



2013

Sudbury Mining Hiring Requirements Forecasts

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EMPLOYMENT ONTARIO

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Executive Summary

Executive Summary



Resource-based industries such as mining have always been, and continue to be, a vital part of a strong northern Ontario economy, particularly in the Sudbury area. To complement this strength, numerous mining supply and services companies (suppliers of heavy equipment, engineering and geological consultation services, etc.) have emerged to support various aspects of the mining industry.

However, human resources challenges threaten growth potential. Labour market pressures vary considerably among the provinces and territories in Canada — reflecting differences in commodities, the mix of exploration and mining activities, and the size of the labour pool. Additionally, the discovery of new deposits such as the Ring of Fire, an area in Ontario's far north presents major development opportunities in mining (including a ferrochrome smelter in Sudbury) which will undoubtedly contribute to the Ontario economy and create future jobs. Access to trained and experienced professionals and skilled trades workers will further add to the human resources challenges already being projected in mining and mining related industries.

This report was prepared for Workforce Planning for Sudbury and Manitoulin by the Mining Industry Human Resources Council (MiHR) and presents hiring requirements forecasts for the District of Sudbury (which includes the City of Greater Sudbury). Developed from a provincial forecast for Ontario, the forecast utilized for this study was customized to capture the unique conditions and context of Sudbury's mining industry. This is one of six separate reports across Northern Ontario examining human resources issues. Other districts include: Kenora and Rainy River; Cochrane and Timiskaming; Nipissing; Algoma; and Thunder Bay.

Research conducted by MiHR has demonstrated that regional analysis of the mining labour market is valuable; it provides important intelligence about local industry conditions, labour market pressures, and helps predict future needs. Effective labour market and workforce planning strategies — based on a solid understanding of mining operations and challenges within each region are equally as important.



MiHR defines the industry as including all phases of the mining cycle from prospecting and exploration, advanced development and construction, support services for exploration and mining, extraction, mineral processing, and closure, care and maintenance. MiHR

research indicates that employment in the mining sector is more cyclical than in many other industries in Canada.¹ Previous labour market forecasts produced by MiHR show that despite this cyclical nature, future hiring requirements will be quite significant across Canada, even under contractionary scenarios (i.e. poor economic outlook). According to these forecasts these same trends mirror the labour market forecasts for Sudbury.

This report uses MiHR’s labour market forecasting system, which was developed to produce forecasts of employment and hiring requirements in the mining industry at the national and provincial /territorial levels.² This model considers a variety of factors to predict changes in employment in the mining and minerals exploration industry, including commodity prices, productivity factors and demographic data. Forecasts are prepared for two, five, and ten-year time horizons, and are presented using three economic scenarios — contractionary, baseline and expansionary. Hiring requirements represent the sum of net changes in employment and replacement requirements due to retirements and other exits from the labour force.

Since sub-provincial forecasting presents a number of unique challenges, MiHR also used information from a local survey of mining and mining supply and services companies, key informant interviews and the workforce planning board’s research and data collection activities³ to supplement the local forecast.

The results of their research indicates that in Sudbury, in 2012, the mining and mining supply and services sectors employed 25,200 workers. When the MiHR forecasting model is applied, under the baseline scenario, the projected cumulative hiring requirements over the next 10 years will be approximately 21,440 workers. Further analysis projects that 21,110 workers will be needed in a contractionary scenario, and 21,840 workers in an expansionary scenario.

1 Canadian Mining Industry Employment and Hiring Forecasts, 2011.

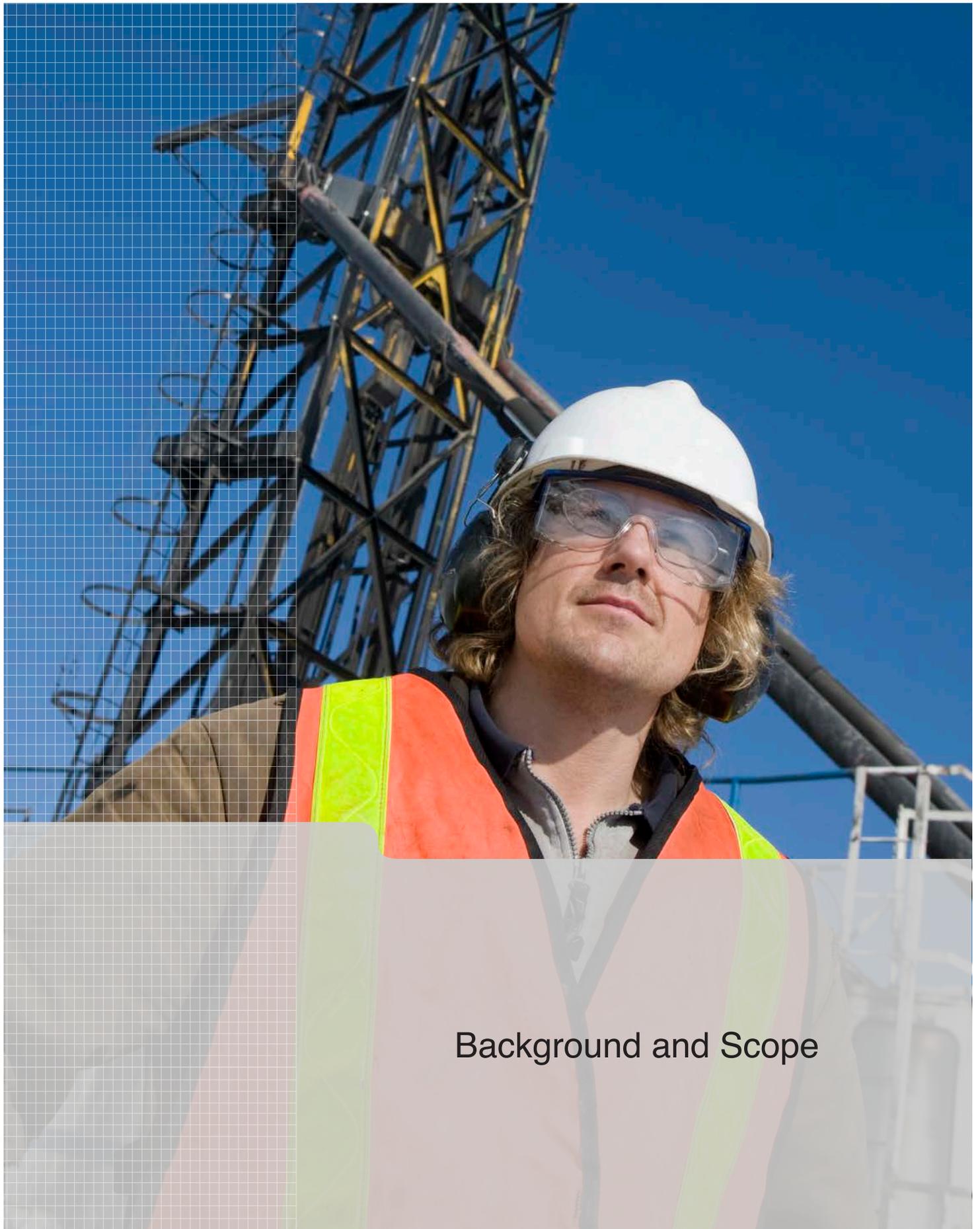
http://www.mihhr.ca/en/publications/resources/employment_hiringforecasts2011_FINALAug4_ENG.pdf

2 The development of the forecast system was supported, in part, by funding from the Government of Canada and with financial contributions and guidance from the mining and minerals exploration industry stakeholders across Canada.

3 The forecasts presented herein provide custom estimates for the region, based on current information available at the time of production.

Additionally, based on discussions with stakeholders, the mining industry in Sudbury is already identifying potential HR issues. These include, but are not limited to: issues related to an aging workforce; pending retirements; and low interest by youth entering the mining profession. The demographic profile also indicates that the traditional pool of workers in mining is also shrinking which will only be further compounded by low birth rates (across the country), meaning the potential pool of workers in the future is growing smaller.

Possible solutions have also been discussed, including the potential to: train and hire non-traditional workers such as women and Aboriginal people; increasing apprenticeship opportunities for students (without compromising safety or the quality of training); improving the image of the industry (and the north) to attract and retain new talent; and finally to ensure a long term sustainable supply of trained and skilled workers it may be necessary to invest and create socially sustainable communities to attract newcomers to the North and to retain the present talent.



Background and Scope

Background and Scope



Human resources' challenges are one of the greatest threats to the future competitiveness of the Canadian mining industry.⁴ A number of factors contribute to these significant HR challenges, including the looming retirement of the baby-boom generation, the struggle to attract and engage younger workers, and an under-representation of diverse groups such as Aboriginal peoples, women and new Canadians. While the industry has made tremendous strides in addressing these issues, finding skilled and experienced workers is becoming more and more difficult, and competition is increasing across all sectors of the Canadian economy.

Labour market pressures vary considerably among the provinces and territories, reflecting differences in commodities, the mix of exploration and mining activities, and the size of the labour pool. Regional analysis

of the mining labour market is valuable. It not only provides important intelligence about local industry, current conditions and labour market pressures, but helps to identify future needs, gaps and possible workforce strategies and solutions.

This report was prepared for Workplace Planning for Sudbury & Manitoulin (WPSM) and encompasses mining, mineral exploration and mining supply and services companies (herein referred to as the mining industry). Developed from a provincial forecast for Ontario, the forecast presented here was developed by the Mining Industry Human Resources Council (MiHR) and was customized to capture the unique conditions and context of mining in Sudbury. The forecasts shown in this report reflect the District of Sudbury, which contains the City of Greater Sudbury, and further captures mining activities occurring in the broader area within the District.

