



2013

## Algoma Mining Hiring Requirements Forecasts

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## EMPLOYMENT ONTARIO

*The views expressed in this document do not necessarily reflect those of Employment Ontario.*

This work is the result of an unprecedented partnership among six workforce planning boards in Northern Ontario.



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### For more information, contact:

Algoma Workforce Investment Committee  
68 Dennis Street, Suite 206  
Sault Ste. Marie, ON P6A 2W9

Tel: (705) 941-9341  
Fax: (705) 941-9588  
Email: [info@awic.ca](mailto:info@awic.ca)  
Website: [www.awic.ca](http://www.awic.ca)

Mining Industry Human Resources Council  
260 Hearst Way, Suite 401  
Kanata, ON K2L 3H1

Tel: (613) 270-9696  
Fax: (613) 270-9399  
Email: [research@mihrc.ca](mailto:research@mihrc.ca)  
Website: [www.mihrc.ca](http://www.mihrc.ca)  
Website: [www.mininghrforecasts.ca](http://www.mininghrforecasts.ca)

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# Executive Summary

## Executive Summary



Resource-based industries are a vital part of a strong Northern Ontario economy. 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. Development of the mineral deposits in the Ring of Fire area will create jobs and better position the Northern Ontario economy for future sustained growth.

However, human resources challenges threaten this 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. Research by the Mining Industry Human Resources Council (MiHR) has demonstrated that regional analysis of the mining labour market is very valuable; it provides important intelligence about local industry conditions, labour market pressures, and predictions of future needs.

This report was prepared for the Algoma Workforce Investment Committee (AWiC) and deals with the geographic region of Algoma. Developed from a provincial forecast for Ontario, the forecast presented here was customized to capture the unique conditions and context of mining in the Algoma District. This is one of six separate reports on districts across Northern Ontario — the other five include: Sudbury; Cochrane and Timiskaming; Kenora and Rainy River; Nipissing; and Thunder Bay. The goal is to empower these districts and others across Ontario to create effective labour market and workforce planning strategies — based on an understanding of mining operations and challenges specific to their region.

In the Algoma District, mining industry activities have traditionally included the full spectrum — from exploration and development to production and processing. In the view of industry stakeholders, the labour market will remain competitive in Algoma and in the northern region in general. With current gold mining activities, Algoma’s mining industry is going through a growth phase with a number of advanced development projects that are expected to come into full production. However, similar to other Northern Ontario districts, Algoma is also facing a demographic shift. Algoma is experiencing an increase in youth out-migration and overall decrease in local populations. With increased expansion in mining and exploration activities, Algoma’s mining industry will need more skilled and trained individuals, already in short supply. In addition, the region has low participation rates among Aboriginal peoples, women and new Canadians.

MiHR research indicates employment in the mining sector is more cyclical than in many other industries in Canada.<sup>1</sup> Previous labour market forecasts produced by MiHR show that despite economic conditions, future hiring requirements will be quite significant across Canada, even under contractionary (i.e., poor economic outlook) scenarios. These same trends are evident in the labour market forecast for the Algoma District.

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.<sup>2</sup> This model uses a variety of factors to predict changes in employment in the mining and minerals exploration industry, including commodity prices, productivity factors and demographic data. The 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 change in employment and replacement requirement due to retirement and other exits from the labour force.



MiHR forecasts for Ontario were modified to produce regional forecasts for each of the six areas in question for these reports. Sub-provincial forecasting presents a number of unique challenges that do not exist in preparing forecasts at provincial and national levels. To address these challenges in its methodology, MiHR adapted a number of provincial assumptions to produce district-specific data. Adaptation was 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<sup>3</sup>.

1 Canadian Mining Industry Employment and Hiring Forecasts, 2011.

[http://www.mihhr.ca/en/publications/resources/employment\\_hiringforecasts2011\\_FINALAug4\\_ENG.pdf](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.

Table 1 shows forecasted hiring requirements for the Algoma District’s mining industry. 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. Forecasts are presented for three scenarios — baseline, contractionary and expansionary. Mining sector employment in the Algoma District was estimated at almost 5,145 workers in 2012. Under the baseline scenario, the projected cumulative hiring requirements over the next 10 years will be approximately 4,820 workers. A projected 4,670 workers would be needed in a contractionary scenario, and 4,980 workers in an expansionary scenario.

**Table 1**  
**Cumulative Hiring Requirements Forecast — Algoma**  
**By Scenario — 2022**

	Net Change in Employment	Replacement Requirements		Cumulative Hiring Requirements
		Retirement	Non-Retirement Separation	
Contractionary	1,570	1,690	1,410	4,670
Baseline	1,690	1,720	1,420	4,820
Expansionary	1,810	1,730	1,440	4,980

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

Based on discussions with stakeholders, the mining industry in the Algoma District faces a number of potential HR issues. These include:

- Issues related to aging workforce;
- Pending retirements of highly knowledgeable and experienced workers;
- Low participation rates in the mining industry among Aboriginal peoples, women and new Canadians;
- Challenges in attracting local youth to mining professions;
- Poor image of the industry among the District’s citizens;
- Shortages of skilled labour with newly emerging coordination among industry employers and education stakeholders;
- Challenges in attracting immigrants to the community.



