



UNEARTHING POSSIBILITIES

Human Resources Challenges and Opportunities in the Canadian Mineral Exploration Sector

A MiHR Sector Study Report



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For more information, contact:

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

Tel: 613 270 9696
Fax: 613 270 9399
Email: research@mihhr.ca

Or visit the website at:

www.mihhr.ca

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Table of Contents

Who We Are	1
Acknowledgements	1
Overview of the Report	2
Mineral Exploration Definition and Demographic Profile	2
Overview of Key HR Issues	3
Career Awareness and Attraction	3
Recruitment	3
Retention	3
Global Mobility of Talent	4
About the Report	4
Project Background and Objectives	5
Background	5
Purpose and Objectives	5
Activities	6
Phase 1: Situational Analysis	6
Phase 2: Primary and Secondary Research	7
Phase 3: Recommendations and Industry Strategy	7
SECTION ONE—Situational Analysis	8
1 Sector Definition and Scope	9
Phase 1: Mineral Resource Assessment	10
Phase 2: Mineral Exploration	10
Phase 3: Mineral Deposit Appraisal	10
Scope of Exploration	11
Industry Participants	11
Governments and Regulating Bodies	11
Prospectors	11
Junior and Senior Mining Companies	11
Consultants/Contractors/Service Providers	11

Accessing Labour Market Statistics	12
North American Industry Classification System (NAICS) for Mineral Exploration	13
National Occupational Classification (NOC) for Mineral Exploration	13
2 Economic and Labour Market Trends	14
The Economics of the Canadian Mineral Exploration Sector	14
A Closer Look at the Juniors	15
Canadian Exploration Expenditures	15
Globalization and International Investment	17
3 Canada’s Mineral Exploration Workforce: Estimates and Analysis	20
Overview of Exploration Employment	20
Characteristics of the Mineral Exploration Workforce	21
Total Estimated Employment	21
Organization Size.....	22
Occupational Mix.....	23
Age	24
Diversity	25
Education	27
A Comparison of Workforces: Exploration vs. Mining	28
SECTION TWO — HR Challenges and Opportunities	30
4 Industry Consultation Approach and Methodology	31
Focus Groups	31
Questionnaires	32
Interviews	32
Findings	32
5 Career Awareness and Attraction	33
Student Perspectives	33
Debunk Myths and Promote Career Options with Targeted Outreach	34
Educators Perspectives	34
Get Their Attention Early	34
Raise Public Awareness of the Sector	35
Solidify Classroom Learning with Hands-On Experiences.....	35

Employee Perspectives	35
The Power of Recommendations from Within	36
Attraction and Career Awareness Recommendations	37
6 Recruitment	38
HR Planning Challenges	39
Student and Job Seeker Perspectives	41
The Value of Experiential Learning	41
Networking is Key.....	42
Job Seeker Confusion.....	42
Employee Perspectives	43
Employer Perspectives	44
The Value of Experience and Skills.....	45
Recruitment Strategies	45
Foreign-Trained Professionals	46
Recruiting in Local Aboriginal Communities	47
Meeting Needs Through Training	47
Recruitment Challenges.....	47
Job-Ready Candidates in Short Supply	50
Keeping up With Changing Roles.....	50
Recruitment Recommendations	51
7 Retention	52
Employer Perspectives	53
Retention Strategies	53
Retention Challenges.....	55
Student Perspectives	57
Seeking Challenge and Life-long Learning	57
Seeking Trust and Autonomy	58
Employee Perspectives	58
Early Preparation Translates to Less Turnover	60
Retention Recommendations	61

8 Key HR Issues and Recommendations for Action.....	62
Career Awareness and Attraction	62
Issues	62
Approach.....	62
Recruitment	63
Issues.....	63
Approach.....	64
Retention.....	64
Issues.....	64
Approach.....	65
Special Focus on Global Mobility of Talent.....	66
Issue	66
Approach.....	66
A Comparison of Mineral Exploration and Mining.....	66
What Makes Mineral Exploration and Mining the Same?	66
How do Mineral Exploration and Mining Differ?	67
Appendix A: Sources of LMI	69
Statistics Canada—Labour Force Survey.....	69
Statistics Canada—Canadian Business Patterns.....	69
Statistics Canada—Postsecondary Student Information System (PSIS)	69
Statistics Canada—2006 Census of Population.....	69
Canadian Association of University Teachers (CAUT)—Almanac of Post-Secondary Education.....	70
Natural Resources Canada—Various Publications	70
Newfoundland and Labrador Department of Natural Resources—Exploration Employment Survey 2007	70
Appendix B: Estimating Mineral Exploration Employment	71
Canadian Business Patterns Data.....	71
Census Data	72
Appendix C: Profile of Questionnaire Respondents.....	75
Respondent Profile: Employee Questionnaire.....	75
Respondent Profile: Employer Questionnaire.....	79

List of Figures and Tables

Figure 1	Exploration Activities Flowchart.....	15
Figure 2	Exploration and Deposit Appraisal Expenditures in Canada, by Junior and Senior Companies, 2003–2010 (current dollars).....	16
Figure 3	Regional Distribution of Global Exploration Budget in 2009	18
Figure 4	Metallic Minerals and Metal Products — Direct Investment Stocks, 1990–2008.....	19
Figure 5	Geographic Reach of TSX-listed Companies, June 2009	19
Figure 6	Occupational Mix in Mineral Exploration in Canada	23
Figure 7	Age Profile of Exploration Workforce (share of labour force, per cent)	24
Figure 8	Age Profile in Selected Occupations (share of labour force over age 55, per cent)	25
Figure 9	Proportion of Women in Exploration and Selected Occupations (share of employment, per cent)	26
Figure 10	Minority Groups in Exploration (share of labour force, per cent).....	26
Figure 11	Educational Profile of Exploration Workforce (share of labour force, per cent).....	27
Figure 12	Net Promoter Scores for Employee Survey Respondents	36
Figure 13	Employers with an HR Plan to Address Recruitment and Retention.	39
Figure 14	Employers Prepared to Fill Retirement Vacancies.....	40
Figure 15	HR Planning as a Function of Organizational Size.....	40
Figure 16	Employee Questionnaire Respondents’ Perceptions on Difficulty Entering the Sector.....	43
Figure 17	Recruiting Challenges by Occupation	48
Figure 18	Effectiveness of Retention Strategies	54
Figure 19	Occupations with High Turnover	55
Figure 20	Employee Perceptions on Effectiveness of Retention Strategies	59
Figure 21	Employee Expectations for Field Work.....	60
Figure C-1	Profile of Respondents.....	75
Figure C-2	Employment Status.....	75
Figure C-3	Length of Time Working in the Sector	76
Figure C-4	Respondent Nationality and Country of Training	76
Figure C-5	Diversity of Respondents.....	77
Figure C-6	Age Profile of Respondents	77

Figure C-7	Gender Profile of Respondents	78
Figure C-8	Type of Employer	78
Figure C-9	Size of Organization	80
Table 1	Exploration and Deposit Appraisal Expenditures by Province, 2003–2010	17
Table 2	Total Mineral Exploration Employment	22
Table 3	Canadian Business Patterns Data on Size of Mineral Exploration Organizations	22
Table 4	Employee Questionnaire Respondents' Barriers to Obtaining Employment	44
Table 5	Employer Recruitment Strategies	46
Table 6	Recruiting Challenges Faced by Employers	49
Table 7	Exploration Employees Five-Year Plans	52
Table 8	Retention Challenges for Key Occupations	56
Table B-1	CBP Estimates of Mineral Exploration Employment	74
Table B-2	Census Estimates of Mineral Exploration Employment	74
Table C-1	Main Exploration Activities Performed by Respondents	79
Table C-2	Main Activities of Employers	79

Who We Are

The Mining Industry Human Resources (MiHR) Council is Canada's national council for the minerals and metals industry. MiHR contributes to the strength, competitiveness and sustainability of the Canadian minerals and metals sector by bringing all industry stakeholders together to address human resources (HR) challenges and opportunities. MiHR is the recognized industry leader in the identification and analysis of HR issues facing the industry and a catalyst for development and implementation of solutions.

Acknowledgements

MiHR partnered with The Prospectors and Developers Association of Canada (PDAC) to develop this research initiative. Consultants conducting research for this project, on behalf of MiHR and PDAC, included HDR Decision Economics Inc. (Calgary), The Conference Board of Canada (Ottawa), and kiskquared (Winnipeg).

MiHR and PDAC are grateful to all of the individuals and organizations in the Canadian mineral exploration sector who contributed their resources, knowledge and insights to this study and report. MiHR wishes to thank all research participants for their valuable time and input to fill out the survey, engage in interviews and contribute to focus groups associated with this report. Over 300 industry volunteers contributed to our research over the past two years.

We are particularly indebted to the project steering committee for their hard work, guidance and insights.

- Lisa McDonald, Chief Operations Officer, PDAC (partner)
- Gavin Dirom, President and CEO, Association for Mineral Exploration B.C. (committee chair)
- Lyn Anglin, President and CEO, Geosciences B.C.
- Harold Gibson, Professor, Laurentian University
- Peter Dimmell, President, Silver Spruce Resources
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- Mike Burke, Golden Predator Corp. (Formerly with the Yukon Geological Survey)
- Gary Vivian, President, Aurora Geosciences Ltd. (Past President, Geoscientists Canada)
- Bill Mercer, President, Avalon Rare Metals, (Past President, Canadian Federation of Earth Scientists)
- Robin Curry, Smithers Exploration Group

Past participation also included individuals from the following organizations:

- Northwest Community College
- Kinross Gold Corporation



Overview of the Report

The purpose of the *Unearthing Possibilities* report is to provide reliable, relevant and timely labour market information to support strategic workforce planning and to stimulate a proactive approach to the human resources (HR) challenges facing the mineral exploration sector. Project work was divided into three phases: a situational analysis; intensive primary and secondary industry research; and stakeholder consultations to develop a strategy and action plan.

Mineral Exploration Definition and Demographic Profile

Mineral exploration involves the search for commercially viable concentrations of minerals. It includes prospecting, surveying and mapping, deposit appraisal and financial analysis, and project planning. Canada is the world leader in exploration activities, and is the world centre for management of exploration projects and associated fundraising activities on the venture exchange markets.

Thus, for the purposes of this study, the exploration sector includes a number of sub-sectors: support services for mining, surveying and mapping, government services, financial analysis and professional geosciences. In terms of occupations: geologists, geochemists and geophysicists; geological and mineral technologists and technicians; drafting technologists and technicians; mapping technologists and technicians; and geological engineers account for more than three-quarters of mineral exploration employment in Canada.

The sector employs slightly more than 25,000 workers. The workforce is comprised of a large cohort of younger workers and another large cohort of mature workers — with a distinct lack of workers in the mid-stages of their careers. Women and Aboriginal peoples are under-represented in the sector; only 20 per cent are women and 2.3 per cent are Aboriginal peoples. The sector employs slightly more new Canadians (23 per cent) than other sectors.

The exploration sector's workforce can be characterized as having high and rising educational requirements. Over three-quarters of the workforce have some form of post-secondary education, with many employees having advanced post-secondary degrees.

Mineral exploration employers are mainly small organizations. Nearly 95 per cent of the sector is made up of micro and small-sized enterprises (SMEs; micro and small organizations are establishments with fewer than 50 employees). Over 60 per cent of employers have fewer than five employees.

Overview of Key HR Issues

Industry consultation revealed several HR challenges and opportunities under the broader headings of career awareness and attraction; recruitment; and retention. In addition, industry stakeholders identified the unique issues associated with global mobility of talent.

Career Awareness and Attraction

- Lack of career awareness and general public awareness of industry
- Need for improved coordination and cooperation between industry and educational institutions
- Under-representation of key talent groups — women, youth, new Canadians
- Lack of global awareness of Canadian employment opportunities

Recruitment

- Thinning labour pool particularly for geoscientists
- Short supply of job-ready candidates
- Mobility of labourers challenged by unrecognized, uncertified occupations
- Candidates lacking critical field experience
- Limited human resources of SMEs, which make up the majority of the sector

Retention

- Seasonal nature of work and wildly cyclical industry, along with short life-span of companies, camps and projects, leading to high seasonal turnover of workers
- The fact that remote locations and fieldwork are deterrents for some under-represented groups (e.g., women, new Canadians) and for professionals in mid- and later stages of their careers
- Mid-career attrition — preponderance of professionals leaving the sector in mid-career

- Age demographics—mix of aging workers and young professionals needing mentorship and experience, with a thin pool of mid-career professionals, signalling a coming gap in worker knowledge and experience, and a thin leadership pipeline
- High proportions of knowledge workers, which translate to an extremely versatile and multi-skilled workforce that can move to other sectors with ease

Global Mobility of Talent

- The global nature of the industry lends itself to global mobility of talent. This challenges Canadian employers to attract and retain workers on an international stage, and to overcome barriers with credential recognition and educational equivalencies assessments.

About the Report

There are two main sections to this report. Section One provides a situational analysis of the exploration sector, including a brief overview of economic trends and a definition of the sector using relevant North American Industrial Classification System (NAICS) and National Occupational Classification (NOC) codes. Section One also includes a demographic profile of the labour force and a description of key labour market issues. Section Two contains discussion and insights on key human resources challenges and opportunities that face the sector, and recommendations on an industry strategy to address the issues.



Project Background and Objectives

Background

One of the Mining Industry Human Resources (MiHR) Council's strategic objectives is to research, analyze, forecast and disseminate labour market, human resource and other human-capital information relevant to the minerals and metals sector. (Such information includes labour market intelligence; sector studies; occupational supply and demand forecasts; and relevant research focused on HR issues.) To meet this objective, MiHR is engaged in several initiatives to improve the quality and availability of labour market information to industry stakeholders. The *Unearthing Possibilities* project and report add to this body of knowledge. Specifically, the report analyzes labour market issues and the short- and long-term human resources challenges facing the mineral exploration sector.

Purpose and Objectives

As the voice for all human resources issues in the minerals and mining sector, MiHR is tasked with obtaining, interpreting and disseminating relevant and timely labour market information to its stakeholders. For this project, MiHR partnered with The Prospectors and Developers Association of Canada (PDAC). PDAC represents the interests of the Canadian mineral exploration and development industry, and also has a strong interest in the sector's labour market issues. In fact, the first objective in PDAC's strategic plan is to "assess the nature and scope of the human resource needs of the exploration sector over the next 10–15 years".¹

¹ PDAC's Strategic Plan, found at: www.pdac.ca/pdac/about/pdf/0707-strategic-plan.pdf

The purpose of the *Unearthing Possibilities* report is to provide reliable, relevant and timely labour market information to support strategic workforce planning, and to stimulate a proactive approach to the HR challenges facing the mineral exploration sector. Research focused on workers involved in exploring for and evaluating mineral deposits that eventually lead to the establishment of new mining operations. Such workers include prospectors, developers, drillers and geoscientists, and may include workers involved in other non-technical support fields such as environmental management, finance and investment analysis.

The primary objectives of this project were to:

- Enhance the labour market information available to mineral exploration industry stakeholders;
- Assess labour supply and demand factors for workers involved in exploring for and evaluating mineral deposits;
- Develop a strategy to monitor, assess and project the supply and demand for the mineral exploration industry's workforce;
- Identify the short- and long-term HR challenges and opportunities facing the mineral exploration segment of the industry; and
- Serve as the basis for developing an industry strategy and action plan to address key HR issues.

The following long-term impacts are anticipated:

- Improved strategies to achieve balance between supply and demand of workers for the Canadian mineral exploration sector;
- Increased understanding among communities of interest about key human resource issues that must be addressed by the exploration sector to ensure its viability; and
- Increased level of dialogue, collaboration and buy-in from mineral exploration sector stakeholders to the collaborative process being fostered in the minerals and metals industry.

Activities

Project work was divided into three phases: a situational analysis; intensive primary and secondary industry research; and stakeholder consultations to develop a strategy and action plan.

Phase 1: Situational Analysis

In the first phase of research, the current state of the workforce and available labour market information was assessed. Primary activities in this phase included:

- Analysis of the current state of knowledge and literature review on known labour market conditions for this segment of the industry;
- Determine the scope of labour market information requirements and reporting needs;
- Develop an inventory of existing sources of information on labour supply and demand;

- Identify the labour market information gaps, and determine probable causes, who is affected and what has been done to date to address the issues; and
- Consult with over 30 industry experts through interviews and facilitated discussions to validate the situational analysis and labour market profile.

Phase 2: Primary and Secondary Research

In the second phase of research, both primary and secondary research was used to identify the human resources challenges and opportunities facing the mineral exploration sector. Over 300 industry employers, employees, students, educators, government stakeholders and industry associations were consulted in this phase of work. Activities included:

- Surveys, interviews, and focus groups with industry stakeholders to determine the short- and long-term HR challenges;
- Review of relevant academic and grey literature on HR issues for the sector, as well as Statistics Canada data products and reports, Natural Resources Canada, PDAC reports, etc.; and
- Determination and discussion of short- and long-term HR challenges and opportunities facing the sector.

Phase 3: Recommendations and Industry Strategy

In the third phase of work, approximately 30 industry stakeholders were consulted to review project findings and develop an industry strategy for addressing the identified issues. This strategy consultation work is the beginning of strategy and action plan discussions that will continue after public release of the project findings. Activities in this phase included:

- Consultation with industry stakeholders about Phase 1 and Phase 2 findings through online communications, roundtable discussions, interviews and strategic meetings, to determine the overall implications for the sector;
- Provision of insights and suggestions for practical solutions; and
- Preliminary development of an industry strategy to address identified issues.



SECTION ONE

Situational Analysis





Sector Definition and Scope

Mineral exploration involves the search for commercially viable concentrations of minerals, with large, high-grade reserves that can be extracted with minimal ground disturbance and disruption to the environment and local communities. Natural Resources Canada (NRCan) has developed a “Generalized Model of Mineral Resource Development”² which describes six broad phases in the life cycle of a mining operation. These are:

- Mineral Resource Assessment
- Mineral Exploration
- Mineral Deposit Appraisal
- Mine Complex Development
- Mine Production
- Environmental Restoration

Activities related to mineral exploration typically fall into the first three phases of the mining cycle: resource assessment; exploration; and deposit appraisal.

² Generalized Model of Mineral Resource Development by Natural Resource Canada (NRCan), found at: http://mmsd.mms.nrcan.gc.ca/stat-stat/expl-expl/pdf/04_e.pdf

Phase 1: Mineral Resource Assessment

The mineral resource assessment phase involves development and publication of maps and databases, and application of general earth-sciences knowledge and research—to support the activities of exploration and mining companies in search of new deposits and/or planning extensions of existing mining operations. These activities are often publicly funded and carried out by government agencies, whose purpose is to supply information and tools to help private companies assess the potential of areas in which certain mineral deposits may be found. For example, the Geological Survey of Canada (GSC) and related provincial agencies provide “the fundamental national geosciences knowledge base required to support effective mineral and hydrocarbon exploration and development across Canada”.³ Private-sector companies use this knowledge to strategically align mineral exploration efforts related to specific target commodities and geographical areas.

Phase 2: Mineral Exploration

Mineral exploration includes various activities categorized within five different stages, including:

1. Exploration Planning
2. Regional Reconnaissance and Surveys
3. Prospecting and Ground Surveys of Anomalies
4. Verification of Anomalies
5. Discovery and Delimitation of a Mineral Deposit

Mineral exploration is defined as “the search for, discovery, and first delineation of a previously unknown mineral deposit or the re-evaluation of a sub-marginal or neglected mineral deposit in order to enhance its potential economic interest based on more appropriate tonnage and grade characteristics”.⁴ The Mining Association of Canada (MAC) estimates that mineral exploration activities account for about 80 per cent of the total exploration and deposit appraisal expenditures in Canada.⁵

Phase 3: Mineral Deposit Appraisal

Mineral deposit appraisal activities are aimed at building a detailed business plan that will support a production decision. Appraisal activities include assessments of the tonnage and grades of the deposit and the cost of extraction (both capital and ongoing operations cost), as well as market analysis (such as mineral-price forecasts) and examination of the environmental, socio-economic and political risks of the opportunity. Feasibility studies and appraisals are commonly conducted progressively through the following four stages:

1. Mineral Deposit Definition
2. Project Engineering
3. Project Economics
4. Production Decision

3 Geological Survey of Canada, found at http://gsc.nrcan.gc.ca/mandate_e.php

4 Natural Resources Canada, “Overview of Trends in Canadian Mineral Exploration”, 2008.

5 The Mining Association of Canada (MAC), “A report on the state of the Canadian mining industry”, 2009.

Scope of Exploration

The definition of exploration used throughout the report includes activities that occur during the pre-production phase of the mine cycle, as well as exploration and deposit appraisal activities occurring as part of expansion on developed, producing mine sites. The definition includes the following exploration activities:

1. Greenfield—the search for mineral deposits in an area where no known deposits have been discovered
2. Brownfield—the search for mineral deposits in areas close to existing known deposits
3. On mine-site—exploration done to expand existing resource bodies already in production

Industry Participants

In Canada, the mineral exploration sector is characterized by: prospectors; companies of varying size and financial means; public entities either directly involved with exploration and deposit appraisal or surveying and mapping; securities commissions (e.g., agencies responsible for regulating securities trading in provincial jurisdictions); professional associations; and a number of support-service providers.