This report is one of six individual reports on districts across northern Ontario including Cochrane and Timiskaming; Kenora and Rainy River; Algoma; Nipissing; and Thunder Bay — the result of a cutting-edge partnership between MiHR and six northern Ontario workforce planning boards. Each report presents a regional-level outlook that follows MiHR's labour market forecasting model and helps to identify unique human resources' challenges, and effective labour market and workforce planning strategies specific to each region.

⁴ Ernst and Young, Business Risks Facing Mining and Metals, 2010.

MiHR's Labour Market Forecasting System

As noted, this report is based on MiHR's labour market forecasting system, which was developed to produce forecasts of employment and hiring requirements in the mining industry at the national and provincial/territorial levels.⁵ MiHR uses various factors to predict changes in employment in the mining and minerals exploration industry, including commodity prices, productivity factors and demographic data. Given the nature of mining, MiHR forecast projections are for two, five and ten-year time horizons for three economic scenarios — contractionary, baseline and expansionary.

Inputs to the MiHR forecasting model includes data from Statistics Canada (including, but not limited to, Census and Labour Force Survey), inputs on several economic indicators, and Natural Resources Canada data. This is supplemented and adjusted using primary research sources — region-specific analysis, mining sector employer surveys and key informant interviews. A general description of the forecast methodology can be found in Appendix A, along with an explanation of the underlying assumptions used to generate the Sudbury hiring requirements forecast.

It is important to note that sub-provincial forecasting presents a number of unique challenges that do not exist in preparing forecasts at the provincial and national levels. These include limited access to data from traditional Labour Market Information (LMI) data sources; high labour mobility; and the fact that workers may live outside the region in which they work (and vice-versa). To address these challenges, MiHR adapted a number of provincial assumptions to produce district-specific data. Adaptations were based on the outcomes of surveys, key informant interviews (conducted as part of this research), and information from each planning board's own research and data collection activities within the district.⁶

Industry Definition and Scope

For the purposes of its forecasts, MiHR defines the mining industry as including all phases of the mining cycle: exploration, development, extraction, processing and reclamation. For this report, MiHR included exploration, mining and quarrying; support services and contractors (not including oil and gas); iron and steel mills and ferro-alloy manufacturing; alumina and aluminum; and other non-ferrous metal production and processing.

The industry is mainly defined using North American Industry Classification Codes (NAICS) and National Occupational Classification for Statistics (NOC-S) codes. Statistics Canada and other LMI sources organize their data according to these classification codes. Together, the NAICS and NOC-S systems allow MiHR to group statistics to obtain estimates of employment and workforce demographics. Details on the NAICS and NOC-S codes included in the forecasts are found in Appendix B.

Each district was defined according to Statistics Canada's economic districts, as shown in Figure 1. Findings from primary research were used to further define a region-specific scope and context; verify and validate data from other sources; determine the unique occupational structure of the local workforce; and provide local measurements of diversity, workforce mobility, turnover and average age at retirement. To acquire this information, MiHR reached out to industry stakeholders in each district through a survey on mining industry profile, labour market needs and human resources trends.

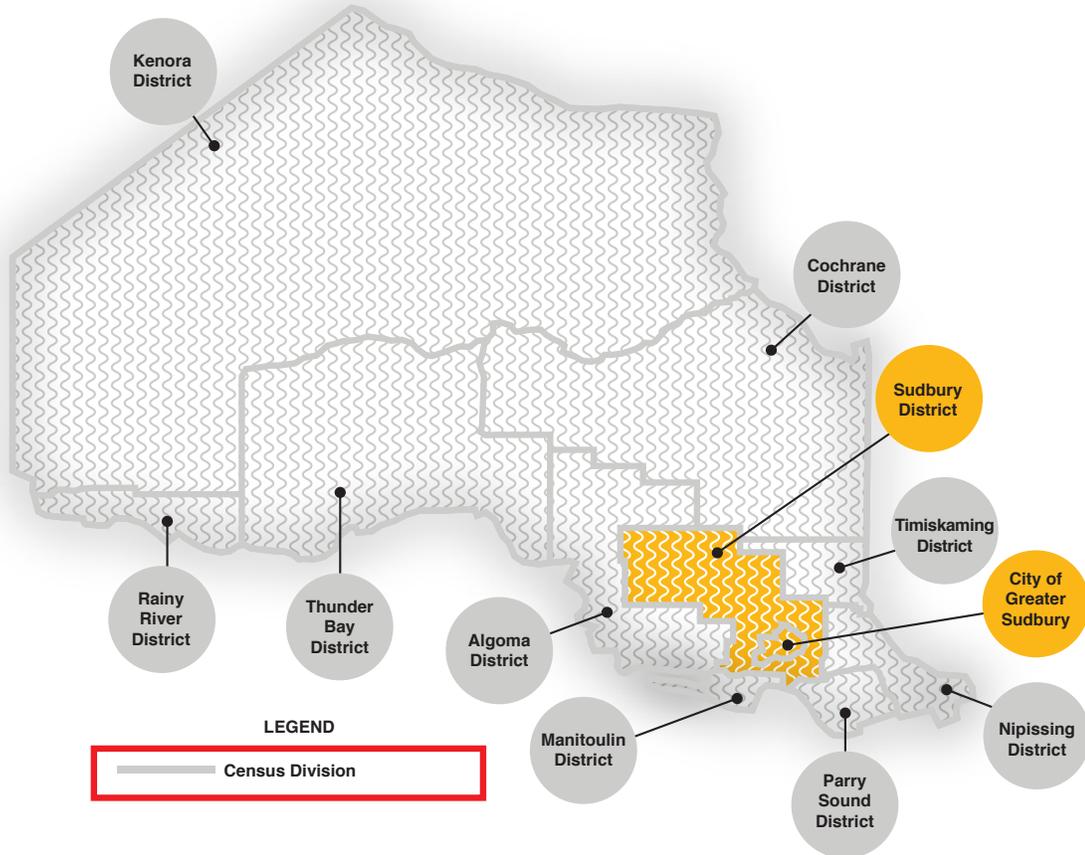
⁵ The development of the forecast system was supported, in part, by funding from the Government of Canada and with financial contributions and guidance from the mining and minerals exploration stakeholders from across Canada.

⁶ The forecasts presented herein provide custom estimates for the region, based on current information available at the time of production.

District Research

In Sudbury, 30 stakeholder groups and employers participated in surveys and interviews. Stakeholders included those in government, education and training, industry associations, research and development, employers in extraction, exploration and development, and employers in the mining support-services sectors. These inputs guided MiHR to validate and adjust assumptions used in its employment modelling and forecasts for the Sudbury area.

Figure 1 – Ontario Districts





Economic Overview and Regional Labour Market

Economic Overview and Regional Labour Market

The global economic recovery stalled due to increased uncertainty in the second half of 2011; as a result, the outlook for global growth deteriorated during this time. One key factor underlying this deterioration was the ongoing euro-area sovereign debt and banking crisis. With this continued uncertainty, global exploration and mining activities slowed in 2012, casting a shadow over industry prospects for the near-term.

However, fluctuations are an industry reality and overall, despite recent activities, the economic outlook is cautiously optimistic. In the United States, the largest single customer for Canadian output and production, the economy has shown signs of gathering momentum for sustained growth since the fall of 2011. Consumer confidence in the U.S. increased in 2012 from the near-record lows of August 2011, and output growth accelerated in both the U.S. manufacturing and non-manufacturing sectors. In addition, demand for Canadian commodities continues to grow as China, India, Brazil, and other nations further develop their economies.

Canadian Economic Overview

Canadian exploration activity slackened in 2012 and industry information indicates that exploration expenditures did not meet anticipated levels during the second half of the year. As a result, the exploration and mining sector operated under a blanket of caution over the latter part of 2012. Nonetheless, Canada's economic outlook remains positive amid continued international uncertainty and a tenuous global recovery. Canadian economic growth is forecast to be modest in the near term and then to gradually and moderately increase over the forecast horizon, as demand for Canada's natural resources continues.



Canada's Recent Economic Performance

Canada's economic performance over the 2008-09 recession and throughout the recovery period has been strong relative to peer countries. This strength reflects Canada's sound economic, fiscal and financial-sector fundamentals, along with the support provided under the federal economic-stimulus package. As a result, Canada's real GDP is well above pre-recession levels — the best economic performance in the G-7 countries.

Canada posted the strongest growth in employment in the G-7 during the recovery period — with both the quantity and quality of new employment exceeding expectations. Overall, Canada has regained the employment ground lost during the recent recession. About 90 per cent of the added jobs were in full-time positions, with over three-quarters in high-wage industries in the private sector. As of mid-year 2012, Canadian businesses were continuing to hire, even though the federal government's temporary stimulus program had ended.

In an October 2012 update of Canada's fiscal and economic outlook, the federal government predicted that real GDP growth in 2013 would be lower than private-sector forecasters had projected in early 2012. The new federal forecast called for stronger growth in 2014 and 2015.

The largest impact in Canada of the most recent global economic turbulence has been fluctuations in commodity prices — generally resulting in lower prices. The European crisis and its impact on growing economies, including China, remains a drag on world economies. In North America, however, both Canadian and United States governments have indicated they will act as needed to provide stimulus to help sustain recovery. This is a clear signal to other countries and to industry to continue to invest in North American economies. In early 2012, investment in Canada was well above pre-recession levels, at an annualized rate of 9.4 per cent.

Mining Industry Economic Overview and Outlook

In sync with other industrial sectors in the economy, the Canadian mining sector's GDP rebounded in 2010 after 2009's unprecedented and precipitous decline — increasing by 15 per cent over the levels of the previous year. The sector responded quickly to international demand with strong exports in 2010.

Globalization of international trade and rebounding demand for Canada's mineral resources have stimulated the industry's recovery; however, in mid-2011, the uncertainties associated with weak markets returned due to a number of developments, including a slowdown in the United States economy and higher than anticipated inflation in China. These trends and others produced a temporary shock to demand for Canadian metals and minerals, and resulted in much lower prices.