# Background and Scope

## Background and Scope



Human resources challenges are one of the greatest threats to the future competitiveness of the Canadian mining industry.<sup>4</sup> 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 experienced and skilled workers is becoming more difficult and competition continues to increase across all sectors of the 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. Research by the Mining Industry Human Resources Council (MiHR) has demonstrated that regional analysis of the mining labour market is very valuable; it provides important intelligence about local industry conditions, labour market pressures and predictions of future needs.

This report was prepared for the Algoma Workforce Investment Committee (AWiC) and deals with the geographic region of the Algoma District. Developed from a provincial forecast for Ontario, the forecast presented here was customized to capture the unique conditions and context of mining in Algoma. This is one of six separate reports on districts across Northern Ontario — the results of a cutting-edge partnership between MiHR and the six Northern Ontario Workforce Planning Boards. Each report presents a regional-level outlook that follows MiHR's labour market forecasting model.

Reports have also been prepared for five other Northern Ontario regions: Sudbury; Cochrane and Timiskaming; Kenora and Rainy River; Nipissing; and Thunder Bay. The goal is to empower these districts and others across Ontario to create effective labour market and workforce planning strategies — based on an understanding of mining operations and challenges specific to their region.

### MiHR's Labour Market Forecasting System

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.<sup>5</sup> This model uses a variety of factors to predict changes in employment in the mining and minerals exploration industry, including commodity prices, productivity factors and demographic data. The forecasts are prepared for two-, five- and ten-year time horizons, and are presented using three economic scenarios — contractionary, baseline and expansionary.

<sup>4</sup> Ernst and Young, Business Risks Facing Mining and Metals, 2010.

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

The data inputs to the MiHR forecasting model include Statistics Canada data (including, but not limited to, Census and Labour Force Survey), inputs on several economic indicators, and Natural Resources Canada Mineral Exploration and Mine Production data. This was 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 Algoma’s hiring requirements forecasts.

Sub-provincial forecasting presents a number of unique challenges that do not exist in preparing forecasts at 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 in its methodology, MiHR adapted a number of provincial assumptions to produce district-specific data. Adaptation was 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 their district<sup>6</sup>.

### 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. The MiHR forecasts presented here include 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.



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

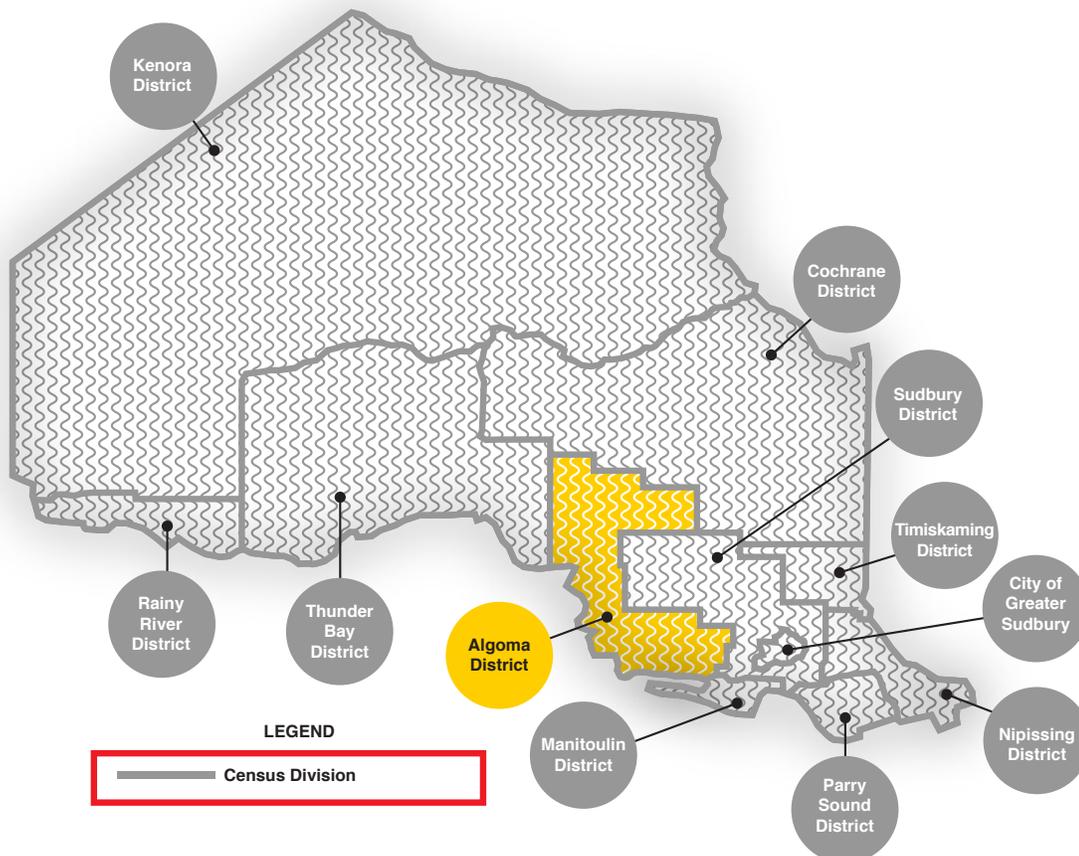
The industry is mainly defined using North American Industry Classification Codes (NAICS) and National Occupational Classification for Statistics (NOC-S) codes. Statistics Canada and other LMI sources organize their data according to these classification codes. Together, the NAICS and NOC-S systems allow 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.

### District Research

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 local scope; set region-specific 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 local information, MiHR reached out to industry stakeholders in the districts through a survey on mining industry profile, labour market needs and human resources trends.

