter workforce:** refers to people who live in one part of Canada but work remotely in another part of the country.
2. **The migrant workforce:** refers to people who have permanently moved or changed their place of residence from one Canadian location to another.

Dependence on a commuter workforce

Mining industry employers often turn to commuters from other parts of Canada to supplement their workforce needs. Employers typically use a rotational schedule to accommodate workers travelling from other regions — a practice that can be critical to the existence of mining projects and to ensuring the mining industry is competitive in the short term. However, in the long term, this approach is expensive and inefficient, especially if the local labour force becomes better prepared for mining employment opportunities. A large commuter workforce also has an impact on regional/provincial tax revenues collected, as commuting workers pay their taxes in other jurisdictions.

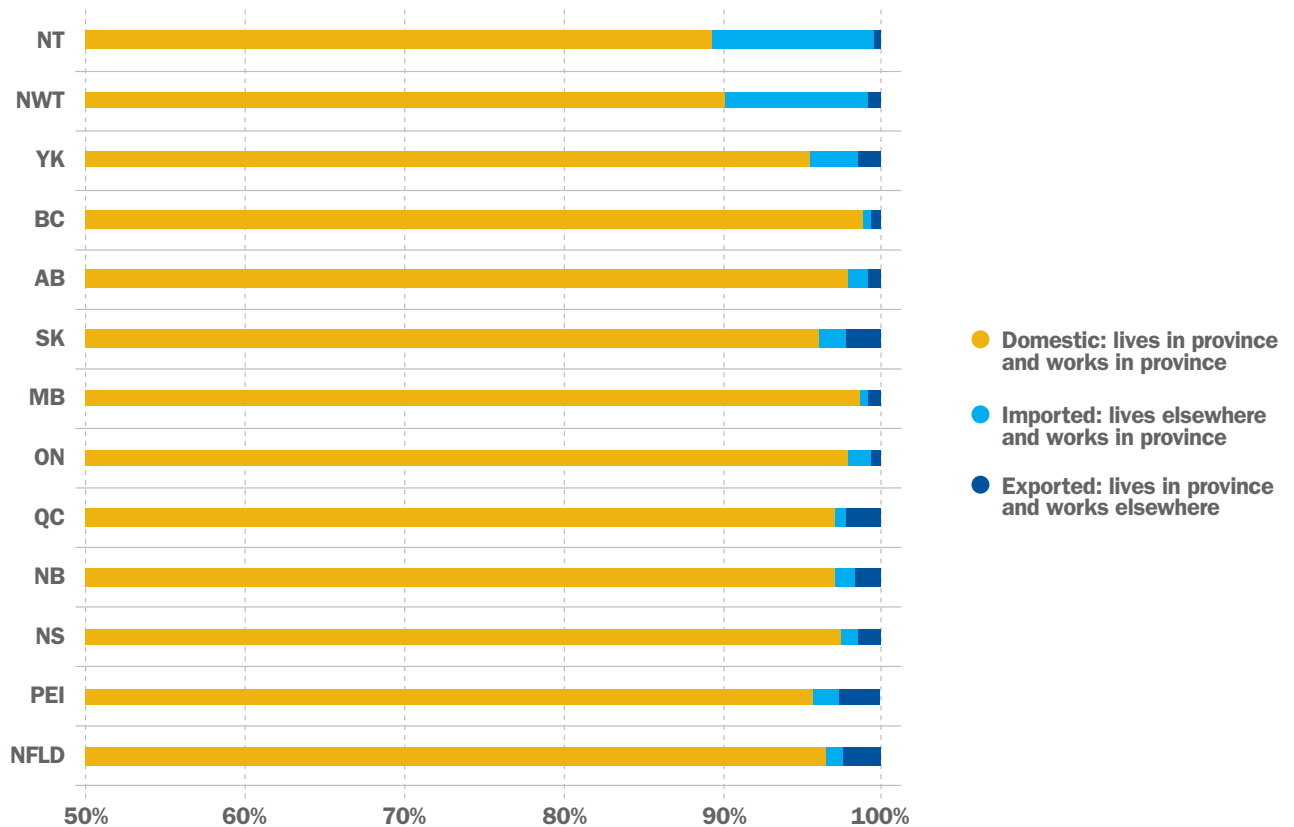
MiHR considers three categories of “commuter status,” each designating a degree of attachment to a particular province/territory:

1. Non-commuters are those who both live AND work in the same province/territory;
2. Imported workers are those who work in a particular province/territory BUT live elsewhere;
3. Exported workers are those who live in a particular province/territory BUT work elsewhere.

Figures 43 and 44 depict the occurrence of these three groups in each province and territory in 2011. Figure 43 shows

the commuter status for all industries combined. As one would expect, the vast majority of workers are non-commuters. Correspondingly, the share of commuters is small, with a median share of about 3 per cent among the provinces and territories. In 8 out of 13 provinces/territories, the share of exported workers exceeded that of imported workers — although these differences are largely insignificant.¹¹ The northern territories (Nunavut, NWT and Yukon) show a different pattern, with a noticeably higher share of imported workers. In Nunavut, more than 10 per cent of the overall workforce was brought in from other Canadian jurisdictions.

Figure 43: Commuter workforce in Canada for all industries, by province/territory (2011)



Source: Mining Industry Human Resources Council, Statistics Canada, 2015

¹¹ Note that an imported worker in a particular province is also an exported worker from the perspective of another province. Therefore, notwithstanding international movements, the sum of all imported workers should equal the sum of all exported workers at the national level. This equality, however, does not apply to Figures 43 and 44, as these figures show the percentages of commuter types within each province, but do not account for the relative weight of each province at the national level. Therefore, the sum of percentages for exported workers does not necessarily equal the sum of the percentages of imported workers.



9%

The median share of commuters in the mining workforce is 9 per cent across all provinces/territories, compared to 3 per cent for all industries.

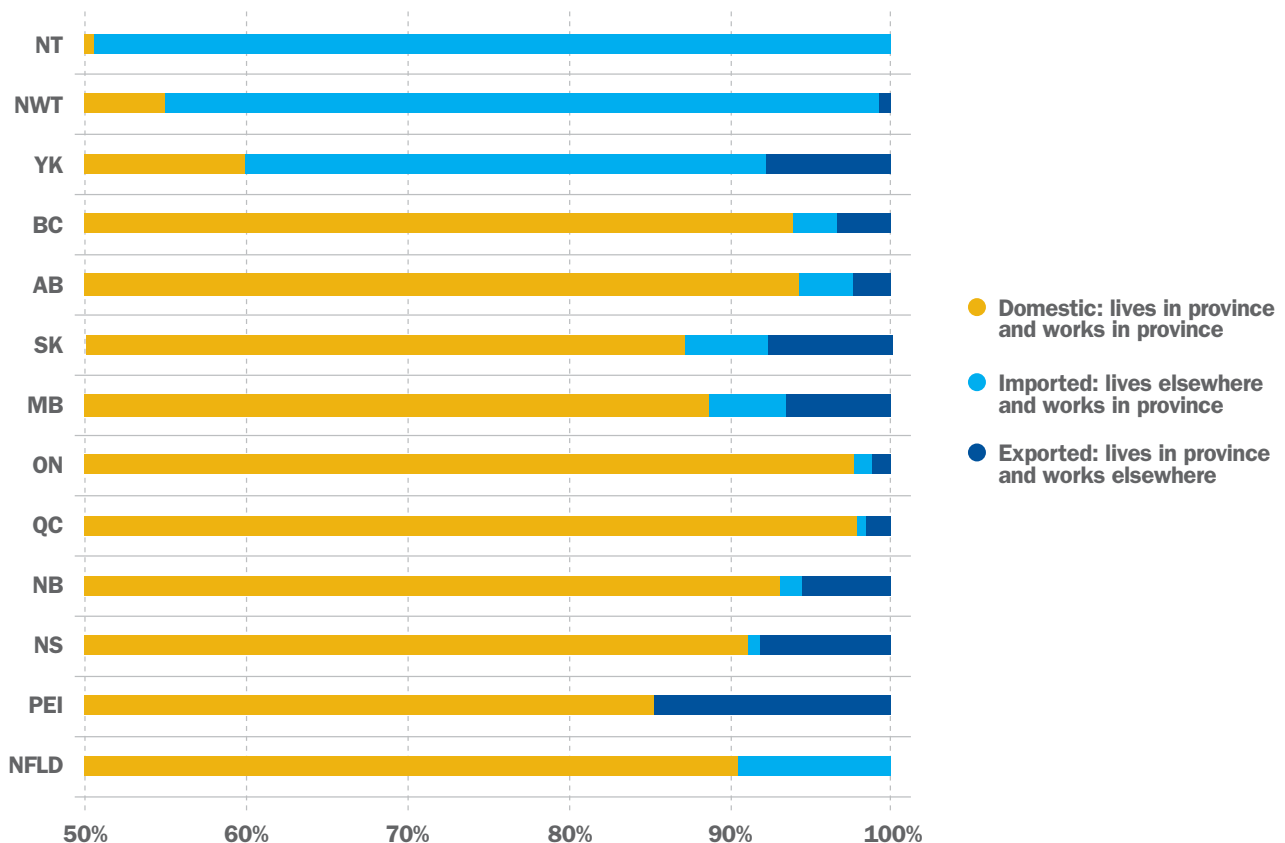
Figure 44 shows that compared to all industries combined, the commuter behaviour for the mining industry is significantly more intense. The median share of commuters in the mining workforce is 9 per cent across all provinces/territories, compared to 3 per cent for all industries. Consistently, the same 8 out of 13 provinces/territories were net exporters of mining sector workers; however, the spread between the

numbers of exported and imported workers is amplified in mining compared to all industries.

The mining industry in the northern territories employs an especially large share of imported workers — as much as 49 per cent in Nunavut, 44 per cent in the Northwest Territories and 34 per cent in Yukon. A number of factors restrict access to local talent pools in mining: the

remoteness of mining operations; a limited population size; a lack of infrastructure, roads and housing; lower overall labour market participation; and education gaps among local populations. To the extent that northern mining communities continue to face these barriers, employers are likely to be required to continue relying on commuting workers.

Figure 44: Commuter workforce in Canada for mining, by province/territory (2011)



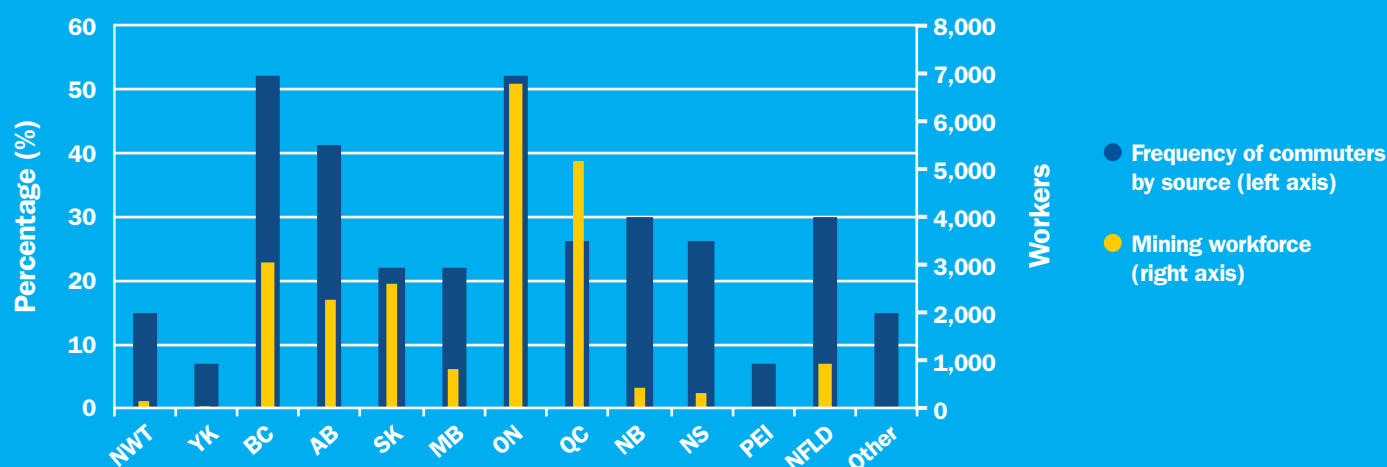
MiHR's 2015 National Employer LMI Survey asked mining employers to estimate the percentage of their organization's commuter workforce. The average response was 18 per cent, although estimates ranged from 0 per cent to as high as 85 per cent. These results are consistent with Figure 44, from which the average portion of commuters is calculated at 17 per cent and varies greatly between the provinces/territories.

