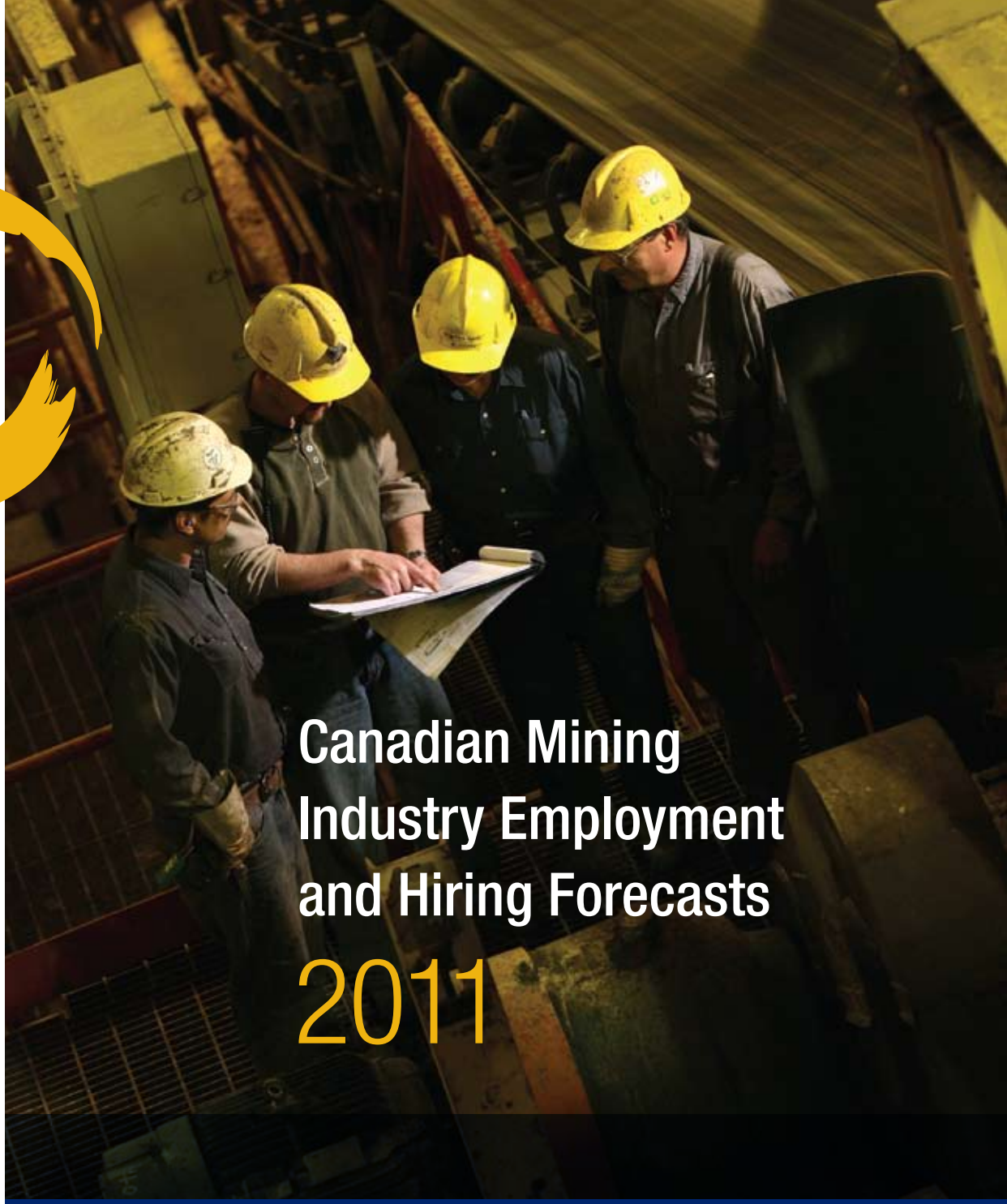

Canadian Mining Industry Employment and Hiring Forecasts 2011

A Mining Industry Workforce Information Network Report

MIHR RHIM | MINING INDUSTRY HUMAN RESOURCES COUNCIL

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1

Background and Overview

Canada's mining industry is a global leader, with the value of mineral production amongst the highest in the world. Mining accounts for roughly 3.5 per cent of the nation's real GDP, $9.7 billion in capital spending[1] and more than $3.3 billion in royalty/mining tax payments.[2] While demand for commodities from both developing economies and industrial economies is expected to remain robust over the forecast period, the Canadian mining industry faces pressures as it strives to meet this demand.

Human resources challenges are one of the largest threats to the future competitiveness of the Canadian mining industry.[3] The looming retirement of the baby boom generation, the difficulty attracting and engaging younger workers, and an under-representation of diverse groups such as women and new Canadians, all contribute to the human resources challenges. Further Aboriginal engagement is also crucial since Aboriginal communities represent a large source of labour close to a significant number of mining operations. While the industry has made tremendous strides in addressing these issues, finding experienced and skilled workers is becoming more difficult, and competition across sectors of the economy is increasing.

This report updates MiHR's 2010 *Canadian Mining Industry Employment and Hiring Forecasts*. As part of the Mining Industry Workforce Information Network (MIWIN), this report also incorporates the most extensive research and analysis available on Canada's mining labour market.

1 The Mining Association of Canada, "The Canadian Mining Industry: Overview, Issues and the Way Forward," April 2010.

2 The Mining Association of Canada, "Revenues to Governments from the Canadian Mineral Sector 2002-2009," July 2010.

3 Ernst and Young, *Business risks facing mining and metals*, 2010.

This edition of the report includes adjustments to the MiHR forecasting model. The most important forecast adjustments are updates to the economic variables and the Commodity Price Index. The general improvement in the outlook for the global economy and for commodities is the principal reason why hiring requirements in this 2011 report differ from those of the 2010 report.

The information contained in this report is intended for all industry stakeholders, including workers, employers, educators, students and governments. MiHR's 2010 *Canadian Mining Industry Employment and Hiring Forecasts* contains a detailed account of research and methodology for MiHR's forecasts. All stakeholders are encouraged to consult and use that report as another important source of information about Canada's mining labour market.

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: 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.

Forecasts presented in the report rely heavily on data from Statistics Canada. Thus, North American Industry Classification Codes (NAICS) and National Occupational Classification for Statistics (NOC-S) codes are used to define the mining industry.

There is no single NAICS code or set of codes that directly corresponds to all phases of the mining cycle. Similarly, there is no single set of NOC-S categories that pertain to only mining. People employed in occupation groups that are prevalent in mining also work in a variety of other industries.

Together, the NAICS and NOC-S systems provide a means for grouping statistics to obtain estimates of employment and workforce demographics using Statistics Canada data sources. Details on the NAICS and NOC-S codes included in the forecasts are found in Appendix C.

About the Report

This report consists of three main sections. The first section is an overview of the economic conditions affecting the mining industry in Canada and the broad trends in the mining sector labour market. The second section presents the hiring requirements forecast for the industry on a national level, as well as the hiring requirements forecasts for the six regions that MiHR has the ability to assess. The final section of this report discusses ways in which the industry can address some of its hiring requirements in the future. It also describes MiHR's plans for incorporating improvements to its labour market forecasts into the 2012 edition of its employment and hiring forecasts report.

2

Economic Overview and Mining Labour Market Trends

Economic Overview

The extended global boom over much of the last decade created unprecedented demand for commodities, as the demands of emerging markets began to compete with established demand. This period resulted in strong economic growth for the Canadian mining industry and over the last 20 years, the value of the minerals and metals sector remained between 3.0 per cent and 4.5 per cent of Canada's real[4] gross domestic product (Real GDP).[5]

The global recession that began in 2008 led to a substantial drop in the demand and prices for commodities. This decline drove down the value of Canadian mineral production, resulting in operations being shuttered or suspended at nearly 32 Canadian mines.[6] The close relationship between commodity prices and employment in the sector is illustrated in Figure 1. MiHR research shows that commodity prices and mining employment are strongly and positively correlated.