In Algoma, ten employers participated in surveys and interviews. Stakeholders included government, education, industry associations, and employers in extraction, exploration and development, and in mining support-services sectors. These inputs guided MiHR to validate and adjust assumptions used in its employment modelling and forecasts for the district.

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 in the last two quarters of the year. The key factor underlying this deterioration was the ongoing euro-area sovereign debt and banking crisis. With the continued uncertainty, global exploration and mining activity slowed in 2012, casting a shadow over industry prospects for the near-term.

However, fluctuations are a reality in the mining industry 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 in the latter part of 2012. Nonetheless, Canada's economic outlook remains positive amid continued global uncertainty and a tenuous global recovery. Canadian economic growth is forecasted 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 2008-2009 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 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 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 U.S. governments have indicated they will act as needed to provide stimulus to help sustain recovery. This is a clear message 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 U.S. 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 slight downward price corrections.

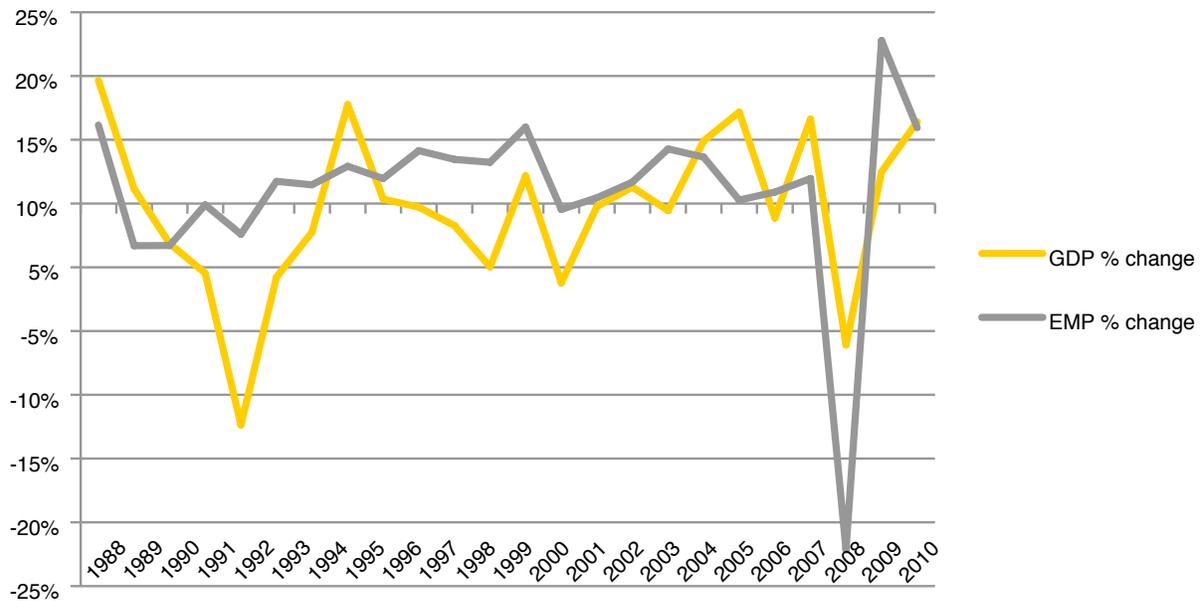
Despite this cyclical rollercoaster, demand for Canadian metals and minerals is expected to grow in the long term. This prediction arises from the gradual but stable economic growth in the U.S. and from the relatively high economic growth rates of China, India and Brazil. These countries' large domestic 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.

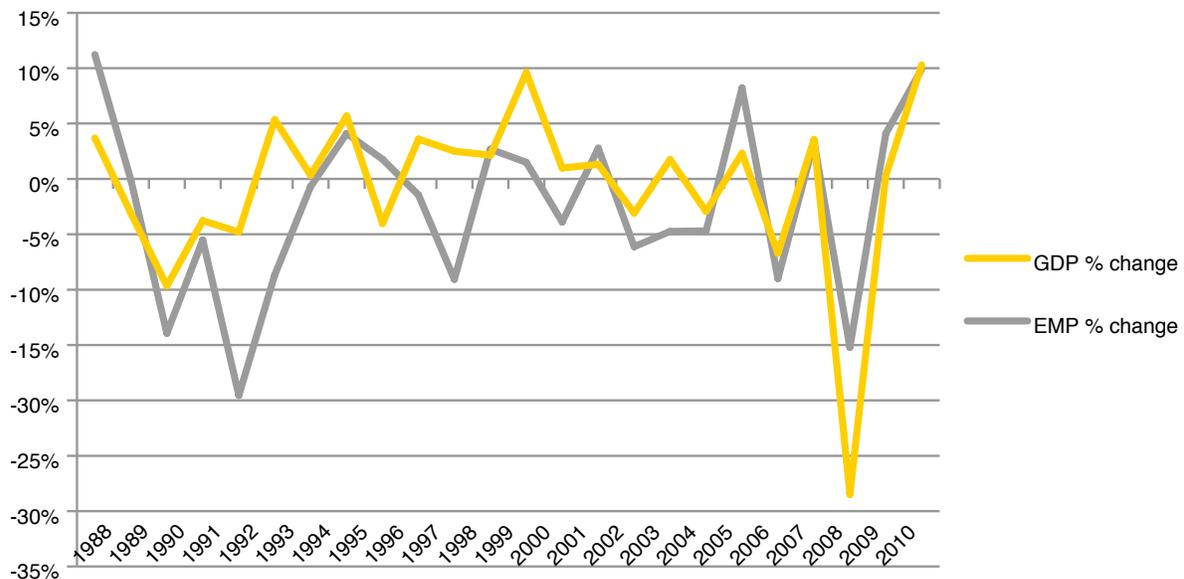
Canadian mining industry employment is sensitive to changes in GDP. Figures 2 and 3 depict this relationship in Canada and in Ontario.

