COVID-19 AND LABOUR MARKET VOLATILITY

IN CANADA'S MINING INDUSTRY

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FOREWORD

Originally, this report was envisioned to be solely about employment volatility and its impact on Canada's mining labour market. But in early 2020, the COVID-19 pandemic upended the world. The magnitude of this event meant that understanding its impact quickly became a priority for MiHR.

In the immediate aftermath, almost every important economic variable we track had to be revisited, and those early days were filled with many questions: *What is happening to employment? How are commodity prices holding up? Has GDP rebounded? And is it a V- or an L-shaped recovery?* (and so on).

Truth be told, the story of COVID-19 and Canada's mining labour market has been revised many times over as new data and information on global events continued to pour in daily.

The COVID-19 event is still in its early days, and its impact will be felt long after this report has been published. Our team put together a study that captures the moment of impact, and in that sense tries to glimpse whether a permanent mark will be left behind in a post-COVID-19 era.

In the end, this study has come full circle as it ties the events of 2020 to the original topic of employment volatility. After all, though COVID-19 may be an outlier, it is hard to think of a better example of labour market volatility.

Source: Iron Ore Company of Canada
Note: Most of the photography in this report was taken prior to the Covid-19 pandemic.

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INTRODUCTION

The COVID-19 pandemic has dramatically changed the world in a short period of time. Since gaining momentum in early 2020, the novel coronavirus has brought substantial loss of life and financial hardship, leading to government-mandated lockdowns and new societal norms (such as social distancing, mask wearing, etc.). The pandemic has affected economies, industries and livelihoods across the globe.

Furthermore, this pandemic event is still unfolding; its effects will likely be felt for several years to come—if not permanently. As with the great recession of 2008-2009, it will take several years of hindsight before the impacts of this event are fully appreciated or understood. These impacts include changes to the composition of the labour force, and requisite workplace skills and recruitment practices, among others.

Abrupt downturns are nothing new to the mining industry, which is accustomed to boom-and-bust cycles that have continually contracted and expanded the mining workforce over time. Consequently, the pattern of volatility in the mining sector has long been a subject of interest in MiHR's ongoing labour market analyses. Previous observations, however, did not seek to evaluate or quantify volatility in detail, nor did they explore how such market movements can affect the mining labour force.

ABOUT THIS REPORT

This report aims to illustrate the short- and long-term effects of the pandemic on Canada's mining labour market, describe the early response from the mining industry and identify which segments of the labour force have been particularly affected. Further, the analysis places the COVID-19 pandemic in the context of historical volatility in the mining industry.

This report is organized into six chapters:

Chapter One investigates how COVID-19 has thus far impacted mining operations and workers, and how the pandemic has changed the trajectory of many key labour market indicators.

Chapter Two highlights how Canada's mining industry has navigated through the different lockdown phases, including how mining operations have adjusted their policies and procedures to adapt to the crisis.

Chapter Three explores which segments of the labour force have been economically disrupted in the immediate aftermath of the pandemic.

Chapter Four considers the potential long-term effects of COVID-19 on the mining labour market, and revisits MiHR's previous forecasts for employment in Canada's mining industry.

Chapter Five examines the characteristics of volatility, its consequences on the mining labour market, and what constitutes a severe downturn. This chapter further explores how market fluctuations have created challenges for mining stakeholders.

Chapter Six summarizes the main findings and key takeaways from this report. This chapter also recommends next steps to support Canadians in a post-COVID-19 environment and suggests a direction for developing labour market information that will best support the industry through volatile times.

INDUSTRY AND OCCUPATIONAL DEFINITIONS

Data presented in this report primarily rely on industry-level data collected and aggregated through Statistics Canada. Data throughout the analysis in this report are aligned with the *North American Industry Classification System (NAICS)* to define the mining industry in Canada, and with the *National Occupational Classification (NOC)* system to define relevant occupations of interest. The mining industry is connected to other industry codes, however for simplicity, this analysis primarily focuses on one NAICS code—*Mining and quarrying (NAICS 212)*.

THE COVID-19 TIMELINE

The COVID-19 pandemic has marked a period of disruption in countless aspects of daily life, social behaviour and economic activity. This study establishes a precise timeline of the pandemic—with six distinct phases (Figure 1) that are characterized throughout this report. It is important to acknowledge that the pandemic continues to unfold, with further developments potentially altering the course of the timeline.

Figure 1: Distinct Phases of the COVID-19 Timeline (Q4 2019 to Q1 2021)
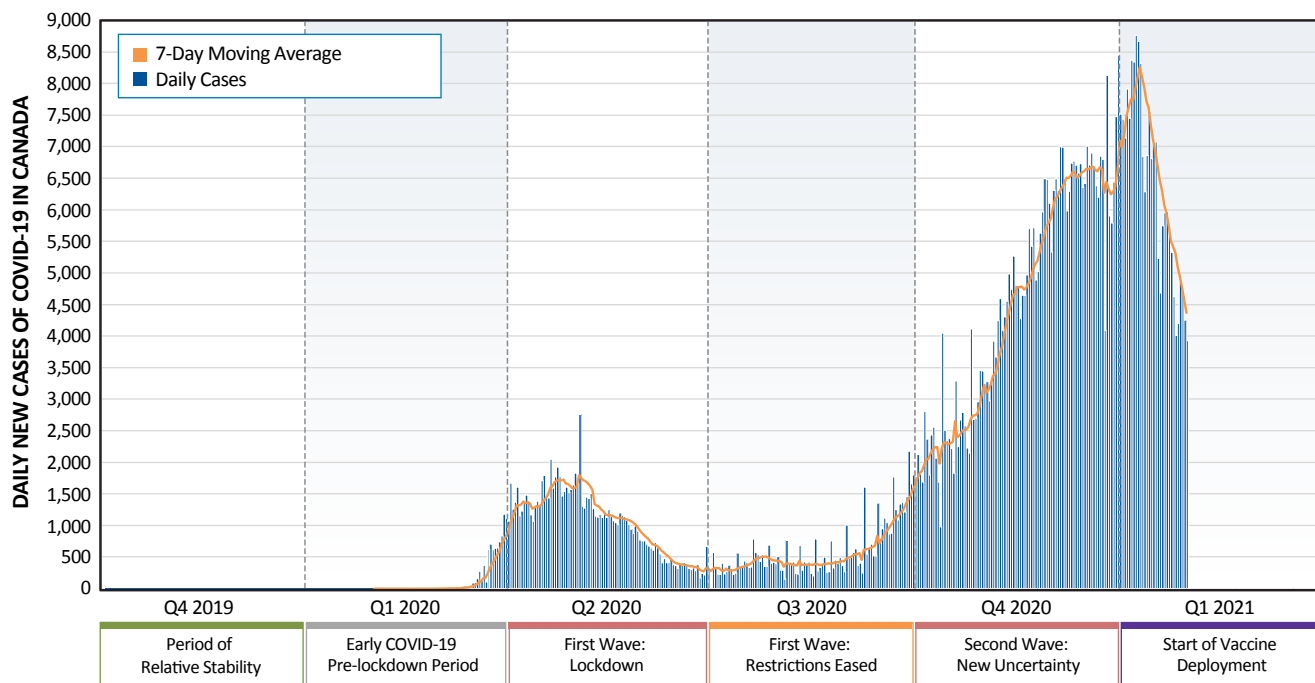
Source: Mining Industry Human Resources Council (2021); Government of Canada Public Health Infobase.

Like other sectors around the globe, mining companies in Canada have been notably impacted by the COVID-19 pandemic. This crisis can be described as a *black swan*, an extremely rare and unexpected event with far-reaching consequences, which was unforeseen in the moment but is seemingly predictable in hindsight. As a result, the pandemic caught the mining industry off guard, forcing several mining operations across the country to interrupt their regular day-to-day activities.

CHAPTER ONE:
THE SHORT-TERM EFFECTS OF COVID-19

In the years leading up to 2020, Canada's mining industry enjoyed a period of relative stability in several leading indicators. The pandemic, however, has triggered a new and visible wave of volatility and precariousness throughout the world economy, and the Canadian mining industry has not been spared.

Labour market indicators offer insight on the outcomes and prospects of labour market participants, helping to paint a picture of prevailing job market conditions. This section aims to study how various economic and labour indicators have been disrupted from their pre-COVID-19 trajectories. Each of the indicators shown in this section cover different aspects of Canada's mining labour market.

Note that early signs of recovery do not imply the crisis is over. Rather, the pandemic may prove to have long-term effects that are even more profound in the coming years.

EMPLOYMENT

The pre-pandemic labour market showed stable vital signs; in the months preceding the first lockdown, employment levels in *Mining and quarrying (NAICS 212)* had been relatively steady heading into the early pre-lockdown period. March of 2020 represents the last pre-COVID data point, followed by a contractionary shift in April and then a sluggish employment trend in subsequent months (Figure 2).

The April shock is observable across many industries, with the main distinction being the depth of the slump and the speed of recovery for each industry. In the mining sector, the initial drop was relatively middle-of-the-road, likely because provincial governments, early on, deemed that mining operations were

an essential service. From March to April 2020, employment in the sector fell by roughly 11%. By comparison, employment in *Accommodation services (NAICS 721)* and *Food services and drinking places (NAICS 722)* fell by roughly 33% and 34% respectively.

Though the mining sector downturn was comparatively less dramatic, the recovery period appears to be somewhat prolonged. Employment levels have stagnated compared to previous years, especially where seasonality has historically favoured an employment boost in the summer months (Figure 2).

Figure 2: Employment in *Mining and quarrying (NAICS 212)* (Jan 2017 to Dec 2020)
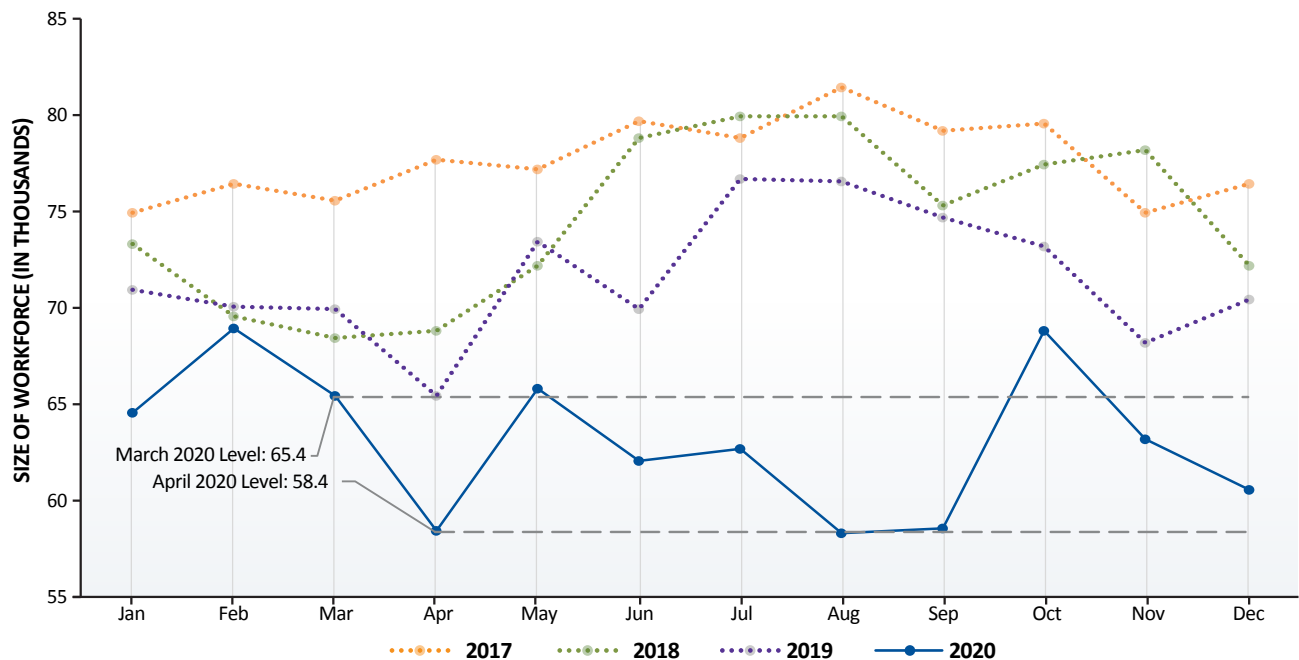
Source: Mining Industry Human Resources Council (2021); Statistics Canada, Labour Force Survey Custom Table, monthly, unadjusted for seasonality (2020).

UNEMPLOYMENT RATE

Prior to the March 2020 lockdown, the unemployment rate in *Mining and quarrying (NAICS 212)* had been relatively low at around 3.3% (Figure 3); the average over the previous five years is estimated at around 3.7% unemployment. The April data point reveals a large spike in unemployment (to 17.9%) as a direct result of lockdown measures—marking the largest unemployment rate in Labour Force Survey records dating back to 1987.

A significant shock in unemployment can be observed across many sectors of the economy, though the recovery paths differ. Following the April 2020 spike, the unemployment rate in *Mining and quarrying (NAICS 212)* quickly recovered to normal levels (back to 4.5% in June) and appeared to stabilize in the 3% to 6% range through the summer and fall months (Figure 3). Yet, the year ended with a resurgence in the unemployment rate (to 9.7%) as of December 2020.

Though *Mining and quarrying (NAICS 212)* experienced unprecedented unemployment rates at certain stages of 2020, this problem was less persistent relative to other sectors. For instance, the unemployment rate in *Air transportation (NAICS 481)* increased from 1% to 23% from March to April and remained elevated at 26% as of December 2020. In certain cases, the rise in unemployment started earlier; in *Accommodation services (NAICS 721)*, the rate increased from 10% to 20% from February to March, rose to 35% in April, and remained at 27% as of December 2020.

Figure 3: Unemployment Rate in *Mining and quarrying (NAICS 212)* (Jan 2017 to Dec 2020)
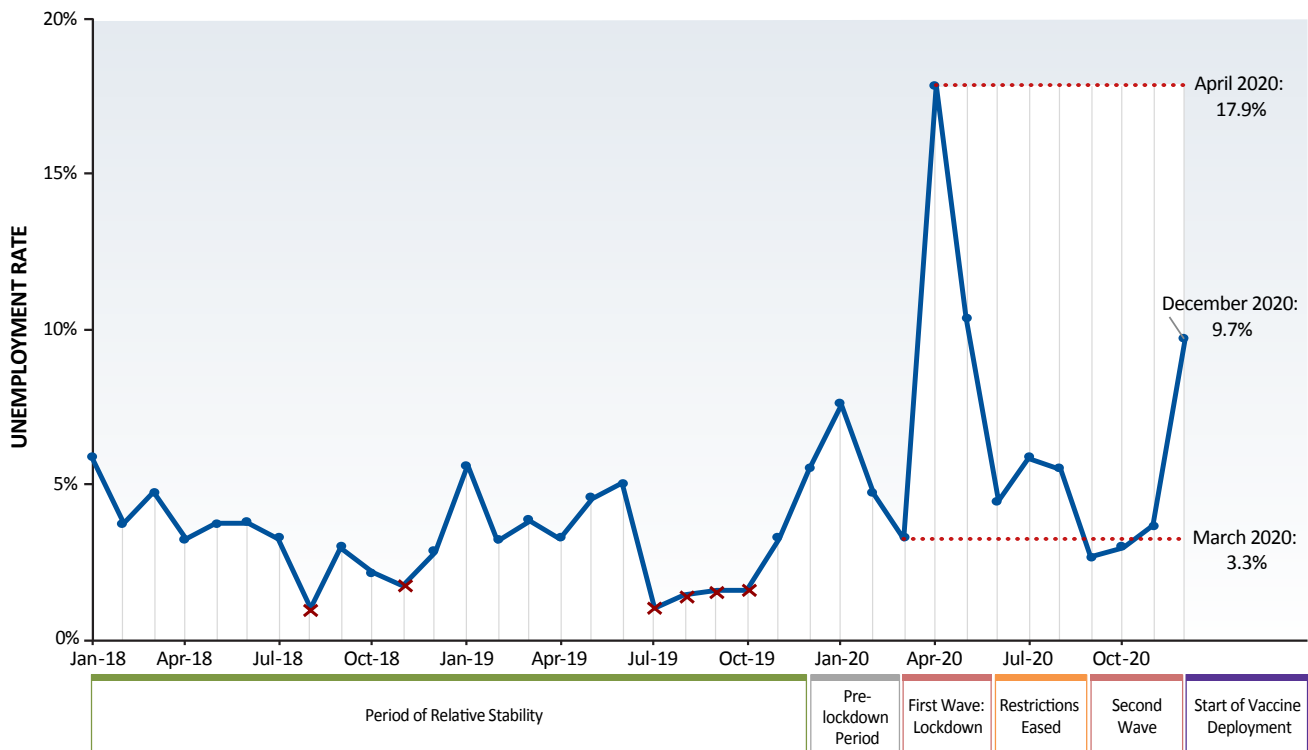
Source: Mining Industry Human Resources Council (2021); Statistics Canada, Labour Force Survey Custom Table, monthly, unadjusted for seasonality (2020).
Note that certain data points were derived due to data suppression. A red x denotes an estimate.

AVERAGE HOURS OF WORK

In 2020, the average weekly hours among workers in *Mining and quarrying (NAICS 212)* fell by roughly 6.3 hours over two months—from 40.7 hours in February to 34.4 hours in April (Figure 4). This denotes the lowest point since 2003, a potential consequence of COVID-19-related measures, or due in part to regular seasonal patterns.

Since the low point in April, however, average weekly hours have rebounded to within their seasonal range. This trend suggests that after the initial lockdown phase, mining employees have been able to regain the hours that they normally work. A similar pattern can be seen across all industries in Canada.

Figure 4: Weekly Average Actual Hours of Work, *Mining and quarrying (NAICS 212)* (Jan 2017 to Dec 2020)

Source: Mining Industry Human Resources Council (2021); Statistics Canada, Labour Force Survey Custom Table, monthly, unadjusted for seasonality (2020).

MEDIAN WAGE RATE

Wage rates provide an indicator of labour market productivity and prosperity. Through the early pandemic months, the median weekly wage rate for workers in *Mining and quarrying (NAICS 212)* appears to have maintained its positive long-term trend (Figure 5).

This trend is in contrast with other indicators such as employment, which showed a more drastic change in trajectory—or unemployment—presenting a clear anomaly in the historical data series. Wages are thus less responsive to acute economic shocks as employers are more inclined to adjust hours or workforce size than to renegotiate wages.

Figure 5: Median Weekly Wage Rate, *Mining and quarrying (NAICS 212)* (Jan 2016 to Dec 2020)

Source: Mining Industry Human Resources Council (2021); Statistics Canada, Labour Force Survey Custom Table, monthly, unadjusted for seasonality (2020).
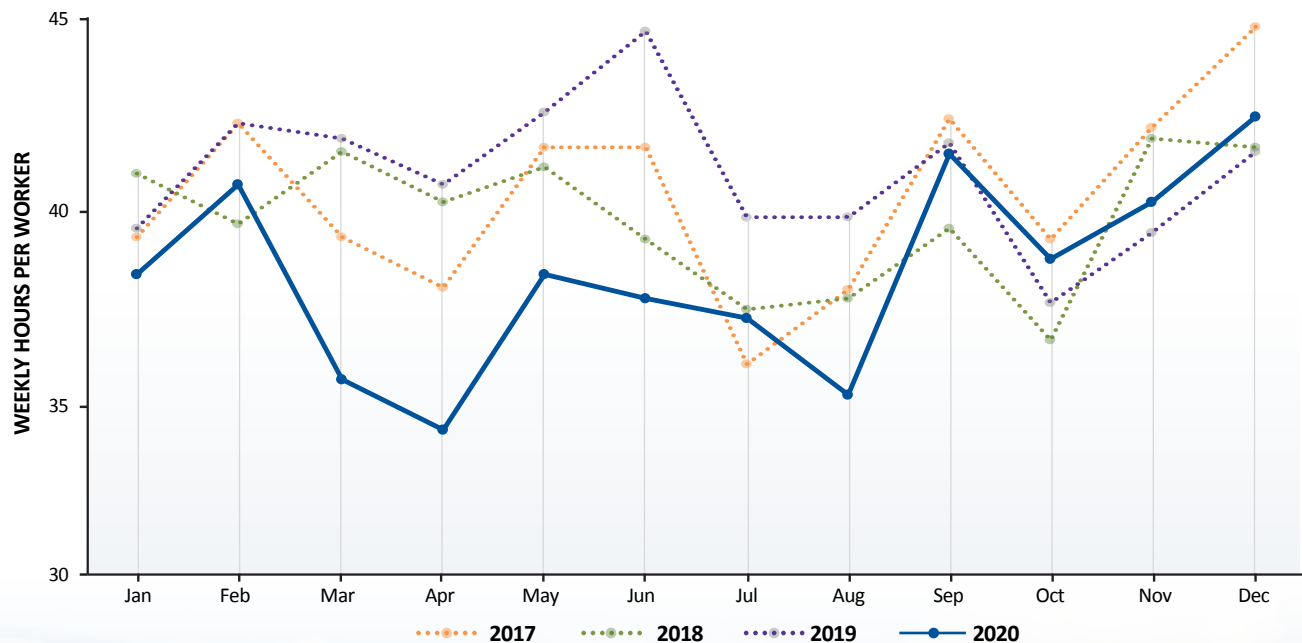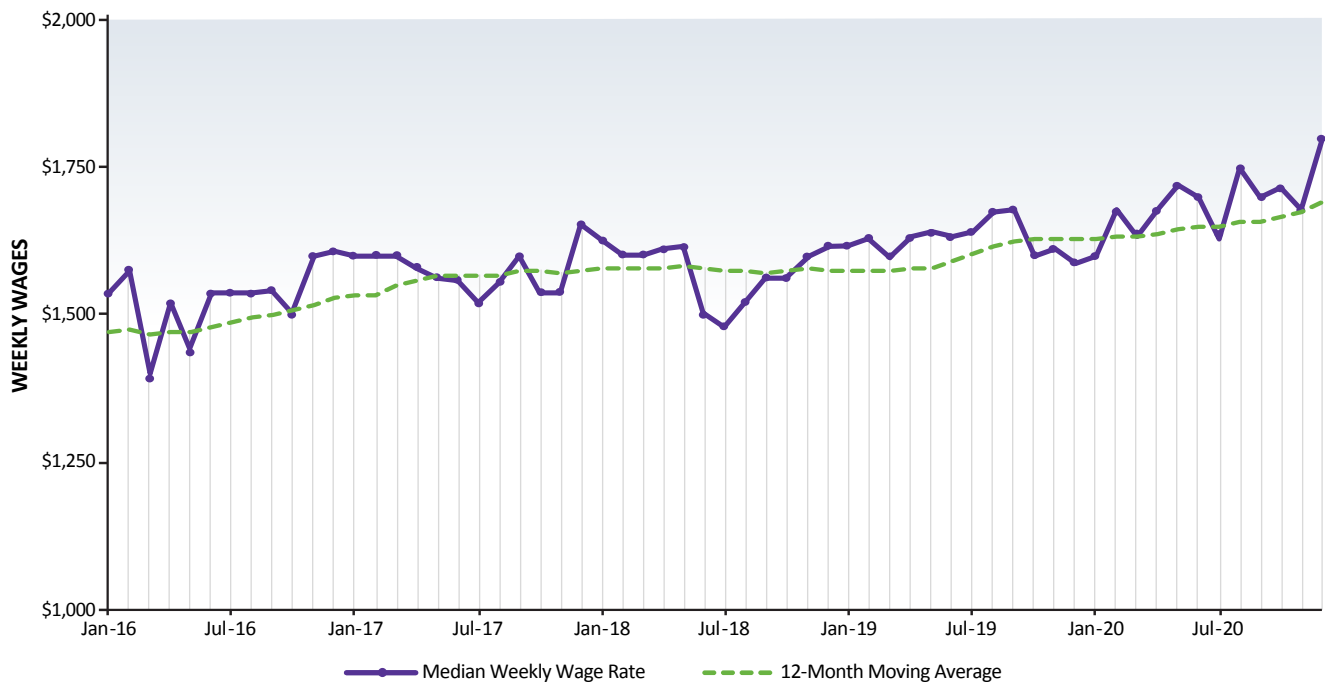
PRODUCTIVITY INDICATORS

Productivity indicators examine businesses' capacity to turn inputs into outputs. A common measure for output is real Gross Domestic Product (GDP), defined as the total value of goods and services produced by an economy (or industry). Prior to the COVID-19 crisis, real GDP for *Mining and quarrying (NAICS 212)* showed stability heading into March 2020 (Figure 6). This trajectory was interrupted in April 2020 with the arrival of government-imposed lockdowns but has since quickly recovered.