While economic growth has resumed, volatility in commodity prices and economic uncertainty continue. As the recession demonstrated, the mining sector is highly sensitive to sudden shifts in global demand. The slow recovery in some developed countries, along with the inflationary pressures in emerging markets, could combine to suppress commodity demands. In the short-term, tight supply levels — combined with a recovery of global demand — are expected to lead to modest increases in minerals and metals prices.[7] Over the medium- and longer-term however, prices are expected to soften, as the level of global supply increases and demand from emerging markets slows somewhat.[8]

4 Real GDP is a measure of the value of output, which has been adjusted for price effects.

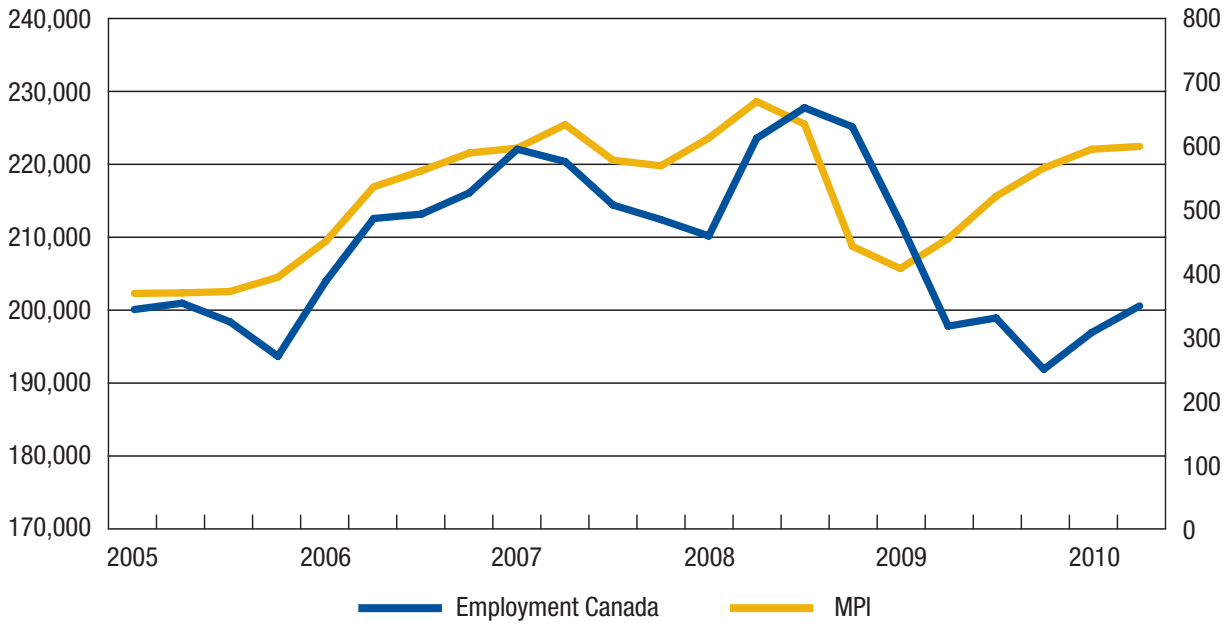
5 Mining Association of Canada, *Facts and Figures 2010, A Report on the State of the Mining Industry*.

6 *Ibid*. (indicates "same as the source above").

7 Bank of Canada, *Monetary Policy Report*, April 2011.

8 *Ibid*.

Figure 1
Mining Employment and the Minerals Price Index (MPI)



Source: Mining Industry Human Resources Council; Bank of Canada; Statistics Canada.

Canada's top 10 minerals by value of production are shown in Table 1. Canada has historically been a world leader in the production of potash and uranium, and near the top in nickel production. The top mineral-producing provinces in 2009 were Ontario, Quebec and British Columbia. Saskatchewan, which had been the top producer in 2008, slipped to fourth place after a sharp decline in potash prices during the global recession.

Table 1
Canada's Top Minerals by Value of Production, 2009[9]

	UNIT	QUANTITY (MILLIONS)	$ VALUE (MILLIONS)
Coal	t	63	4,544
Potash	t	4	3,380
Gold	g	96	3,365
Iron Ore	t	32	3,174
Copper	kg	480	2,775
Nickel	kg	132	2,239
Diamonds	ct	11	1,684
Sand and Gravel	t	216	1,487
Cement	t	11	1,441
Uranium	kg	10	1,392

Source: Mining Association of Canada, Facts and Figures, 2010.

9 Data reported for 2009 are preliminary estimates.

Mining Labour Market Trends

As the baby boom generation begins to reach retirement age over the next decade, Canada is expected to reach a point where there will be more people able to leave the labour force than entering it.[10] This dynamic presents a challenge for all sectors of the Canadian economy and the mining industry is no exception. In fact, the urgency for the mining sector is greater than for many other sectors. Over the last 20 years, the average age of retirement in the Canadian mining industry has been 59.5 — younger than the average of 62 across the entire economy. Thus, the mining industry may face the retirement pressures sooner than other industries.

One means of addressing this looming wave of retirements is to try to increase attraction and retention of key talent groups in the mining workforce. These groups include women, youth, new Canadians and Aboriginal peoples. Increasing their representation will help ensure that the necessary workers are available in both the short- and long-terms.

Currently, the mining industry lags the labour force as a whole in employing women and new Canadians. According to Statistics Canada's 2006 census, the participation of women in mining was just 14 per cent in 2006 (compared to 47 per cent for the entire economy).

The mining industry also under performs compared to the overall economy when it comes to the employment of new Canadians. While immigrants accounted for nearly 21 per cent of the Canadian labour force, Statistics Canada's 2006 Census shows they accounted for only 8.7 per cent of the mining workforce.

When it comes to employing Aboriginal peoples, the mining industry outperforms the rest of the economy, with seven per cent of the mining workforce self-identifying as being of Aboriginal descent, nearly double the rate for the overall labour force.[11] As one of the fastest-growing segments of the Canadian population — and with Aboriginal communities close to many mine sites and operations — they are a large potential pool of workers for the mining industry.

However, the overall change in the Canadian labour market means that increasing the representation of women, new Canadians, youth and Aboriginal peoples in the mining workforce will only partially offset the impact of the aging workforce. In the medium-term, the need to replace older workers will outstrip the availability of younger talent in the labour pool.

Along with broadening the labour pool, the Canadian mining industry will also need to increase productivity to maintain its strong position. Productivity is influenced by a number of different trends, factors and developments that affect the level of a sector's output over time — such as improvements in technology or training methods. Knowledge transfer will become a challenge as experienced workers depart the labour force. This knowledge needs to be captured and transferred to the remaining workforce to reduce the risk of decreased productivity as workers take on new roles.

10 Statistics Canada, *Labour Force Survey*.

11 Statistics Canada, 2006 Census.

3

Forecasted Hiring Requirements in the Canadian Mining Industry

Employment in the mining sector is exceptionally volatile. Previous MiHR research[12] has shown a strong correlation between the level of the Minerals Price Index and mining employment. When commodity prices are high, the industry has historically engaged in significant development and expansion, while a decline in commodity prices has generally led to a contraction of the workforce and the shutting of mine sites or delayed expansion plans.

However, even outside of this volatility, the demographics of the sector's labour force threaten the industry's viability and competitiveness in the near future. The combination of churn in the workforce and the looming retirement of the baby boom generation will require the hiring of tens of thousands of workers, even under a contractionary scenario.

Forecasting Model

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,[13] the model translates these factors into forecasts of mining employment and hiring requirements over a 10-year period.[14]

12 *2010 Canadian Mining Industry Employment and Hiring Forecasts*, MiHR, Summer 2010.

13 MiHR conducts regular surveys of industry stakeholders and consultations through HR forums and sector studies.

14 Further information on MiHR's forecasting model, the methodology used to develop the forecast and key economic forecast assumptions is available in Appendix A and in the *2010 Canadian Mining Industry Employment and Hiring Forecasts* Report.

National Hiring Requirements Forecasts

The overall forecast for Canada is produced by aggregating the change in employment and the hiring requirements of each of the six regions presented in this report.[15]

As was the case in the 2010 report, employment in the Canadian mining industry is expected to continue to decline over the forecast period, fuelled by continuous gains in labour productivity. However, due to an improved outlook for commodity prices, the decline in employment is forecast to be less than what was projected in the 2010 report. Despite the decline in employment, cumulative hiring requirements are forecast to be more than half of the current industry workforce by 2021, due to projected retirements and historical non-retirement separation rates.

Table 2 shows the cumulative change in employment and the replacement-worker requirements under baseline, contractionary and expansionary forecast scenarios. These forecasts are provided over a 10-year horizon. In all three scenarios, the replacement demand resulting from retirements and non-retirement separations will exceed the changes in employment resulting from changes to commodity prices and productivity. The expansionary scenario forecasts a cumulative hiring requirement of 141,540 by 2021. However, changes in employment in this scenario are offset by the number of retiring workers (71,740) and those leaving the mining industry workforce for other reasons (49,300).

Table 2
Total Hiring Requirements Forecasts — Canada[16]
By Scenario — 2021

	CHANGE IN EMPLOYMENT	REPLACEMENT REQUIREMENTS		CUMULATIVE HIRING REQUIREMENTS
		RETIREMENT	NON-RETIREMENT SEPARATION	
Contractionary	–28,200	61,550	41,930	75,280
Baseline	–1,000	67,080	45,940	112,020
Expansionary	20,500	71,740	49,300	141,540

Source: Mining Industry Human Resources Council, Summer 2011.

