Saskatchewan Mining Industry
Hiring Requirements and
Available Talent Forecasts

2014

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Executive Summary

Background

A sharp decline in oil prices in late 2014 and generally lower commodity prices have created a cautious business environment especially in resource-rich provinces. Across Canada, many expansionary plans and projects are being scaled back and mining industry employers are being forced to adopt cost cutting measures. In this depressed business environment, the hiring pressures within the mining industry have waned. By comparison, Saskatchewan's economy has weathered the turbulence in the global economy fairly well – sustaining positive economic growth – and the mining industry has significantly contributed to the province's economic resiliency.

This report presents an updated forecast of employment in mining in Saskatchewan, taking into account the current business climate and using the latest available data, including primary data collected through an employer survey. It follows two previous labour market studies in Saskatchewan published in 2008 and 2011. This new outlook includes an updated forecast of hiring requirements, available talent and a gap analysis that is adjusted to reflect a number of Saskatchewan-specific factors such as the province's unique commodity mix, regional variations in the labour market and productivity. Four additional occupations have also been added to the forecast to address the specific needs of the Saskatchewan mining industry. The research outcomes of this study are intended to provide data and analysis that can be used by industry stakeholders to discuss the needs of the sector in terms of human resource development strategies that will support a strong, competitive mining industry in Saskatchewan now and into the future.

> *Please note: Although many of the occupations profiled in this study are commonly engaged in other sectors within Saskatchewan's economy, this analysis and the forecasts relate specifically and exclusively to the mining industry's hiring requirements and available talent. The results reported here should not be generalized for these occupations in sectors other than mining nor should they be interpreted as the supply and demand for specific occupations in Saskatchewan as a whole.*

The gap between hiring requirements and available talent has narrowed for some occupations – in some cases, it has closed altogether – but this does not signal an end to the human resources challenges for mining in Saskatchewan. The industry still faces significant hiring requirements driven primarily by the replacement of workers who are retiring or leaving for other reasons. In addition, there are specific groups of occupations, for example the *Technical Occupations*, for which there are still significant gaps between the mining industry's hiring requirements and its share of available talent.

Furthermore, there are signals that Saskatchewan's mining labour market is not functioning in an optimal manner, as employers still struggle to match their recruitment needs with the skills of job-seekers. For example, according to the Saskatchewan Employer Labour Market Information (LMI) Survey, Engineers (Mining, Mechanical and Electrical) are still listed amongst the top five occupations for which employers struggle to recruit, while only some of these occupations exhibit shortages in terms of numbers. This may be a symptom of underlying labour market frictions such as competition from other provinces and/or international employers who may be able to provide monetary and non-monetary incentives to attract a larger share of the available talent.

Key Findings

Labour Market Trends

- Saskatchewan's mining workforce shows a larger proportion of younger workers (29 per cent) compared to the mining labour force in Canada (24 per cent) or to Saskatchewan's overall workforce (20 per cent).

- Retirements continue to pose a challenge to stable labour market succession, with 12 per cent of the current mining workforce over the age of 55.

- Saskatchewan is a net exporter of commuting mining sector workers. Approximately 1,400 mining sector workers who live in Saskatchewan work in mining elsewhere (primarily Alberta); conversely, some 900 people who work in mining in Saskatchewan commute from mainly neighbouring provinces (Alberta and Manitoba).

- Women are underrepresented in mining, making up only 14 per cent of the sector's labour force although they represent 47 per cent of the total labour force in the province. The underrepresentation is most notable in the technical and trades and production occupations.

- Immigrants are underepresented in the mining workforce and make up only 4 per cent of Saskatchewan's mining labour force are immigrants, compared to seven per cent in the province's overall population. Immigrants in the mining workforce are most prevalenty employed in the technical, scientific and management roles.

- Aboriginal peoples make up approximately 10 per cent of the mining workforce similar to the proportion in the overall workforce. Employment tends to be focused in trades and production occupations and support workers, and underrepresented in professional and physical science, human resources and financial and technical and supervisory occupations.

- A larger proportion of the mining workforce hold apprenticeships and other trades qualifications as their highest level of educational attainment than the general workforce in Saskatchewan – 23 and 14 per cent, respectively.

Employment and Hiring Requirement Forecast

- MiHR estimates that Saskatchewan's mining industry directly employed nearly 22,000 people in 2014 – down slightly from 2013.

- Despite the current market conditions the mining industry will need to hire 12,990 new workers by 2024, assuming a baseline scenario.

- Should the economy perform more poorly than expected, the hiring need will decrease to 8,675 workers, despite shedding some 3,600 jobs.

- Under an expansionary scenario, Saskatchewan's mining industry will create over 3,500 new jobs and the overall hiring need will increase to 18,450 workers.

- The occupation-specific hiring requirements for the 71 occupations analyzed in this report are estimated to exceed 8,600 workers.

Available Talent Forecast and the Gap

MiHR's available talent forecast shows that the mining industry can expect to attract about 6,900 new workforce entrants in the 71 occupations assessed in this report. The gap between the hiring requirements and available talent for broad occupational groups is shown in the following table. The largest occupational gaps are in *Technical Occupations*. *Supervisors, Coordinators and Foremen* as well as *Professional and Physical and Science Occupations* also show significant gaps between industry's need and the flow of new entrants with the appropriate skills.

	THE NEED	TALENT AVAILABILITY AND GAP	THE CHALLENGE			
	CUMULATIVE HIRING REQUIREMENTS	TALENT AVAILABILITY – MINING'S SHARE	GAP	TOTAL NEW ENTRANTS – ALL SECTORS	MINING'S SHARE	MINING'S REQUIRED SHARE
Production Occupations	2,950	2,890	-60	18,670	15%	16%
Designated Trades	1,440	1,660	220	13,225	13%	11%
Professional and Physical Science Occupations	1,111	742	-370	5,200	14%	21%
Human Resources and Financial Occupations	315	227	-85	5,863	4%	5%
Support Workers	515	314	-201	10,125	3%	5%
Technical Occupations	1,330	384	-946	5,418	7%	25%
Supervisors, Coordinators, and Foremen	995	679	-316	2,339	29%	43%

Source: Mining Industry Human Resources Council, 2014.

Mining Workforce Development Strategies

To address both new and ongoing HR challenges facing Saskatchewan's mining industry, a number of key observations and related recommendations are made. These include:

1. Continue to develop workforce diversity strategies aimed at improving industry's ability to attract workers from under-represented groups and to make the best use of all potential sources of skilled workers. Target groups should include Aboriginal peoples, women and immigrants.

2. Develop attraction and retention initiatives which address:

   - succession planning – especially around supervisory and leadership skills
   - increasing mining's share of available talent – particularly in the Technical and *Professional/Physical Science Occupations*
   - increase the total number of new entrants
   - the ability of mining employers to attract or retrain workers with the right knowledge and skills for the job

3. Fostering partnerships between industry and education to better align post-secondary training with career opportunities and industry needs, focusing on high-demand occupations.

1   Introduction

In 2008 and again in 2011, the Mining Industry Human Resources Council (MiHR) prepared labour market outlook reports in partnership with the Saskatchewan Mining Association (SMA). Both of the previous reports provided a detailed analysis of the labour market challenges faced by the Saskatchewan mining industry at that time and predicted cumulative hiring requirements and, in the case of the 2011 report, estimated future available talent for the coming decade. The employment forecasts from the 2008 and 2011 studies have been widely used by government and training/education institutes in Saskatchewan to identify, fund and develop key post-secondary training programs that are designed to prepare people for work in the mining industry in Saskatchewan. This report is an update, using the latest available data that provides further detailed analysis at the sub-provincial, industry sector and occupational levels.

In the last three years, the global economy has gone through a slow yet notable transition with signs of recovery. The global surge in commodity prices has gradually subsided, translating into a less optimistic commodity market. Other factors have also changed the economic climate of Saskatchewan's mining industry (i.e., declining interest rates, restricted access to capital, reduced profit margins, high commodity prices and equally high operating costs, among others.) Each of these factors has an impact on the hiring decisions of mining employers as they aim to operate at competitive levels.

This report provides an updated analysis of Saskatchewan's mining labour market and has been developed in partnership with the SMA and with funding provided by the SMA and the International Minerals Innovation Institute (IMII).This new outlook includes an updated forecast of hiring requirements, available talent and a gap analysis that is adjusted to reflect a number of Saskatchewan-specific factors related to the province's unique commodity mix, regional variations in the labour market and productivity factors. MiHR has also added four more occupations to the forecast for the first time to incorporate the specific local needs of the Saskatchewan mining industry.

Saskatchewan's 2014 labour market forecasts are, in part, based on a number of economic variables that shape the outlook of the mining labour market in the province, including the long-term price forecast of commodities. Changes in the current global economy and a fundamental shift in the long-term forecast of commodity prices have driven the need for an updated outlook for Saskatchewan mining industry.

Data Collection and Methodology

MiHR's forecasts rely on a variety of data inputs, mining industry intelligence, and other information that is incorporated into its models and analyses. For example, MiHR's hiring requirements forecast uses past trends and consensus forecasts in an econometric model[1] to predict mining employment and replacement requirements over a 10-year horizon. Current economic activity and consensus forecasts of future conditions, such as anticipated price fluctuations, changes in the cost of capital or other key economic factors are inputs. A more detailed description of MiHR's forecasting methodology can be found in Appendix A.

Industry intelligence is taken from key data sources from Statistics Canada (e.g., the *National Household Survey, Census, Labour Force Survey, Survey of Employment Payroll and Hours, Canada Business Patterns*) and other information sources such as Natural Resources Canada, the Government of Saskatchewan the Saskatchewan Mining Association (SMA) and from a number of economic/financial forecasting organizations (e.g., TD Economics, RBC Economics). These sources cover a wide range of important themes including labour market statistics and reporting (e.g., labour force participation, separation, demographics); economic and demographic trends; and current and upcoming mining projects in the region.

MiHR also conducted an extensive *Employer Labour Market Information (LMI) Survey* with mining sector employers in Saskatchewan to gather the important workforce data, pertaining specifically to producers in the province. Deployed by the Saskatchewan Mining Association (SMA) to their member companies, the Saskatchewan *Employer LMI Survey* had an overwhelming response, with all SMA HR committee member companies providing data. Findings from this survey are used to inform aspects of the modeling exercise, and to validate data from other sources, such as the occupational structure of the workforce, as well as demographic characteristics, participation and turnover rates. In November 2014, MiHR conducted a stakeholder forum in Saskatoon to obtain valuable feedback and to strengthen the forecast, interpretations and recommendations included in this report.

Industry Definition and Scope

For the purpose of this forecast, MiHR defines the mining industry as including all phases of the mining cycle: exploration; extraction/milling; minerals fabrication and reclamation. Forecasts presented in this report rely heavily on data from Statistics Canada. North American Industry Classification codes (NAICS) and National Occupational Classification 2011 (NOC-2011)[2] codes are used to define the mining industry and its workforce. There is no single NAICS code or set of codes that directly corresponds to all phases of the mining cycle. Similarly, there is no single set of NOC-2011 categories that pertain only to mining. Together, the NAICS and NOC-2011 systems provide a means for grouping statistics to obtain estimates of employment and workforce demographics using Statistics Canada as data source. Details on the NAICS and NOC-2011 codes included in the forecasts of the Saskatchewan mining workforce are found in Appendix D.

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1   An econometric model measures past relationships among economic variables such as prices, production, interest rates, employment, and then uses these relationships to forecast how changes in some of the variables will affect the future course of other variables.

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

2 Economic Overview

The following section provides a discussion of various economic factors that influence the employment and hiring requirements forecasts including GDP, labour market conditions and relevant commodity prices.

Gross Domestic Product

Gross Domestic Product (GDP) provides a measure of economic output for an industry and a region. Research by MiHR has found that, across Canada, there is a strong correlation between GDP movement and employment.

Despite the recessionary conditions, Canada has been able to sustain modest economic growth since 2010/11. According to Statistics Canada in the last half of 2013, real gross domestic product (GDP) increased by 1.3 per cent. A recent International Monetary Fund (IMF) forecast suggests that the Canadian economy will grow at an average rate of 2.4 per cent to the end of 2014. Moving forward, the IMF has predicted that global economic growth in 2015 will remain steady at around four per cent. However, with the dramatic drop in the price of crude oil as 2014 draws to a close, a deceleration in resource-based regional economies in Canada is anticipated. As a result, real GDP growth forecasts for Alberta, Newfoundland and Labrador and Saskatchewan have been downgraded.[3] Nevertheless, the decline in oil prices can also have some offsetting benefits to provincial economies including lower costs of production, reduced inflation and continued low interest rates. Furthermore, the falling value of the Canadian dollar will likely provide a much-needed boost to sectors such as manufacturing, tourism and exports.

By comparison, Saskatchewan weathered the recessionary period relatively well and is showing good prospects for future growth. From 2010 onwards, Saskatchewan's economy has performed well, with an annual GDP growth rate of 5 per cent in 2014, notably above the national average (see Figure 1). RBC's forecast for real GDP growth in Saskatchewan for 2015 is 2.8 percent,[4] a downward revision which reflects the negative effects of significantly lower oil prices on income growth in the province, as discussed above. According to this same forecast, Saskatchewan's economy will get a boost in 2015 from a resurgence in mining activity, which was restrained in the first half of 2014, primarily due to cutbacks in potash production. Global demand and prices for potash are expected to be bolstered by a growing world economy in 2015 and even into 2016.