Governments and Regulating Bodies

Federal and provincial governments support the mineral exploration sector through the development of geological maps and other tools that aid the search for mineral deposits in various geographical areas of interest. Governments also provide regulatory services in the areas of exploration and environmental permitting, land access and administration of claims. Securities commissions vary in scope and reach and are generally responsible for regulating securities trading.

Prospectors

A licensed prospector is generally the first person to search for potential mineral deposits and to stake claims. Prospectors may work on their own, in a group or for a mining/mineral exploration company.

Junior and Senior Mining Companies

Mining companies are defined largely by the way in which they derive their revenues. A junior mining company typically has no mining operations and must rely almost entirely on the capital markets to finance its exploration activities. Senior mining companies are producers that generate revenues from the production and sale of the commodities they mine.

Consultants/Contractors/Service Providers

A variety of companies regularly provide specialized services for mineral exploration to both junior and senior mining companies. Consultancies and contractors provide services for geosciences; surveying and mapping; geochemical and other laboratory analysis; other geological services; equipment rentals; drilling and blasting; camp services; and other labour services (e.g., line cutters).

Accessing Labour Market Statistics

Statistics Canada is the primary source of information on labour market statistics in Canada. Labour market data reported from Statistics Canada is organized using two different systems for categorizing employment data. The first is the North American Industrial Classification System (NAICS), which is used by statistical agencies in Canada, the United States and Mexico to describe economic and business activity at the industry level. NAICS uses a production-oriented framework that groups together organizations producing similar goods or services. Assignment to a specific industry is based on an organization's primary activity.

The second system used to categorize employment data is the National Occupational Classification for Statistics (NOC-S). This is a national system developed by Statistics Canada and Human Resources and Skills Development Canada (HRSDC) to provide a standardized way of describing the work performed by Canadians in the labour market. Individuals are grouped together in this framework based on similarities in their job roles and the work they perform.

To conduct analysis on a segment of Canada's labour market, it is necessary to define the sector of interest in terms of NAICS and NOC-S codes. Both the NAICS and the NOC-S classification systems are used extensively in Statistics Canada surveys and reporting on labour market information, including the Labour Force Survey (LFS); the Survey of Payroll, Employment and Hours (SEPH); the Canadian Business Patterns (CBP) database; and the Census.

Unfortunately, there is no clearly defined industry NAICS code that directly corresponds with the mineral exploration industry. There is also no clearly defined collection of occupation NOC-S codes that directly correspond to exploration activities. Despite certain occupations being prevalent in the mineral exploration industry, people in these occupations also work in a wide variety of other industries. For example, at any given time, a geologist is likely to have projects in several sectors, such as mineral exploration, government, or oil and gas extraction. These limitations make it difficult to access readily available data; therefore, there is no easy way to ascertain the size or characteristics of the mineral exploration workforce.

Through in-depth analysis of the labour market data and classifications, MiHR has identified the following NAICS and NOC-S codes as being the ones of primary relevance to the mineral exploration sector. However, no single definition will capture the entire sector—and in some cases, the NAICS codes include information about sub-sectors not related to exploration. In other cases, an occupational code may include individuals who also work in sectors other than exploration (in particular, oil and gas extraction). That said, the NAICS and NOC-S codes listed here provide the best possible approximation of the sector and allow for access to a wide array of useful labour market information.

North American Industry Classification System (NAICS) for Mineral Exploration

The NAICS has a hierarchical structure that is composed of sectors (two-digit code), sub-sectors (three-digit code), industry groups (four-digit code) and industries (five-digit code). An examination of the activities associated with mineral exploration and the organization activities established in the NAICS classifications produced the following list of NAICS industries that contribute to the mineral exploration sector.⁶

- 213117 Contract drilling (except oil and gas)
- 213119 Other support activities for mining
- 541360 Geophysical surveying and mapping services
- 541380 Testing laboratories
- 54162 Environmental consulting services

National Occupational Classification for Mineral Exploration

Canada's National Occupational Classification System (NOC-S) provides a consistent way to collect data and describe the nature of work. In consultation with industry experts, MiHR conducted an examination of the nature of work performed in the sector. The following NOC-S codes were determined to most likely describe the work conducted in the mineral exploration sector:

- B012 Financial and investment analysts
- C013 Geologists, geochemists and geophysicists
- C015 Other professional occupations in physical sciences
- C044 Geological engineers
- C054 Land surveyors
- C112 Geological and mineral technologists and technicians
- C154 Land survey technologists and technicians
- C155 Mapping and related technologists and technicians
- C134 Construction estimators
- C153 Drafting technologists and technicians
- H622 Drillers and blasters
- I214 Labourers

⁶ It is noteworthy that the major data source in this report, 2006 Census data from Statistics Canada, only provides data disaggregation to the four-digit NAICS-code level.



Economic and Labour Market Trends

Mineral exploration is a global activity. Since the mid-twentieth century, a trend of growing foreign investment and overseas projects has integrated the world's mineral exploration activities. According to Natural Resources Canada (NRCan), over 800 Canadian companies were exploring outside Canada in more than 100 countries in 2007.⁷

However, each exploration site has unique characteristics that affect the activities and expenditures (and thus the level of employment) in any nation or region. For example, geography, the magnitude of proven reserves, infrastructure, climate, socio-economic and political landscapes, and various nation-specific tax incentives all work together to determine the potential for any exploration activities.

It is thus important to consider both the global and the national situations in an economic profile of the mineral exploration sector. This section of the report first introduces key statistics related to the size of the sector in Canada, followed by a discussion of globalization.

The Economics of the Canadian Mineral Exploration Sector

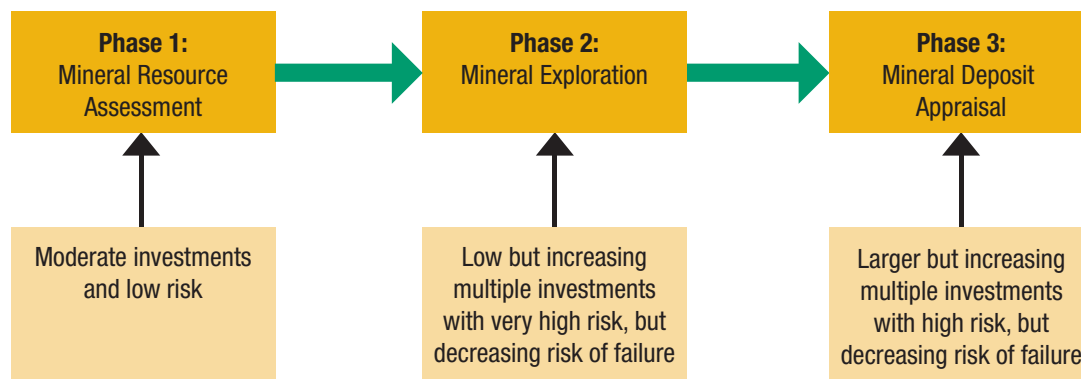
As a company moves through the phases of exploration, the risk of failure (in terms of actually determining whether a mineral deposit is present and economical) declines, while the amount of investment required to complete each phase increases. According to the Mining Association of Canada (MAC), Phase 2: Mineral Exploration generally accounts for approximately 80 per cent of the total exploration and deposit appraisal expenditures in Canada.⁸

⁷ Natural Resources Canada (NRCan), "Overview of Trends of Canadian Mineral Exploration", 2008.

⁸ A report on the state of the Canadian mining industry, The Mining Association of Canada (MAC), 2009

Figure 1

Exploration Activities Flowchart



Source: Natural Resources Canada, MiHR, Summer 2011.

A Closer Look at the Juniors

Junior mining companies have limited or no cash flow from existing mining operations and therefore, they rely on capital markets to finance exploration. Activities in junior companies are more sensitive and swifter to react to the impacts of economic variations. For instance—as shown in Figure 2—from 2006 to 2007, Canadian junior companies increased their expenditures from \$1,238 million to \$1,904 million—a 53 per cent increase, compared to 38 per cent for major companies. Juniors also reduce spending more drastically in times of economic downturns—with expenditures falling by more than 54 per cent, compared to 34 per cent for senior companies.

Canadian Exploration Expenditures

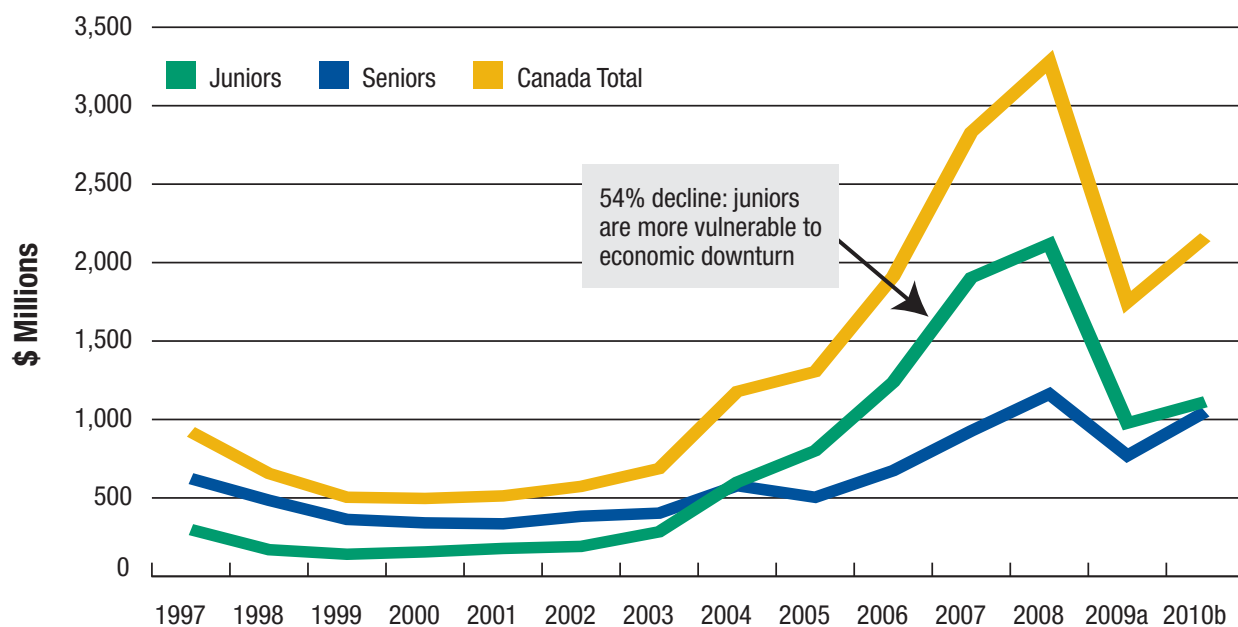
Mineral exploration expenditures, and thus exploration activity in general, are largely influenced by changes in commodity prices. Between 2003 and 2008, exploration expenditures in Canada increased by an average of 36 per cent a year, in line with average annual mineral-price increases of 22 per cent.⁹ Total expenditures in Canada reached a record \$3.3 billion in 2008, subsequently plummeting by over 47 per cent to \$1.7 billion in 2009—due to the economic recession and falling commodity prices. During the same period, the number of exploration projects in Canada also declined—from 822 to 669. Within this group, the number of projects with expenditures over \$1 million decreased by approximately 50 per cent.¹⁰

⁹ Average annual mineral price changes calculated using Bank of Canada metal price index.

¹⁰ Natural Resources Canada, "Overview of Trends of Canadian Mineral Exploration", 2009.

Figure 2

Exploration and Deposit Appraisal Expenditures in Canada, by Junior and Senior Companies, 2003–2010 (current dollars)



Source: Natural Resources Canada, from the federal-provincial-territorial Survey of Mineral Exploration, Deposit Appraisal and Mine Complex Development Expenditures.
a. Preliminary estimates at February, 2010.
b. Spending intentions at February, 2010.

As the economy improved, the industry experienced rapid recovery; by the end of 2010, total exploration expenditures — measured in terms of spending intentions — climbed above the \$2 billion mark. Escalating commodity prices also sparked renewed interest in previously marginal or sub-economic deposits.

Spending intentions in almost all provinces/territories in Canada (with the exception of Manitoba) are expected to continue to increase through 2011. In terms of the distribution of exploration expenditures by province: Ontario continues to lead the country, followed by Quebec, Saskatchewan and British Columbia — as shown in Table 1. Activities in Ontario’s Ring of Fire region have heated up over the past year and this trend is expected to continue. Saskatchewan has become an increasingly important location as a result of high potash prices and new diamond exploration activities. In addition, exploration expenditures in the territories have historically been driven by the search for diamonds and this trend is also expected to continue.

Table 1**Exploration and Deposit Appraisal Expenditures by Province, 2003–2010**

IN \$ MILLIONS	2003	2004	2005	2006	2007	2008	2009a	2010b	ANNUAL CHANGE (2009–2010)	CAGR (2003–2010)
Newfoundland and Labrador	23.1	33.2	48.7	100.8	148.0	146.7	53.5	57.8	8.0%	14.0%
Nova Scotia	6.4	9.1	6.5	11.0	23.5	21.4	9.8	19.8	102.0%	17.5%
New Brunswick	2.6	13.4	10.1	13.4	35.8	32.7	10.0	16.9	69.0%	30.7%
Quebec	134.0	227.2	205.1	295.1	476.4	526.1	347.9	466.9	34.2%	19.5%
Ontario	219.4	306.9	294.0	346.5	571.7	799.3	469.4	607.7	29.5%	15.7%
Manitoba	27.2	36.0	52.9	52.9	102.6	152.1	83.7	72.6	-13.3%	15.1%
Saskatchewan	47.7	71.8	133.9	235.6	314.0	430.7	292.6	292.9	0.1%	29.6%
Alberta	4.9	6.3	6.6	18.7	11.8	20.8	8.0	10.1	26.3%	10.9%
British Columbia	62.5	151.9	218.1	344.2	470.6	435.4	179.0	236.7	32.2%	21.0%
Yukon Territory	12.7	22.0	54.0	106.4	144.7	134.0	74.9	75.8	1.2%	29.1%
Northwest Territories	53.6	112.4	96.3	176.2	193.7	147.7	29.5	66.3	124.7%	3.1%
Nunavut	92.7	187.5	178.7	210.6	338.0	432.6	189.0	238.3	26.1%	14.4%
CANADA TOTAL	686.7	1,177.8	1,304.8	1,911.5	2,830.8	3,279.5	1,747.4	2,161.7	23.7%	17.8%

Source: Natural Resources Canada, 2010.

a. Preliminary estimates at February, 2010.

b. Spending intentions at February, 2010.

Globalization and International Investment

For the majority of the past three decades, Canada has been the number-one destination for mineral exploration investment. Although overtaken by Australia from 1992 to 2003, Canada has retained the top position since 2004.¹¹ As illustrated in Figure 3, approximately 16 per cent of total global exploration expenditure in 2009 was spent within Canada (US\$1.2 billion of total worldwide expenditures of US\$7.3 billion).¹² Additionally, Canadian mining companies account for about 40 per cent of global exploration spending, the largest share of any nation.¹³ A large portion of spending in the Canadian exploration sector is on professional and managerial services for international projects.¹⁴

11 The Mining Association of Canada, "A Report on the State of the Canadian Mining Industry", 2009.

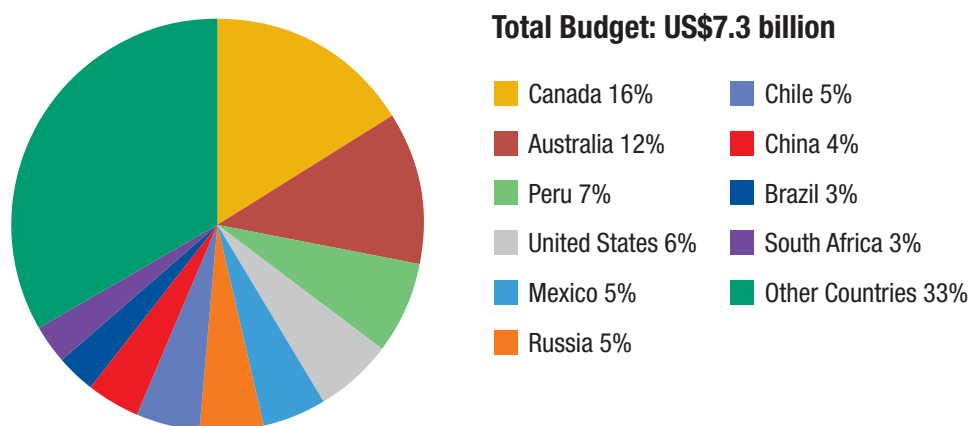
12 Metals Economics Group, "World Exploration Trends, A Special Report for the PDAC International Convention", 2009.

13 *Ibid.*

14 It is worth noting here that the HR challenges facing the exploration sector are global in nature. While emphasis is placed in this report on the challenges and opportunities facing exploration in Canada, it is important that particular talent groups are considered in the global context (e.g., geoscientists). The sector must address issues related to international mobility of highly skilled, professional talent, multi-lingual and multi-cultural contexts, and ensure that the correct supports and services are in place in Canada to support Canada's worldwide exploration talent. More information on these issues in a broader context can also be found in MIHR's *Making the Grade: Human Resources Challenges and Opportunities for Knowledge Workers in Canadian Mineral Exploration and Mining* (www.mihrc.ca).

Figure 3

Regional Distribution of Global Exploration Budget in 2009



Source: Natural Resources Canada, 2010.

Canada is well known for its investor-friendly and relatively risk-free environment for exploration investments. Following the trend of economic globalization, the Canadian mining and exploration industry has gradually developed a strong international focus. Federal and provincial governments are dedicated to promoting the exploration business, both domestically and internationally.

The federal government has developed a “Flow-Through Shares” (FTS) program aimed at attracting more foreign investment by providing tax incentives to exploration corporations. Under this program, the federal and provincial credit for an individual investor could reduce the cost of a \$1,000 investment to about \$383.¹⁵ This tax-incentive program benefits the development of exploration companies, especially juniors.

As a result, a large number of foreign exploration companies have entered the Canadian market, which brought in international investment and further stimulated international trade. One indication of this is the total stock of direct foreign investment in Canada, in terms of metallic minerals and metal products. This foreign investment grew significantly from \$17 billion in 2000 to nearly \$60 billion at the end of 2008, as a result of foreign acquisitions that occurred in Canada’s minerals and metals sector in recent years. Meanwhile, Canadian mining companies have also expanded their business overseas, primarily in the U.S. and Latin America. Canadian direct investment abroad (CDIA) increased from \$42.4 billion to \$57 billion from 2000 to 2008, as shown in Figure 4.

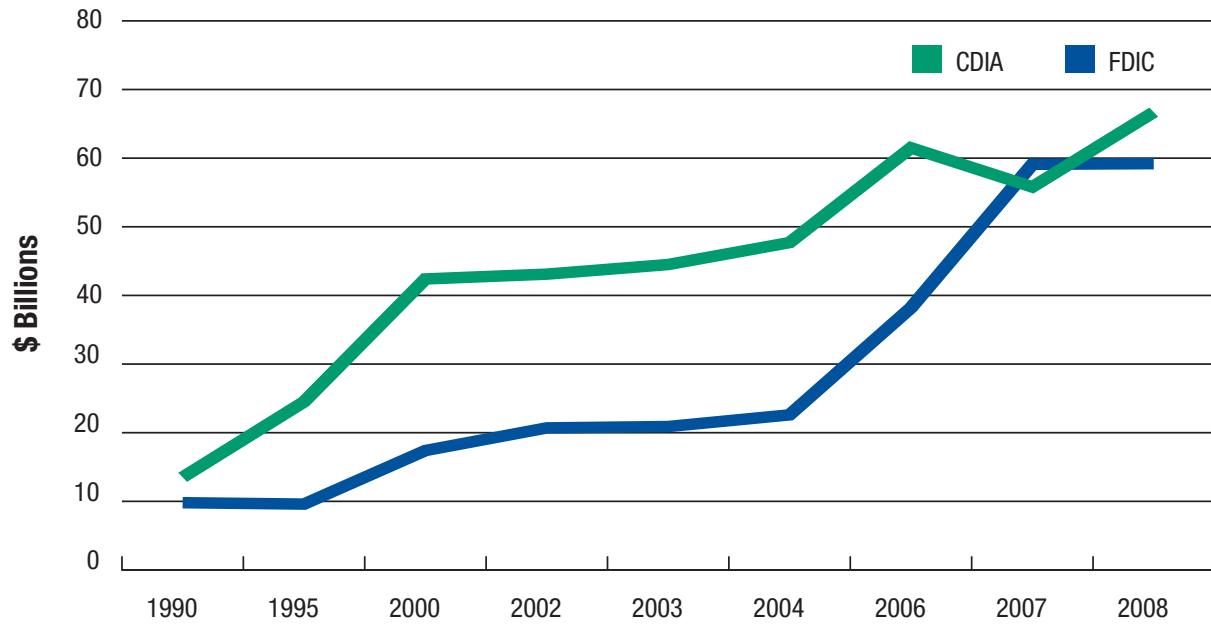
According to a 2009 Natural Resources Canada report, 29 larger foreign-based exploration companies (companies planning to spend more than US\$3 million) were expected to spend a total of US\$295 million in Canada in 2010—compared to US\$411 million in 2008. Foreign-based companies intended to undertake over 34 per cent of all larger-company exploration programs planned in Canada in 2010.¹⁶ Meanwhile, 165 larger Canadian-based companies allocated 65 per cent of their exploration budgets to programs outside Canada (almost US\$1.3 billion), including approximately 12 per cent in the United States and nine per cent in Mexico.