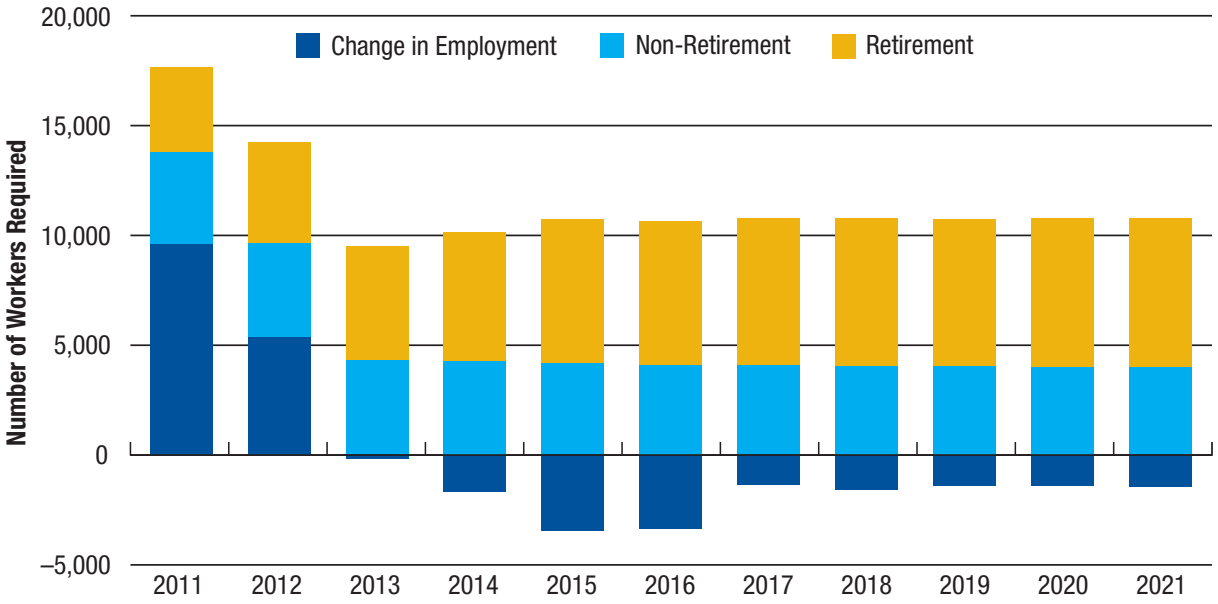
Figure 2 shows the overall hiring requirements of the Canadian mining industry on an annual basis over the forecast period. Except for the first two years of this period, almost all of the hiring requirements will result from workers retiring or departing the mining industry for other reasons. The mining industry faces substantial hiring requirements across the forecast period, with the peak occurring in 2011 — when hiring requirements are expected to reach nearly 18,000 workers and total employment is forecast at just over 201,000.

15 No specific model was developed for Canada as a whole. However, individual forecasting models were developed for each of the six regions in this report. Their results are added together to produce the overall Canadian forecast.

16 Further information about the MiHR model and the economic assumptions used can be found in Appendix A of this report.

The peak in 2011 largely reflects the higher prices and improved demand for commodities in the global economy, as the after-effects of the recession recede. The improved outlook for the Commodity Price Index accounts for the higher employment gains in the first few years of the 2011 forecast — compared to the forecast in MiHR's 2010 report. However, the expected moderation of commodity prices is similar in both reports.

Figure 2
Annual Hiring Requirements Forecasts — Canada
Baseline Scenario — 2011 to 2021



Source: Mining Industry Human Resources Council, Summer 2011.

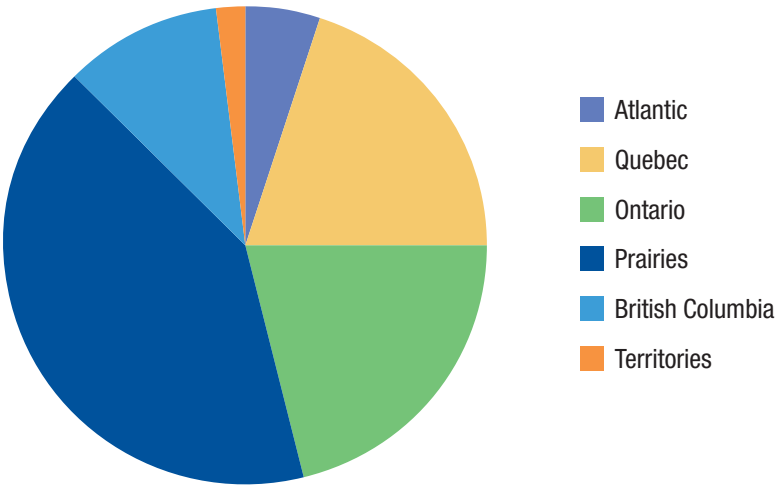
Table 3 condenses the cumulative hiring requirements for Canada over two-, five- and 10-year time horizons under the three different scenarios. Under the baseline scenario, the industry is forecast to need to hire 41,650 workers by 2013 — due to changes in economic factors, and increased retirements and other separations from the industry. This is a higher forecast than in the 2010 report, largely because of higher forecast prices for commodities.

Table 3
Cumulative Hiring Requirements Forecasts — Canada
By Scenario — 2013, 2016, 2021

	CUMULATIVE HIRING REQUIREMENTS		
	2013	2016	2021
Contractionary	33,540	45,760	75,280
Baseline	41,650	64,900	112,020
Expansionary	48,770	80,860	141,540

Source: Mining Industry Human Resources Council, Summer 2011.

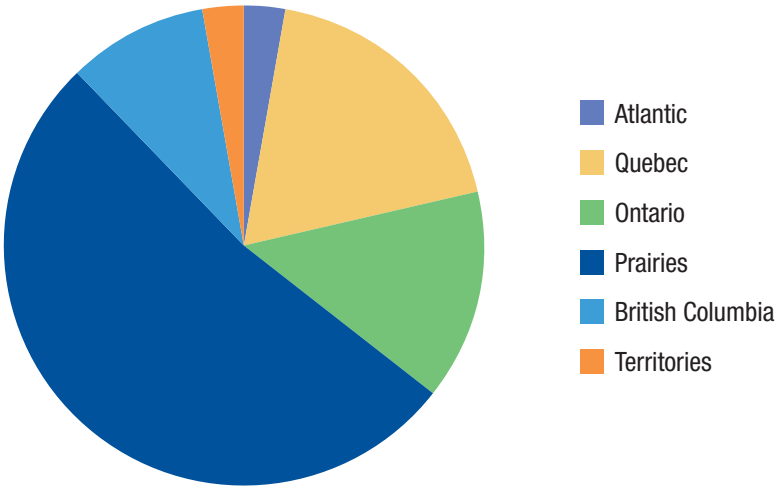
Figure 3
Breakdown of the Mining Labour Force, by Region — Canada
2011



Source: Mining Industry Human Resources Council, Summer 2011.

Under the baseline scenario, by 2021, cumulative hiring requirements are forecast to be just over 112,000 mining workers. Hiring requirements range from 75,280 workers under the contractionary scenario, to 141,540 under the expansionary scenario. Figure 4 shows how the cumulative hiring requirements break down by region, in the baseline scenario.

Figure 4
Breakdown of the Cumulative Hiring Requirements Forecast, by Region — Canada
Baseline Scenario — 2011 to 2021



Source: Mining Industry Human Resources Council, Summer 2011.

Forecasts by Occupation

The current forecasting system includes up to 66 different key mining occupations as defined by NOC-S categories. This is an increase of 10 occupations from the 2010 edition of the forecast, and is part of MiHR's ongoing refinement and improvement to our forecasting model and methodology. With the addition of these NOC-S categories, MiHR's occupational forecast now represents nearly two-thirds of the entire Canadian mining industry workforce (as defined by NAICS industry codes). The selected occupations can be grouped into the following broader occupational categories:

- Trades and Undesignated Occupations
- Professional and Physical Science Occupations
- Managers and/or Financial Occupations
- Support Workers
- Technical Occupations
- Supervisors, Coordinators and Foremen

Table 4 provides estimates of cumulative hiring requirements for the baseline scenario under these broad occupational categories. Each category is further broken down to include hiring requirements forecasts for occupations that are most relevant to the mining industry. Among the different broad occupational categories, the hiring requirements will be greatest for the Trades and Undesignated Occupations at 35,625, which represents nearly 32 per cent of the industry overall hiring requirements by 2021.

Table 4
Cumulative Hiring Requirements — By Broad Occupational Categories and Relevant Occupations[17]
Baseline Scenario — 2013, 2016, 2021

	CUMULATIVE HIRING REQUIREMENTS		
	2013	2016	2021
TRADES AND UNDESIGNATED OCCUPATIONS			
Underground production and development miners	1,605	2,485	4,475
Heavy-equipment operators (except crane)	2,210	3,415	5,795
Truck drivers	1,820	2,940	4,955
Construction millwrights and industrial mechanics (except textile)	1,680	2,465	4,335
Heavy-duty equipment mechanics	950	1,425	2,465
Welders and related machine operators	1,055	1,620	2,755
Mine labourers	450	665	1,140
Industrial electricians	705	1,070	1,915
Underground mine service and support workers	380	575	1,010

(continued over)

17 Figures have been rounded. Occupations with hiring requirements below 15 workers over the forecast period have not been reported.