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3   See for example: www.td.com/document/PDF/economics/qef/ProvincialEconomicForecast_Dec2014.pdf

4   www.rbc.com/economics/economic-reports/pdf/provincial-forecasts/sask.pdf
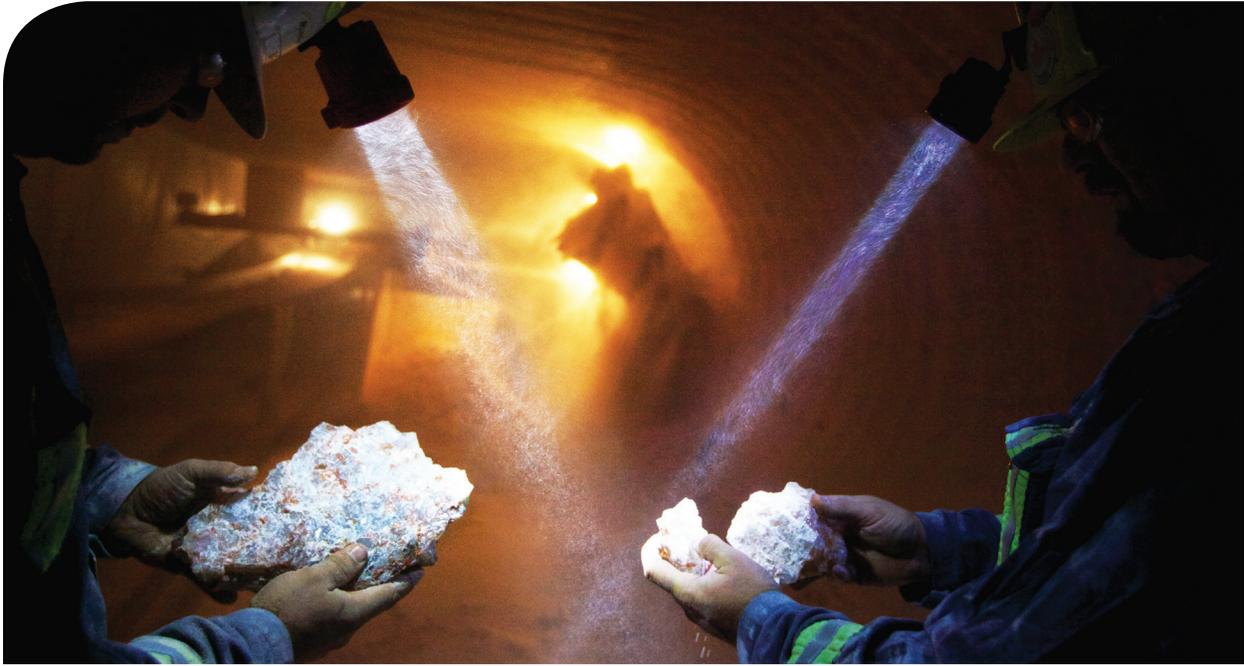
Historical Change in Total GDP – Saskatchewan and Canada, 1998–2013
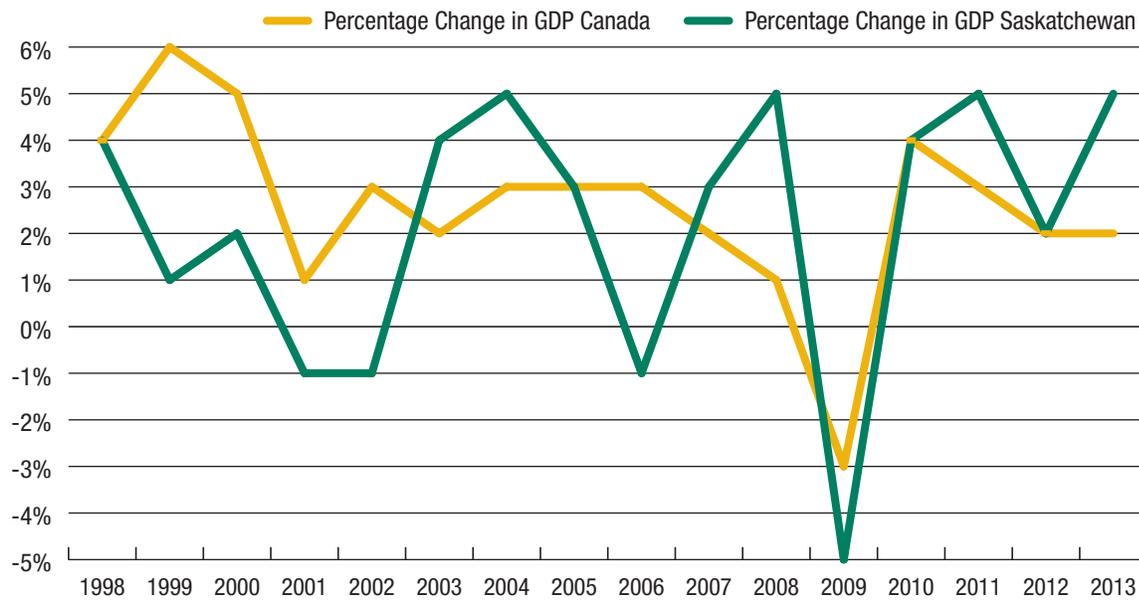
Source: Mining Industry Human Resource Council; Statistics Canada, 2014

Labour Market

Figure 2 shows unemployment rates by province in 2014. As this figure suggests, labour markets in resource-rich provinces like Alberta and Saskatchewan have become tighter with lower rates of unemployment, whereas manufacturing hubs like Ontario and Quebec are experiencing record high rates of unemployment. Moreover, tighter labour market conditions in certain regions of the country are also pointing towards the possibility of skills gaps.

FIGURE 2

Total Unemployment Rate by Province, 2014
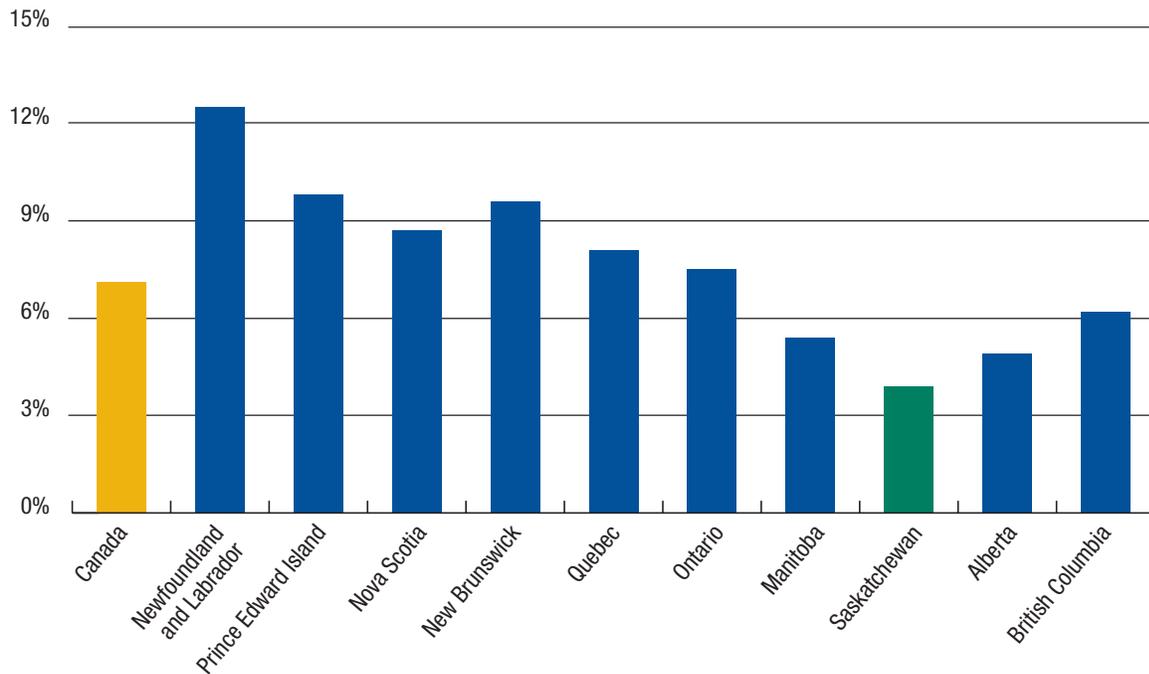
Source: Mining Industry Human Resources Council; Statistics Canada, 2014

The employment index shown in Figure 3 suggests that in the last 24 months employment growth has been stronger in the natural resource sectors (forestry, fishing, mining, quarrying, oil and gas) and construction, compared to manufacturing.

FIGURE 3

Employment Index by Selected Industries, Canada, January 2013–June 2014
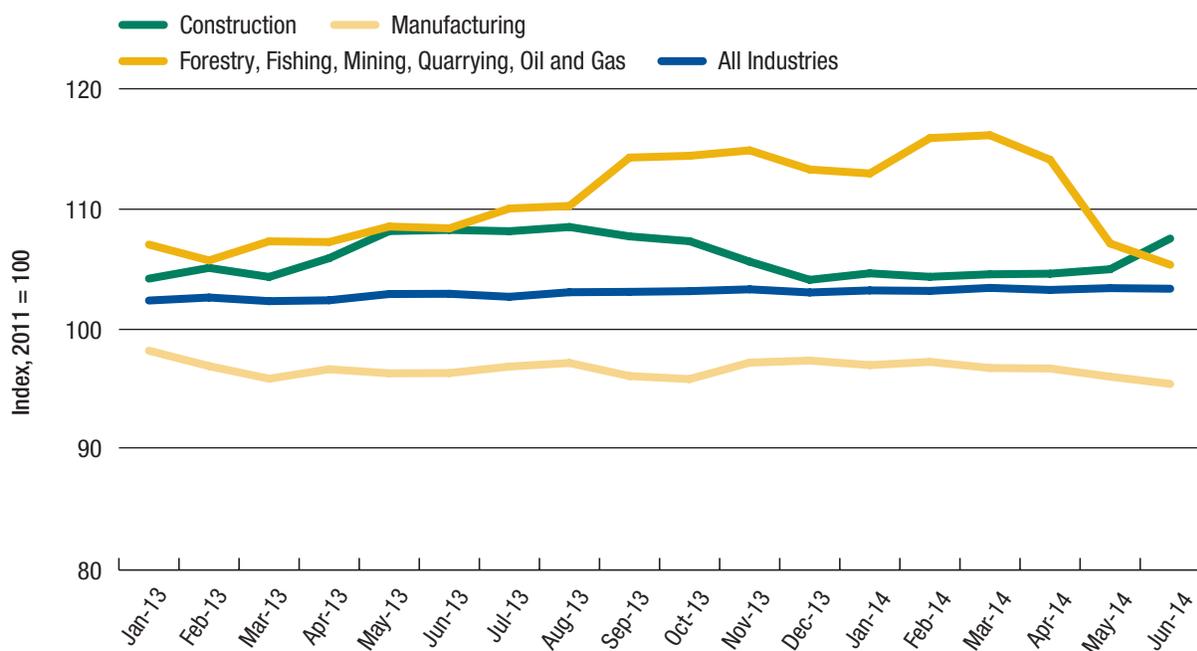
Source: Mining Industry Human Resources Council; Statistics Canada, 2014

In the long-term, external economic factors coupled with demographic shifts will continue to create a challenging environment for Canadian employers. The looming retirement of baby boomers, a lack of skilled workers and youth unemployment will give rise to added human resources challenges in the economy.

Despite the volatile economic environment, Saskatchewan's labour market has performed well. In 2013, the unemployment rate in Saskatchewan hovered at only 4 per cent, the lowest in the country. The downside of a tight labour market is that employers in all sectors face even more difficulties in filling job vacancies and competition for specific skills sets is fierce. Nevertheless, RBC's provincial outlook for Saskatchewan foresees improving labour market conditions within the provinces due, in part, to robust in-migration of skilled workers.

Figure 4 shows the age profile of Saskatchewan's population compared to Canada's population. In Saskatchewan, 23 per cent of the total labour force is between the ages of 45 and 54 and 21 per cent is over the age of 55. In the coming decade, a large proportion of this cohort will exit the labour force. This will have a significant effect on the availability of skilled labour, especially workers that have substantial workplace knowledge and experience.

FIGURE 4

Age Profile of the Total Workforce – Canada and Saskatchewan, 2011
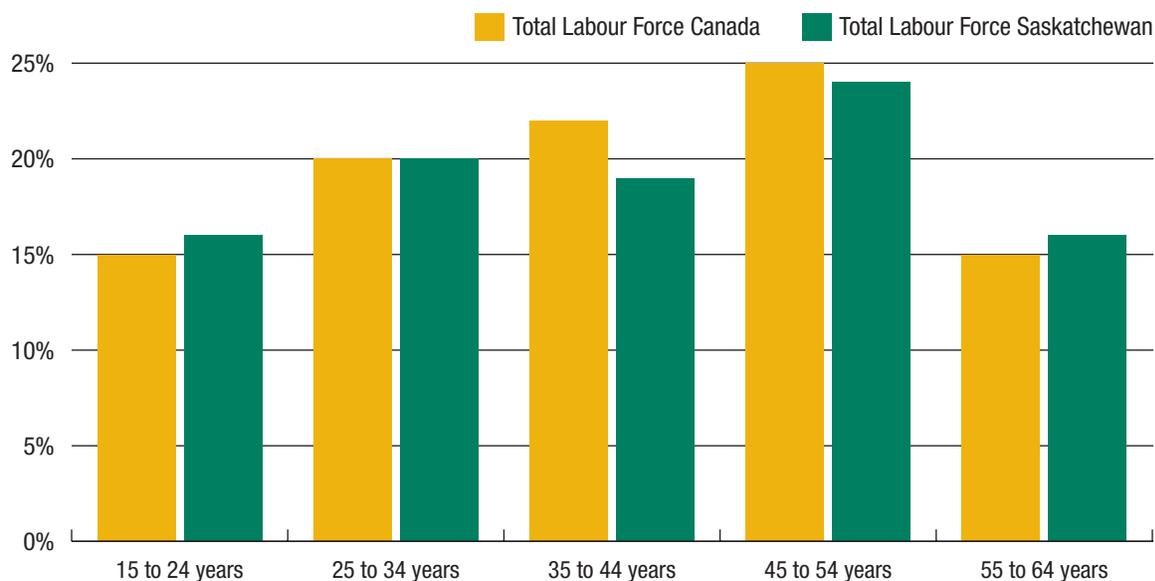
Source: Mining Industry Human Resources Council; Statistics Canada, 2011

The Mining Sector

Figure 5 shows the breakdown of the value of Saskatchewan's mining production in 2012 by commodity type. The chart indicates that 86 per cent of the commodities produced in Saskatchewan are non-metallic ores, primarily potash. According to the Government of Saskatchewan, 25 to 30 per cent of the potash produced globally is mined in the province, making it the largest single producer of potash in the world. Metallic mineral mining, including uranium, makes up approximately 12 percent of the value of mining production in Saskatchewan.

FIGURE 5
Value of Mining Production, by Commodity Type, 2013

Non-metallic Minerals (including Potash)   Coal   Metallic Minerals (including Uranium)

12%
2%
86%
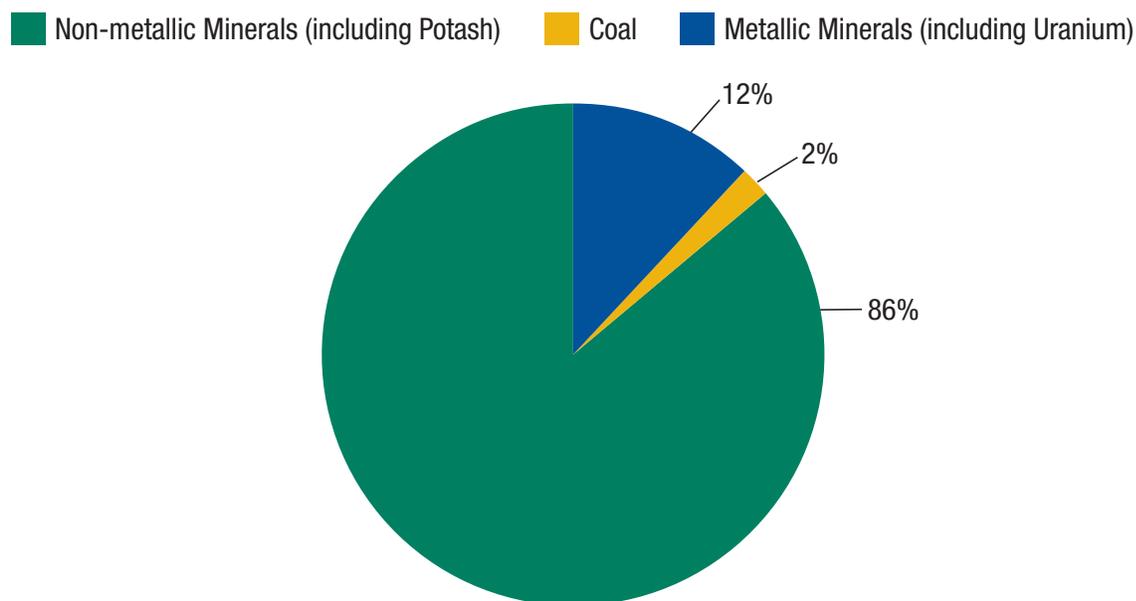
Source: Mining Industry Human Resources Council; Natural Resources Canada, 2014

Commodity Prices Outlook

In the first half of 2014, commodity prices continued to decline due to geopolitical concerns in the Middle East and a weakening demand in China and Europe is still exerting downward pressure on prices. In 2014, the World Bank price index for metals declined by 1 per cent compared with 2013. The decline in this price index was driven by the decrease in the price of iron ore (down 15 per cent when compared with last quarter). According to the latest World Bank Commodity Markets Outlook (July 2014), metal prices are expected to decrease by more than 6 per cent in 2014.