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



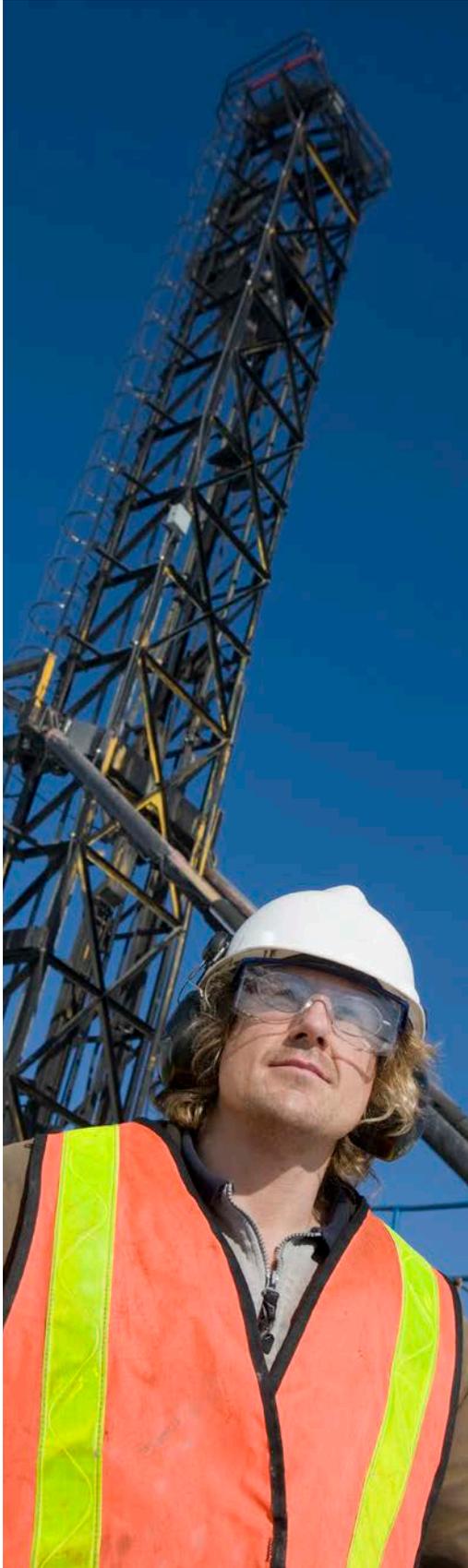
### **The Northern Ontario Mining Industry and the Ring of Fire**

Resource-based industries are a vital part of a strong Northern Ontario economy. 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. Development of the mineral deposits in the Ring of Fire area will create jobs and better position the Northern Ontario economy for future sustained growth. 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.

### **Regional Labour Market**

In the Algoma District, mining industry activities have traditionally included the full spectrum — from exploration and development to production and processing. In the view of industry stakeholders, the labour market will remain competitive in Algoma and in the northern region in general. Current gold mining activity in Algoma is expected to expand; and advanced development projects are expected to come into production over the short term. The District also has down-stream mineral processing facilities that require workers with specialized skills sets.

According to the MiHR survey of local employers, the mining labour market in the Algoma District is going through transformation. Regional respondents to MiHR's survey questionnaire indicated that employment in mining, exploration, development and support activities will likely increase in the region over the next 10 years. Most employers reported business conditions as favourable and expected conditions to remain the same or improve in the year ahead. Employers in the District tend to anticipate workforce needs in advance and react quickly (within 6 months) to economic conditions.



The slow but definitive decline in Algoma’s population —coupled with a demographic profile that includes an aging population, outward youth migration, and low participation rates by Aboriginal peoples, women and new Canadians — illustrates the challenges the region faces with respect to training employees for highly skilled mining positions. Consultations held in Wawa with District employers revealed concerns with an aging workforce and early retirement; hiring and retaining experienced workers; training and education initiatives and building sustainable communities and reducing reliance on the commuter workforce.

Respondents to MiHR’s survey of employers 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 7 per cent. Workers who commute into the region are mainly coming from elsewhere in Ontario. Turnover or churn was reported at about 15 per cent for employers, but ranged between less than 1 per cent to as much as 40 per cent, depending on the employer’s activities and operating context.

#### **The Aging Workforce in Algoma**

During consultations, the region’s mining employers underscored the impact of the aging labour force in the Algoma District, where the median age of the population is 47. This fragile labour force profile is further exacerbated by a significant number of pending retirements; around 25 per cent of the population in Algoma is over age 60. Findings from MiHR’s survey of employers revealed that the average age of respondents’ workforces was 42 years old, with some employers reporting an average age of as high as 52. Employers reported up to 20 per cent of their workforces are eligible to retire in the next 12 months, with between 2 and 10 per cent more becoming eligible over the next 3 years, and up to 20 per cent more eligible in 3 to 5 years. The average age of retirement is not tracked by many respondents, but the few who do track it reported between 55 and 65 years.