Table 4 *(continued)*
Cumulative Hiring Requirements — By Broad Occupational Categories and Relevant Occupations
Baseline Scenario — 2013, 2016, 2021

	CUMULATIVE HIRING REQUIREMENTS		
	2013	**2016**	**2021**
Construction trades helpers and labourers	435	680	1,160
Material handlers	380	575	1,065
Central control and process operators, mineral and metal processing	610	915	1,615
Steamfitters, pipefitters and sprinkler system installers	395	660	1,125
Drillers and blasters — Surface mining, quarrying and construction	185	275	465
Crane operators	135	215	365
Machine operators, mineral and metal processing	1,040	1,330	2,330
Other trades helpers and labourers	70	110	180
Labourers in mineral and metal processing	980	1,365	2,545
Carpenters	100	155	260
Plumbers	60	85	145
Total	**13,640**	**20,540**	**35,625**
PROFESSIONAL AND PHYSICAL SCIENCE OCCUPATIONS			
Civil engineers	50	70	120
Geologists, geochemists and geophysicists	500	790	1,370
Mining engineers	235	370	665
Mechanical engineers	135	220	385
Electrical and electronics engineers	85	130	225
Geological engineers	20	35	60
Other professional occupations in physical sciences	65	100	190
Chemical engineers	80	110	185
Industrial and manufacturing engineers	155	230	415
Biologists and related scientists	10	10	20
Chemists	45	70	125
Metallurgical and materials engineers	85	120	220
Total	**1,470**	**2,260**	**3,990**
HUMAN RESOURCES AND FINANCIAL OCCUPATIONS			
Financial auditors and accountants	415	655	1,135
Human resources managers	135	215	375
Specialists in human resources	145	215	365
Financial managers	135	215	375
Financial and investment analysts	45	65	120
Total	**875**	**1,365**	**2,370**

Table 4 *(continued)*
Cumulative Hiring Requirements — By Broad Occupational Categories and Relevant Occupations
Baseline Scenario — 2013, 2016, 2021

	CUMULATIVE HIRING REQUIREMENTS		
	2013	**2016**	**2021**
SUPPORT WORKERS			
Secretaries (except legal and medical)	540	870	1,465
Administrative clerks	140	230	390
Dispatchers and radio operators	195	300	530
Cooks	105	155	250
Production clerks	2,540	3,905	6,960
Construction estimators	10	20	35
Inspectors and testers, mineral and metal processing	385	600	1,110
Transportation route and crew schedulers	150	245	430
Total	**4,070**	**6,330**	**11,185**
TECHNICAL OCCUPATIONS			
Drafting technologists and technicians	105	155	265
Geological and mineral technologists and technicians	565	845	1,470
Land surveyors	70	115	195
Chemical technologists and technicians	210	320	560
Civil engineering technologists and technicians	10	15	30
Mechanical engineering technologists and technicians	90	140	250
Land survey technologists and technicians	20	30	50
Electrical and electronics engineering technologists and technicians	205	285	485
Industrial engineering and manufacturing technologists and technicians	95	145	260
Mapping and related technologists and technicians	10	20	35
Biological technologists and technicians	15	25	35
Total	**1,395**	**2,095**	**3,635**
SUPERVISORS, COORDINATORS, AND FOREMEN			
Primary production managers (except agriculture)	1,170	1,930	3,265
Supervisors, mining and quarrying	770	1,140	2,000
Engineering managers	75	120	205
Contractors and supervisors, mechanic trades	55	95	150
Construction managers	70	120	200
Supervisors, mineral and metal processing	600	820	1,515
Contractors and supervisors, pipefitting trades	310	490	845
Total	**3,050**	**4,715**	**8,180**

Source: Mining Industry Human Resources Council, Summer 2011.

The top occupations in terms of hiring requirements include:

- Production clerks
- Heavy-equipment operators (except crane)
- Truck drivers
- Underground production and development miners
- Construction millwrights and industrial mechanics (except textile)
- Primary production managers
- Welders and related machine operators
- Heavy-duty equipment mechanics
- Machine operators, mineral and metal processing
- Labourers in mineral and metal processing

By 2021, hiring requirements for these occupations will be nearly 37,000 (just over one-third of total hiring requirements).

Regional Hiring Requirements Forecasts

Hiring requirements forecasts are presented for six geographical regions:

- Atlantic
- Quebec
- Ontario
- Prairies
- British Columbia
- Territories

Certain data limitations posed by Statistics Canada privacy policies require this section to present the sub-national hiring requirements forecasts on a regional level, rather than for individual provinces.

Note that comparisons across the regions should be approached with caution. Economic factors affecting changes in employment differ for each region. There are also differences in the age profiles of the mining workforce in different parts of the country. These differences will have the greatest effect at the end of the forecast period, as Canada's population continues to age and the baby boom generation begins to depart the labour force in large numbers.

Table 5 presents an overview of the projected level of mining employment in the different regions for the years 2013, 2016 and 2021, under the baseline scenario. While overall mining employment is forecast to decline for Canada, it is expected to grow in two regions: the Prairies and the Territories. Between 2011 and 2021, employment in the Prairies is expected to grow at an average annual rate

of about 1.0 per cent (approximately 1,000 workers a year), while the Territories' employment is forecast to grow by 1.1 per cent (approximately 50 workers a year) during the same period,[18] under a baseline scenario. Total employment in the four other forecast regions is expected to decline between 2011 and 2021.

Table 5
Total Mining Employment by Region[19]
Baseline Scenario — 2013, 2016, 2021

				AVERAGE ANNUAL GROWTH RATE
	2013	2016	2021	2011–2021
Atlantic	11,100	10,200	8,600	-2.3%
Quebec	41,800	37,100	34,500	-1.7%
Ontario	44,600	38,700	35,800	-2.0%
Prairies	88,000	96,900	97,900	1.0%
British Columbia	21,900	20,500	19,400	-1.1%
Territories	4,000	4,600	4,500	1.1%
Canada	216,600	208,000	200,700	-0.5%

Source: Mining Industry Human Resources Council, Summer 2011.*

* Year-over-year employment growth rates differ in the model from the average annual growth rate column of the table. That column presents the compound annual growth rate over the entire forecast period.

Regional Occupational Breakdowns

Hiring requirements by occupation are presented for each region. The regional breakdowns are calculated by developing an occupational coefficient based on the estimated proportion of the workforce in each occupation.[20]

Atlantic Region

Mining industry employment in the Atlantic region (Newfoundland and Labrador, Nova Scotia and New Brunswick) is forecast to decline at an average annual rate of 2.3 per cent over the next decade, from just over 11,100 in 2011 to 8,600 in 2021. However, the departure of workers due to retirement and other factors means that in all three forecast scenarios, there are positive hiring requirements for the industry.

18 Percentages are compound annual-growth rates derived from MiHR's results.

19 Employment figures have been rounded to the nearest thousand.

20 The information used to develop these coefficients is drawn from Statistics Canada's 2006 Census data and from industry consultations during the model-development process. Limited availability of census data prevented detailed analysis of occupational structure by region for all occupations in the mining industry. The use of the occupational coefficients assumes that the structure of the labour force remains constant over the forecast period.

Table 6 summarizes the cumulative hiring requirements for the region under the three different forecast scenarios, for 2013, 2016 and 2021. Under the baseline scenario, it is predicted that approximately 3,400 workers (representing approximately 30 per cent of the current workforce) will need to be hired by 2021.

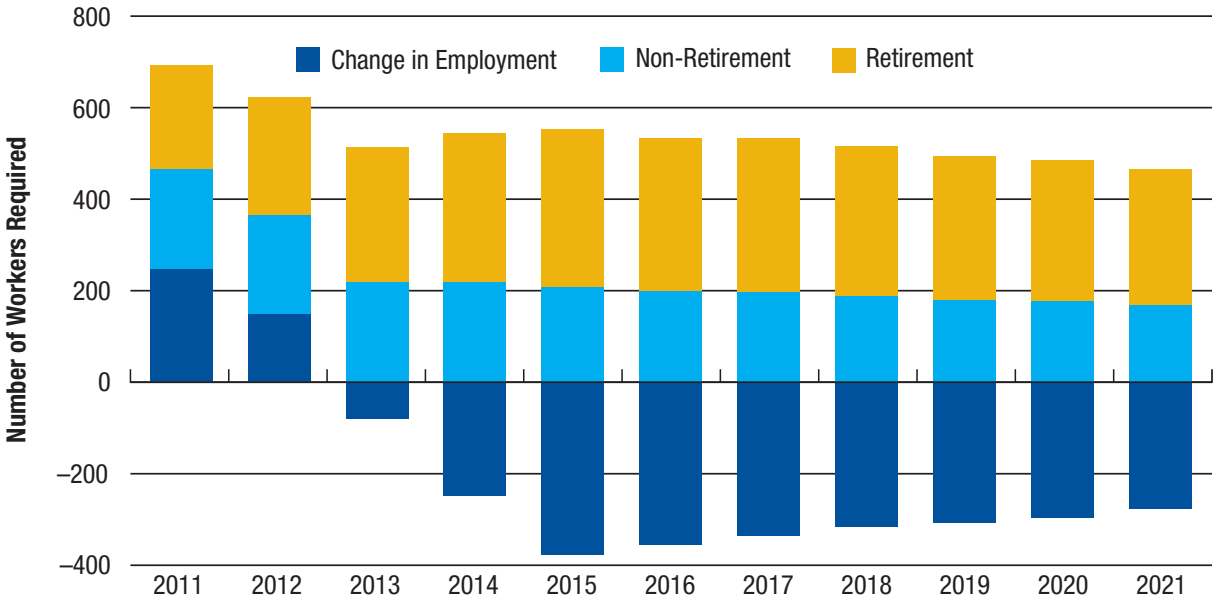
Table 6
Cumulative Hiring Requirements Forecasts — Atlantic Region
By Scenario — 2013, 2016, 2021

	CUMULATIVE HIRING REQUIREMENTS		
	2013	**2016**	**2021**
Contractionary	910	780	720
Baseline	1,780	2,440	3,400
Expansionary	2,670	4,050	5,890

Source: Mining Industry Human Resources Council, Summer 2011.