Potash Prices

Figure 6 shows the historical and forecasted price of potash since 1987. In 2013, Saskatchewan's potash producers suffered a major setback due to a significant decrease in the price of potash. This adjustment was caused by two main factors: softening demand from India and China and the breakup of a Russian-Belarusian potash cartel.[5] The resulting decline in the price of potash also affected employment in Saskatchewan's extraction and mining sector. Nevertheless, the long-term outlook for potash prices is cautiously optimistic as demand will be driven primarily by agricultural use.

5   Please refer to www.td.com/document/PDF/economics/special/AssessingtheImpactoftheBreakUpoftheBPCCartel.pdf

FIGURE 6

Historical and Forecasted Price Movements of Potash, 1987–2025
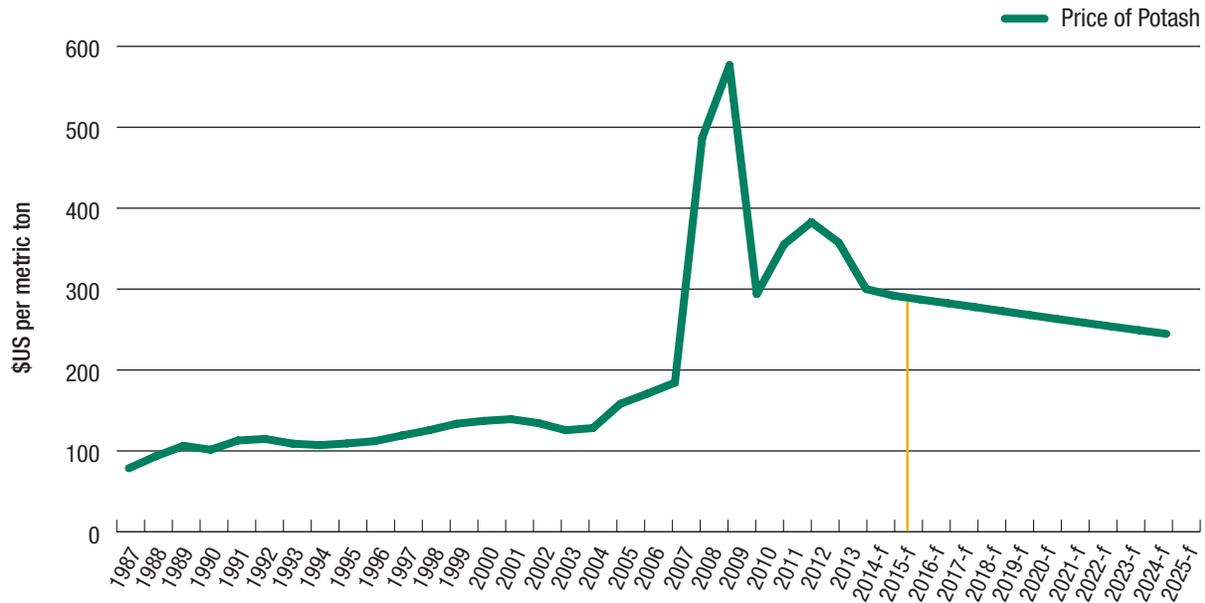
Source: Mining Industry Human Resources Council; World Bank, 2014

Uranium Prices

World demand for uranium is driven by an increasing need for electricity. Countries across the world are investing in nuclear power generation. According to the World Nuclear Association there are 435 nuclear reactors in 31 countries and over 60 new reactors are under construction in 13 countries. Moreover, there is additional investment underway in upgrading existing nuclear plants, especially in the USA. Similarly, China and India are also investing heavily in nuclear reactors to meet the electricity needs of their population.

However, uranium produced in Saskatchewan is sold primarily on long-term contracts (typically three to five years) in which production levels and prices are predetermined and fixed during the length of the agreement. For example, in 2010, China's Guangdong Nuclear Power Holding Co. Ltd. signed a long-term supply contract (until 2025)[6] with Cameco. This means that, unlike other commodities that are mined in Canada, spot prices for uranium have little or no correlation with employment in the industry as shown in Figure 7. Instead, employment in uranium mining is determined primarily by production quotas set through predetermined contracts.

FIGURE 7

Percentage Change in Employment, Production and Price of Uranium, Canada, 2009–2012
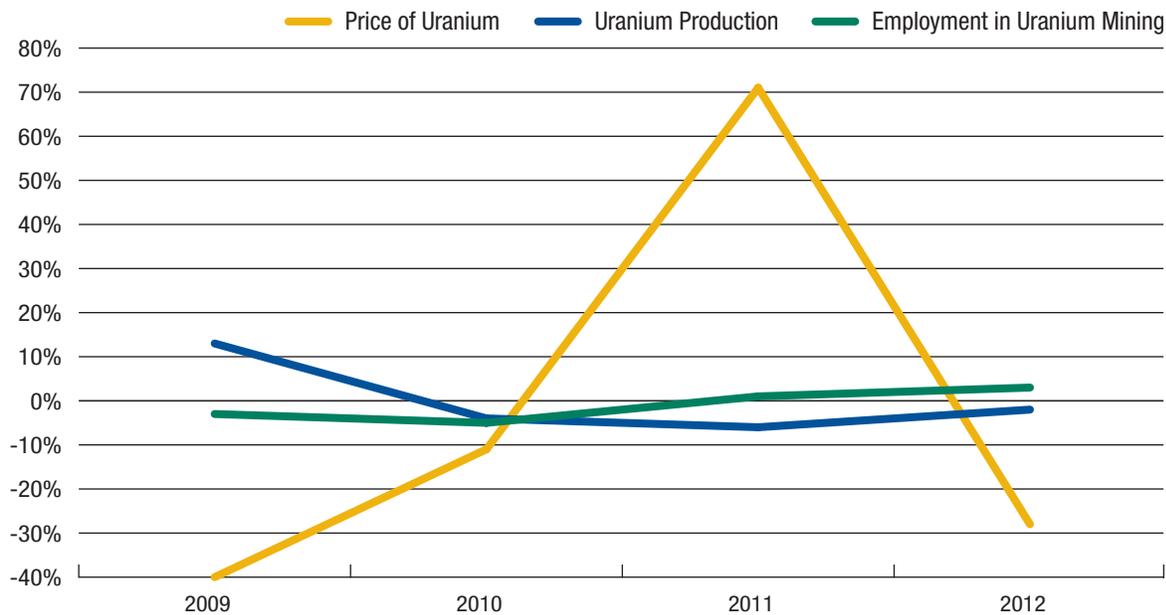
Source: Mining Industry Human Resources Council; Natural Resources Canada, 2014

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6   Please refer to www.theglobeandmail.com/globe-investor/cameco-signs-long-term-uranium-supply-deal-with-china/article4081015/

3 Mining Labour Market Trends

MiHR estimates that the Canadian mining industry directly employed nearly 215,000 people in 2013 – down slightly from 2012. Thirty per cent of the total mining labour force was employed in extraction and milling; 18 per cent in exploration; 18 per cent in mining support and supply services and 33 per cent in mineral fabrication (such as iron, steel and aluminum manufacturing). Mineral exploration experienced a decline of nearly 30 per cent in total employment from 2012 to 2013. This decline highlights the impact on the labour market of tightening conditions in the capital markets and a decline in capital investment in exploration-related projects.

Composition of Saskatchewan's Mining Workforce

MiHR estimates that Saskatchewan's mining industry directly employed nearly 22,000 people in 2013 – down slightly from 2012. Figure 8 shows employment in the Saskatchewan mining industry by sector over the period of 2000 to 2012.

FIGURE 8

Total Employment in Saskatchewan Mining Industry, by Sector, 2000–2012
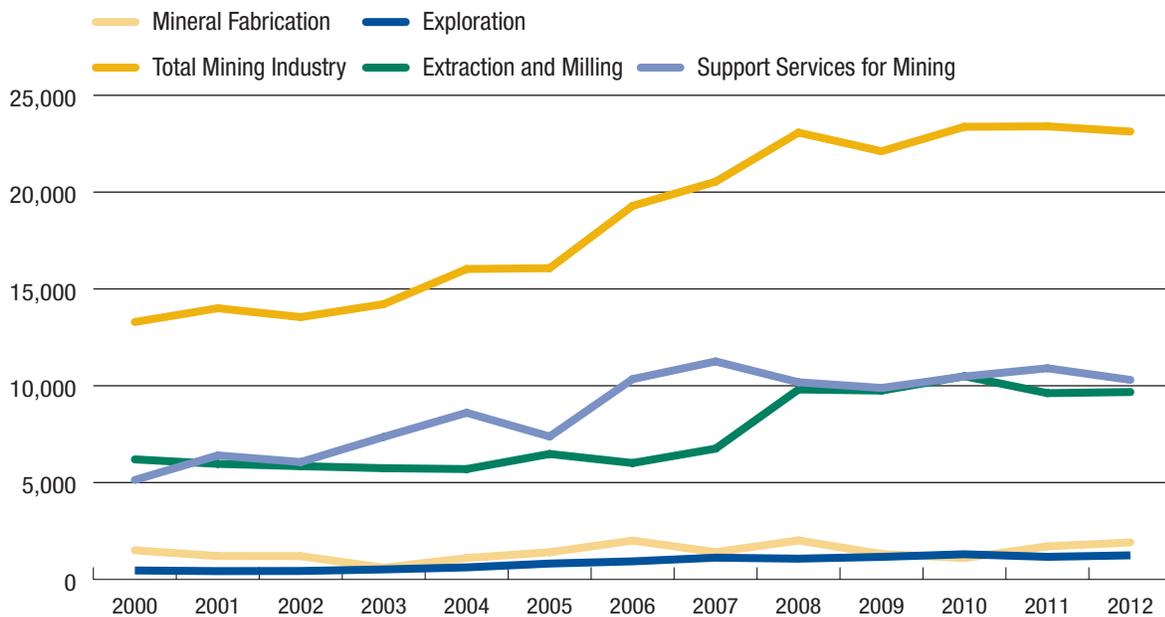
Source: Mining Industry Human Resources Council; Statistics Canada, 2014

As shown in Figure 9, 45 per cent of the total 2013 mining labour force in Saskatchewan was employed in extraction and milling; 42 per cent in mining support services and only 6 and 8 per cent in exploration and mineral fabrication, respectively. Compared to the Canadian mining workforce, Saskatchewan has a much higher proportion of workers employed in extraction/milling and support services for mining and a much smaller proportion of the mining workforce is engaged in exploration and mineral fabrication activities.

FIGURE 9

Proportion of Labour Force by Sub-sector, Saskatchewan and Canada, 2013
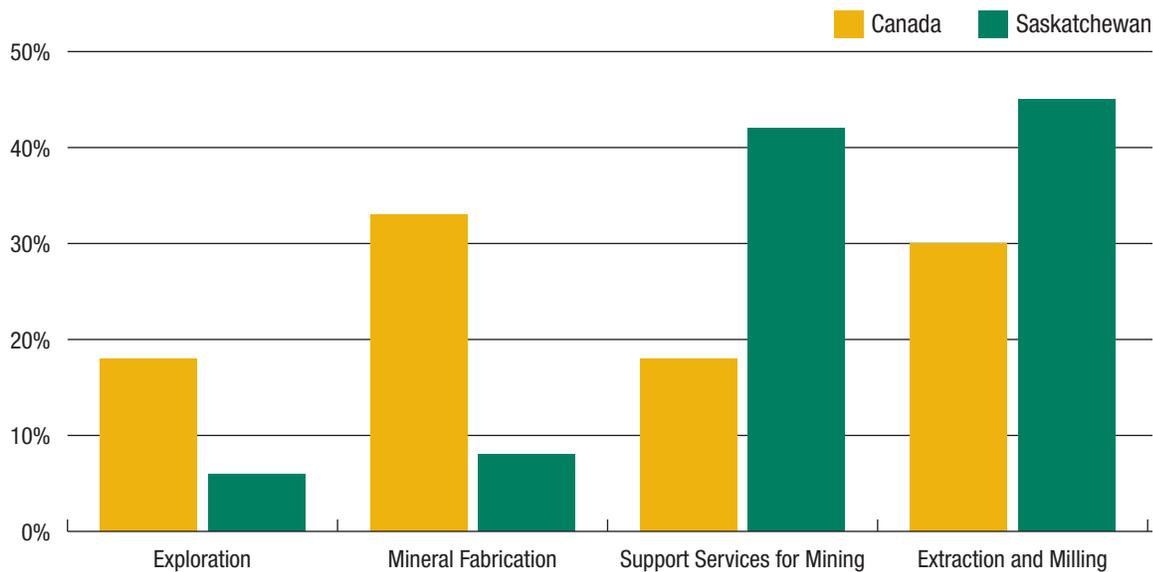
Source: Mining Industry Human Resources Council; Statistics Canada, 2014

Demographic Profile

Age Structure

Figure 10 compares the age profile of the mining labour forces in Saskatchewan and Canada overall. This data indicates that Saskatchewan miners are relatively younger, as 43 per cent of the Saskatchewan mining labour force is under the age of 35 years compared to 34 per cent in the Canadian mining industry. Furthermore, data from the *Saskatchewan Employer LMI Survey* show that the average age of employees in mining is 40.2 years. This younger workforce brings new human resources challenges for workforce planners: even if the younger workers are highly skilled, they still lack the depth of experience and workplace insight of their predecessors, leaving a potential gap in leadership.

Although Saskatchewan's mining labour force is comparatively young, the retirement eligibility and aging of the workforce is still a concern. Twelve per cent of Saskatchewan's mining labour force is over the age of 55, implying that, in the coming decade, this cohort will be entering their retirement years. In 2013, the average age at retirement for private sector employees in Canada was 63.7 years, whereas data collected through the *Saskatchewan Employer LMI Survey* show that the average age at retirement is 61 years, a full two-and-a-half years younger than the Canadian average. Respondents indicated that approximately 9 per cent of their full time workforce will be eligible to retire in the next three to five years, suggesting that Saskatchewan's mining industry will need to address the challenge of a less experienced workforce, in addition to skills and labour shortages in key occupation groups. MiHR's model projects that the annual retirement rate in Saskatchewan's mining industry will rise from about 2.16 per cent in 2013 to 2.5 per cent in 2024 – an increase of almost 16 per cent.