¹⁵ B.C. Ministry of Mines, “Energy and Petroleum Resources”, December 5, 2008.

¹⁶ Natural Resources Canada, “Overview of Trends of Canadian Mineral Exploration”, 2009.

Figure 4

Metallic Minerals and Metal Products — Direct Investment Stocks, 1990–2008

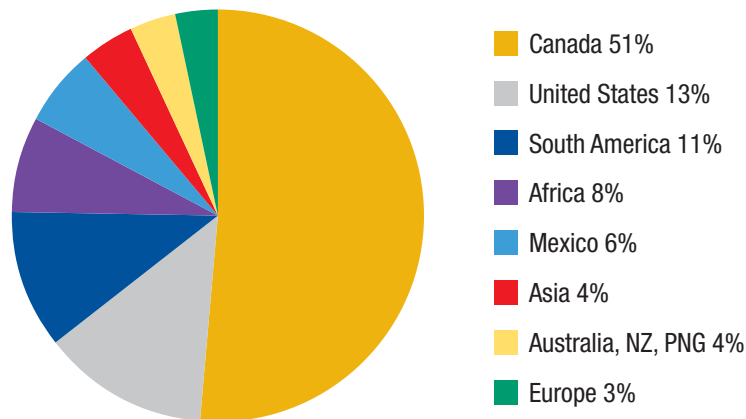


Source: Statistics Canada, MiHR, Summer, 2011.

At the end of June 2009, 57 per cent of the world’s public mining companies were listed on the TSX (Toronto Stock Exchange) and TSX-V (TSX-Venture Exchange).¹⁷ These companies carried out 9,319 mining and exploration projects worldwide, 49 per cent of which were located outside Canada—as shown in Figure 5.

Figure 5

Geographic Reach of TSX-listed Companies, June 2009



Source: The Mining Association of Canada, 2009.

¹⁷ See TMX Group’s Mining Sector Profile at www.tmx.com/en/pdf/Mining_Sector_Sheet.pdf.



Canada's Mineral Exploration Workforce: Estimates and Analysis

To the best of MiHR's knowledge, current labour market information (LMI) sources in Canada have not addressed the mineral exploration industry specifically. Certain publicly available LMI sources capture aspects of the mineral exploration sector but, for the most part, this data is combined with other sectors (e.g., with mineral extraction and/or oil and gas). To address this gap, MiHR's research work began with a major customized LMI initiative to provide an estimate of labour force trends and profiles in the Canadian exploration sector under certain assumptions.

This section will first describe the approach taken to estimate employment for the exploration sector, including sources and limitations. This is followed by an estimation of the demographic profile of the mineral exploration workforce. The section ends with a summary of labour force trends and major influences on the labour market.

The primary reason why it is necessary to estimate employment in the exploration sector is because there is no defined North American Industrial Classification System (NAICS) code for the mineral exploration sector and few, if any, public LMI sources that report on the sector in isolation. Two methodologies are used here to estimate mineral exploration employment in Canada from traditional Statistics Canada data sources. The methodologies are based on previous work that MiHR has undertaken and new work commissioned to The Conference Board of Canada (CBoC). A description of the methodologies used to create the estimates is contained in Appendix B.

Overview of Exploration Employment

Over the past three decades the mineral exploration industry in Canada has grown significantly. This growth was largely determined by the level and growth of commodity prices. Changes in employment are strongly correlated with economic growth in the sector. As with commodity prices, the employment levels in the industry are characterized by longer-term growth, interspersed with boom and bust cycles.

Geologists, geochemists, and geophysicists; geological and mineral technologists and technicians; drafting technologists and technicians; mapping technologists and technicians; and geological engineers account for more than three-quarters of mineral exploration employment in Canada. In addition, the importance of many of these occupations is growing. The share of sector employment for some of these occupations has grown substantially over the past couple of decades and is expected to continue to rise. Furthermore, labour shortages are expected for geoscientists, and technologists and technicians over the next 10 years, so talent with the necessary skills to occupy these roles may be scarce.

The exploration sector's workforce can be characterized as having high and rising educational requirements. Given the sector's high skill requirements, demand for new workers generally needs to be met by either attracting more immigrants with the necessary skills or training new entrants through the post-secondary education system.

The sector's workforce also has an above-average proportion of younger workers, at 38 per cent, and an above-average share of immigrant workers, at 24 per cent. However, other employment equity groups are generally under-represented in the sector's workforce. For example, women account for only 20 per cent of the workforce, which is slightly more than the mining sector (13 per cent) but which falls well shy of the national average for all sectors (47 per cent).

Aboriginal groups account for a below-average share of the sector's workforce, at 2.6 per cent, compared to the rest of the labour force (3.1 per cent) and mining (6.8 per cent). The share of Aboriginal workers has been rising with time and the gap is small compared to the national average for all sectors; however, it is well below the average employment of Aboriginal peoples in mining.

Characteristics of the Mineral Exploration Workforce

In the process of estimating employment for the mineral exploration sector, a variety of interesting employment trends emerged. For example, employment in the industry rose substantively over the past decade, driven by higher commodity prices and increased exploration budgets. As well, it appears that many occupations in the sector that are of specific interest to exploration, such as geologists, are accounting for a rising share of the sector's employment.

Total Estimated Employment

The number of people employed by the exploration sector has more than doubled over the past decade, as shown in Table 2.¹⁸ This pattern appears to be closely related to rising commodity prices. The integration of major developing economies into the global economy led to surging demand for raw materials, which in turn triggered higher prices, greater interest in finding new mineral reserves and increased employment.

¹⁸ It is unknown how much of this employment growth is due to more exploration activity being conducted in Canada and how much is due to a growth in the Canadian workforce engaged in activities to manage exploration projects outside of Canada. Anecdotal evidence about the number of geoscientists working in Canada on international projects suggests a strong influence of the latter scenario.

Table 2**Total Mineral Exploration Employment¹⁹**

	2001	2002	2003	2004	2005	2006	2007	2008	2009
TOTAL	9,451	10,750	12,806	15,785	18,224	21,166	24,159	25,871	25,109

Source: The Conference Board of Canada, MiHR, Summer 2011.

Sector employment fell in 2009—likely because the prices of many industrial metals fell during the global financial crisis. However, some metal prices, such as gold, have remained high through the recession, while others, such as copper and nickel, have experienced significant recoveries. The result is that as 2009 drew to a close, companies were again ramping up their exploration budgets and employment began to recover relatively quickly.

Organization Size

Statistics Canada's Canadian Business Patterns Database (CBP) provides the number of establishments in an industry, with a breakdown by size of the organization (head count number of employees). Using the industry classification codes to define mineral exploration (as discussed in Chapter 1), the CBP shows 3,589 establishments registered to the sector, as of December 2009. As shown in Table 3, over 60 per cent of the exploration sector is made up of micro-sized organizations (fewer than five employees). In fact, 95 per cent of the sector is made up of micro-, small- and medium-sized enterprises (SMEs have 50 or fewer employees).

Table 3**Canadian Business Patterns Data on Size of Mineral Exploration Organizations**

NUMBER OF EMPLOYEES	NUMBER OF ESTABLISHMENTS	SHARE OF TOTAL (%)
1–4	2,171	61
5–9	550	15
10–19	381	11
20–49	277	8
50–99	115	3
100–199	52	1
200–499	25	1
500+	18	1
TOTAL	3,589	100

Source: Statistics Canada, The Conference Board of Canada, MiHR, Summer 2011.

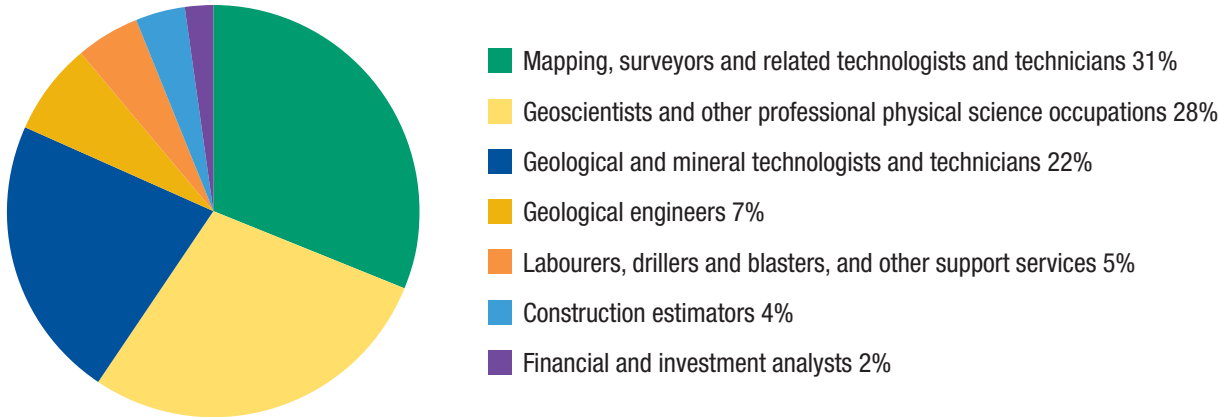
19 Data from 2001 and 2006 are actual figures taken from the Census. Data for each intervening year are estimates based on extensive labour market modelling conducted by The Conference Board of Canada.

This high proportion of SMEs in the sector presents unique HR challenges. Most SMEs do not have formal HR functions, nor do they have HR specialists on staff with the resources to build in-house capacity for HR management. Indeed, HR activities in SMEs are largely focused on staffing and payroll, with very little workforce planning or strategic HR management. Many SMEs devote a significant portion of their budget to outsourcing staffing and payroll. Managers and owners of SMEs have little time or resources to devote to important employee-engagement and workforce-management initiatives such as formal training and development programs; performance management; flexible benefits and work arrangements; strategic workforce planning; succession planning; and workplace diversity and inclusion.

Occupational Mix

As the number of employees has risen over much of the past 10 years, the occupational mix of the exploration sector has also evolved. For example, geologists and geological technicians have been increasing in importance, and now account for 27.1 per cent and 22.5 per cent of total sector employment, as shown in Figure 6. Broad categories illustrated in Figure 6 contain a number of specific occupations. In particular, it should be noted that occupations associated with sample preparation, assay analysis and other laboratory work are included under the heading “Geological and Mineral Technologists and Technicians”.

Figure 6
Occupational Mix in Mineral Exploration in Canada



Source: The Conference Board of Canada, MiHR, Summer 2011.

When the occupational mix from the employment estimates was presented to experts during industry consultations, stakeholders were surprised by the results for three occupational categories—mapping and surveyors; labourers, drillers and blasters and support services; and financial and investment analysts. Experts initially felt that the representation of mapping and surveyors was larger than anticipated. Further investigations revealed that this was due to the inclusion of government geological surveys in the sector definition and scoping.

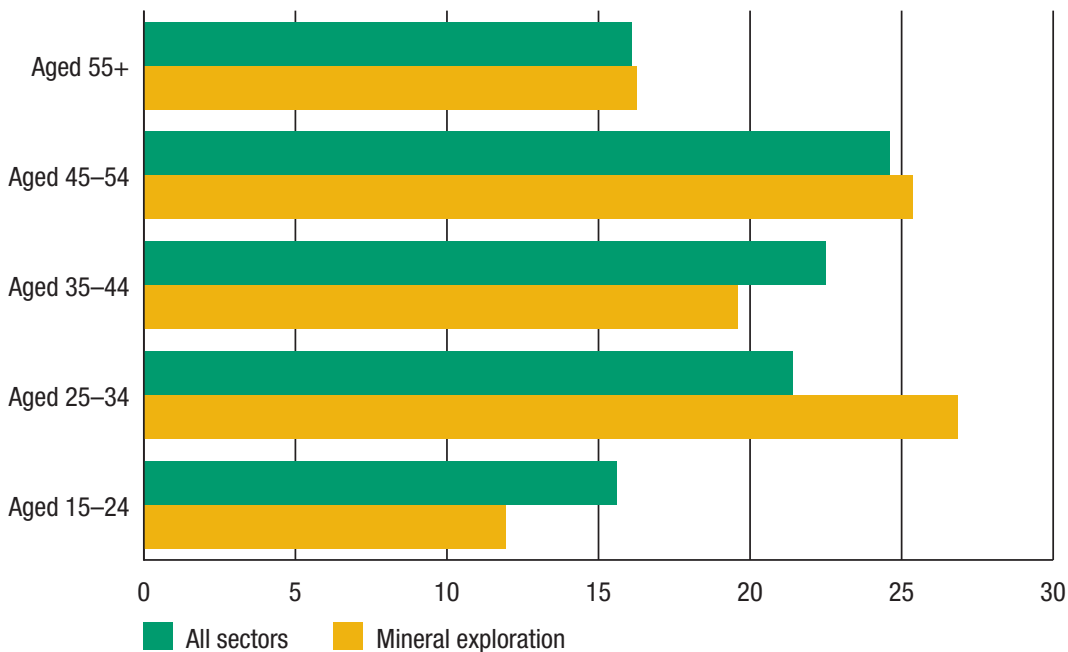
In contrast, experts felt that the representations of both the labourer and financial groups were smaller than anticipated. These results reflect the cross-sectoral nature of employment for these occupations (i.e., these employees do not usually work exclusively in one sector but are employed in multiple sectors). Estimates here include workers that spend the majority of their time employed in the mineral exploration sector, as self-identified in the 2006 Census.

Age

A large and growing population of younger workers—under age 35—is employed in the exploration sector, as shown in Figure 7. However, the sector is not immune to the broad trend affecting nearly all industries in Canada—that of an aging workforce. Between 2001 and 2009, the share of the sector’s workforce over age 55 increased from 9.3 per cent to 16.3 per cent. This is slightly above the average for the entire Canadian workforce, where 16.1 per cent was over age 55 in 2009. Furthermore—and of particular importance—the sector has a shortage of workers in the middle parts of their career (aged 35–44), suggesting challenges with mid-career attrition.

Figure 7

Age Profile of Exploration Workforce (share of labour force, per cent)



Source: The Conference Board of Canada, MiHR, Summer 2011.

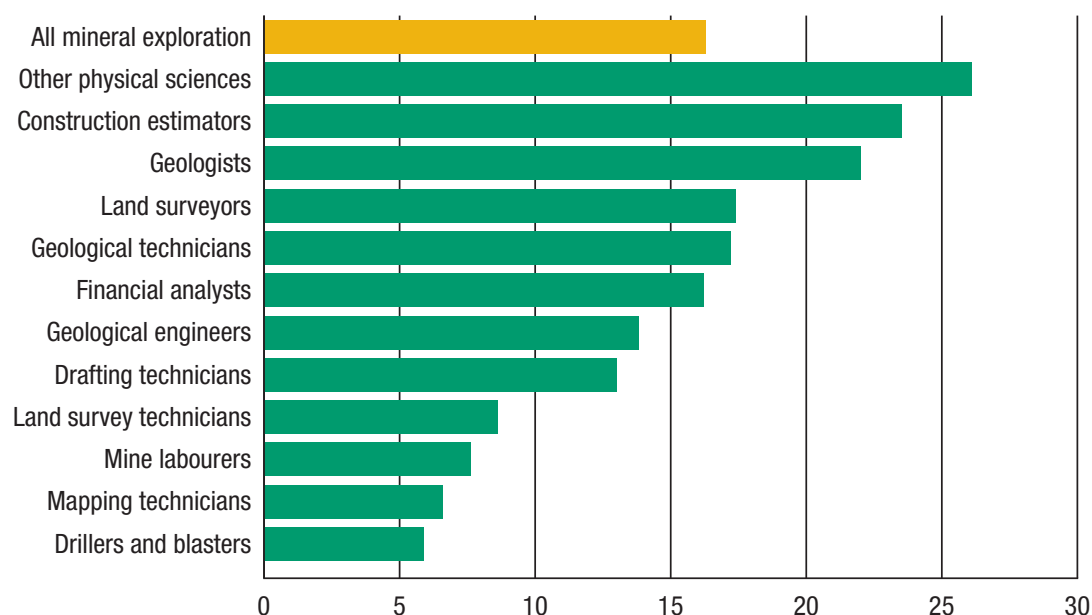
Trends in the age profile of the sector vary by occupation. (See Figure 8.) The age profile of workers is much older than average for certain mineral exploration occupations, particularly professional science occupations. Among geologists, for example, the share of the mineral exploration workforce over age 55 is very high, at 22 per cent.

The combination of labour shortages, an aging workforce in the professional sciences occupations, and a trend of mid-career attrition could translate into a crisis for certain talent groups, particularly management and senior-level positions.

One factor that may alleviate the effects of the aging workforce is the average retirement age for these workers. Exploration workers tend to retire slightly later than those in the rest of the mining sector. If workers are encouraged to remain in the workforce after reaching retirement age, the effects of the aging workforce could be considerably delayed.

Figure 8

Age Profile in Selected Occupations (share of labour force over age 55, per cent)



Source: The Conference Board of Canada, MiHR, Summer 2011.

Diversity

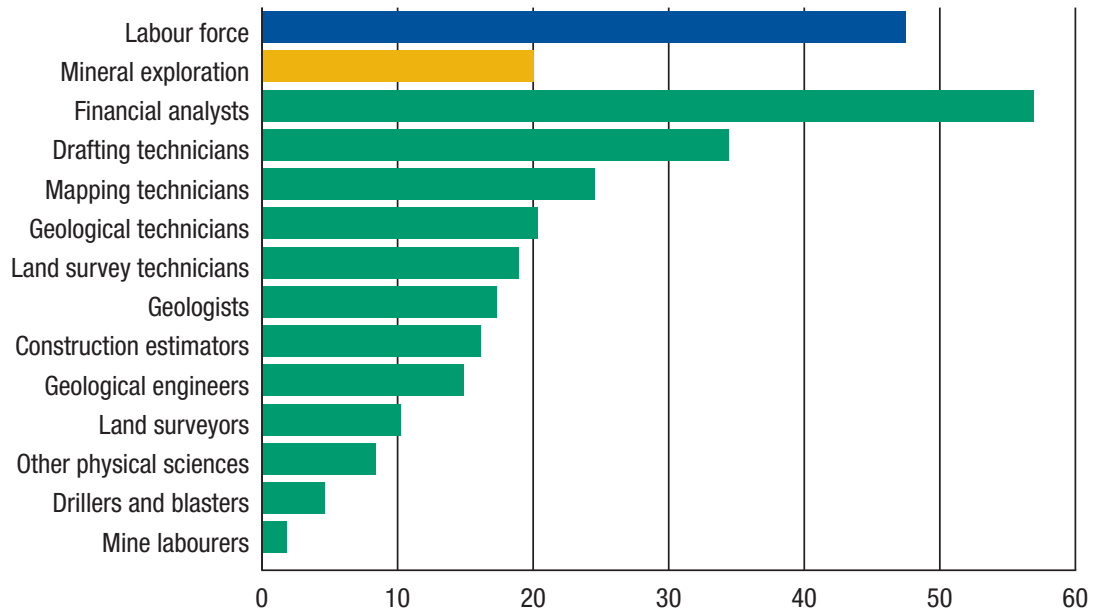
Attracting more women to the sector would also alleviate the effects of the aging workforce. At present, women account for only 20 per cent of the mineral exploration workforce, as shown in Figure 9. This marks an increase from 18 per cent in 2001, but is still well below the average for the entire labour force (47 per cent). Women are an important labour source that is being underutilized by the industry.

The relatively low proportion of women is more a reflection of the occupations in question than mineral exploration as a sector. Regardless of which industry they work in, men make up a dominant share of the workers in most of the occupations identified as part of the mineral exploration sector. Therefore, the shortage of female workers may best be addressed by attracting more women to certain occupations, and then—once they have entered those occupations—attracting them to the mineral exploration sector specifically.

Canada's position as a global centre for mineral exploration fund raising, as well as the largest recipient of mineral exploration dollars are likely contributing factors to the international flavour of the sector's labour force. In terms of workforce representation of other minority groups, the mineral exploration sector is similar to the average for all industries. (See Figure 10.) For example, visible minorities account for 13 per cent of the sector's workforce compared to 15 per cent for the entire workforce. Aboriginal groups account for a slightly below-average share of the sector's workforce—2.7 per cent compared to 2.9 per cent across all industries. However, the industry has a greater than average share of immigrants in its workforce—23 per cent compared to 21 per cent for the Canadian workforce as a whole.