Figure 5 below shows the hiring requirements for the Atlantic region on a year-over-year basis, for the baseline scenario. While total employment will decline over the forecast period, the mining industry is still expected to hire around 500 workers each year because of retirement and other replacement demands.

Figure 5
Annual Hiring Requirements Forecasts — Atlantic Region
Baseline Scenario — 2011 to 2021



Source: Mining Industry Human Resources Council, Summer 2011.

For specific occupations under the baseline scenario in the Atlantic region, hiring requirements will be greatest for heavy-equipment operators (except crane) and production clerks, as shown in Table 7.

Table 7
Cumulative Hiring Requirements of Top 10 Occupations in the Atlantic Region
By Scenario — 2013, 2016, 2021

TOP 10 OCCUPATIONS	CUMULATIVE HIRING REQUIREMENTS		
	2013	2016	2021
Heavy-equipment operators (except crane)	155	210	295
Production clerks	115	160	220
Underground production and development miners	110	150	210
Truck drivers	75	105	145
Welders and related machine operators	75	100	140
Construction millwrights and industrial mechanics (except textile)	70	100	140
Heavy-duty equipment mechanics	60	80	115
Supervisors, mining and quarrying	55	75	105
Industrial electricians	55	75	100
Mine labourers	45	60	85

Source: Mining Industry Human Resources Council, Summer 2011.

Quebec

The combination of the outlook for iron ore prices and productivity increases are expected to reduce overall mining employment in Quebec by nearly 19 per cent by 2021. However, due to the aging workforce and non-retirement departures from the industry, hiring requirements in the region are expected to be significant. Under the baseline scenario, by 2013, 11,170 workers will be required — increasing to 20,710 by 2021. Even under the contractionary scenario, hiring requirements are forecast to exceed 17,200 by 2021.

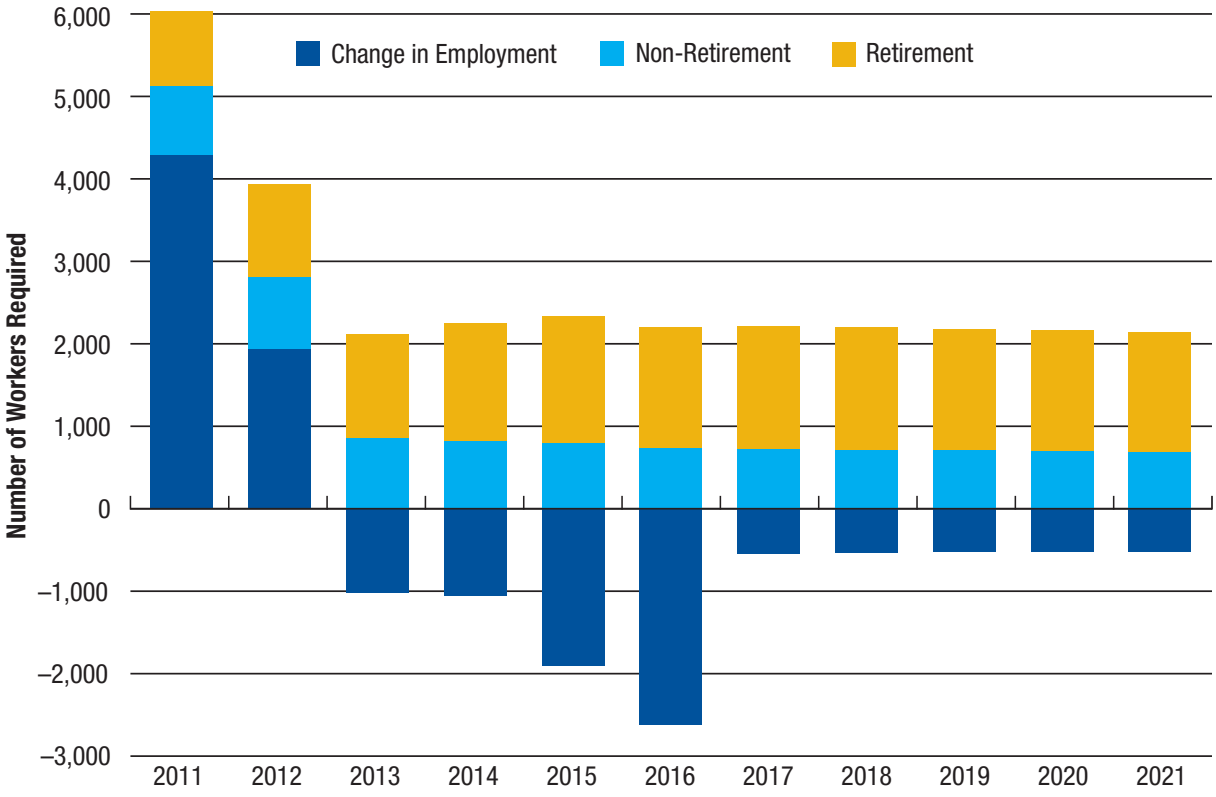
Table 8
Cumulative Hiring Requirements Forecasts — Quebec
By Scenario – 2013, 2016, 2021

	CUMULATIVE HIRING REQUIREMENTS		
	2013	2016	2021
Contractionary	10,720	11,380	17,250
Baseline	11,170	12,380	20,710
Expansionary	11,770	13,380	22,860

Source: Mining Industry Human Resources Council, Summer 2011.

Changes to employment in Quebec are pronounced over the first half of the forecast period, as shown in Figure 6. The near-term strength of iron ore prices are expected to lead to an increase in employment of just over 4,300 jobs in 2011. Reductions in employment are forecast to begin in 2013 and continue throughout the forecast period, as iron ore prices stabilize and the productivity effects persist. Even with the expected decline in employment, replacement demands dictate that hiring requirements in Quebec remain positive.

Figure 6
Annual Hiring Requirements Forecasts — Quebec
Baseline Scenario — 2011 to 2021



Source: Mining Industry Human Resources Council, Summer 2011.

Table 9 shows the occupations with the greatest hiring requirements in Quebec under the baseline scenario. The 10 occupations with the greatest hiring requirements include construction millwrights, industrial mechanics, machine operators, and other positions that reflect the large amount of mineral processing and refining activities in the province compared to the rest of the country.

Table 9
Cumulative Hiring Requirements of Top 10 Occupations in Quebec
By Scenario — 2013, 2016, 2021

TOP 10 OCCUPATIONS	CUMULATIVE HIRING REQUIREMENTS		
	2013	2016	2021
Production clerks	880	975	1,630
Construction millwrights and industrial mechanics (except textile)	770	855	1,430
Machine operators, mineral and metal processing	765	850	1,420
Labourers in mineral and metal processing	650	720	1,205
Underground production and development miners	540	600	1,000
Heavy-equipment operators (except crane)	455	505	845
Supervisors, mineral and metal processing	415	460	775
Heavy-duty equipment mechanics	310	340	570
Supervisors, mining and quarrying	300	335	560
Industrial electricians	260	290	485

Source: Mining Industry Human Resources Council, Summer 2011.

Ontario

The hiring requirements of the mining industry in Ontario are broadly similar to those of Quebec during the forecast period. While overall mining employment in Ontario is expected to decline (by nearly 20 per cent by 2021), the replacement requirements will be significant due to an increasing number of retirements on the horizon. Under the baseline scenario, Ontario will need to hire 15,810 workers by 2021 — a figure that represents more than 35 per cent of the current mining industry workforce in the province.