FIGURE 10
Age Group Distributions in the Saskatchewan Mining Workforce, 2011

Legend: Canadian Mining Labour Force | Saskatchewan Mining Labour Force

Age Group	Canadian Mining Labour Force	Saskatchewan Mining Labour Force
15 to 24 years	10%	14%
25 to 34 years	24%	29%
35 to 44 years	23%	22%
45 to 54 years	27%	22%
55 to 64 years	14%	12%
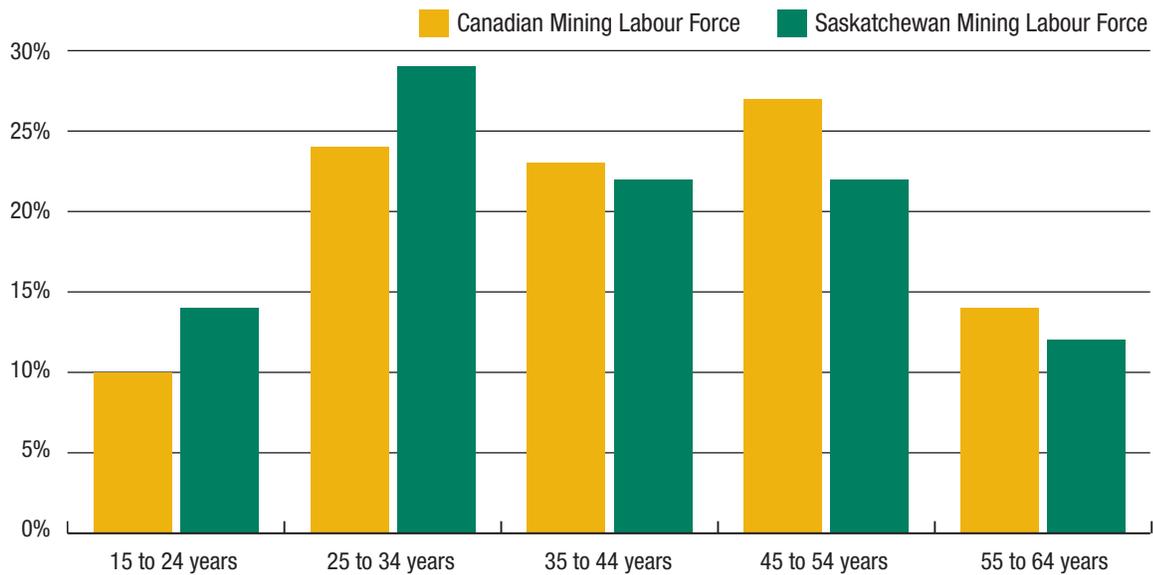
Source: Mining Industry Human Resources Council; Statistics Canada, 2014

Education

Saskatchewan's mining industry is one of the leading employers of highly skilled workers and technological advancements are likely to continue to increase demand for these individuals. As illustrated in Figure 11, the educational profile in the mining sector is different than the overall labour force in Saskatchewan. Twenty-three per cent of the mining labour force holds an apprenticeship or other trades certificate or diploma compared to only 14 per cent in the overall workforce. Conversely, a lower proportion of the mining workforce has university level education compared to the overall workforce in Saskatchewan.

FIGURE 11

Proportion of Mining Labour Force, by Highest Level of Educational Attainment,[7] 2011
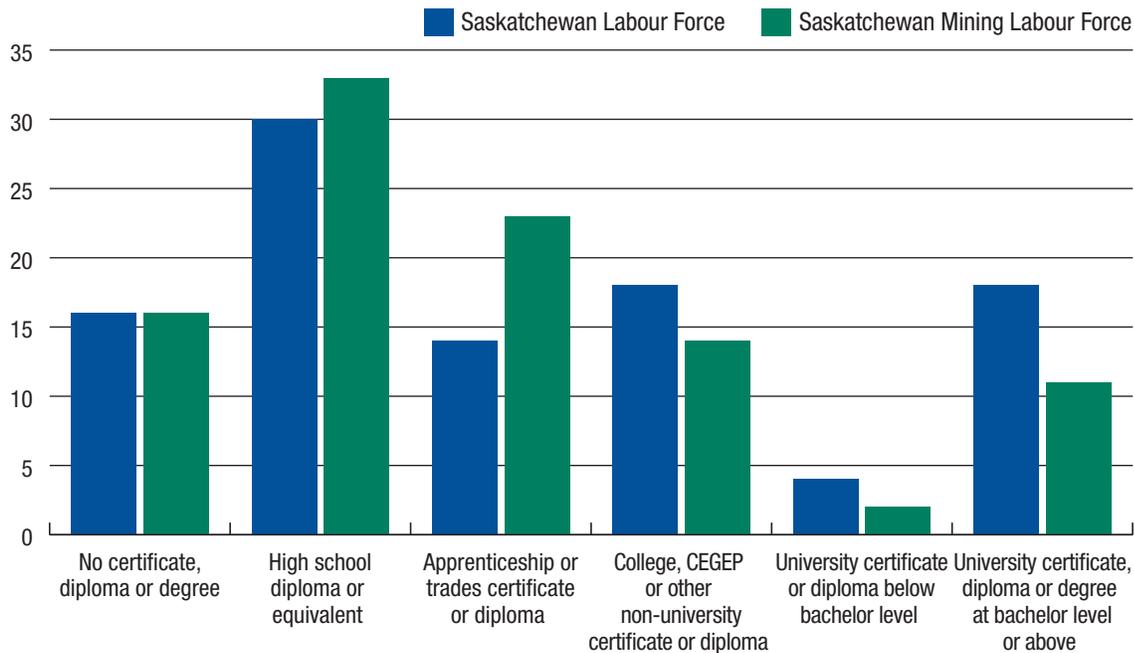
Source: Mining Industry Human Resources Council; Statistics Canada, 2014

Diversity

A diverse labour pool provides strength to any competitive industry; that is, an employers' ability to draw from a wide range of talented individuals can be an advantage. People from different backgrounds offer unique abilities and perspectives that can drive creativity and innovation. Moreover, in the presence of a skills shortage, mining employers may seek to access workers from underutilized pools of labour such as immigrants, women and Aboriginal peoples, to help address their long-term hiring challenges.

Figure 12 indicates the proportion of women, immigrants and Aboriginal peoples in the Saskatchewan mining labour force compared with the total labour force in the province. The figure shows that, compared to the general workforce, women and immigrants are underrepresented in mining. Whereas women make up 47 per cent of the total labour force in the province, they occupy only 14 per cent of the jobs in mining. Only 4 per cent of Saskatchewan's mining labour force are immigrants, compared to 7 per cent in the province's workforce. In contrast, Aboriginal peoples are as visible in the mining industry as in the general labour force, making up approximately 10 per cent of the workforce.

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7   Note: Statistics Canada defines "Other trades certificates or diplomas" to include pre-employment or vocational certificates and diplomas which are awarded after brief (less than two years) trade programs completed at community colleges, institutes of technology, vocational centres, and similar institutions. This category does not include two-year technician or technology diplomas.

FIGURE 12

Participation of Aboriginal Peoples, Immigrants and Women, 2011
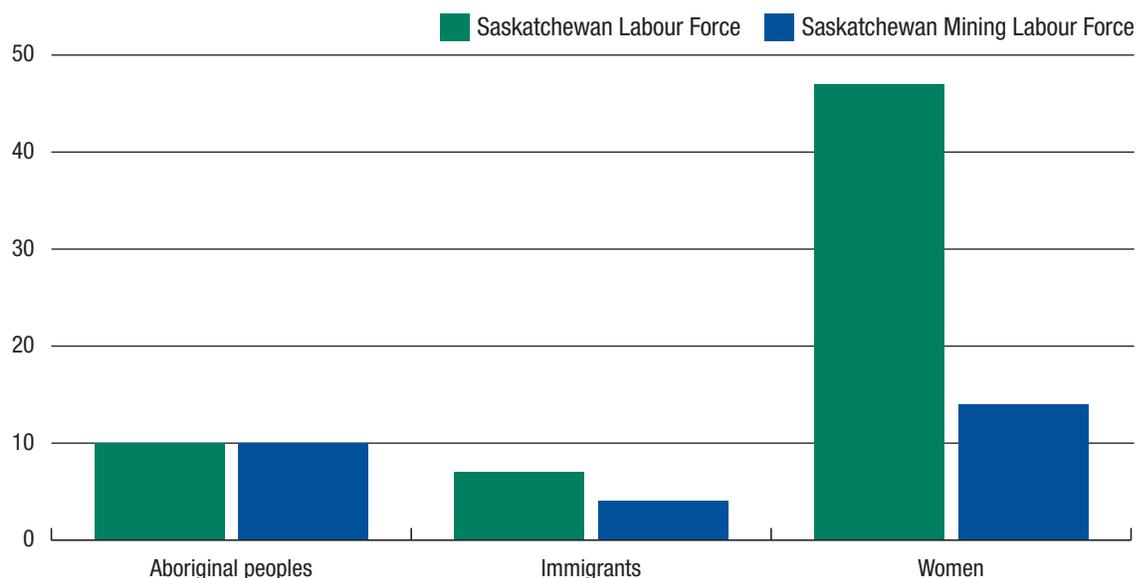
Source: Mining Industry Human Resources Council; Statistics Canada, 2014

Aboriginal Peoples

While Aboriginal peoples are not underrepresented in the mining workforce, there is still room for improvement. According to Statistics Canada's *2011Census*, 15.6 per cent of Saskatchewan's population identify as Aboriginal,[8] a proportion that is expected to continue to grow over the next decade. Furthermore, 100 per cent of the respondents to *Saskatchewan Employer LMI Survey* agreed that Aboriginal peoples are an important part of the solution to meeting the industry's human resources challenges. Figure 13 shows the responses of Saskatchewan mining employers when asked to rank factors that contribute to the "employability" of Aboriginal peoples in the industry.

Almost 50 per cent of survey participants stated that "level of formal education" is very important in facilitating the employment of Aboriginal peoples in the industry, whereas 10 per cent indicated it is not a significant factor. Survey responses related to mining-specific technical skills were mixed. While 40 per cent of the respondents agreed that mining-specific skills are a very important facilitator for Aboriginal employment in mining, approximately 30 per cent of respondents indicated that it is not significantly important. One hundred per cent of respondents indicate that the work readiness and essential skills levels of Aboriginal peoples is the single most important indicator for facilitating their employment in the mining industry.

When asked about the use of flexible scheduling to accommodate traditional lifestyles and culture, 50 per cent of the respondents indicated that it is very important while 20 per cent said it was neutral as a factor in facilitating the employment of Aboriginal peoples. Workplace culture was ranked as very important by 70 per cent of survey respondents. Half of the survey participants felt that awareness of the industry and of careers in mining were very important factors is facilitating the employment of Aboriginal peoples.

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8   www12.statcan.gc.ca/nhs-enm/2011/as-sa/99-011-x/2011001/tbl/tbl02-eng.cfm

FIGURE 13

Factors that Facilitate the Employment of Aboriginal Peoples in Saskatchewan Mining Industry, 2014
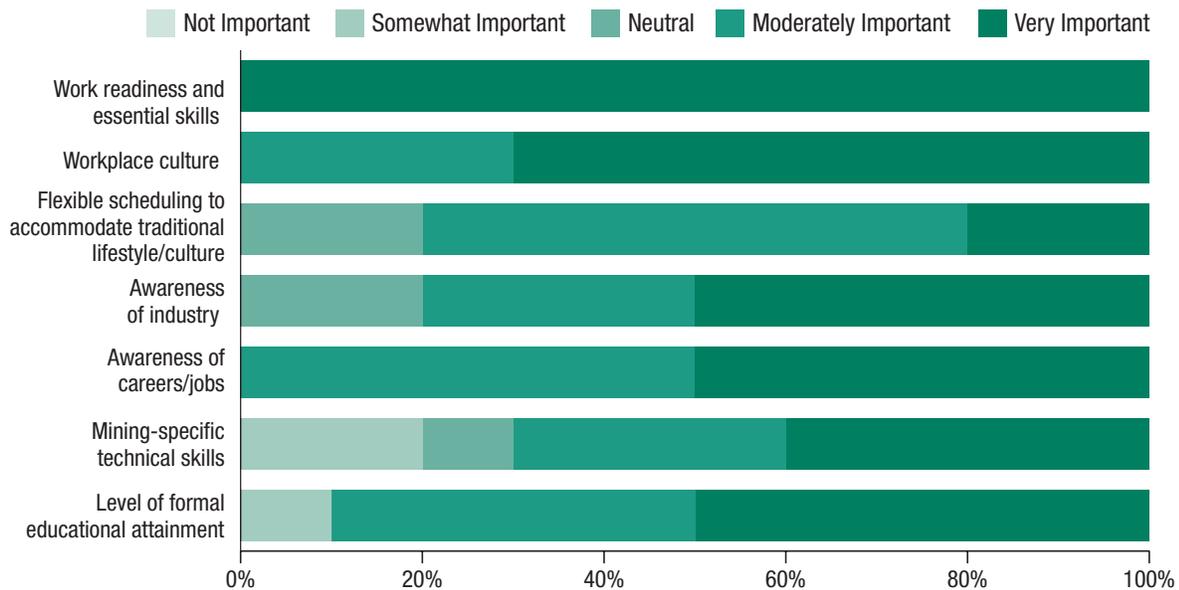
Source: Mining Industry Human Resources Council, Saskatchewan Employer LMI Survey, 2014

As shown in Figure 14, when compared to both the general labour force and the mining industry workforce as a whole, a higher proportion of Aboriginal workers in the industry do not hold a diploma, degree or certificate, confirming that lack of formal education may not be a major road block to participation in the mining sector. Nevertheless, this factor can have an influence on the ability of Aboriginal workers to attain jobs for which the educational and skills requirements are higher, such as *Professional and Physical Science Occupations* and *Technician/Technologist Occupations*. Furthermore, Figure 15 shows a concentration of Aboriginal peoples in the *Trades and Production Occupations* and as well as *Support Worker Occupations*, where on-the-job training tends to dominate the skills development strategies and shape career development and advancement opportunities. Data from Statistics Canada and the *Saskatchewan Employers LMI survey* also indicates that there are lower numbers of Aboriginal workers in the supervisory and managerial roles. Research has shown that higher levels of education and years of experience are one of the major drivers of career progression. This suggests a need for programs such as continuing education, on the job training and leadership/mentorship programs for Aboriginal workers to support career progression.[9]

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9   In 2015/16, MiHR will be conducting more detailed research on factors that influence Aboriginal participation in the mining industry workforce.