In the short term, trends have been characteristic of a V-shaped recovery, which signals that after the initial shock of the pandemic, as restrictions were eased, mining operations were able to adapt to the new environment and recover real GDP to March 2020 levels by July 2020. Though there has since been a slight dip, real GDP levels appear to have resumed to the pre-COVID-19 trend.

Figure 6: Gross Domestic Product (GDP), *Mining and quarrying (NAICS 212)* (Jan 2019 to Oct 2020)
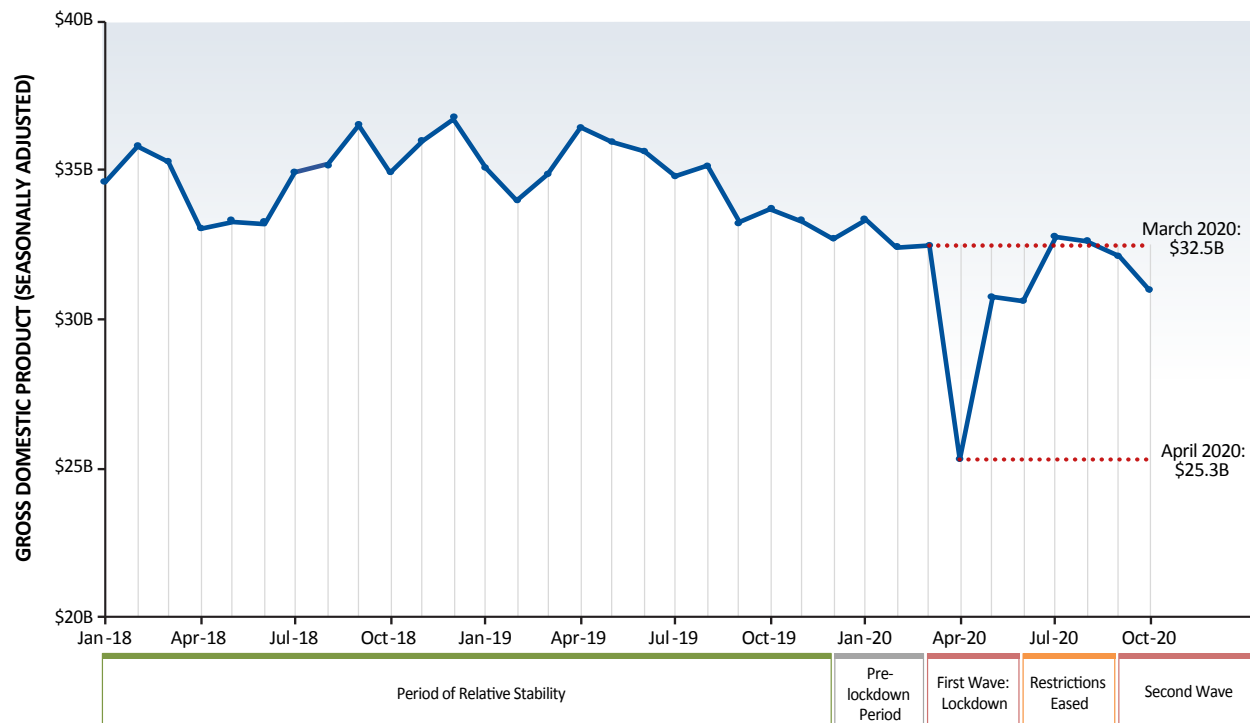
Source: Mining Industry Human Resources Council (2021); Statistics Canada, Table 36-10-0434-01 Gross domestic product (GDP) at basic prices, by industry, monthly (x 1,000,000), seasonally adjusted at annual rates (Chained (2012) Dollars).

Labour productivity is defined as the value of output that is produced for every input of labour— commonly measured as real GDP per hour of work. This measure indicates how labour is being used to produce output over time. Mining is a tightly coordinated undertaking that comprises management of heavy equipment, safety protocols and production schedules; therefore, changes to the factors of production can have a significant impact on labour productivity.

Through the pandemic, labour productivity in *Mining and quarrying (NAICS 212)* experienced two distinct phases. In the early lockdown phase, when businesses were adjusting

to new restrictions, total hours of work fell in parallel with real GDP (Figure 7). In the following months, total hours of work remained depressed (due to lower employment levels), yet real GDP in the mining sector rebounded as businesses adapted and continued operations with a smaller workforce and fewer labour hours.

By August, labour productivity had risen substantially, reaching its highest level in 15 years. Though the trend has since reverted to normal levels, this seemingly temporary adjustment to operate with fewer labour inputs may have long-term ramifications for the mining labour market.

Figure 7: Indices of Labour Productivity, Total Hours of Work and Real GDP, *Mining and quarrying (NAICS 212)* (Jan 2018 to Oct 2020)
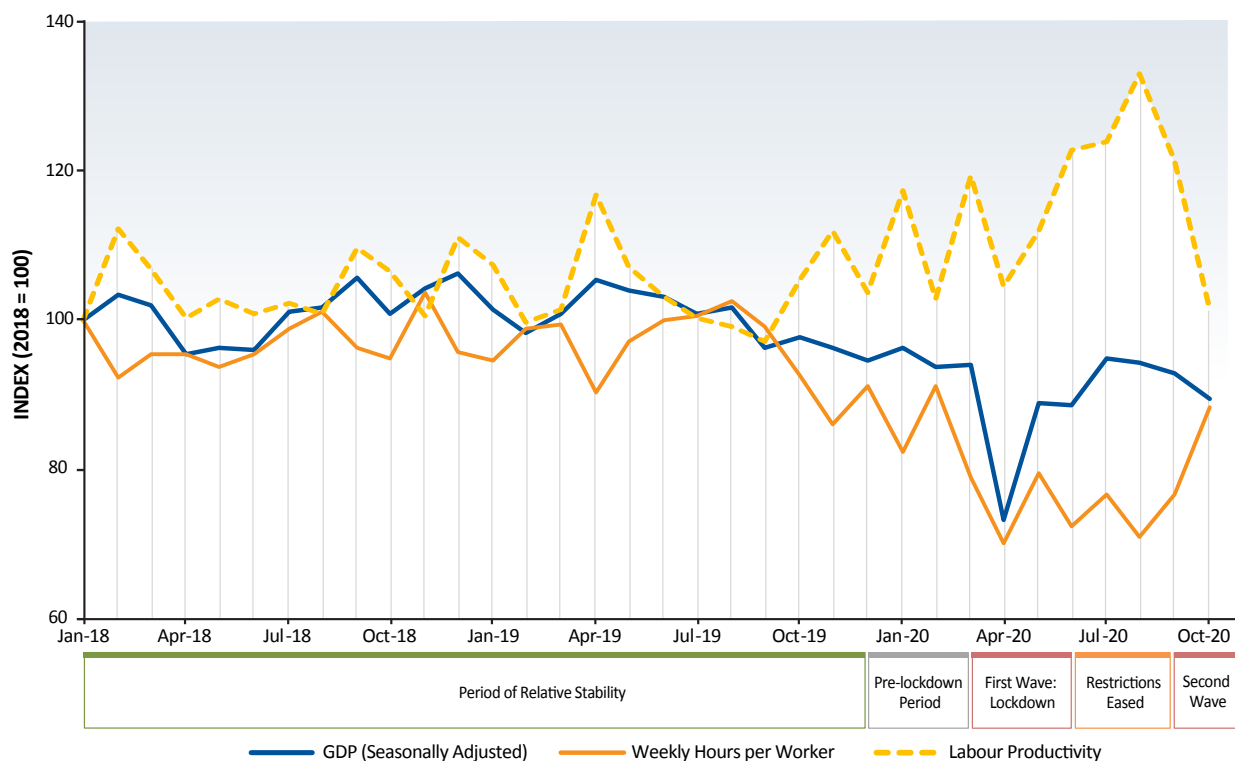
Source: Mining Industry Human Resources Council (2021); Statistics Canada, Table 36-10-0434-01 Gross domestic product (GDP) at basic prices, by industry, monthly (x 1,000,000), seasonally adjusted at annual rates; Statistics Canada, Labour Force Survey Custom Table, monthly, unadjusted for seasonality (2020).

Figure 8: Industrial Capacity Utilization Rate, *Mining and quarrying (NAICS 212)* and *Support activities for mining and oil and gas extraction (NAICS 213)* (Q1 2001 to Q3 2020)

Source: Mining Industry Human Resources Council (2021); Statistics Canada, Table 16-10-0109-01 Industrial capacity utilization rates, by industry.

Another indicator of productivity is the capacity utilization rate (CUR), which measures the percentage of actual to potential output. This metric, provided by Statistics Canada, captures the extent to which an industry uses its production capacity over time. The average CUR in mining (*NAICS 212* and *NAICS 213* combined) over the previous five years was about 74% (Figure 8). This percentage plummeted to 58% in the second quarter of 2020 following the start of the pandemic, dropping to levels not seen since the great recession of 2008-2009 (which marked a low point of 55%).

The CUR trend provides further indication that mining output was considerably impaired through the pandemic and that there was a direct cost in real GDP. Note that the CUR measure (shown in Figure 8) includes *Support services for mining and oil and gas extraction (NAICS 213)*, which may be partially exacerbating the downward trend in 2020.

COMMODITY PRICES

Commodity prices are one of the main drivers for production, exploration activity, and employment in the mining sector. A rise in the price of mined commodities makes production more profitable, attracting additional investment in mining projects and leading to increased mining and exploration activity.

Canada's mining industry explores for and produces a wide range of commodities (Figure 9; note that this figure excludes oil). Every commodity is unique in its production methods, geographical distribution, and end marketplace. Therefore, each responds differently to changing economic conditions. For example, demand for gold tends to rise in times of economic uncertainty and in low interest-rate environments, while demand for base metals is largely driven by infrastructure spending and consumer demand.

Although the pandemic has been greatly disruptive to mining operations and to employment, this same economic shock does not appear to have adversely affected the trajectory of commodity prices, and in some instances has propelled prices upwards.

Prices for precious metals have gained considerable momentum through the pandemic period, and base metals have also expanded after a brief price slump at the start of the pandemic (Figure 10). The upward trend in several price movements is a reason for optimism for the mining industry moving forward, even as mining companies continue to deal with the logistical disruption of the pandemic.

One exception is the price of oil, which suffered through shifting market conditions due to COVID-19, but also experienced a price war between Russia and Saudi Arabia in 2020. Still, the downturn in 2020 has been less impactful than the collapse of oil prices that occurred in the mid-2010s.

Figure 9: Top 10 Mineral Products in Canada by Value (2019 Estimate)

Mineral Product	
Gold	$10.28B
Coal	$5.77B
Iron ore	$5.59B
Potash (K_2O)	$5.55B
Copper	$4.35B
Nickel	$3.32B
Sand and Gravel	$2.27B
Diamonds	$2.19B
Stone	$1.96B
Platinum group	$1.20B

Source: Mining Industry Human Resources Council (2021); Natural Resources Canada, Annual Statistics of Mineral Production (2020).

Figure 10: Indices of Metals & Minerals, Precious Metals, and Crude Oil (Jan 2010 to Dec 2020)
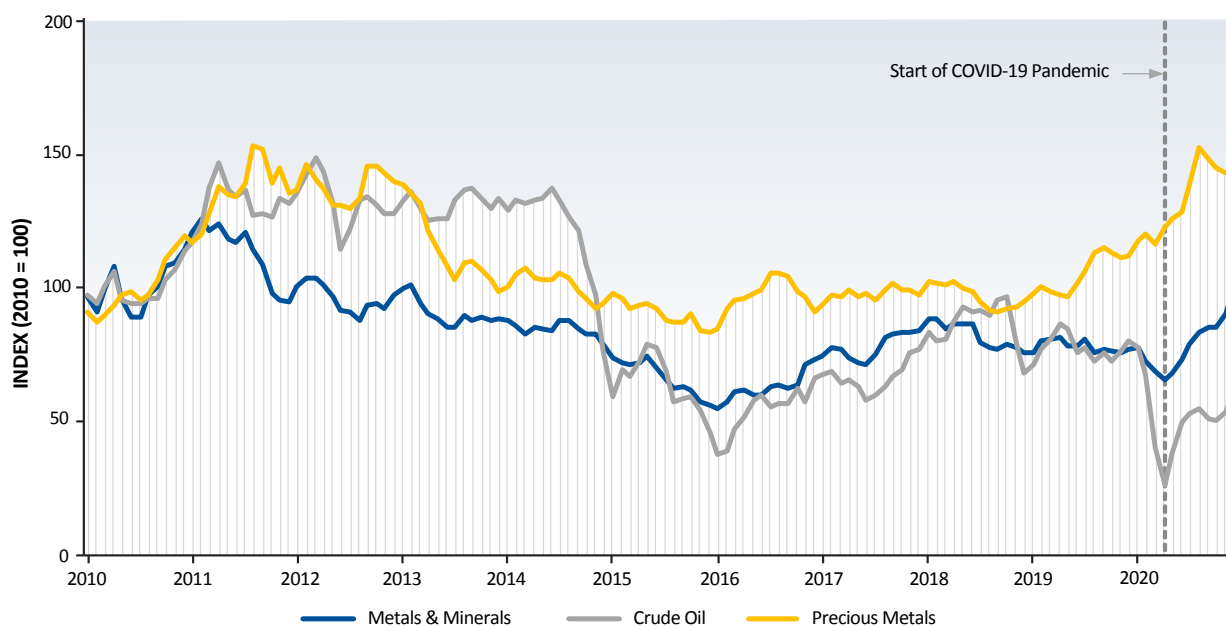
Source: Mining Industry Human Resources Council (2021); The World Bank, Commodity Prices, "Pink Sheet" Data, (Oct 2020).

The uncertainty surrounding COVID-19—and its resulting effect on global macroeconomic conditions—greatly shifted economic expectations around the world. This can be observed in prevailing price projections for certain commodities, which were significantly revised upwards following the onset of the pandemic (Figure 11), setting a more positive outlook for the mining sector in the short-to-medium term.

Figure 11: World Bank Forecasts of Mineral Prices (Published Oct 2019 and Oct 2020)
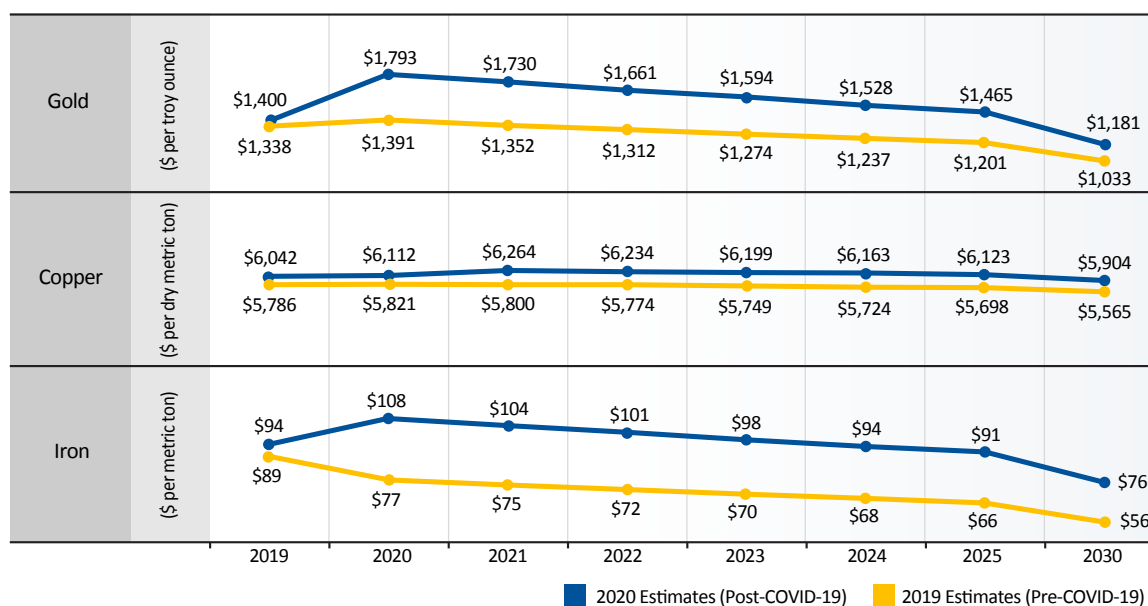
Source: Mining Industry Human Resources Council (2021); The World Bank, Commodity Markets Outlook, Price Forecasts (Oct 2019, Oct 2020).

GOVERNMENT SUPPORT

As an immediate response to the economic disruption of COVID-19, the government of Canada implemented emergency supports for both individuals and businesses.

The Canada Emergency Relief Benefit (CERB) provided financial relief to those who were unable to work due to the pandemic. The benefit was available from April to September of 2020, a period during which the government issued over $80 billion in aid to Canadians. CERB was subsequently replaced with a more flexible Employment Insurance (EI) system and three new streamlined relief benefits for those unable to work due to the pandemic—because of illness, caregiving for others, or the inability to find full-time work.

Business support options were quickly made available to Canadian businesses including:

- The 10% Temporary Wage Subsidy for Employers (TWS), which reduced the amount of payroll deductions of eligible employers for a three-month period.
- The Canada Emergency Business Account (CEBA), which offered interest-free loans of up to $60,000 to Canadian small businesses and not-for-profits to help pay for non-deferrable operating expenses and to stimulate hiring and retention.

- The Canada Emergency Wage Subsidy (CEWS), which allowed employers who had seen a decrease in revenue to receive a subsidy to help cover the cost of wages and salaries and to allow them to rehire workers, prevent further layoffs, and resume business operations.

The *Canadian Survey on Business Conditions*, administered by Statistics Canada, revealed that the uptake rate for these programs was slightly lower for Canadian businesses in *Mining, quarrying, and oil and gas extraction (NAICS 21)*, but still in line with businesses across all industries (Table 1):

- 45% of respondents in *Mining, quarrying, and oil and gas extraction (NAICS 21)* received assistance under the Canada Emergency Business Account (CEBA).
- 26% accessed the Canada Emergency Wage Subsidy (CEWS).
- 14% received the Temporary Wage Subsidy (TWS).

Table 1: Percentage of Businesses Approved for Funding or Credit due to COVID-19, All Industries and *Mining, quarrying, and oil and gas extraction (NAICS 21)* (Q4 2020)

Sources of Funding or Credit	All industries	Mining quarrying, and oil and gas extraction (NAICS 21)
Canada Emergency Business Account (CEBA)	54%	45%
Temporary 10% Wage Subsidy	21%	14%
Canada Emergency Wage Subsidy (CEWS)	31%	26%
Canada Emergency Commercial Rent Assistance (CECRA)	6%	2%
Export Development Canada (EDC) Small and Medium-sized Enterprise Loan and Guarantee program	0%	0%
Business Development Bank of Canada (BDC) Co-Lending Program for Small and Medium-sized Enterprises	1%	2%
Innovation Assistance Program	0%	0%
Regional Relief and Recovery Fund	1%	0%
Provincial, Territorial or Municipal government programs	3%	1%
Grant or loan funding from philanthropic or mutual-aid sources	1%	0%
Financial institution	4%	2%
Loan from family or friends	3%	2%
Other approved sources of funding or credit	3%	4%
No approved sources of funding or credit	28%	31%

Source: Mining Industry Human Resources Council (2021); Statistics Canada, Table 33-10-0284-01 Approved funding or credit due to COVID-19, by business characteristics (2020).

KEY CHAPTER HIGHLIGHTS

Pandemic shock: The emergence of COVID-19 triggered an initial economic shock that rippled through all sectors of the economy (including the mining sector).

Adapting to the crisis: The pre-pandemic mining labour market showed stable vital signs; after the initial pandemic shock, mining was deemed an essential service by several provincial governments and mining operations began to adapt to the new environment.