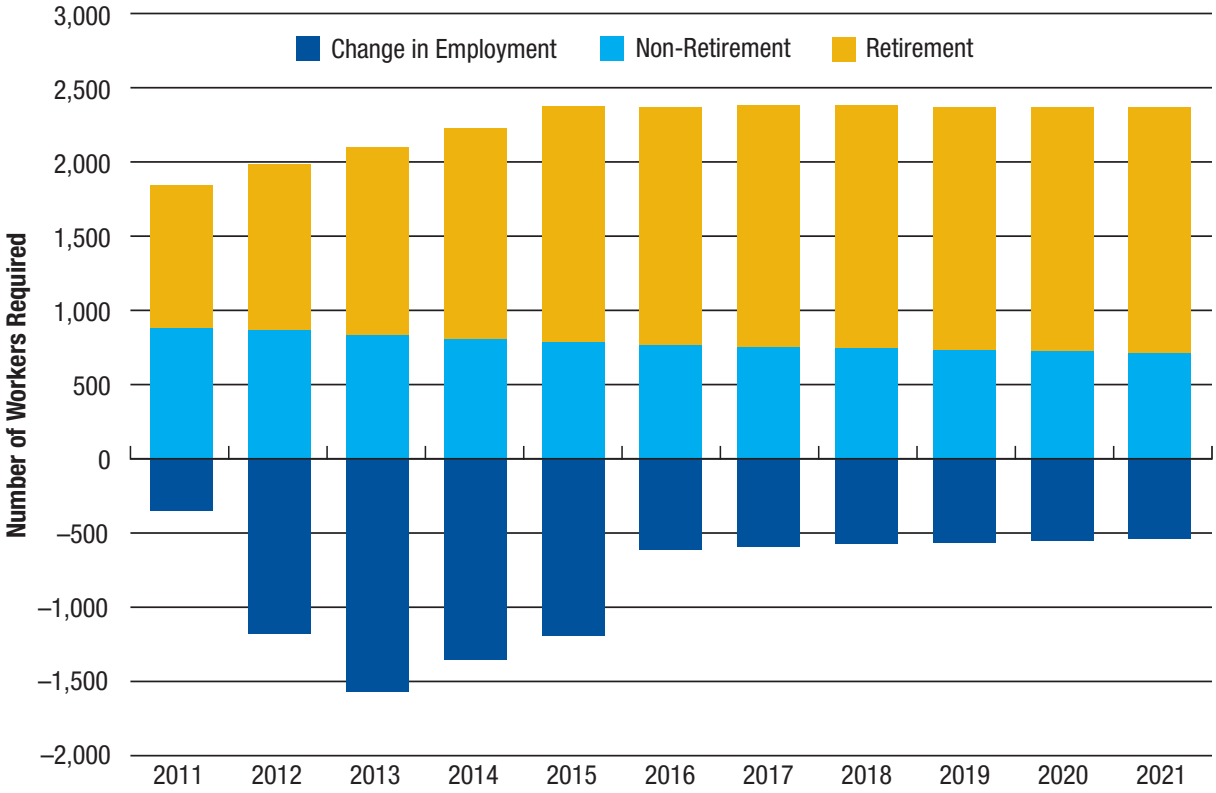
Table 10
Cumulative Hiring Requirements Forecasts — Ontario
By Scenario — 2013, 2016, 2021

	CUMULATIVE HIRING REQUIREMENTS		
	2013	2016	2021
Contractionary	2,200	5,410	14,080
Baseline	2,850	6,700	15,810
Expansionary	3,400	7,640	16,910

Source: Mining Industry Human Resources Council, Summer 2011.

The improved outlook for the Commodity Price Index accounts for the large increase in mining employment in Ontario at the start of the forecast period, as shown in Figure 7. Although mining in Ontario is expected to decline over the longer-term, this decline will be more than offset by replacement requirements averaging nearly 2,300 a year between 2011 and 2021.

Figure 7
Annual Hiring Requirements Forecasts — Ontario
Baseline Scenario — 2011 to 2021



Source: Mining Industry Human Resources Council, Summer 2011.

Table 11 summarizes the 10 occupations for which the hiring requirements in Ontario are greatest, under the baseline scenario. Production clerks (a new occupational category for the 2011 forecast) have the greatest hiring requirements, followed by underground production and development miners, and labourers in mineral and metal processing.

Table 11
Cumulative Hiring Requirements of Top 10 Occupations in Ontario
By Scenario — 2013, 2016, 2021

TOP 10 OCCUPATIONS	CUMULATIVE HIRING REQUIREMENTS		
	2013	2016	2021
Production clerks	295	695	1,640
Underground production and development miners	235	550	1,300
Labourers in mineral and metal processing	160	375	880
Construction millwrights and industrial mechanics (except textile)	150	350	830
Heavy-equipment operators (except crane)	105	245	575
Supervisors, mineral and metal processing	85	205	485
Industrial electricians	85	200	480
Supervisors, mining and quarrying	70	170	400
Machine operators, mineral and metal processing	70	160	375
Heavy-duty equipment mechanics	60	145	340

Source: Mining Industry Human Resources Council, Summer 2011.

Prairie Region

The Prairie region (Manitoba, Saskatchewan and Alberta) is forecast to be one of just two regions that will experience employment growth over the forecast period. This region is also the only one projected to experience positive employment growth in every year of the forecast.[21] Employment is expected to grow at an average annual rate of about 1.0 per cent. By 2021, mining employment in the Prairie Region is forecast to be 11 per cent higher than in 2011.

Table 12
Cumulative Hiring Requirements Forecasts — Prairie Region
By Scenario – 2013, 2016, 2021

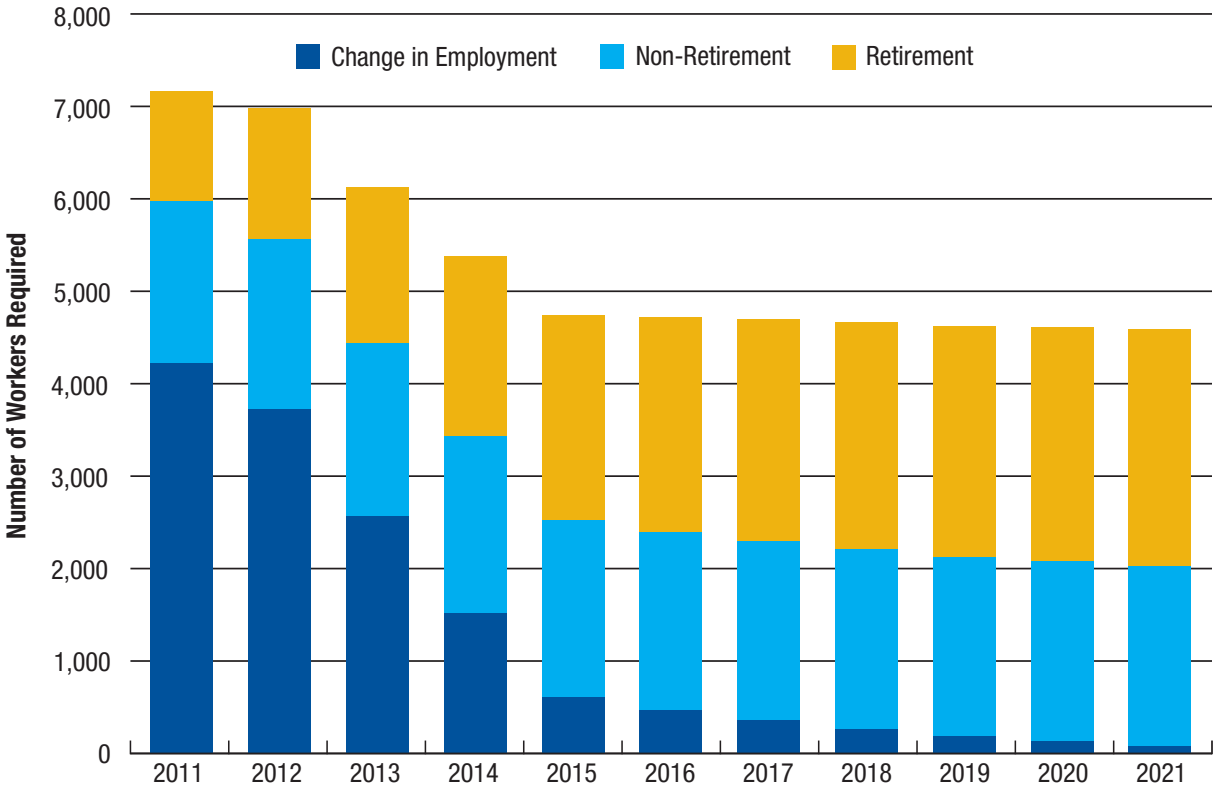
	CUMULATIVE HIRING REQUIREMENTS		
	2013	2016	2021
Contractionary	14,850	23,190	34,960
Baseline	20,340	35,230	58,500
Expansionary	25,200	45,650	78,260

Source: Mining Industry Human Resources Council, Summer 2011.

21 Employment in the oil sands is currently not part of MiHR's forecasting model.

The strong rebound in commodity prices after the global recession is driving the significant hiring requirements in the Prairies that will occur early in the forecast period, as shown in Figure 8. The 20,340 workers expected to be needed by 2013 represent nearly 35 per cent of the hiring requirements for the region over the entire 10-year forecast period. By 2021, the Prairies are forecast to have the greatest hiring requirements in Canada.

Figure 8
Annual Hiring Requirements Forecasts — Prairie Region
Baseline Scenario — 2011 to 2021



Source: Mining Industry Human Resources Council, Summer 2011.

The 10 occupations with the greatest hiring requirements are shown in Table 13. Truck drivers, heavy-equipment operators and production clerks are the occupations for which hiring requirements are expected to be greatest by 2021.

Table 13
Cumulative Hiring Requirements of Top 10 Occupations in the Prairie Region
By Scenario — 2013, 2016, 2021

TOP 10 OCCUPATIONS	CUMULATIVE HIRING REQUIREMENTS		
	2013	2016	2021
Truck drivers	1,150	1,990	3,305
Heavy-equipment operators (except crane)	970	1,680	2,795
Production clerks	895	1,550	2,575
Primary production managers (except agriculture)	815	1,410	2,340
Construction millwrights and industrial mechanics (except textile)	550	950	1,580
Welders and related machine operators	520	905	1,500
Underground production and development miners	470	810	1,345
Secretaries (except legal and medical)	365	635	1,055
Heavy-duty equipment mechanics	335	585	970
Steamfitters, pipefitters and sprinkler system installers	285	495	820

Source: Mining Industry Human Resources Council, Summer 2011.