FIGURE 14

Labour Force Participation by Highest Level of Educational Attainment, Aboriginal Peoples, Mining Labour Force and Total Labour Force, Saskatchewan, 2013
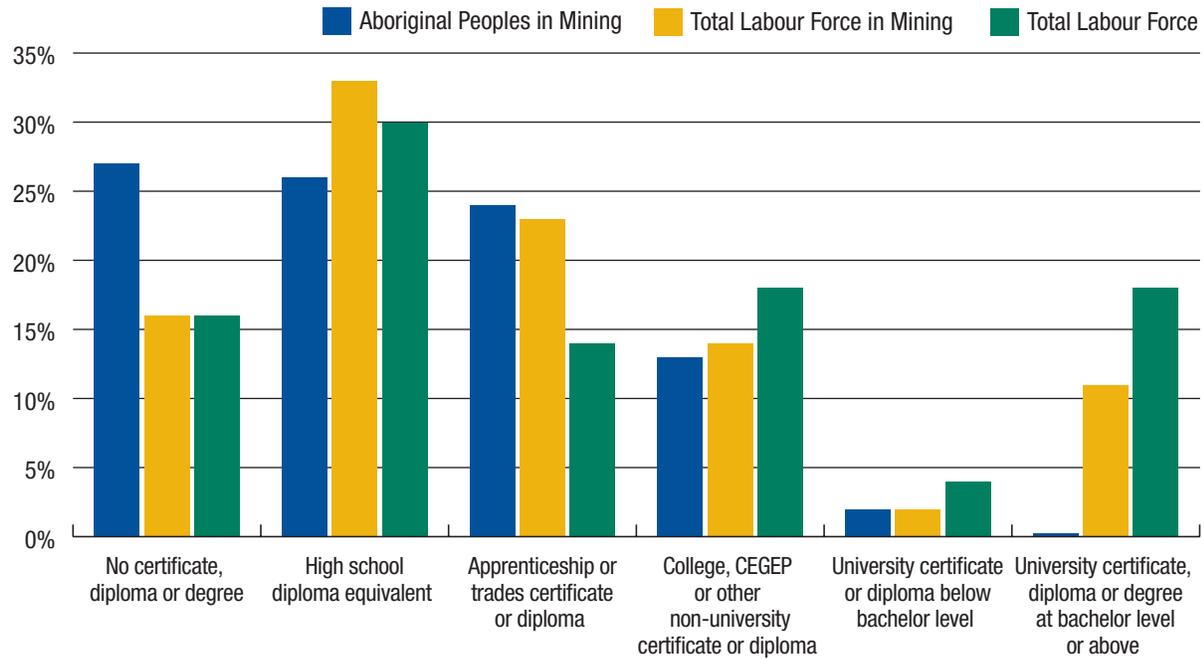
Source: Mining Industry Human Resources Council; Statistics Canada, 2014

FIGURE 15

Proportion of Aboriginal Peoples in Selected Mining Occupations, Saskatchewan, 2014
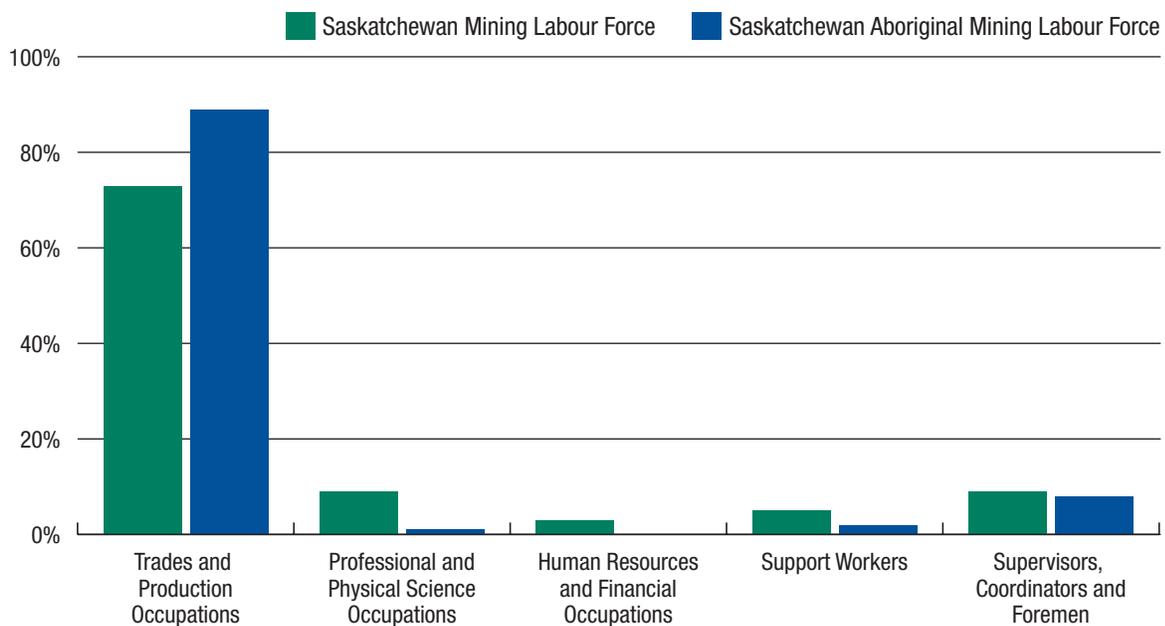
Source: Mining Industry Human Resources Council; Statistics Canada, 2014

Women

The participation of women in the mining workforce is low compared to the provincial average, where women make up 47 per cent of the total labour force. At 14 per cent, the representation of women in the Saskatchewan mining industry is one of the lowest among resource sectors. Traditionally mining is viewed as a male-dominated industry and stereotypical perceptions of the industry are still among the factors believed to play a role in reduced female participation. Other contributing factors may include among others, workplace culture, as well as a lack of female role models, and lack of support systems for women.

Data from Statistics Canada shown in Figure 16 indicates that 38 per cent of the female mining workforce works in support services, 22 per cent in trades and production followed by 17 per cent in *Human Resources and Financial* occupations.

FIGURE 16
Gender and Employment in Select Mining Occupations in Saskatchewan's Mining Industry, 2014
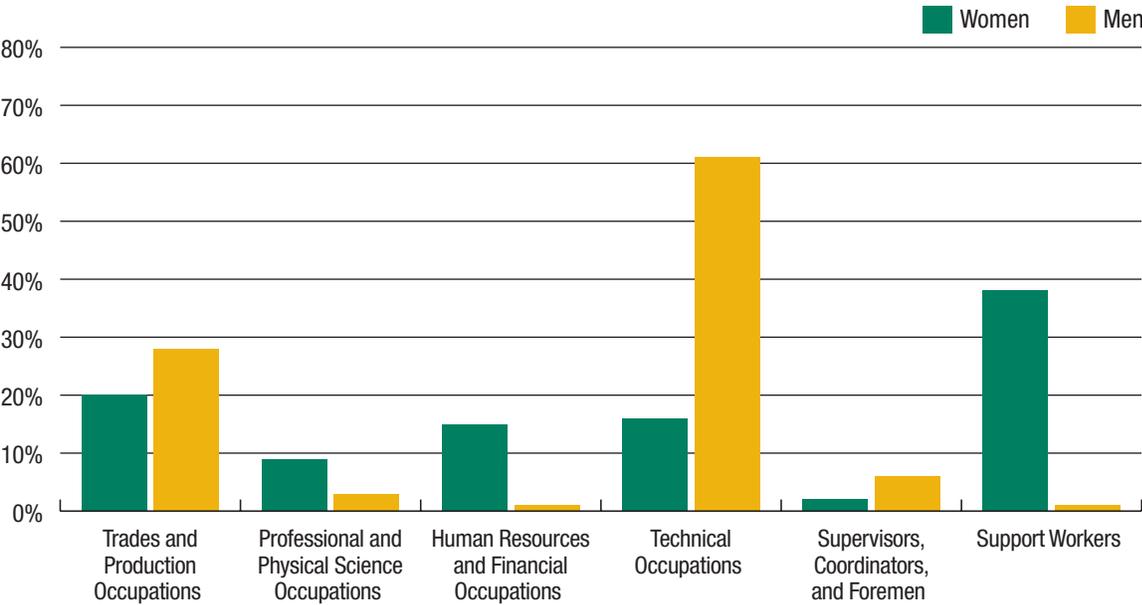
Source: Mining Industry Human Resources Council; Statistics Canada, 2014

Immigrants

Immigrants account for less than 5 per cent of the mining labour force in Saskatchewan; those who do work in mining tend to occupy positions that require higher levels of education. Figure 17 indicates that a greater percentage of immigrants working in mining have a post-secondary education compared to the mining labour force as a whole.

FIGURE 17

Highest Level of Educational Attainment, Saskatchewan Mining Industry, Immigrants and Total Labour Force, 2011
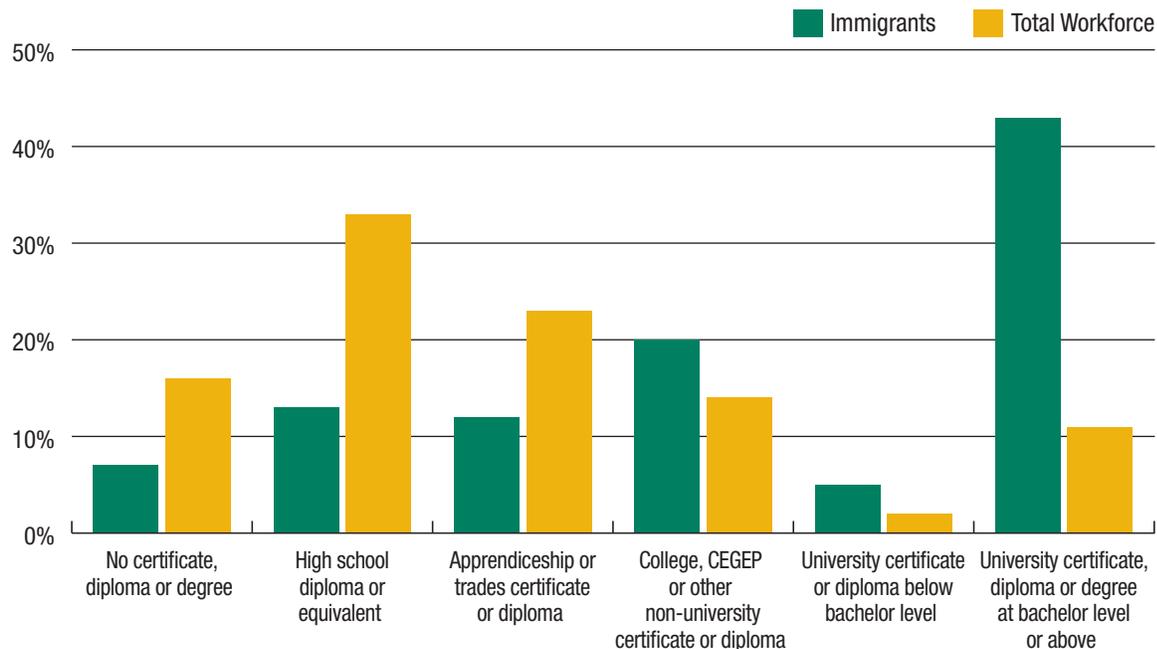
Source: Mining Industry Human Resources Council; Statistics Canada, 2011

The *Saskatchewan Employer LMI survey* shows that in Saskatchewan most of the immigrants in the sector are employed in technical, scientific and management roles. They are concentrated in engineering and technology occupations along with project manager positions.

Mobility and the Commuter Workforce

Saskatchewan's mining industry employs approximately 900 workers who live outside the province. In contrast, Saskatchewan is home to some 1,400 people who work in mining in other provinces, making Saskatchewan a net exporter of almost 500 mining sector workers in 2011. The majority of employees who commute to Saskatchewan to work in the mining industry but live elsewhere come from Alberta and Manitoba, provinces which share a border with Saskatchewan. Almost half of these workers are employed in extraction and milling and 30 per cent are working in support services in mining and oil and gas extraction, primarily as contractors. Amongst Saskatchewan residents who work in the mining industry in other provinces, 69 per cent are employed in Alberta, with a smaller proportion commuting to Manitoba. Fifty-nine per cent of Saskatchewan's commuting workers are contractors working in the mining support services (including mining, oil and gas), with a much smaller proportion working in extraction and milling and mineral fabrication – 15 and 14 per cent, respectively.

4   Hiring Requirements Forecast

MiHR's forecast of hiring requirements estimates the cumulative number of workers that the industry will need to hire over the next decade. These estimates are strongly influenced by the prevailing economic and demographic trends and activities, as discussed in previous sections of this report. The cumulative hiring forecasts presented here cover the period 2014–2024 and provides an update of the 2011 *Saskatchewan Mining Industry Hiring Requirement and Talent Availability Forecasts* report.

MiHR's employment and hiring requirements forecasts are based on an econometric model that relates changes in economic drivers such as commodity prices, mining GDP, exchange rates, and domestic investment to changes in total employment in the mining sector. For the purposes of this report, the scope of the forecast was expanded to include estimates for exploration, extraction and milling, mineral fabrication and mining support services. Furthermore, to understand the regional variations in the local labour market, the hiring requirement forecast for the extraction/milling sector are further broken down by geographical regions (North versus South).

Data from Statistics Canada, the World Bank, Natural Resources Canada and *Saskatchewan Employer LMI Survey* and the Saskatchewan Mining Association are key inputs in the model. Hiring requirements projected in this report represent direct employment in the mining industry. Indirect or secondary employment due to mining activities is not included in this report.

MiHR's hiring requirement forecasts combine net change in employment due to industry growth with replacement requirements from retirement and other separations.

Net Change in Employment

Total employment in the mining industry is expected to register modest gains or remain stable over the forecast period, depending on the scenario. Projected changes are fuelled by economic uncertainty in the early part of the forecast and gains in labour productivity in later years.

Retirement Rates

The decision to retire is a complex process dependent on many different socio-economic variables and personal behaviours. MiHR's retirement model uses demographics and participation rates for various age groups, as well as levels of educational attainment, to predict general retirement rates.

Other Separations

Attrition from the labour pool occurs for a variety of reasons. In MiHR's model, the category of "other separations" captures permanent leaves of absence that are not related to retirement, such as movement to other sectors or other countries, and injury/mortality. For Saskatchewan, the model uses a non-retirement separation rate of 4 per cent each year, a rate that was validated by the responses in the *(Saskatchewan Employer LMI Survey)*.

Cumulative Hiring Requirements Forecast

Table 1 shows the cumulative hiring requirements for the Saskatchewan mining industry to 2024. The baseline scenario in the hiring requirement forecasts depicts the current economic conditions in Saskatchewan and envisions modest changes to the underlying assumptions about the future of the industry. The expansionary scenario assumes greater-than-expected growth, while the contractionary scenario assumes lower-than expected growth. Both expansionary and contractionary scenarios take into account historical economic trends as well as consensus forecasts of future trends, and they are further supported by intelligence from a variety of sources including the World Bank, Natural Resources Canada, the Conference Board of Canada and *Saskatchewan Employer LMI Survey*.

In a baseline scenario, Saskatchewan's mining industry will need to hire 12,990 workers over the coming decade. Under this scenario, the hiring requirement is comprised of a slight contraction of the total workforce by 520 jobs but this is counterbalanced by replacement hiring requirements from both retirement and non-retirement exits from the workforce. In the expansionary scenario, the hiring requirements are driven by the creation of 3,350 new jobs in addition to significant replacement hiring requirements, leading to a total hiring requirement of 18,450 workers. Under the contractionary scenario, MiHR forecasts the need to hire nearly 8,675 workers, despite the need to shed 3,660 workers.

TABLE 1

Cumulative Hiring Requirements Forecast, by Scenario – 2024

	NET CHANGE IN EMPLOYMENT	REPLACEMENT REQUIREMENTS		CUMULATIVE HIRING REQUIREMENTS
		RETIREMENT	NON-RETIREMENT SEPARATION	
Contractionary	-3,660	3,400	8,950	8,675
Baseline	-520	3,640	9,870	12,990
Expansionary	3,350	4,090	11,020	18,450

Source: Mining Industry Human Resources Council, 2014

As illustrated in Table 1, non-retirement separation – workers who leave the mining workforce for reasons other than retirement – is expected be one of the major drivers of cumulative hiring requirements over the forecast period. This type of attrition occurs when an individual decides to pursue a career in another industry, moves into a mining job outside the province or leaves the labour market due to illness or death. Data from the *Saskatchewan Employer LMI Survey* indicates that different occupational categories have different non-retirement separation rates.[10] According to respondents, non-retirement separation is less than one per cent among *Supervisors, Coordinators and Foremen* and can be as high as 7 per cent for the *Human Resources and Financial* occupations. The non-retirement separation rate for *Professional and Physical Science* occupations was reported at 2 per cent. Overall, the average non-retirement separation rate as reported by Saskatchewan employers is 4 per cent. Occupations that are not mining-specific such as *Human Resources and Financial Occupations* experience higher non-retirement separation compared to occupations such as *Supervisors, Coordinators and Foremen* which require significant industry-specific experience and/or training.