Mining employers were also asked to indicate the origins of their commuter workforces. Figure 45 shows the frequency (in percentage terms) with which each province and territory was identified as a source of commuting workers. The figure also highlights mining employment in each province and territory (according to MiHR's estimates for the mining industry) to add perspective on the relative size or "gravity" of each regional mining labour market. One would expect that the provinces with the highest mining employment would be frequent suppliers of commuting workers.

Figure 45 illustrates this trend; it shows that Ontario, Quebec, BC and Saskatchewan — the four provinces with the highest mining employment levels — were also identified as among the frequent sources of commuting workers. However, the commuter workforce also comes from other places; for example, the Atlantic provinces of New Brunswick, Nova Scotia and Newfoundland collectively represent a small share of mining employment in Canada, yet MiHR's employer survey reported these provinces as frequent sources of commuting workers. At the same time, Quebec is a comparatively infrequent source of commuting workers, even though the province represents a substantial proportion of Canada's mining employees.

These apparent differences between a region's commuter behaviour and the size of its labour market suggest that other "push-pull" factors help determine the sources of commuting workers across Canada.

Figure 45: MiHR's 2015 National Employer LMI Survey: Where does your commuter workforce come from?



Source: Mining Industry Human Resources Council, Employer LMI Survey, 2015

Migration boosted in early career years and by educational attainment

Labour migration is a natural phenomenon that is not limited to the mining industry. Migration helps to ensure that the skill sets of the workers are aligned with the hiring needs of the local market. A mobile labour force helps to fill the skills gaps and to correct labour market imbalances. Mobility brings benefits to local labour markets that lack locally available supplies of skilled workers. People with the flexibility to relocate are better positioned to maximize their employment outcomes and expand their skills sets — creating more robust labour pools, which in turn, benefits employers.

Various motivations drive individuals and their families to make the decision to move to another region of Canada or to come to Canada from another country. A number of personal attributes and circumstances can influence the likelihood of migration, including age, income level, educational background, marital/family status and the push-pull aspects of different regions. This section explores characteristics that are particularly relevant to migration in the mining industry.

MiHR relies on migration information reported by Statistics Canada to describe migration patterns in the mining industry. This data reflects the in-migration that occurred between 2006 and 2011, in

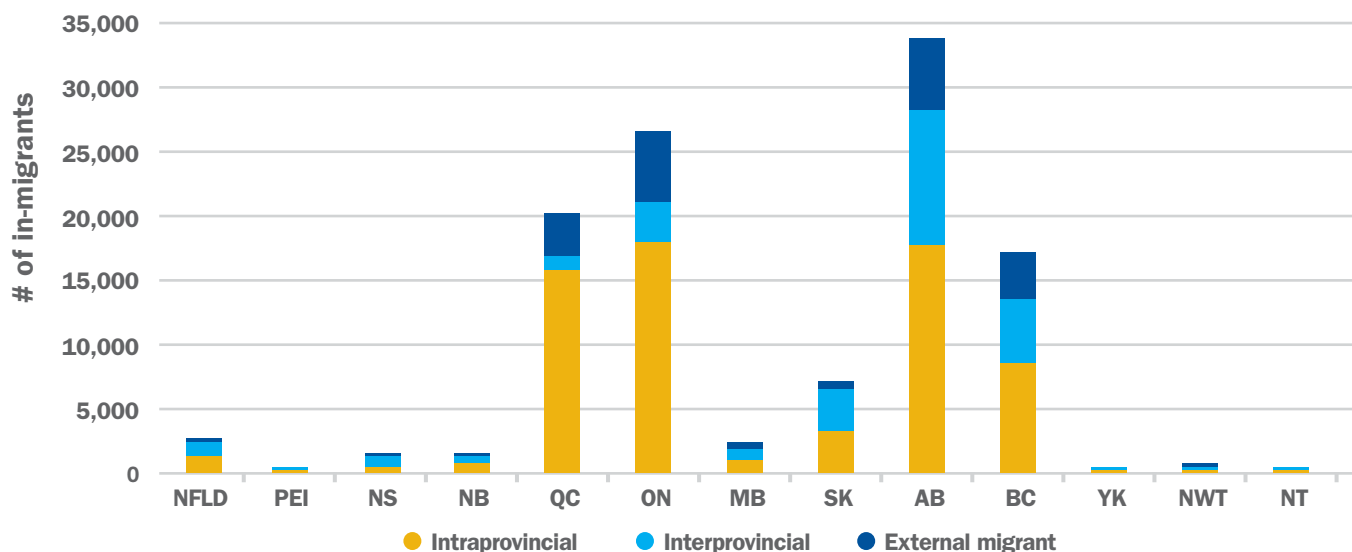
accordance with the last two Census reference periods. A person is counted as a migrant if they lived in one part of Canada in 2006 and in a different part in 2011.¹² Three main types of migration are considered:¹³

1. Intraprovincial migrants refer to people who moved to another city or town within the same province.
2. Interprovincial migrants refer to people who moved to another city or town and changed provinces in the process.
3. External migrants refer to people who moved to Canada from another country.

¹² For a more detailed description of Statistics Canada's "Components of Migration," see the following link: <http://www12.statcan.gc.ca/nhs-enm/2011/ref/dict/pop086-eng.cfm>

¹³ Note that an observed migration is not sufficient to conclude that a person has also changed their job. However, throughout these analyses, it is assumed that the number of migrants who have maintained their job before and after moving is negligible, in comparison to those who have acquired a new job as a result of moving.

Figure 46: In-migration: the mining workforce (2006 vs. 2011)



Source: Mining Industry Human Resources Council, Statistics Canada, 2015

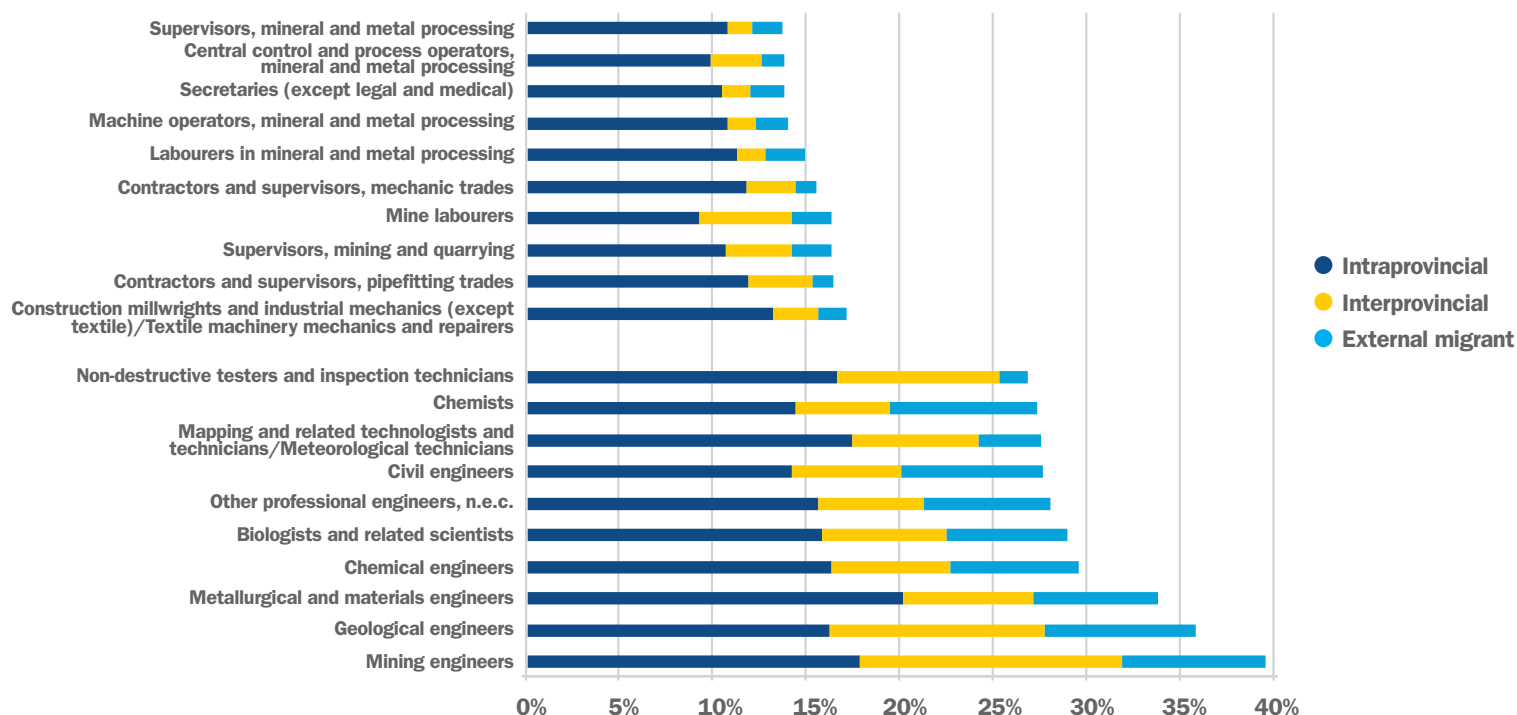
Observed migration in the mining industry differs across Canada. As shown in Figure 46, Alberta has the highest in-migration levels, followed by Ontario, Quebec and British Columbia. Generally, the migration in each province/territory is related to the size of employment and its population overall. Still, other push-pull factors can further shape migrant behaviour across regions. For instance, the significant interprovincial migration observed in Alberta is likely driven by the oil sands mining in Northern Alberta.

Figure 47 demonstrates how migration activity differs by age category in the mining workforce and compares it to the Canadian workforce overall; a similar pattern emerges in both cases — suggesting that migration tends to vary with age. Workers in the 25 to 34 age cohort display the highest rate of migration, while those between the ages of 55 and 64 display the lowest rate. Accordingly, as the mining workforce gets younger — and older workers enter their retirement years — migration will likely increase in the coming years.

The figure also shows that migration activity is marginally higher in the mining workforce, compared to all industries. The differences occur mainly in the intraprovincial and interprovincial categories, as opposed to the external migrant category.