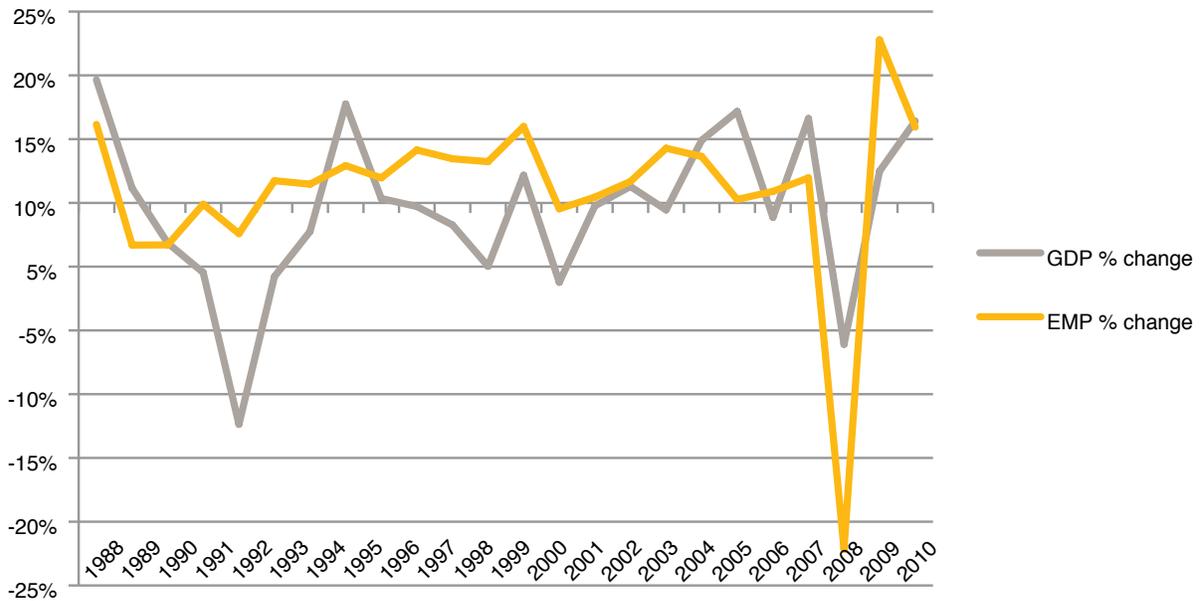
Despite the sector's cyclical nature, demand for Canadian metals and minerals is expected to grow in the long term. The prediction arises from the gradual but stable economic growth in the United States, and from the relatively high economic growth rates of China, India and Brazil. These countries' large domestic markets for Canadian exports of base metals, potash and potassium compounds, and coal bode well for additional incremental demand for Canadian metals and minerals in the near term, as well.

Canadian Mining Industry Employment

The mining industry directly employs over 235,000 people in Canada. Employment in the sector reflects a net increase of 15 per cent during the last six years, or an average increase of 2.5 per cent year-over-year between 2004 and 2010.

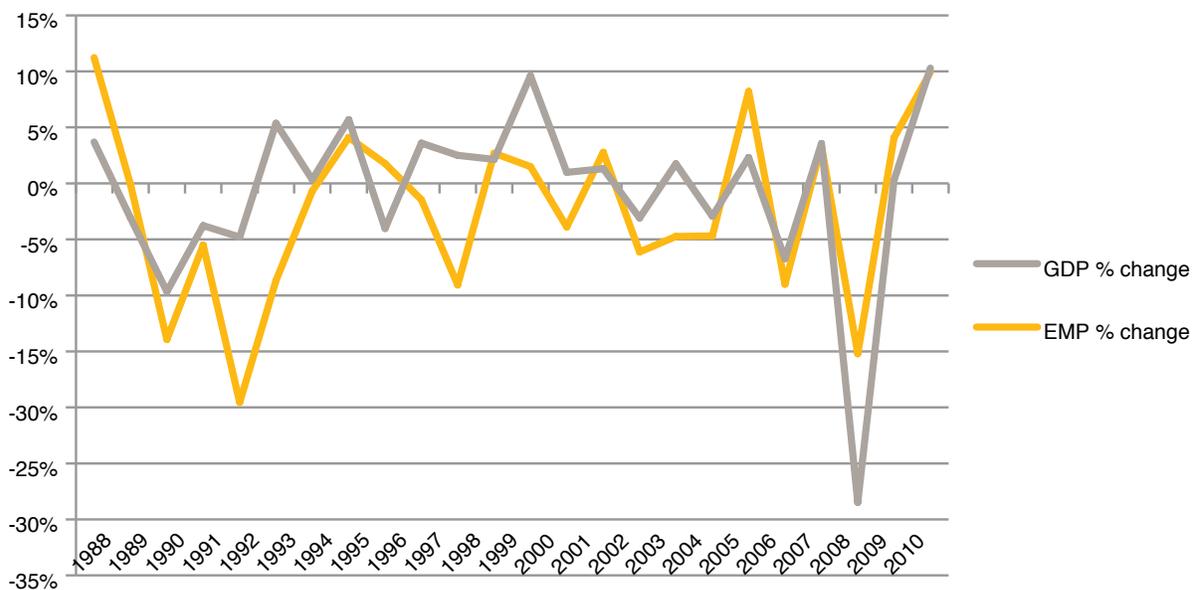
Canadian mining industry employment is sensitive to changes in GDP. Figures 2 and 3 depict this relationship in Canada and in Ontario.

Figure 2 – Employment and GDP Mining – Canada



Source: Mining Industry Human Resources Council

Figure 3 – Employment and GDP Mining – Ontario



Source: Mining Industry Human Resources Council



The Northern Ontario Mining Industry and the Ring of Fire

Resource-based industries are, and continue to be a vital part of a strong northern Ontario economy. Recent investments in mining exploration and development in northern Ontario are expected to spur a “mining super-cycle”, providing direct as well as spillover benefits for the area’s economy.

Each mining area across northern Ontario is however impacted by the global economy and by Canada’s GDP growth. For regions in the north, the other reality is a human resources issue; where the demand for workers will outpace local supply. For example, it is well recognized that a large portion of older workers — with their wealth of skills and experience — are near retirement age. Sudbury is no exception.

While the discovery of significant mineral deposits in the Ring of Fire, an area in Ontario’s far north, presents major development opportunities in mining that will contribute to the Ontario economy, create jobs and better position the northern Ontario economy for future sustained growth, strategies to address human resources challenges in the Ring of Fire and across northern Ontario

mining communities, need to be developed. According to recent feasibility and impact studies, the mine developments currently under consideration in the Ring of Fire are expected to create more than 1,500 permanent jobs, once the mines are in full production. In addition, related jobs will be created in the mining service and supply sector.

Sudbury’s Mining Labour Market

Sudbury is one of the more established mining areas in northern Ontario and one of the oldest mining centres in North America. The region has a large base-metal mining component, supporting polymetallic mines that produce nickel, copper and platinum group metals.

Based on the 2006 Census, over 7 per cent of the region’s population is employed in the mining and oil and gas extraction sector.

To support the mining industry, various mining and mining-supply services companies (e.g., engineering and geological consultants, and suppliers of heavy equipment) have been established; all of these industries contribute to the economic impact and labour environment in the mining sector. Additionally, significant employment gains since 2011 have effectively reversed the downward trend that began with the 2008-09 recession. The industry has now recovered to almost pre-recession levels of employment in both the *Professional and Scientific* and the *Technical and Construction* categories.

Sudbury has made efforts to become a sustained and stable community that supports a number of other industries, which in turn makes it a more attractive destination for firms, employees, government representatives, students and families. However, demand for qualified and skilled workers in Sudbury’s mining industry continues to be competitive and is expected to continue into the future. This may also be further impacted by out-migration from the Sudbury area which could cause a scarcity of resources in the skilled trades sector in a growing economy. Additionally, an impending wave of retirements is also a looming threat as Sudbury’s median age of 48.2 is above the Ontario average (at 40.4), and includes a relatively high percentage of workers aged 60 and older.

Sudbury’s Worker Profile and Demand

Employers in Sudbury who responded to MiHR’s Fall 2012 survey indicated that employment in mining exploration, development and support activities will likely increase in the region beginning in 2014. Over three-quarters of employers reported business conditions as favourable and expected conditions to remain the same or improve in the year ahead. Most employers have a workforce planning horizon of about 12 months and react within six months to economic conditions. There are several post-secondary institutions and other training providers in the area that already work closely with industry on initiatives to develop the future workforce—supporting and nurturing these kinds of programs will be essential to meeting the industry’s need for talent as it faces significant growth over the next three years.



Survey respondents also indicated that approximately 60 per cent of their non-Aboriginal workforce live in the region, with some employers reporting as much as 100 per cent local workforces and others reporting as few as 5 per cent. Workers mainly commute into the region from elsewhere in Ontario, with some employers reporting that a small proportion of their workforce commute from Quebec and Manitoba. Turnover or churn was reported at about 9 per cent for employers, but ranged between less than 1 per cent to as much as 25 per cent, depending on the employer’s activities and operating context—with larger extraction employers experiencing lower turnover rates than smaller support-services employers.⁷

⁷ Note however, there is a scaling effect here. For example a smaller employer, with six staff members, can experience 50 per cent turnover by losing three people; whereas a larger employer with 60 people would experience only 5 per cent turnover when losing three people.

Respondents to MiHR's survey reported that on average 45 per cent of their workforce is at a high school level of education, 30 per cent have completed college education, 35 per cent have received trades certification and just over 15 per cent have a university level of education. The majority of respondents reported outsourcing at least one component of education and training for their organization, including health and safety, common core training, leadership and managerial, apprenticeships and language training.