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10 In the *Saskatchewan employer LMI survey*, participants were asked to identify voluntary turnover rate based on broader occupational categories. According to MiHR's definition, voluntary turnover rate equates to non-retirement separation rate.

Figure 18 illustrates the year-over-year hiring requirements for the Saskatchewan mining industry under a baseline scenario between 2014 and 2024. In the early part of the forecast, projected net job losses are due to the uncertain economic conditions and volatility in commodity prices. By the end of the forecast period, the bulk of the hiring requirements stem from the need to replace workers retiring or leaving the industry for other reasons.

FIGURE 18

Annual Hiring Requirements Forecasts, Baseline Scenario 2014–2024
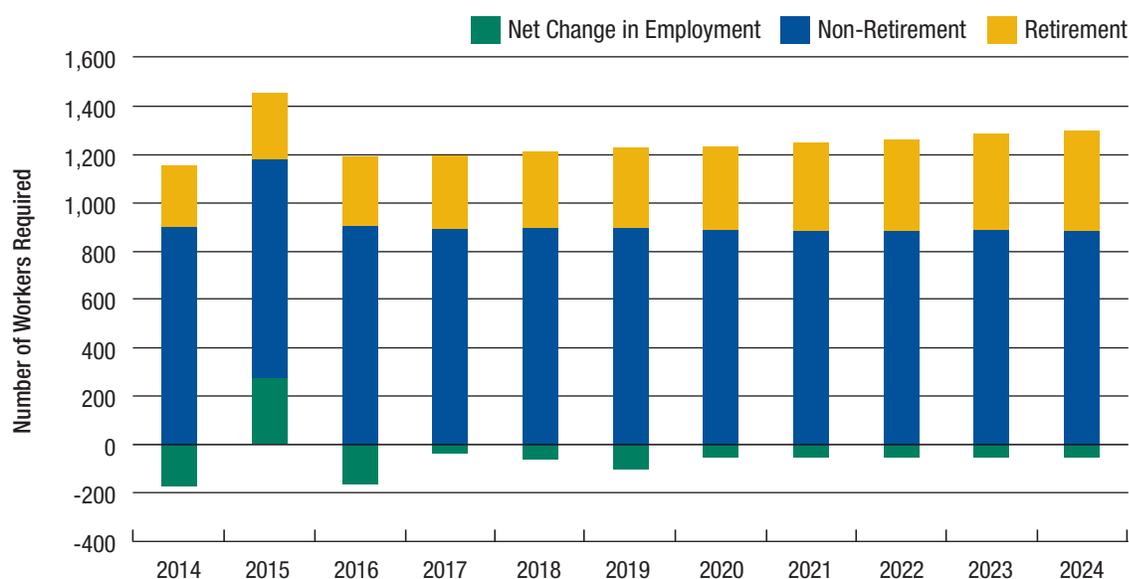
Source: Mining Industry Human Resource Council, 2014

Table 2 summarizes the cumulative hiring requirements in 2016, 2019 and 2024, under MiHR's contractionary, baseline and expansionary scenarios. The baseline scenario projects the need to hire 6,900 workers by 2019, due to changes in economic factors, increased retirements and other separations from the industry. If economic conditions are better than expected in the baseline scenario, and if planned development projects move into production, (i.e., the expansionary scenario), the total cumulative hiring requirements could grow to 10,400 workers by 2019.

TABLE 2

Cumulative Hiring Requirements Forecast, by Scenario – 2016, 2019, 2024

CUMULATIVE HIRING REQUIREMENTS			
	2016	**2019**	**2024**
Contractionary	2,140	3,970	8,670
Baseline	3,460	6,900	12,990
Expansionary	5,450	10,400	18,450

Source: Mining Industry Human Resources Council, 2014

Forecasts by Sector

Hiring requirements forecasts are also broken down for four industry sectors- minerals extraction/milling, mineral exploration, mineral fabrication and mining support services. These forecasts illustrate each sector's unique labour market characteristics as well as their separate responses to forecasted conditions.

Table 3 shows the cumulative hiring requirements for each mining industry sector under a baseline scenario. Extraction and milling has the greatest hiring requirements, despite the loss of 120 jobs, owing to significant non-retirement separation. While total employment in exploration decreases, with 317 jobs being lost over the forecast period, replacement needs outweigh this contraction in the total employment. The projected decrease in total employment in the exploration sector results from a softening of commodity prices and challenges related to raising capital in the face of uncertain economic conditions in the near-term.

TABLE 3

Cumulative Hiring Requirements Forecasts, by Industry Sector, Baseline Scenario – 2024

	EMPLOYMENT IN 2014	NET CHANGE IN EMPLOYMENT	REPLACEMENT REQUIREMENTS		CUMULATIVE HIRING REQUIREMENTS
			RETIREMENT	NON-RETIREMENT	
Mineral Exploration	1,218	-317	168	460	311
Extraction and Milling	9,813	-119	1,655	4,481	6,017
Mineral Fabrication	1,673	97	284	767	1,148
Mining Support Services	9,815	-185	1,535	4,164	5,515

Source: Mining Industry Human Resources Council, 2014

Hiring Requirement Forecasts by Region

To understand the regional variations in the labour market, MiHR has assessed hiring requirements by region (North and South Saskatchewan). To produce the regional forecasts, MiHR geo-coded producing mines in Saskatchewan to their respective regions using Statistics Canada's definition of North and South regions of Saskatchewan (referred to as Economic Regions). The regional forecasts in Table 4, therefore, pertain only to employment in extraction/milling and do not reflect exploration, support services or minerals fabrication employment.

Northern Saskatchewan has a high concentration of uranium mines, whereas southern Saskatchewan is home to most of the province's many potash deposits. Under the baseline scenario, the extraction/milling sector in southern Saskatchewan will require 3,672 workers, whereas northern Saskatchewan will require 2,355. Again, the bulk of these cumulative hiring requirements come from the need to replace workers.

TABLE 4

Cumulative Hiring Requirement Forecasts, by Region, Baseline Scenario – 2024

REGIONS	TOTAL EMPLOYMENT 2014	CHANGE IN EMPLOYMENT	REPLACEMENT REQUIREMENT		CUMULATIVE HIRING REQUIREMENTS
			RETIREMENT	NON-RETIREMENT	
South	5,949	-70	1,010	2,740	3,672
North	3,863	-40	650	1,750	2,355

Source: Mining Industry Human Resource Council, 2014

Occupational Hiring Requirements Forecast

MiHR's occupational forecast in 2011 was estimated for 71 key mining industry occupations.[11] These occupational forecasts include hiring requirements for an additional four occupations – which include *Information Systems Analysts and Consultants, Industrial Instrument Technicians and Mechanics, Non-destructive Testers and Inspection Technicians* and *Power Engineers*. The decision to include these additional occupations was taken after an extensive job mapping exercise and feedback from Saskatchewan's mining stakeholders. In addition, at the request of the Saskatchewan Mining Association, MiHR provides a separate forecast for Environmental Engineers, which are normally reported as part of the Civil Engineering group.

Table 5 provides estimates of cumulative hiring requirements over a 10-year period under a baseline scenario for broad occupational categories, for each industry sector.

TABLE 5

Cumulative Hiring Requirement Forecasts, by Broad Occupational Category, Baseline Scenario – 2024

BASELINE	EXTRACTION/ MILLING	MINERAL FABRICATION	SUPPORT SERVICES	EXPLORATION
Trades and Production Occupations	2,676	465	1,215	33
Professional and Physical Science Occupations	916	116	308	100
Human Resources and Financial Occupations	226	24	62	3
Support Workers	186	58	256	15
Technical Occupations	597	333	326	74
Supervisors, Coordinators and Foremen	662	54	274	5
All Other Occupations	894	146	2,839	126
Total	6,017	1,148	5,515	311

Source: Mining Industry Human Resources Council, 2014

A complete listing of the cumulative hiring forecasts for each of the 71 occupations over a 10-year horizon is found in Chapter 6.

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11 Appendix D contains a detailed list of the occupations.

5 Available Talent

Available talent describes the potential talent pool for the mining industry to fill positions and offset their hiring requirements. The hiring requirement forecast estimates the number of hires the industry will need to make in order to keep activities at a competitive level over the next 10 years. This 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 workforce that, under existing conditions, is expected to be available to fill those positions.

MiHR has developed a model of labour supply that projects the amount of talent that will become available to fill positions in specific occupations over the forecast horizon. The forecast is based on historical patterns and assumes the existing state of affairs will continue through the forecast horizon. Thus, by not making assumptions about strategies and policies (for example development of new training programs) yet to be introduced, the available talent forecast exposes labour pressures as they are expected to evolve based on conditions that exist today. For each occupation, the model estimates the pool (supply) of new workers that will become available to all industries between 2014 and 2024 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 Appendix C.

Table 6 shows the cumulative available talent for all 71 occupations over a two-, five-, and 10-year time horizon. The forecast shows that there will be approximately 60,800 new entrants into Saskatchewan's labour force in the selected 71 occupations over the next 10 years. Of these new entrants, the mining industry can expect to attract 6,895 workers, assuming the sector's historical share remains the same moving forward.

TABLE 6

Cumulative Available Talent, All Sectors and Mining, Saskatchewan, 71 Occupations – 2016, 2019, 2024

CUMULATIVE AVAILABLE TALENT	2016	2019	2024
Total entrants for 71 occupations, all industry sectors	12,882	31,102	60,833
Mining's share of entrants for 71 occupations (assuming the historical rate for each occupation per year)	1,456	3,491	6,895

Source: Mining Industry Human Resources Council, 2014

Available Talent by Occupation

Table 7 shows the cumulative available talent over the next 10 years for all industries by broad occupational category. In addition, the table shows the proportion (per cent) of this available talent that the mining industry has historically attracted. The historical share of available talent in mining is calculated using data from the *2011 Census* and it indicates the proportion of workers in those occupations that have historically been employed by Saskatchewan's mining sector. This is used to calculate the number of workers that are available to address hiring needs in the industry.

TABLE 7

Cumulative Available Talent by Broad Occupational Categories, Saskatchewan – 2024

	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)
Designated Trades	1,660	13,225	13%
Production Occupations	2,890	18,670	15%
Professional and Physical Science Occupations	741	5,200	14%
Human Resources and Financial Occupations	227	5,863	4%
Support Workers	313	10,125	3%
Technical Occupations	384	5,417	7%
Supervisors, Coordinators and Foremen	680	2,338	29%

Source: Mining Industry Human Resources Council, 2014

6 The Talent Gap

MiHR's gap analysis provides a side-by-side comparison of the hiring requirements and the available talent forecast for the selected 71 occupations. The nature of talent gaps varies among occupations. In some cases, there is a larger pool of new talent and the industry must strive to attract more new entrants from this pool into mining careers (i.e., carve out a larger slice of the pie). In other cases, there simply aren't enough people in the talent pool to meet the industry's needs, let alone the demands from other industries (i.e., there is a need to make the pie bigger). In all cases, the mining industry must strive to retain the workers it already employs and to make the best possible use of talent (e.g., through technology, innovation, improved productivity, and appropriate skills and knowledge development).

A talent gap can also have a different impact, depending on the occupation. This is especially true for jobs that are highly specialized and require years of training and workplace experience or for those occupations that have a specialized but transferable skills set. A seemingly small gap can pose a significant challenge when there are only a few people with the specialized skills and experience to perform the role. The analysis presented in this report presents gaps in terms of raw numbers, but this analysis should be balanced with the awareness that not all the illustrated talent gaps are mission-critical or high-concern gaps. Even the absence of a gap does not necessarily indicate that employers are not experiencing other challenges in terms of recruitment and retention due to other labour market friction.

Table 8 provides assesses the potential talent gap for the 71 selected occupations under MiHR`s baseline scenario. Understanding the gaps between hiring requirements and available talent is important, as it can inform the development of targeted strategies and initiatives to fill the gaps. Given that the available talent forecast is an occupation-based forecast, an occupation-level hiring requirements forecast is used to provide an appropriate comparison.

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. These columns can be used to gauge the degree that the industry needs to change its historical share in order to meet its future hiring needs. For example, *Supervisors, Coordinators and Foremen* have an available talent forecast of 2,339 for all industries; of that number, the mining industry is projected to attract 29 per cent based on historical patterns, yet the industry is expected to need 43 per cent of what is available to all industries.

Table 8 shows that, among the occupational categories, *Technical Occupations* collectively exhibit the largest gap between hiring requirements and available talent for Saskatchewan. The occupations in these categories are expected to face a greater challenge as available talent will not meet the predicted hiring requirements.

TABLE 8

Occupational Breakdown of Cumulative Hiring Requirements and Available Talent, Saskatchewan, Baseline Scenario – 2024

	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
PRODUCTION OCCUPATIONS						
Underground production and development miners	840	805	-35	860	93%	
Transport truck drivers	500	425	-75	5,645	8%	
Heavy equipment operators (except crane)	485	470	-15	2,700	17%	
Heavy-duty equipment mechanics	300	335	35	1,770	19%	
Mine labourers	245	240	-5	295	83%	
Material handlers	135	155	20	2,740	6%	
Construction trades helpers and labourers	115	110	-5	3,775	3%	
Underground mine service and support workers	90	85	-5	100	85%	
Machine operators, mineral and metal processing	80	85	5	135	63%	
Central control and process operators, mineral and metal processing	80	115	35	140	79%	
Labourers in mineral and metal processing	35	30	-5	105	29%	
Drillers and blasters – surface mining, quarrying and construction	30	30	0	95	31%	
Other trades helpers and labourers	15	5	-10	310	2%	
Total	2,950	2,890	-60	18,670	15%	16%
DESIGNATED TRADES						
Carpenters	25	30	5	4,145	1%	
Plumbers (C)[12]	45	30	-15	1,330	2%	
Crane operators	35	30	-5	230	13%	
Steamfitters, pipefitters and sprinkler system installers	85	100	15	620	16%	
Power engineers and power systems operators	90	65	-25	655	10%	

12 (C) means that it is a Compulsory Trade in Saskatchewan. It should be noted that Compulsory Trades differ from one province to another.