Brief recovery: Several leading labour market indicators in *Mining and quarrying (NAICS 212)* made a brief comeback after the initial shock in March and April of 2020.

Economic turbulence: Despite the short-lived stabilization, the subsequent months have been rather turbulent in several economic indicators of interest.

Lagging indicators: Employment levels follow a somewhat depressed path throughout 2020; after hitting record highs in April, the unemployment rate returned to near normal, though December levels exhibited signs of trouble at the end of 2020.

Improved indicators: Other indicators display stronger recovery signs; average hours per worker has returned to its normal range despite being reduced in April of 2020, and the trend in real GDP is characteristic of a V-shaped recovery, at least for the year 2020. Labour productivity showed a substantial increase, a result of higher real GDP levels being produced with fewer hours of work overall.

Reasons for optimism: Although the pandemic has been greatly disruptive at the operational level, there are signs of optimism for a growing mining sector; the severe economic shock does not appear to have adversely affected commodity prices, especially as certain mined commodities (such as gold) are routinely counter cyclical to the overall economy.

Government support: A number of business support options were quickly made available to Canadian businesses in response to the pandemic. The Canada Emergency Business Account (CEBA), the Canada Emergency Wage Subsidy (CEWS), and the Temporary Wage Subsidy (TWS) were among the three most commonly used funding/support resources by businesses in *Mining, quarrying, and oil and gas extraction (NAICS 21)*.

CHAPTER TWO:
MANAGING THROUGH THE CRISIS

Similar to other industries, the COVID-19 pandemic caught the mining industry by surprise. As provincial borders closed to limit the spread of the virus, several mines were quickly shut down, while other employers scrambled to revise policies and procedures—all while balancing the demands of their day-to-day operations.

This section examines how the mining industry has thus far responded to the stress of the pandemic, including examples of the policies implemented and measures taken to mitigate the impact of the virus.

MiHR has reached out to various mining employers to gather input related to COVID-19. This section highlights recurrent themes from these discussions as well as from the Mining Association of Canada's (MAC) *Pandemic Action Summaries from MAC Members*. Lastly, this section features findings from Statistics Canada's *Canadian Survey on Business Conditions (CSBC)*, which aims to measure the impact of COVID-19 on Canadian businesses. Note that the data from this survey is for *Mining, quarrying and oil and gas extraction (NAICS 21)*.

ADAPTING TO THE POST-COVID-19 ENVIRONMENT

At the height of the first lockdown phase, the overall reaction from mining companies was relatively minor compared to other heavily impacted sectors in the economy, even with some mine closures and workforce changes. According to the CSBC, as of May 2020, roughly 36% of respondents in *Mining, quarrying and oil and gas extraction (NAICS 21)* stated they made no changes to adapt to the COVID-19 situation—a significantly higher share compared to all other industries at 13% of respondents.

That said, the above industry percentages do not distinguish by the size of the business, which has a significant effect on the reported COVID-19 response level. CSBC data show that,

regardless of industry, respondents with 1 to 4 employees were more likely to report they made no changes (at 17.7%) than respondents with over 100 employees (at 3.4%). Note that this makes comparisons across industries problematic given each has a unique composition of business sizes.

Temporary closures were one of the immediate actions implemented to prevent the spread of the virus. Roughly 14% of businesses surveyed in *Mining, quarrying and oil and gas extraction (NAICS 21)* closed temporarily as mandated by the government while close to 12% elected to temporarily close voluntarily (Figure 12).

Figure 12: Changes Made by Businesses During the Initial Lockdown Phase, *Mining, quarrying and oil and gas extraction (NAICS 21)** (May 2020)

Category	Percentage
No changes made to adapt to COVID-19 situation	35.5%
Added new ways to interact with or sell to customers	22.5%
Increased use of virtual connections internally	21.9%
Increased maintenance costs	14.1%
Closed temporarily as mandated by government	13.8%
Other changes made to adapt to COVID-19 situation	12.4%
Voluntarily closed temporarily	11.6%
Increased use of virtual connections externally or e-commerce	9.9%
Decreased maintenance costs	8.5%
Altered methods of production	7.2%
Discontinued a product or service	6.9%
Cancelled contracts	6.3%
Postponed a merger or acquisition	3.1%
Altered products or services offered to customers	3.0%
Altered research and development	2.6%
Closed permanently	0.8%
Invested in equipment to produce new products or expand existing product lines	0.4%
Temporarily halted exports	0.1%

Source: Mining Industry Human Resources Council (2021); Statistics Canada, Table 33-10-0250-01 Changes made by businesses to adapt to the COVID-19 pandemic, by business characteristics (2020).
Note that this figure reflects businesses of all sizes; it has also been found that smaller-sized businesses are more likely to report that they make no changes to adapt to COVID-19.

The pandemic has also forced mining operations to realign their resources to meet the new realities. CSBC results indicate that respondents in *Mining, quarrying and oil and gas extraction (NAICS 21)* have since increased expenditures (Figure 13) in sanitation and cleaning (61%), personal protective equipment and supplies (59%), repair and maintenance (18%), and technology and equipment for teleworking (17%).

Figure 13: COVID-19 Impacts on Various Expenditures, *Mining, quarrying, and oil and gas extraction (NAICS 21)* (Aug 2020)*

Category	Percentage
Sanitization and cleaning	61.0%
Personal protective equipment and supplies	59.0%
Repair and maintenance	18.3%
Technology and equipment for teleworking	16.7%
Research and development	4.4%
Research and development personnel	4.0%
Rent	1.0%
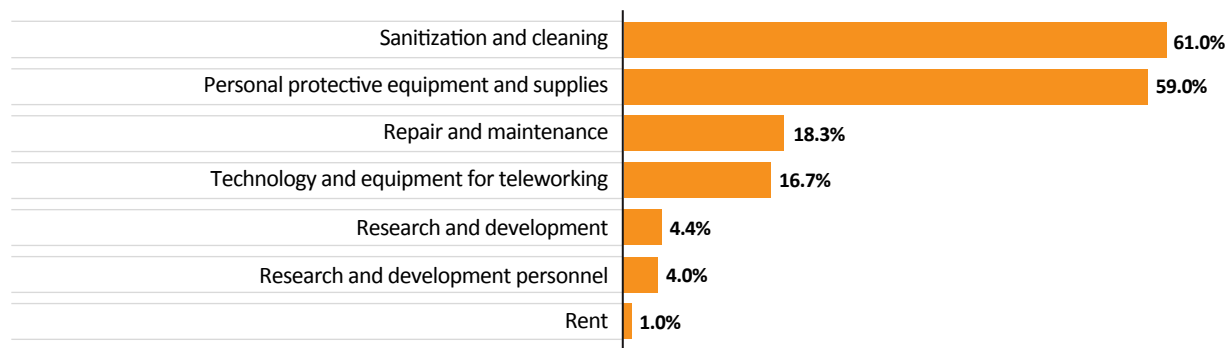
Source: Source: Mining Industry Human Resources Council (2021); Statistics Canada, Table 33-10-0283-01 COVID-19 impacts on various expenditures, by business characteristic (2020).
Note that this figure reflects businesses of all sizes; it has also been found that smaller-sized businesses are more likely to report that they make no changes to adapt to COVID-19.

HEALTH AND SAFETY MEASURES

Businesses across the globe have been compelled to revisit their procedures to ensure all people entering their workspaces remain safe and healthy.

Health and safety have long been a core practice in the mining industry. Mining companies have also taken steps to adhere to COVID-19 regulations. Some mining operations have enforced health screening measures upon arrival to mine sites to ensure that employees displaying COVID-19-related symptoms do not enter the workplace. In the event a worker becomes ill while on-site, companies have set up dedicated areas where they can isolate from other employees.

Operating procedures have also been adjusted to allow for social distancing to be always upheld; these adjustments include a reduction in the number of employees allowed in a mine cage at a time, and staggered seating in vehicles. Operations have additionally increased their cleaning and sanitation efforts in all mining facilities to prevent the spread of the virus.

These actions are consistent with findings from the CSBC, which reports that "restriction on the number of people allowed into the business space at one time" and "frequent cleaning of high-touch areas or surfaces" are among the most frequently cited safety measures taken by businesses in *Mining, quarrying and oil and gas extraction (NAICS 21)* (Figure 14).

Figure 14: Current or Planned Actions or Measures in Place Due to COVID-19, *Mining, quarrying and oil and gas extraction (NAICS 21)* (Aug 2020)*

Measure	Percentage
Provide hand sanitizer to employees and customers	60.2%
Insist that employees displaying any signs of illness stay home	57.9%
Frequent cleaning of high-touch areas or surfaces	54.3%
Provide facemasks, gloves, or other personal protective equipment to employees	53.7%
Restriction on the number of people allowed into the businesses space at one time	46.5%
Screen employees upon entry into the workplace for a fever, cough, or other signs of illness	33.3%
Request that customers displaying any signs of illness do not enter	31.8%
Addition of signage or floor markers to promote physical distancing	27.8%
No measures implemented	23.6%
Provide facemasks, gloves, or other personal protective equipment to customers	22.3%
Screen customers upon entry into the workplace for a fever, cough, or other signs of illness	18.8%
Reduction of business hours	15.2%
Modification of the office space	12.1%
More janitorial staff	11.1%
Adding plexiglass or sneeze guards	8.1%
Expansion of business or organization into existing outdoor space	4.5%
Current or planned actions or measures, other	3.2%
Rental or acquisition of more physical space for the business or organization	3.1%
Fill positions with less skilled workers	1.6%
Subcontract out more work	1.0%

Source: Mining Industry Human Resources Council (2021); Statistics Canada, Table 33-10-0277-01 Current or planned actions or measures in place due to COVID-19, by business characteristics (2020).

*Note that this figure reflects businesses of all sizes; it has also been found that smaller-sized businesses are more likely to report that no measures were implemented.

"WE REALIZED THAT EMPLOYEE MENTAL HEALTH AND WELLNESS IS SO IMPORTANT – MORE IMPORTANT THAN I THINK WE FULLY REALIZED."

– CANADIAN MINING EMPLOYER

More than just physical safety, COVID-19 has had a notable impact on the mental health and well-being of Canadians. In May 2020, Statistics Canada conducted a survey on the impact that the pandemic has had on the mental health of 46,000 Canadians. Entitled *Impacts of COVID-19 on Canadians: Your mental health, the survey looks at the overall mental health*, anxiety-related symptoms, and emotional response to social distancing. Results show that, from 2018 to 2020,[1] the share of Canadians who consider their mental health to be "poor or fair" has risen by 16%, whereas 23% fewer people reported having "very good or excellent" mental health. Mining employers have also acknowledged the strain and stress that their employees are experiencing due to the pandemic. Efforts have been made to maintain regular and supportive communication with staff to ensure that everyone feels connected and engaged.

Source: Agnico Eagle Ltd

PROTECTING VULNERABLE COMMUNITIES

Mining employers noted that under-represented groups, particularly Indigenous people, faced increased challenges as a result of COVID-19, notably the loss of work hours and income as mines were closed and operations were significantly altered. Additionally, training stoppages or limitations left many Indigenous workers without access to training in several remote communities. To counteract interruptions to work schedules, many companies offered paid leave to Indigenous workers during the pandemic.

In certain cases, regular consultation between mining companies and Indigenous community partners has been disrupted due to travel restrictions; still, members of both have been committed to remaining in regular contact via email, phone, and virtual meetings. Certain mining operations have opened accessible and clear channels for community members to submit grievances, comments, and requests, with the promise that they will be acted on in a timely manner.

"UNDER-REPRESENTED GROUPS REALLY BORE A LOT OF THE IMPACT OF COVID. WE'VE DEVELOPED NEW TOOLS TO ACCOMMODATE, AND WON'T BE DISCONTINUING ANYTIME SOON."

– CANADIAN MINING EMPLOYER

Members of the mining industry have made extensive efforts to support local Indigenous communities through the ongoing crisis. In Northern areas, several mines have allocated funds to numerous COVID-19 relief efforts—including donating to food banks, providing PPE and medical supplies, and ensuring that the communities have access to educational materials and information regarding COVID-19.

There has also been an effort to assist Indigenous businesses as they adjust to the COVID-19 pandemic. Many operations will be funding initiatives dedicated to helping Indigenous suppliers and businesses get back on their feet.

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1 The cited figures contrast responses from the 2018 Canadian Community Health Survey and the 2020 Impacts of COVID-19 on Canadians: Your mental health survey.

STAFFING ACTIONS TAKEN

Many mining companies initially responded to the COVID-19 pandemic by sending a portion of their workforce home in order to prevent the spread of the virus and to determine their next steps. As provincial governments implemented regulations to prevent the spread of COVID-19, mining operations across Canada were able to bring workers safely back on-site. Because several provinces deem mining an essential service, employees were able to quickly resume their duties.

CSBC data show that only 7% of businesses in *Mining, quarrying and oil and gas extraction (NAICS 21)* laid off more than 90% of their workforce in response to COVID-19 (Figure 15). By contrast, 25% of businesses in *Arts, entertainment and recreation (NAICS 71)* laid off more than 90% of their workforce.

Figure 15: Proportion of Businesses That Laid Off Workers due to COVID-19, *Mining, quarrying, and oil and gas extraction (NAICS 21)* (May 2020)
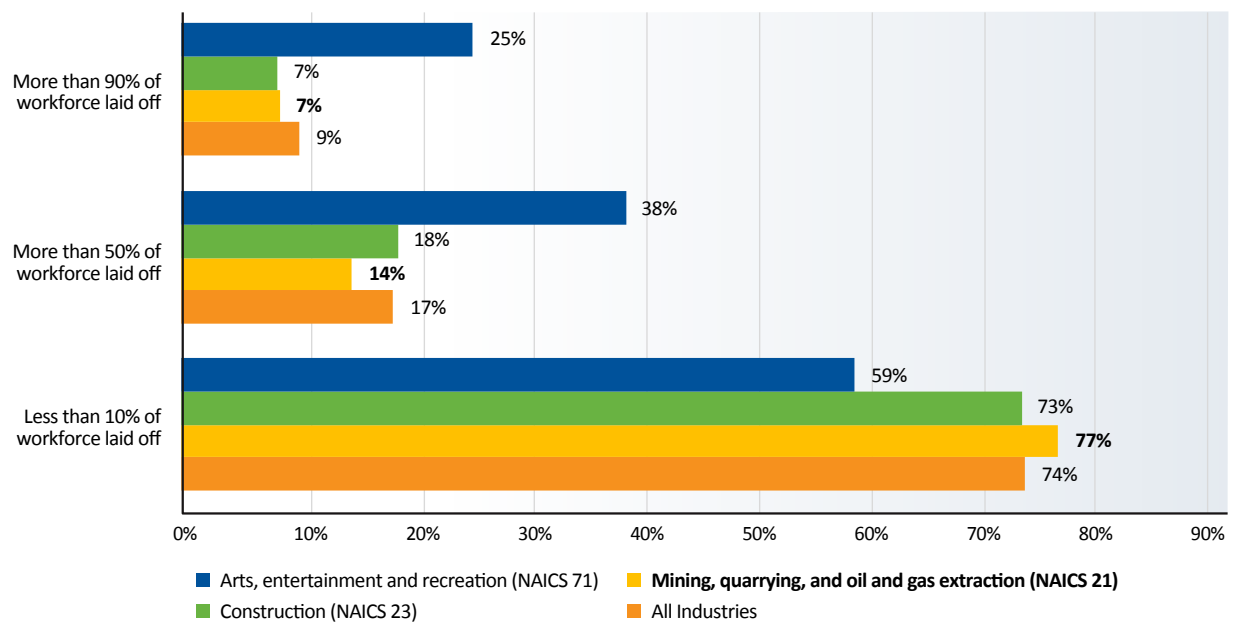
Source: Mining Industry Human Resources Council (2021); Statistics Canada, Table 33-10-0252-01 Percentage of workforce laid off to adapt to COVID-19, by business characteristics (2020).

ALTERED METHODS OF PRODUCTION

The pandemic has forced industries across the world to rethink their production methods. The primary hurdle has been to ensure a safe environment for employees (and customers) who would otherwise be in close contact. Consequently, COVID-19 brought new rules regarding how people co-exist in the same workspace.

"TIME TO RETHINK OUR OLD WAYS OF DOING MINING WORK."

– CANADIAN MINING EMPLOYER

Overall, the Canadian mining industry has demonstrated its resilience and has effectively navigated the challenges of COVID-19, as most mines have resumed operations. Several Canadian mining companies have re-evaluated their day-to-day processes in response to shifting government restrictions that limit travel and the number of people on-site—fundamentally changing the way that mines operate, and that people work.

To reduce the number of employees physically present at the job site, many mining companies have implemented new technologies that allow for remote workforce planning and training initiatives, working from home (when applicable), and the greater use of automation on-site. The pandemic has put additional pressure on mining companies to automate processes wherever possible, to the extent that remote capabilities can protect operations against future disruptions in production.

"IT WAS REMARKABLE TO SEE HOW PEOPLE TRANSITIONED DURING RECRUITING, INTERVIEWING AND ON-BOARDING VIRTUALLY."

– CANADIAN MINING EMPLOYER

The implementation of new processes has placed pressures on many workers to take on additional responsibilities beyond their normal roles. Where possible, employers have endeavoured to cross-train and upskill their existing workforce to meet these needs in order to retain existing employees rather than hiring for these roles externally.

In cases where outside hiring has been necessary, various technologies have been used to interview and onboard people virtually, rather than in-person. Mining employers have found that modern methods of hiring have streamlined their recruiting processes and allowed them to efficiently meet the needs of their workforce.

Many employers noted that COVID-19 *'pushed us where we needed to go'* which resulted in the use of digital learning academies, virtual recruitment fairs, new forms of work arrangements and revised accommodation policies. For many operations, these new technologies were being explored in some capacity before the pandemic, but COVID-19 accelerated the timeline of their implementation.

"WE ARE DOING ALL OF OUR INTERVIEWS VIRTUALLY NOW; WE HAVEN'T REALLY MISSED A BEAT." – CANADIAN MINING EMPLOYER

REMOTE WORK

Remote working arrangements have gained considerable momentum since the first wave of government lockdowns was introduced. The pandemic forced many businesses and governments to assess which roles demanded in-person attendance at the traditional workplace and which could be managed remotely. To maximize social distancing efforts and limit exposure to risky environments, mining operations allowed for remote working arrangements when feasible.

"IT [COVID-19] MADE US REALIZE THAT WE CAN DO SO MUCH MORE REMOTELY."
– CANADIAN MINING EMPLOYER

The mining sector is comprised of a wide range of occupations, some of which require a physical presence. This means that some remote work arrangements have not been possible for a segment the workforce due to the nature of their work. Those who work in more office-based positions, however, have been able to continue to work productively from a remote environment.

Some employers have received highly positive feedback from their employees regarding remote work arrangements—a signal that pandemic-era measures may continue in the long term. The perception is that remote working arrangements have allowed operations to increase efficiency and lower costs while maintaining productivity.

Remote work has become increasingly mainstream over the course of the past year (Figure 16). Before the onset of the pandemic in January of 2020, nearly 13% of CSBC respondents in *Mining, quarrying and oil and gas extraction (NAICS 21)* reported that over half of their workforce was working remotely. By the end of March, this rate had risen to 37% as the pandemic fueled an urgent need to implement new remote working arrangements. Though this estimate has fluctuated as the first lockdown restrictions eased, remote work has left a permanent impression on industry employers; roughly 30% indicated that over half of their workforce will continue to work remotely post-pandemic.

"UNANIMOUS INTEREST WAS EXPRESSED BY OUR EMPLOYEES IN CONTINUING WORK FROM HOME."
– CANADIAN MINING EMPLOYER

Figure 16: Percentage of Workforce Teleworking or Working Remotely, *Mining, quarrying, and oil and gas extraction (NAICS 21)* (Various reference dates in 2020)
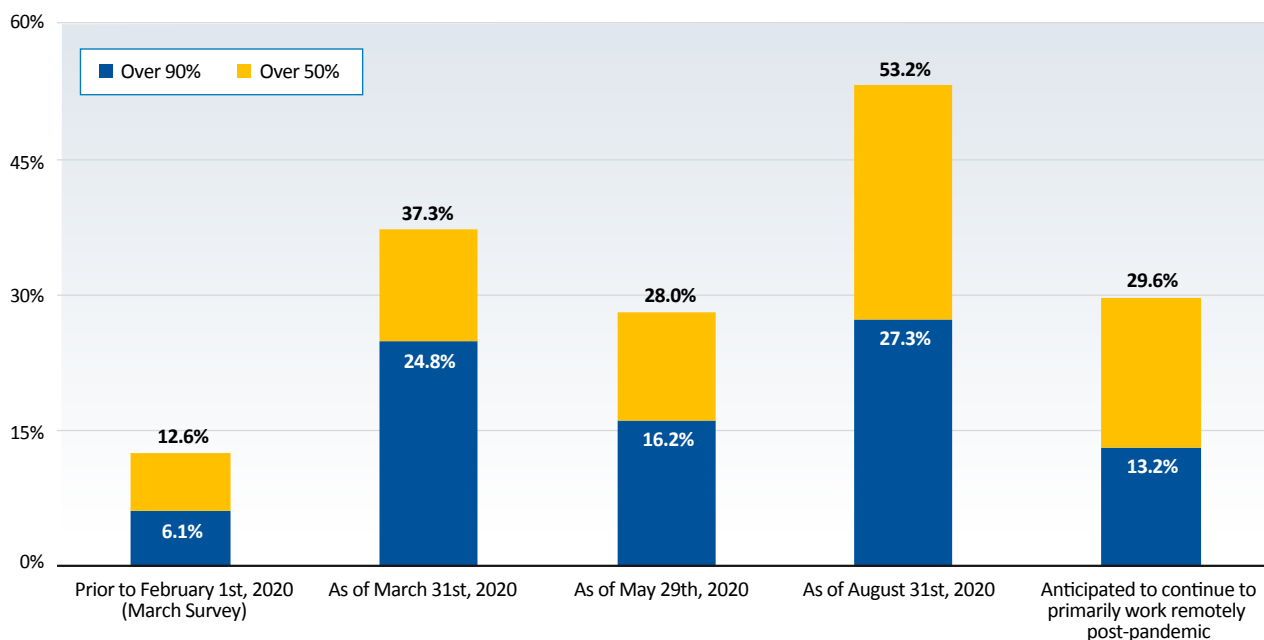
Source: Mining Industry Human Resources Council (2021); Statistics Canada, Tables 33-10-0228-01, 33-10-0247-01, 33-10-0274-01 Percentage of workforce teleworking or working remotely, and percentage of workforce expected to continue teleworking or working remotely after the pandemic, by business characteristics (2020).