Findings from MiHR's survey of employers also revealed that the average age of respondents' workforces was 40 years old, with some employers reporting an average age of as much as 48 or as young as 30 years. Mining sector workforces tended to be older; whereas exploration and support services employers reported slightly younger workforces. Most employers reported that: between 1 and 8 per cent of their workforces are currently eligible to retire; between 1 and 6 per cent are eligible to retire in the next 12 months; between 1 and 10 per cent becoming eligible over the next three years, and another 5 to 25 per cent eligible in three to five years. The average age of retirement was reported as 62 years, with a range between 59 and 65 years.

Employers in the region also reported that they rely most heavily on online job boards, newspapers and other print media, company websites and word-of-mouth when recruiting talent. Over half of surveyed employers in Sudbury use social media, direct recruiting from college/university, and referrals of current employees to find talent. Very few (less than 5 per cent) of employers reported using radio or TV, information interviews or former employees to find talent.

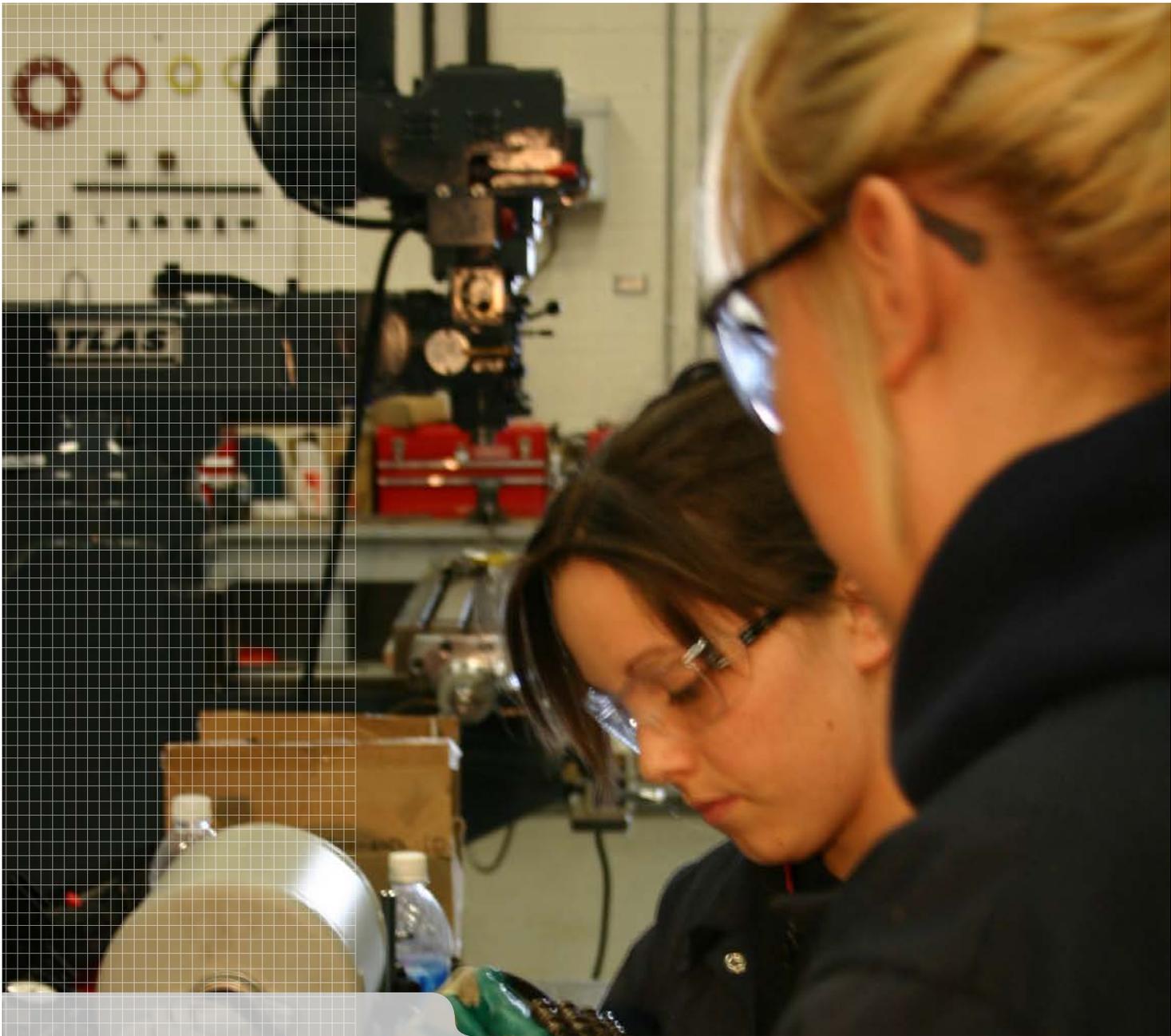
Sudbury's Potential to Employ Aboriginal Peoples and Other Diverse Groups

Responses to MiHR's survey indicated that less than 1 per cent of mining workforces are Aboriginal peoples. Note that this is an average from a sample of employers and not all employers responded to this question—it is assumed that participation could be much higher in individual companies. That said, it is not unusual to see lower participation rates of Aboriginal peoples in mining when mining activities are located in close proximity to larger urban centres.

The majority of the Aboriginal population in the broader area resides in the District of Manitoulin, (39 per cent Aboriginal), where quarries and aggregate production predominate. While this Aboriginal base does not live within daily commuting distances from Sudbury's mining operation, there is a possibility that some may be willing to relocate. Sudbury's Aboriginal population on the other hand is relatively small, at 14 per cent of the total population.

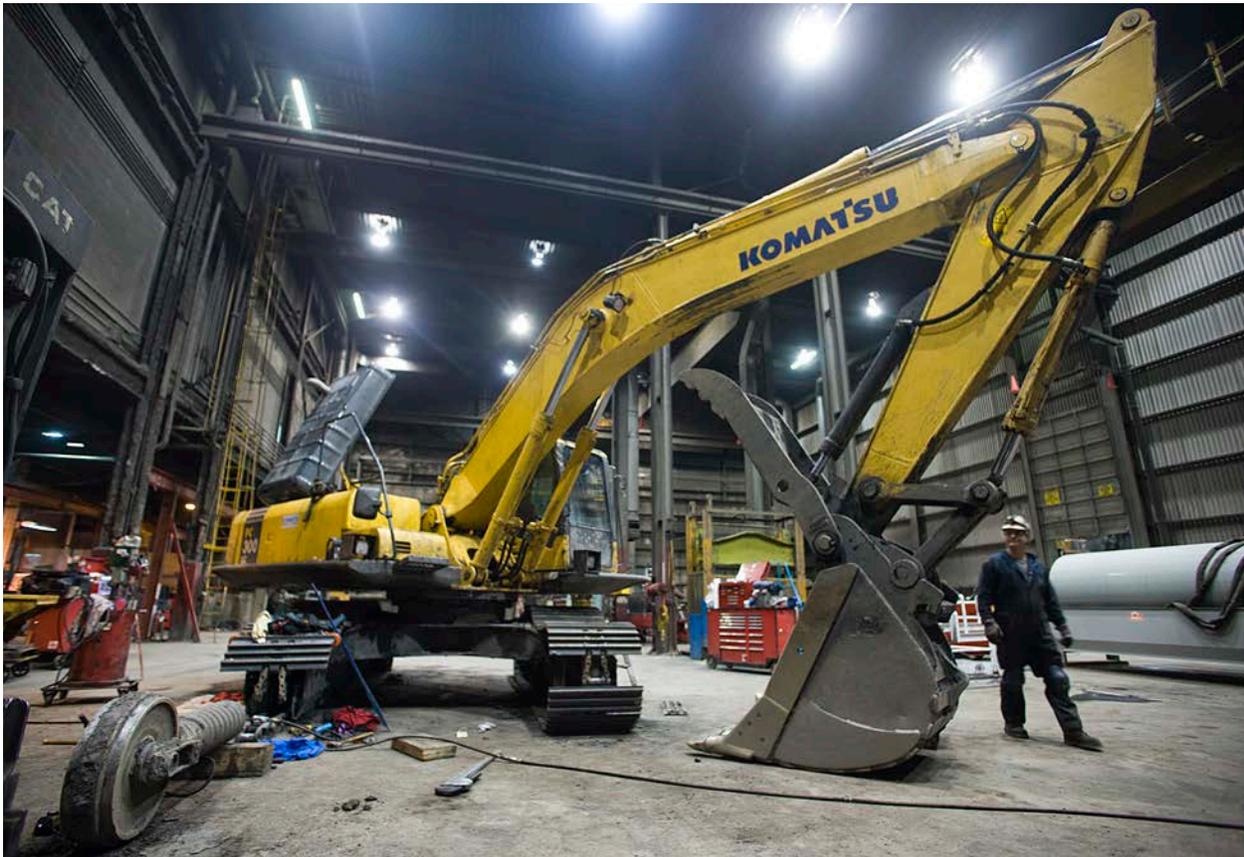
Other demographic characteristics of the survey respondents' workforces are similar to the national patterns observed for mining. About 9 per cent of respondents' workforces are female with a range of less than 5 per cent to as much as 33 per cent. Industry stakeholders across Sudbury are committed to seeing more Aboriginal youth as well as women become part of the area's skilled-trade labour sector.

Lastly, on average, employers reported less than 5 per cent of their workforces are new Canadians or temporary foreign workers.



Sudbury Hiring Requirements

Sudbury Hiring Requirements



MiHR research indicates that employment in the mining sector is more cyclical than in many other industries in Canada.⁸ Previous labour market forecasts produced by MiHR show that despite this cyclical nature, future hiring requirements will be quite significant across Canada, even under contractionary (i.e., poor economic outlook) scenarios. MiHR's projections for all of Canada forecast mining hiring requirements ranging from 118,600 to 196,300 workers over the next 10 years. Even with a very moderate outlook, MiHR's baseline scenario for the Canadian mining industry predicts the need to hire approximately 147,400 workers in the next 10 years.