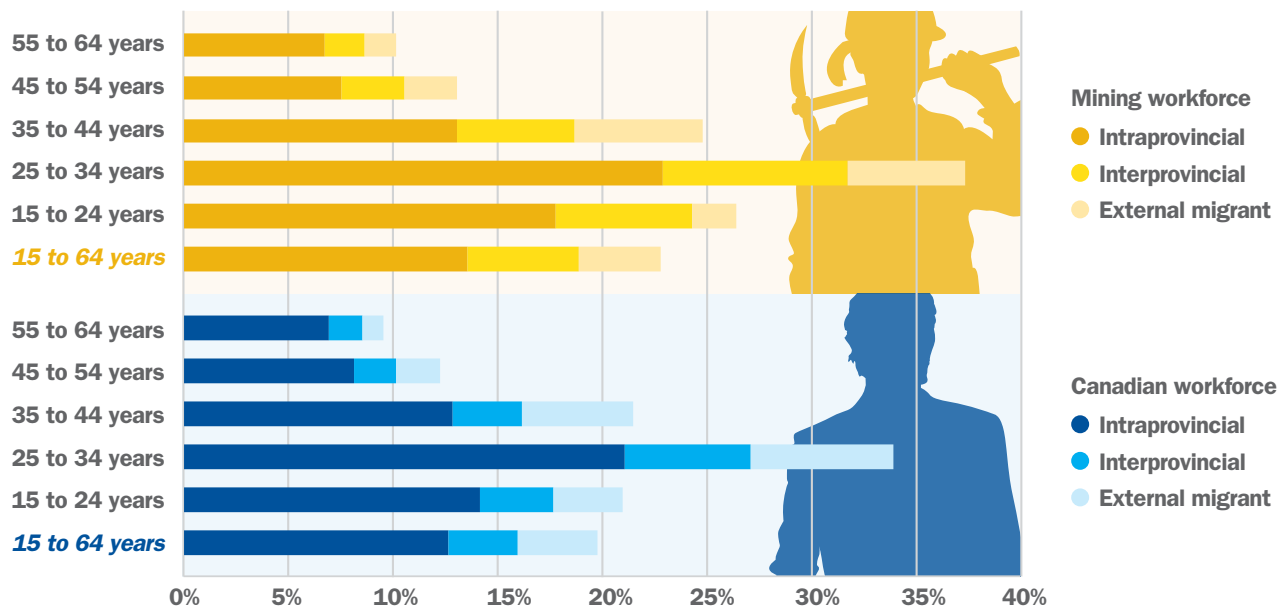
Figure 48 shows the migration rates observed in various mining-related occupations (selected from the list of 70 occupations considered in this report). The figure includes the 10 occupations with the smallest migration rates and the

Figure 48: Migration status, by mining-related occupations (2006 vs. 2011)



Source: Mining Industry Human Resources Council, Statistics Canada, 2015

Figure 47: Migration status, by age category (2006 vs. 2011)



Source: Mining Industry Human Resources Council, Statistics Canada, 2015

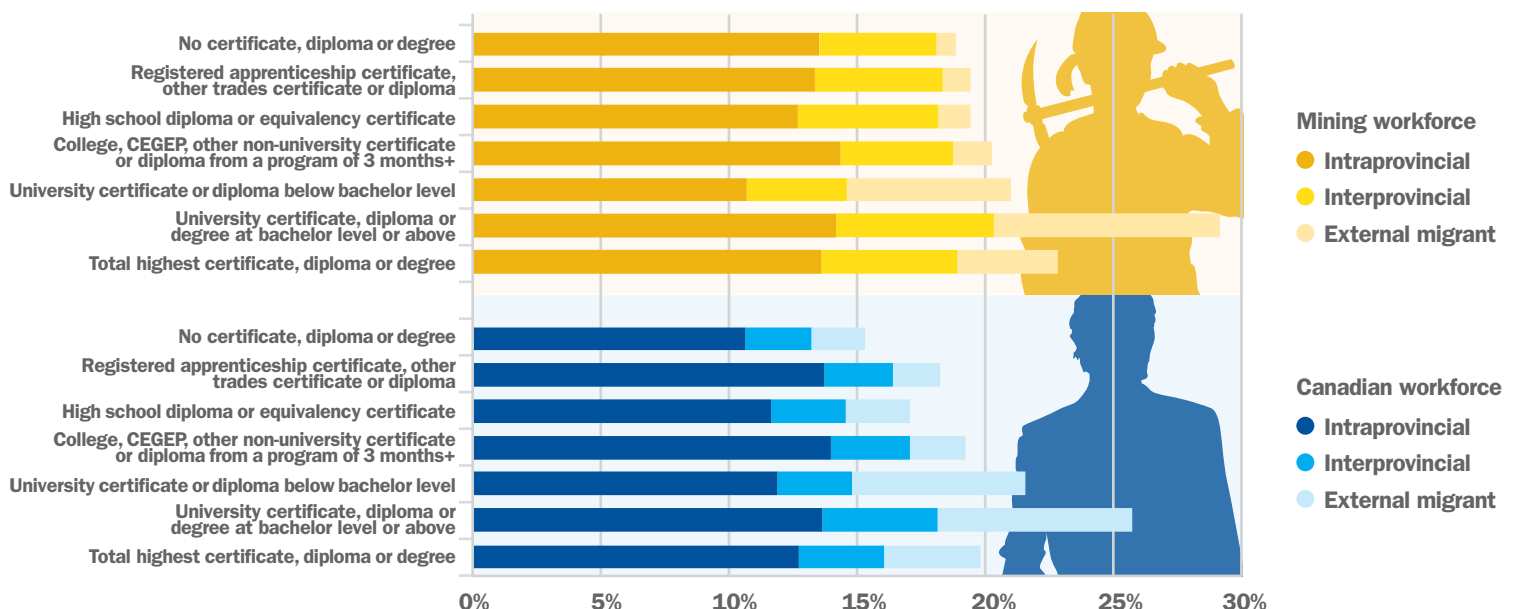
10 occupations with the largest rates. The highest migration rates occur mainly in the professional sciences and engineering occupations, while the lowest rates occur in a number of trades and production-level occupations. These differences by occupation type generally appear in all three migration categories.

In Figure 48, the natural clustering of certain occupation types may indicate they share characteristics that commonly affect migration behaviour. For instance,

educational attainment may affect a person's migration prospects; as shown in Figure 48, occupations that require a university degree have higher migration rates in both the mining and overall workforces; at the same time, occupations requiring no diploma or degree, have lower migration rates. This result, however, seems to largely reflect increased numbers of external migrants with university degrees—who have moved to Canada since the previous reference period of 2006.

Overall, the likelihood of migration can vary by occupation and educational background. A person with a recognized educational credential has signalled to prospective employers that they have the aptitudes necessary for the job—and have thus widened their opportunities, geographically. As such, the occupations that require a significant investment in education (e.g. engineering) can also be expected to exhibit higher migration rates, as is the case in Figure 49.

Figure 49: Migration status, by educational attainment (2006 vs. 2011)



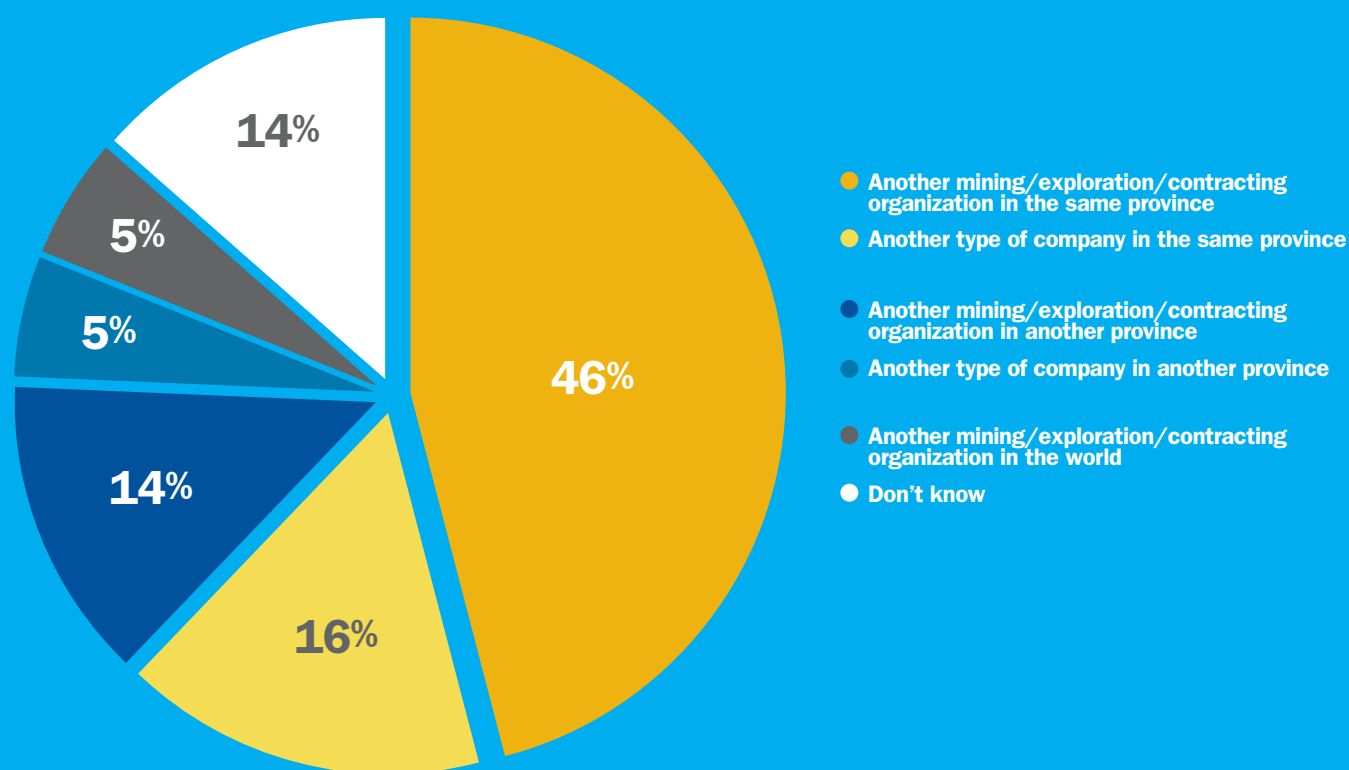
Source: Mining Industry Human Resources Council, Statistics Canada, 2015

MiHR's 2015 National Employer LMI Survey asked employers to report where employees go when they leave their organization. Specifically, the question asked respondents to select from an inclusive list of possible outcomes for employee migration. The responses are summarized in Figure 50. Nearly two thirds (or 62 per cent) of employer respondents said that employees have migrated within their province. Roughly one quarter (or 24 per cent) indicated that employees have migrated outside of the province. This result reinforces the observation that

intraprovincial migration represents the largest share of migration activity in the mining industry.

Figure 50 also highlights additional tendencies within the migrant workforce. For example, 65 per cent of respondents indicated that migrants land in a mining-related organization, as opposed to another type of company. Finally, 14 per cent acknowledged that they do not know or do not track where employees go when they leave.

Figure 50: MiHR's 2015 National Employer LMI Survey: When the employees leave your organization, where do they generally go to?