Figure 9

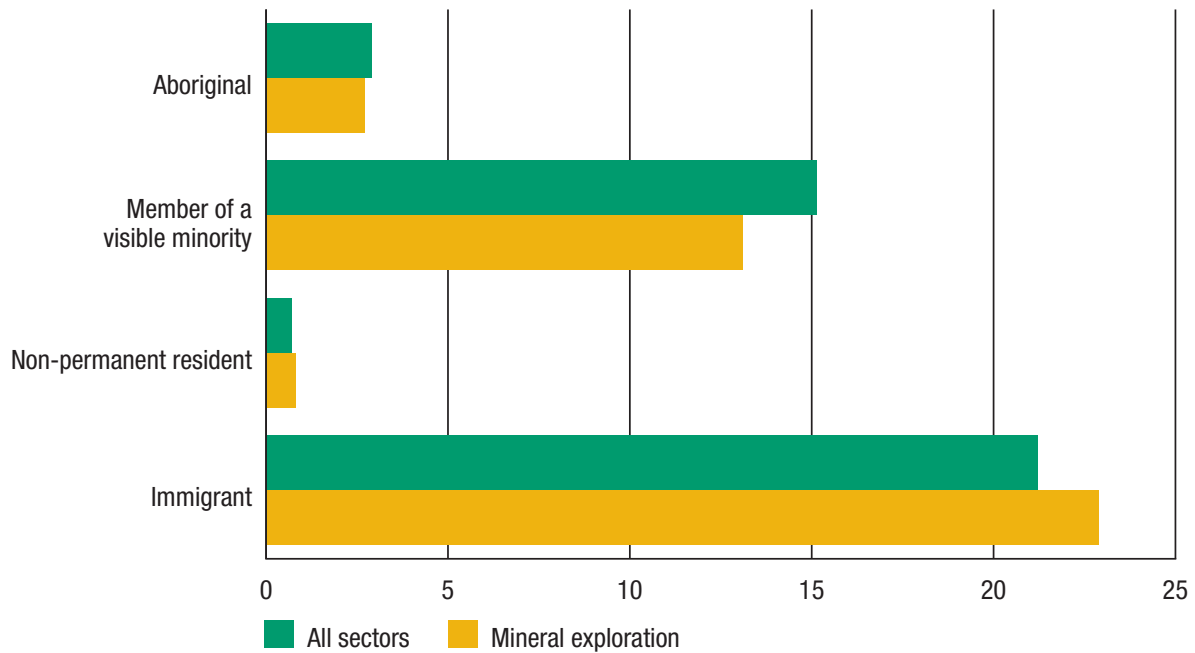
Proportion of Women in Exploration and Selected Occupations (share of employment, per cent)



Source: The Conference Board of Canada, MiHR, Summer 2011.

Figure 10

Minority Groups in Exploration (share of labour force, per cent)



Source: The Conference Board of Canada, MiHR, Summer 2011.

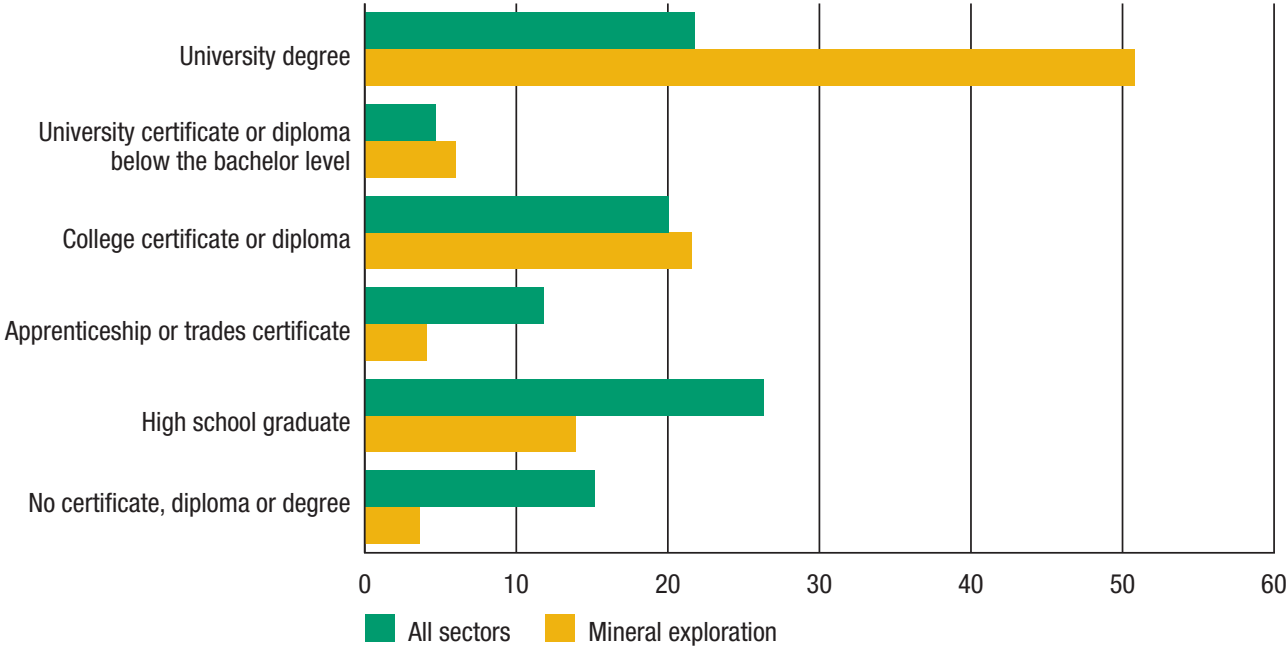
Minority-group representation varies widely across the sector’s occupational groups. For example, the share of exploration-sector geologists that are immigrants is well above the sector’s overall average at 27 per cent, but the share of visible minorities in this occupation is well below average, at 11 per cent. Aboriginal groups are well represented in specific occupations, including: labourers (22 per cent representation), drilling and blasting (5.5 per cent) and geological technicians (4.4 per cent).

Education

The proportion of the sector’s workforce with a college or university education (Figure 11) has always been above average and continues to increase. For example, between 2001 and 2009, the share of workers with a college or university education rose from 70 per cent to 78 per cent. At the same time, the proportion of the exploration workforce with no formal education or with apprenticeship training has fallen.

The shift in educational needs has occurred in all exploration-sector occupations to a certain degree, but some groups are experiencing particularly significant changes. One example is the drafting technician occupational group. In this group, the share of the workforce with apprenticeship training has fallen from 17 per cent to 11 per cent over the past nine years — a major factor in the declining role of apprenticeship training across the exploration sector. Much of the decline in the workforce with no formal training can be tied to the geological technician group — where the proportion of workers without a diploma, degree or certificate fell from 14 per cent to 6 per cent between 2001 and 2009.

Figure 11
Educational Profile of Exploration Workforce (share of labour force, per cent)



Source: The Conference Board of Canada, MiHR, Summer 2011.

A Comparison of Workforces: Exploration vs. Mining

The mineral exploration sector workforce has similarities with the rest of the mining sector but also key differences. For example, women are under-represented in the workforce of both segments, but the age profile of the mineral exploration sector is significantly younger. This appears to be due to an influx of younger workers in recent years.

Another key difference is the size of the organizations in the two sectors. In the mineral exploration sector, the majority of employers are micro-, small-, and medium-sized establishments; the mining sector, on the other hand, is mainly comprised of fewer large, multinational employers. Therefore, the approach to researching, identifying and providing support for HR challenges and opportunities differs between the sectors, despite several similarities.

One common challenge for the sectors is an aging workforce. Despite the younger age profile of the mineral exploration sector, some occupations will still face problems as workers age in the coming years. Some occupations in particular now have a bimodal distribution of workers — a bulge of younger workers and older workers and few in the middle. A possible explanation for this distribution is the limited expansion of the industry during the 1990s, when fewer people entered the workforce. (New entrants in the 1990s would now be mid-career.) As older workers retire in the affected occupations, finding qualified people for senior-level positions will become increasingly difficult.

Many diversity issues are common to both the exploration and mining sectors. Women, for example, are under-represented in both, albeit to a lesser degree in exploration. Additionally, the exploration sector makes more effective use of immigrant labour, both temporary and permanent. Canada's position as a global centre for mineral exploration fundraising and as the largest recipient of mineral exploration dollars likely contributes to the international flavour of the sector's labour force.

The exploration sector underperforms both the mining sector and the rest of the labour market in employment of Aboriginal peoples. The broader mining sector is the number-one employer of Aboriginal peoples in Canada (with 6.8 per cent Aboriginal representation, compared to 3.2 per cent in the labour force). However only 2.1 per cent of the exploration workforce is of Aboriginal descent. To a degree, this relates to the educational profile of the sector — but not entirely. Given the close proximity of Aboriginal communities to exploration activities, the sector has an opportunity to grow a local labour force by tapping the Aboriginal labour pool, which also holds true across the broader mining sector.

One final characteristic stands out in the exploration sector's demographic profile: the educational requirements of the industry are very high and increasing. These requirements reduce the mobility of workers into exploration from other occupations and industries, as the skills required to work effectively in exploration require a high degree of sector-specific training. Therefore, any future labour shortages will most likely need to be alleviated by a combination of attracting more immigrants with the necessary skills, and increasing enrolment in post-secondary programs geared towards the industry's needs.

The ever-increasing education requirements mean that a large portion of the exploration workforce is knowledge workers, a trend that is expected to accelerate in the years ahead. This will impact development of technology and innovation in the sector, which in turn will raise educational requirements and attract more knowledge workers to the sector. Since the 1990s, Canadian exploration companies have implemented a number of technological innovations. For example, the rapid development of technology and use of the Internet have helped exploration companies to locate large, high-grade deposits at lower cost, making investments in technology innovations an attractive option in the sector. For more information on knowledge workers and their impacts on a sector, please refer to *Making the Grade: Human Resources Challenges and Opportunities for Knowledge Workers in Canadian Mining*.²⁰

These results represent an initial estimate of mineral exploration employment that incorporates a variety of assumptions regarding the makeup of the sector. Primary research with industry stakeholders, conducted as part of this study, was used to corroborate and validate the assumed impacts of the demographic trends noted in the labour market analysis.

²⁰ See www.mhr.ca for a copy of this report.



SECTION TWO

HR Challenges and Opportunities



Industry Consultation Approach and Methodology

Primary research involved a series of focus groups, interviews and questionnaires, as well as both formal and informal roundtables and discussions. Focus groups were held in three major centres across Canada (Vancouver, Sudbury, and Toronto), in association with industry events. Interviews were conducted with stakeholders across the country. Research participants included students, workers, employers, educators, government representatives and industry associations. Over 300 individuals participated in the various research activities supporting project findings. A project steering committee comprised of representatives from education, employers, government and industry associations met regularly throughout the research process to offer insight, guidance and expertise.

Focus Groups

Six focus group sessions were held in three major cities over the course of the primary research phase. Focus group participants discussed a series of issues guided by the background research and situational analysis phases of the research. Focus groups ranged in size from three to 12 participants, with an average size of 10.

Questionnaires

Using information collected in the qualitative and background research, a 79-question employer questionnaire and a 41-question student questionnaire were developed. Questionnaires were deployed in an online format. Invitations were distributed to potential participants in mineral exploration and exploration-related programs of study, through the project steering committee and project partners. In addition to the online format and email invitations to participate, PDAC Convention 2011 attendees had the opportunity to complete the questionnaires on an iPad while attending the convention. An incentive strategy was employed to increase response rates. The online questionnaires remained active from March 4 until April 11, 2011. See Appendix C for a profile of questionnaire respondents.

Interviews

Key informant interviews were conducted with 15 industry stakeholders. Key informants included stakeholders representing: industry, professional and industry associations, government, educational institutions and students. Interview content was tailored to suit the expertise of each informant. Each interview was between 60 and 90 minutes in length, and in some cases, follow-up interviews were conducted to clarify or delve deeper into key issues. Key informant interviews were conducted throughout the primary research phase, ending in March 2011.

Validation interviews were conducted with 21 industry stakeholders. The purpose of these interviews was to verify findings from primary research; the content of the interviews was tailored for each stakeholder perspective. The profile of validation informants mirrored that of key informants but included a different subset of individuals. Each validation interview lasted between 60 and 90 minutes. Validation interviews were conducted throughout May 2011.

Findings

The HR challenges and opportunities identified in the industry consultation and primary research activities were aggregated and organized into three main sections: career awareness and attraction; recruitment; and retention. In each section, the perspectives of the various stakeholders (students, educators, employees, employers and others) are discussed individually. This report notes patterns and themes and makes recommendations for addressing the issues raised—for each of the three broad sections.



Career Awareness and Attraction

Focus group participants (students, employees, employers, educators and other stakeholders) indicated that the general public and students are not sufficiently aware of the mineral exploration industry or its related career opportunities. General public awareness is necessary not only for industry investment, but also for raising career awareness and attracting the next generation of exploration workers. General public awareness campaigns are costly; however, more can be achieved with limited resources by focusing on schoolchildren (of all ages), classroom teachers and career education leaders. Focus group participants said that mineral exploration education is deficient through all school levels, from elementary to high school; as such, many students enter university with little or no knowledge of mineral exploration as a career option. Questionnaire respondents (students working in the sector, employees and employers) also indicated some barriers to awareness of and entering the sector.

Student Perspectives

Students perceived mineral explorers as passionate about their work, and willing to put in extra time and effort because they find the work fascinating and fun. They felt that mineral explorers are “outdoorsy”, adventurous types who are willing to work when and where needed. The idea of working in camps with other like-minded people who share their passion for geology was extremely appealing to students. They were attracted to the variety (e.g., being outdoors at different sites working with rocks, as opposed to “monotonous” desk work) and travel opportunities that mineral exploration offers. Students saw mineral explorers as detectives at heart. For some, the relatively high pay and possibility of fame (becoming a well-known scientist for making a big find) were additional attractions of a career in mineral exploration.

For focus group students, an interest in and fascination with geology developed early in life, either through personal experience or through an introduction to geology in high school. For many, however, post-secondary education in mineral exploration was not a first choice, often because of lack of awareness of geology as an option. These students knew of biology, chemistry and physics, but were not introduced to geology until university; some switched from one program (often one of the physical sciences or engineering) into geology after taking an introductory course as an elective. At the high-school level, focus group students stated that teachers and guidance counsellors—who characterized any aspect of mining as cyclical, unstable work in unpleasant environments—directed them away from mining and mineral exploration as career choices. Students in the focus groups did not indicate that they were aware of outreach to high school students by universities and the industry in the last few years.

Debunk Myths and Promote Career Options with Targeted Outreach

Students saw a need for greater industry outreach to secondary-school students to increase awareness of mineral exploration and geology as a career option. One student believed high school students see geologists as stereotypical prospectors with big beards who pan for gold; increased communication between industry and secondary schools could go a long way to update this antiquated image. In students' opinions, teens that are aware of geology have a limited view of what geology entails and what geologists do on a day-to-day basis. Students advocated for greater exposure through actual mine visits, while others said that industry representatives should visit schools.

Students believed outreach should be extended to mature students. The positive aspects of mineral exploration, such as earning potential and travel, should be highlighted. Increasing public awareness and improving the public image of mining and mineral exploration was another need identified by students. The negative side of mineral resources development is often shown in the news (e.g., layoffs, conflicts with Aboriginal members, environmental damage). Students felt that the mineral exploration industry is taking impressive steps to respect the environment, and that highlighting these efforts would improve its image.

Educators Perspectives

Education stakeholders discussed a three-pronged approach to early-age industry awareness. This approach includes education in earth sciences and geology throughout a child's education. Secondly, education stakeholders felt that in addition to education in earth sciences, students must also have opportunities to draw the connection between classroom learning and career choices. Finally, they felt that abstract knowledge about a career choice must be paired with opportunities for experiential learning at the grade-school, middle-school and high-school levels.

Get Their Attention Early

According to several education stakeholders, career awareness of mineral exploration is best begun with geosciences education at the middle-school level or earlier. Several indicated strong support for programs like the Mineral Resources Education Program of British Columbia, which has a developed K–12 curriculum. Middle school is a time when young people are already considering their career choices.

Participants felt that it is too late to introduce earth sciences (and the connection between earth sciences or geology and interesting career choices) at the high-school level. Moreover, by the time young adults reach high school, they have already decided if they will be working towards courses that meet the prerequisites for university. For those that select the university route, the required university-entrance courses generally include physics, chemistry and biology — not geology. In fact geology is often not offered at the secondary level at all.

Raise Public Awareness of the Sector

Participants raised another obstacle to awareness of career opportunities in exploration: a lack of awareness about mineral exploration in general, one that grows with educators' geographic distance from exploration activities. Educators in densely populated urban areas have limited ability, willingness and awareness to engage with mineral exploration or to recommend the sector as a career option. Large urban centres have the largest pools of available future workers; participants indicated that efforts in these areas might have large payoffs for attracting the future exploration workforce.

Education stakeholders also suggested that any successful curriculum development and career awareness effort must be paired with experiential learning opportunities. However, this requires participation of industry employers. One educator cited a recent example of two employers that offered career-education teachers the opportunity to visit their locations. These same employers also co-developed work-experience programs that introduce high school students to their workplaces and to the myriad of interesting occupations within their companies. These programs also provide young people with opportunities to engage in actual job duties, to meet young employees like themselves to whom they can relate, and to generally feel welcomed by employees in a potential future workplace.

Solidify Classroom Learning with Hands-on Experiences

In addition to career awareness, experiential learning opportunities will go a long way to help education providers address employer concerns about a lack of required practical skills among graduates. Typically, employers must teach new hires the hands-on aspects of the job and graduates must be willing to learn. One educational representative gets feedback from employers who suggest students that receive regular (even one day per week) hands-on training that connects classroom learning with on-the-job activities are better prepared when they enter the exploration workforce. Employers saw the benefits of co-op placements or adding a practical component to the curriculum. Co-ops allow students to try out different aspects of mining (e.g., fieldwork, labs, safety awareness and drilling). Academic institutions support this approach but want employers to participate in such practical training.

Employee Perspectives

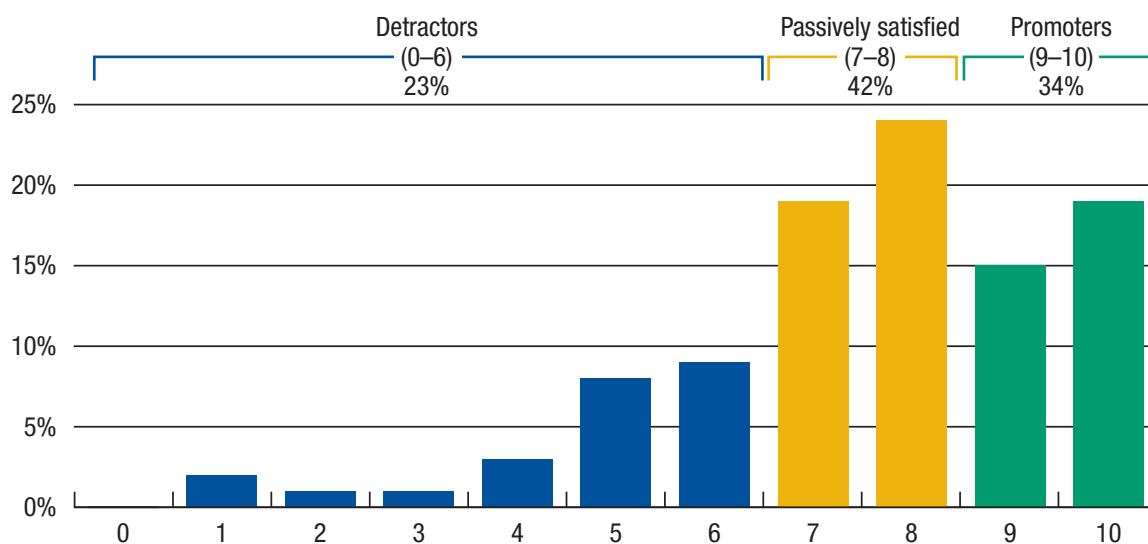
Employees indicated that they had an early interest in the sciences but most were unaware of geology when entering university. They were introduced to geology by a friend or by taking introductory geology as an elective, and found the field interesting. Employees believed that limited exposure to geology prevents many young people from recognizing mineral exploration as a potential career. The fact that many of them discovered their field at a post-secondary level signals a lack of geology awareness and education in elementary-, middle- and high-school curricula.

The Power of Recommendations from Within

One of the most powerful attractors for any industry sector trying to get the attention of the future workforce is an enthusiastic recommendation from employees already working in the sector. Mineral explorers tend to be enthusiastic about their jobs, as shown by the survey findings in Figure 12. One-third of employees surveyed (34 per cent) can be classified as “promoters” (extremely likely to recommend their occupation to others currently thinking about career choices) and a further 42 per cent are “passively satisfied” (may recommend the sector to others). Only 23 per cent of employees surveyed are “detractors” (not likely to recommend mineral exploration as a quality career choice).

Figure 12

Net Promoter Scores²¹ for Employee Survey Respondents



Note: Percentage total does not total 100% due to rounding.
Source: kisquared, MiHR, Summer 2011.

Once awareness of geology as a potential career is raised, several factors augment the appeal of mineral exploration: salary, travel opportunities, the excitement of discovery, potential for fame, and working outdoors, to name a few. That said, recent graduates' main expectation from any prospective employer is a competitive salary, according to employees. New mineral explorers do not crave the greater stability in lifestyle and income that may be preferred by some more experienced employees.

Building the company brand and enhancing its status through internal networks is one important way companies seek to attract new staff. Some junior companies strive to distinguish themselves from other juniors by developing a good reputation, based on treating communities and employees well. Some companies appeal to potential hires through their current staff and board members, which include “rock stars” (i.e., those with records of success).

²¹ A Net Promoter Score is a marketing measurement of how likely an individual would be to recommend something to others. Respondents rank statements on a 10-point scale and rankings are binned into three categories as shown in the Figure. As with all psychometric scales, the Net Promoter Score has many pros and cons, and the theoretical underpinnings are hotly debated in the academic community. Results here are meant to be interpreted with caution as indicators of behaviour.