Projections for Ontario mirror the national trends. The range for Ontario mining hiring projections is an estimated 51,600 to 65,800 workers. Even under a moderate hiring outlook (the baseline scenario), MiHR projects the need to hire over 59,000 workers in Ontario over the next 10 years — slightly shy of one-third of the total mining hiring requirements for all of Canada.

These same trends are evident in the labour market forecast for the Sudbury District. Even under a contractionary scenario — where total employment in the area's mining sector increases by 27 percent — more than 21,100 workers will need to be hired to offset workforce attrition due to retirements and other separations.

⁸ Canadian Mining Industry Employment and Hiring Forecasts, 2011.
http://www.mihhr.ca/en/publications/resources/Employment_HiringForecasts2011_FINALAug4_ENG.pdf

Cumulative Hiring Requirements Forecast

Table 1 shows forecasted hiring requirements for the Sudbury mining industry under three scenarios — baseline, contractionary and expansionary. (Details on scenario development and assumptions can be found in Appendix A). Mining sector employment in Sudbury was estimated at almost 25,200 workers in 2012. Under the baseline scenario, the projected cumulative hiring requirements over the next 10 years will be approximately 21,440 workers. A projected 21,110 workers would be needed in a contractionary scenario, and 21,840 workers in an expansionary scenario.

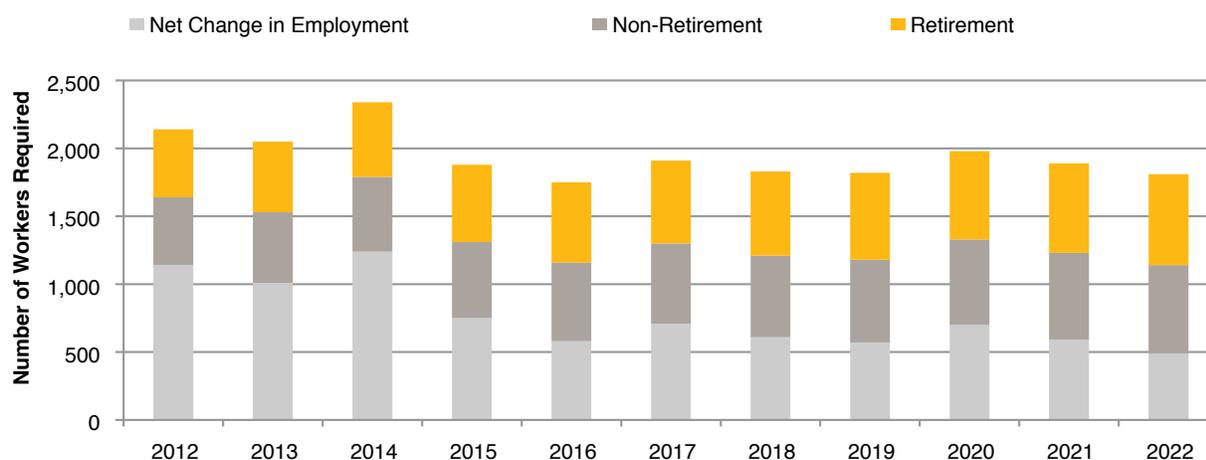
Table 1
Cumulative Hiring Requirements Forecast — Sudbury by Scenario — 2022

	Change in Employment	Replacement Requirements		Cumulative Hiring Requirements
		Retirement	Non-Retirement Separation	
Contractionary	8,140	6,560	6,380	21,110
Baseline	8,390	6,580	6,430	21,440
Expansionary	8,700	6,660	6,460	21,840

Source: Mining Industry Human Resources Council, December 2012
(Estimates may not add perfectly due to rounding).

Figure 4 shows the hiring requirements for Sudbury on a year-over-year basis, for the baseline scenario.

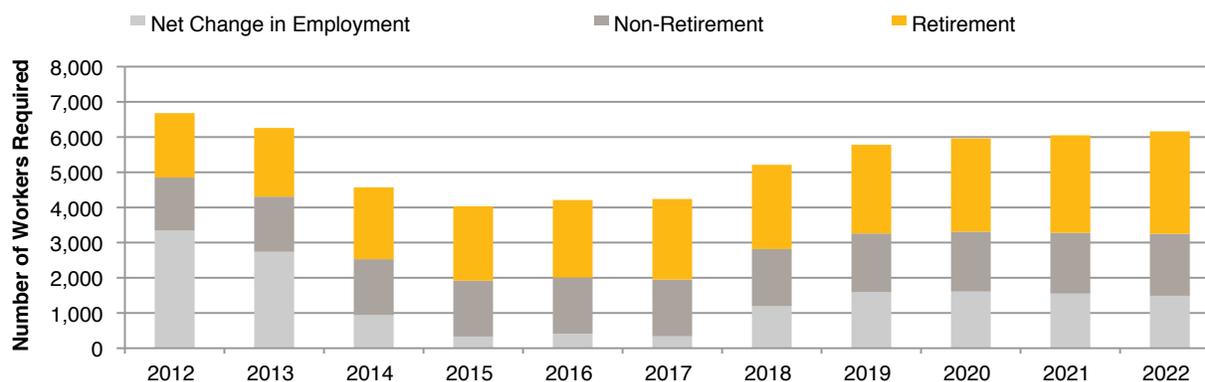
Figure 4
Annual Hiring Requirements Forecasts — Sudbury
Baseline Scenario — 2012 to 2022



Source: Mining Industry Human Resources Council, December 2012

As shown in Figure 5, the Ontario mining industry as a whole shows cumulative hiring requirements of approximately 59,000 workers. These requirements are driven by a combination of replacement demands and industry expansion.

Figure 5
Annual Hiring Requirements Forecasts – Ontario
Baseline Scenario – 2012 to 2022



Source: Mining Industry Human Resources Council, December 2012

Table 2 summarizes the cumulative hiring requirements for the Sudbury District in 2014, 2017 and 2022, under MiHR’s contractionary, baseline and expansionary scenarios.

Table 2
Cumulative Hiring Requirements Forecast – Sudbury by Scenario – 2014, 2017, 2022

	Cumulative Hiring Requirements		
	2014	2017	2022
Contractionary	6,460	11,840	21,110
Baseline	6,550	12,100	21,440
Expansionary	6,650	12,390	21,840

Source: Mining Industry Human Resources Council, December 2012

Hiring Requirements Forecast by Occupation

MiHR includes 66 key occupations in its occupation-level analysis of forecasts. These occupations represent just over 70 per cent of all employees in the mining sector and are carefully selected to represent a broad spectrum of jobs that are considered unique or essential to the industry. Occupations listed in the “other” category are considered non-specific to mining; these are jobs also commonly found in other sectors (e.g., cleaning and janitorial positions, non-specific administrative roles, accountants and business analysts, nurses and other roles).

The occupational hiring requirements for the Sudbury District are presented in Table 3 by broad occupational category. Occupational hiring requirements are based on the current occupational structure of the mining sector and may over or under-estimate needs for each occupation, as new mines come online and the occupational structure of the mining workforce shifts over time. Such a shift would occur, for example, when mine development moves from the construction phase into the production phase. The estimates in Table 3 provide an indication of needs for training and other supports in Sudbury, in particular occupational groups.



Table 3
Cumulative Hiring Requirements Forecast by Occupational Category⁹ – Sudbury,
Baseline Scenario – 2014, 2017, 2022

	Cumulative Hiring Requirements		
	2014	2017	2022
Trades and Production Occupations	2,970	5,485	9,705
Professional and Physical Science Occupations	340	640	1,130
Human Resources and Financial Occupations	145	270	480
Support Workers	225	420	740
Technical Occupations	235	445	785
Supervisors, Coordinators, and Foremen	495	910	1,610
All Other Occupations	2,140	3,930	6,990
Total	6,550	12,100	21,440

Source: Mining Industry Human Resources Council, December 2012

These requirements can be broken down even further by individual NOC-S codes and this breakdown is shown in Table 4. It should be noted that with smaller area-specific data sets, such as the ones used here, the error margins for an occupation-specific breakdown is high and the forecasts should be interpreted with caution.

⁹ An occupation-specific breakdown of the needs within each category is possible. These are presented in Appendix B, but should be interpreted with caution, given the smaller area-specific dataset. Occupational needs will adjust over the forecast period and be mainly driven by the specific context of the mining operations that develop in the region. All occupation-specific data has been rounded to the nearest five workers.

Table 4:
Occupational Breakdown of Hiring Requirements Forecast — Sudbury
Baseline Scenario to 2022

Trades and Production Occupations	
Underground production and development miners	1,755
Labourers in mineral and metal processing	1,185
Construction millwrights and industrial mechanics (except textile)	1,125
Heavy equipment operators (except crane)	780
Industrial electricians	645
Crane operators	540
Machine operators, mineral and metal processing	510
Central control and process operators, mineral and metal processing	500
Heavy-duty equipment mechanics	460
Truck drivers	420
Material handlers	400
Welders and related machine operators	370
Underground mine service and support workers	300
Mine production support workers	255
Construction trades helpers and workers	175
Steamfitters, pipefitters and sprinkler system installers	135
Drillers and blasters — Surface mining, quarrying and construction	85
Carpenters	45
Plumbers	15
Other trades helpers and workers	5
Total	9,705
Professional and Physical Science Occupations	
Geologists, geochemists and geophysicists	290
Mining engineers	230
Industrial and manufacturing engineers	150
Metallurgical and materials engineers	110
Mechanical engineers	95
Other professional occupations in physical sciences	95
Chemists	55
Electrical and electronics engineers	50
Chemical engineers	25
Civil engineers	25
Geological engineers	5
Other professional engineers, n.e.c. (not elsewhere classified)	0
Biologists and related scientists	0
Total	1,130

Human Resources and Financial Occupations	
Financial auditors and accountants	200
Human resources managers	95
Financial managers	85
Specialists in human resources	55
Financial and investment analysts	45
Total	480