PARENTAL SUPPORT FOR STAFF

COVID-19 introduced new demands on parents working remotely, who need to care for children while also performing their regular work duties. Many pre-COVID-19 policies for mining workers with children could not fully accommodate those who had to juggle the demands of family and work. COVID-19 has introduced new and complex logistical issues for both employees and employers.

Some mining employers have modified their policies so that parents can continue to be as productive as possible. CBCS results show that allowing parents to work remotely (17.4%) and to change their schedules (16.6%) were among the most cited actions by respondents in *Mining, quarrying and oil and gas extraction (NAICS 21)* (Figure 17). In fewer cases, respondents indicated that workers took a leave of absence with reduced or no pay (6.4%) or switched their employment status to part-time on a temporary or limited basis (5.3%).

More frequently, respondents stated that measures to support working parents were not applicable (53%). However, this finding is most likely reported by the smaller-sized businesses in *Mining, quarrying and oil and gas extraction (NAICS 21)*, for which a breakdown is unavailable.

"OUR WORKFORCE HAS DIVERSE NEEDS. COVID-19 MADE US RETHINK OUR POLICIES AROUND LEAVE, CHILDCARE, WORK/LIFE/FAMILY BALANCE AND HOW WE CAN AS EMPLOYERS DO A BETTER JOB AT SUPPORTING [THEM]."

– CANADIAN MINING EMPLOYER

Figure 17: Current or Planned Actions or Measures in Place for Parents Employed by the Business or Organization, *Mining, quarrying and oil and gas extraction (NAICS 21)** (Aug 2020)

Measure	%
Not applicable, all work can be performed on a flexible schedule	29.1%
Not applicable, schools and child care facilities in our area are expected to have a normal schedule	24.0%
Not considering any special accommodation for parents	22.9%
Allow parents to telework or work remotely	17.4%
Allow parents to change their schedules	16.6%
Offer an extended leave of absence with reduced or no pay	6.4%
Allow parents to switch to part-time status on a temporary or limited basis	5.3%
Assign parents alternate tasks that can be done outside of normal business hours	2.8%
Create weekend, evening, or overnight shifts to provide more flexibility for parents	1.9%
Allow parents to bring children to work	1.5%
Current or planned measures, other	1.0%

Source: Mining Industry Human Resources Council (2021); Statistics Canada, Table 33-10-0278-01 Current or planned actions or measures in place for parents employed by the business or organization, by business characteristics (2020).

Note that this figure reflects businesses of all sizes; it has also been found that smaller-sized businesses are more likely to indicate that these measures are not applicable to their operations.

OBSTACLES FOR BUSINESSES

The transformation that businesses have achieved through the pandemic has not occurred without growing pains. For all organizations, the way of doing business, the policies and procedures and the established marketplaces were each formed before the pandemic occurred. Thus, it is natural that a new (post-COVID-19) environment would introduce challenges and frictions for businesses trying to adapt to very different circumstances.

According to the CSBC, financial stability and the demand for goods and services were the most cited obstacles among respondents in *Mining, quarrying and oil and gas extraction (NAICS 21)* in the months following the onset of the pandemic (Figure 18). Other notable concerns include government regulations, the rising cost of inputs and labour force shortages.

Figure 18: Business or Organization Obstacles Over the Last Three Months, *Mining, quarrying and oil and gas extraction (NAICS 21)** (Aug 2020)

Obstacle	Percentage
Financial constraints	45%
Insufficient demand for goods or services offered	37%
Fluctuations in consumer demand	32%
Maintaining sufficient cash flow or managing debt	30%
Government regulations	19%
Obstacles for the business or organization, none	18%
Recruiting and retaining skilled employees	12%
Rising cost of inputs	12%
Shortage of labour force	11%
Obtaining financing	10%
Obstacles for the business or organization, other	10%
Corporate tax rate	8%
Increasing competition	8%
Challenges related to exporting goods and services	1%
Broadband access	1%
Shortage of space or equipment	1%

Source: Mining Industry Human Resources Council (2021); Statistics Canada, Table 33-10-0273-01 Business or organization obstacles over the last three months, by business characteristics (2020).
Note that this figure reflects businesses of all sizes.

KEY CHAPTER HIGHLIGHTS

Initially caught by surprise: The COVID-19 pandemic caught the mining industry by surprise; several mines were quickly shut down, while other mining employers scrambled to revise policies and procedures to protect the health and safety of workers.

New health and safety protocols: Mining employers have increased their efforts in health screening measures, sanitation and cleaning of surfaces, ensuring social distancing in their operations, modifying physical spaces, using signage, and embracing remote work where it is feasible.

Protecting vulnerable communities: The health and safety of many remote populations quickly became a priority for mining operations, especially for those in Indigenous communities.

COVID-19 relief efforts: Several mining companies have contributed to COVID-19 relief efforts to support local Indigenous communities—including donating to food banks, providing PPE and medical supplies, and ensuring that the communities have access to educational materials and information regarding COVID-19 and assistance for Indigenous businesses as they adjust to the pandemic.

Rethinking production methods: COVID-19 brought new regulations regarding how people co-exist in the same workspace. Thus, the pandemic has forced industries across the world to rethink their production methods to ensure a safe environment for employees (and customers).

Embracing new technologies after COVID-19: With the goal of reducing the number of employees required to be physically present, mining companies have implemented new technologies that allow for remote workforce planning and training initiatives including working from home (when applicable).

Greater use of automation: The pandemic has put additional pressure on mining companies to automate processes, wherever possible, to the extent that remote capabilities can protect operations against production disruptions in the future.

New pressures for some workers: A reduced on-site workforce and the implementation of new processes and technologies have forced many workers to take on additional responsibilities beyond their normal roles.

Training needs and COVID-19: Where possible, employers have endeavoured to cross-train and upskill their existing workforce to meet their needs rather than hiring for these roles externally.

Remote work has become mainstream: Remote working arrangements have gained considerable momentum in the mining sector since the first wave of lockdowns. There is early indication that this shift may be endure in the post-pandemic era.

Measures not applied equally: Given the wide range of roles in the industry, some measures (such as remote work arrangements) have not been possible for those occupations requiring a physical presence at the workplace. At the same time, other roles (e.g. office-based positions) have been able to continue to work seamlessly from a remote environment.

Supports for parents: COVID-19 introduced new demands for parents, especially as many pre-COVID-19 policies could not fully accommodate the logistical challenges of caring for young children (and other family members) during a pandemic. Some mining employers have modified their policies so that parents can continue to be as productive as possible.

Concerns over economic and financial stability: In the months following the pandemic, financial constraints, insufficient demand for goods and services, government regulations, the rising cost of inputs, and labour force shortages were among the most cited obstacles for businesses in *Mining, quarrying and oil and gas extraction (NAICS 21)*.

CHAPTER THREE:
WHO HAS BEEN MOST DISRUPTED?

The COVID-19 pandemic has adversely affected some workers more than others. While certain people work from home with ease, others have unexpectedly found themselves in critical frontline positions. Still others are vulnerable to the shifting economic landscape as jobs are phased out and hours reduced. This section compares how different segments of Canada's mining industry have fared through the pandemic, particularly those who have suffered most from the economic fallout of COVID-19 in 2020. Key labour market variables (employment, unemployment rates, average hours and weekly wage rates) show a picture of disruption for each labour market group of interest.

MINING RELATED SUB-SECTORS

Mining and Quarrying (NAICS 212) is the most mining-centric industry code and the primary focus of this report. However, Canada's mining industry intersects with several other industry codes, though the overlap is not as straightforward as with NAICS 212. MiHR typically monitors four main subsectors in its ongoing analysis.

The analysis in this section focuses on five (3-digit) NAICS codes. They are:

- *Oil and gas extraction (NAICS 211)*
- *Mining and quarrying (except oil and gas) (NAICS 212)*
- *Support activities for mining, and oil and gas extraction (NAICS 213)*
- *Primary metal manufacturing (NAICS 331)*
- *Professional, scientific and technical services (NAICS 541)*

The mining industry draws on the labour pool of each of these sectors to some extent, though unlike NAICS 212, their connections to mining are less direct (Table 2).

Source: Agnico Eagle Ltd

Table 2: Key Sectors Relevant to Canada's Mining Industry, by 3-Digit NAICS Code

MiHR Sub-Sectors	Description	Relevant industry code shown in this report
EXTRACTION AND MILLING	Describes the activities at operating mines across Canada, including both surface and underground mining operations, and on-site processing activities.	**NAICS 212:** Mining and quarrying (except oil and gas) **NAICS 211:** Oil and gas extraction **relevant to oil-sands mining*
SUPPORT SERVICES	Includes the activities of organizations providing support services for a wide range of mining activities, often on a contract or fee basis.	**NAICS 213:** Support activities for mining, and oil and gas extraction
PRIMARY METAL MANUFACTURING	Consists of activities that are directly downstream from extraction and milling, including smelting and refining of ferrous and non-ferrous metals.	**NAICS 331:** Primary metal manufacturing
EXPLORATION	Encompasses activities focused on the discovery of minerals and metals.	**NAICS 541:** Professional, scientific and technical services

Source: Mining Industry Human Resources Council (2021); Statistics Canada.

A comparison of employment changes across 103 sectors (3-digit NAICS codes) revealed that *Mining and quarrying (NAICS 212)* was in the middle of the spectrum both in terms of employment loss (-6%) and in the unemployment rate spike (+6%) resulting from the first wave of the pandemic (from Q1 to Q2 of 2020). Among all sectors of interest, the average employment change was -9% and the average unemployment rate increase was +6%.

A few of the hardest hit sectors show dramatic changes through those early pandemic months, including *Food service and drinking places (NAICS 722)*, *Accommodation services (NAICS 721)*, *Amusement, gambling and recreation industries (NAICS 713)*, *Air transportation (NAICS 481)* and *Clothing and clothing accessories stores (NAICS 448)*; each experienced an employment loss of roughly 30% or more and an unemployment spike of roughly 20% or more.

In all mining-related sectors, the COVID-19 impact on labour market trends is highly visible. For example, the unemployment rate in each sector highlights an anomalous trend in 2020 relative to the seasonal trends over the previous two decades (Figure 19). The deviations are further illustrated by comparing the actual 2020 trend (orange line) to a prediction based on historical data (blue line). Starting from the actual observation in Q1, the prediction shows the unemployment rate path had it followed historical median growth in Q2, Q3 and Q4.

Among the mining-related sectors, *Support activities for mining, and oil and gas extraction (NAICS 213)*[2] stands out as the most disrupted sector across indicators following in 2020 (Table 3). While other sectors have been able to close the gap on various indicators, this sector continued to underperform throughout 2020 and showed the largest deviation from the previous year.

Figure 19: Unemployment Rate by Sector, Based on Quarterly Averages (2001 to 2020)
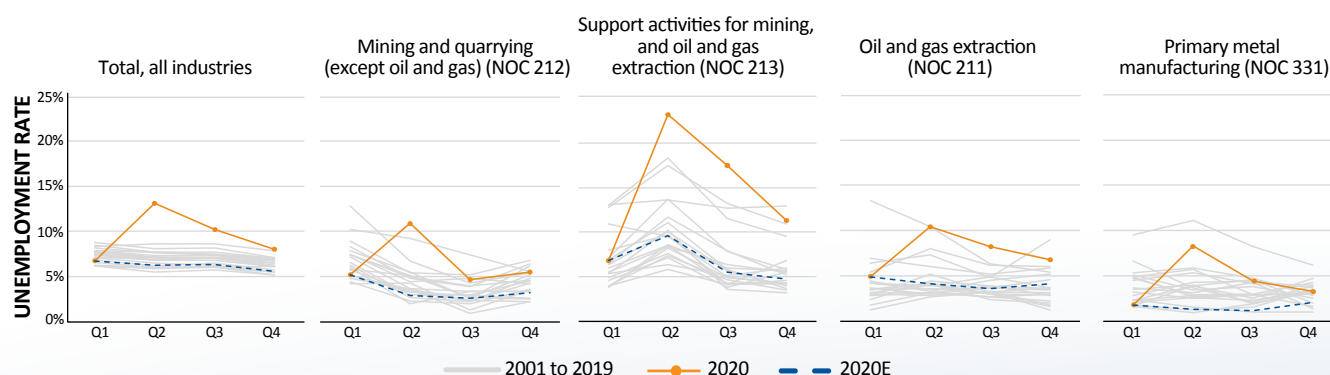
Source: Mining Industry Human Resources Council (2021); Statistics Canada, Labour Force Survey Custom Table, monthly, unadjusted for seasonality (2020).
Note that certain data points were estimated due to data suppression.

2   Note that roughly 70% of Support activities for *mining, and oil and gas extraction (NAICS 213)* was from Alberta in 2020, indicating that oil and gas support services activities could influence these numbers.

Table 3: Year-to-Year Changes in Key Labour Market Indicators, by Sector, Based on Quarterly Averages (2020 vs 2019)

Employment (% Change from the previous year)					
Sector	Avg 2020	Q1	Q2	Q3	Q4
Oil and gas extraction (NOC 211)	90,000	-12%	-13%	+3%	+13%
Mining and quarrying (except oil and gas) (NOC 212)	63,000	-6%	-11%	-21%	-9%
Support activities for mining, and oil and gas extraction (NOC 213)	74,000	-6%	-20%	-29%	-20%
Primary metal manufacturing (NOC 331)	70,000	+38%	+1%	+5%	-15%
Professional, scientific and technical services (NOC 541)	1,554,000	+2%	-4%	-1%	+3%
Total, all industries	18,060,000	-1%	-12%	-5%	-3%

Unemployment Rate (% Difference from previous year)					
Sector	Avg 2020 (%)	Q1	Q2	Q3	Q4
Oil and gas extraction (NOC 211)	8%	+1%	+7%	+5%	+2%
Mining and quarrying (except oil and gas) (NOC 212)	7%	+1%	+7%	+3%	+2%
Support activities for mining, and oil and gas extraction (NOC 213)	15%	0%	+12%	+12%	+8%
Primary metal manufacturing (NOC 331)	4%	0%	+7%	+2%	0%
Professional, scientific and technical services (NOC 541)	5%	0%	+4%	+4%	+2%
Total, all industries	10%	+1%	+8%	+4%	+3%

Average actual hours (Difference from previous year)					
Sector	Avg 2020 (hrs/week)	Q1	Q2	Q3	Q4
Oil and gas extraction (NOC 211)	39	-1	+1	-1	+2
Mining and quarrying (except oil and gas) (NOC 212)	38	-3	-6	-3	+1
Support activities for mining, and oil and gas extraction (NOC 213)	40	+3	-5	-1	-4
Primary metal manufacturing (NOC 331)	37	0	-1	+1	-1
Professional, scientific and technical services (NOC 541)	33	-1	-2	0	0
Total, all industries	31	-1	-3	-1	0

Average weekly wage rate (Difference from previous year)					
Sector	Avg 2020 ($/week)	Q1	Q2	Q3	Q4
Oil and gas extraction (NOC 211)	$2,222	+59	+164	+188	-45
Mining and quarrying (except oil and gas) (NOC 212)	$1,723	+29	+9	-10	+117
Support activities for mining, and oil and gas extraction (NOC 213)	$1,707	+114	+38	+32	-13
Primary metal manufacturing (NOC 331)	$1,374	-6	+39	+96	+100
Professional, scientific and technical services (NOC 541)	$1,414	+56	+107	+91	+30
Total, all industries	$1,086	+55	+109	+63	+55

Source: Mining Industry Human Resources Council (2021); Statistics Canada. Labour Force Survey Custom Table, monthly, unadjusted for seasonality (2020).
Note that certain data points were estimated due to data suppression.

OCCUPATIONS

The mining industry employs a wide range of occupations that support mining at all stages of development. The occupation mix refers to the composition of roles that are found in the industry; this mix provides a measure of how certain mining functions and roles trend over time, and how they respond to the economic shock that was brought on by the pandemic.

Highlighted here are five occupational categories (at the 2-digit NOC level) in *Mining and quarrying (NAICS 212)*, representing roughly two thirds of employment in the sector (Figure 20). Currently, there is no definitive evidence that the pandemic permanently disrupted the broad occupational mix in 2020, as employment levels in various occupational categories fluctuated somewhat, but kept within their historical range in 2020. That said, *Professional occupations in natural and applied sciences (NOC 21)* showed robust growth in 2020 despite starting off the year at a relatively low level.

Although COVID-19 is widely expected to accelerate certain technological trends that would permanently change the nature of work (see Chapter Four), the effects on the occupational mix may take longer to become apparent in the data.

Among other labour market indicators, the trends are irregular, but a few interesting data points stand out. For example, Q2 showed a distinct spike in the unemployment rate across all categories, with the notable exception of *Professional occupations in natural and applied sciences (NOC 21)*. Furthermore, *Supervisors and technical occupations in natural resources (NOC 82)* experienced by far the largest cut in hours per week in Q2, while *Professional occupations in natural and applied sciences (NOC 21)* felt the largest average wage decrease in the first half of the year. In general, the indicators show instability in the first three quarters of the year followed by a relative recovery in Q4.

Figure 20: Employment by Occupational Category, *Mining and quarrying (NAICS 212)*, Based on Quarterly Averages (2007 to 2020)
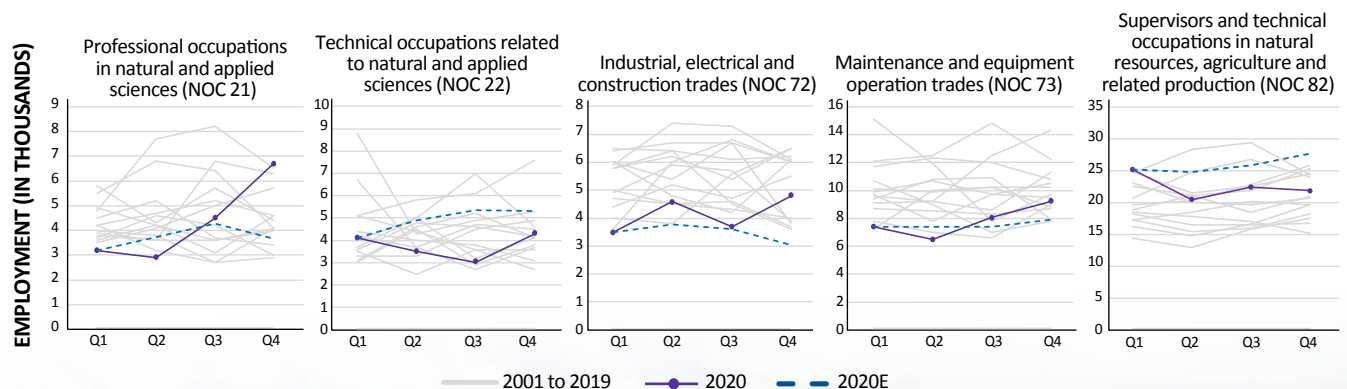
Source: Mining Industry Human Resources Council (2021); Statistics Canada. Labour Force Survey Custom Table, monthly, unadjusted for seasonality (2020).

Table 4: Year-to-Year Changes in Key Labour Market Indicators, by Occupational Category, *Mining and quarrying (NAICS 212)*, Based on Quarterly Averages (2020 vs 2019)

Employment (% Change from the previous year)					
Occupational Category	Avg 2020	Q1	Q2	Q3	Q4
Professional occupations in natural and applied sciences (NOC 21)	4,000	-17%	-20%	-34%	+1%
Technical occupations related to natural and applied sciences (NOC 22)	4,000	-39%	-5%	+11%	+26%
Industrial, electrical and construction trades (NOC 72)	4,000	-28%	-23%	-36%	+32%
Maintenance and equipment operation trades (NOC 73)	8,000	-37%	-47%	-32%	-10%
Supervisors and technical occupations in natural resources, agriculture and related production (NOC 82)	22,000	+2%	-28%	-24%	-15%
Total, all occupations	63,000	-6%	-12%	-22%	-9%

Unemployment Rate (% Difference from previous year)					
Occupational Category	Avg 2020 (%)	Q1	Q2	Q3	Q4
Professional occupations in natural and applied sciences (NOC 21)	2%	+2%	-1%	+3%	0%
Technical occupations related to natural and applied sciences (NOC 22)	10%	+1%	+19%	+1%	-8%
Industrial, electrical and construction trades (NOC 72)	6%	-8%	+9%	+7%	+6%
Maintenance and equipment operation trades (NOC 73)	4%	+1%	+7%	+3%	+4%
Supervisors and technical occupations in natural resources, agriculture and related production (NOC 82)	9%	+2%	+11%	+3%	+4%
Total, all occupations	7%	+1%	+7%	+3%	+3%

Average actual hours (Difference from previous year)					
Occupational Category	Avg 2020 (hrs/week)	Q1	Q2	Q3	Q4
Professional occupations in natural and applied sciences (NOC 21)	38	-1	+1	-3	+1
Technical occupations related to natural and applied sciences (NOC 22)	38	+3	+2	-2	-1
Industrial, electrical and construction trades (NOC 72)	40	-2	+1	+1	-4
Maintenance and equipment operation trades (NOC 73)	39	-3	-5	+1	+3
Supervisors and technical occupations in natural resources, agriculture and related production (NOC 82)	38	-2	-12	-4	-1
Total, all occupations	38	-3	-6	-3	+1

Average weekly wage rate (Difference from previous year)					
Occupational Category	Avg 2020 ($/week)	Q1	Q2	Q3	Q4
Professional occupations in natural and applied sciences (NOC 21)	$1,936	-246	-232	-23	+382
Technical occupations related to natural and applied sciences (NOC 22)	$1,693	+43	-79	+233	+335
Industrial, electrical and construction trades (NOC 72)	$1,867	-8	-13	-189	-37
Maintenance and equipment operation trades (NOC 73)	$1,946	+189	+254	+151	+146
Supervisors and technical occupations in natural resources, agriculture and related production (NOC 82)	$1,711	-29	-4	+38	+87
Total, all occupations	$1,724	+29	+9	-10	+140

Source: Mining Industry Human Resources Council (2021); Statistics Canada. Labour Force Survey Custom Table, monthly, unadjusted for seasonality (2020).
Note that certain data points were estimated due to data suppression.