	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
DESIGNATED TRADES (CONT'D)						
Construction millwrights and industrial mechanics	480	480	0	1,345	36%	
Industrial electricians (C)	365	470	105	995	47%	
Welders and related machine operators	315	455	140	3,905	12%	
Total	1,440	1,660	220	13,225	13%	11%
PROFESSIONAL AND PHYSICAL SCIENCE OCCUPATIONS						
Mechanical engineers	245	110	-135	950	12%	
Electrical and electronics engineers	190	64	-126	807	8%	
Geoscientists and oceanographers	190	186	-4	425	44%	
Mining engineers	130	229	99	332	69%	
Biologists and related scientists	90	21	-69	817	3%	
Civil engineers	55	10	-45	793	1%	
Other professional engineers, n.e.c.	50	8	-42	104	7%	
Geological engineers	35	31	-4	87	36%	
Chemical engineers	30	10	-20	164	6%	
Metallurgical and materials engineers	25	0	-25	3	0%	
Industrial and manufacturing engineers	20	34	14	324	11%	
Environmental engineers	15	3	-12	236	1%	
Other professional occupations in physical sciences	10	15	5	24	63%	
Chemists	5	21	16	134	16%	
Total	1,111	742	-370	5,200	14%	21%
HUMAN RESOURCES AND FINANCIAL OCCUPATIONS						
Financial auditors and accountants	135	116	-19	2,988	4%	
Human resources managers	70	41	-29	544	8%	
Financial and investment analysts	65	30	-35	457	7%	
Financial managers	30	20	-10	984	2%	
Human resources professionals	15	20	5	890	2%	
Total	315	227	-85	5,863	4%	5%

	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
SUPPORT WORKERS						
Inspectors in public and environmental health and occupational health and safety	215	142	-73	854	17%	
Administrative assistants	130	58	-72	1,664	4%	
Non-destructive testers and inspection technicians	50	27	-23	169	16%	
Cooks	30	38	8	5,987	1%	
General office support workers	30	4	-26	426	1%	
Dispatchers	15	24	9	560	4%	
Production logistics coordinator	15	10	-5	217	5%	
Inspectors and testers, mineral and metal processing	10	5	-5	17	29%	
Engineering inspectors and regulatory officers	10	5	-5	35	15%	
Transportation route and crew schedulers	5	0	-5	41	0%	
Construction estimators	5	0	-5	155	0%	
Total	515	314	-201	10,125	3%	5%
TECHNICAL OCCUPATIONS						
Drafting technologists and technicians	315	25	-290	738	3%	
Civil engineering technologists and technicians	220	2	-218	252	1%	
Geological and mineral technologists and technicians	155	114	-41	268	43%	
Electrical and electronics engineering technologists and technicians	130	40	-90	968	4%	
Land surveyors	120	4	-116	245	2%	
Industrial instrument technicians and mechanics	95	91	-4	315	29%	
Chemical technologists and technicians	85	49	-36	485	10%	
Land survey technologists and technicians	55	4	-51	50	8%	
Mechanical engineering technologists and technicians	55	7	-48	128	5%	

	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 (CONT'D)						
Information systems analysts and consultants	35	36	1	1,353	3%	
Industrial engineering and manufacturing technologists and technicians	25	5	-20	266	2%	
Technical occupations in geomatics and meteorology	25	4	-21	85	5%	
Biological technologists and technicians	15	3	-12	264	1%	
Total	1,330	384	-946	5,418	7%	25%
SUPERVISORS, COORDINATORS, AND FOREMEN						
Supervisors, mining and quarrying	400	295	-105	323	91%	
Managers in natural resources production	310	276	-34	406	68%	
Construction managers	95	54	-41	1,051	5%	
Contractors and supervisors, pipefitting trades	65	0	-65	157	0%	
Engineering managers	60	11	-49	75	15%	
Supervisors, mineral and metal processing	50	22	-28	35	63%	
Contractors and supervisors, mechanic trades	15	22	7	291	8%	
Total	995	679	-316	2,339	29%	43%

Source: Mining Industry Human Resources Council, 2014

It is important to note that Table 8 indicates that some of the occupations that are traditionally associated with mining have a lower than expected value for mining's share of available talent. For example, mining's share of available talent for Mining Engineers is estimated as 69 per cent for Saskatchewan. There may be a variety of explanations for this including that some may be working in sectors other than mining, some may be working in sectors that are not captured in MiHR's current industry definition classification (for example oil and gas or construction). Furthermore, data for all of Canada shows no gaps between the hiring requirements and available talent for Mining Engineers, yet it is still among the top occupations identified by employers in the *Saskatchewan Employer LMI Survey* as difficult to hire. This apparent anomaly may be partially explained by high international demand for Mining Engineers (especially those trained at Canadian universities). Furthermore, recent data from Engineers Canada shows that the number of engineering undergraduate degrees awarded has increased by almost 25 percent since 2009 and that, Mining and Minerals Engineering is the most rapidly growing engineering discipline in Canada, with undergraduate enrolment up by over 51 percent between 2009 and 2013.

The following factors are important to consider when reviewing the forecasts presented in this report. As with any modelling and forecasting exercise, the predictive power[13] of the MiHR models will be influenced by two main factors: the reliability of the external forecasts used as explanatory variables (for example, World Bank forecasts of commodity prices) and changes in factors that underlie the various assumptions used to develop the model and its associated scenarios. While MiHR has an element of control over the second factor (i.e., can adjust the underlying assumptions around the three forecasting scenarios) there is little to no recourse in the face of rapidly changing global economic conditions, which can significantly impact the economic outlook around specific model inputs (prices, interest rates, labour productivity).

When comparing Table 8 with the forecasts from the 2011 "Saskatchewan Mining Industry Hiring Requirements and Talent Availability Forecasts[14]," there is a considerable change in the outlook for some occupations.

Some of the changes are the result of proactive policy measures. The Government of Saskatchewan has invested heavily in attracting skilled workers to the province. Statistics Canada captures data related to movers from other countries to Saskatchewan in the "external migrant category." External migrants moving to Saskatchewan have tripled from 2006 to 2011.[15] Similarly, inter-provincial migration (workers moving into Saskatchewan from other provinces) has increased by 65 per cent from 2006 to 2011. For example, the total available talent for all sectors for "inspectors in public and environmental health and occupational health and safety" increased to 854 in 2014 from 380 in 2011. A significant portion of this change in this specific occupation comes from increases in in-migration in that occupation.

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13 Appendix A contains a more thorough evaluation of the predictive power of MiHR's forecasting model by comparing the forecasts made in 2011 with the actual hiring numbers reported by Saskatchewan employers in the Saskatchewan Employer LMI survey in 2014.

14 Please refer to page 38-Table D1 (Saskatchewan Mining Industry Hiring Requirements and Talent Availability Forecasts 2011).

15 Statistics Canada, 2006 and 2011.

Increased investment in education and training programs has also contributed to anticipated new available talent. For example, the number of new entrants (overall increase from school leavers/graduates, immigrants, entrants from other provinces, etc.) in the occupation of industrial electrician has increased considerably between 2006 and 2011. Many of these new entrants are a result of an increase in school leavers. Data from the annual report *Saskatchewan Apprenticeship and Trade Certificate Commission* confirms an overall increase in the number of registered apprentices in the electrician trade; in 2011 there were 1,680 registered electrician apprentices in Saskatchewan, and in 2014 this number has increased to 2,127 – an increase of 26 per cent. In addition, immigration and inter-provincial migration has also contributed to the overall increase of the availability of industrial electricians in Saskatchewan.

The gap analysis reveals a few zeros in the "mining's share" column. Regional analysis of data on the basis of occupations and industry often results in data suppression. These zeros show that there was not enough data available to calculate mining's share. For example, mining's share of metallurgical and materials engineers appears to be zero in Saskatchewan whereas the cumulative hiring need is 25. There are insufficient data to calculate the talent availability and mining's share.

Replacing the baseline forecasts with the expansionary or contractionary forecasts for hiring requirements will alter the forecasts around gaps significantly. Table 10 shows calculated gaps in the baseline, expansionary and contractionary scenarios for the broad occupational groups. Skills shortages that may not appear significant in the short-term because of the current economic climate, could become a major concern for the industry, depending upon longer-term market outcomes. For example, under the baseline scenario, Table 9 shows a small surplus in *Trades and Production Occupations* (approximately 17 workers per year over the next 10 years). However, should the mining sector grow faster than anticipated over the coming decade, the gap between hiring requirements and available talent will expand rapidly, resulting in a shortage of 1,700 workers in this occupational group. Conversely, if the mining industry contracts significantly (contractionary scenario), MiHR's forecast shows an over-supply of *Trades and Production* workers, based only on the mining sector's needs. Again, it is important to note that the identification of these gaps refers specifically to the mining industry requirements only. It does not contain any information pertaining to the demand for these occupations from other industries.

TABLE 9
Gap Between Hiring Requirements and Available Talent Under Alternative Scenarios, 2014–2024

OCCUPATIONAL GROUP	GAP BETWEEN HIRING REQUIREMENTS AND AVAILABLE TALENT		
	CONTRACTIONARY SCENARIO	BASELINE SCENARIO	EXPANSIONARY SCENARIO
Trades and Production Occupations	1,625	160	-1,700
Professional and Physical Science Occupations	0	-370	-840
Human Resources and Financial Occupations	20	-85	-220
Support Workers	-30	-201	-420
Technical Occupations	-500	-946	-1,510
Supervisors, Coordinators, and Foremen	20	-308	-730
Total	1,135	-1,750	-5,420

Source: Mining Industry Human Resources Council, 2014

7   Mining Labour Market Trends and Recommendations

Saskatchewan weathered the global economic downturn very well, in large part due to its thriving mining industry. Despite the fact that potash prices have adjusted from their peak levels, the forecast and gap analysis presented in this report shows that the mining industry still faces significant HR challenges.

The mining labour market in Saskatchewan differs from other regions in the country. As a major producer of uranium and potash, Saskatchewan's extraction sector has very specific labour needs. The occupational analysis has shown *Technicians and Technologists* make up more than 10 per cent of the total hiring requirements in Saskatchewan's mining industry, compared to less than 3 per cent in Canada as a whole. MiHR's forecasting model also indicates that in the next 10 years, these Technical occupations will have a gap of over 900 workers, taking into account the available talent and mining's traditional ability to attract workers in these occupations. The analysis also shows that there are significant potential gaps in the *Professional and Physical Sciences and Supervisor, Coordinator and Foremen* occupational groups.

These key labour market gaps are being projected, assuming a baseline economic scenario. In addition, they assume that current partnerships between industry, education and government, especially the collaboration between the SMA and the IMII, continue to evolve, ensuring that post-secondary institutions are able to align training and education to the mining industry's specific labour market needs and career opportunities in Saskatchewan.

An integrated and strategic approach will be required in the long-term to build a skilled and sustainable mining labour force. In this section MiHR has outlined some of the recommendations that are a direct result of the research and shaped by consultation with industry stakeholders.

Increasing Workforce Diversity

Participation of Aboriginal Peoples

Despite the fact Aboriginal peoples are well-represented in Saskatchewan's mining workforce; there is still room for additional efforts to enhance both employment and advancement opportunities for this important talent pool. Many members of Aboriginal communities face challenges relating to academic qualifications, participation in the labour market, work-readiness skills and, in some cases, opportunities for advancement. The need for programs aimed at work readiness and essential skills development as well as workplace skills development and leadership training are amongst the highest priority areas, according to Saskatchewan employers. These initiatives will help to promote higher levels of participation in the general workforce and engagement and advancement within the mining industry, specifically.

MiHR's preliminary research results from approximately 300 mining sector employees suggest that there may be a need for more programs targeted specifically at issues around workplace culture and the experience of Aboriginal peoples as members of the mining workforce.[16]

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16 MiHR's research into the experience of Aboriginal peoples in the mining workforce will be published in October/November 2015.

Making Better Use of Skilled Immigrants

Immigrants remain an underutilized labour pool in Saskatchewan's mining workforce. Data from the 2011 Census suggest that the number of international immigrants to Saskatchewan has tripled between 2006 and 2011 and that the educational attainment amongst these immigrants is higher than for the general population. Challenges in the recognition of international credentials and a lack of Canadian experience/networks still pose barriers to participation of immigrants in the Canadian labour force. Partnerships between governments, employers, Immigrant Serving Agencies (ISAs) and training institutions can assist through the development of bridging programs aimed at new Canadians. These partnerships help smooth the transition of highly-skilled immigrants into the local labour force and harness an underutilized labour pool.

Furthermore, census data show that the majority of immigrants prefer to settle in larger urban areas such as Vancouver, Montreal and Toronto and that these skilled workers tend to be under-employed in these areas. Designing programs to attract these skilled immigrants to work in the Saskatchewan mining industry could support meeting future hiring requirements, especially in the *Professional and Physical Science* occupations.

Engaging Women in a Wider Range of Occupations

Women make up only 14 per cent of the mining workforce. A majority of these participants are employed primarily in clerical and corporate services roles, with participation at less than 5 per cent in *Trades and Production Occupations* or in *Supervisory* roles. Continued efforts to engage women, removing barriers and encouraging women's participation in all occupations, from trades and production jobs through supervisory and management positions will help to address both labour shortages and leadership challenges.

Attraction and Retention

The mining sector will need to continue its efforts to attract new entrants, especially in occupations for which the gap between available talent and hiring requirements is large. Currently, there is a mismatch between industry's needs and the skill profiles of job-seekers. Furthermore, job-seekers, whether youth, unemployed, immigrants or Aboriginal peoples, lack access to up-to-date information about the job prospects and career progression opportunities in the mining industry. A key strategy in this regard is ensuring that those who are looking for work are able to access information about the high-demand occupations in the mining industry, providing information about the skills and training required to get hired and informing potential employees about the path of career progression as they build their skills and competencies.

Data from the 2011 Census shows that the Saskatchewan mining industry has a younger labour force, compared to the Canadian mining workforce. This younger workforce has fewer years of on-the-job experience, creating a greater need for supervision and mentoring. This factor is compounded by the continued stream of retiring workers, especially in the supervisory occupations. Developing mentorship and succession programs will be essential to ensure a steady supply of future supervisory and managers. Identifying and grooming high potential employees for managerial and supervisory roles and incorporating leadership development in early career stages are possible initiatives to address this need.

The non-retirement separation rate is one of the major drivers of cumulative hiring requirements over the forecast period. Although churn naturally occurs in any labour market, a high turnover rate can indicate that an industry is struggling to retain workers. Even though mining enjoys a lower voluntary turnover rate compared to sectors such as retail or construction, employers still face a significant challenge in retaining workers with specialized skills. In addition, data from the 2011 Census suggest that Saskatchewan is a net "exporter" of commuting mining sector workers. Retaining talent will continue to be a challenge for employers in Saskatchewan and creating effective retention strategies will be important.

Training for a Robust Labour Market

Fostering partnerships between industry and education is important, particularly given the projected gaps between the need for skilled and educated workers and the supply of available talent. Continuous feedback from mining stakeholders to education and training institutes helps in developing programs that can ensure a supply of skilled labour that is relevant to the needs of the mining labour market. It can take many years to initiate or change education and training programs and then additional years to graduate a cohort of students to fill vacant positions, which makes monitoring and communicating present and anticipated future needs in terms of workforce skills and knowledge to governments and educational institutions essential for proactive workforce planning.

The collaborative partnership between the SMA and IMII is an example of how industry, government and post-secondary institutions can collaborate to align post-secondary training and education to labour market needs/career opportunities in the mining sector. Continued monitoring of fluctuating labour market conditions, demographic factors, workforce behaviours and sector-specific challenges will help to support sustainable workforce planning strategies and the long-term competitiveness of Saskatchewan's mining industry.

Appendix A –
Predictive Power Analysis

MiHR is engaged in the ongoing evaluation and improvement of the forecasts presented in this report. For the first time, we are including a *predictive power analysis* for our hiring requirement forecast. In all cases, MiHR's models are tested for statistical significance to ensure they provide the best representation of a region's mining labour market; the variables that are used to predict changes in employment and demand for skilled workers are required to possess considerable predictive power. At the same time, a "real world test" of predictive power offers another opportunity for evaluating and ultimately strengthening MiHR's forecasts.