Support Workers	
Inspectors and testers, mineral and metal processing	230
Production clerks	135
Secretaries (except legal and medical)	115
Dispatchers and radio operators	85
Inspectors in public and environmental health and occupational health and safety	80
Administrative clerks	65
Transportation route and crew schedulers	15
Construction estimators	15
Engineering inspectors and regulatory officers	0
Cooks	0
Total	740

Technical Occupations	
Geological and mineral technologists and technicians	290
Chemical technologists and technicians	140
Industrial engineering and manufacturing technologists and technicians	115
Electrical and electronics engineering technologists and technicians	75
Mechanical engineering technologists and technicians	75
Drafting technologists and technicians	35
Land surveyors	35
Mapping and related technologists and technicians	10
Land survey technologists and technicians	5
Civil engineering technologists and technicians	5
Biological technologists and technicians	0
Total	785

Supervisors, Coordinators, and Foremen

Supervisors, mineral and metal processing	655
Supervisors, mining and quarrying	540
Primary production managers (except agriculture)	260
Contractors and supervisors, mechanic trades	70
Engineering managers	60
Construction managers	15
Contractors and supervisors, pipefitting trades	10
Total	1,610

Source: Mining Industry Human Resources Council, December 2012

Notable Trends and Potential HR Issues

As shown by the forecasts and trends presented in this report, the mining industry in the Sudbury area faces a number of potential HR issues. These include:

- On an occupational basis, the greatest hiring requirements in the region are in the “*trades and production occupations*.” This category includes occupations such as heavy equipment operators, truck drivers and production miners, as well as other trades’ positions such as construction millwrights and industrial mechanics, welders and related machine operators and industrial electricians. With several new mines expected to come online over the forecast period, extraction and production positions may become increasingly difficult to fill.
- The demographics and aging of the workforce indicate that the industry in Sudbury will soon be losing a large number of experienced workers. Survey respondents indicated that as much as 40 per cent of their current workforces will become eligible to retire over the next five years. The average age of retirement in mature operations in the region is 59.5 years, well below the national average age of 62 years for the overall Canadian labour force. This could pose a significant challenge as their replacements may lack the experience and workplace intuition that comes with many years’ experience on the job.
- The category with the second greatest hiring requirements is “*supervisors, coordinators, and foremen*”. This is not surprising, given the outlook for the Sudbury area, the mix of activities being undertaken, and the need for more trades and production workers — who will need to be managed and supervised. These supervisory roles are normally occupied by employees with significant experience in the industry. The fact that a majority of these experienced workers are eligible to retire over the next decade underscores a key replacement challenge — the need to attract and retain new employees now to provide them with the opportunity to build their depth of experience and develop the competencies required for the supervisory roles they will need to assume.
- Although some occupational categories have comparatively lower hiring requirements they may still pose a recruitment challenge. “*Professional and physical science*” and “*technician and technology*” occupations, for example, require workers who are educated, experienced and highly skilled. The number of workers sought may be lower but these positions can prove difficult to fill — largely because qualified personnel are highly mobile, and have higher levels of formal education and adaptable skill sets. This makes attracting and retaining them difficult and resource-intensive.

Given the above potential HR challenges, various options will need to be explored and seriously considered. For example:

- Immigration should be explored as a key source of talent for the Sudbury area. Mining is a global industry and many skilled workers are already coming to Canada to find opportunities; however, new Canadians tend to settle in large urban centres. Survey responses indicated that mining employment of new Canadians in the Sudbury area is less than 5 per cent which is slightly below the national average for mining, which is at 8.7 per cent. Employers in the area may be able to achieve positive results by implementing strategies to attract new Canadians from other large cities across Canada such as Toronto, Vancouver and Montreal.
- Women are broadly under-represented in Canadian mining (14 per cent compared to 47 per cent in the national labour force). Furthermore, the women employed in the industry mainly occupy administrative and clerical roles. Survey results indicate that women are under-represented in mining in Sudbury. While not a Census estimate, the survey respondents reported that women represent 9 per cent of their mining workforce on average – with employers providing a range of 5 to 33 per cent. Efforts to remove potential barriers and ensure opportunities for women in the industry will be key to meeting future hiring requirements in Sudbury.
- Attracting youth and skilled workers from colleges and universities are important solutions to address Sudbury’s future hiring requirements. Specific partnerships and initiatives are discussed later in this report.
- Internal pay (and bonus) structures (and its impact on employee movement within an organization), may also be important for the industry to examine, particularly when trying to convince their current labour pool to fill supervisory roles.



Available Talent—Ontario

Available Talent – Ontario

A natural reaction to MiHR's hiring requirements forecasts is a desire to know more about the potential sources of talent to meet projected needs. MiHR has recently developed new forecasting capabilities to project total available talent for the same 66 key mining occupations included in its hiring requirements forecasts. Currently, these talent projections have been developed at the provincial level only — largely due to challenges with reliably tracking mobility rates at a sub-provincial level.

While MiHR is not yet able to disaggregate these forecasts to a regional level, the provincial-level projections can provide an indicator of the needs of a specific region, assuming that the region will attract a portion of the talent available to the province as a whole. The numbers presented here are intended to provide insights into the gaps that Sudbury can expect to face in meeting its hiring needs over the next decade. They also help to inform the recommendations at the end of this section on ways to increase the region's share of available talent, as well as potential strategies to grow the talent pool.



Forecasting Talent Availability for the Province of Ontario

MiHR's model for available talent includes specific occupations identified as critical to the mining industry. This model first projects the pool of labour that the mining industry is expected to draw from — for each occupation — and then predicts the proportion of that pool that the industry will successfully attract in a given year.

The share of talent that the mining industry is able to attract varies among occupations — depending on how specific an occupation is to the mining industry. For example, the mining industry has historically attracted approximately 100 per cent of underground mine service and support workers, but only 3 per cent of HR specialists. The predicted share for the mining industry is based on historic patterns — reflecting the industry's traditional capacity to attract and retain talent compared to all other industries drawing from that same occupation pool. Talent share is typically stable over time. As the mining industry attempts to increase its own share, it is likely that competition from other industries will intensify in response.

Available Talent for Ontario Mining

Although a number of the occupations included in the dataset are specific to mining, many are not; therefore, total supply of talent was forecast by occupation across all industries. This allowed MiHR to assess the potential pool of Ontario workers available to the mining industry. The analysis also estimates the number of workers in each occupation that are historically attracted to employment in mining — permitting an assessment of the relative tightness of the mining labour market for each occupation.

MiHR forecasted annual supplies of workers in all industries across all 66 occupations, and estimated the mining industry's share of the talent pool based on historic trends on the flow of workers into the mining industry.

The available talent for each occupation can be reasonably estimated using predictions for new entrants into the labour market — based on migration trends, school leavers and people re-entering the market. This model assumes relative equilibrium in current supply. It also assumes that those already employed or seeking employment will remain in the province (not necessarily with the same employer) or be captured as exiting the labour pool in “exit” estimates. Using this stock and flow model, new entrants represent the pool of available talent to fill hiring needs over the forecast horizon.

Table 5 shows the availability of talent over a two, five, and ten-year horizon for the province of Ontario. According to model projections, there will be approximately 509,800 new entrants into Ontario's labour force for the selected 66 occupations. Historically, the mining industry in Ontario has attracted 3 per cent of new entrants. Assuming this rate remains constant, Ontario's mining industry can expect to attract 14,900 new entrants over the next 10 years.

Table 5
Cumulative Available Talent, Ontario — All Sectors and Mining
66 Occupations — 2014, 2017, 2022

	2014	2017	2022
Total entrants for 66 occupations, all industry sectors	137,900	277,000	509,800
Mining's share of entrants for 66 occupations (assuming the historic rate of 3 per cent)	4,000	8,000	14,900

Source: Mining Industry Human Resources Council, December 2012
(Estimates may not add perfectly due to rounding).



Addressing the Gaps

Addressing the Gaps

Just as the nature of talent gaps differs among occupations, so do the strategies to address the gaps. The responsibility to develop and implement these strategies does not rest with industry employers alone, but also with industry associations, community stakeholders, education and training institutions and governments. The importance of all stakeholders working together to attract and retain talent is critical not only to the mining areas across Ontario, but to the Ontario economy as a whole.

Increasing Mining's Share of Available Talent

As mining competes for more than its traditional share of the talent pool, other industries will respond with attempts to maintain or expand their own shares; as a result, the competition for talent will simply increase. In order to attract more entrants from an existing pool, and boost the human resources capacity in the mining industry, various public and private sector industries need to work together.



Increasing Awareness and Improving Industry Image

The ability of the mining industry to attract talent from other sectors is however, sometimes limited by unfavourable perceptions about the industry, especially among young people and parents. Therefore, finding opportunities to showcase the industry as a viable career choice and a source of interesting, technically sophisticated employment will be important for attracting new talent.

Although Sudbury has embarked on several strategies to increase awareness and challenge perceptions about the industry, more can be done. For example, more effort could be placed on:

- Supporting programs and initiatives that provide young people with first-hand exposure to the industry;
- Promoting a career in mining earlier in the education system (i.e., in elementary school) rather than waiting until late high school or the post-secondary level;
- Branding the industry as an attractive employer and showcasing the various job opportunities and occupations available;
- Launching recruitment campaigns targeted at universities, alumni groups, other related industry sectors and communities with comparator industry sectors in decline;
- Investigating transitional training initiatives with other employers in the resource industry (e.g., forestry-to-mining transition).
- Expanding and coordinating initiatives to engage, develop, support and provide essential skills development and employment opportunities for local Aboriginal populations.

Growing the Talent Pool

Targeted efforts to re-attract retirees and retain mature workers have proven to be good mitigation strategies where talent — particularly experienced talent — is not yet available. These efforts ensure that an already small labour pool does not shrink further and that experienced workers remain in the workforce to mentor younger workers and rapidly increase their future potential in the workforce.