EDUCATIONAL ATTAINMENT

Mining operations draw on people with diverse educational backgrounds. This report considers four distinct levels of educational attainment: (1) no degree, certificate or diploma, (2) high school diploma, (3) post-secondary certificate or diploma and (4) university degree.

Within *Mining and quarrying (NAICS 212)*, those with no degree, certificate or diploma have especially felt the weight of the pandemic, as the unemployment rate for this group climbed to unparalleled levels after Q1 in 2020 (Figure 21). Most other education levels exhibit a similar uptick in the unemployment rate in the second quarter (during the initial lockdown phase) but all have since recovered closer to normal levels.

In general, workers with lower levels of educational attainment have fared worse than the rest of the mining workforce (Table 5). Notably, high school graduates have shown the largest employment drop relative to 2019, reaching nearly 50% in Q3 and Q4 (Table 5).

Figure 21: Unemployment Rate by Educational Attainment, *Mining and quarrying (NAICS 212)*, Based on Quarterly Averages (2001 to 2020)

Source: Mining Industry Human Resources Council (2021); Statistics Canada, Labour Force Survey Custom Table, monthly, unadjusted for seasonality (2020).
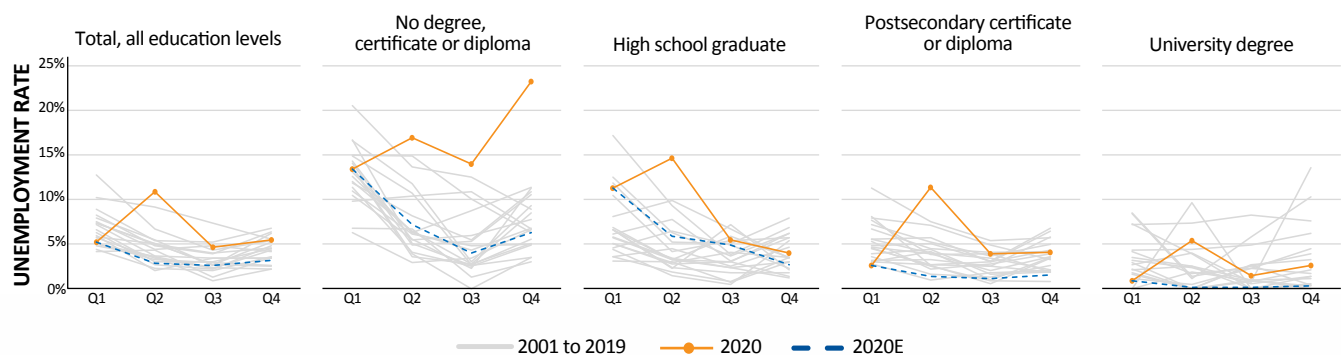*Note that certain data points were estimated due to data suppression.*

Table 5: Year-to-Year Changes in Key Labour Market Indicators, by Educational Attainment, *Mining and quarrying (NAICS 212)*, Based on Quarterly Averages (2020 vs 2019)

Employment (% Change from the previous year)					
Educational Attainment	Avg 2020	Q1	Q2	Q3	Q4
No degree, certificate or diploma	5,000	-4%	-11%	+22%	+6%
High school graduate	10,000	-26%	-36%	-48%	-48%
Postsecondary certificate or diploma	35,000	-8%	-19%	-16%	+4%
University degree	12,000	+42%	+102%	-21%	-16%
Total, all education levels	63,000	-6%	-11%	-21%	-9%

Unemployment Rate (% Difference from previous year)					
Educational Attainment	Avg 2020 (%)	Q1	Q2	Q3	Q4
No degree, certificate or diploma	17%	+3%	+11%	+12%	+12%
High school graduate	9%	+7%	+13%	+5%	-1%
Postsecondary certificate or diploma	6%	-1%	+7%	+2%	+2%
University degree	3%	+1%	-4%	+2%	+1%
Total, all education levels	7%	+1%	+7%	+3%	+2%

Average actual hours (Difference from previous year)					
Educational Attainment	Avg 2020 (hrs/week)	Q1	Q2	Q3	Q4
No degree, certificate or diploma	39	-11	-8	+2	-2
High school graduate	39	-2	-6	-5	+4
Postsecondary certificate or diploma	38	-3	-7	-2	0
University degree	38	-1	-1	-2	+3
Total, all education levels	38	-3	-6	-3	+1

Average weekly wage rate (Difference from previous year)					
Educational Attainment	Avg 2020 ($/week)	Q1	Q2	Q3	Q4
No degree, certificate or diploma	$1,393	-183	-215	+187	+62
High school graduate	$1,686	-48	+90	+111	+216
Postsecondary certificate or diploma	$1,685	-5	-51	-53	+24
University degree	$2,008	+117	-41	-28	+357
Total, all education levels	$1,723	+29	+9	-10	+117

Source: Mining Industry Human Resources Council (2021); Statistics Canada. Labour Force Survey Custom Table, monthly, unadjusted for seasonality (2020).
Note that certain data points were estimated due to data suppression.

REGIONS

Canada's mining industry is spread across several distinct jurisdictional regions. The provinces with the greatest employment in *Mining and quarrying (NAICS 212)* are Quebec, Ontario, British Columbia, Saskatchewan and Newfoundland and Labrador. Together, these five provinces account for nearly 90% of employment in the sector.

The pandemic did not affect the provinces equally. Notably, Ontario and Quebec experienced the greatest employment losses in 2020 (Figure 22). Quebec started the year with the highest employment level since 2001, which could not be sustained in subsequent quarters. Saskatchewan witnessed an initial drop in Q2 but then managed to recover by the end of the year.

There are also signs that COVID-19 has disturbed pre-pandemic employment patterns, with the biggest year-over-year deviations witnessed in Q3 and Q4 across most provinces with the notable exception of Newfoundland (Table 6).

The relative spike in unemployment rates also shows disparity among provinces, with Ontario and Quebec being the two hardest hit (especially Quebec in Q2).

Across all provinces, there was a drop in average hours of work in Q2 relative to the previous year, likely due to restrictions related to COVID-19. The numbers show a nearly complete recovery by the end of 2020 (except for British Columbia and Newfoundland).

Figure 22: Employment by Province, *Mining and quarrying (NAICS 212)*, Based on Quarterly Averages (2020)
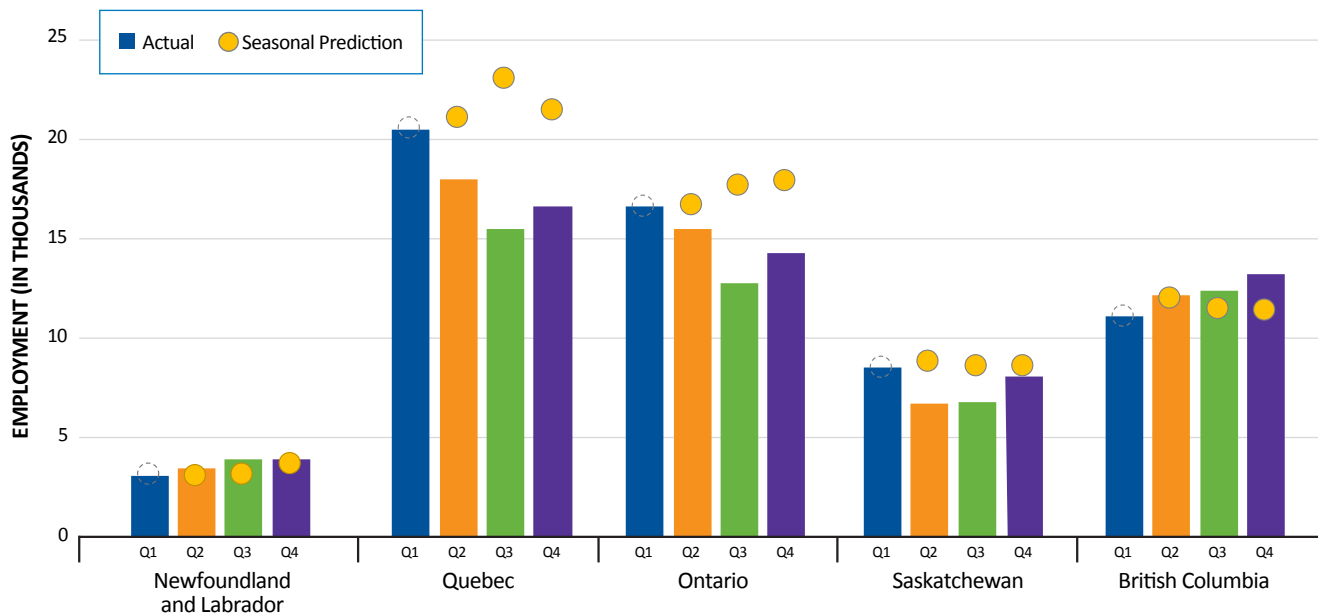
Source: Mining Industry Human Resources Council (2021); Statistics Canada, Labour Force Survey Custom Table, monthly, unadjusted for seasonality (2020).

Table 6: Year-to-Year Changes in Key Labour Market Indicators, by Province, *Mining and quarrying (NAICS 212)*, Based on Quarterly Averages (2020 vs 2019)

Employment (% Change from the previous year)					
Province	Avg 2020	Q1	Q2	Q3	Q4
Quebec	18,000	+7%	0%	-24%	-14%
Ontario	15,000	+1%	-4%	-29%	-23%
British Columbia	12,000	+22%	-3%	-15%	+8%
Saskatchewan	8,000	+2%	-20%	-31%	-15%
Newfoundland and Labrador	4,000	-2%	+28%	+46%	+32%
Canada	63,000	-6%	-11%	-21%	-9%

Unemployment Rate (% Difference from previous year)					
Province	Avg 2020 (%)	Q1	Q2	Q3	Q4
Quebec	6%	-1%	+12%	+1%	+5%
Ontario	5%	0%	-3%	+6%	+6%
British Columbia	4%	0%	+2%	+3%	-2%
Saskatchewan	5%	-1%	+6%	+6%	-4%
Newfoundland and Labrador	4%	-7%	+1%	+5%	+4%
Canada	7%	+1%	+7%	+3%	+2%

Average actual hours (Difference from previous year)					
Province	Avg 2020 (hrs/week)	Q1	Q2	Q3	Q4
Quebec	37	-7	-6	-5	0
Ontario	40	-2	-5	+1	+4
British Columbia	38	-5	-8	-3	-4
Saskatchewan	38	+2	-4	-2	+5
Newfoundland and Labrador	39	-2	-10	-4	-5
Canada	38	-3	-6	-3	+1

Average weekly wage rate (Difference from previous year)					
Province	Avg 2020 ($/week)	Q1	Q2	Q3	Q4
Quebec	$1,611	-11	-33	-155	+168
Ontario	$1,576	+47	+36	+56	-4
British Columbia	$1,931	+209	+146	-103	+21
Saskatchewan	$1,966	-137	-33	+117	+248
Newfoundland and Labrador	$1,864	+218	-98	-78	-129
Canada	$1,723	+29	+9	-10	+117

Source: Mining Industry Human Resources Council (2021); Statistics Canada. Labour Force Survey Custom Table, monthly, unadjusted for seasonality (2020).

*Note that certain data points were estimated due to data suppression.*

DIVERSITY GROUPS

MiHR's ongoing analysis regularly monitors the labour market outcomes for a set of diverse demographic groups. Indigenous people, women, immigrants and various age categories are frequently listed among the critical groups of interest, though this list is not entirely inclusive. Each of the aforementioned demographic groups faces unique challenges in the mining industry.

Among the diverse groups of interest, 15- to 24-year-olds, Indigenous and immigrant workers experienced the greatest drops in employment in *Mining and quarrying (NAICS 212)*. By comparison, female workers in the sector have shown more resiliency and have followed a level of employment closer to

the expectations and in line with previous years; women in the industry are more likely to have higher levels of education, which may have contributed to the strong numbers in 2020.

Young workers (15 to 24 years) particularly experienced significant volatility in employment, especially during the first half of 2020. Lastly, male workers (86%) and prime-age workers (25 to 54 years) (75%) each represent the majority of workers in their respective categories, and are therefore subject to the greater trends for the industry as a whole.

Figure 23: Employment by Diversity Group of Interest, *Mining and quarrying (NAICS 212)*, Based on Quarterly Averages (2001 to 2020)
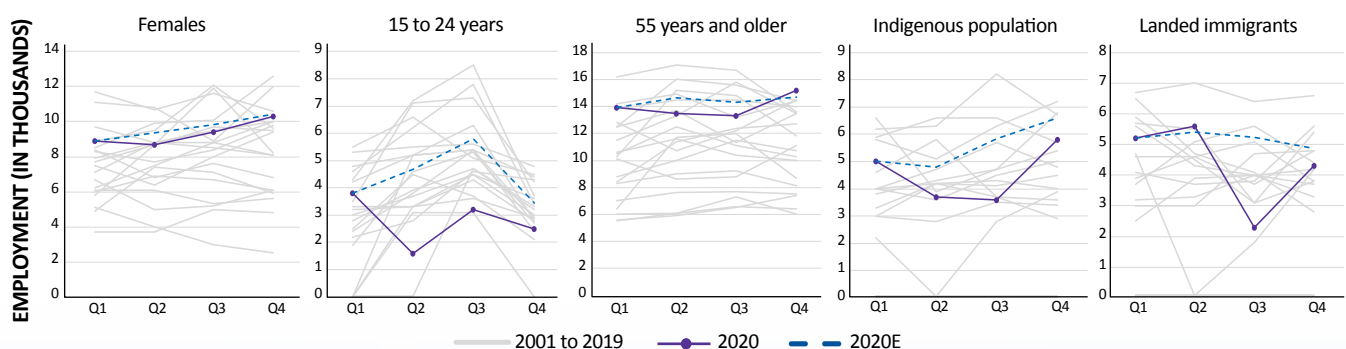
Source: Mining Industry Human Resources Council (2021); Statistics Canada, Labour Force Survey Custom Table, monthly, unadjusted for seasonality (2020).

Table 7: Year-to-Year Changes in Key Labour Market Indicators, by Diversity Group of Interest, *Mining and quarrying (NAICS 212)*, Based on Quarterly Averages (2020 vs 2019)

Employment (% Change from the previous year)					
Group	Avg 2020	Q1	Q2	Q3	Q4
Males	54,000	-5%	-12%	-25%	-11%
Females	9,000	-8%	0%	+7%	+3%
15 to 24 years	3,000	+61%	-69%	-40%	-16%
25 to 34 years	16,000	+8%	-4%	-38%	-22%
35 to 54 years	31,000	-21%	-18%	-19%	-8%
55 years and older	14,000	+9%	+27%	+9%	+5%
Aboriginal population	5,000	-15%	-44%	-45%	+1%
Non-Indigenous population	58,000	-6%	-9%	-20%	-10%
Landed immigrants	4,000	+63%	+68%	-43%	+33%
Born in Canada	58,000	-11%	-18%	-21%	-11%
Both sexes	63,000	-6%	-11%	-21%	-9%

Unemployment Rate (% Difference from previous year)					
Group	Avg 2020 (%)	Q1	Q2	Q3	Q4
Males	7%	+1%	+7%	+4%	+3%
Females	4%	-2%	+1%	0%	-4%
15 to 24 years	17%	-18%	+39%	+5%	+4%
25 to 34 years	8%	+5%	+8%	+8%	+3%
35 to 54 years	5%	+1%	+6%	+2%	+1%
55 years and older	5%	-1%	0%	-1%	+2%
Aboriginal population	11%	+6%	+14%	+5%	-2%
Non-Aboriginal population	6%	+1%	+6%	+3%	+2%
Landed immigrants	3%	+1%	+10%	-1%	+1%
Born in Canada	7%	+1%	+7%	+4%	+2%
Both sexes	7%	+1%	+7%	+3%	+2%

Average actual hours (Difference from previous year)					
Group	Avg 2020 (hrs/week)	Q1	Q2	Q3	Q4
Males	39	-3	-5	-3	+1
Females	34	-6	-9	+1	+3
Information for 15 to 24 year olds not available					
25 to 34 years	38	-6	-6	-8	+2
35 to 54 years	38	-3	-7	-2	+1
55 years and older	40	-1	-3	+3	-1
Information for Indigenous and immigrant groups not available					
Both sexes	38	-3	-6	-3	+1

Average weekly wage rate (Difference from previous year)					
Group	Avg 2020 ($/week)	Q1	Q2	Q3	Q4
Males	$1,748	+33	+12	-16	+96
Females	$1,569	-7	+13	+61	+241
Information for 15 to 24 year olds not available					
25 to 34 years	$1,655	-94	-110	-18	+102
35 to 54 years	$1,863	+103	+98	+139	+166
55 years and older	$1,602	+28	-171	-357	+37
Information for Indigenous and immigrant groups not available					
Both sexes	$1,723	+29	+9	-10	+117

Source: Mining Industry Human Resources Council (2021); Statistics Canada. Labour Force Survey Custom Table, monthly, unadjusted for seasonality (2020).
Note that certain data points were estimated due to data suppression.

KEY CHAPTER HIGHLIGHTS

Middle of the spectrum impacts: The COVID-19 pandemic has adversely affected some workers more than others; from Q1 to Q2 in 2020, *Mining and quarrying (NAICS 212)* was in the middle of the spectrum both in terms of employment loss (-6%) and in the unemployment rate spike (+6%) resulting from the first wave of the pandemic.

Unprecedented unemployment rates: COVID-19 marks a highly visible anomaly in the prevailing labour market trends, showing the largest unemployment rates spike across mining-related sectors since the turn of the century.

Hardest hit mining-related sector: *Support activities for mining, and oil and gas extraction (NAICS 213)* exhibits the greatest degree of disruption across several labour market indicators in 2020. This sector includes many of the contractors that support mining development in Canada.

Growth for science occupations: Within *Mining and quarrying (NAICS 212)*, *Professional occupations in natural and applied sciences (NOC 21)* steadily grew in employment in 2020 despite starting off the year at a relatively low level.

Indeterminate influence on occupational mix: Employment levels in various occupational categories fluctuated somewhat in 2020, though there is no definitive evidence of long-term occupational disruption.

Low education, high impact: Workers with lower levels of educational attainment have fared worse than the rest of the mining workforce. The unemployment rate for those with no degree, certificate or diploma climbed to unparalleled levels after Q1 in 2020; at the same time, the rates for workers with higher educational attainment have mostly recovered closer to their normal unemployment ranges.

Not all provinces affected equally: Ontario and Quebec experienced the greatest employment losses in 2020. Quebec started the year with the highest employment level since 2001, which could not be sustained in subsequent quarters.

Young workers among the worst hit: Young workers (15 to 24 years) experienced significant volatility in employment and unemployment rate during the first half of 2020.

Women more resilient: Female workers in the sector have shown more resiliency, maintaining a level of employment that is closer to the expectations, and in line with previous years.

Trouble for traditionally well-represented groups: Male and prime-age workers (25 to 54 years), which represent the majority of workers in *Mining and quarrying (NAICS 212)*, reveal employment losses reflective of the industry as a whole.

CHAPTER FOUR:
AFTERMATH AND LONG-TERM OUTLOOK

The nature of work has experienced extraordinary change since early 2020, as the pandemic has mobilized all sectors of the economy to adapt to new restrictions and to rethink conventional work arrangements. Some adaptations—such as closures and layoffs—have led to significant economic destruction, while others—such as the shift to remote work—have emerged as sustainable and productive approaches to work. The disparity of change across the workforce has been a hallmark of the pandemic.
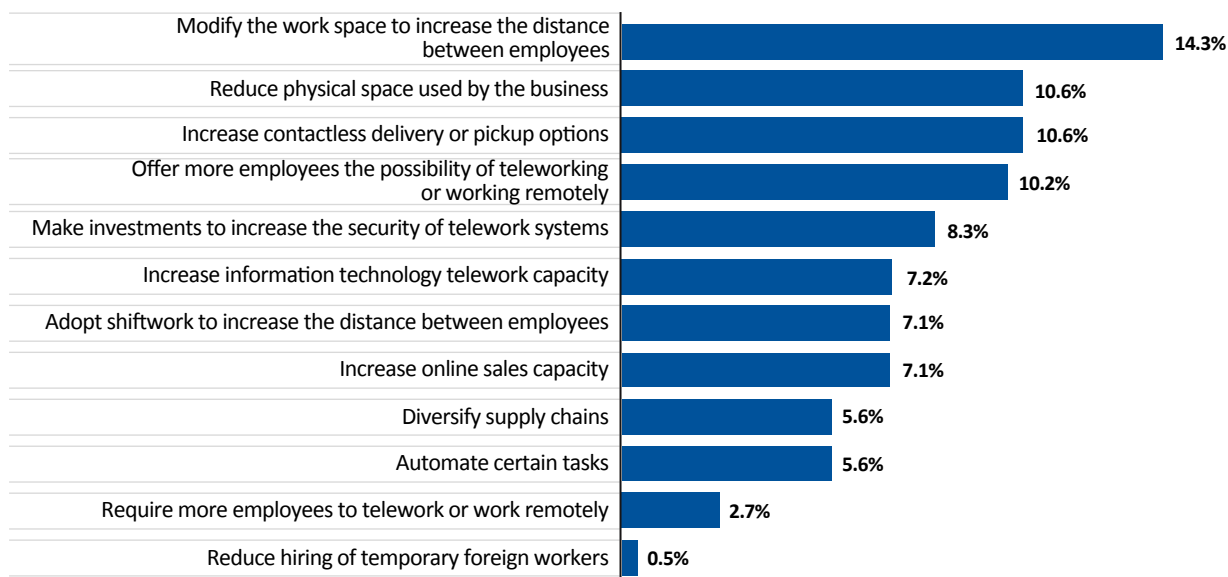
While the short-term impacts are somewhat apparent, the longer-term impacts are less understood. This section explores which aspects of the COVID-19 era will likely endure beyond the pandemic, perhaps permanently.