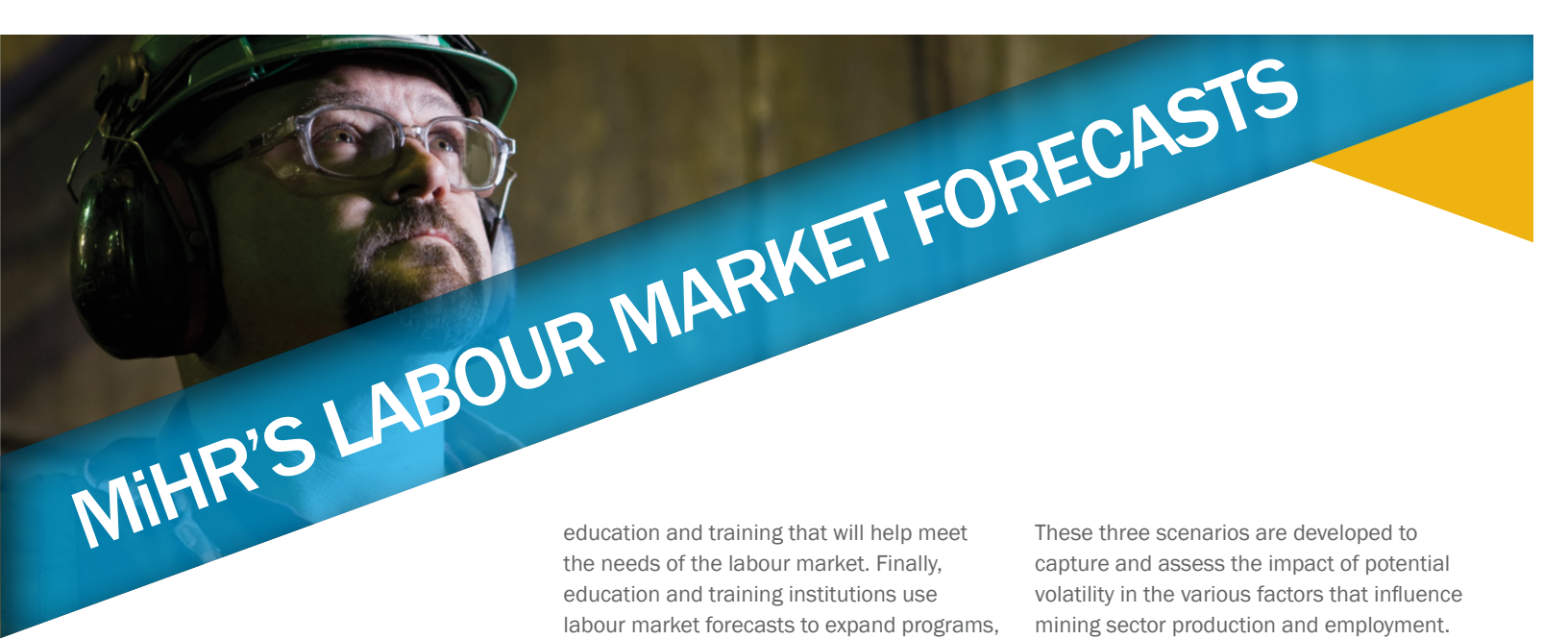


Source: Mining Industry Human Resources Council, Employer LMI Survey, 2015

Summary of Canada's mining labour market analysis

Canada's mining labour force displays the following characteristics:

- lower unemployment rates compared to other industries
- few to no part-time jobs
- different labour market outcomes for younger workers
- signs of getting younger, but still an older workforce
- under-representation among immigrants and women
- low educational attainment among Aboriginal people
- strong reliance on a commuter workforce
- migration that is influenced by age, occupation type and educational attainment



MIHR'S LABOUR MARKET FORECASTS

Labour markets are always in a state of flux. Economic volatility, demographic and technological shifts, and structural changes in the economy all affect the balance between supply and demand for workers in a sector. For employers, the changing dynamics in a labour market will mean adjusting their approaches to recruiting, training and retaining workers. MiHR's labour market forecasts enable mining industry recruiters, human resources managers and training departments to anticipate future recruitment needs and to evaluate the cost implications, both for recruitment and for on-boarding. At the same time, MiHR's LMI forecast can inform prospective job seekers about what jobs are available, as well as highlight training and educational programs that can increase their opportunities for employment in mining. Labour market forecasts also provide governments with insights to guide them to develop policies, and invest in

education and training that will help meet the needs of the labour market. Finally, education and training institutions use labour market forecasts to expand programs, or to plan and develop new training that will help an industry meet future needs for a skilled workforce.

Employment forecast

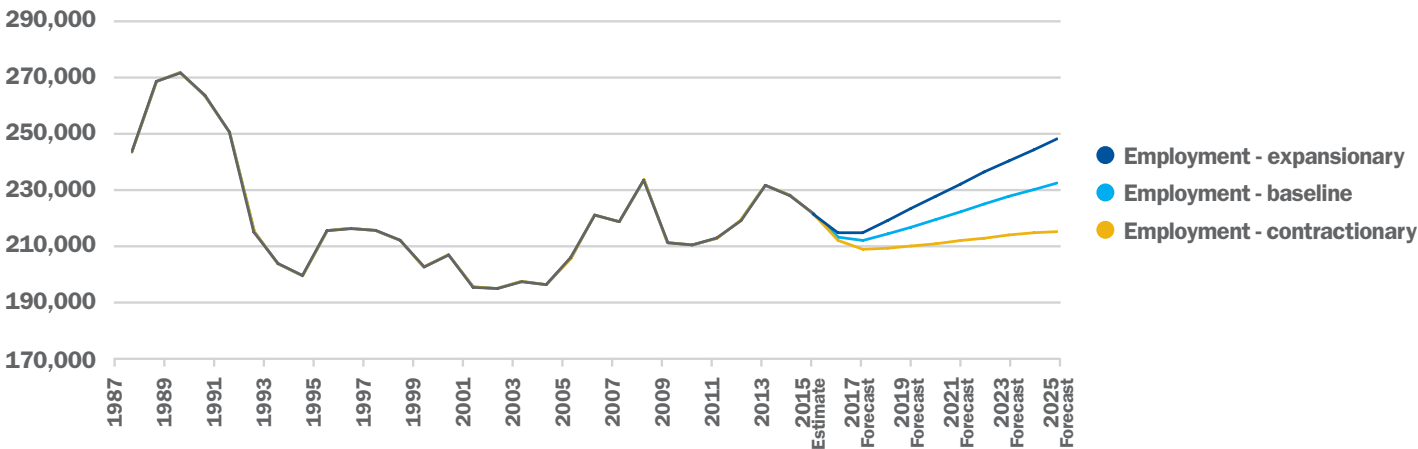
MiHR's employment model estimates the total number of workers to be employed in the mining industry in the next 10 years. The estimates are based on anticipated commodity prices, GDP, exchange rates and other economic factors. The employment projection shows the creation of new jobs due to an expansion in the industry or, conversely, a contraction of output resulting from job losses. MiHR produces an estimate of total mining industry employment for each year of the forecast period and calculates the net change in employment over the entire 10-year horizon.

The employment forecasts are generated using three potential economic scenarios.

These three scenarios are developed to capture and assess the impact of potential volatility in the various factors that influence mining sector production and employment. The baseline scenario uses historical market trends and external forecasts from organizations such as the World Bank and the Conference Board of Canada for the selected economic variables. The contractionary and expansionary scenarios are constructed by adjusting the underlying forecasts for prices, exchange rates and productivity to account for higher and lower expected outcomes for these variables.

Figure 51 shows total employment in the mining industry for the period between 1987 and 2025. The graph shows actual employment between 1987 and 2014. Total employment in 2015 is estimated to be approximately 220,000 workers. This is a loss of almost 6,800 jobs from 2014 levels, stemming largely from sluggish commodity prices and reduced investment in exploration activities, while also reflecting general uncertainty in the market – in part, from oil price plunges in late 2014.

Figure 51: Total employment in mining (1987-2025)



Source: Mining Industry Human Resources Council, Statistics Canada, 2015

The forecasted total employment from 2016 to 2025 under the three economic scenarios is also shown in Figure 51. In the baseline scenario, MiHR's forecast shows a net gain of more than 11,600 new jobs in the coming decade. The expansionary scenario results in a 9.5 per cent increase in total employment in the industry — with 21,000 new mining jobs being created. As discussed in Section Five of this report, these jobs are expected to be almost exclusively full-time positions, with wages and salaries higher than in many other sectors.

Under MiHR's contractionary scenario, the mining industry is expected to shed more than 6,300 jobs, a decrease in total employment of almost three per cent from 2015 to 2025.

Hiring requirements forecast

MiHR's hiring requirements forecast predicts the total number of workers that will need to be hired by Canadian mining industry over a 10-year period. The hiring requirements

forecast differs from the employment forecasts, in that it captures more than the creation or loss of new jobs. It also forecasts the total recruitment demands to fill all vacancies — beyond those created through industry expansion or lost through contraction.

MiHR defines hiring requirements as the sum of:

1. Net change in total employment (as described in the previous section) **and**
2. Replacement requirements

There are two sources of attrition that make up replacement hiring requirements in MiHR's model: retirement and non-retirement separation.

Retirement: MiHR estimates the expected retirement rate for each year in the forecast period. MiHR uses a retirement model that is similar to methodologies used to estimate life expectancy; in this case, MiHR's retirement model estimates an individual's "working life

expectancy." The likelihood that an individual is participating in the labour force in a given year depends on a number of factors. MiHR's retirement model considers an individual's age, education attainment and whether they are in the labour force in the previous year.

Non-Retirement separation: This factor describes exits from the mining labour force that are not related to retirement. Non-retirement separation captures the movements of workers in and out of the mining workforce, looking at behaviours such as emigration, inter-sectoral mobility, injury and mortality. The estimates for non-retirement separation are not modelled in the same manner as the retirement rate; rather, the rate is assumed — based on information from MiHR's 2015 National Employer LMI survey, as well as migration and mobility statistics from Statistics Canada and other sources. For the purposes of the forecasts presented in this report, the non-retirement separation rate is assumed to be 2 percent per year.

Table 2: Cumulative hiring requirements forecasts by scenarios (2016-2025)

	Net Change in Employment	Replacement Requirements		Cumulative Hiring Requirements
		Retirement	Non-Retirement	
Contractionary	-6,330	48,600	41,830	85,723
Baseline	11,640	51,030	43,800	106,490
Expansionary	20,951	53,260	45,600	126,590

Source: Mining Industry Human Resources Council, 2015

Cumulative hiring requirements forecast

Table 2 presents cumulative hiring requirements under MiHR's contractionary, baseline and expansionary scenarios over a 10-year forecast period. The cumulative hiring requirement forecasts show that over the next decade, the mining industry will need to hire 106,490 workers, based on the current economic climate and forecasted

business outlook (the baseline scenario). This forecast includes the creation of more than 11,500 new jobs in the industry. However, if the mining industry expands faster than currently predicted, it could need to hire almost 127,000 workers — with more than 20,000 new positions being created. Under MiHR's contractionary scenario, total employment in the industry will contract

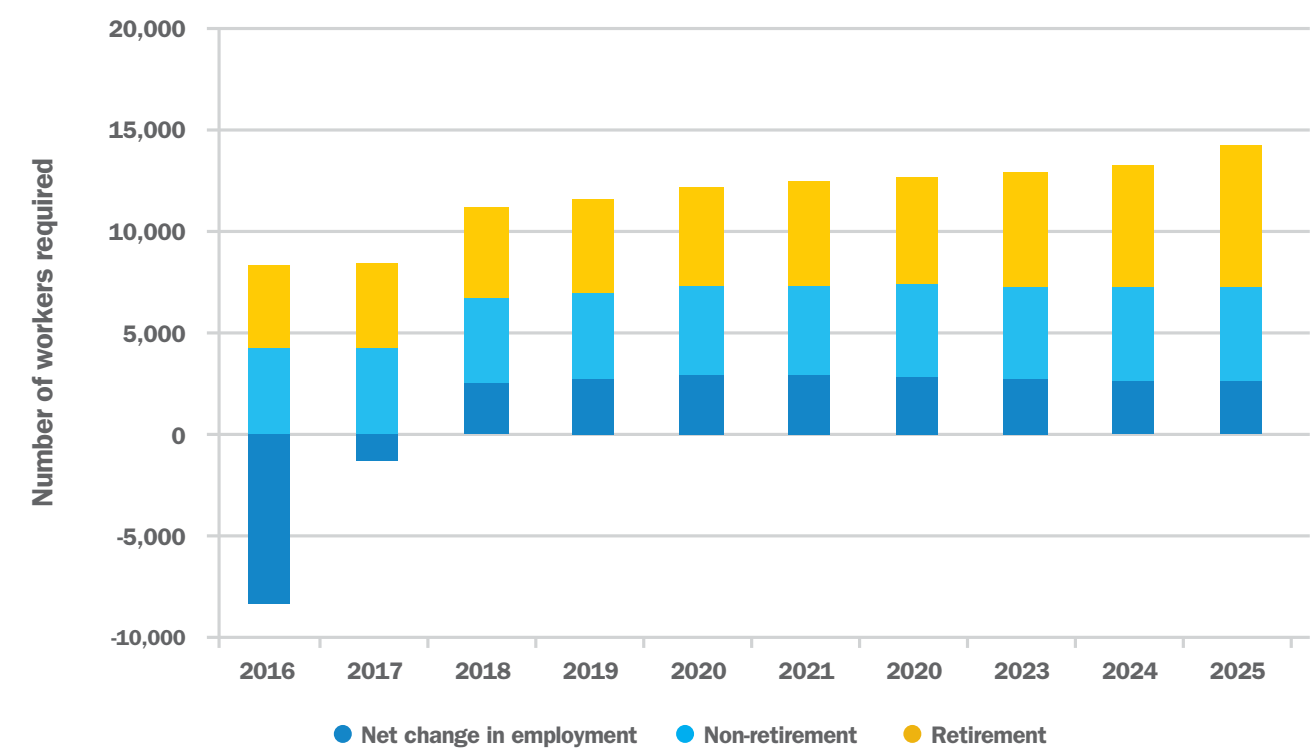
to 112,000 workers by 2025, shedding around 6,300 jobs. In the contractionary scenario, however, employers would still face a cumulative hiring requirement of almost 86,000 workers — fueled by the need to replaceretiring employees and workers who leave the industry for other reasons.