Industry stakeholders reported that some companies had implemented programs to mitigate the effects of the aging workforce. These included innovative workplace programs such as job-sharing between older and younger workers, mentorship and retention of recently retired workers in an advisory capacity.

### **Algoma Education and Training**

Employers participating in the research mentioned that hiring and retaining an experienced workforce is a challenge. They pointed out that during boom cycles companies can resort to employing individuals with little or no experience in mining, in order to fill positions and meet demands for contracts and work outputs. However, even though workers from other sectors such as forestry have transferable skills, a new entrant in mining needs vigorous training and onboarding. Of particular importance is Occupational Health and Safety. Respondents noted that inadequate safety training not only increases risk of work hazards but also negatively affects productivity targets. Similarly participants agreed that the lack of experienced individuals in the labour market has resulted in a competition for skills and labour that is resulting in aggressive HR practices and firms competing with one another for talent. Rather than continue to compete and shuffle around talent already working in the industry, employers agreed that joint efforts to attract, train, and develop new talent will prove important in the future.

Education and training is top of mind as employers wrestle with critical skills shortages in the District. Respondents to MiHR's survey reported that on average 45 per cent of their workforce is at a high school level of education, 25 per cent have completed college education, 35 per cent have received trade certification and just under 15 per cent have a university level of education. Over three quarters of employers reported outsourcing at least one component of education and training for their organization, including health and safety, Common Core training, leadership and managerial, apprenticeships, skills development, and language training.

Employers in the region rely most heavily on word of mouth, printed job postings, and company websites when recruiting talent. Very few (less than 5 per cent) of employers reported using job fairs, radio or TV, or recruiting agencies. Few employers indicated that they recruit directly from schools to find talent.

### **Algoma's Potential to Employ Aboriginal Peoples and Other Diverse Groups**

Responses to MiHR's survey showed that nearly 15 per cent of mining workforces in the Algoma District are Aboriginal peoples; with a range of approximately 5 per cent to as much as 30 per cent. Note that these are averages 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, particularly those with partnership agreements with local communities.

Other demographic characteristics of the survey respondents' workforces are similar to the national patterns observed for mining. About 20 per cent of respondents' workforces are female with a range of less than 5 per cent to as much as 50 per cent. Employers reported less than 5 per cent of their workforces are new Canadians or temporary foreign workers.



## Algoma District Hiring Requirements

## Algoma District Hiring Requirements



MiHR research indicates that employment in the mining sector is more cyclical than in many other industries in Canada.<sup>7</sup> 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 2012 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 over the next 10 years.

Projections for Ontario mirror the national trends. The range for Ontario mining hiring projections is estimated from 51,600 to 65,800 workers. Even under a moderate hiring outlook (the baseline scenario), MiHR projects the need to hire over 59,000 mining 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 Algoma District; even under a contractionary scenario — where total employment in the District's mining sector increases by 36 percent — close to 4,700 workers will need to be hired to meet demands of new job growth and offset workforce attrition due to retirements and other separations.

### Cumulative Hiring Requirements Forecast

Table 1 shows forecasted hiring requirements for the Algoma District's 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 the Algoma District was estimated at about 5,145 workers in 2012. Under the baseline scenario, the projected cumulative hiring requirements over the next 10 years will be approximately 4,820 workers. A projected 4,670 workers would be needed in a contractionary scenario, and 4,980 workers in an expansionary scenario.

<sup>7</sup> Canadian Mining Industry Employment and Hiring Forecasts: A MIWIN Report, 2011.  
[http://www.mihr.ca/en/publications/resources/Employment\\_HiringForecasts2011\\_FINALAug4\\_ENG.pdf](http://www.mihr.ca/en/publications/resources/Employment_HiringForecasts2011_FINALAug4_ENG.pdf)

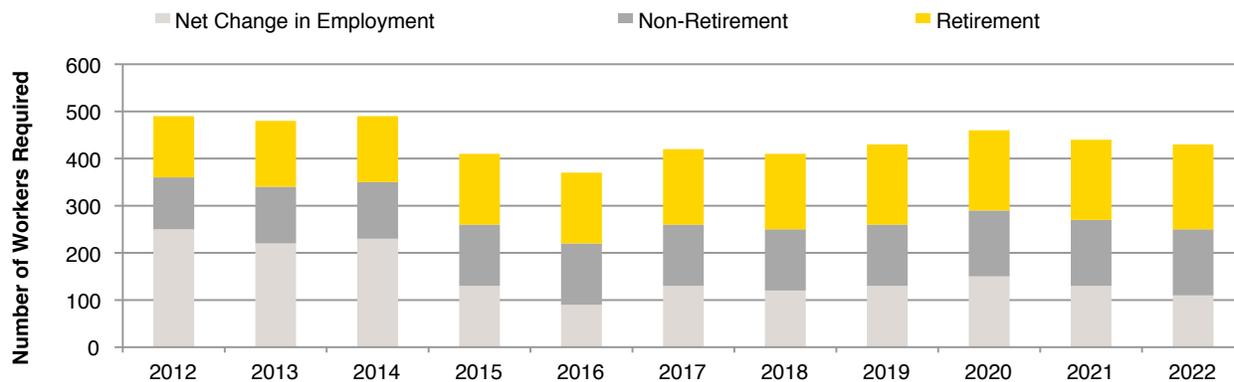
Table 1  
Cumulative Hiring Requirements Forecast — Algoma by Scenario — 2022