CSBC data finds that a sizable share of respondents in *Mining, quarrying, and oil and gas extraction (NAICS 21)* are planning to make permanent changes to their existing work arrangements (Figure 24). This includes minimizing how often certain workers are required to be physically present at the workplace, by reducing the physical space used by the business (10.6% of respondents) and by offering employees the possibility of working remotely (10.2% respondents).

Source: Vale

Figure 24: Likelihood of Various Measures Being Permanently Adopted Once the COVID-19 Pandemic is Over, *Mining, quarrying, and oil and gas extraction (NAICS 21)* (May 2020)

Measure	Percentage
Modify the work space to increase the distance between employees	14.3%
Reduce physical space used by the business	10.6%
Increase contactless delivery or pickup options	10.6%
Offer more employees the possibility of teleworking or working remotely	10.2%
Make investments to increase the security of telework systems	8.3%
Increase information technology telework capacity	7.2%
Adopt shiftwork to increase the distance between employees	7.1%
Increase online sales capacity	7.1%
Diversify supply chains	5.6%
Automate certain tasks	5.6%
Require more employees to telework or work remotely	2.7%
Reduce hiring of temporary foreign workers	0.5%

Source: Mining Industry Human Resources Council (2021); Statistics Canada, Table 33-10-0263-01 Likelihood of various measures being permanently adopted once COVID-19 pandemic is over, by business characteristics (2020).

HEALTH AND SAFETY PROTOCOLS

Health and safety has historically been a top priority for Canadian mining operations, and yet COVID-19 has brought new pandemic related protocols to the forefront. It is expected that several mining operations across Canada will continue to implement certain COVID-19 related health and safety practices in the future. As discussed in Chapter Two, mining employers in Canada have increased their efforts in sanitation and cleaning surfaces, ensuring social distancing in their operations, modifying physical spaces, using signage, and embracing remote work where it is feasible.

It is uncertain which of these early measures will persist in the long term, especially given that they are still evolving. However, certain changes will be difficult to stick to in the absence of a pandemic, namely those that interfere with efficiencies or work against operational flow/production methods. For example, physical distancing at the workplace may not be as rigorously followed in a post-pandemic world. At the same time, permanent measures such as modifying the workspace (see Figure 24) to increase the distance between employees will make pandemic-era protocols more persistent.

At the very least, a lasting memory of the pandemic is likely to endure as mining operations will use the experience in preparation for another pandemic or related event.

Occupational risk from COVID-19

Measures to protect workers from hazardous settings are not afforded equally, as certain occupations naturally have greater exposure levels. An April 2020 study by The World Economic Forum (WEF)[3] quantified the level of exposure to the COVID-19 virus in the workplace. The study leverages data from the U.S. Department of Labor's Occupational Information Network (O*NET) and considers three physical job attributes: (1) contact with others, (2) physical proximity, and (3) exposure to disease and infection.

WEF aggregates these three dimensions to generate a COVID-19 Risk score between 0 (lowest risk) and 100 (greatest risk) for 1,000 occupations in the U.S. Economy. MiHR has adapted this model to the Canadian Mining context, focusing on 107 mining-relevant occupations (Figure 25).

Note that these scores represent work conditions in the absence of any physical distancing measures. Nevertheless, a higher score can signal which occupations should take the most precautions to avoid potential infection.

Table 8: Descriptive Statistics of COVID-19 Risk Scores Across Mining-related Occupations

Statistic	Value
Number of Occupations Examined	107
Mean Risk Score	49.42
Median Risk Score	55.67
Interquartile Range	46.83 - 56.67
Maximum	70
Minimum	35
Average Industry Score, Weighted by Headcount	48.33

Source: Mining Industry Human Resources Council (2021); World Economic Forum. *"These are the occupations with the highest COVID-19 risk"* (Apr 2020); Statistics Canada. 2016 Census. Mining Industry Human Resources Council, (2016).

3   Marcus Lu (April 20, 2020), WEF: *"These are the occupations with the highest COVID-19 risk,"* World Economic Forum. Retrieved from: https://www.weforum.org/agenda/2020/04/occupations-highest-covid19-risk/

Figure 25: COVID-19 Occupational Risk Scores for 107 Mining-related Occupations
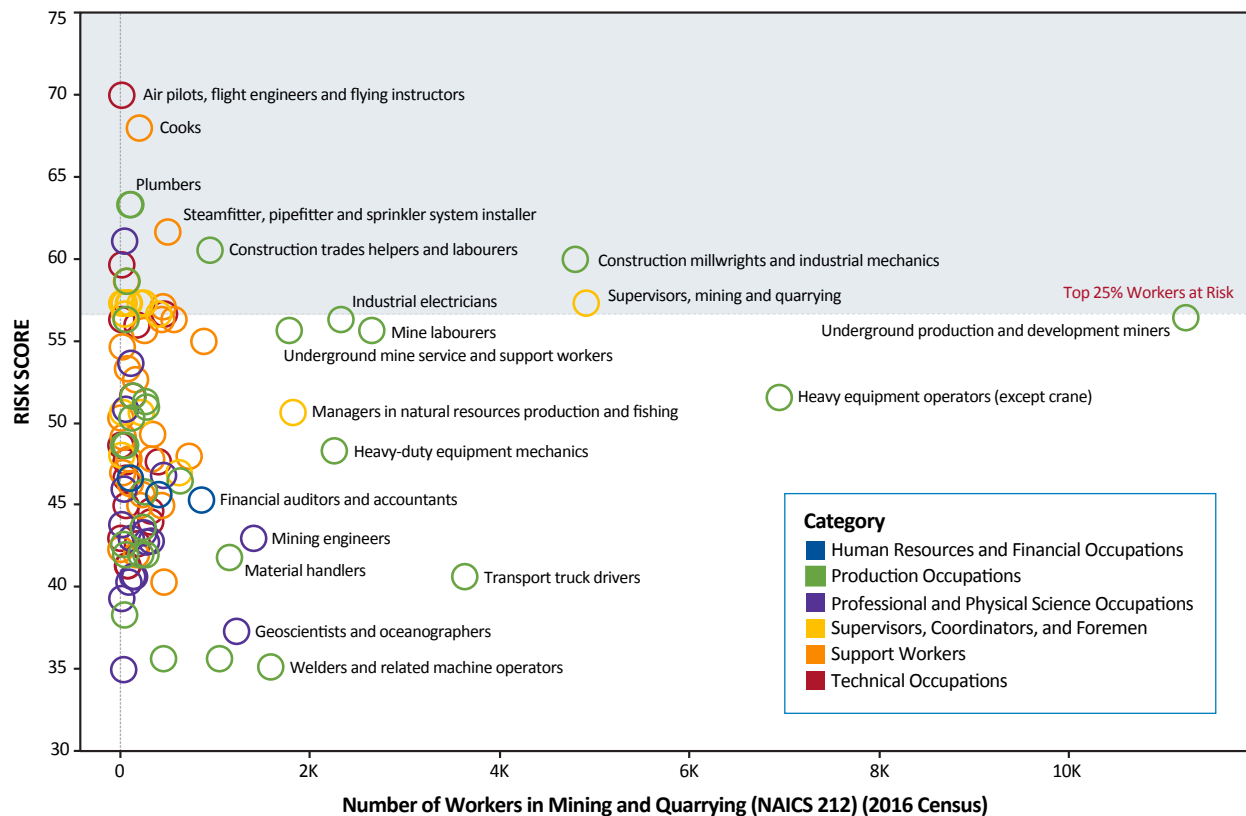
Source: Mining Industry Human Resources Council (2021); World Economic Forum.
"These are the occupations with the highest COVID-19 risk" (Apr 2020); Statistics Canada. 2016 Census. Mining Industry Human Resources Council, (2016).

Figure 26: COVID-19 Occupational Risk Scores for Broad Occupational Categories in Mining
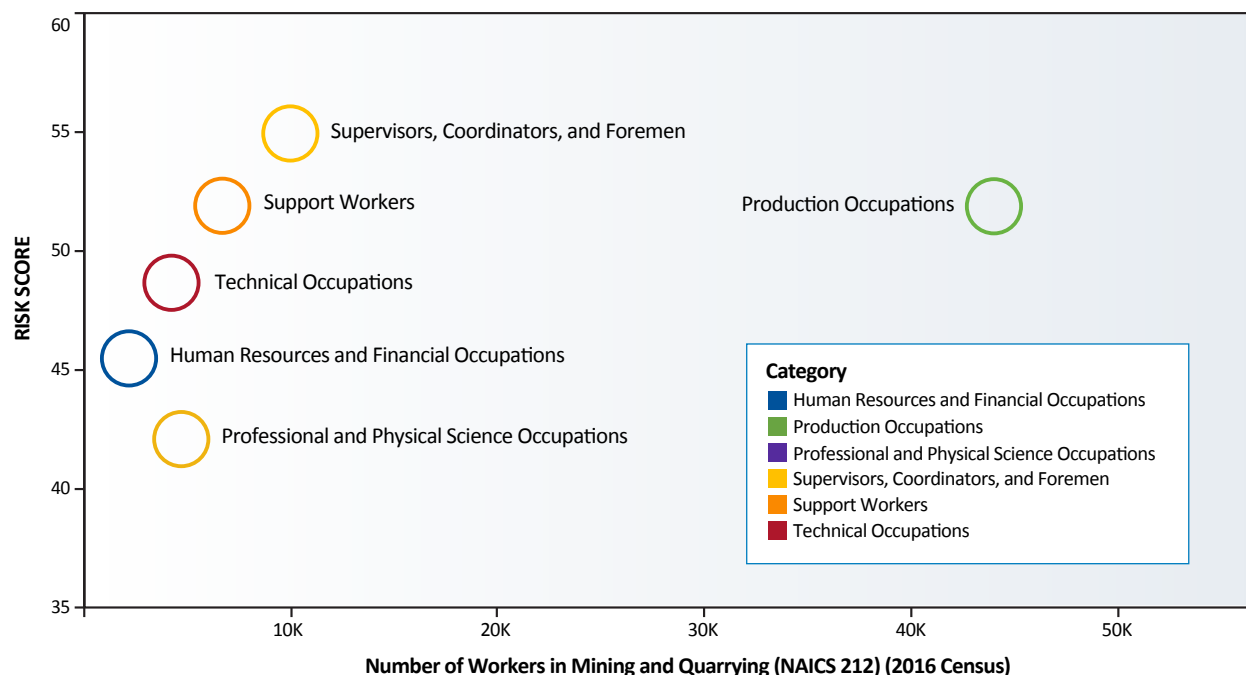
Source: Mining Industry Human Resources Council (2021); World Economic Forum.
"These are the occupations with the highest COVID-19 risk" (Apr 2020); Statistics Canada. 2016 Census. Mining Industry Human Resources Council, (2016).

MiHR's analysis shows that *Air pilots, flight engineers and flying instructors (NOC 2271)* and *Cooks (NOC 6322)* are the two occupations with the highest risk of exposure to COVID-19 in the workplace, though they are relatively few in number. On the other hand, the most common occupation, *Underground production and development miners*, has only a medium level of risk.

For context, *Dental assistants (NOC 3411)* have the highest risk score among all occupations (roughly 97), while *Chainsaw and skidder operators (NOC 8421)* had the lowest score (about 18).

Among broad occupational categories, *Supervisors, coordinators and foremen* collectively have the highest average risk score; *Production occupations* shows a relatively elevated risk score and features the largest number of workers in *Mining and quarrying (NAICS 212)*. Workers in these occupational categories are likely to feel the greatest long-term impact from new health and safety protocols, as they will have to adapt to a world where pandemics have become a part of the mainstream consciousness.

ECONOMIC LOSS AND MACROECONOMIC CONDITIONS

The short-term (i.e., immediate) economic loss from COVID-19 has been rather obvious; as highlighted in Chapter One, measures of employment and real GDP in *Mining & quarrying (NAICS 212)* show a clear and sudden drop in April of 2020—unquestionably the consequence of the pandemic. The long-term effect, however, is much more ambiguous as the future recovery path may still take on a range of possibilities.

A Quick Return to 'Normal': One possibility is that COVID-19 will not have a long-lasting effect beyond the immediate and direct economic fallout. In this case, the economy will rebound and stabilize to its pre-pandemic trajectory. Real GDP numbers in *Mining & quarrying (NAICS 212)* have mostly recovered (for the time being) to their pre-pandemic levels (Chapter One). It remains to be seen whether a recovery trend will be sustained in the long term.

Long-term Economic Turbulence: Another possibility is that the global economy will continue to struggle from the effects of COVID-19. Challenges in several key sectors (retail, tourism, etc.) will spill over to the overall economy and ultimately put stress on the mining sector and the demand for upstream metals and minerals. A long-term contractionary scenario tied to COVID-19 is difficult to predict given the unprecedented nature of events, many of which will continue to evolve past the release of this report.

Forecasting for Canada's Mining sector

Each year MiHR produces updated forecasts related to Canada's mining labour market, including projections for employment over a 10-year horizon. The forecasts encompass four distinct mining subsectors (also discussed in Chapter Three). The events of COVID-19 have introduced unprecedented uncertainty, making it difficult for MiHR's conventional forecasts to capture the new realities in a post-COVID-19 economy.

Listed below are some of the known factors that could potentially have a material impact on the overall economy and the mining industry:

- Permanent changes to recruitment, training and the shift to remote work
- Acceleration of technology and innovation in mining
- The vaccine deployment timeline
- Post COVID-19 government policy (i.e., regulatory, fiscal, monetary)
- Macroeconomic conditions (i.e., consumer demand, trade, commodity prices, etc.)

This report presents three main employment scenarios for the next five years (2020 to 2025), each portraying a potential path for employment beyond COVID-19. Together, the scenarios investigate the sensitivity of MiHR's employment model in view of post-COVID-19 data.

A Note of Caution: The results should be interpreted with caution as the underlying model was developed before the pandemic and in a different economic environment. Therefore, the forecasted scenario is not based on a model that was built with the pandemic in mind; such a model is not yet appropriate to the extent that more post-pandemic data inputs are necessary to adequately understand the post-COVID-19 economy. Some key data inputs, such as employment levels and metals and minerals imports and exports, are still taking shape and do not yet show the full effects of the COVID-19 pandemic.

Additionally, the assumptions and data considered are limited to that which was available at the time of this publication, and since MiHR's conventional forecast uses annual inputs, several data for 2020 are not yet available. In certain cases, MiHR has estimated missing data inputs to produce the scenario of employment.

Lastly, the presented forecast findings are not intended to predict specific future outcomes; rather, they are meant to explore the pandemic's degree (and direction) of influence on Canada's mining labour market.

Scenario 1: MiHR's 2020 (pre-COVID-19) baseline employment forecast

MiHR's previous employment forecast, developed in 2019 and published in MiHR's 2020 Canadian Mining Labour Market 10-Year Outlook, establishes the expected path of mining employment before the pandemic. Thus, this projection serves as a benchmark for understanding how COVID-19 has disrupted this trajectory moving forward and provides an idea of whether the industry is on a path to recovery and is 'back to normal'.

MiHR uses an econometric model to project changes in employment over the forecast period. This model considers the movements of relevant explanatory variables, such as mineral prices and exports, and observes their effects on employment. Future changes in employment over the next decade are then estimated using various leading forecasts and intelligence as key explanatory variables. Note that forecast data for this scenario has been updated to 2019 for the most current view of a pre-COVID-19 world.

Scenario 2: MiHR's employment forecast with post-COVID-19 data – Optimistic

MiHR leverages the existing model with new data inputs from 2020. This exercise is intended to show how new data points alter the previously forecasted employment outcomes.

This scenario takes on the hypothesis that underlying behaviour is fundamentally unchanged, and that the labour market will respond to new forecasting inputs in a similar way as before. Therefore, this scenario assumes that COVID-19 will be a short-lived event and that employment will regress back to normal levels relatively quickly. At the same time, updated forecasting inputs (e.g., commodity price forecasts) have been revised to reflect the new post-COVID-19 conditions, and the employment level in 2020 has been adjusted to an actual estimate for 2020.

Scenario 3: MiHR's employment forecast with post-COVID-19 data – Pessimistic

MiHR again leverages the existing model with new data inputs from 2020, except the forecast places more weight on reduced employment levels in 2020.

This scenario assumes the downward shift in employment in 2020 will have a more enduring effect, and that the pandemic has set mining employment on a lower trajectory. The hypothesis is that the employment levels are indicative of a new structural change to the mining workforce, and that this shift represents a new normal for the industry. Similar to Scenario 2, forecasting inputs (e.g., commodity price forecasts) have been updated with post-COVID-19 data and expectations.

Figure 27: Historical and Forecasted Employment in Canada's Mining Industry, Three Scenarios (2007 to 2025)
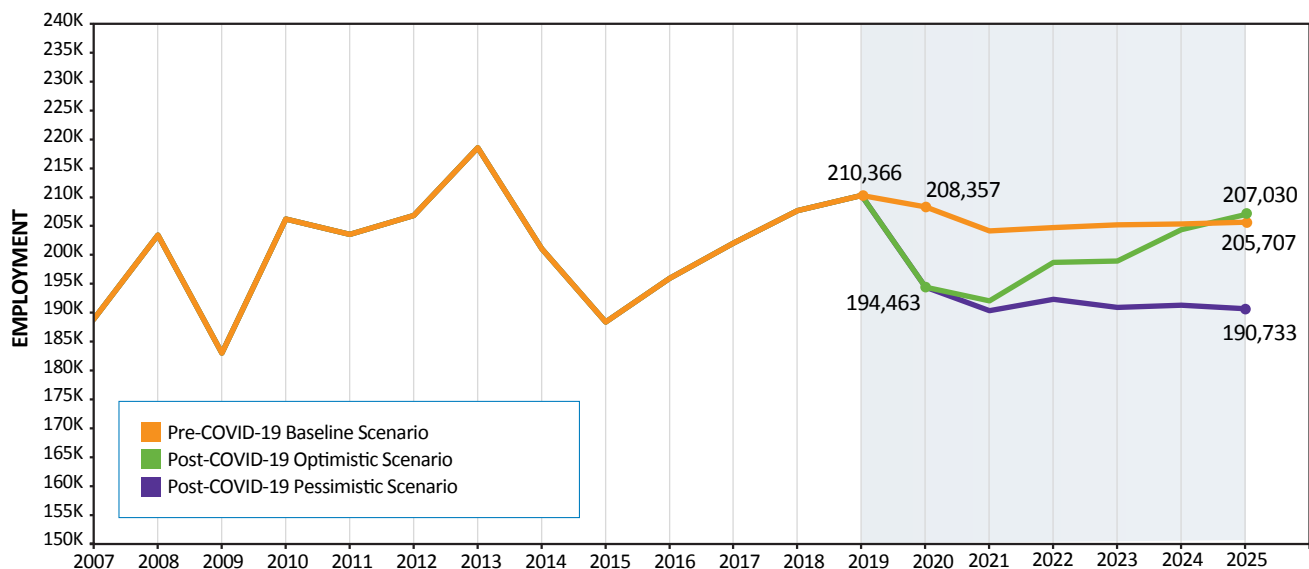
The three forecasting scenarios collectively show a potential range of alternatives for post-pandemic employment levels. MiHR's definition of mining includes four subsectors, some of which are anticipated to perform better than others through this time period.

The pre-COVID-19 baseline scenario shows the expected path of mining employment in the absence of the pandemic (Figure 27). The post-COVID-19 optimistic scenario shows how employment levels actually dropped in 2020 and projects a steady rebound thereafter; this scenario envisions a net-positive for mining employment in the long run with higher employment than the pre-COVID-19 baseline scenario by 2025, though most of the early expansion will be a recovery from 2020. Alternatively, the post-COVID-19 pessimistic scenario represents a possible permanent shift to a lower employment path in the long-term.

ALTERED METHODS OF PRODUCTION

The changes brought on by COVID-19 generally fall into two categories. The first category includes temporary changes (such as new rules around social distancing) that would not have occurred in the absence of the pandemic. In the second category, COVID-19 was a catalyst for changes already occurring (such as remote work), which includes innovations rather than stop-gap measures. It is the second category of adaptations that is most likely to persist in the long-term.

Mining innovations carry many benefits and can push the industry forward on health & safety, environmental protection, production efficiency and cost savings (among other aspects). At the same time, innovative changes can also be disruptive to vulnerable segments of the workforce.

MiHR's 2020 report, *The Changing Nature of Work—Innovation, Automation and Canada's Mining Workforce* introduces a composite indicator to compare mining occupations' vulnerability to the negative effects of technological disruption. *MiHR's Occupational Vulnerability Index* (MOVI) makes it possible to quantify which worker groupings are likely to be disrupted, and to point to segments of the labour pool that would most benefit from supportive resources. This report lists the five occupations with the highest (most vulnerable) MOVI scores (Table 9).

Table 9: Top 5 Mining Occupations Most Vulnerable to Technological Disruption

Occupation	Number of Workers (2016 Census)	Share of NAICS 212	MOVI Score	Broad Occupational Category
Underground production and development miners	11,035	15.83%	0.75	Production Occupations
Heavy equipment operators (except crane)	6,830	9.79%	0.73	Production Occupations
Mine labourers	2,550	3.66%	0.73	Production Occupations
Machine operators, mineral and metal processing	1,020	1.46%	0.65	Production Occupations
Construction trades helpers and labourers	895	1.28%	0.64	Production Occupations

Source: Mining Industry Human Resources Council (2021); Mining Industry Human Resources Council, The Changing Nature of Work: Innovation, Automation and Canada's Mining Workforce (2020).

Note that a high MOVI score does not necessarily suggest that workers in that occupation are on a set path to losing their jobs. Rather, a high MOVI indicates that there are the means, the incentives, and the environment for these occupations to be disrupted by incoming technologies. This could include job loss, or it also could mean people will be required to adapt to working in a different way or use different skills and technologies.

Finally, the MOVI scores were estimated before COVID-19 and thus do not account for vulnerability due to a pandemic, which is likely to expedite the timeline of incoming technologies.

REMOTE WORK

Perhaps the most visible transformation to the workplace in 2020, remote work will potentially have profound implications on the workforce of the future. The shift to remote work in 2020 was driven by the critical need to keep workers productive during the pandemic. However, this shift has helped mining operations to realize what is (and what could be) possible with remote work.