Year-over-year hiring requirements (2016–2025)

Figure 52 shows the year-over-year hiring requirements for the period 2016–2025, under the baseline scenario. Both 2016 and 2017 show continued contraction in mining sector employment, with projected job losses of 8,400 and 1,300, respectively. Subsequently, the industry is expected to create between 2,400 and 2,800 jobs per year to the end of 2025.

Figure 52: Annual hiring requirements forecast, baseline scenario (2016-2025)



Source: Mining Industry Human Resources Council, 2015



Table 3: Hiring requirements forecasts by broad occupational categories, baseline scenario to 2, 5 and 10 years to 2025

Baseline	2017	2020	2025
Trades and Production Occupations	2,114	12,747	32,708
Professional and Physical Science Occupations	362	2,186	5,607
Human Resources and Financial Occupations	176	1,063	2,727
Support Workers	208	1,257	3,223
Technical Occupations	258	1,553	3,986
Supervisors, Coordinators, and Foremen	376	2,262	5,802
All Other Occupations	3,386	20,432	52,437
Total	6,880	41,500	106,490

Source: Mining Industry Human Resources Council, 2015

Hiring requirements by occupation

The occupational breakdown of the hiring requirements model is based on 70 selected mining occupations, as defined by the National Occupation Classification (NOC) codes. The occupational breakdown reported in this forecast covers approximately 52 per cent of the all occupations in the mining industry.

The cumulative hiring requirements are presented by broad occupational category in Table 3. The highest hiring requirements are in “trades and production occupations” followed by “professional and physical science occupations.”

The 10 occupations with the highest hiring requirements include:

- Underground production and development miners
- Heavy equipment operators (except crane)
- Construction millwrights and industrial mechanics (except textile)
- Truck drivers

- Welders and related machine operators
- Primary production managers (except agriculture)
- Machine operators, mineral and metal processing
- Heavy-duty equipment mechanics
- Industrial electricians
- Supervisors, mining and quarrying

A complete listing of cumulative hiring requirements by occupations, along with estimates of available talent for these occupations, is found in the Appendix.

Available talent

The hiring requirements forecast presented in the previous section estimates the number of hires the industry will need to make, in order to keep activities at a competitive level. This forecast primarily depends on anticipated economic conditions and demographic factors. However, to fully understand labour market pressures, the hiring requirements model must be balanced with an estimate of the

number of workers expected to be available to fill those positions. MiHR’s available talent forecasts provide an estimate of the total number of new entrants to the Canadian labour market in selected occupations. MiHR defines “new entrants” as a sum of school leavers, immigrants and interprovincial migrants, and other new entrants that include workers from other sectors or employees returning after temporary absences.

MiHR has developed a model of labour supply that projects the amount of new talent that will become available to fill positions in specific occupations over the forecast horizon. The available talent model is built on key demographic trends. While economic and business conditions tend to be volatile over a period of time, demographic data tends to be more stable, following more consistent historical trends. The available talent forecast does not make any assumptions about future developments, such as the introduction of new training programs or changes to immigration policies.

Table 4: Cumulative available talent, all sectors and mining, Canada, 70 occupations (2017, 2020 and 2025)

Cumulative Available Talent	2017	2020	2025
Total entrants for 70 occupations, all industry sectors	327,000	684,000	1,360,000
Mining's share of entrants for 70 occupations (assuming the historical rate for each occupation per year)	13,000	30,000	61,300

Source: Mining Industry Human Resources Council, 2015

For each occupation, the model estimates the pool of new workers (entrants) that will become available to all industries between 2015 and 2025 – and then determines the portion that will enter the mining industry. The model considers new labour market entrants from a variety of sources, including education flows, immigration (both international and interprovincial) and other entry points. A full description of this model can be found in the Appendix.

Table 4 shows the cumulative available talent for all 70 occupations over two, five, and 10-year time horizons. The forecast anticipates approximately 1,360,000 new entrants into Canada's labour force in the selected 70 occupations over the next 10 years. Of these new entrants, the mining industry can expect to attract 61,300 workers, assuming the sector's historical share remains the same moving forward.

Available talent by occupation

Table 5 shows the cumulative available talent over the next 10 years for all industries, by broad occupational category. In addition, the table shows the proportion of this available talent that the mining industry has historically attracted. This is used to calculate the number of workers expected to be available to address hiring needs in the industry.

Table 5: Cumulative available talent by broad occupational categories (2016-2025)

	Mining's Share of Available Talent (number of workers)	Total Available Talent, All Sectors (number of workers)	Mining's Historic Share of Available Talent (per cent)
Trades and Production Occupations	37,300	541,000	7%
Professional and Physical Science Occupations	6,600	143,000	5%
Human Resources and Financial Occupations	2,340	191,000	1%
Support Workers	3,450	253,500	1%
Technical Occupations	5,810	182,600	3%
Supervisors, Coordinators and Foremen	5,800	49,000	12%

Source: Mining Industry Human Resources Council, 2015

Mining labour market gaps and frictions

What is a labour market gap?

As described in Section 5, the labour market for the mining sector as a whole is tight — that is, the number of unemployed workers per reported vacancy in the sector is lower than the average for the entire Canadian labour market — and significantly lower than many sectors with which mining competes for key talent, such as construction.

MiHR's labour market forecasting models provide projections about the future needs of industry to hire workers, by occupation, and estimates the likely number of new labour market entrants in those occupations. The hiring requirements forecasts take into account a range of potential economic outcomes in the future — in an attempt

to capture the volatility inherent in commodity prices and other determinants of employment within the sector. On the other hand, the available talent estimates assume that historical patterns of career choices for new entrants, prevailing rates of school enrolment, and graduation and demographic variables (e.g. age structure and provincial population) will likely remain relatively stable over the 10-year forecast period.

By comparing these two estimates, the gap analysis allows formation of some expectations about tightness of the market for a particular occupation, in terms of filling vacant positions with available workers. It also highlights the occupations for which the mining industry can expect to face significant challenges in finding the right people with the right skills. It should be noted, however, that even occupations that currently exhibit temporary surpluses

of workers to fill available jobs can experience major challenges in the future, depending upon mining's longer-term economic performance. To illustrate this, Table 6 shows the projected gaps between hiring requirements and available supply under the contractionary, baseline and expansionary scenarios for broad occupational groupings. At first glance, Table 6 seems to suggest that in two of the three scenarios, no significant skills gaps exist; however, this data must be interpreted with care. It should be noted that significant shortages of workers appear in almost all occupational groupings when the expansionary scenario is applied. In other words, as the economic conditions that affect mining employment fluctuate over the forecast horizon, so do the hiring requirements. In contrast, the flow of new entrants into the available talent pool remains relatively steady.

Table 6: Occupational gaps, broad categories by scenarios (2016-2025)

Occupational Grouping	Contractionary	Baseline	Expansionary
Trades and Production Occupations	11,430	4,560	-1,615
Professional and Physical Science Occupations	21,560	980	-76
Human Resources and Financial Occupations	190	-390	-900
Support Workers	900	230	-380
Technical Occupations	2,660	1,820	1,070
Supervisors, Coordinators, and Foremen	1,260	40	-1,050
Total	18,604	7,244	-2,956

Source: Mining Industry Human Resources Council, 2015

The gaps presented in this report represent significant change from MiHR's 2013 forecast. Table 7 shows how MiHR's forecasted gaps between hiring requirements and available talent have changed over the previous three years. According to this data, the talent gap has closed in most occupational areas. This change is primarily due to a projected contraction in total employment over the short term. As shown in the employment forecast (see Figure 51), there has been

a steady erosion of mining industry employment between 2013 and 2015. Total employment peaked in 2013 with 229,000 workers and decreased to an estimated 219,000 in 2015. MiHR's employment forecast signals a further erosion of total employment—a loss of approximately 9,700 jobs, under the baseline scenario—until 2017, when production and employment will begin to rebound. Given the level of uncertainty about the future and the underlying cyclical

nature of the mining industry, this analysis suggests that extra care will be needed to ensure that workers who may become disenchanted because of a temporary downswing are retained—and that skilled and experienced workers are not lost to other competing sectors. At the very least, the mining industry must take measures to ensure that it continues to attract its traditional share of available talent.

Table 7: Gaps between hiring requirements and available talent, baseline scenarios (2013, 2014, and 2015)

Occupational Grouping	2013	2014	2015
Trades and Production Occupations	-7,875	-425	4,560
Professional and Physical Science Occupations	-900	230	980
Human Resources and Financial Occupations	-480	-720	-390
Support Workers	-1,195	-25	230
Technical Occupations	-2,760	660	1,820
Supervisors, Coordinators, and Foremen	-2,810	-760	40
Total	-16,020	-1,040	7,244

Source: Mining Industry Human Resources Council, 2015

Refer to the Appendix for a full listing of the occupation-specific gaps. Despite the apparent balance of demand and supply of workers based on MiHR's broad occupational groupings, there remain significant unresolved gaps between available talent and hiring requirements for specific occupations including:

1. Trades and Production occupations: Underground Production and Development Miners, Machine Operators and Mine labourers

2. Professional and Physical Scientists: engineers (electrical, mechanical and other P. Eng.)
3. Selected Technicians and Technologists
4. Mine/ mill operations supervisors and construction/engineering managers

The analysis above does not account for other labour market frictions that can make attraction, recruitment and retention of

available workers challenging. For example, the physical location of many mining operations in Canada make it necessary for employers to employ a large proportion of commuting workers and to adopt a fly-in, fly-out work schedule. In addition, failure to recognize the qualifications of workers who originate from outside of the province or territory, including international workers, can severely constrain the ability of employers to fill vacancies.

MiHR's National Employer LMI Survey asked respondents to identify the top five occupations for which recruitment is the most difficult. The following occupations/groups were the most commonly identified:

1. Trades and production occupations (underground miners, operators, electricians, he mechanics/millwrights) – 85 per cent of respondents placed these occupations among the top-five hardest jobs for which to find workers.
2. Engineers – 63 per cent of respondents reported that they have challenges in attracting and recruiting mining, electrical and metallurgical engineers.
3. Front-line supervisors (underground or surface mines, mills, operations and project managers) – 45 per cent of respondents said that finding experienced supervisors for their mines, mills and exploration/drill sites is a serious challenge.