In this report, MiHR is enhancing its model evaluation for Saskatchewan by comparing the predictions found in the 2011 Saskatchewan forecast report with the actual hiring patterns provided by mining employers who responded to the *Saskatchewan Employer LMI Survey*. Specifically, predictive power analysis refers to (1) comparing the actual outcomes in Saskatchewan's mining labour market against the predictions specified by the model (2) identifying where the actual outcomes diverge from the predictions (3) understanding the differences and (4) investigating opportunities to improve the forecasting process. This new feature is useful for both the end users of the forecast as well as for the forecasters as it provides significant insights into the usability and relevance of the forecast, therefore creating opportunities for continuous improvement.

Improving the forecasting model is a continuous exercise. Factors such as changes in economic conditions, shocks to the economy and change in technology affect the relevance and reliability of the forecast. In the 2014 report, MiHR has modified its forecasts to improve the predictive power. These improvements are a direct result of this in-depth analysis and feedback from our stakeholders.

Evaluating the Predictive Power of the Hiring Requirements Model

As mentioned, actual hiring patterns as reported by respondents to *Saskatchewan Employer LMI Survey* over the period between 2011 and 2014 was compared with the previously published 2011 Saskatchewan forecast for the same period to evaluate the predictive power of MiHR's model. As shown in Table 11, MiHR's 2011 forecast predicted that Saskatchewan's mining industry would need to hire approximately 3,645 workers under a baseline scenario. The *2014 Saskatchewan Employer Survey* asked employers to report the number of full-time workers hired between since March 2011 and March 2014. Respondent companies reported a total of 1,818 full-time workers and 908 non-permanent full-time employees hired, indicating a total hiring of 2,726 over the forecast period.

TABLE 10

Cumulative Hiring Requirement Forecasts by Scenario, 2011 and 2013

	CHANGE IN EMPLOYMENT	REPLACEMENT REQUIREMENTS		CUMULATIVE HIRING REQUIREMENTS
		RETIREMENT	NON-RETIREMENT	
Contractionary	609	491	1,590	2,690
Baseline	1,370	535	1,740	3,645
Expansionary	2,187	581	1,880	4,648

Source: Mining Industry Human Resources Council, 2014

In the last two years, a decline in commodity prices has resulted in a slow growth in Saskatchewan's mining industry. Therefore, for the purpose of predictive power analysis we will be using the contractionary scenario forecast from the 2011 Saskatchewan hiring requirement model.

Under the contractionary scenario, the 2011 Saskatchewan hiring requirement model published in the 2011 Saskatchewan mining industry forecast predicted that in the next two years Saskatchewan mining will need approximately 2,690 workers. It should be noted that the 2014 survey sample focussed on operating mines in the province whereas the 2011 forecast included employment in exploration, mineral processing and support services in addition to extraction activities. Approximately 55 per cent of the mining labour force in Saskatchewan is attached to these subsectors. If we assume that employers in these other sub sectors followed a similar hiring pattern to extraction companies, the actual hiring levels between 2011 and 2014 would be closer to 5,400 workers, an outcome that actually exceeds even the forecast in the expansionary scenario.

To date, validation of the complete 10-year hiring requirement forecast is not possible, however there are a variety of factors that can influence the reliability of any forecasting tool, including accuracy of the inputs, economic shocks and changing market conditions and model specification.

External Inputs

Input data plays a significant role in determining the reliability and predictive power of the model. MiHR's cumulative hiring model uses a variety of inputs from other data sources which include commodity forecasts from the World Bank, the Conference Board of Canada and several key financial and economic analysis firms. Despite a strong mathematical framework, a volatile input (external forecast) can significantly affect the accuracy of output. A pessimistic or an overly-optimistic commodity price forecast can have a significant impact on the employment forecast. For example, the actual price of potash in 2014 is significantly lower than the forecasted price used in the 2011 forecasts (Figure 19), meaning that the baseline economic scenario used may have been slightly too optimistic.

FIGURE 19
Actual versus Forecasted Potash Prices, 2011–2014
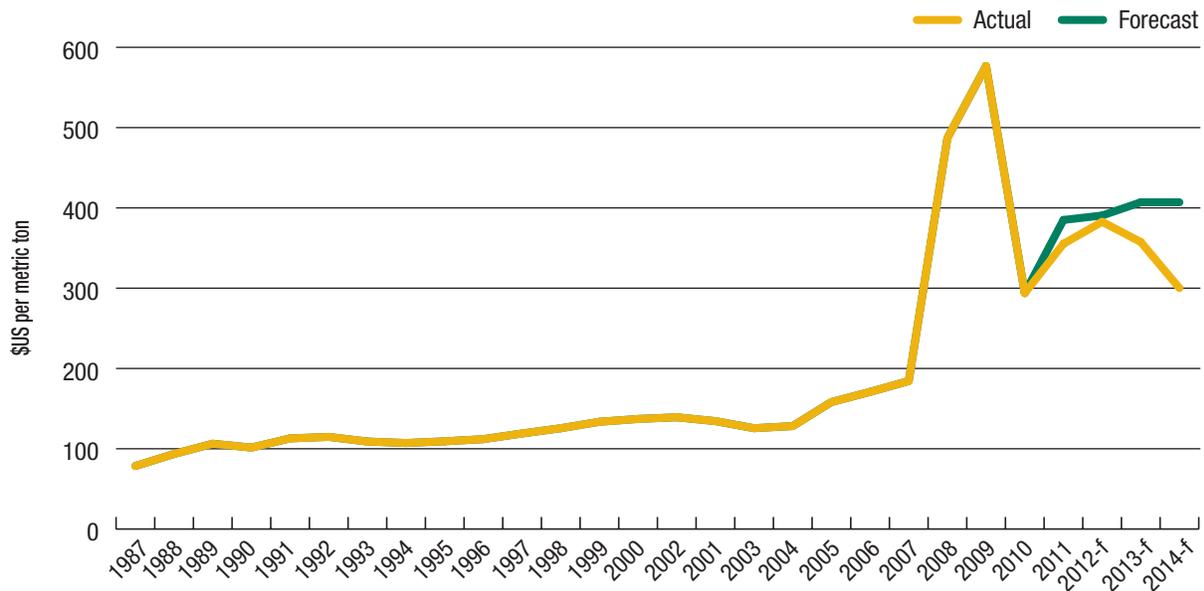
Source: Mining Industry Human Resources Council, 2011

Economic Shocks and Changing Market Conditions

Forecasting models are built on a set of underlying economic assumptions. Shocks such as a sudden fall in the price of a commodity like oil or the introduction of a new technology are difficult to model and forecast. In order to account for potential volatility over the 10-year forecast period, MiHR's analysis includes three scenarios, where the baseline scenario depicts the relevant economic scenario that is prevalent at the time of the forecast, whereas contractionary and expansionary scenarios show two other potential outcomes.

Specification of the Model

Similarly, econometric specification of the model plays an important role in determining its predictive power. MiHR's 2011 employment forecasting model in Saskatchewan used an econometric specification in which uranium prices were included. Our recent research has shown that uranium prices are not a good predictor of employment in mining in Saskatchewan.[17] In the new model we have dropped uranium prices and added predictors such as total output in the extraction sector and the total net investments in commodities in Saskatchewan that have improved the statistical predictive power of the model.

17 Please refer to the first chapter –section on uranium prices.

Appendix B –
Hiring Requirements Forecast Methodology

This appendix outlines the methodology used by MiHR to produce forecasts of hiring requirements in the mining industry. It also describes the various data that were required, along with the development of the forecasting models. A flowchart depicting this methodology is provided in Figure A1.

Forecasting models of employment were estimated based on the following six steps:

- Step 1: Collect and analyze data that may potentially explain changes in the number of jobs in each region.
- Step 2: Determine the driver(s) that explain the greatest level of variation in the number of jobs in each region by testing various model specifications through regression analysis.
- Step 3: Produce baseline, contractionary and expansionary forecasts for employment over a 10 year horizon.
- Step 4: Produce forecasts of retirement separations based on age profile, level of education, and participation rates.
- Step 5: Combine forecasts of employment change, retirement, and other separations to produce hiring requirements forecast.
- Step 6: Calculate and apply occupational coefficients to produce estimates of hiring requirements by occupation.

Several indicators were considered as explanatory variables for predicting employment. Rigorous modelling showed that economic indicators predicting change in GDP, (e.g., commodity prices, labour productivity, capital stock, downstream production and sales, etc.) were the best predictors of employment in mining. There is a strong positive relationship between mining GDP and employment. Expansionary scenarios assume better than predicted, and contractionary scenarios assume worse than predicted changes in GDP indicators.

MiHR regularly validates forecasts and collects primary inputs through surveys of industry employers on the size and age profile of their workforces, diversity and demographic characteristics, occupational profile, expected hiring needs, and the turnover and separation patterns they observe. Survey findings are used to validate forecasts and augment the assumptions for the forecast scenarios.

MiHR's hiring-requirements forecasting model combines the effects of various economic indicators (e.g., changes in commodity prices, productivity, downstream output sales) on employment, retirement rates and non-retirement separation rates to produce estimates of hiring requirements.

Appendix C –
Available Talent Model Inputs and Assumptions

Employment by Occupation

MiHR generates estimates of employment, retirements and "other" exits by occupation, as part of its hiring requirements forecasts. Employment outlooks for each occupation in mining were tied to MiHR's employment forecasts. Employment estimates for each occupation in other industry sectors were tied to The Conference Board of Canada's forecasts for non-mining sectors.

Employment by occupation is used to help estimate migration patterns in the model. Employment for each occupation is divided into two categories: the mining industry and other industries. Census data provides information on the starting points of these two series. The mining portion of employment is taken from MiHR's mining-employment forecasts, and employment for all other sectors is taken from The Conference Board of Canada's employment forecasts. These results are then combined to generate total employment by occupation.

The underlying assumption behind this methodology is that occupational employment in the mining sector will grow at the same pace as the entire mining industry, and that occupational employment outside of the mining sector will grow at the same pace as the rest of the economy. This is a reasonable assumption, as it implies that the share each occupation occupies—both within the mining sector and within the rest of the economy—will remain constant.

Migration

Net international migration forecasts are based on estimates of net international migration for Canada by occupation, taken from Employment and Social Development Canada's (ESDC's) Canadian Occupational Projection System (COPS) model.

Net inter-provincial migration is based on the balance of supply and demand of workers in a particular occupation. This assumes that a surplus of workers (a "soft labour market") leads to net outward migration, while a lack of workers (a "tight labour market") leads to a net inflow of workers in a given province. According to modelling done by The Conference Board of Canada, the unemployment rate in a region is an important determinant of migration flows, and the gap between supply and demand is a proxy for the unemployment rate for each occupation.

The forecasts of employment by occupation are used to generate estimates of net migration for each occupation. Interprovincial and international immigration by occupation is known from the 2006 census. To forecast immigration, the share of immigrants by occupation, relative to total immigration, is kept constant over the forecast period, and applied to The Conference Board of Canada's provincial forecast for immigration by province. This is done for both interprovincial and international immigration.

This methodology incorporates the relative mobility of each occupation into the forecast. Occupations where people have historically been less likely to move will continue to display this characteristic and those with historically higher levels of mobility will continue to behave in a similar manner. As well, by tying the forecast to the Conference Board of Canada's existing forecasts for provincial immigration, this methodology incorporates a measure of the attractiveness of a region. The Conference Board of Canada's forecasts are dependent on the relative tightness of a region's labour markets and its historic ability to attract migrants.

School Leavers

The forecast of school leavers is generated using two methods. The first method is based on the occupation's historic ability to attract people leaving school; if a certain share of the population under the age of 25 has historically entered a particular occupation, it is assumed that the share of entrants will remain similar going forward. Thus, the number of new entrants depends on the age profile of the workforce. School graduation figures and forecasts for specific occupations are also considered.

Second, to estimate the number of school leavers by occupation, the educational attainment of workers aged 25 to 34 is used to establish the education profile for each occupation. The 2006 census provides the most recent data on the number of workers by age group, occupation, and highest certificate, diploma or degree obtained. This information is combined with demographic data to estimate the number of school leavers per occupation. An estimate of how attractive a particular occupation is to school leavers is also applied for each occupation. Finally, estimates of how many school leavers will enter the workforce every year are created. School-leaver estimates are calculated for three broad levels of education: high school diploma or lower; trade, college or other post-secondary education below the bachelor's degree level; and university degree.

Retirements

Retirement leavers are estimated through MiHR's forecasted retirement rates; these are based on the observed labour force participation in Saskatchewan (by age and level of education) and predict the likely separation behaviour of those participating in the province's mining labour force. Retirement estimates are created using data from the *Census 2011*.

Other Entrants

The last group of new entrants is the "other" category, which largely consists of new people entering from other occupations or re-entering the workforce. Given the degree of training required for many of these occupations, it is very likely that these entrants would be already trained in that occupation. For simplicity, the number of new entrants is assumed to be a certain percentage of the existing labour force. This rate is set equal to the "other" leavers' rate that MiHR uses as part of its existing models and is constant across occupations. In this manner, "other" entrants are precisely equal to and offset "other" leavers.

Other Leavers

Other leavers include people moving to other occupations, people temporarily leaving the workforce, and those who have fallen ill or who are deceased.

Appendix D – Industry Definition and Scope

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

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 for Statistics (NOC-S). Both systems provide a hierarchical structure that divides higher-level categories into more detailed categories in order to group similar establishments and individuals.

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) to provide standardized descriptions of the work that Canadians perform in the labour market. NOC- codes organize labour force participants according to the nature of work they perform, thereby enabling similar occupations to be grouped. NOC-2011 codes are specific to Canada.

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-2011 categories that pertain only to 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. In the previous reports MiHR has used the NOC-S standards that are now deemed to be obsolete by ESDC. In this report we have used NOC-2011. The NOC -2011 updates the NOC-S system of classification. A full description of both classification systems can be found on ESDC's website.

The Mining Sector, Industry Classifications

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 NAICS codes that define the mining industry include:

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

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.

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.

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).

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.

NAICS 5413: Architectural, engineering and related services. This industry group comprises establishments primarily engaged in providing architectural, engineering and related services, such as structure design, drafting, building inspection, landscape design, surveying and mapping, laboratory and on-site testing, and interior, industrial, graphic and other specialized design services. Note that only a portion of this NAIC code relates to Geosciences, Surveying and Mapping, and Assay Laboratories.

Occupation Classification

Listed on the next page are the 66 NOC-S codes that MiHR uses to define the occupations that are essential to the 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-2011 code. A resource to map NOC-S codes to job titles is found on the Employment and Social Development Canada website (specifically the "Quick Search" box).

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. Note that (C) in the following table denotes Compulsory Trade in Saskatchewan.

NOC 2011	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
	TRADES OCCUPATIONS
7271	Carpenters
7251	Plumbers (C)
7371	Crane operators
7252	Steamfitters, pipefitters and sprinkler system installers* (Sprinkle system installer in SK is a separate trade from steamfitters and pipefitters)
9241	Power engineers and power systems operators
7311	Construction millwrights and industrial mechanics
7242	Industrial electricians (C)
7237	Welders and related machine operators
	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

(C) means that it is a Compulsory Trade in Saskatchewan. It should be noted that Compulsory Trades differ from one province to another.

Notes

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