	Change in Employment	Replacement Requirements		Cumulative Hiring Requirements
		Retirement	Non-Retirement Separation	
Contractionary	1,570	1,690	1,410	4,670
Baseline	1,690	1,720	1,420	4,820
Expansionary	1,810	1,730	1,440	4,980

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

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

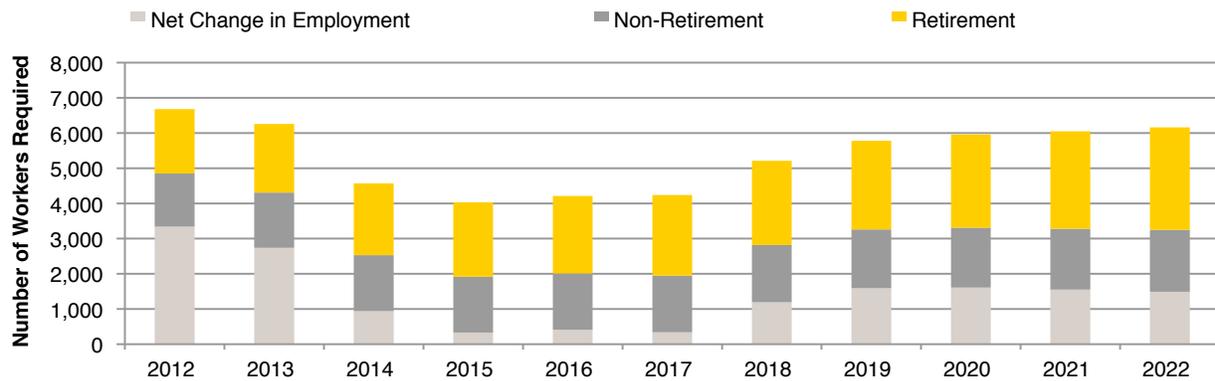
Figure 4  
Annual Hiring Requirements Forecasts — Algoma  
Baseline Scenario — 2012 to 2022



Source: Mining Industry Human Resources Council

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  
(Estimates may not add perfectly due to rounding.)

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

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

	Cumulative Hiring Requirements		
	2014	2017	2022
Contractionary	1,430	2,540	4,670
Baseline	1,460	2,650	4,820
Expansionary	1,500	2,770	4,980

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

## Hiring Requirements Forecast By Occupation

The occupational hiring requirements for the Algoma 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 phases.

The estimates in Table 3 provide an indication of needs for training and other supports in Algoma, for particular occupational groupings.

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).

**Table 3**  
Cumulative Hiring Requirements Forecast by Occupational Category<sup>8</sup> – Algoma District, Baseline Scenario – 2014, 2017, 2022

	Cumulative Hiring Requirements		
	2014	2017	2022
Trades and Production Occupations	605	1070	1940
Professional and Physical Science Occupations	70	120	225
Human Resources and Financial Occupations	30	50	95
Support Workers	45	80	150
Technical Occupations	45	90	155
Supervisors, Coordinators, and Foremen	100	175	320
All Other Occupations	415	765	1405
<b>Total</b>	<b>1310</b>	<b>2350</b>	<b>4290</b>

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

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 regional-specific data sets, such as the ones used here, the error margins for an occupation-specific breakdown are high and the forecasts should be interpreted with caution.

<sup>8</sup> 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 region-specific data set. 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 5 workers.

**Table 4:**  
**Occupational Breakdown of Hiring Requirements Forecast — Algoma District**  
**Baseline Scenario — to 2022**

<b>Trades and Production Occupations</b>	
Underground production and development miners	350
Labourers in mineral and metal processing	240
Construction millwrights and industrial mechanics (except textile)	225
Heavy equipment operators (except crane)	155
Industrial electricians	130
Crane operators	110
Machine operators, mineral and metal processing	100
Central control and process operators, mineral and metal processing	100
Heavy-duty equipment mechanics	90
Truck drivers	85
Material handlers	80
Welders and related machine operators	75
Underground mine service and support workers	60
Mine labourers	50
Construction trades helpers and labourers	35
Steamfitters, pipefitters and sprinkler system installers	25
Drillers and blasters — Surface mining, quarrying and construction	15
Carpenters	10
Plumbers	5
Other trades helpers and labourers	0
<b>Total</b>	<b>1940</b>
<b>Professional and Physical Science Occupations</b>	
Geologists, geochemists and geophysicists	60
Mining engineers	45
Industrial and manufacturing engineers	30
Metallurgical and materials engineers	20
Mechanical engineers	20
Other professional occupations in physical sciences	20
Chemists	10
Electrical and electronics engineers	10
Chemical engineers	5
Civil engineers	5
Geological engineers	0
Other professional engineers, n.e.c.	0
Biologists and related scientists	0
<b>Total</b>	<b>225</b>

<b>Human Resources and Financial Occupations</b>	
Financial auditors and accountants	40
Human resources managers	20
Financial managers	15
Specialists in human resources	10
Financial and investment analysts	10
<b>Total</b>	<b>95</b>

<b>Support workers</b>	
Inspectors and testers, mineral and metal processing	45
Production clerks	25
Secretaries (except legal and medical)	25
Dispatchers and radio operators	15
Inspectors in public and environmental health and occupational health and safety	15
Administrative clerks	15
Transportation route and crew schedulers	5
Construction estimators	5
Engineering inspectors and regulatory officers	0
Cooks	0
<b>Total</b>	<b>150</b>