Spotlight on labour market gaps and frictions in key occupations in mining

Highest demand, biggest gap and younger workers – underground production and development miners

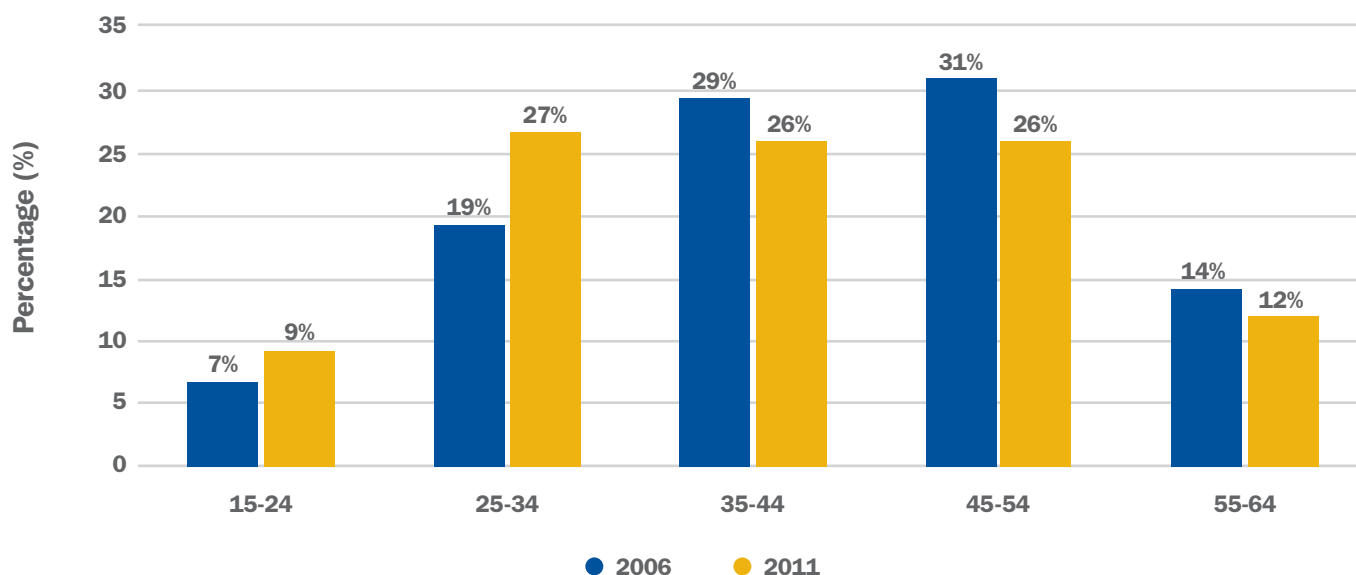
According to MiHR's hiring requirements forecast, underground production and development miners comprise the highest-demand occupational group in Canada's mining industry. The model estimates the need to hire more than 5,000 workers in this group over the next decade, using MiHR's baseline scenario. When compared

with estimates of available talent, this occupation shows a gap of well over 1,000 workers, even when all available sources of talent are taken into consideration. This analysis points to the need to actively grow the labour pool for this occupational group. Given that most training for underground miners is conducted in-house, employers face significant costs associated with recruiting and on-boarding of new workers.

Furthermore, a significant shift in the age structure of these miners has occurred. Figure 53 compares the age structure of this group of workers between 2006 and 2011. In 2006, approximately 45 per cent

of underground miners in Canada's labour force were over the age of 45, compared to 38 per cent in 2011. In contrast, 36 per cent of underground miners were between the ages of 15 and 34 in 2011, compared with 26 per cent in 2006. This growth in the proportion of younger workers in the industry, coupled with fewer older, more experienced workers, points to potential challenges in ensuring sufficient numbers of qualified personnel to mentor, train and supervise younger, less experienced miners.

Figure 53: Age profile, underground production and development miners (2006 and 2011)



Mismatch between job seekers and employers – mining engineering

MiHR's hiring requirements model estimates the need for industry to hire almost 1,000 mining engineers over the next decade. Moreover, the talent gap analysis shows there is an oversupply of mining engineers, despite the fact that mining has traditionally attracted only about 55 per cent of the new entrants in this occupation. On the supply side, Engineers Canada's 2014 publication, *Canadian Engineers for Tomorrow – Trends in Engineering Enrolment and Degrees Awarded 2009 –2013*, shows that enrolment in mining and minerals engineering programs across Canada is the fastest-growing among engineering disciplines, increasing from fewer than 900 enrolments in 2009 to more than 1,300 in 2013 – an increase of 56 per cent.

Nevertheless, MiHR's 2015 National Employer LMI Survey suggests that employers are still experiencing significant difficulties recruiting for these positions. The survey data suggest that more than 60 per cent of respondents have difficulty in attracting, recruiting and retaining employees with engineering degrees and experience. Industry employers continue to report that they frequently resort to hiring engineers from non-mining disciplines and training them in mining-specific operations. Furthermore, many report a reluctance to hire new graduates as engineers-in-training but instead seek mining engineers who have 3 to 5 years' experience.

Interviews with senior students in mining engineering programs suggest that Canadian employers are facing significant competition from other countries for graduates. Many international mining industry employers are offering very competitive compensation packages, which may include scholarships and bursaries, as well as relocation expenses. The added cachet of potential work in exotic locations can pose additional challenges to Canadian employers in attracting potential new entrants to this occupation.

MiHR's research on labour mobility reported in Section 5 suggests that those occupations, such as engineering, for which higher levels of education are required,

exhibit higher levels of interprovincial and international mobility than those requiring less post-secondary training.

Mind the Experience Gap! Retiring workers replaced by younger, inexperienced university graduates – frontline supervisors

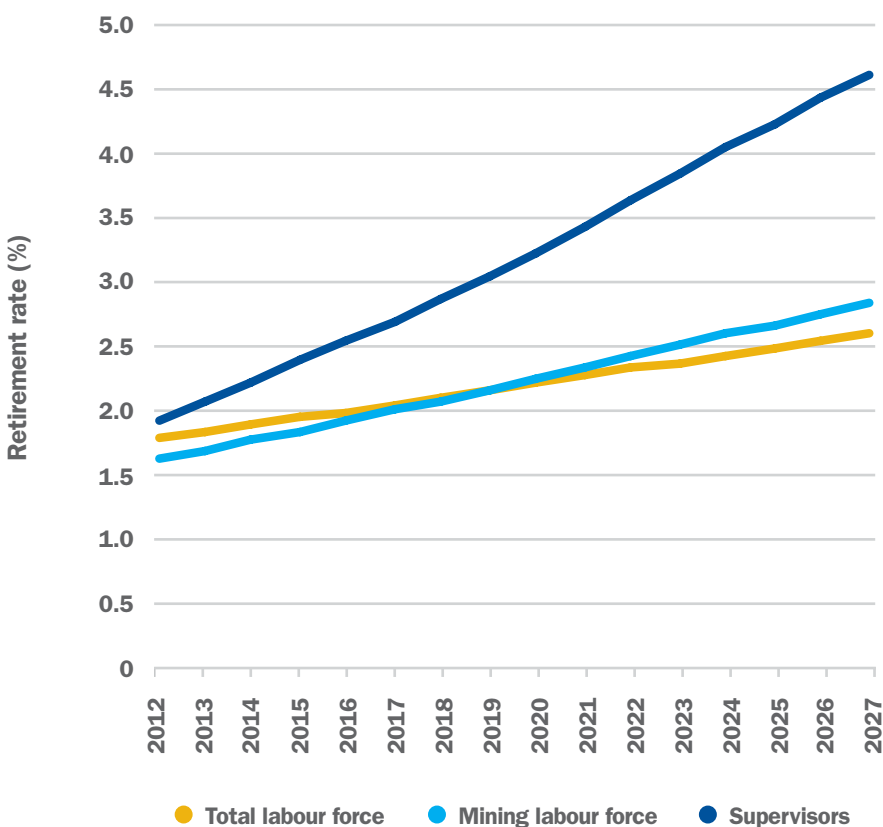
MiHR's hiring requirement model estimates the need to hire almost 2,700 workers in the occupations of "Supervisor – mining and quarrying" and "Supervisor, mineral and metals processing," by 2025. Even when new entrants to these occupations are considered, MiHR's gap analysis points to a shortfall in available talent for these occupations. Front-line supervisors were also identified in the 2015 National Employer LMI Survey as being challenging to recruit – with 44 per cent listing them among the most difficult positions to fill.

Front-line supervisors in mines and mill operations across the country are amongst the fastest-aging workers in the

industry. Figure 54 shows the retirement profile for mining and minerals processing supervisors, compared with that for the overall mining sector workforce and for the total Canadian labour force – as estimated by MiHR's retirement forecasting model. By 2027, the annual retirement rate for supervisors will reach 4.7 per cent, compared to 2.9 per cent in the mining workforce overall.

Because of the older age profile and the dwindling number of experienced workers within the mining and minerals processing occupations (see profile on underground production and development miners, above), some employers are reporting that they are increasingly required to substitute education for experience, by staffing these front-line supervisory positions with new university graduates. This is a particular challenge because these graduates often do not have sufficient workplace experience, particularly in the occupations they are being asked to supervise.

Figure 54: Retirement rate of Supervisors versus the retirement rate of total labour force and mining labour force (2012-2027)



Source: Mining Industry Human Resources Council, Statistics Canada, 2015



SUMMARY AND CONCLUSIONS

The key characteristics, observations and trends contained in this report provide a reference and guide for governments, educators, policymakers and employers, as they address the major human resources challenges in Canada's mining industry. This section summarizes the main findings and highlights their significance to development of potential counter-balancing strategies moving forward.

No one-size-fits-all solution

As highlighted, the mining industry is somewhat unique in each part of the country. Certain characteristics — the size of the mining industry, the mix of minerals and the principal mining activities that drive mining development — vary from region to region. Equally, each region's mining industry has unique economic drivers, customers and markets, as well as individual labour requirements and pressures. To the extent that these labour pressures are different among regions, the strategies to address HR challenges in a particular region may not be applicable in another.

Furthermore, as shown in this report, each mining-related occupation exhibits a unique set of characteristics and challenges. Therefore, the strategies to address HR challenges in a particular occupation may not be transferrable to other occupations.

For example, the labour market for mining engineers is faced with unique challenges, even though the available talent is projected to outstrip the hiring requirements for this group. Mining employers in Canada have reported difficulties in recruiting mining engineers and competition with international employers. Thus, strategies aimed at developing a strong pool of mining engineers in Canada might focus on strengthening the skills and experience of young workers, or on possible new measures to keep Canada competitive with international employers. These types of strategies are not necessarily applicable to other occupations, which may face different challenges.

Overall, the wide range of mining developments across Canada suggests that prospective HR strategies need to be customized, with full understanding of the regional labour market characteristics and the particular types of occupations that are in focus.

Certain challenges exist regardless of economic conditions

Global economic conditions have a significant impact on mining developments in Canada. A positive or negative shift in conditions can affect the global demand for mineral products and the willingness of investors to take part in mining projects. As such, mining projects often live or die according to the external business environment.

Yet, industry stakeholders in Canada typically do not have control over certain economic factors that directly impact their mining activities. Most notably, mineral prices are usually determined by international markets and are subject to individual global demand patterns; as shown in Figure 2, mineral prices are largely in flux, and it is realistic for individual prices to react differently amid shifting global economic conditions. For mining employers in Canada, price fluctuations are an accepted part of the business environment that have persistently changed the industry's need for labour inputs both positively and negatively throughout history.