British Columbia

While mining employment is expected to decline during all but two years of the forecast period, replacement requirements dictate that the cumulative hiring requirements in British Columbia are positive in all three scenarios. The 10,460 workers forecast to be needed by 2021 under the baseline scenario represent nearly 48 per cent of the mining industry workforce in 2011.

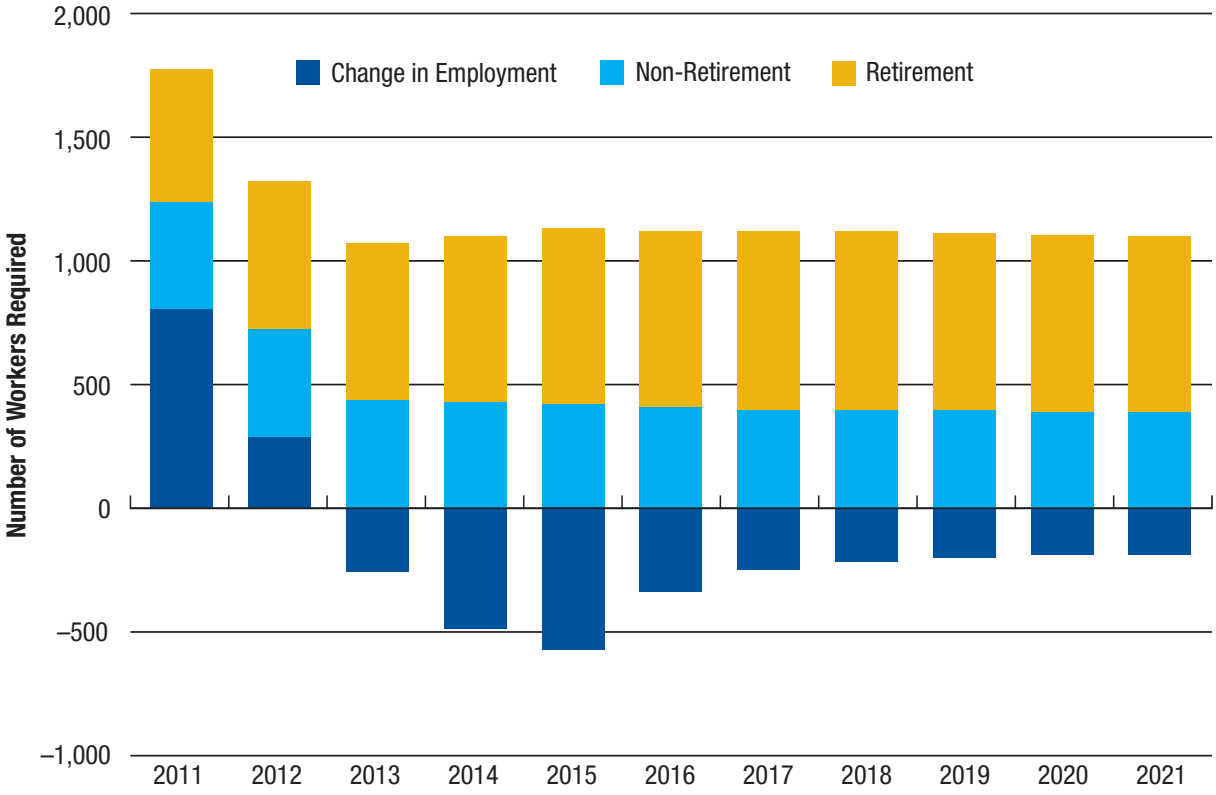
Table 14
Cumulative Hiring Requirements Forecasts — British Columbia
By Scenario — 2013, 2016, 2021

	CUMULATIVE HIRING REQUIREMENTS		
	2013	2016	2021
Contractionary	2,930	3,950	6,990
Baseline	3,950	5,910	10,460
Expansionary	4,880	7,540	13,100

Source: Mining Industry Human Resources Council, Summer 2011.

As with other regions, higher commodity prices in the near-term are expected to lead to growth in employment in both 2011 and 2012, as shown in Figure 9. Over the remainder of the forecast period, mining employment is forecast to decline in British Columbia, while the replacement requirements of more than 1,100 workers a year offset this decline.

Figure 9
Annual Hiring Requirements Forecasts — British Columbia
Baseline Scenario — 2011 to 2021



Source: Mining Industry Human Resources Council, Summer 2011.

Table 15 outlines the 10 occupations that will have the greatest hiring requirements over the forecast period. British Columbia is expected to have a significant need for heavy-equipment operators, production clerks and truck drivers.

Table 15
Cumulative Hiring Requirements of Top 10 Occupations in British Columbia
By Scenario — 2013, 2016, 2021

TOP 10 OCCUPATIONS	CUMULATIVE HIRING REQUIREMENTS		
	2013	2016	2021
Heavy-equipment operators (except crane)	330	490	870
Production clerks	275	410	725
Truck drivers	225	335	590
Heavy-duty equipment mechanics	150	225	400
Underground production and development miners	150	225	400
Primary production managers (except agriculture)	150	220	390
Construction millwrights and industrial mechanics (except textile)	120	180	315
Geologists, geochemists and geophysicists	105	160	280
Geological and mineral technologists and technicians	105	160	280
Supervisors, mining and quarrying	100	145	260

Source: Mining Industry Human Resources Council, Summer 2011.

Territories

Territories (Nunavut, Northwest Territories and Yukon) is one of two regions where mining employment is forecast to grow in the baseline scenario. Despite a relatively small workforce, mining employment is forecast to grow at an annual average rate of around 1.1 per cent between 2011 and 2021. This is the fastest-projected growth rate of all the regions in Canada.

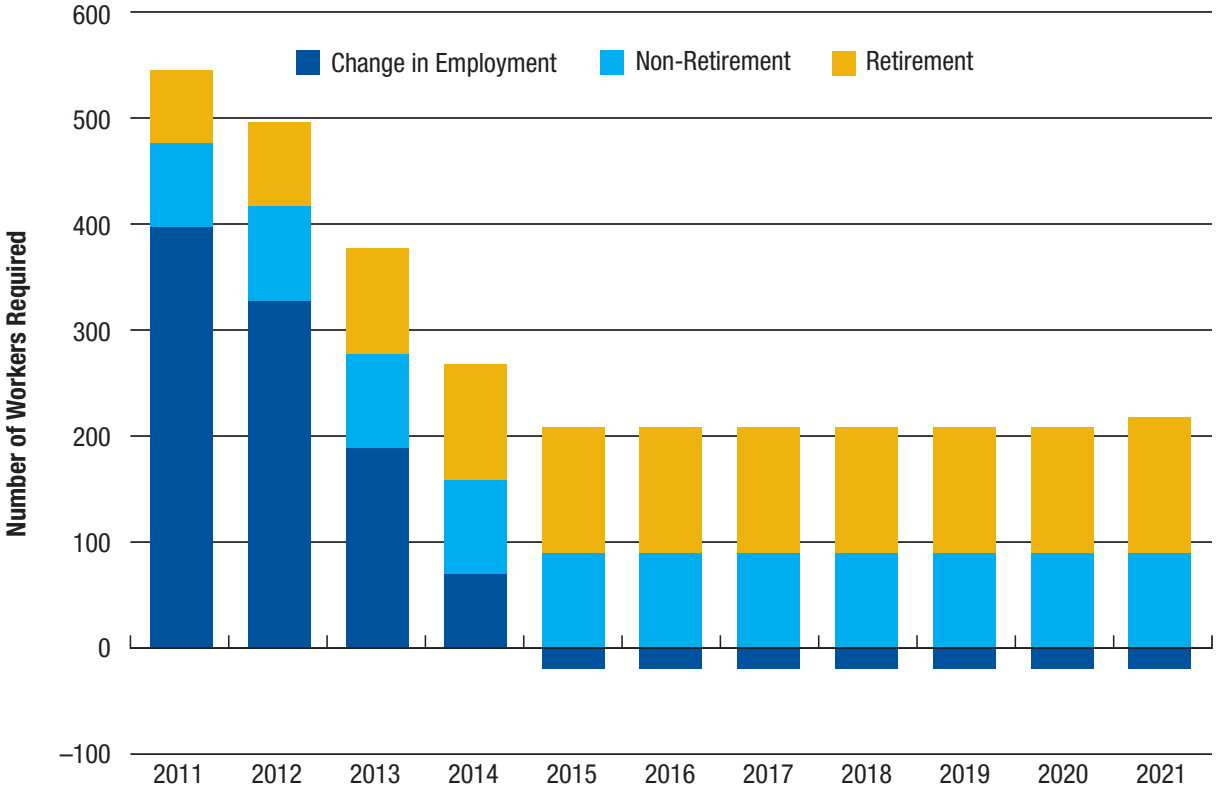
Table 16
Cumulative Hiring Requirements Forecasts — Territories
By Scenario — 2013, 2016, 2021

	CUMULATIVE HIRING REQUIREMENTS		
	2013	2016	2021
Contractionary	920	1,080	1,280
Baseline	1,420	2,070	3,020
Expansionary	1,890	3,010	4,660

Source: Mining Industry Human Resources Council, Summer 2011.