<b>Technical Occupations</b>	
Geological and mineral technologists and technicians	60
Chemical technologists and technicians	30
Industrial engineering and manufacturing technologists and technicians	25
Electrical and electronics engineering technologists and technicians	15
Mechanical engineering technologists and technicians	15
Drafting technologists and technicians	5
Land surveyors	5
Mapping and related technologists and technicians	0
Land survey technologists and technicians	0
Civil engineering technologists and technicians	0
Biological technologists and technicians	0
<b>Total</b>	<b>155</b>

Supervisors, Coordinators, and Foremen	
Supervisors, mineral and metal processing	130
Supervisors, mining and quarrying	110
Primary production managers (except agriculture)	50
Contractors and supervisors, mechanic trades	15
Engineering managers	10
Construction managers	5
Contractors and supervisors, pipefitting trades	0
<b>Total</b>	<b>320</b>

### Notable Trends and Potential HR Issues

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

- On an occupational basis, the greatest hiring requirements for the region are in the “*trades and undesignated occupations.*” This is consistent with the requirements that MiHR has found across the country. The production and extraction phases of mining are labour-intensive and workers in these roles will become more mobile. The Algoma District has advanced development projects expected to move into production phases over the forecast horizon. This will place more pressure on these occupations.
- The demographics and aging of the workforce indicate that the industry in the Algoma District will soon be losing a large number of experienced workers. This could pose a significant challenge, as their replacements may lack the experience and workplace intuition that come with many years’ experience on the job.
- The category with the second-greatest hiring requirements is “*supervisors, coordinators, and foremen.*” This need is not surprising, given the outlook for the region and the mix of activities being undertaken — with new mines projected to begin operations over the forecast period. 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 key challenges: retain and re-engage experienced employees, and provide opportunities to build and develop newer employees in the competencies required for the supervisory roles.



- 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 both educated and experienced. The number of workers sought may be lower but these positions can prove difficult to fill — largely because the 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.
- Employers responding to MiHR surveys expressed concern that the mining industry as a sector has failed to attract young people in the District. They stated that negative media publicity, lack of mining related curriculum in schools, and few strategies to attract youth are some of the factors that contribute to the challenges. Stakeholders felt that there is a need for career awareness programs in mining to attract local youth to mining specific jobs.
- Immigration will be another key source of talent for the District. 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 Algoma District (much less than 5 per cent) is well below the national average for mining, which is 8.7 per cent. Employers in the district may achieve positive results by implementing strategies to attract immigrant talent from large cities.
- Women are broadly under-represented in Canadian mining (14 per cent compared to 47 per cent in the overall national labour force). Furthermore, the women employed in the industry occupy mainly administrative and clerical roles. Survey results indicated that women are comparatively under-represented in mining in the Algoma District. While not a Census estimate, the surveys suggested that women represent 20 per cent of the mining workforce on average — with employers providing a range of 0 to 50 per cent. Efforts to remove potential barriers and ensure opportunities for women in the industry will be a key to meeting future hiring requirements in the district.
- The Algoma district pursued several actions in 2011 and 2012 to address specific industry needs, including the skills shortage. AWIC implemented many initiatives in this period, all designed to build on previous committee activities including: *Youth Careers in Innovation Presentations; the Green Collar Economy Conference; Remote Employment Opportunities Workshop for People with Disabilities; and supporting the Algoma and Manitoulin Youth Enterprise Camp.*
- In the absence of a shared training resource across the region, companies are often called upon to provide internal training to Aboriginal workers. The Algoma District is home to three colleges and a university, providing opportunities for innovative education and training approaches. For example, the industry and one or more educational institutions could collaborate to develop courses tailored to industry needs.



# Available Talent—Ontario

## Available Talent – Ontario

A natural reaction to MiHR’s hiring requirements forecasts is a desire to know more about potential sources of talent to meet the 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 the Algoma District 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. The 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 mining’s traditional capacity to attract and retain talent compared to all other industries drawing from the 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 data set 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



## 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, educational institutions and governments. By working together to support the mining industry's ability to attract talent, stakeholders will enable a key economic sector to progress to the benefit of Ontario's economy as a whole.

### **Increasing Mining's Share of Available Talent**

In some cases, industry, education and government must aim to attract more entrants from an existing pool (i.e. carve out a larger slice of the talent pie); however, this is not an easy undertaking. As mining competes for more of its traditional share of the talent pool, other industries will respond with attempts to maintain or expand their own shares; the competition for talent will simply increase.

Furthermore, as the competition for talent heats up, other complications arise. For example, workers become more mobile and look for options in other sectors or other regions. In some cases, employers feel driven to offer higher salaries and increased benefits in a bid to retain talent. These strategies may result in short-term gains but quickly become unsustainable.

To address these types of gaps, employers, educational institutions and governments can do the following:

- Work together to promote careers in Ontario mining to youth, workers in other provinces and new immigrants.
- Support the career-awareness and outreach activities of various associations, such as the local planning boards.
- Adopt a consistent industry brand that promotes positive impressions of mining careers and dispels myths. MiHR's *Explore for More* brand can be readily adapted to provincial and regional needs.
- Coordinate and expand initiatives to engage, educate, train and provide employment opportunities for under-represented and under-utilized segments of the labour force, such as women, new Canadians, and members of local Aboriginal communities.
- Create a community of practice to share experiences, initiatives and practices, and to create synergies among regional employers in attracting new talent. For example, collaborative and cooperative hiring campaigns and career fairs could be held within Ontario and in other provinces, to inform skilled workers outside the region about the mining employment opportunities that exist within the region.