At the same time, there are numerous factors that impact mining development in Canada, regardless of the prevailing

economic conditions. These include the underlying factors that determine the strength of Canada's mining labour market and the ability of mining employers to access a healthy supply of skilled workers.

Many factors undermine labour market efficiency

This report examines the factors that have undermined Canada's mining labour market, especially the demographic factors that have effectively eroded the potential pool of workers for the industry. For example, demographic trends — such as the aging workforce, high youth unemployment, the lack of immigrants and women in mining, and the lack of labour force participation among Aboriginal peoples (as discussed in this report) — are factors that threaten to contract the industry's labour pool or that represent a missed opportunity for the mining industry to broaden the labour pool moving forward.

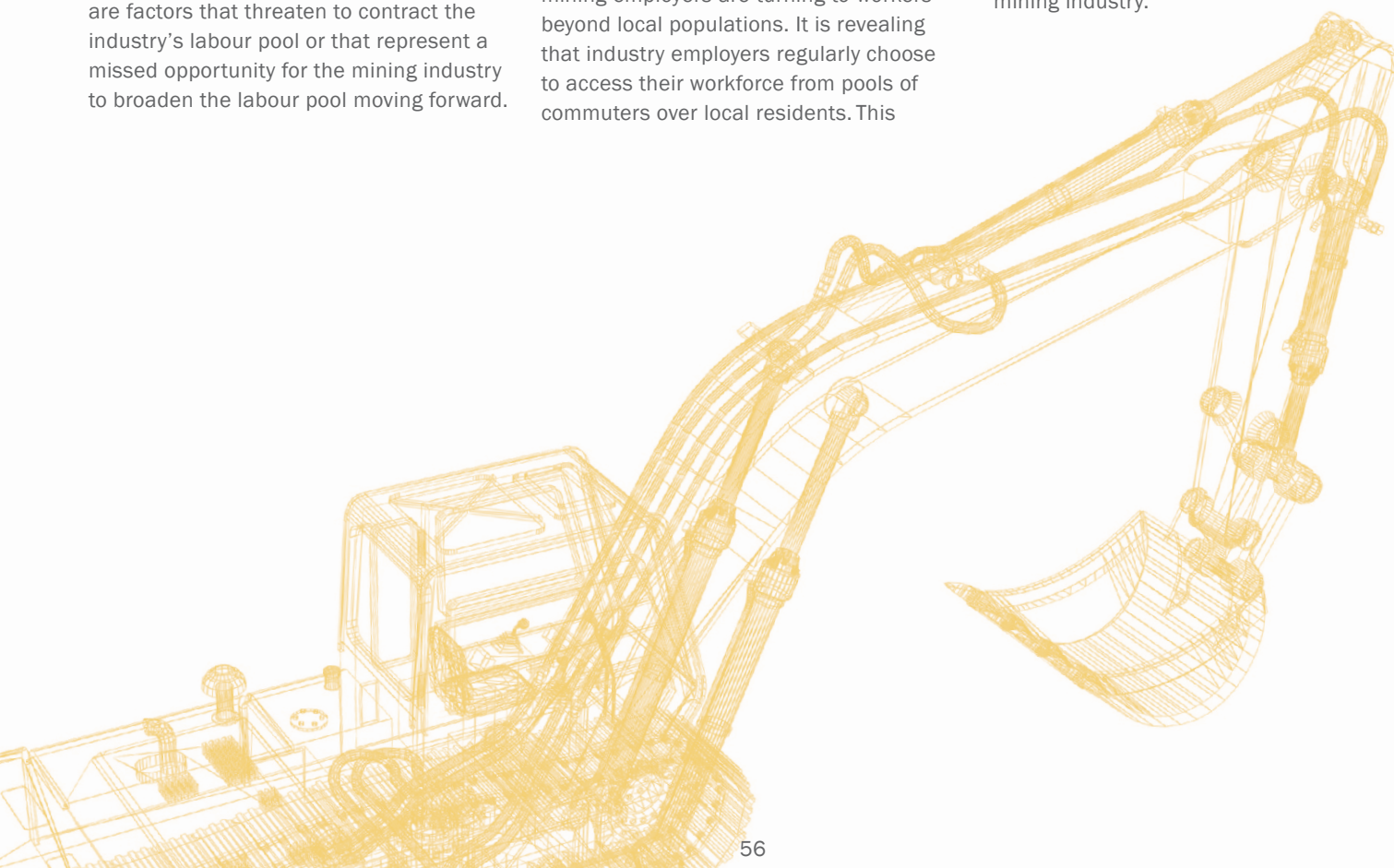
Symptoms of a tight labour market

Findings in this report suggest that Canada has a tight mining labour market; in other words, there is a shortfall of available workers compared to available jobs. As discussed in Section Four, factors such as low unemployment, lower ratios of unemployed workers-to-job vacancies, fewer instances of part-time work and higher earnings, are among the symptoms of a relatively tight mining labour market — since hard-to-find employees can bargain for better-quality jobs in terms of wages and full-time status.

The dependence on commuting workers is further evidence that the mining industry has a tight labour market, as mining employers are turning to workers beyond local populations. It is revealing that industry employers regularly choose to access their workforce from pools of commuters over local residents. This

practice can be expensive and inefficient relative to hiring local workers — a sign that the local labour market is frequently too thin to support mining development.

While the local labour force remains a priority for mining employers, the remoteness of mining operations; the limited population size; a lack of infrastructure, roads and housing; lower levels of labour market participation; and education gaps are among the factors that typically restrict access to the local labour pool. As a result, the use of commuting workers is often necessary for the short-term existence of the industry. At the same time, overdependence on commuting workers reduces the long-term flexibility and prosperity of employers, governments and other stakeholders in Canada's mining industry.



Factors eroding the mining labour pool

This report has identified a number of trends, factors and characteristics that

could potentially limit or challenge the labour market efficiency of Canada's mining industry. Table 8 provides a summary of these (left column), as well as an interpretation of what each factor

means to prospective strategies aimed at improving the industry's labour market (right column).

Table 8: Factors that are limiting to a strong labour market in Canada's mining industry

Labour market factor covered in this report	Implications for mining stakeholders and prospective strategies to improve Canada's mining labour market
Mining employment is volatile	Strategies to handle mining's HR challenges should consider fluctuations in mining employment and the industry's turbulent (up and down) economic cycles. A policy that does not account for the industry's economic cycles could potentially undermine proactive strategies for attracting workers. Proactive strategies could also emphasize creative ways of retaining workers through the cycles.
Labour market outcomes are different for young people	Young people are naturally more likely to be working part-time or to experience unemployment – the mining industry is no exception. However, younger people in mining also experience great fluctuations in unemployment. This trend has the potential to undercut use of proactive strategies for attracting workers, which are frequently targeted at younger people. Young people represent an opportunity for the mining industry to develop and keep workers on a long-term basis.
Young workers are making a comeback	A younger workforce has different needs than an older workforce. Needs include having the support, mentorship and leadership to be able to step in the role as the stewards of the industry in the future.
The retirement crisis isn't over	A large number of retiring and soon-to- retire workers has an impact on the industry, as mining employers scramble to replace experienced and skilled workers. Retirements are inevitable; therefore, a strategy to retain experience and skills involves mitigating the loss of mature workers by (1) making full use of their skills and (2) passing their knowledge on to younger generations before they retire.
Certain groups are underrepresented in the mining industry	Underrepresented groups signify missed opportunities to strengthen the labour market. An effective strategy to strengthen the labour market must include all diverse groups.
Immigrants are older and more educated	Immigrants represent a relatively large segment of Canada's overall labour force but remain largely absent in the mining industry. Given that this group is comparatively better-educated and more mature, its absence is an even greater loss to the mining industry.
Aboriginal peoples not participating in the labour force	Aboriginal participation in the mining labour force is strong; however, a large segment of the Aboriginal population still does not participate in the general labour force. Thus, the most effective approach to engage Aboriginal people in the mining industry would be to improve their overall participation; this involves reaching those who would be interested in a career and equipping them for general labour force participation before developing their specific technical skills. Essential skills and educational attainment have a significant positive impact on labour force participation.
Women not in trades and production occupations	More than ever, women are participating in the labour force but their presence in the mining industry remains low. Therefore, the mining industry must compete with other industries for women, especially in trades and related occupations.

We want to hear from you.

If you have any feedback on this report, or suggestions for the next report, please give us your feedback using this survey link: www.mihr.ca/en/publications/Feedback-Survey.asp

We look forward to hearing from you.





APPENDIX

This appendix lists the North American Industry Classification Codes (NAICS) and National Occupational Classification (NOC) codes used throughout this report to define the mining industry. MiHR is engaged in ongoing, iterative research to include more NOC codes in this definition of the sector and to better capture Statistics Canada data related to the mining-industry workforce.

Industry definition

Statistics Canada, the main source of Canada's labour market information, uses two different coding systems to classify data: the North American Industry Classification System (NAICS) and the National Occupational Classification (NOC).

NAICS codes are used by statistical agencies throughout North America to describe economic and business activity at the industry level. The system features a production-oriented framework where assignment to a specific industry is based on primary activity, enabling it to group together establishments with similar activities.

The NOC system was developed by Statistics Canada and Employment and Social Development Canada (ESDC) (formally Human Resources and Skills Development Canada) to provide standardized descriptions of the work that Canadians perform in the labour market.

Forecasts presented in this report rely on NAICS and NOC-2011 codes.¹⁴ There is no single NAICS code that directly corresponds to all phases of the mining cycle (which includes exploration, development, extraction, processing and reclamation). Similarly, there is no single set of NOC categories that pertain to only mining. People employed in occupation groups that are prevalent in mining also work in a variety of other industries. Together, the NAICS and NOC systems

provide a means for grouping statistics to obtain estimates of employment and workforce demographics using Statistics Canada data sources. A full description of both classification systems can be found on Statistics Canada's website (www.statcan.gc.ca).

Industry classifications (NAICS codes)

MiHR has defined the sector according to the following NAICS codes, thereby providing the best correspondence between the industry's main primary and processing activities, as defined by Natural Resources Canada. The list below describes the NAICS codes considered to be relevant to Canada's mining industry. The NAICS codes that define the mining industry include:

Extraction & Milling:

- **NAICS 2121: Coal mining.** This industry group comprises establishments primarily engaged in mining bituminous coal, anthracite and lignite by underground mining, and auger mining, strip mining, culm bank mining and other surface mining.
- **NAICS 2122 Metal ore mining.** This industry group comprises establishments primarily engaged in mining metallic minerals (ores). Also included are establishments engaged in ore dressing and beneficiating (treatment of raw materials such as washing or pulverizing)

operations, whether performed at mills operated in conjunction with the mines served or at mills, such as custom mills, operated separately.

- **NAICS 2123 Non-metallic mineral mining and quarrying.** This industry group comprises establishments primarily engaged in mining or quarrying non-metallic minerals, except coal. Primary preparation plants, such as those engaged in crushing, grinding and washing, are included.

Support Services:

- **NAICS 2131 Support activities for mining and oil and gas extraction.** This industry group comprises establishments primarily engaged in providing support services, on a contract or fee basis, required for the mining and quarrying of minerals and for the extraction of oil and gas. Establishments engaged in the exploration for minerals, other than oil or gas, are included. Exploration includes traditional prospecting methods, such as taking ore samples and making geological observations at prospective sites.

Fabrication & Manufacturing:

- **NAICS 3311: Iron and Steel Mills and Ferro-Alloy Manufacturing.** This industry group comprises establishments primarily engaged in smelting iron ore and steel scrap to produce pig iron in molten or solid form.

¹⁴ NOC 2011 replaces the previous National Occupational Classification for Statistics (NOC-S).