In some cases however, there simply aren't enough people in the talent pool to meet the mining industry's needs. While Sudbury has the advantage of being a well-established mining centre in Northern Ontario, the number of younger workers will not be enough to replace the current workforce. As noted, the industry needs to collaborate with government, education and others to attract more entrants from all sources and grow the talent pool. These solutions are generally longer term in nature and require coordinated and streamlined efforts by everyone.

Possible approaches to growing the talent pool might include:

- Exploring ways to increase flexibility in apprenticeship and skills-training programs to develop new workers at a faster rate, without compromising safety and/or quality of training;
- Increasing participation and collaboration by all stakeholders — especially employer representatives — in local education taskforces, planning boards and committees;
- Coordinating industry efforts with local educational institutions to provide work-experience programs and encouraging graduates to remain in the area;

- Supporting participation in MiHR's Canadian Mining Certification Program (CMCP), which provides a nationally-recognized credential to experienced workers in previously unrecognized mining-specific occupations such as Underground Miner, Minerals Processing Operator, Surface Miner and Diamond Driller/Diamond Driller Assistant. Professionalizing these occupations will help attract youth and second-career seekers to mining as a chosen employment path.
- Developing a communication strategy targeted at the public and separate school systems to promote the mining sector as an employer of choice;
- Encouraging young women to enter the non-traditional trades and adjusting work environments to further accept women in the industry in these occupations;
- Working with key educators (e.g., principals, guidance counsellors and teachers) to integrate mining curriculum and programming, and expanding upon the work of the Prospectors and Developers Association of Canada's (PDAC's) Mining Matters program; and
- Supporting and strengthening communication between employers and educational institutions on emerging labour needs, as it can take years to mobilize resources and institute new training programs to graduate competent new entrants to the market. Employer requirements are usually more immediate than what educational institutions can accommodate. Longer planning horizons for employers and close channels of communication with educators can help to reduce this gap.



Co-op, Apprenticeship and Graduate Level Programs

- Students, including those who graduate from a college program, do not come to companies 100 per cent prepared. For most trades' occupations in the mining industry, occupational learning happens mostly on the job. Thus, it is important for the education system to partner with industry to attain the right balance of classroom learning and “hands-on” learning — where trainees are provided key on-site experiences through co-op and apprenticeship opportunities.
- Sudbury is also a destination for prospective students and apprentices looking to enrol in leading mining programs offered by well-established education and training institutions. For example:
 - Laurentian University has recently announced their new Goodman School of Mines, for professional students entering the industry;
 - The Northern Centre for Advanced Technology (NORCAT) is another example of a training facility that offers industry training in health/safety and common core training at their operating mine; and
 - Cambrian College offers SkyTech whose “mission is to be the training supplier of choice to Northern Ontario industry and students by providing trades training programs” (www.cambriancollege.ca). Collège Boréal also has an industry-college consortium to discuss industry need and college programming in the trades.

Workforce Optimization

Workforce optimization and strategic workforce planning will help ensure that the current workforce is well-tuned and functioning at its best, despite a tightening labour market. Use of optimization and strategic planning tools is often overshadowed by activities aimed at attracting from other industries and growing the labour pool. Optimization analysis should not be confused with downsizing or other reactionary workforce adjustments; it is a joint analysis of workforce management, organizational design, technology, equipment, employee training and development, and business outcomes.



Some key aspects to workforce optimization include:

- Supporting the existing workforce by analyzing and identifying optimal staffing ratios; sources of inefficiencies (e.g. equipment functionality, work process and organizational design); and opportunities for productivity improvements.
- Maintaining awareness of shifts in the industry such as fundamental changes in technology that can have an impact on the mandatory skills of employees, or cause the industry to re-focus on which skills are necessary.

- Finding the optimal level of technology to improve efficiencies but keeping in mind the end-user, the local community and the level of technology that can be supported. For example, Sudbury has innovative research and development expertise that is moving the boundaries of mining technology, so finding that optimal level of technology is crucial.
- Constantly adapting and aligning programs offered at educational institutions with industry needs. Otherwise, the industry will face the undesirable situation of having “jobs without people and people without jobs.” According to key informant interviews, it takes approximately two years to develop and have a new program approved by Ontario’s Ministry of Training, Colleges and Universities. Consequently, even though industry demand for specific programs may be immediate, it may take up to two years for a program to be approved and offered.

Final Considerations — Retaining Talent

As previously mentioned, MiHR research has shown that mining industry employment correlates with its business cycle activity. It is not uncommon for economic conditions, and therefore the employment level, to fluctuate greatly. Given that the industry is generally quick to react to changing business conditions, letting go of, or laying off workers can be a detriment to the industry after conditions improve, as those valuable workers often move on to other industries or locations. Strategic thinking and building loyal employee/employer relationships may put the mining industry in a more competitive position when conditions are favourable.

This could mean making a commitment to employees, so that they reciprocate the commitment and are retained in good times. Creating a stable environment also makes it easier to attract potential employees, who are more confident when they see the prospect of a steady working arrangement. Work-sharing programs and retaining workers with wage reductions during economic downturns are two examples of how companies can avoid losing valuable people they will need to remain competitive in the long run.

Fluctuating business cycles can also create a coordination problem between industry needs and the skills of students being supplied by training programs. As it can take many years to fully prepare someone for the workplace, changing conditions means the education-system response falls behind and is forced to play catch-up. A proactive relationship between industry and education is necessary to grow and retain its future workforce.



Appendices

Appendix A

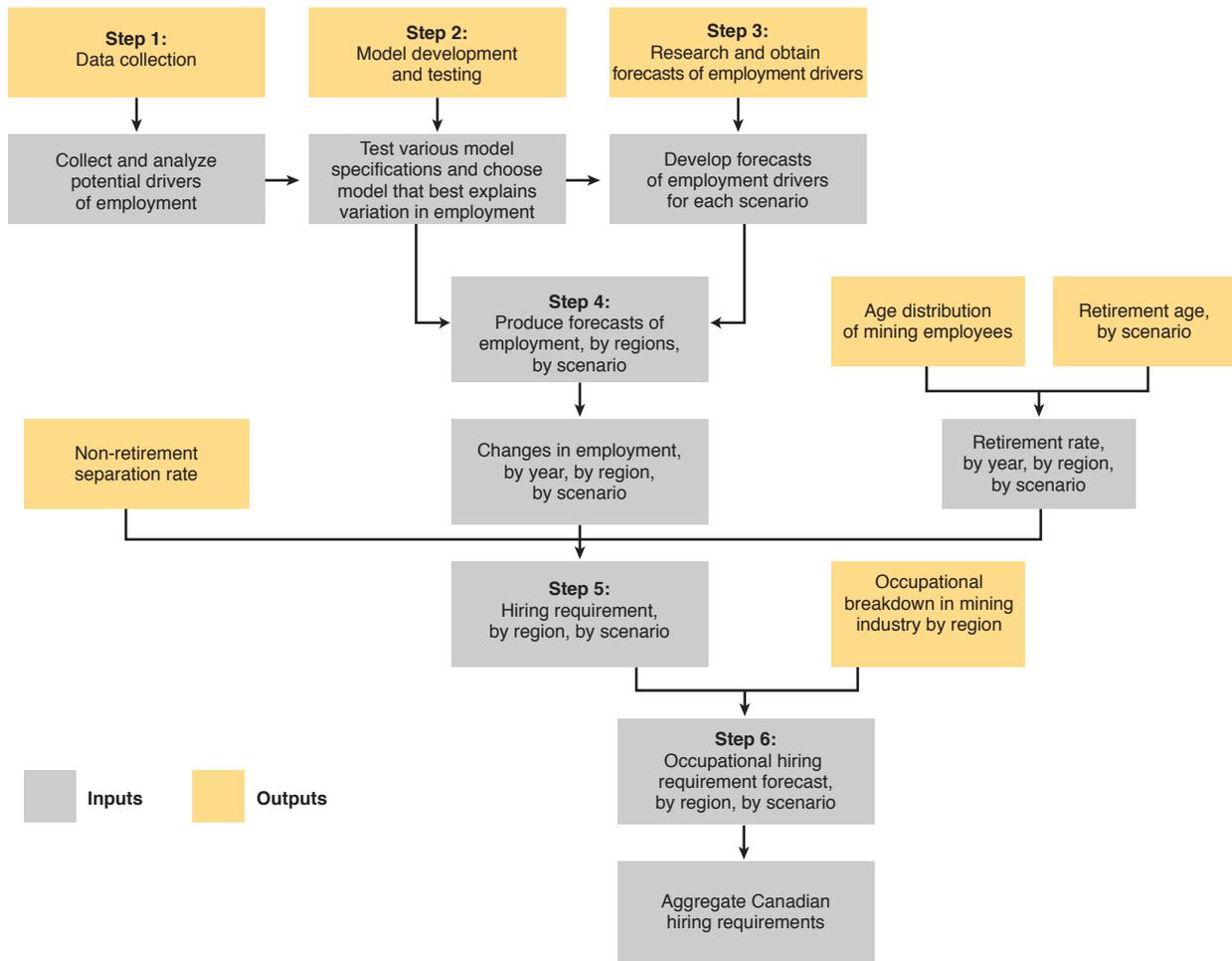
This appendix outlines the methodology used by MiHR to produce forecasts of hiring requirements in the mining industry at the national and provincial levels. A flowchart depicting this methodology is provided in Figure A1. It also describes the model specification and various data used to develop the Sudbury District's forecasts.