As some employers have begun to adapt their methods in day-to-day production, recruitment and training, the legacy of these changes is likely to be felt in the long run, even in a post-pandemic environment.

KEY CHAPTER HIGHLIGHTS

The changing nature of work: The pandemic has mobilized all sectors of the economy to adapt to new restrictions and to rethink conventional work arrangements. It remains to be seen which early measures will stick in the long term.

Identifying the lasting effects: Certain changes (e.g., physical distancing at the workplace) may be difficult to sustain in the absence of a pandemic, while other pandemic-era measures (e.g., modifying workspaces) will likely remain permanent. At the very least, the memory and experience of COVID-19 will help prepare mining operations for another pandemic or related event.

Occupational risk from COVID-19: This study quantifies the level of exposure to the COVID-19 virus for 107 mining-related occupations, leveraging an approach from the World Economic Forum (WEF). High-exposure occupations will likely experience the greatest long-term impact from new health and safety protocols.

Highly exposed occupations: *Air pilots, flight engineers and flying instructors (NOC 2271)* and *Cooks (NOC 6322)* show the highest risk of exposure to COVID-19; *Underground production and development miners (NOC 8231)*, the most common occupation in *Mining and quarrying (NAICS 212)*, has only a medium level of risk.

Highly exposed broad occupations: *Supervisors, coordinators and foremen* collectively have the highest risk of exposure to COVID-19. *Production occupations* shows a relatively elevated risk and feature the largest number of workers in *Mining and quarrying (NAICS 212)*.

Forecasting post-COVID-19: Updated forecasts for Canada's mining industry (comprising four distinct subsectors) develop three employment scenarios for the next five years (2020 to 2025); each investigate the sensitivity of MiHR's employment model in view of post-COVID-19 data. The long-term effects of the pandemic remain rather ambiguous as the future recovery path may still take on a range of possibilities.

Three scenarios developed: The three forecasting scenarios together show a potential range of post-pandemic employment levels. The pre-COVID-19 baseline scenario shows the expected path of mining employment in the absence of the pandemic; the post-COVID-19 optimistic scenario shows how employment levels actually dropped in 2020 and projects a steady rebound thereafter; and the post-COVID-19 pessimistic scenario represents a possible permanent shift to a lower employment path in the long-term.

COVID-19 a catalyst for change: COVID-19 was a catalyst for changes already occurring (such as the use of remote work, automation and digitization of processes), which are better described as longer-term innovations rather than temporary stop-gap measures.

Remote work here to stay: The shift to remote work in 2020 was driven by the critical need to keep workers productive during the pandemic. However, this shift has helped mining operations to realize what is (and what could be) possible with remote work.
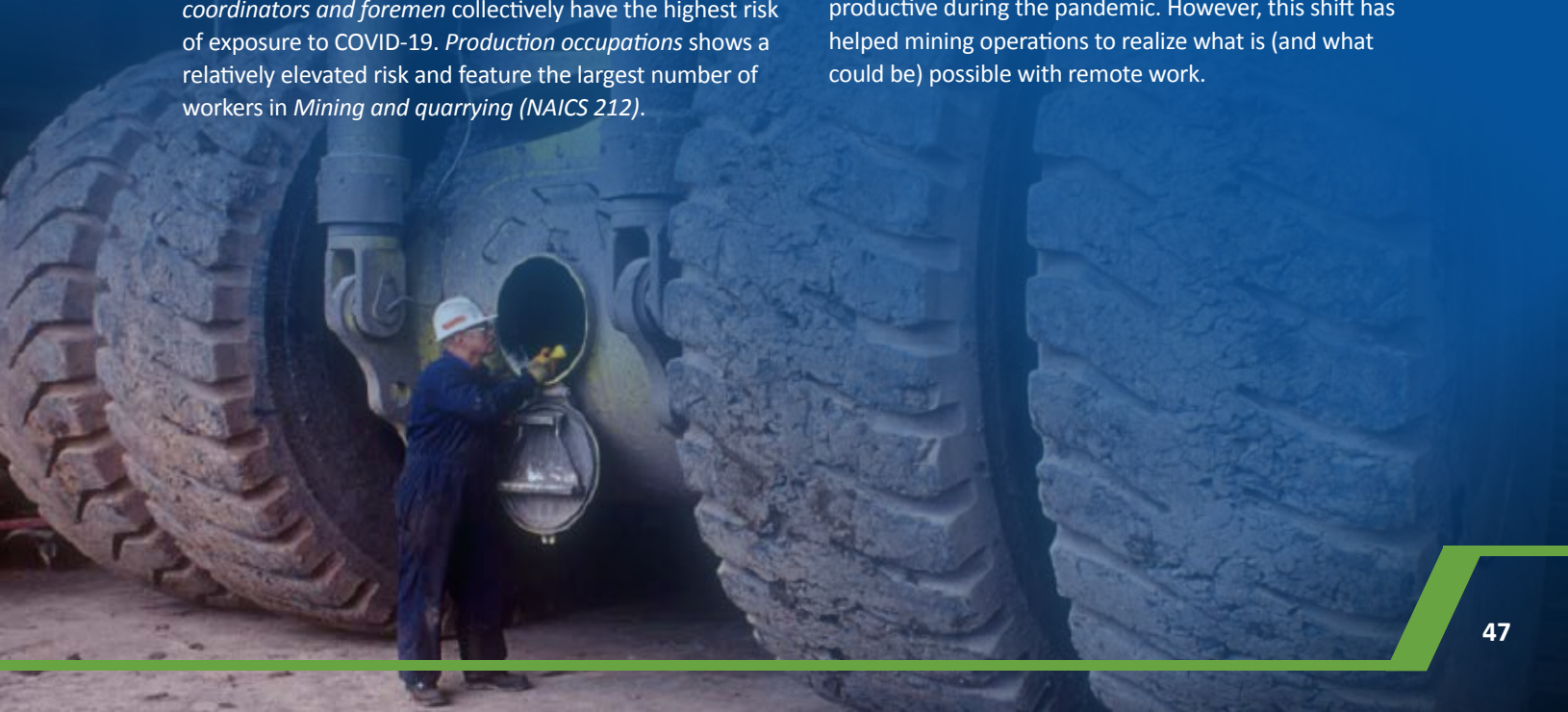
CHAPTER FIVE:
EMPLOYMENT VOLATILITY IN MINING

The term volatility describes the unpredictable movements observed in an economic indicator over time. This chapter explores employment volatility in Canada's mining sector—how it has looked historically, and how it compares to employment volatility in other industries across Canada.

At its core, volatility is a measure of uncertainty. A highly volatile market can make it difficult for employers and job seekers to make firm decisions about the future. Accordingly, this chapter investigates how employment volatility can potentially create problems and inefficiencies for the mining industry.

The objective is to quantify how employment in mining typically fluctuates so that any employment changes can be placed in a historical context, and set against the anomaly of the COVID-19 pandemic.

DEFINING EMPLOYMENT VOLATILITY

There are numerous measurements of volatility. One common approach that is often used in finance is to observe the spread of numbers (i.e., the variance or standard deviation) in a time series. Observed fluctuations can reflect a variety of underlying factors, and a particular time series can be deconstructed into four main components: level, trend, seasonality, and random movements (i.e., noise).

This report is primarily concerned with volatility stemming from ongoing trends (i.e., economic cycles), rather than predictable seasonal patterns. Measures of volatility, as defined in this analysis, will therefore exclude seasonality as much as possible by making simple adjustments to the data.

Nevertheless, this chapter subsequently highlights how seasonality affects mining employment over the course of a typical year, providing context for current employment trends in the mining sector.

WHAT DOES EMPLOYMENT VOLATILITY IN THE MINING INDUSTRY LOOK LIKE?

Employment in Canada's mining industry has experienced large swings over the years. Since 2000, several economic cycles and major events have shaped the size of the workforce in *Mining and quarrying (NAICS 212)* and in *Support activities for mining, and oil and gas extraction (NAICS 213)*.

Employment data show how the workforce has fluctuated in these two sectors over the last 20 years (Figure 28). Significant world events and economic recessions are also highlighted for reference. Of these two sectors, *Support activities for mining, and oil and gas extraction (NAICS 213)* has continued to exhibit greater variation in employment since the turn of the century.

Figure 28: Historical Employment in *Mining and quarrying (NAICS 212)* and *Support activities for mining, and oil and gas extraction (NAICS 213)* (Jan 2000 to Dec 2020)
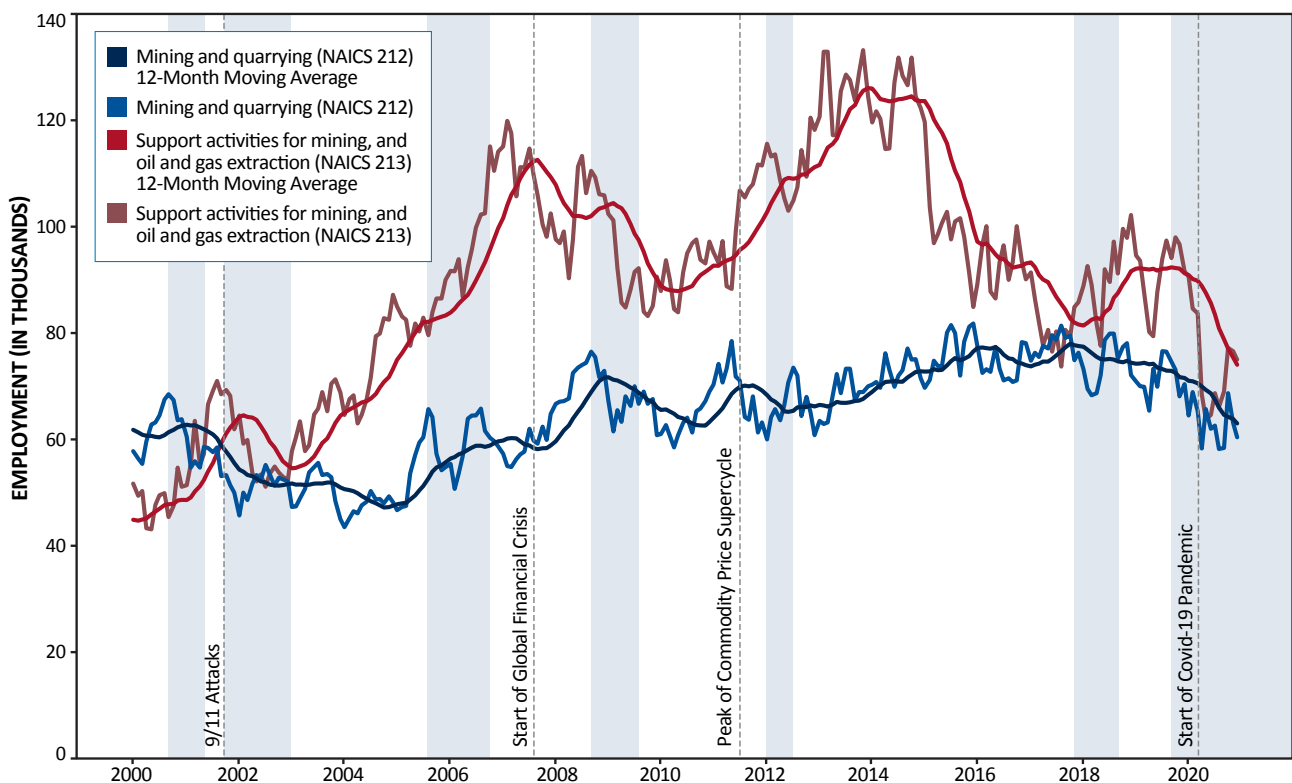
Source: Mining Industry Human Resources Council (2021); Statistics Canada, Labour Force Survey Custom Table, monthly, unadjusted for seasonality (2020).

Magnitude of Growth Cycles

A histogram of employment changes is shown for 396 months of data (from January 1988 to December 2020) (Figure 29). Specifically, the data show the employment change from a given month relative to the previous year, to remove seasonal effects. This resulting data therefore represent variations primarily from economic cycles (and from random noise to a much lesser extent).

This data shows a wider variance in employment growth for *Support activities for mining, and oil and gas extraction (NAICS 213)*. In this sector, the median year-over-year employment change was roughly +2,000; the largest increase was +28,600, while the largest decrease was -37,400. By comparison, in *Mining and quarrying (NAICS 212)*, the median year-over-year employment change was

roughly -850, while the range was slightly narrower, between -28,600 and +17,700 (Figure 29).

These numbers offer a benchmark against specific observed changes and can be used to evaluate whether a particular employment drop (or rise) is extreme or on par with normal movements in the labour market. For context, in 2020, employment growth in *Mining and quarrying (NAICS 212)* was -7,533, -16,167 and -6,467 in Q2, Q3 and Q4 respectively. In *Support activities for mining, and oil and gas extraction (NAICS 213)*, employment growth was -16,800, -27,233 and -19,167 in Q2, Q3 and Q4 respectively.

Figure 29: Distribution of Year-Over-Year Growth in Employment in *Mining and quarrying (NAICS 212)* and *Support activities for mining, and oil and gas extraction (NAICS 213)* (Jan 1988 to Dec 2020)
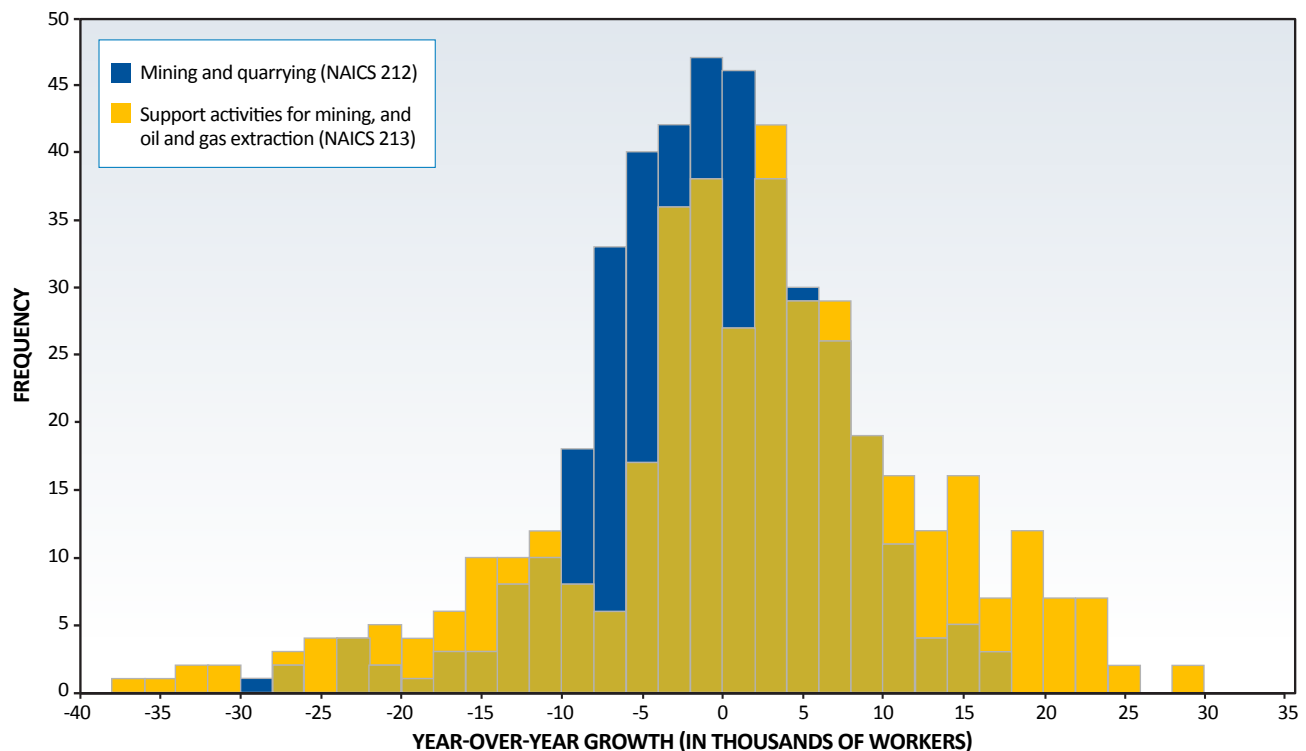
	Mining and quarrying (NAICS 212)	Support activities for mining, and oil and gas extraction (NAICS 213)
No. of Monthly Observations (Jan 1988 - Dec 2020)	396	396
Mean Year-Over-Year Growth	-913	+1,213
Median Year-Over-Year Growth	-850	+2,000
Interquartile Range	(-5,200 to +3,825)	(-3,900 to +8,000)
Maximum	+17,700	+28,600
Minimum	-28,600	-37,400

Source: Mining Industry Human Resources Council (2021); Statistics Canada, Labour Force Survey Custom Table, monthly, unadjusted for seasonality (2020).

Duration of Growth and Contraction Cycles

Another important factor in characterizing volatility is the duration of growth and contraction cycles. The uncertainty from volatility stems from the magnitude of the fluctuations and from how often the trend changes direction (from growth to contraction and vice versa). Therefore, this analysis measures the typical duration of a growth cycle by counting the consecutive months that employment either grows or contracts relative to the previous year.

Employment in Mining and quarrying (NAICS 212) is shown to frequently switch between growth and contraction (Figure 30)[4]; since 2000, this sector has witnessed seven distinct periods of growth (averaging 18 months in duration) and eight periods

of contraction (averaging 15.8 months). Conversely, *Support activities for mining, and oil and gas extraction (NAICS 213)* experienced five distinct periods of growth (averaging 29.8 months in duration) and six periods of contraction (averaging 17.2 months).

Though *Support activities for mining, and oil and gas extraction (NAICS 213)* displayed greater swings in employment, growth cycles in this sector have tended to be longer in duration compared to *Mining and quarrying (NAICS 212)*.

Figure 30: Year-Over-Year Growth in Employment (12-Month Moving Average) in *Mining and quarrying (NAICS 212)* and *Support activities for mining, and oil and gas extraction (NAICS 213)* (Jan 2000 to Dec 2020)
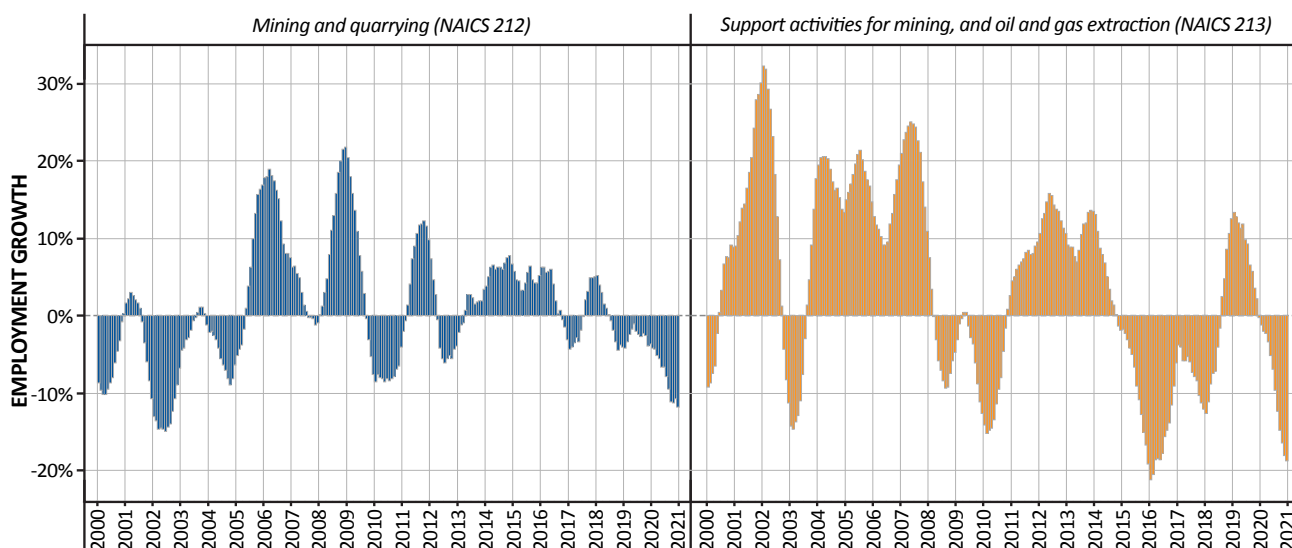
Sector	Count	Average Length (No. months)	Max	Min	Standard Deviation
Periods of Growth					
212 Mining and quarrying (except oil and gas)	7	18	42	4	13
213 Support activities for mining, and oil and gas extraction	5	29.8	55	2	22
Periods of Contraction					
212 Mining and quarrying (except oil and gas)	8	15.8	30	5	8.2
213 Support activities for mining, and oil and gas extraction	6	17.2	45	5	14.2
All Periods (Growth and Contraction)					
212 Mining and quarrying (except oil and gas)	15	16.8	42	4	10.4
213 Support activities for mining, and oil and gas extraction	11	22.9	55	2	18.4

Source: Mining Industry Human Resources Council (2021); Statistics Canada, Labour Force Survey Custom Table, monthly, unadjusted for seasonality (2020).

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4   Note that Figure 30 uses a 12-month moving average of year-over-year changes in employment to determine the beginning and end of a given growth cycle.

COMPARING EMPLOYMENT VOLATILITY ACROSS SECTORS

Every industry has an inherent level of employment volatility that must be managed to ensure the labour market can support fluctuations in labour demand. A comparison of relevant sectors in Canada reveals differences in growth among them and provides context for the volatility in mining-related sectors.

An analysis of selected industries shows the typical year-over-year growth rates during times of expansion and contraction from 2000 to 2020 (Table 10). *Mining and quarrying (NAICS 212)* shows moderate volatility and the second highest number of contractionary months; only *Primary metal manufacturing (NAICS 331)* shows more.

In contrast, *Support activities for mining, and oil and gas extraction (NAICS 213)* is among the most volatile, showing the second-highest positive growth rates during expansion months and the second-lowest negative growth rates during contractionary months. The only sector with greater volatility indicators is *Non-metallic mineral product manufacturing (NAICS 327)*. Interestingly this was the best-performing sector in Q2 of 2020 (in the wake of the COVID-19 lockdowns).