Another strategy junior companies use to attract explorers is to offer stock options. Compared to larger companies, juniors are more reliant on financing sources; offering employees stock options is not only an employment incentive, but also provides much-needed backing for a growing company. Juniors believe offering stock options is an effective strategy to attract job seekers because the payoff potential of stock options appeals to mineral explorers' risk-seeking personalities.

Attraction and Career Awareness Recommendations

- Promoting career awareness at elementary and middle-school levels is essential; by high school, many students have already made career plans (by selecting physics, biology and chemistry as university prerequisites, for example). Research participants agreed that middle-school students are an ideal age group for exposure to mineral exploration, as they are open-minded and beginning to consider career options.
- Many research participants said that a three-pronged approach to building career awareness would be most effective, consisting of: (1) earth science/geology curriculum development and delivery; (2) career awareness; and (3) experiential learning opportunities.
- Both curriculum development and career awareness require the involvement of teachers, guidance counsellors and school boards. Once educators are aware of and willing to promote mineral exploration as a respected career choice, students will also become aware.
- Site visits may not be possible for educators in major urban centres, but engaging students in a “hands-on” way is still possible—by inviting guest speakers (e.g., geologists) who can bring mineral samples for students to handle, by taking students to visit the head offices of mining and exploration companies, and by having classes attend industry events such as the PDAC Convention and the Association for Mineral Exploration British Columbia AME BC's Mineral Exploration Roundup. One essential aspect of participation in trade shows is arranging interactive events that vividly convey the mineral exploration experience.
- Although middle-school and even elementary-school students are the ideal cohort to participate in full-scale site visits (because children at these levels attend as a class), experiential learning and awareness must also be implemented for students in high schools and universities to ensure a steady labour supply in the future.
- Integrating mineral exploration information into teachers' existing course plans must be made easy to be effective. A well-refined curriculum makes adoption more likely; such a curriculum exists in British Columbia (the B.C. Mineral Resources Education Program) and nationally (PDAC's Mining Matters). The task then becomes to familiarize educators with the available curricula and to persuade them of its merits.
- Experiential learning is best achieved with assistance from the industry. Where location permits, work-experience and co-op programs located at operating mines and exploration sites are an excellent way to make students aware of mineral exploration, and to give them first-hand engagement with potential future colleagues.
- Other types of experiential learning models for mineral exploration are already used in some parts of Canada, and could likely be used elsewhere across the country, with modification and input from employers.



Recruitment

Financing for an exploration project often happens very quickly, which means that employers frequently need to find employees with very little lead time. Many employers struggle to find workers on such short notice, particularly workers located in the community of the field site. Similarly, when a new exploration project gets the green light, it is often difficult for potential employees to know which company has available work for the exploration site. For example, a major mining company launching an exploration project may issue a sub-contract to a junior company, which in turn may enlist assistance from another junior. With so many different players involved, potential workers may not know which employer in that chain is hiring—or even be aware that subcontractors are involved in the project.

Recruitment challenges in the sector also change over time and are greatly affected by the cyclical nature of the mineral exploration economy and activities. When the season is right and the economy is expanding, labour demand is high—making recruitment more difficult for employers and jobs easier to find for job seekers. Stakeholders say recruitment becomes particularly difficult when the industry recovers rapidly, closely following an economic downturn. During economic downturns, exploration employees are the first to lose their jobs, and many will move to a different industry. When exploration picks up again, bringing people back into the industry is difficult, and employers must rely on new, inexperienced people to take on exploration jobs.

In addition, the skills profiles of candidate positions are challenging to fulfill, particularly the physical or personal traits that often aren't included in job descriptions, but that are essential on the job. Employers often need workers who are physically fit, licensed to drive, have first-aid certification, and are work-ready and prepared to travel at a moment's notice. Finding sufficient numbers of employees that meet these requirements — on short notice — is frequently difficult. Recruiters must also assess workers' physical abilities to undertake the job.

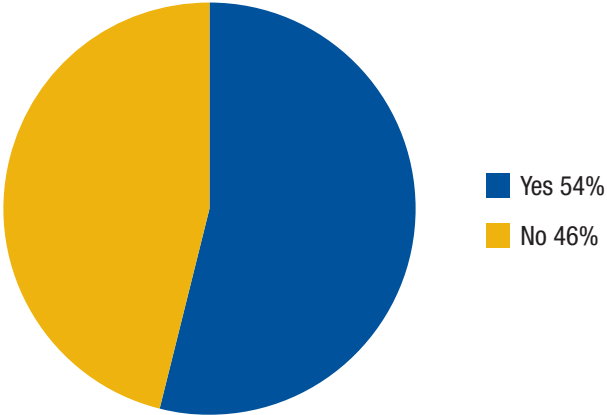
“Keep your bags packed and be ready to go.”

“Fitness is a really big deal. We can train workers to do mineral exploration but if they can't haul a bag of rocks up a steep slope, their career is over.”

HR Planning Challenges

Job seekers and employers in the exploration sector typically use an informal hiring process. Both rely on personal contacts, and employers often hire based on word-of-mouth. Mineral exploration employers are predominantly micro- and small-sized enterprises, with limited capacity for strategic HR planning to recruit and retain employees. Nearly half of employers responding to the questionnaire indicated that they do not have an HR plan to address recruitment and retention, as shown in Figure 13.

Figure 13
Employers with an HR Plan to Address Recruitment and Retention

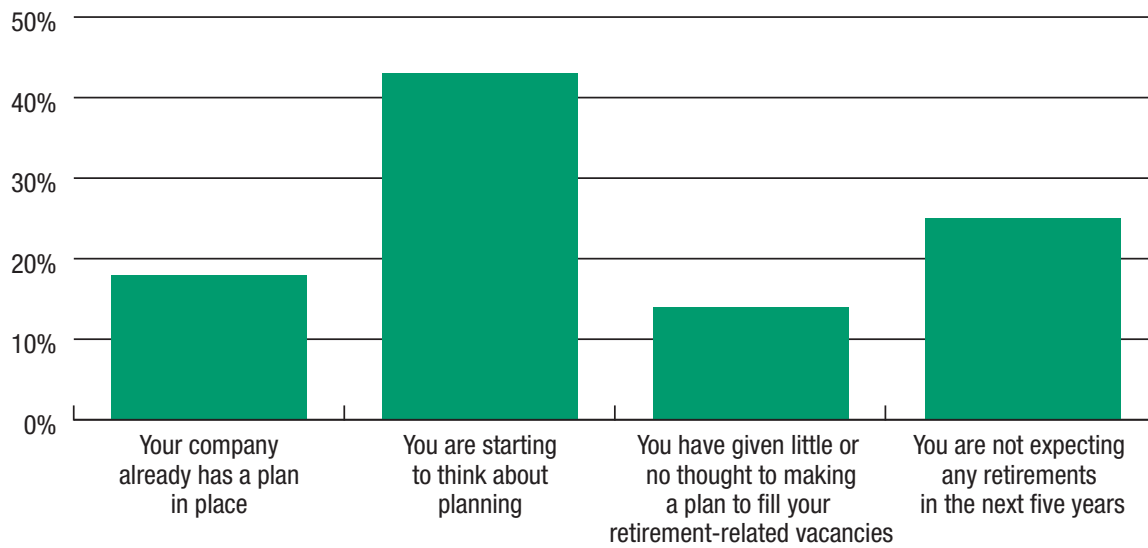


Source: kisquared, MiHR, Summer 2011.

In addition, few employers have a plan to fill positions left vacant by looming retirements but nearly half are beginning to think about this need, as shown in Figure 14.

Figure 14

Employers Prepared to Fill Retirement Vacancies

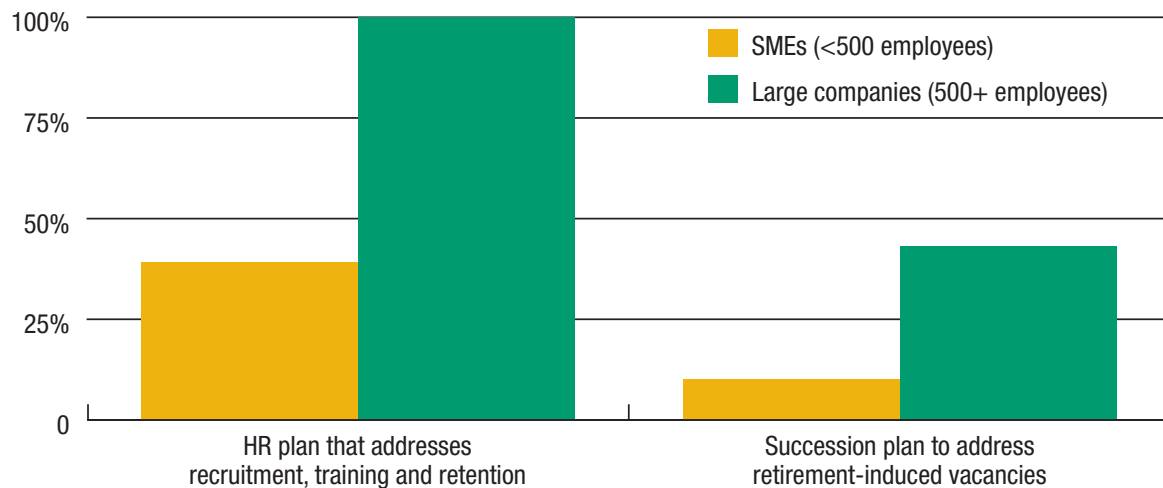


Source: kisquared, MiHR, Summer 2011.

The likelihood that an employer had an HR plan and felt prepared to fill positions left vacant by retirements depended on the size of the organization, as shown in Figure 15. Small- and medium-sized organizations were less likely to have a plan and to feel prepared than large organizations. This signals a need for a better understanding of HR management in exploration companies and for the provision of appropriate support and services to the sectors SMEs.

Figure 15

HR Planning as a Function of Organizational Size



Source: kisquared, MiHR, Summer 2011.

Student and Job Seeker Perspectives

Not all students believed university had prepared them for joining the workforce. Some students said that university teaches theory well but that much needs to be learned on the job-site. University students expressed a desire to see more education sessions offering practical experience in the mineral exploration industry (especially for first- and second-year students).

“I think 80 per cent of the skills you acquire on the job site while you have the job and 20 per cent is the stuff you work on [in school].”

Areas that students mentioned as not taught in university include: mineral economics; running a drilling program; the difference between weathered samples and fresh samples; and community-liaison skills. Some students, however, felt they gained practical knowledge in field classes but few indicated that they have actually participated in any experiential learning opportunities.

The Value of Experiential Learning

Focus group and survey employers stated that recent graduates generally lack field experience; some attempt to resolve this problem (and satisfy hiring needs) by participating in co-op work-placement programs. Through such participation, employers aim to meet immediate labour needs as well as evaluate employees' long-term potential. After graduation, many co-op students return to their co-op placement employer for permanent employment. Findings from the employer questionnaire show that work-placement programs are used more than internships; nearly half of employers surveyed (45 per cent) use co-op work-placement programs but only 16 per cent use internships as a recruiting tool.

One student described a co-op program in which the university finds students three jobs each summer: one survey job, one resource estimation job and one mapping job. Students saw this type of co-op as an excellent opportunity that gives them a taste of different types of jobs. Students prefer a co-op situation that offers assistance in finding a job, rather than leaving it up to them to find their own employment. Additionally, students said that co-op placements work well in locations surrounded by a variety of companies in close proximity, but may not work in all geographic locations.

Students saw value in an online forum that provides opportunities to discuss their experiences in the sector. For students and unemployed workers, a resource that offers job-search tips and training (e.g., résumé building and networking) would be helpful. Students were also interested in labour market data and forecasting, and would like a centralized source that provides supply and demand projections, and trends over time.

“I would like the standardization of the P.Geo and P.Eng. I did my undergrad in Nova Scotia and then we all migrate west and try to make your courses match up because the courses aren't the same. It is just complicated but I don't think it needs to be.”

For focus group students, selecting courses that can be applied towards accreditation was a mystery—even their professors are unable to help them. Students saw the need for an advocate—such as Geoscientists Canada—to move the designation towards one Canadian standard, and to provide early assistance in helping them coordinate their education experiences with the requirements for earning a professional designation. Indeed, Geoscientists Canada has been addressing this issue and working to ensure this is not the case moving forward. A key development in this initiative was the recent publication of *Geoscience Knowledge and Experience Requirements for Professional Registration in Canada*.²²

Networking is Key

Students were asked in focus groups about the role of mentorships and co-op opportunities in securing full-time employment. Generally, students felt that mentorship opportunities are valuable in teaching them what is involved in the work and the environment, and, more importantly, in making key connections with industry.

“This industry is small and the more people you know the better.”

When the time comes to find employment, students stressed the importance of networking and word-of-mouth referrals. Summer and part-time employment gives some students a chance to interact with geologists and senior management, while other students report limited exposure to upper management personnel because managers spend very little time in the field—with correspondingly few opportunities for direct contact.

Students spoke highly of conferences (e.g., PDAC Convention, AME BC’s Roundup), discussion groups, and industry-related presentations as forums for meeting potential employers, distributing résumés, collecting business cards, and ultimately finding summer jobs and full-time employment. While some students will approach companies indirectly via a website (a student who gets a job by emailing a résumé is considered lucky), many view connecting directly with industry representatives as the surest way to secure employment.

“You’ll always hear things about other networking events, not just PDAC. And if you do a good job of talking yourself up to an industry rep it’s not uncommon to get a business card and they will ask you to email your résumé. It’s really important to be able to sell yourself and making contacts is the most important way, most personal way. Everyone can go on a website and send their email.”

Job Seeker Confusion

Stakeholders cited confusion in job-posting services in the mineral exploration sector—describing a landscape where there is no centralized source for postings. Even when online job-posting sources do exist, many potential workers, particularly in some labourer occupations, are not online or may be only minimally computer-literate—making it especially difficult for this labour pool to connect to available jobs. Frequently, the company who is hiring for entry-level positions doesn’t have the time to hire through a formal process, nor is it located in a head office with access to the services of an HR department. Often, such employers are already located in the community, and have to rely on local sources and locations for hiring.

²² Please see www.ccpq.ca/pgeoreg/en/Documents/4214%20CCPG%20Requirements%20Booklet%20Web.pdf

Once an exploration project is announced at the community level, it is very difficult for a potential employee to determine who is actually doing the hiring. Exploration business practice is to subcontract to a subcontractor, who then subcontracts to someone else—making it a circuitous and time-consuming process to locate the correct company contact for conversations or to receive a résumé.

Finding a job is a challenge for exploration job seekers, even during boom times, due to the culture of the industry; employers typically evaluate “who you know” and have worked with, along with “what you know”, when evaluating potential new employees. Therefore, networking at conferences, industry events, etc., is crucial for new entrants. Those who do not recognize the importance of networking tend to experience greater problems in entering the industry. Organizations come and go rapidly in the sector, so some job seekers struggle to connect with contacts and experience many incorrect connections and dead ends.

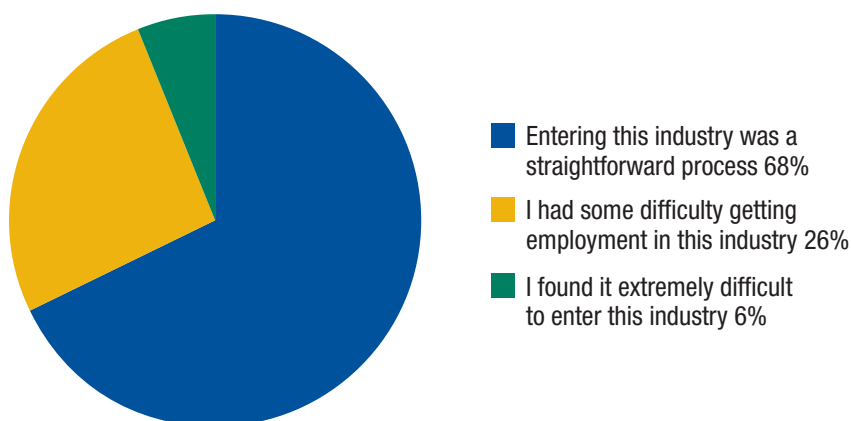
For some, efforts include literally knocking on doors to meet managers and owners. This technique, however, works best for small firms; with large firms, some job seekers find it difficult to get past HR gatekeepers. Mineral explorers that students meet while in school or during summer jobs are also seen as important contacts—people who may one day be responsible for hiring. Students find that most universities post relevant job openings, and that professors actively advise and assist students in finding employment. Some students access general employment websites such as InfoMine.

Employee Perspectives

Generally, few employees felt they faced challenges in entering the mineral exploration industry (Figure 16). During economic downturns, however, finding employment is more difficult—simply because fewer jobs are available. About one-quarter of respondents indicated that jobs were not available when they first entered the industry. (This is not alarming, given that three-quarters of respondents first entered the sector during a downturn.)

Figure 16

Employee Questionnaire Respondents' Perceptions on Difficulty Entering the Sector



Source: kisquared, MiHR, Summer 2011.

A key barrier to entering the industry is a lack of field experience. Employers, employees, students and industry stakeholders all said that graduates are typically ill-prepared to enter the industry, due to a lack of practical experience. One out of five employees surveyed cited insufficient work experience as a barrier to entering the industry, as shown in Table 4.

Table 4

Employee Questionnaire Respondents' Barriers to Obtaining Employment

BARRIERS	%
Jobs were not available	25
I had no or insufficient field experience	21
I didn't know where to look for jobs	8
Location too remote	6
Only term/seasonal positions available	6
Unattractive ratio of weeks on to weeks off	6
I was overeducated for the positions	5
The pay was too low	5
Location had poor communication technology/poor link to home	3
Jobs were too dangerous	3
I experienced none of these barriers	1
Entering this industry was a straightforward process	68

Note: Percentage total exceeds 100% because multiple responses were accepted.
Source: kisquared, MiHR, Summer 2011.

Employer Perspectives

Most employers find it more difficult to recruit for more senior and skilled positions (e.g., geologists), than for less-skilled positions (e.g., labourers). As employees age, many find fieldwork less enticing. Many experienced workers eventually choose to work for major companies that offer greater stability and less fieldwork; this makes recruiting experienced workers more problematic for junior companies.

The uncertainty of mineral prices has pushed some geologists to seek work in more stable industries. Some stakeholders blame employers' lack of foresight for the lack of experienced geologists. Some employers have been hiring new workers who can learn from their experienced colleagues, but many employers admit they have not hired enough to replace all the experienced workers now retiring. Competition from other sectors and international companies is attracting some geologists out of the Canadian labour market.

Hiring a new geologist out of school with some field experience is a more attractive choice to employers than hiring a professional geologist with no such experience. However, sending a geologist with some experience into the field can only succeed if the more junior employee is assisted by an experienced geologist or prospector. Junior companies are seriously challenged to get value from a new geologist (i.e., ensuring a return on their hiring investment) because commonly, these smaller employers cannot spare a senior geologist to mentor young geologists.

The Value of Experience and Skills

Some employers felt that recent graduates require more essential skills development in communications and decision-making. Employers also believed that post-secondary institutions don't provide adequate training in community-relations skills and cultural sensitivity. While engaging with local communities is an increasingly important job responsibility for geologists, many universities are not yet producing graduates with conflict-resolution and negotiating skills. Graduates also tend to lack familiarity with customs appropriate for working with Aboriginal communities, which often occurs in the context of land claims and land use contract agreements.

Although these skills gaps constitute hiring barriers for employers and workers alike, the biggest hurdle for both parties is recent graduates' lack of fieldwork experience. Employers, educators and employees all agree that this is new graduates' most serious deficit; it hampers their entry to employment and burdens employers—who must train new employees in the realities of their industry, and bridge the chasm between theory and practice. It is not uncommon for an employer to pair a new geologist with a prospector for the first few years of that young geologist's tenure.

Recruitment Strategies

Employers faced with a hiring need will first try to hire from within. As shown in Table 5, 64 per cent of questionnaire respondents indicated that they hire from within. Many employers recognize the advantages of internal hiring practices: First, internal recruiting is less costly than external recruiting; evaluating a current employee's suitability for a given position is typically less onerous than evaluating an unknown candidate. Second, hiring from within boosts morale and generally improves employee retention. (The prospect of career advancement is a recognized retention driver for exploration employees.) Finally, hiring from within ensures that the candidates are accustomed to the sector and the context of the work environment in the sector. Employers strongly value culture and trust and seek to find team members that understand the sector's culture.

The majority of employers rely on their professional networks to find new employees—using tactics such as attending industry conferences, or relying on employees and colleagues to recommend friends or acquaintances. Eighty-nine per cent of employers responding to the questionnaire indicated that they rely upon personal contacts and word-of-mouth recommendations in their recruiting efforts. Employers predominantly use industry events, such as regional, provincial and national conferences, to network with mineral exploration students for future professional staff requirements. Employers also work within communities—at band offices, community events, high schools and local recruiting agencies. One employer highlighted the importance of networking (combined with the industry's relatively small size), by noting that mineral explorers who “burn their bridges” will not last long in the industry.