Models of employment were estimated based on the following six steps:

- Step 1: Collect and analyze Statistics Canada, Labour Force Survey and other secondary data on commodity prices, labour productivity and population demographics that may potentially explain changes in the number of jobs in the region.
- Step 2: Determine the driver(s) that explain the greatest level of variation in the number of jobs by testing various model specifications through regression analysis.
- Step 3: Produce baseline, contractionary and expansionary forecasts for each driver determined in Step 2.
- Step 4: Combine Steps 2 and 3 to produce the forecasts for employment under baseline, contractionary and expansionary scenarios.
- Step 5: Produce forecasts of the total hiring requirements given the change in employment (determined in Step 4) and estimates of retirement and non-retirement separation rates.
- Step 6: Calculate and apply occupational coefficients to produce estimates of hiring requirements by occupation.
- Step 7: For the Sudbury District, the provincial-level forecast prepared in the previous steps is adjusted based on data inputs for the district, including anticipated major projects expected to go into production, differences in the age structure of the population and levels of labour mobility.

Figure A1

Employment and Hiring Requirements Forecasting Model



Source: Mining Industry Human Resources Council, December 2012

Forecast Methodology

MiHR’s forecasts are based on an economic model that combines a number of factors, including labour productivity, changes in commodity prices, retirement rates and non-retirement separation rates. Using a combination of independent economic forecasts and information from industry stakeholders, the model translates these factors into forecasts of mining employment and hiring requirements over a 10-year period.

The Sudbury hiring requirements forecasts are the result of adjusting and partitioning the hiring requirements forecast from MiHR’s provincial model for Ontario and injecting region-specific intelligence from other data sources. The provincial model was customized using data from Statistics Canada’s 2011 Census, Labour Force Survey data, and data collected in the district – triangulated with data from key informant interviews and a survey of industry employers.

Labour Productivity

Labour productivity is influenced by various factors and trends that affect the level of a sector's output over time — for example, technology advancements and training can increase workers' productivity. On the whole, labour productivity has an inverse relationship with the overall level of employment. As productivity grows, the sector is able to “do more with less,” which means that higher levels of productivity tend to be associated with contractions in employment needs. In the model, the Sudbury District's mining labour productivity is assumed to be identical to the productivity forecast for the Ontario mining industry as a whole.

Minerals and Metals Prices

Mining employment in Canada tends to be more volatile than in many other sectors, making long-term workforce planning more challenging. In large part, the volatility of mining employment is a result of reactionary workforce adjustments — due to the large and sometimes unpredictable fluctuations in the prices and demand for mining commodities. MiHR research demonstrates a strong positive correlation between movements in commodity prices and the overall level of mining employment in Canada.

As a result, the model includes a consensus on minerals and metals prices for the forecast period that was custom-designed for use in the MiHR system. Authorities contributing to this consensus include the World Bank, Bank of Canada, private sector Canadian banks and commodity-specific economic analysis consultancies.

Retirement Rate

Over the next decade, the entire Canadian labour force is facing a looming wave of retirements, as members of the baby-boom generation become eligible to leave the workforce. However, it is difficult to predict the timing of retirements. The decision to retire is a complex one and each individual considers a number of factors such as financial goals, levels of debt and savings, family circumstances, health status, retirement policies and other labour market pressures. The complex nature of individual retirement decisions is an important factor when developing predictions for future retirement rates.

MiHR uses a conservative approach when estimating retirement rates. Historical retirement ages are considered and a profile of expected retirement is created based on the age demographics of the region. For this forecast, the demographics for the province of Ontario are used as a basis for the district's age demographics but these were adjusted, taking into account local industry inputs.

Non-Retirement Separation Rate

The non-retirement separation rate captures important movement and churn in the labour market that are not directly related to a change in the overall level of employment. This variable includes, for example, individuals leaving the mining industry in the Sudbury district for another industry sector or for the mining industry in another region, as well as people leaving the labour force for other non-retirement reasons such as death or disability, or to return to school.

A challenge inherent to producing a forecast on the district level is that the relatively small geographic area of a regional-level analysis of the labour market dictates that workers' mobility should be considered. Workers are exceptionally mobile within a region, as compared to the provincial and national levels of analysis. They are able to live in an outside region while working in the Sudbury district or easily travel from the district to other regions to work.

This makes developing a non-retirement separation rate for the region difficult and poses challenges around how workers should be counted. Should they be counted based upon where they contribute to the economy through spending and living, or based on where they work and contribute through an employer's spending and investment in the region? In this forecast, individuals are counted on the basis of where they live.

These challenges are unique to the analysis of a district's labour market. As a result, MiHR has adopted conservative forecast estimates that were validated through industry consultation. In order to reflect the significantly higher labour mobility at the district level, MiHR doubled the assumed non-retirement exit rate used for the provincial forecasts — from 2 to 4 percent.

Forecast Scenarios

This report presents three forecast scenarios that adjust assumptions to illustrate a range that the hiring requirements may take over the forecast period. The baseline scenario uses a consensus forecast for commodity prices and productivity changes over the forecast period. Accounting for the consensus forecasts, the baseline scenario is the most likely path that hiring requirements will take — given the assumptions listed above and current operating environments. The expansionary scenario assumes that commodity prices are stronger than the consensus forecast (leading to increased mining activity) and that labour productivity is lower than the historic trend — providing an upper boundary for the hiring requirements forecast. Conversely, the contractionary scenario assumes commodity prices that are weaker than the consensus forecast (leading to less mining activity) and labour productivity higher than the historic trend — providing a lower boundary for the hiring requirements forecast.

In addition to model inputs, information from key informants, Statistics Canada, Natural Resources Canada, and MiHR research was incorporated to develop the forecast for mining employment in the district. In particular, the baseline scenario assumes that known advanced development projects will move forward as currently predicted. The model and resulting hiring requirements forecasts are deliberately conservative, taking into account the uncertainty in the economic cycle. This approach assumes that mine development may take longer than the forecast period as projects move through construction and into production phases.

Appendix B

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.

Industry Definition and Scope

Statistics Canada, the main source of Canada's labour market information, uses two different coding systems to classify employment 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-S system was developed by Statistics Canada and Human Resources and Skills Development Canada (HRSDC) to provide standardized descriptions of the work that Canadians perform in the labour market. NOC-S codes organize labour-force participants according to the nature of work they perform, thereby enabling similar occupations to be grouped. NOC-S codes are specific to Canada.

There is no single NAICS code that directly corresponds to all phases of the mining cycle (exploration, development, extraction, processing and reclamation). Similarly, there is no single set of NOC-S categories that pertains 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-S systems provide a means for grouping statistics to obtain estimates of employment and workforce demographics using Statistics Canada data sources. A full description of both classification systems can be found on Statistics Canada's website.

The Mining Sector

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 212: Mining and Quarrying (except Oil and Gas) — This subsector comprises establishments primarily engaged in mining, beneficiating or otherwise preparing metallic and non-metallic minerals, including coal.
- NAICS 213: Support Activities for Mining and Oil and Gas Extraction — This subsector 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.

- 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 5413: Professional sciences and consulting including geosciences, environmental engineering, geophysical surveying and mapping, assay and chemical analysis laboratories, and other surveying and mapping activities.

Occupation Classification

Listed below are the 66 NOC-S codes that MiHR uses to define the occupations that are essential to the exploration and mining sector. Note that the occupation titles listed below are those used in the Statistics Canada system. Often an occupation can have multiple titles and Statistics Canada offers a means to map or connect job titles back to the proper NOC-S code, found on the Human Resources and Skills Development Canada website (specifically the “Quick Search” box).¹⁰

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)” includes 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; and stacker operator — heavy equipment.

NOC Code Title

A111	Financial managers
A112	Human resources managers
A121	Engineering managers
A371	Construction managers
A381	Primary production managers (except agriculture)
B011	Financial auditors and accountants
B012	Financial and investment analysts
B021	Specialists in human resources
B211	Secretaries (except legal and medical)
B541	Administrative clerks
B573	Production clerks
B575	Dispatchers and radio operators
B576	Transportation route and crew schedulers
C012	Chemists
C013	Geologists, geochemists and geophysicists
C015	Other professional occupations in physical sciences
C021	Biologists and related scientists

¹⁰ <http://www5.hrsdc.gc.ca/NOC/English/NOC/2011/Welcome.aspx>

C031	Civil engineers
C032	Mechanical engineers
C033	Electrical and electronics engineers
C034	Chemical engineers
C041	Industrial and manufacturing engineers
C042	Metallurgical and materials engineers
C043	Mining engineers
C044	Geological engineers
C048	Other professional engineers.
C054	Land surveyors
C111	Chemical technologists and technicians
C112	Geological and mineral technologists and technicians
C121	Biological technologists and technicians
C131	Civil engineering technologists and technicians
C132	Mechanical engineering technologists and technicians
C133	Industrial engineering and manufacturing technologists and technicians
C134	Construction estimators
C141	Electrical and electronics engineering technologists and technicians
C153	Drafting technologists and technicians
C154	Land survey technologists and technicians
C155	Mapping and related technologists and technicians
C162	Engineering inspectors and regulatory officers
C163	Inspectors in public and environmental health and occupational health and safety
G412	Cooks
H013	Contractors and supervisors, pipefitting trades
H016	Contractors and supervisors, mechanic trades
H111	Plumbers
H112	Steamfitters, pipefitters and sprinkler system installers
H121	Carpenters
H212	Industrial electricians
H326	Welders and related machine operators
H411	Construction millwrights and industrial mechanics (except textile)
H412	Heavy-duty equipment mechanics
H611	Heavy equipment operators (except crane)
H621	Crane operators
H622	Drillers and blasters — Surface mining, quarrying and construction
H711	Truck drivers
H812	Material handlers
H821	Construction trades helpers and workers
H822	Other trades helpers and workers
I121	Supervisors, mining and quarrying
I131	Underground production and development miners
I141	Underground mine service and support workers
I214	Mine workers
J011	Supervisors, mineral and metal processing
J111	Central control and process operators, mineral and metal processing
J121	Machine operators, mineral and metal processing
J125	Inspectors and testers, mineral and metal processing
J311	Workers in mineral and metal processing



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