Most of the hiring in the Territories will occur early in the forecast period — between 2011 and 2014. While mining employment will see small declines between 2015 and the end of the forecast period, these declines are not expected to offset the near-term growth. When replacement requirements are factored in, the Territories region faces considerable hiring requirements (more than 80 per cent of the current workforce) over the forecast period.

Figure 10
Annual Hiring Requirements Forecasts – Territories
Baseline Scenario – 2011 to 2021



Source: Mining Industry Human Resources Council, Summer 2011.

As shown in Table 17, the hiring requirements by occupation in the Territories under the baseline scenario are quite similar to the Atlantic, Prairies and British Columbia regions — with heavy-equipment operators, underground production and development miners, truck drivers and production clerks having the greatest hiring requirements.

Table 17
Cumulative Hiring Requirements of Top 10 Occupations in the Territories
By Scenario – 2013, 2016, 2021

TOP 10 OCCUPATIONS	CUMULATIVE HIRING REQUIREMENTS		
	2013	2016	2021
Heavy-equipment operators (except crane)	195	285	415
Underground production and development miners	105	150	220
Truck drivers	85	125	185
Production clerks	80	115	170
Mine labourers	60	85	125
Primary production managers (except agriculture)	55	75	115
Cooks	45	70	100
Geologists, geochemists and geophysicists	40	60	85
Geological and mineral technologists and technicians	35	50	70
Heavy-duty equipment mechanics	35	50	70

Source: Mining Industry Human Resources Council, Summer 2011.

4

Discussion and Future Developments and Additions to MIWIN

Discussion

In response to changes in employment, retirements and other departures, the mining industry will need to hire more than 112,000 workers over the next 10 years, according to the baseline scenario. With the looming retirement of the baby boom generation, a number of approaches are needed to ensure that there is an adequate labour pool to meet these hiring requirements and ensure that the Canadian mining industry remains globally competitive.

Recently, the industry has used many proactive strategies to attract, recruit and retain top talent, and strengthening these initiatives over the next decade will remain important. Remarkable achievements have been made as the industry has worked to diversify the workforce and to increase the employment of previously under-represented groups. However, to meet the looming human resources challenge, new strategies may emerge, and the industry must continue to develop innovative approaches to industry branding and career promotion, and to enhance training and education.

In addition to maximizing the available labour, the industry will need to take steps to maximize how efficiently it can turn inputs (labour and capital) into outputs — in other words, to increase productivity. Investments in technology, workplace training, research and development, and a host of other components can help maximize the productivity of the mining labour force, allowing companies to “do more with less” and reduce the pending hiring requirements pressure.

Coming Attractions

As part of the continual development and expansion of the Mining Industry Workforce Information Network (MIWIN) system, MiHR is developing a number of new features to incorporate into upcoming versions of this national report.

One of the major additions to the report will be the incorporation of a talent-availability (or supply-side) forecast. When combined with MiHR's existing hiring requirements forecast, this will provide a more complete picture of the mining labour market. The addition of the talent availability forecast will also allow MiHR to undertake a gap analysis of the difference between the mining industry's hiring requirements and talent availability, and to highlight the various approaches that may be taken to reduce the size of the gap.

MiHR is also planning to enhance the hiring requirements model by more fully incorporating the individual commodity mix of each province into the employment forecast. Eventually, MiHR hopes to combine this work with additional sources of data to present a hiring requirements forecast for every province.

MiHR will also incorporate new industry developments and the results of ongoing research into the industry's human resources needs. An important component of this will be to adjust the scoping of MiHR's hiring requirements forecast to better include the minerals exploration portion of the sector.

Human resources form the backbone of an industry-wide strategy for success and of the continuing global competitiveness of the Canadian mining industry. Managing and growing this well-skilled workforce will ensure that the strength and position of the industry continue well into the future.

Appendix A

Methodology

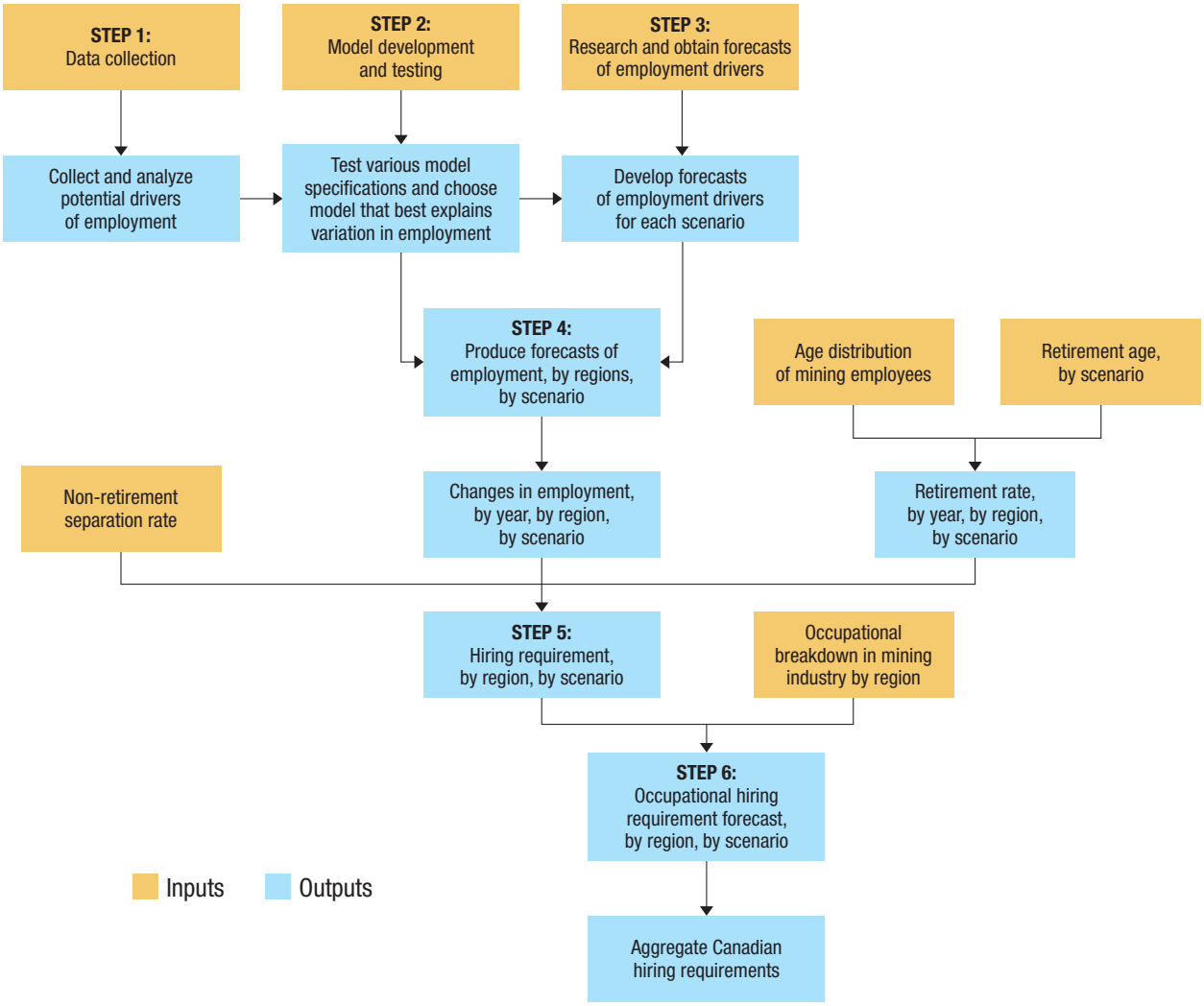
This appendix outlines the methodology used by MiHR to produce forecasts of hiring requirements in the mining industry. It also describes the various data that were required, along with the development of the forecasting models. A flowchart depicting this methodology is provided in Figure A1.

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

- **Step 1**: Collect and analyze data that may potentially explain changes in the number of jobs in each region.
- **Step 2**: Determine the driver(s) that explain the greatest level of variation in the number of jobs in each region by testing various model specifications through regression analysis.
- **Step 3**: Produce baseline, contractionary and expansionary forecasts for 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.

Several indicators were considered as explanatory variables for predicting employment. Statistical analysis showed that commodity prices, in conjunction with labour productivity and previous year's employment, were the best predictors of employment in the mining industry. There is a positive relationship between commodity prices and employment, and a negative correlation between labour productivity and employment.

Figure A1
Employment and Hiring Requirements Forecasting Model



Source: Mining Industry Human Resources Council, Summer 2011.

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 data: NAICS and 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 (which includes exploration, development, extraction, processing and reclamation). Similarly, there is no single set of NOC-S categories that pertain to only mining. People employed in occupation groups that are prevalent in mining also work in a variety of other industries. Together, the NAICS and NOC-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).

MiHR uses the following 66 NOC-S codes to define the occupations that are essential to the mining sector.

CODE	OCCUPATION
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
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, n.e.c.

(continued over)

CODE	OCCUPATION
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 labourers
H822	Other trades helpers and labourers
I121	Supervisors, mining and quarrying
I131	Underground production and development miners
I141	Underground mine service and support workers
I214	Mine labourers
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	Labourers in mineral and metal processing

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