Employers receive unsolicited résumés from applicants and keep those handy for future hiring needs. Seventy-one per cent of employers responding to the questionnaire indicated that they use résumés as a recruiting source. Applicants who make a good first impression (often by submitting a résumé with an in-person visit) are likely to stay top-of-mind with employers.

Table 5**Employer Recruitment Strategies**

STRATEGY	% OF EMPLOYERS WHO USE THIS STRATEGY
Personal contacts/word of mouth	89
Résumé submitted to your company	71
Internal company searches/hiring from within	64
Internet job postings	57
Co-op or student work placement programs	45
Newspaper advertising	45
Industry networking events	41
On-campus recruitment such as job fairs and career symposiums	38
Professional agencies	38
Working directly with band offices	25
Internet searches	23
Drop-in visits to work locations from locals	20
Internships	16
Recruiting foreign-trained professionals	14
Recruiting temporary workers	14
Job banks	13

Note: Percentage total exceeds 100% because multiple responses were accepted.
Source: kisquared, MiHR, Summer 2011.

More than half of employer respondents, 57 per cent, use internet job postings as a recruiting source. They are less likely to use job banks, with only 13 per cent of surveyed employers recruiting from this source. Online recruitment makes sense in this industry; explorers already expect to travel for work, so place-of-residence plays a lesser role in the consideration of opportunities than it does in other industries. For example, a Saskatoon-based teacher will likely seek local employment, whereas a Saskatoon-based geologist will readily travel to northern B.C. or Ontario's Ring of Fire for an employment opportunity.

Foreign-Trained Professionals

Some employers recruit foreign-trained professionals and temporary foreign workers to fill geologist positions; however, many do not pursue this avenue because they do not feel they have the time or know-how to complete the required paperwork. Some employers felt that it is too onerous a process to be worthwhile.

Overall, foreign workers are a largely untapped source of labour for exploration companies. Only 14 per cent of employers said they recruit foreign workers. One employer noted that, since mineral explorers typically seek adventure-filled work, foreign explorers could view Canada as an exotic location. Other employers viewed foreign workers as potential labour sources to be used during times of high labour demand. Geoscientists Canada is currently involved in project work through HRSDC's Foreign Credential Recognition program aimed at facilitating Canadian professional registration of internationally-trained geoscientists.²³

23 Please see www.cccpg.ca/news/en/Documents/Geoscientists%20Canada%20%20Press%20release-%20ITG%20Project%20%2013%20April%202010_E.pdf

Recruiting in Local Aboriginal Communities

Recruiting for positions such as field assistants and driller helpers presents unique challenges to both employers and employees. In northern B.C., recruiting by collaborating with recruiting-related organizations already in place — such as band education-coordinators, employers, and natural-resource managers at the band level — is extremely successful. Employers are still challenged, however, to ensure that each of these entry-level employees already has a first-aid certificate, a valid driver's licence, no record of drug or alcohol problems, and references that demonstrate reliability and punctual work habits.

Unforeseen problems have arisen in connection with meeting Aboriginal employee hiring commitments (based on land claims and land use contract agreements/MOUs). To properly meet those requirements, an employer may have to hire unskilled individuals or employees who may not be work-ready. This can lead to situations where Aboriginal employees are not expected to undertake the same work volume or type of work, or are not held to the same attendance standards as other employees on the worksite — thus creating tension. Managing this consequence of a well-intentioned policy is a difficult HR challenge for employers and employees alike.

Meeting Needs Through Training

Employers offer in-house training to broaden their recruitment pool as a remedy for lack of key skills among recent graduates entering the workforce. Employers noted a considerable learning curve for recent graduates when it comes to fieldwork; although recent graduates understand job requirements in theory, it takes time for them to understand those requirements in practice. Some employers implement internal mentorship programs (formal and informal) to facilitate the transition from student to employee; others help educate students by partnering with post-secondary institutions to offer co-op work-placement programs. One company is hiring retired explorers to train newer geologists and engineers in missing skills areas (e.g., narrow vein, hard rock, seismicity, people management and resource modelling).

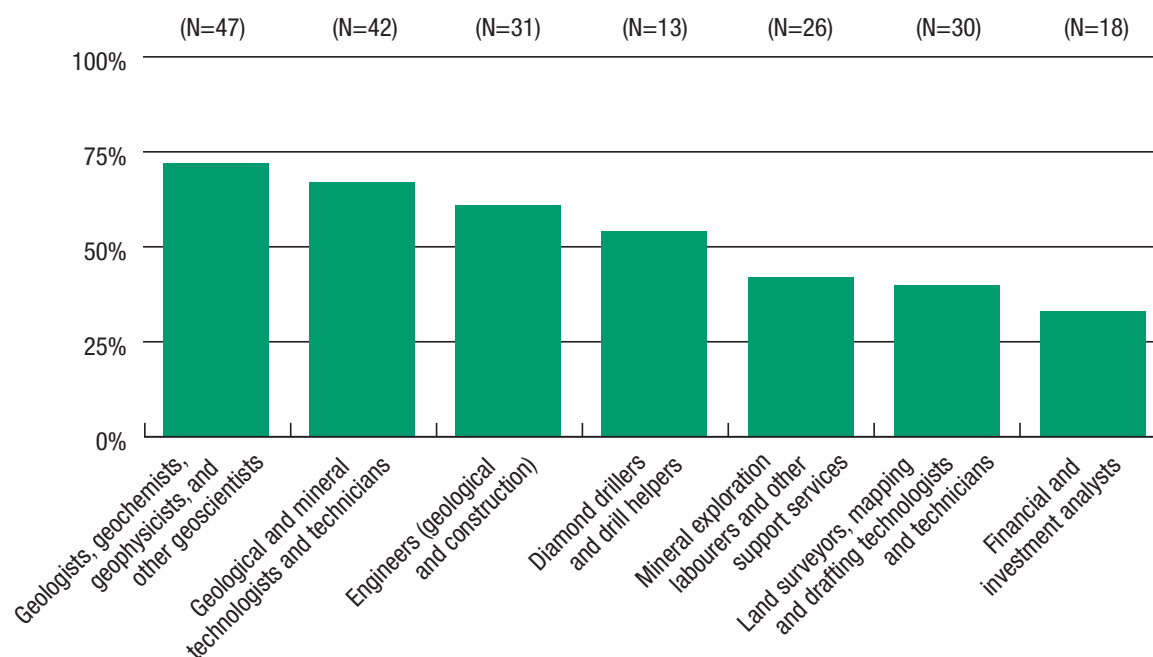
Some employers also offer cultural-sensitivity training. Fostering community relations is quickly becoming a key skill-requirement, especially for geologists, as they are typically the site team-leader and the ones most likely to interact with neighbouring communities. (These skills are not taught at post-secondary institutions.) While some employers address the need by hiring community-relations specialists, others opt to train new and existing employees.

Recruitment Challenges

Generally, entry-level positions pose different recruitment problems than do more senior positions. The requirements for entry-level positions vary greatly, even within labourer and helper positions. Although some training is preferable for field assistants and driller helpers, it is not always feasible. Often, employers have such a short lead-time to fill entry-level positions that they find it very difficult to source workers who are mobile, licensed to drive, have first-aid training, and are healthy and physically fit enough to do the job.

When hiring for a senior skilled position, most employers rely on word-of-mouth recommendations; without a single, credible, comprehensive job-matching service available, their ability to find a suitable candidate is limited. For more senior positions, employers often struggle to find workers with the right experience and skills, and who can handle the extreme conditions and seasonal work associated with mineral exploration. As shown in Figure 17, specific hard-to-fill positions include geologists, geophysicists, geochemists and engineers. Employers responding to the questionnaire also cited geosciences technologists and technicians, and diamond drillers and labourers as challenging positions to fill.

Figure 17
Recruiting Challenges by Occupation



Source: kigsawed, MiHR, Summer 2011.

For Canadian companies conducting exploration activities abroad (e.g., Central and South America), some employers face challenges finding exploration geologists who are qualified to sign-off on the *National Instrument 43-101*—a mineral-resource classification used for the public disclosure of information relating to mineral properties owned or explored by companies which report on stock exchanges within Canada. Workers with this qualification command a hefty salary, which can also make them difficult to secure.

Employers responding to the questionnaire listed the challenges they face in recruiting for key occupations, as shown in Table 6. Lack of field experience was the challenge selected most often for occupations requiring field work. Lack of available talent in local communities was the second most commonly cited challenge.

Location of work also creates a recruiting challenge for some employers. For example, some B.C. employers felt that recruiting from other provinces and countries is challenging, because potential employees perceive B.C. to have a high cost of living and high taxes. A related factor is the remoteness of exploration sites. The closer an exploration site is to a major centre, the more attractive the posting is; employers with extremely isolated sites struggle to find employees willing to work in such locations.

Table 6
Recruiting Challenges Faced by Employers

CHALLENGE	WHEN RECRUITING						
	GEOLOGISTS, GEOCHEMISTS, GEOPHYSICISTS AND GEOSCIENTISTS (N= 33)	GEOLOGICAL AND MINERAL TECHNOLOGISTS AND TECHNICIANS (N=27)	ENGINEERS (GEOLOGICAL AND CONSTRUCTION) (N=17)	LAND SURVEYORS, MAPPING AND DRAFTING TECHNOLOGISTS AND TECHNICIANS (N=11)	DIAMOND DRILLERS OR DIAMOND DRILLER HELPERS (N=27)	MINERAL EXPLORATION LABOURERS AND SUPPORT SERVICES (N=17)	FINANCIAL AND INVESTMENT ANALYSTS (N=6)
Career advancement opportunities are available in junior and mid-tier mineral exploration companies that are unavailable in ours	13	10	8	4	2	1	3
Mentoring capabilities are available in large mineral exploration companies that are unavailable in ours	3	7	2	1	1	1	2
Better salaries and benefits are offered by global mineral exploration companies that we can't compete with	13	12	5	2	3	1	1
Better salaries and benefits are offered by global mining exploration companies that we can't compete with	11	10	2	2	4	2	1
Competition from large mineral exploration companies that offer better job security	12	12	8	4	3	5	3
Competition from global mining companies that offer better job security	10	8	7	3	3	2	2
Competition from other industries	10	10	5	4	2	4	1
Difficult to locate new hires with both academic credentials and field experience	29	20	11	6	3	8	5
No available labour pool in local community	19	16	9	7	3	8	2

Note: Due to low N sizes, the above table shows number of respondents instead of percentages.
Source: kisquared, MiHR, Summer 2011.

Job-Ready Candidates in Short Supply

Employers identified job-readiness as a key problem when recruiting recent graduates. Many students believe they are ready for the field, but an eye-opening experience awaits them (and their employers) upon entering the workforce. According to employers, some universities typically produce job-ready graduates, whereas others focus more on economic or environmental geology and neglect the practical aspects of exploration and hands-on training.

As shown in Table 6, surveyed employers noted difficulty finding new hires with both academic and field experience for positions such as geologists and geoscientists, geological technologists, and technicians and engineers. Some employers find that new industry entrants lack essential skills (e.g., communication, listening and decision-making skills) and may have a sense of entitlement when it comes to work conditions and compensation; students know they are in demand, and expect to get paid “top dollar” even though they are just starting out.

Junior-exploration companies experience particular recruitment challenges. They compete with larger companies that can offer advantages most juniors cannot, such as job stability and career-advancement opportunities. Recruiting experienced older workers is often difficult for such companies as well, given these workers’ greater desire for stability and higher incomes. However, juniors tend to have more success than major companies when recruiting the archetypal “passionate adventurer” mineral explorer. Larger employers agree that juniors attract a certain type of person; some employers who have poached employees from juniors find they do not work out because they don’t fit the corporate culture. Some juniors have trouble offering competitive compensation but may offset lower salaries with generous stock options.

All stakeholders agreed that more industry integration in post-secondary curricula (e.g., co-op work placements) would help produce “work-ready” graduates. Acquiring hands-on field experience will make it easier for recent graduates to find employment. Better prepared new industry entrants will also alleviate some of the training burden facing employers; at present, substantial on-the-job training and mentorship is required to raise recently-hired graduates’ skills to acceptable levels.

Keeping up with Changing Roles

Employers noted that geologists’ roles have changed over time; the importance of community relations and health and safety is today more pronounced than ever. Not all geologists have the necessary diplomacy or negotiating skills for community-relationship building; this forces some employers to give in-house community-relations training before employees set off for camp, or to outsource a component of this to community-relations experts.

Another recent change in mineral exploration recruitment is an increased emphasis on community development and local hiring. Many companies are now focused on skills development and bringing in trainers. Cultural-sensitivity training for all workers is also becoming more important and prevalent. Some universities offer courses that address community relations, cultural sensitivity and legal issues, but without first-hand field experience, such training is often deemed relatively ineffective.

Recruitment Recommendations

- Education and industry stakeholders indicated that better communication between industry and training institutions would help ensure that candidates are ready to work. In some cases, this will involve establishing essential skills profiles and national occupational standards for key exploration occupations (in particular; geosciences technologists and technicians, field assistants, camp managers and line cutters).
- Experiential learning and education outreach programs are two effective recruitment solutions for many employers. Valuable experiential learning in exploration can be fostered by employer participation in co-op programs, work placements and mentorships; these all help to remedy one of the industry's biggest recruitment barriers — recent graduates' lack of field experience.
- Many employers also participate in education outreach programs to connect with students — attending career symposiums, guest-lecturing, and volunteering time to act as resources for student projects. A company supporting these types of programs gains a recruiting edge over other companies: these employers are engaged with students throughout their post-secondary careers and often get first pick of the top graduates.
- Community outreach is another recruiting strategy that benefits some employers, especially when recruiting for entry-level labourer positions. Some employers are partnering with community organizations (e.g., local training offices, band offices and employment centres) to bolster recruitment efforts and to make the process more efficient and less burdensome.
- Where possible, promoting staff from within not only simplifies recruiting (as internal hiring processes are usually less time-consuming and costly than external ones), but also promotes employee retention. Mineral explorers want to work for a company that supports the career growth of its employees; within the tight-knit mineral exploration community, such companies become known as employers of choice, and are more appealing to potential employees.
- Some employers (especially juniors) do not have the resources available for costly recruiting campaigns. Most juniors opt for inexpensive and time-saving recruiting solutions — contacting colleagues to try to fill a position or posting jobs online. A better understanding is needed on the unique challenges associated with HR planning in the sector's SMEs.
- Stakeholders felt that tapping the international labour pool will be necessary, and they supported the work of professional geosciences associations to better understand portability of professional credentials. In addition, many organizations offer professional (and in many cases free or cost-recovery only) services to help employers of all sizes better understand recruitment and hiring of international talent. Stakeholders using such services found them highly valuable.



Retention

Mineral explorers are highly mobile. They tend to look for new and exciting opportunities, and their adventure-seeking personalities drive them to frequently switch employers. According to one stakeholder, switching companies and/or careers is common among all young adults regardless of industry, with most having 10 changes over a lifetime. As shown in Table 7, when employees were asked where they see themselves in five years, most indicated that they would stay in the sector, but less than half indicated that they would be with the same employer.

Table 7
Exploration Employees Five-Year Plans

IN FIVE YEARS, I SEE MYSELF..	%	
Working at a higher level job within my organization	36	90% plan to remain in the industry.
Working at a higher level job within another organization	25	
Working in the same job within my organization	16	
Working in the same job within another organization	7	
Owning my own mineral exploration business	7	
Doing something else other than these options	9	
Working outside mineral exploration	1	

Note: Exclude those who expect to retire within the next five years.
Source: kisquared, MiHR, Summer 2011.

In addition, employers, particularly smaller companies, are vulnerable to losing multiple employees at once. Sometimes one employee who finds a new opportunity will take several other employees to the new company. Employers are also susceptible to losing an employee in a very specialized position; this could mean the loss of competitive edge if the employee goes to work for a competitor.

Employer Perspectives

Stakeholders emphasized that most employers struggle more with retaining staff than with recruiting new employees. Long-term retention in exploration is practically non-existent; employers do not expect to keep most workers beyond a set number of years (or even months).

“Mom and pop’ drillers know they’ll have a helper and will have him for 18 months maybe, at best. Then they’ll lose him to the next size [company]. . . . But they are staying in the industry, they’re just moving around.”

Retention Strategies

As shown in Figure 18, many employers noted that competitive salary and benefits packages are effective retention strategies. However, most employers selected opportunities to advance skills and mentorship as effective for retention. Other incentives that they believed employees appreciate include paid housing, subsidized food and use of company vehicles.

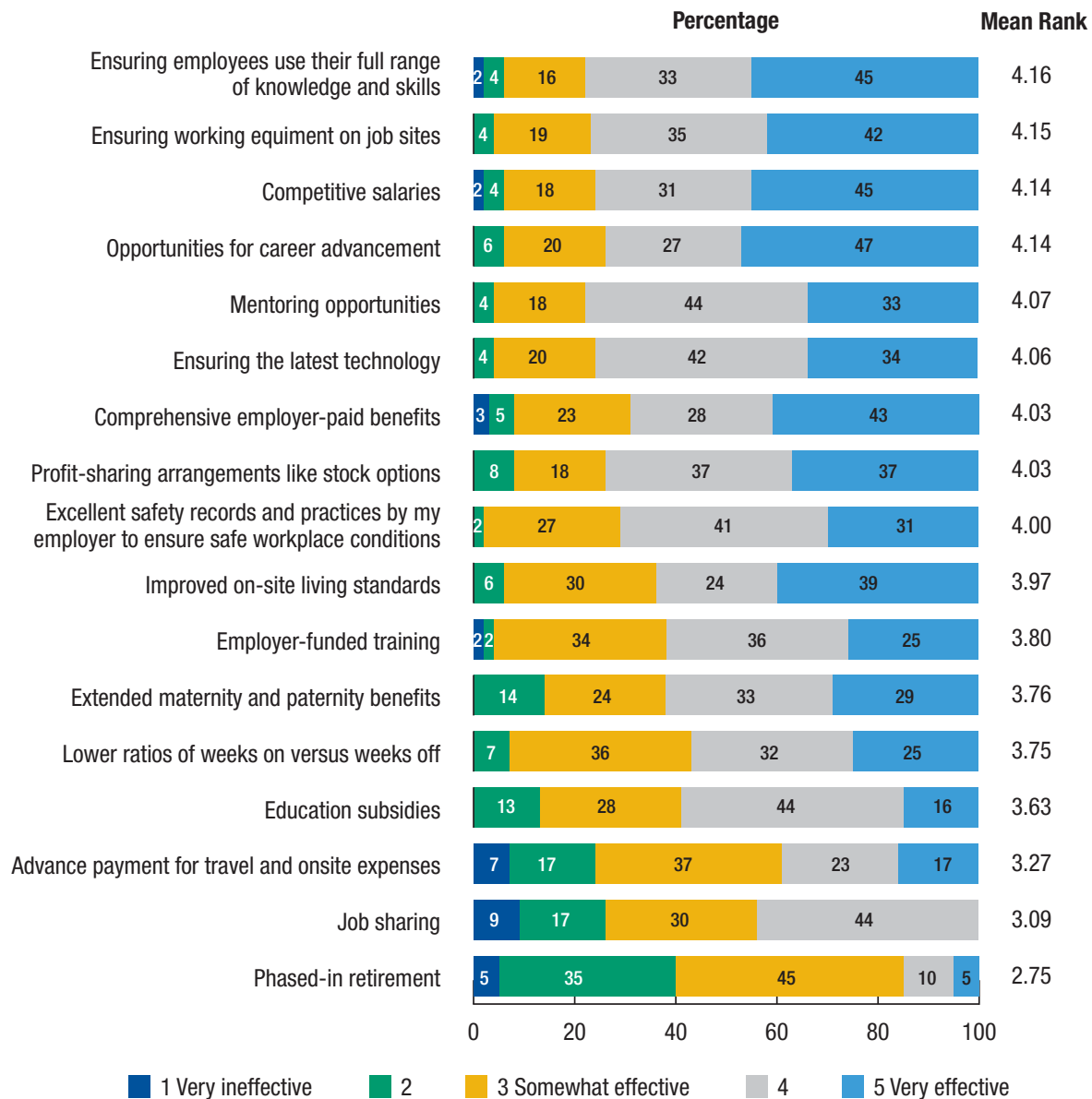
Employers in focus group sessions, however, said that monetary incentives are shortsighted, and that employees are motivated by a spectrum of needs. One instructor who keeps in touch with past students believes that—although money and benefits are important—they aren’t much of a differentiator, being similar across the industry. He named four factors that will induce workers to stay (or leave, if they are lacking): challenges, training, advancement and independence. Essentially, mineral explorers want to continue to learn and grow throughout their careers, and if they cannot get this from their current employer, they will seek new opportunities. To increase retention, some employers, for example, will send employees back to university to complete the courses needed for their P.Geology designation, while others keep workers’ skills current with continuous training.

Stakeholders perceived a growing focus on family-friendly policies and a desire for work-life balance among employees; mineral explorers expect employers to listen to their needs and respect their values. Stakeholders believed that employers who show respect for family needs by offering flexible scheduling will be appreciated. For some employers, this might mean asking employees which on-off schedule (e.g., seven days on, seven days off) will work best for them. Other initiatives that may increase retention—especially for those with a family—include: limiting extended time away from home; offering greater amounts of vacation time; offering communication channels in the field (e.g., satellite telephones and Internet access); and childcare options.