- NAICS 3313: Alumina and Aluminum Production and Processing. This industry group comprises establishments primarily engaged in extracting alumina.
- NAICS 3314: Non-Ferrous Metal (except Aluminum) Production and Processing. This industry group comprises establishments primarily engaged in smelting, refining, rolling, drawing, extruding and alloying non-ferrous metal (except aluminum).

Mineral Exploration:

- NAICS 5413: Architectural, engineering and related services. This industry group comprises establishments primarily engaged in providing architectural, engineering and related services, surveying and mapping, laboratory and on-site testing, and specialized design services. MiHR has undertaken an extensive review of the primary activities

in exploration and their coverage under the NAICS system in order to develop an appropriate definition of the exploration sector. Given that only a portion of NAICS 5413 is related to exploration activities, MiHR has adjusted estimates under this code accordingly to capture only the activities that are relevant to mineral exploration (such as those under geosciences, surveying and mapping, and assay laboratories, etc.)

Occupation classification (NOC 2011 Codes)

Listed below are the 70 NOC codes that MiHR uses to define the occupations that are essential to mining sector. Often an occupation can have multiple titles and it can be difficult to interpret which label is the correct one. In that instance, Statistics Canada offers a means to map or connect job titles back to the proper NOC code. A resource to

map NOC codes to job titles is found on the Employment and Social Development Canada website (specifically the “Quick Search” box).¹⁵

For example, a “Quick Search” for “Haul Truck Driver—Underground Mining” shows that this occupation maps directly to “Underground mine service and support workers”. The site will also show which job titles are listed for each occupation category. For example “Heavy equipment operators (except crane)” include job titles such as: apprentice heavy equipment operator; heavy-duty equipment operator; heavy equipment operator; operating engineer, heavy equipment; ripper operator – heavy equipment; shovel operator – heavy equipment; spreader operator – heavy equipment; stacker operator – heavy equipment. The NOC codes that are relevant to Canada’s mining industry are listed in Table 9 below:

Table 9: List of National Occupational Classification (NOC) Codes

Trades and Production Occupations	
8231	Underground production and development miners
7511	Transport truck drivers
7521	Heavy equipment operators (except crane)
7312	Heavy-duty equipment mechanics
I214	Mine labourers
7452	Material handlers
7611	Construction trades helpers and labourers
8411	Underground mine service and support workers
9411	Machine operators, mineral and metal processing
9231	Central control and process operators, mineral and metal processing
9611	Labourers in mineral and metal processing
7372	Drillers and blasters - Surface mining, quarrying and construction
7612	Other trades helpers and labourers
7271	Carpenters
7251	Plumbers
7371	Crane operators
7252	Steamfitters, pipefitters and sprinkler system installers
9241	Power engineers and power systems operators
7311	Construction millwrights and industrial mechanics
7242	Industrial electricians
7237	Welders and related machine operators

¹⁵ <http://www5.hrsdc.gc.ca/noc/english/noc/2011/Occupations.aspx?val=0>



Professional and Physical Science Occupations

2132	Mechanical engineers
2133	Electrical and electronics engineers
2113	Geoscientists and oceanographers
2143	Mining engineers
2121	Biologists and related scientists
2131	Civil engineers
2148	Other professional engineers, n.e.c.
2144	Geological engineers
2134	Chemical engineers
2142	Metallurgical and materials engineers
2141	Industrial and manufacturing engineers
2115	Other professional occupations in physical sciences
2112	Chemists

Human Resources and Financial Occupations

1111	Financial auditors and accountants
112	Human resources managers
1112	Financial and investment analysts
111	Financial managers
1121	Human resources professionals

Support Workers

2263	Inspectors in public and environmental health and occupational health and safety
1241	Administrative Assistant
2261	Non-destructive testers and inspection technicians
6322	Cooks
1411	General office support workers
1525	Dispatchers
1523	Production logistics co-ordinators
9415	Inspectors and testers, mineral and metal processing
2262	Engineering inspectors and regulatory officers
1526	Transportation route and crew schedulers
2234	Construction estimators

Technical Occupations

2253	Drafting technologists and technicians
2231	Civil engineering technologists and technicians
2212	Geological and mineral technologists and technicians
2241	Electrical and electronics engineering technologists and technicians
2154	Land surveyors
2243	Industrial instrument technicians and mechanics
2211	Chemical technologists and technicians
2254	Land survey technologists and technicians
2232	Mechanical engineering technologists and technicians
2171	Information systems analysts and consultants
2233	Industrial engineering and manufacturing technologists and technicians
2255	Technical occupations in geomatics and meteorology
2221	Biological technologists and technicians

Supervisors, Coordinators, and Foremen

8221	Supervisors, mining and quarrying
811	Managers in natural resources production and fishing
711	Construction managers
7203	Contractors and supervisors, pipefitting trades
211	Engineering managers
9211	Supervisors, mineral and metal processing
7301	Contractors and supervisors, mechanic trades

Gap analysis by occupation

Table 10 provides the side-by-side comparison of hiring requirements and available talent for each occupation and shows that the size of the talent gaps

varies among the occupations considered in this report. The figures represent cumulative counts over a 10-year horizon to 2024. Occupations are also grouped into broader categories. The three right-hand columns entitled “The Challenge” show

(1) the available talent pool for all industry sectors, (2) mining’s historic share of the labour pool and (3) an estimate of the share mining will need to attract to meet its projected hiring requirements.

Table 10: Labour market gaps by occupation (2016-2025)

	The Need	Talent Availability and Gap		The Challenge		
	Cumulative Hiring Requirements	Talent Availability – Mining’s Share	Gap	Total Available Talent – All Sectors	Mining’s Share	Mining’s Required Share
Trades and Production Occupations						
Underground production and development miners	5,055	4,026	-1,029	4,423	91.0%	
Heavy equipment operators (except crane)	4,079	4,604	525	29,453	15.6%	
Construction millwrights and industrial mechanics (except textile)	3,434	3,646	212	26,761	13.6%	
Truck drivers	3,266	4,146	880	119,829	3.5%	
Welders and related machine operators	2,220	2,780	560	48,023	5.8%	
Machine operators, mineral and metal processing	1,916	1,794	-122	3,079	58.3%	
Heavy-duty equipment mechanics	1,795	2,440	645	16,397	14.9%	
Industrial electricians	1,751	1,691	-61	10,932	15.5%	
Labourers in mineral and metal processing	1,397	2,426	1,029	5,560	43.6%	
Mine labourers	1,204	1,048	-156	1,250	83.8%	
Material handlers	1,088	1,591	503	80,712	2.0%	
Crane operators	865	1,000	135	4,843	20.6%	
Construction trades helpers and labourers	838	1,192	354	75,230	1.6%	
Steamfitters, pipefitters and sprinkler system installers	771	984	213	9,612	10.2%	
Underground mine service and support workers	745	1,042	297	1,241	84.0%	
Central control and process operators, mineral and metal processing	707	1,023	316	1,472	69.5%	
Power engineers and power systems operators	649	750	101	10,297	7.3%	
Drillers and blasters - Surface mining, quarrying and construction	435	458	23	1,343	34.1%	
Other trades helpers and labourers	234	138	-96	4,219	3.3%	
Carpenters	183	312	129	66,432	0.5%	
Plumbers	76	178	102	20,299	0.9%	
Total	32,708	37,266	4,558	541,406	7%	6%

	The Need	Talent Availability and Gap		The Challenge		
	Cumulative Hiring Requirements	Talent Availability – Mining's Share	Gap	Total Available Talent – All Sectors	Mining's Share	Mining's Required Share
Professional and Physical Science Occupations						
Geologists, geochemists and geophysicists	1,360	1,934	574	8,253	23.4%	
Mining engineers	864	1,359	495	2,462	55.2%	
Mechanical engineers	708	623	-85	26,204	2.4%	
Electrical and electronics engineers	499	339	-160	22,137	1.5%	
Chemical engineers	400	400	0	7,938	5.0%	
Industrial and manufacturing engineers	373	700	327	13,756	5.1%	
Chemists	268	267	-1	14,562	1.8%	
Metallurgical and materials engineers	235	405	170	1,659	24.4%	
Other professional engineers, n.e.c.	229	16	-214	2,019	0.8%	
Other professional occupations in physical sciences	187	235	48	772	30.4%	
Geological engineers	170	108	-62	1,548	7.0%	
Biologists and related scientists	169	52	-117	14,492	0.4%	
Civil engineers	145	151	6	27,125	0.6%	
Total	5,607	6,588	981	142,926	5%	4%
Human Resources and Financial Occupations						
Financial auditors and accountants	1,193	1,177	-16	93,147	1.3%	
Human resources managers	558	315	-244	16,626	1.9%	
Financial managers	469	317	-152	27,957	1.1%	
Specialists in human resources	379	357	-22	24,310	1.5%	
Financial and investment analysts	128	175	47	28,599	0.6%	
Total	2,727	2,340	-387	190,639	1%	1%
Support Workers						
Secretaries (except legal and medical)	719	864	145	72,277	1.2%	
Inspectors in public and environmental health and occupational health and safety	705	547	-159	8,850	6.2%	
Non-destructive testers and inspection technicians	410	256	-154	3,150	8.1%	
Inspectors and testers, mineral and metal processing	316	518	202	1,666	31.1%	
Production clerks	279	336	57	10,846	3.1%	
Dispatchers and radio operators	241	332	91	12,900	2.6%	
Cooks	200	159	-41	84,611	0.2%	
Administrative clerks	179	338	159	48,601	0.7%	
Construction estimators	95	32	-63	6,740	0.5%	
Engineering inspectors and regulatory officers	76	34	-42	1,621	2.1%	
Transportation route and crew schedulers	3	34	31	2,295	1.5%	
Total	3,223	3,450	227	253,556	1%	1%

	The Need	Talent Availability and Gap		The Challenge		
	Cumulative Hiring Requirements	Talent Availability – Mining's Share	Gap	Total Available Talent – All Sectors	Mining's Share	Mining's Required Share
Technical Occupations						
Land surveyors	550	230	-320	5,205	4.4%	
Information systems analysts and consultants	491	1,303	812	81,599	1.6%	
Industrial instrument technicians and mechanics	439	369	-70	3,150	11.7%	
Mechanical engineering technologists and technicians	427	287	-140	6,223	4.6%	
Geological and mineral technologists and technicians	325	1,461	1,136	4,920	29.7%	
Chemical technologists and technicians	317	812	495	18,153	4.5%	
Civil engineering technologists and technicians	280	31	-249	5,610	0.6%	
Drafting technologists and technicians	261	340	79	20,137	1.7%	
Electrical and electronics engineering technologists and technicians	261	469	208	14,941	3.1%	
Mapping and related technologists and technicians	228	62	-166	5,372	1.2%	
Land survey technologists and technicians	224	50	-174	1,714	2.9%	
Industrial engineering and manufacturing technologists and technicians	112	359	247	9,270	3.9%	
Biological technologists and technicians	71	36	-35	6,304	0.6%	
Total	3,986	5,810	1,824	182,598	3%	2%
Supervisors, Coordinators, and Foremen						
Primary production managers (except agriculture)	1,964	2,673	709	6,127	43.6%	
Supervisors, mining and quarrying	1,604	1,455	-149	1,624	89.6%	
Supervisors, mineral and metal processing	1,082	976	-106	2,261	43.2%	
Engineering managers	454	206	-248	8,375	2.5%	
Construction managers	449	144	-305	22,002	0.7%	
Contractors and supervisors, mechanic trades	209	285	76	6,528	4.4%	
Contractors and supervisors, pipefitting trades	40	106	66	1,760	6.0%	
Total	5,802	5,844	42	48,676	12%	12%

Source: Mining Human Resources Council, 2015



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