## Growing the Talent Pool

In other cases, there simply aren't enough people in the talent pool to meet the mining industry's needs. The industry and its counterparts in education and government must strive to increase the number of entrants and grow the talent pool (i.e. make the talent pie bigger). These solutions are generally long-term and require coordinated and streamlined efforts among employers, government, educators and industry associations.

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.

Possible approaches to growing a talent pool include:

- Government, employers and educators could explore ways to increase flexibility in apprenticeship and skills-training programs to develop new workers at a faster rate, without compromising quality of training.
- Enhance participation and collaboration by all stakeholders — especially employer representatives — in local education task forces, planning boards and committees.
- Coordinate industry efforts with local educational institutions to provide work-experience programs and encourage graduates to remain in the local area.
- Support and strengthen efforts to facilitate communication between employers and educational institutions on the topic of emerging labour market needs. 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 reduce this gap.
- Invest in pre-employment and in-house training programs to ensure equal opportunities for all communities of interest, as well as smooth transitions from training to employment.



## Appendices

## Appendix A

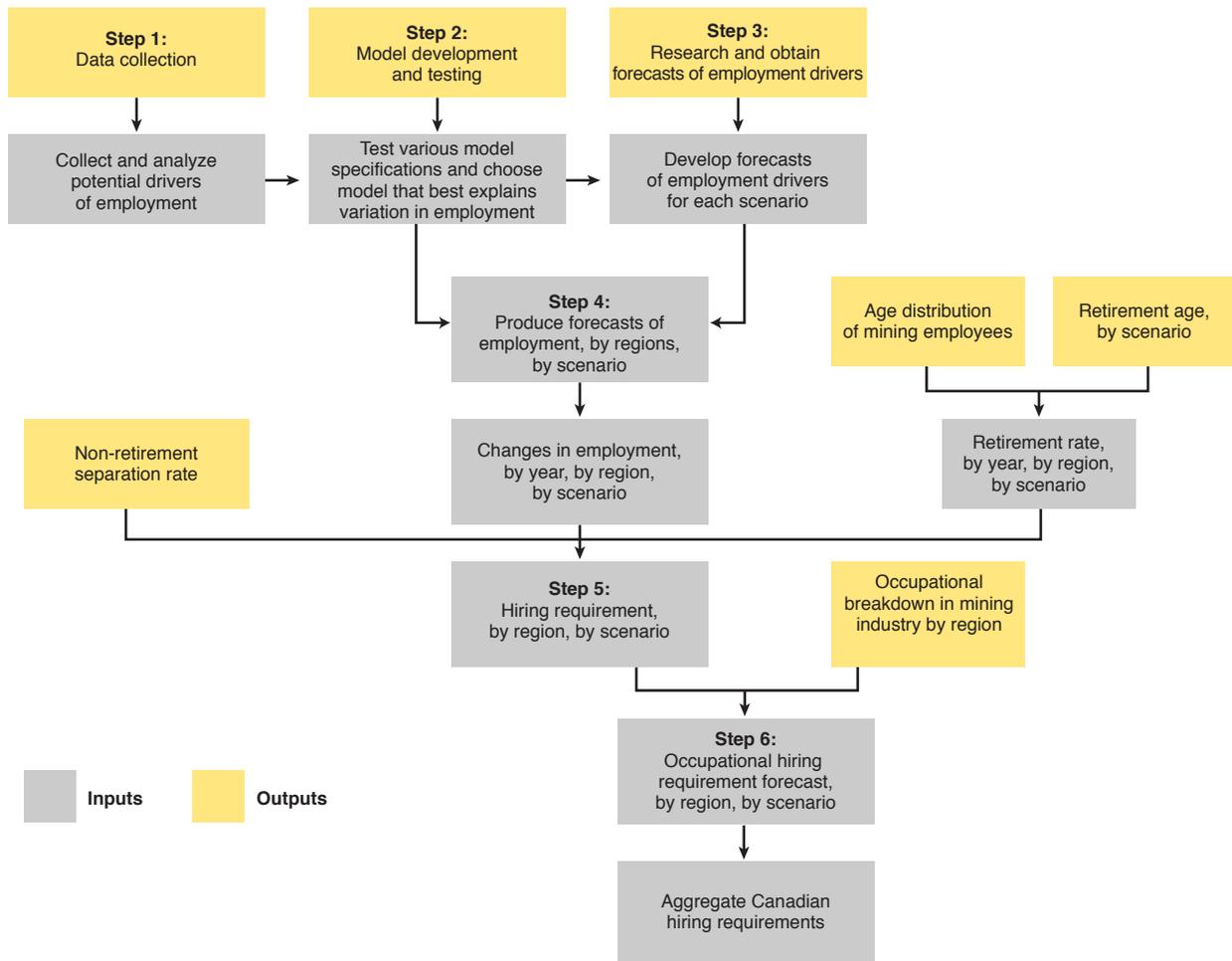
This appendix outlines the methodology used by MiHR to produce forecasts of hiring requirements in the mining industry at the national and provincial levels. A flowchart depicting this methodology is provided in Figure A1. It also describes the model specification and various data used to develop the Algoma 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 Algoma 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 Algoma 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 Algoma 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 Algoma 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 forecasting labour markets on the district level is the fact that the relatively small geographic area of a regional-level analysis 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 Algoma District or to 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 per cent.

### 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 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-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).<sup>9</sup>

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

<sup>9</sup> See <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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