According to stakeholders, employees want to feel valued. One stakeholder noted that there are many small and inexpensive ways in which employers can show employees they are valued, such as verbal thanks and extra time off for hard work. Events such as staff/family barbecues, family-oriented parties and holiday celebrations can make employees feel like they are a part of a caring company.

Figure 18

Effectiveness of Retention Strategies



Note: N sizes range from 73 to 108.
Source: kisquared, MiHR, Summer 2011.

“Small things like ‘I know you put in those four extra days or you were over there gone for four weeks. When you come back I know you have four weeks of holidays but don’t come back into work for three days. Spend some time with your family, take them out for dinner and send me the bill.’ Those little things create a sense of value.”

Retention Challenges

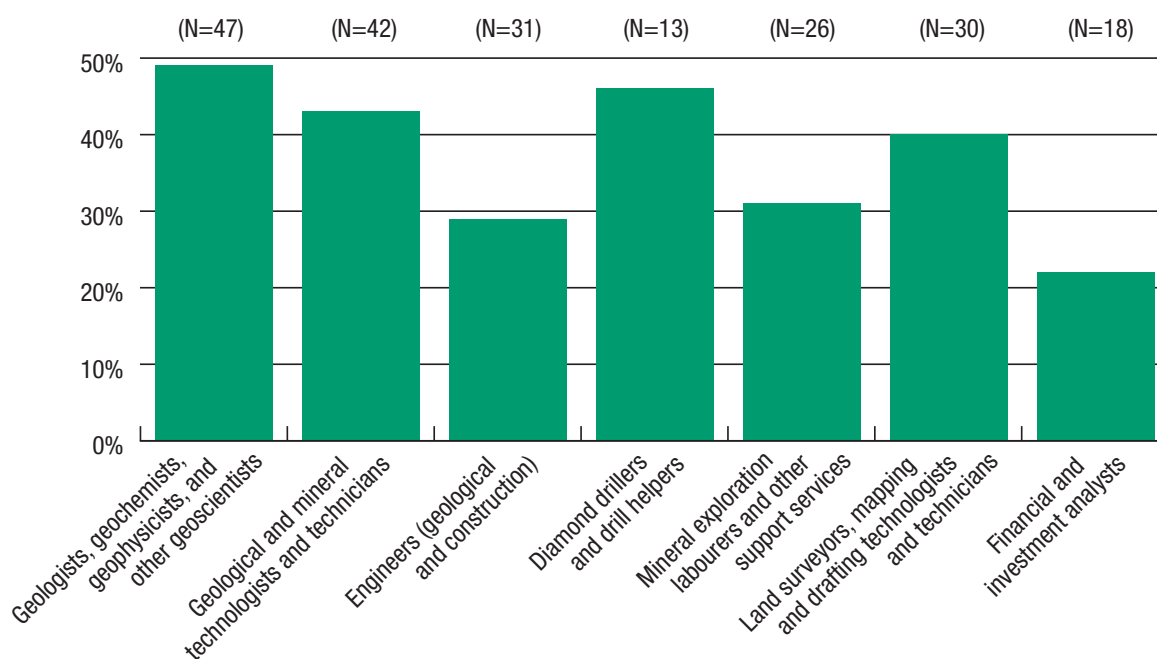
Any company's ability to keep great employees is deeply influenced by market volatility. During recessionary periods, employers simply cannot afford to retain employees. Many must let go even their best workers. During slowdowns, highly-skilled workers are more likely than others to find work in a related field (e.g., mining); however, nearly all mineral explorers have an ultimate "back-up plan" (e.g., working in the service or forestry sectors) for those times when even their preferred option fails.

The seasonal cycle of mineral exploration work also poses retention challenges for employers. In the off-season, some employees who are laid off may turn to their back-up plan to make ends meet, and choose not to return to exploration when the next on-season arrives.

Competition from other employers is another retention issue for employers. During periods of high labour demand, employees can be lured to other companies. Juniors face particular difficulties competing with offers made by major companies, which can include higher salaries, more opportunities for travel and adventure, increased stability and security, or all of these attractions.

As shown in Figure 19, employers in the sector are particularly challenged to retain geoscientists. Nearly half of respondents to the employer survey indicated that geoscientists, and geosciences technologists and technicians are a challenge to retain. Nearly half of employers also cited challenges in retaining diamond drillers and drill helpers. Most employers subcontract drillers, and competition for this specialized group of workers is fierce.

Figure 19
Occupations with High Turnover



Source: kisquared, MiHR, Summer 2011.

Employers noted that career-advancement opportunities at mid-tier companies are a main draw for geosciences employees moving to new companies, as shown in Table 8. By comparison, drillers and drill helpers are drawn to better pay at other companies.

Table 8
Retention Challenges for Key Occupations

CHALLENGE	WHEN RETAINING						
	GEOLOGISTS, GEOCHEMISTS, GEOPHYSICISTS AND GEOSCIENTISTS (N=21)	GEOLOGICAL AND MINERAL TECHNOLOGISTS AND TECHNICIANS (N=16)	ENGINEERS (GEOLOGICAL AND CONSTRUCTION) (N=8)	LAND SURVEYORS, MAPPING AND DRAFTING TECHNOLOGISTS AND TECHNICIANS (N=9)	DIAMOND DRILLERS AND DIAMOND DRILLER HELPERS (N=4)	MINERAL EXPLORATION LABOURERS AND SUPPORT SERVICES (N=6)	FINANCIAL AND INVESTMENT ANALYSIS (N=4)
Career advancement opportunities are available in junior and mid-tier mineral exploration companies that are unavailable in ours	13	11	6	5	2	1	4
Mentoring capabilities are available in large mineral explorations companies that are unavailable in ours	6	4	2	2	1	1	1
Better salaries and benefits are offered by global mineral exploration companies that we can't compete with	9	5	3	4	4	1	1
Better salaries and benefits are offered by large global mining exploration companies that we can't compete with	7	4	1	2	4	1	0
Competition from large mineral exploration companies that offer better job security	9	5	2	4	3	3	1
Competition from global mining companies that offer better job security	8	2	4	3	2	1	1
Competition from other industries	6	6	2	1	1	3	1
Difficult to locate new hires with both academic credentials and field experience	7	4	2	2	1	4	1
No available labour pool in local community	4	4	2	2	1	3	0

Note: Due to low N sizes, the above table shows number of respondents instead of percentages.
Source: kisquared, MiHR, Summer 2011.

Student Perspectives

Students recognized that staying with one employer for more than five years (on average) is not common in mineral exploration. Whether to stay with one company (for stability) or to try different ones (for variety) is a matter of personal preference. Some expect a natural progression from a junior company to a major company because junior companies often cannot offer career-advancement opportunities. Stage-of-life and family-friendly work conditions (greater stability, more regular hours, closer to home) are another reason to migrate from a junior to a major. Some students have an entrepreneurial bent and foresee owning their own exploration company someday.

Students believed that a desire to find the ideal employment situation would likely lead them to move from one company to another. Students want to work in a welcoming, respectful environment that offers challenging experiences; if one employer does not offer these elements, they will look for opportunities elsewhere. Disagreeable work conditions, such as stress, conflicts with the employer, or poor health and safety conditions will push some to seek new employment. Some students felt they could be lured by the right opportunity—including better pay, better benefits or a higher-level position—particularly if their current company could not offer them similar incentives.

In general, students are committed to staying in mineral exploration; many do not plan to leave to pursue another industry. For most students, the decision to leave mineral exploration would be made only in dire circumstances, such as another economic downturn or inability to find employment in the industry. Geology students view the oil and gas industry as an option for employment. While some students aspire to own their own exploration business, others see teaching as a future option, either at the university or high-school level.

Seeking Challenge and Life-long Learning

Students participating in focus group sessions indicated that they seek employment that offers engagement in activities they love, with compatible co-workers. For some, love of the work itself (e.g., an interesting project or an exciting location) outweighs the pay rate. Varied and interesting day-to-day tasks are extremely important to students:

“If you’re in the core shack doing nothing but logging core for five months you go a bit stir crazy.”

*“I don’t want to just log core or just map.
I would like the best of both worlds.”*

Students also indicated that they value proper instruction in how to do their jobs and want to learn from their mistakes. They expect opportunities for continuous learning and advancement, with some looking for employment with companies that support obtaining professional accreditation (e.g., P.Geo). Students want to be kept busy and challenged.

Seeking Trust and Autonomy

Students expect mutual trust and respect from an employer, on both a personal and professional level. They want to be treated well, and to have their employers trust them with responsibility and autonomy. Many claimed that being respected and valued by an employer would go a long way to keep them on a job. Respect from an employer is understood to range from allowing employees to publish their own research, to listening and taking action on employees' safety concerns.

They also expect agreeable work conditions, which include good food options (in a camp setting), access to Internet and satellite telephones, safe working conditions and positive co-workers. Some students will stay as long as they continue to love what they do and who they work with, and are not likely to seek alternative employment. They want to be continually stimulated with a range of challenging tasks; if they feel they have learned all the skills they can from one job, they will move on.

The majority of students surveyed want to work for someone they respect for industry knowledge, leadership skills and interpersonal skills. Employers known for their excellent safety records and commitment to safety are often popular with graduates. Students expect the employer to give an honest account of the job's expectations (e.g., time-on/time-off ratio). Many students respect companies that are cutting-edge, use the latest technologies and equipment, and are always looking to the future. However, while working for an ethical and environmentally and socially responsible organization is important, some admitted that they may overlook unethical behaviour to gain employment and experience.

For some students, financial compensation is one of the most important factors in selecting a job. Common employment benefits — such as health, dental and holiday pay — are expected by most students. They expect regular pay raises, bonuses, stock options, RRSPs, training and continuous learning. Good benefits and pensions will help to retain some students. Students' willingness to remain with one employer is in part influenced by the degree to which they are rewarded for their work and dedication.

Student preferences are often split between major and junior companies. Those seeking stable employment, excellent benefits, stringent safety procedures and career advancement opportunities tend to prefer major companies as potential employers. Students who favour junior companies place higher value on excitement, doing fieldwork and having greater responsibilities. Mid-tier companies are seen as offering the best of both worlds.

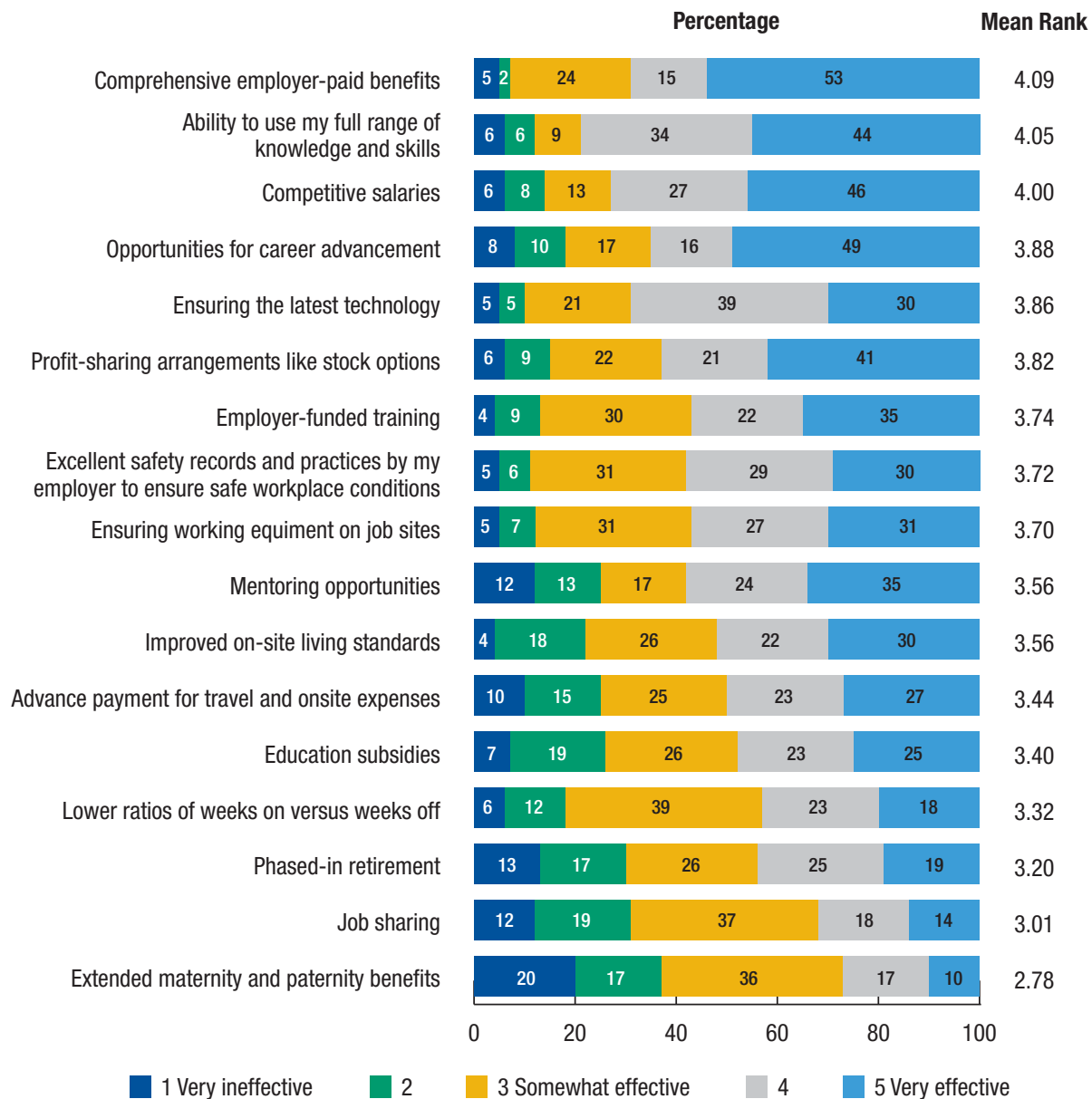
Employee Perspectives

Simply put, employers that meet their employees' needs tend to keep employees, as shown in Figure 20. Employees identified five main needs: competitive compensation; challenge and using their skills; autonomy; lifelong learning; and opportunities for career advancement. These needs are common drivers of employee engagement in any sector.

First, employees look for competitive compensation. That said, it is not the only factor that weighs into decisions to stay with their current employer. Second, employees want to be challenged; employers that continually provide employees with exciting opportunities on different projects will more likely retain them. Employees want to use the full range of their knowledge and skills in their job; employees who end up performing repetitive and boring tasks are likely to seek other employment.

Third, employees want autonomy and independence. In particular, highly skilled employees want to work for an employer that trusts them to lead an exploration team throughout a project, because employees are immensely attracted to the responsibility and independence that comes with such leadership. Fourth, employees see continuous learning as an important aspect of their careers. Mentorship programs are effective ways to increase employee loyalty, and the connection that employees form with their mentor typically results in increased allegiance to their employer as well. Employees also want to participate in external training opportunities such as those found at industry events and conferences. Supporting employees' desire to be engaged in the industry and expand their industry knowledge will also aid retention.

Figure 20
Employee Perceptions on Effectiveness of Retention Strategies



Source: kisquared, MiHR, Summer 2011.

Finally, employees seek work that will provide them with career-advancement opportunities; if employees see a natural career path with a given employer, they are more likely to stay with that employer. A common cause of employee turnover is the availability of advancement opportunities at other companies. Providing career-advancement opportunities and making employees aware of those opportunities go a long way to foster employee retention.

While the five retention drivers discussed above tended to pertain more to retaining highly skilled workers, some strategies are more effective at retaining workers in positions not requiring post-secondary education. These positions are also more likely to be seasonal and some employers have developed strategies for retaining these workers over time:

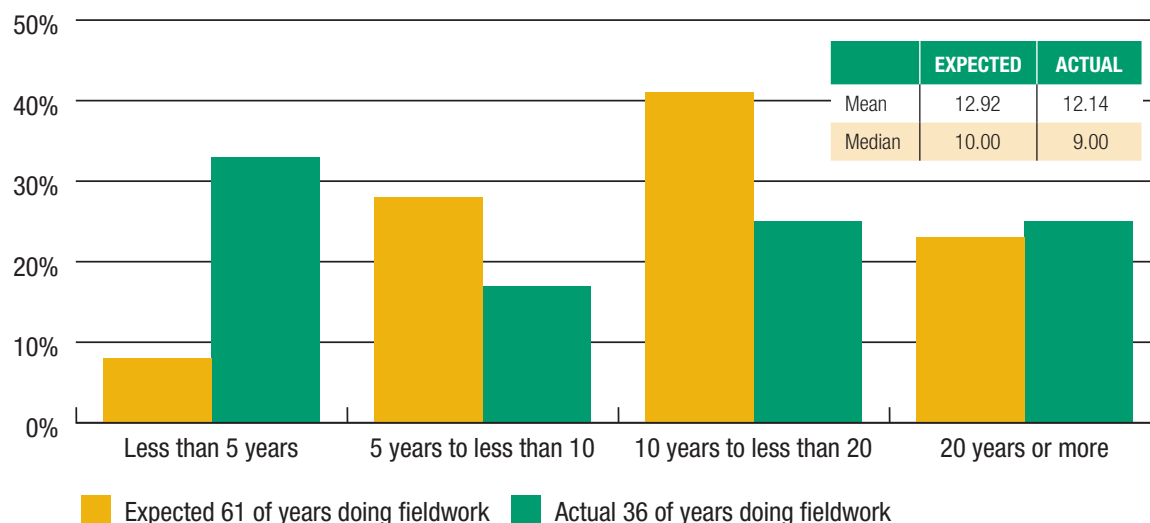
- They ensure that their seasonal employees work enough hours during the on-season to qualify for Employment Insurance (EI) for their entire off-season. (Workers that have EI to rely on during the off-season are less likely to seek alternative employment, and more likely to return to the same employer year after year);
- They pay their seasonal workers well-above competing local business and industries; and
- They keep in touch with their employees during the off-season.

Early Preparation Translates to Less Turnover

Gaps in job preparedness among recent graduates affect retention along with recruitment. Because most students graduate from post-secondary institutions with insufficient fieldwork experience, many are taken aback by the realities of working in the field. A large proportion of new graduates are forced to realize within the first few years of employment, that they are not actually cut out for mineral exploration fieldwork.

As shown in Figure 21, employees entered careers expecting to do fieldwork for between 10 and 20 years. However, many actually experienced less than 10 years of fieldwork. This is somewhat driven by mid-career attrition in the sector, which allows some at the mid-stages of their careers to opt for other opportunities. Mid-career employees indicated that fieldwork was more appealing at earlier stages of their careers.

Figure 21
Employee Expectations for Field Work



Note: N sizes are 61 (expected) and 36 respectively (actual).
Source: kisquared, MiHR, Summer 2011.

Retention Recommendations

- Nearly all mineral explorers seek five things in their employment: (1) competitive compensation; (2) intellectual challenge and a job where they can apply all their knowledge and use their skills; (3) training; (4) advancement opportunities; and (5) independence. Companies that integrate these motivators into job postings and offers will recruit more successfully than those that do not.
- The advantages of working for a junior company typically differ from those of working for a major—for example, juniors may offer greater responsibility, along with an exalted job title and independence. In turn, majors may offer professional development and greater stability. Employees expect employers to spell out those differences in postings and offers.
- Money matters. Great compensation or a decent salary plus stock options are prerequisites for mineral exploration employees to join and stay with a company. This is an industry fuelled by big finds and potential big money. Money-related topics not addressed at the outset can drive workers from their jobs; a simple but crucial retention strategy is ensuring that employees doing fieldwork have credit cards and money to cover the expenses they incur while work is ongoing.
- A final retention strategy—deemed effective by both employers and employees—relates to work-environment-based solutions: Employers that follow safe work-practices and use the latest equipment and technology enjoy greater success in retaining workers.



Key HR Issues and Recommendations for Action

Industry consultation revealed several HR challenges and opportunities under the broader headings of career awareness and attraction; recruitment; and retention, as well as issues associated with global mobility of talent. All the issues are summarized below.

Career Awareness and Attraction

Issues

- Lack of career awareness and general public awareness of industry
- Need for improved coordination and cooperation between industry and educational institutions
- Under-representation of key talent groups — women, Aboriginal peoples, new Canadians, youth
- Lack of global awareness of Canadian employment opportunities

Approach

Industry Associations

- Develop social and general media campaigns to raise public awareness of exploration sector.
- Continue to expand career awareness and outreach activities (e.g., PDAC Mining Matters activities; MiHR Explore for More).
- Continue to participate in curriculum development (e.g., B.C. Mineral Resource Education Program; PDAC Mining Matters).

- Extend education outreach to earlier school years (before high school) and focus on children, students, teachers and education leaders (e.g., PDAC Mining Matters).
- Make resources easy for teachers to integrate into learning situations and classrooms (e.g., MiHR Explore for More; PDAC Mining Matters).
- Prioritize the provision of experiential learning opportunities, financial support for students and field experience opportunities (e.g., PDAC S-IMEW).
- Support MiHR to conduct research and develop programs for targeted attraction and recruitment strategies for under-represented talent.

Government and Educators

- Support and expand community outreach and education programs (e.g., Aboriginal job readiness and training and development programs).
- Work with industry stakeholders to ensure curriculum development and resources for teachers are integrated into learning situations and classrooms.