Table 10: Comparison of Year-Over-Year Growth in Employment by Sector (Jan 2000 to Dec 2020)

Sector	Number of Months	Average Growth Rate	Median Growth Rate	Standard Deviation of Growth Rate	Maximum Growth Rate	Minimum Growth Rate	Growth Rate in Q2 2020
Months with Employment Growth (Relative to Previous Year)							
212 Mining and quarrying (except oil and gas)	118	9.7%	8.3%	7.9%	34.8%	0.2%	
213 Support activities for mining, and oil and gas extraction	154	14.1%	11.9%	10.6%	50.8%	0.1%	
211 Oil and gas extraction	161	11.2%	7.6%	9.5%	44.9%	0.1%	
221 Utilities	135	5.5%	4.3%	4.6%	22.3%	0.1%	
236 Construction of buildings	162	10.1%	7.3%	8.7%	42.9%	0.0%	
237 Heavy and civil engineering construction	152	9.6%	8.5%	7.2%	34.6%	0.2%	
238 Specialty trade contractors	186	4.8%	4.8%	2.9%	14.1%	0.0%	
327 Non-metallic mineral product manufacturing	126	15.0%	12.7%	13.5%	95.0%	0.2%	13%
331 Primary metal manufacturing	111	9.8%	7.5%	8.4%	45.2%	0.3%	1%
541 Professional, scientific and technical services	211	3.5%	3.0%	2.3%	11.3%	0.1%	
Total, all industries	230	1.5%	1.5%	0.7%	4.0%	0.0%	
Months with Employment Contraction (Relative to Previous Year)							
212 Mining and quarrying (except oil and gas)	134	-7.4%	-6.9%	5.3%	-0.1%	-24.4%	-10.8%
213 Support activities for mining, and oil and gas extraction	98	-12.7%	-12.2%	8.4%	-0.5%	-32.1%	-20.2%
211 Oil and gas extraction	91	-8.3%	-6.8%	6.6%	-0.2%	-28.9%	-13.1%
221 Utilities	117	-4.0%	-3.6%	2.9%	-0.1%	-11.1%	-6.0%
236 Construction of buildings	90	-5.0%	-4.6%	3.2%	-0.1%	-12.8%	-5.2%
237 Heavy and civil engineering construction	100	-7.3%	-6.4%	5.4%	0.0%	-25.1%	-15.3%
238 Specialty trade contractors	66	-4.5%	-3.3%	4.4%	0.0%	-24.5%	-18.7%
327 Non-metallic mineral product manufacturing	126	-13.5%	-13.4%	8.8%	0.0%	-37.1%	
331 Primary metal manufacturing	141	-9.8%	-9.1%	6.8%	-0.1%	-25.3%	
541 Professional, scientific and technical services	41	-1.6%	-1.4%	1.3%	0.0%	-4.9%	-4.0%
Total, all industries	22	-3.9%	-2.1%	3.9%	-0.7%	-15.1%	-12.3%
All Months							
212 Mining and quarrying (except oil and gas)	252	0.6%	-0.8%	10.8%	34.8%	-24.4%	-10.8%
213 Support activities for mining, and oil and gas extraction	252	3.7%	4.3%	16.3%	50.8%	-32.1%	-20.2%
211 Oil and gas extraction	252	4.1%	3.8%	12.7%	44.9%	-28.9%	-13.1%
221 Utilities	252	1.1%	0.7%	6.1%	22.3%	-11.1%	-6.0%
236 Construction of buildings	252	4.6%	3.2%	10.2%	42.9%	-12.8%	-5.2%
237 Heavy and civil engineering construction	252	3.0%	3.2%	10.7%	34.6%	-25.1%	-15.3%
238 Specialty trade contractors	252	2.4%	3.4%	5.4%	14.1%	-24.5%	-18.7%
327 Non-metallic mineral product manufacturing	252	0.7%	-0.1%	18.2%	95.0%	-37.1%	12.8%
331 Primary metal manufacturing	252	-1.2%	-1.3%	12.3%	45.2%	-25.3%	0.9%
541 Professional, scientific and technical services	252	2.7%	2.5%	2.9%	11.3%	-4.9%	-4.0%
Total, all industries	252	1.1%	1.5%	2.0%	4.0%	-15.1%	-12.3%

Source: Mining Industry Human Resources Council (2021); Statistics Canada, Labour Force Survey Custom Table, monthly, unadjusted for seasonality (2020).

SEASONALITY IN SECTOR EMPLOYMENT

Seasonal patterns represent relatively predicable movements that businesses are better able to anticipate within a given year. The above analysis on employment volatility controls for seasonality to isolate the less predictable trends. Yet, seasonal trends often represent the largest swings in employment for some sectors. It is therefore important to observe the impact that seasonal swings can have on employment and how a particular employment path can deviate from the identified seasonal pattern in a typical year.

From 1988 to 2020, employment growth patterns in *Mining and quarrying (NAICS 212)*, *Support activities for mining, and oil and gas extraction (NAICS 213)* and *Construction of buildings (NAICS 236)* illustrate how different sectors vary by their range of seasonality, including the degree of volatility (i.e. variation) within each season (Figure 31). To better capture the effects of seasonality, employment growth is calculated as the change in employment relative to three months earlier.

In *Mining and quarrying (NAICS 212)*, the seasonal pattern shows that employment growth typically peaks in July and has its lowest point in January. *Support activities for mining, and oil and gas extraction (NAICS 213)* follows a different seasonal pattern, declining in April and May before ramping up to its peak in August. This sector also exhibits less predictability in seasonal growth for certain months (e.g. August). In contrast with these two mining-related sectors, *Construction of buildings (NAICS 236)* has a more pronounced seasonality and shows a tighter range of growth rates in each month.

Further illustrated is how the average seasonal growth in employment (1988 to 2019) compared with growth in 2020, highlighting the impact of COVID-19 on normal seasonal trends (Figure 31). Whereas *Construction of buildings (NAICS 236)* found normalcy in the latter half of 2020, a greater disparity is shown in the respective 2020 growth patterns for *Mining and quarrying (NAICS 212)* and *Support activities for mining, and oil and gas extraction (NAICS 213)*, a sign that the mining industry continues to be disrupted by the pandemic.

Figure 31: Seasonal Growth in Employment (Three-Month Changes) in *Mining and quarrying (NAICS 212)*, *Support activities for mining, and oil and gas extraction (NAICS 213)* and *Construction of buildings (NAICS 236)* (Jan 1988 to Dec 2020)
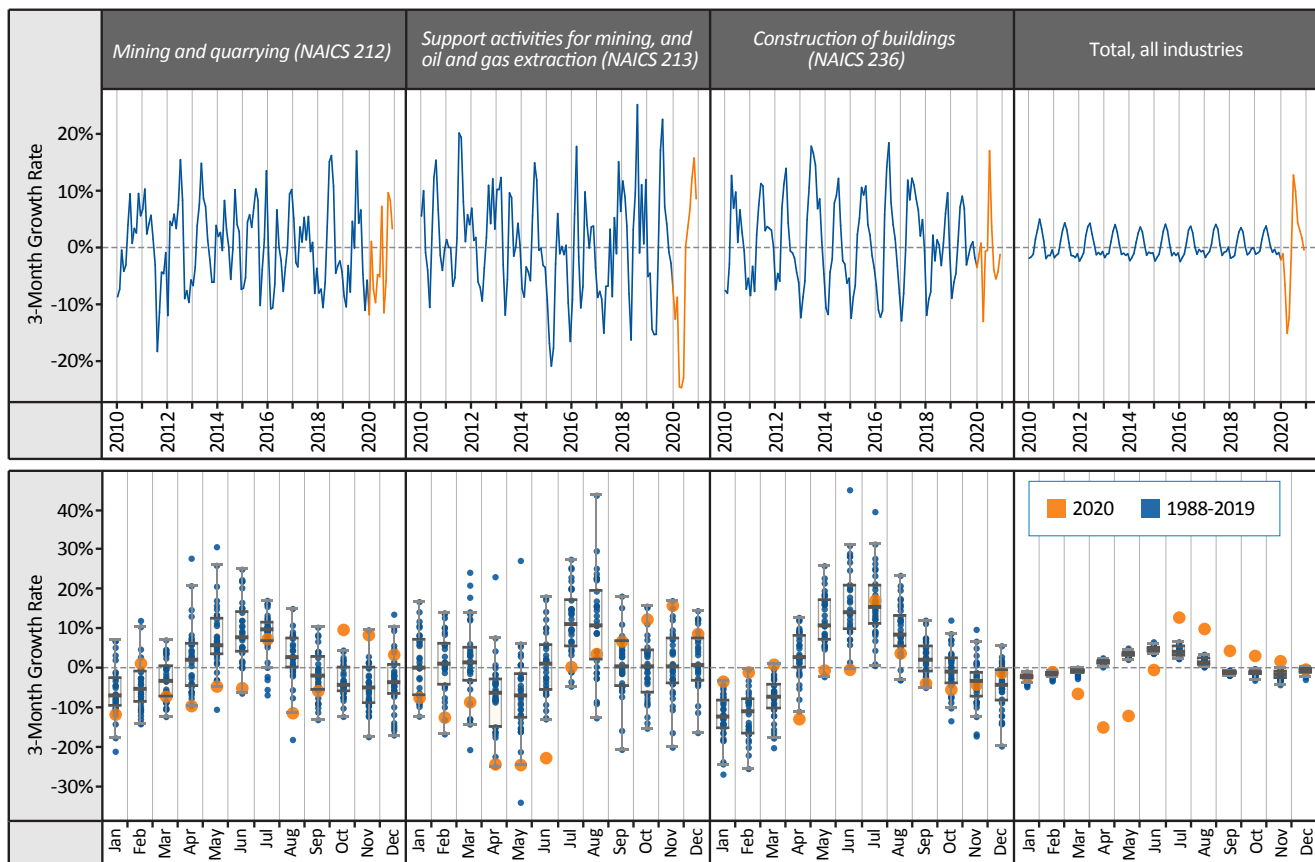
Source: Mining Industry Human Resources Council (2021); Statistics Canada, Labour Force Survey Custom Table, monthly, unadjusted for seasonality (2020).

HOW EMPLOYMENT VOLATILITY CHALLENGES THE LABOUR MARKET

For decision-makers, continual deviations from the expectation leads to instability in future planning. Volatility is especially a problem if there is underlying labour market tightness, given that employers have a narrow margin of error to respond to market fluctuations. In other words, the labour market's ability to respond to volatility is the most important factor in determining whether market fluctuations are truly problematic.

A tight labour market occurs when the number of available candidates is insufficient, making it more difficult to fill job vacancies. Typical symptoms include higher wages, low unemployment and fewer available workers. A tight labour market can result from competition with rival employers over the existing talent pool, or insufficient labour supply to adequately meet the employer demand (often referred to as a thin labour supply). A tight labour market requires more aggressive (and perhaps expensive) recruitment strategies, which may include wage competition, poaching of talent, extensive advertising, and so on.

Ideally, the labour market will have sufficient labour supply to respond to market fluctuations. However, when employers are continually either ramping down or up, their ability to secure necessary labour sources is undermined given workers' reluctance to endure the uncertainty of market conditions.

To illustrate how volatility can be problematic for a tight labour market, MiHR considers three sectors with different labour force circumstances (Figure 32): *Mining and quarrying (NAICS 212)*, *Support activities for mining, and oil and gas extraction (NAICS 213)* and *Construction of buildings (NAICS 236)*.

The labour force (i.e., employed plus unemployed) in *Mining and quarrying (NAICS 212)* is comparatively tight-fitting with employment changes. As such, the sector must often and rapidly expand the labour force beyond recent levels, since employed workers (in blue) and unemployed job seekers (in orange) are insufficient to meet the new demand. This need to continually expand the labour force is characteristic of a tight labour market.

By contrast, data for *Construction of buildings (NAICS 236)* highlight more labour force stability, with employment fluctuations buffered by an overall stronger labour market attachment. This means that unemployed people are more willing to endure downturns in anticipation of more favourable seasonal labour demand.

Lastly, these figures are for illustrative purposes and focus only on the change in labour force levels. An expanded analysis would also consider the financial implications of labour market tightness as well as the loss of labour market attachment during a downturn.

Figure 32: Employment and Unemployment (Three-Month Moving Averages) in *Mining and quarrying (NAICS 212), Support activities for mining, and oil and gas extraction (NAICS 213)* and *Construction of buildings (NAICS 236)* (Jan 2010 to Dec 2020)
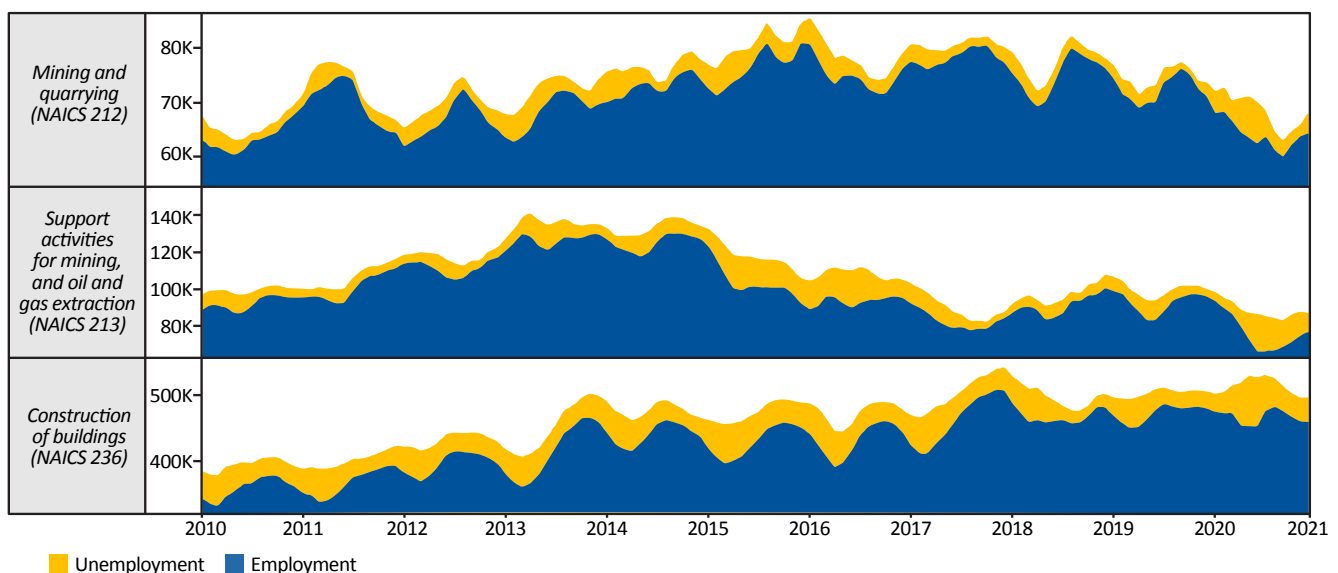
Mining Industry Human Resources Council (2021); Statistics Canada, Labour Force Survey Custom Table, monthly, unadjusted for seasonality (2020).

KEY CHAPTER HIGHLIGHTS

Measuring Employment Volatility: Volatility describes the observed unpredictable movements in an economic indicator over time. Employment volatility is a measure of uncertainty in the labour market. A highly volatile market can make it difficult for employers and job seekers to make firm decisions about the future.

Volatility in Support Activities: Canada's mining industry has experienced large swings in employment over the years. Since the turn of the century, *Support activities for mining, and oil and gas extraction (NAICS 213)* has continued to exhibit greater variation in employment compared to *Mining and quarrying (NAICS 212)*.

Shorter Growth Cycles in Mining and Quarrying: Employment in *Mining and quarrying (NAICS 212)* is shown to frequently switch between growth and contraction; since 2000, this sector has witnessed seven distinct periods of growth (averaging 18 months in duration) and eight periods of contraction (averaging 15.8 months).

Seasonality Across Sectors: In *Mining and quarrying (NAICS 212)*, employment growth typically peaks in July and has its lowest point in January. For *Support activities for mining, and oil and gas extraction (NAICS 213)*, employment growth declines in April and May before ramping up to its peak in August.

Volatility and Labour Market Tightness: The ability to respond to volatility is the most important factor in determining whether market fluctuations are truly problematic. The labour market requires a sufficient labour supply to respond to market fluctuations. When employers are continually either ramping down or up, their ability to secure necessary labour sources is undermined as workers become less willing to endure uncertain market conditions.

CHAPTER SIX:
SUMMARY AND CONCLUSIONS

In a relatively short time, COVID-19 has had an unmistakable impact on daily life, upending the state of economies and labour markets around the world. Observers will likely study this period for many years to understand the full magnitude of this singular global event.

Although events are still evolving, this report examines the relative impact of COVID-19 on Canada's mining labour market at the focal point of the pandemic fallout in 2020.

The analysis revisits key labour market indicators to observe how the pandemic has rippled through the mining labour market. It also discusses the response from mining companies as they, like so many other businesses, have scrambled to keep their businesses viable despite lockdowns and other restrictions. The analysis also discovers which segments of the labour market were particularly disrupted in 2020 and concludes with a longer-term outlook on which facets of the COVID-19 era will most likely endure in the future.

Source: Vale

Overall, this study finds that the immediate effects of lockdowns and other restrictions were indeed significant, yet as restrictions eased over time, and as mining was deemed an essential service, the industry showed early signs of recovery. At the same time, turmoil can still be seen among several indicators such as employment levels and unemployment rates. Thus far, it is unclear whether the industry will be able to recapture its pre-pandemic trajectory, especially considering the crisis has not yet run its full course.

The final chapter of this report examines employment volatility in the mining industry, including how historical workforce fluctuations—their typical movements, magnitude and duration—have shaped the labour force over time. Such insights can help mining stakeholders to prepare for present-day fluctuations by quantifying and placing them in context with the historical data. For instance, this study finds that, since the year 2000, there has been no contractionary period (as defined in Chapter Five) exceeding 30 months in *Mining and quarrying (NAICS 212)*. It remains uncertain whether the current COVID-19 related downturn will set a new standard in this regard.

Moreover, Canada's mining industry demonstrates employment volatility, especially in *Support activities for mining, and oil and gas extraction (NAICS 213)*, whereas *Mining and quarrying (NAICS 212)* has historically experienced shorter cycles with a greater number of distinct phases of expansion and contraction.

Ultimately, the labour market's ability to navigate these fluctuations is the primary concern, given that abrupt market turns can destabilize and weaken the labour supply. When the underlying labour market is tight, in order to expand, employers must adopt more expensive strategies (e.g., increasing wages, expanding advertising budgets to attract new workers, training new workers to replace the experienced workers who have left, etc.).

SELECTED REPORT FINDINGS

Chapter One: The Short-Term Effects
of COVID-19

- **Adapting to the crisis:** The pre-pandemic mining labour market showed stable vital signs; after the initial pandemic shock, mining was deemed an essential service by several provincial governments and mining operations began to adapt to the new environment.

- **Brief recovery:** Several leading labour market indicators in *Mining and quarrying (NAICS 212)* made a brief comeback after the initial shock in March and April of 2020.

- **Economic turbulence:** Despite the short-lived stabilization, the subsequent months have been rather turbulent in several economic indicators of interest.

Chapter Two: Managing Through the Crisis

- **New health and safety protocols:** Mining employers have increased their efforts in health screening measures, sanitation and cleaning of surfaces, ensuring social distancing in their operations, modifying physical spaces, using signage, and embracing remote work where it is feasible.

- **Protecting vulnerable communities:** The health and safety of many remote populations quickly became a priority for mining operations, especially for those in Indigenous communities.

- **Greater use of automation:** The pandemic has put additional pressure on mining companies to automate processes, wherever possible, to the extent that remote capabilities can protect operations against production disruptions in the future.

Chapter Three: Who Has Been Most Disrupted?

- **Unprecedented unemployment rates:** COVID-19 marks a highly visible anomaly in the prevailing labour market trends, showing the largest unemployment rates spike across mining-related sectors since the turn of the century.

- **Low education, high impact:** Workers with lower levels of educational attainment have fared worse than the rest of the mining workforce. The unemployment rate for those with no degree, certificate or diploma climbed to unparalleled levels after Q1 in 2020; at the same time, the rates for workers with higher educational attainment have mostly recovered closer to their normal unemployment ranges.

Chapter Four: Aftermath and
Long-Term Outlook

- **COVID-19 a catalyst for change:** COVID-19 was a catalyst for changes already occurring (such as the use of remote work, automation and digitization of processes), which are better described as longer-term innovations rather than temporary stop-gap measures.

- **Remote work here to stay:** The shift to remote work in 2020 was driven by the critical need to keep workers productive during the pandemic. However, this shift has helped mining operations to realize what is (and what could be) possible with remote work.

Chapter Five: Employment Volatility in Mining

- **Volatility and labour market tightness:** The ability to respond to volatility is the most important factor in determining whether market fluctuations are truly problematic. The labour market requires a sufficient labour supply to respond to market fluctuations. When employers are constantly either ramping down or up, their ability to secure necessary labour sources is undermined as workers become reluctant to endure uncertain market conditions.

Source: Iron Ore Company of Canada

LOOKING AHEAD: SUPPORTING CANADIANS IN A POST-COVID-19 WORLD

MiHR developed this report with the goal of understanding where the mining labour market landscape is headed in a post-COVID-19 world.

Canadians will need to understand the long-term implications of the pandemic. Present-day career decisions will become increasingly significant in the coming years as the post-COVID-19 economy emerges, revealing which occupations and skills offer a competitive advantage in the future. Therefore, identifying new opportunities to strengthen the labour market for employers and job seekers is a critical objective for current labour market research.

Well before the onset of COVID-19, MiHR was already monitoring the potential impact of advanced digital technologies on the mining industry. There are still unanswered questions about the extent to which the current global pandemic has accelerated the progress of technological transformations, notably the wide-spread adoption of remote work, artificial intelligence and automation.

MiHR is using the outcomes of this study to inform and validate the direction of its future labour market information program. Emphasis will be placed on:

- Quantifying and forecasting workforce skills and occupations in demand.
- Highlighting potential career pathways by analyzing overlapping occupations and skills transferability.
- Identifying workers who are vulnerable to automation and other disruptive factors (e.g., the pandemic).
- Understanding the costs of volatility (e.g., weakened labour market attachment and higher recruitment costs) to inform countercyclical workforce planning.