Employers

- Participate in education outreach (e.g., mentorship, guest speaking, co-op programs, work placements, field experience).
- Extend education outreach to earlier school years (before high school) and focus on children, students, teachers and education leaders.
- Prioritize the provision of experiential learning opportunities, financial support for students and field experience opportunities.
- Develop targeted attraction and recruitment strategies for under-represented talent, and strategies for workplace diversity and inclusion.

Recruitment

Issues

- Thinning labour pool, particularly for geoscientists
- Short supply of job-ready candidates are in short supply
- Mobility of labourers challenged by unrecognized, uncertified occupations
- Candidates lacking critical field experience
- Limited human resources of small- and medium-sized enterprises (SMEs), which make up the majority of the sector

Approach

Industry Associations

- Support MiHR in the development of essential skills profiles and national occupational standards for key exploration occupations (in particular: geosciences technologists and technicians, field assistants, camp managers, line cutters).
- Work with MiHR to develop a centralized HR support centre for the sector's SMEs to provide strategic workforce planning, coordinated outreach and recruiting efforts, and other HR-function support with a single, central point of contact.
- Support and partner with professional associations regarding foreign credential recognition programs and assessment of education equivalencies.
- Support MiHR in research efforts to understand the sector's need for foreign-credential recognition programs.

Government and Educators

- Support research efforts to better understand the sector's needs for foreign-credential recognition.
- Provide support to industry employers to help them understand policies and procedures for hiring foreign professionals and temporary foreign workers.
- Support research to better understand the unique HR-management needs of the sector's SMEs.

Employers

- Provide more opportunities for field experience and practical application of classroom knowledge.
- Support and partner with professional associations regarding foreign-credential recognition programs and assessment of education equivalencies.
- Have major companies with HR functions provide mentorship and support to junior companies in developing strategies for HR management.
- Coordinate recruiting efforts as an industry.

Retention

Issues

- Seasonal nature of work and wildly cyclical industry, along with short life-span of companies, camps and projects, leading to high seasonal turnover of workers.
- The fact that remote locations and field work are deterrents for some under-represented groups (e.g., women, new Canadians) and for professionals in mid- and later-stages of their careers.
- Mid-career attrition — preponderance of professionals leaving the sector in mid-career.

- Age demographics—mix of an aging workforce and professionals needing mentorship and experience, with a thin pool of mid-career professionals, signalling a coming gap in worker knowledge and experience and a thin leadership pipeline.
- High proportions of knowledge workers which translate to an extremely versatile and multi-skilled workforce that can move to other sectors with ease.

Approach

Industry Associations

- Support MiHR in research on counter-cyclical workforce management strategies and flexible employment options for SMEs.
- Implement recommendations and strategies from MiHR’s knowledge-workers study.
- Support MiHR in research to better understand employee engagement in the sector and in professional science occupations.
- Support and partner with professional associations to better understand mid-career attrition in the sector, and in geosciences and engineering in general.
- Develop an industry strategy for mentorship, succession planning and knowledge transfer for exploration (extending on MiHR’s Virtual Mine Mentor program and Knowledge Transfer initiatives).

Government

- Implement recommendations and strategies from MiHR’s knowledge workers study.
- Support research to better understand employee engagement in the sector and in professional science occupations.
- Support and partner with professional associations to better understand mid-career attrition in the sector, and in geosciences and engineering in general.

Employers

- Develop strategies to retain the aging workforce and develop creative post-retirement work options.
- Improve succession planning and knowledge-transfer initiatives—support and adapt MiHR Mentorship and Knowledge Transfer programs for exploration.
- Participate in industry mentorship programs.
- Develop and conduct employee-engagement surveys.
- Conduct exit interviews and/or assess exit interview data from employers to determine reasons for workers leaving the sector.

Special Focus on Global Mobility of Talent

Issue

The global nature of the industry lends itself to global mobility of talent. This challenges Canadian employers to attract and retain workers on an international stage and to overcome barriers with credential recognition and educational equivalencies assessments

Approach

- Study and better understand the flow of new Canadians and temporary foreign workers into the sector, and associated HR issues.
- Study the impacts of globalization on Canadian exploration companies in the competition for talent.
- Investigate options for knowledge-management strategies for the sector.

A Comparison of Mineral Exploration and Mining

There are a number of similarities between exploration and mining—in terms of the profile of the sectors and the HR challenges they face; however, there are also aspects of exploration that present unique HR challenges. Strategies and initiatives developed by MiHR to address HR issues in mining are relevant to exploration. However, there will be new strategies and initiatives needed to address the exploration sector's unique HR issues.

What Makes Mineral Exploration and Mining the Same?

Many programs and industry initiatives already exist at MiHR to address the awareness, recruitment and retention challenges of the mining sector. Research participants cited many of these initiatives during this study's primary research and consultation phases. That said, there are many opportunities to improve and develop these services for the exploration sector.

- As with mining, there are occupations in exploration that require support through the industry's credential-recognition programs. Exploration activities tend to be shorter-lived than mining activities, so a system to ensure smooth transitions of workers around the sector is needed. Essential skills profiles and national occupational standards can be created for occupations such as line cutters, camp managers, field assistants, and technologists and technicians. MiHR can then work with the sector to ensure an appropriate system is in place to recognize the skills and credentials of workers in exploration and to ensure smooth transitions for these exploration workers.
- The sector has a large proportion of professional occupations, particularly geoscientists. Mentorship and development of future talent is essential, to ensure that the future workforce has the experience and knowledge transfer from mature workers to ensure the sector's success.
- While there is a slightly larger proportion of women working in exploration than mining, exploration—like mining—falls well short of the participation rates seen in the Canadian labour force. Programs and initiatives in the mining side of the sector would also be effective in encouraging more women to choose careers in exploration.

- Many large, multinational mining companies have mineral-exploration branches. There is an opportunity in the sector for larger companies to leverage their HR functions to provide support and partnerships to assist smaller firms to manage the workforce, and to provide guidance and expertise on strategic, long-term workforce management.
- As with mining, the exploration sector has a large cohort of mature workers. Programs and initiatives to engage and retain the aging workforce are also important for the future success of the exploration sector.
- Young people, particularly students, are largely unaware of the career options in exploration. Geosciences, in particular, are popular choices for young people in post-secondary education, but the flows into the sector are thin. MiHR's Explore for More career-outreach initiatives can be adapted to focus on career awareness for exploration.

How do Mineral Exploration and Mining Differ?

Mineral exploration differs from extraction and processing in several key ways, including: main activities performed; occupational mix; size and nature of organizations involved in the sector; type of work; location of work; and demographic profile of the workforce. Consequently, the exploration sector faces unique HR challenges.

- The sector employs a large proportion of highly educated professionals. However, general career awareness of mineral exploration is minimal. Career educators at secondary- and post-secondary levels, and students at all levels, are unaware of the career opportunities in the sector and readily confuse it with mining — thinking it predominantly employs labourers.
- Many occupations in the industry involve remote fieldwork in wilderness locations and camp settings. Industry jobs often require workers to live far from towns or cities — away from family and friends — under primitive conditions, for long stretches. The sector therefore lends itself to attracting individuals with adventurous personalities who enjoy the outdoors.
- The exploration sector is seasonal and cyclical. The economic conditions and business side of the sector are shaped by periods of intense exploration activity and periods of contraction. In addition, the activities are generally research and development oriented (as opposed to operations oriented) and budgets tend to be discretionary in nature. The sector attracts individuals who are entrepreneurial and comfortable with risk-taking. Furthermore, the payoffs are limited. Few companies find viable resource deposits. The seasonal nature of the sector shapes the rhythms of daily work; market volatility regularly affects activities and ultimately careers in the sector. Therefore, the sector also tends to attract individuals with an optimistic outlook.
- Unlike mining, which is dominated by large multinational organizations that generate significant revenue internally and have large workforces, the exploration sector is predominantly made up of micro- and small-sized organizations that raise funds through investments from the financial sector. Small enterprises have limited capacity or resources for formal HR functions. As a result, workforce planning tends to be relatively short-sighted and reactive.
- The exploration sector contains a larger proportion of knowledge workers. Nearly three-quarters of the exploration workforce have advanced post-secondary education. Higher education requirements dictate longer schooling for students and the need to ensure opportunities for obtaining appropriate experience. The sector must work closely with educational institutions to ensure that the future workforce has the skills and competencies they will need on the job.

- The age profile of the exploration sector differs from mining, in that in addition to a large cohort of mature workers, the sector also has a relatively large cohort of younger workers, and fewer workers at the mid-stages of their careers. Furthermore, the intensive knowledge-based aspects of the sector require employees to spend many years on the job to be fully effective. This creates a challenge in ensuring that the knowledge of mature workers is captured and properly passed along to younger workers. An immediate challenge for the sector is ensuring that there will be enough experienced knowledge workers to take on senior roles as the maturing workforce begins to retire and that effective knowledge transfer systems are in place.
- The demographic profile of the exploration sector differs from mining in terms of Aboriginal participation—at 2.7 per cent, compared to 6.8 per cent in mining. Exploration activities are often conducted in close proximity to Aboriginal communities, but the duration of work is often short-lived compared to extraction activities. The sector also employs a large portion of highly educated professionals, making it uniquely positioned to grow the Aboriginal talent pool and support opportunities for higher education of Aboriginal peoples.
- Both sectors are global in nature; however, in exploration, the workforce actively seeks opportunities on a global scale and most professionals conduct work overseas, as well as in Canada. This, in conjunction with the seasonal nature of exploration activities in Canada, and a highly educated workforce with broad and transferable skills, translates to a highly mobile, global workforce. Global mobility of talent and recognition of foreign professional and educational credentials pose unique HR challenges and opportunities for the sector.

Appendix A: Sources of LMI

A small group of government agencies and industry organizations have collected labour market information that could be used as potential data sources for the mineral exploration industry.

Statistics Canada—Labour Force Survey

The survey is conducted monthly by Statistics Canada and captures the number of workers in each industry and occupation, based on NAICS and NOC-S codes. Much of the employment data on mineral exploration is captured under NAICS 213 “Support Activities for Mining and Oil and Gas Extraction” and is available for a long-term time series (10 years and above), and for provinces and census metropolitan areas (CMAs) in Canada. The survey, however, does not capture cross-tabulated statistics in specific occupations for certain industries. (This information is only available from the Census) For example, the occupation of geologists represents both those who work in mineral exploration and those working in other industries. Likewise, for a specific industry, it is not possible to disaggregate the workforce by occupations.

Statistics Canada—Canadian Business Patterns

Statistics Canada publishes this report every six months; it contains counts of business establishments and locations, in terms of employment-size ranges, geography groupings and industries—using NAICS codes. The report indicates the employment size of each establishment, which provides insight on the segmentation of large and small employers. However, mineral exploration is again segmented under NAICS 213 “Support Activities for Mining and Oil and Gas Extraction”. The employment numbers are not possible to disaggregate any further.

Statistics Canada—Postsecondary Student Information System (PSIS)

This annual national survey provides detailed information on enrolments and graduates of Canadian post-secondary educational institutions, including on a variety of programs related to earth sciences. The enrolment data includes longitudinal series that track students over time. However, the fact that not all graduates will enter a mineral exploration occupation upon graduation limits its usefulness as a labour-demand measurement.

Statistics Canada—2006 Census of Population

Every five years, Statistics Canada conducts a national Census of Population, which provides detailed employment statistics segmented by industries, occupations, age groups, geographic locations and other characteristics. Again, the mineral exploration industry is categorized mainly under NAICS 213 and across a number of occupations. (See Chapter 2 for details.) The Census allows us to obtain employment and compensation levels for a certain occupation in a specific industry, and further, by age groups, gender and education level. The Census data covers 1996–2006, but is only available every five years and is typically released slowly over time.

Canadian Association of University Teachers (CAUT)—Almanac of Post-Secondary Education

The annual Almanac of CAUT lists university and college enrolment data for geology and earth sciences programs over time. However, similarly to Statistics Canada's PSIS, the usefulness of the data is limited, as not all graduates will necessarily work in the mineral exploration industry upon graduation.

Natural Resources Canada—Various Publications

Natural Resources Canada (NRCan) conducts an annual national survey on mineral exploration and deposit appraisal, and mine complex-development expenditures. Based on the survey results, annual statistics of mineral exploration and deposit appraisal expenditures are distinguished by provinces, type of minerals sought, and junior and senior companies. In addition, NRCan publishes an annual report of Canadian Mineral Exploration Trends, which contains an analysis of recent indicators of exploration activities in Canada. Although NRCan has not included labour force requests in their survey, the expenditure numbers could be useful for comparing the relative employment sizes between provinces and companies.

Newfoundland and Labrador Department of Natural Resources—Exploration Employment Survey 2007

The Department of Natural Resources in Newfoundland and Labrador conducted an employment survey of the 116 mineral exploration companies in the province in 2007. By distinguishing eight occupations in the industry, the survey obtained the number of full-time equivalent employees in each occupational category—providing a breakdown for a total of 341 person-years.

Appendix B: Estimating Mineral Exploration Employment

In an effort to correct for these potential problems with analysis of existing data, The Conference Board of Canada (CBoC) has proposed two methodologies for estimating employment in the mineral exploration sector. The first uses the Canadian Business Patterns (CBP) database to create an estimate of industry employment from the list of six-digit NAICS codes presented in Table B-1. This is the only data set that provides measures of employment at that level of detail. The second methodology creates an estimate of employment by combining information on occupations and four-digit NAICS industries from the Census. The rest of this section discusses the relative merits of these methodologies.

Canadian Business Patterns Data

CBP data is based on Statistics Canada's Business Register, which is the central repository of information on businesses in Canada. The Business Register maintains a complete, up-to-date and unduplicated list on all active businesses in Canada that have a corporate income tax account, are an employer or have a GST account. Although the Business Register is updated on an on-going basis, data on the population of businesses with employees are released semi-annually.

As such, this source of information is essentially a census of businesses, making it both timely and deep, providing information at a level of industry detail that is unavailable in nearly every other survey. However, the number of concepts that are available from this data set, for each industry, are very few. For the purposes of this project, estimates of the size of the workforce in the mineral exploration sector, as well as a breakdown of the sizes of the establishments in the sector, are useful. However, this data set provides no information regarding the makeup of the sector's workforce, such as its demographic profile or how its skills needs are changing.

The CBoC created an estimate of total employment in the mineral exploration sector over the period 2001–2009, using the CBP database. Table B-2 provides the detailed employment estimates. According to these estimates, Canadian mineral exploration employment at the end of 2009 stood at 48,400, up from 39,600 in 2001.

The CBP database also shows that the mineral exploration sector is comprised mainly of micro-, small-, and medium-sized establishments. Approximately 97 per cent of establishments in the sector have less than 100 employees. In fact, well over half of the organizations (60 per cent) employ between one and four individuals.

While the employment estimate does provide some guidance on the size of mineral exploration employment and how it has changed over time, there is a variety of potential problems with it. For example, this estimate is total employment for the four six-digit NAICS codes identified in Table B-1. Thus, it includes occupations that are not specific to mineral exploration activity—everything from cleaners to corporate lawyers.

Another caveat is that the CBP is employer-based. Employer-based surveys such as the CBP and Survey of Employment, Payrolls and Hours (SEPH) ask employers how many people they employ, while employee-based surveys such as the Census and the Labour Force Survey (LFS) ask people if they are employed. In practical terms, this means that employer-based surveys generally find that employment in a specific industry is less than that of employee-based surveys. This is because contract workers self-report as being employed, but businesses do not record them as employees. This difference can be quite large if employers make frequent use of contract workers. For example, in the architectural and engineering industry (NAICS 5413), SEPH employment is nearly 30 per cent less than LFS employment—suggesting that the use of contract workers in this industry is substantial. As such, mineral exploration employment may be considerably larger than this estimate suggests.

One final caveat with the CBP estimate of mineral exploration employment concerns how the data is reported. Rather than a total employment figure, the data is provided as the number of establishments with employment, in a particular range of employment. Thus, employment figures are calculated by multiplying the number of establishments by the “average” number of employees in a range. The estimates of mineral exploration employment are highly dependent on those assumed averages.

Census Data

The Census is the most detailed source of employment data available from Statistics Canada that provides a simultaneous breakdown of employment by both industry and occupation. However, the Census is only conducted once every five years. Thus, it provides an excellent snapshot of the labour force at a particular point in time, but it provides only limited insights in terms of how the labour force is changing over time. With this in mind, the CBoC created estimates of employment in the mineral exploration sector over time by combining data from the 2001 and 2006 censuses, with the timelier LFS.

The LFS provides monthly estimates of employment, with employment by industry detail available down to the four-digit NAICS level. Therefore, there is readily available and timely information regarding employment changes in the NAICS codes of which the mineral exploration industry is a part. All that is required is to estimate how the mineral exploration sector is changing within those NAICS codes.

Table 3 in Appendix B-1 highlights the results from this estimation, which shows that mineral exploration employment is estimated to have risen from 8,300 in 2001 to 21,700 in 2009.

Obviously, this number is different from the one derived from the CBP database, although the gap between the two estimates has narrowed in recent years. A key reason for this difference is that the census estimate includes employment only in the 12 occupations identified in Table 1, while the CBP estimate contains all occupations in a specific NAICS code. The other major difference between the two estimates is that the CBP number is an employer-based estimate, whereas the census estimate is employee-based.

These are two of the reasons why the CBoC recommends that MiHR use the employment estimates based on the Census, rather than the CBP. As an organization devoted to addressing the human resources needs of Canada's mining sector, it makes sense for MiHR to focus its efforts on occupations that are critical to the success of the mineral exploration industry.

The fact that the Census is an employee based survey provides two benefits to MiHR. First, it includes all the people who work in the specified occupations within the industry, regardless of whether they are contract workers. Second, it eliminates any problems associated with multiple job-holders. If someone holds part-time positions in multiple firms they will show up only once as being employed in an employee-based survey, but they could potentially be listed as part-time employees at multiple firms in employer-based surveys.

One final benefit of the census employment estimate is that it provides a detailed breakdown of the demographic profile of the mineral exploration workforce. Factors such as gender, age, educational attainment and minority status of the workforce are readily available in data from the Census. This is not the case with the employment estimates from the CBP. Thus, the Census estimates of employment provide considerably more detail regarding the consistency of the mineral exploration sector's workforce.

Table B-1
CBP Estimates of Mineral Exploration Employment

SECTOR	2001	2002	2003	2004	2005	2006	2007	2008	2009
Total	39,578	39,040	37,406	37,611	42,943	46,462	46,923	48,366	48,414
213117 Contract drilling (except oil and gas)	3,367	3,131	3,001	3,592	3,418	3,551	3,843	4,262	4,150
213119 Other support activities for mining	11,022	9,846	8,443	7,666	9,255	11,046	13,289	15,008	15,622
541360 Geophysical surveying and mapping services	10,923	10,600	9,793	9,981	11,105	12,866	9,013	8,716	7,899
541380 Testing laboratories	14,266	15,463	16,169	16,372	19,165	18,999	20,778	20,380	20,743

Source: The Conference Board of Canada, MiHR, Summer 2011.

Table B-2
Census Estimates of Mineral Exploration Employment

DEMOGRAPHIC CATEGORY	2001	2002	2003	2004	2005	2006	2007	2008	2009
Total	8,257	9,331	11,140	13,715	15,853	18,492	21,100	22,465	21,740
Men	6,740	7,580	9,037	11,100	12,815	14,949	17,014	18,030	17,383
Women	1,517	1,750	2,104	2,615	3,038	3,544	4,086	4,435	4,357
Aged 15–24	820	940	1,150	1,449	1,721	2,071	2,422	2,627	2,597
Aged 25–34	2,338	2,618	3,093	3,778	4,334	5,018	5,702	6,053	5,836
Aged 35–44	2,502	2,718	3,107	3,646	3,997	4,397	4,717	4,714	4,256
Aged 45–54	1,830	2,109	2,565	3,214	3,779	4,482	5,193	5,614	5,516
Aged 55+	767	946	1,226	1,628	2,022	2,525	3,065	3,457	3,535
No certificate, diploma or degree	579	618	715	826	893	973	992	926	788
High school graduate or equivalent	1,144	1,280	1,540	1,894	2,198	2,590	2,941	3,102	3,018
Apprenticeship or trades certificate or diploma	767	800	882	994	1,047	1,106	1,126	1,049	890
College, CEGEP, or other non-university certificate or diploma	174	243	343	489	640	832	1,053	1,236	1,302
University certificate, diploma or degree	1,856	2,086	2,453	3,000	3,441	3,974	4,532	4,854	4,706
University certificate, diploma or degree below the bachelor level	3,737	4,304	5,207	6,511	7,634	9,017	10,456	11,297	11,037
Non-immigrant	6,403	7,194	8,570	10,509	12,115	14,115	16,044	16,969	16,336
Immigrant	1,799	2,071	2,489	3,101	3,614	4,229	4,883	5,305	5,214
Non-permanent resident	54	65	81	104	124	148	173	191	190
Member of visible minority	897	1,064	1,316	1,687	2,021	2,429	2,880	3,212	3,237
North American Indian single response	109	123	153	191	227	276	317	328	313
Métis single response	73	85	105	132	156	185	213	227	220
Inuit single response	8	9	12	15	19	25	29	29	27
Multiple Aboriginal identity responses	3	4	6	7	9	10	12	13	13

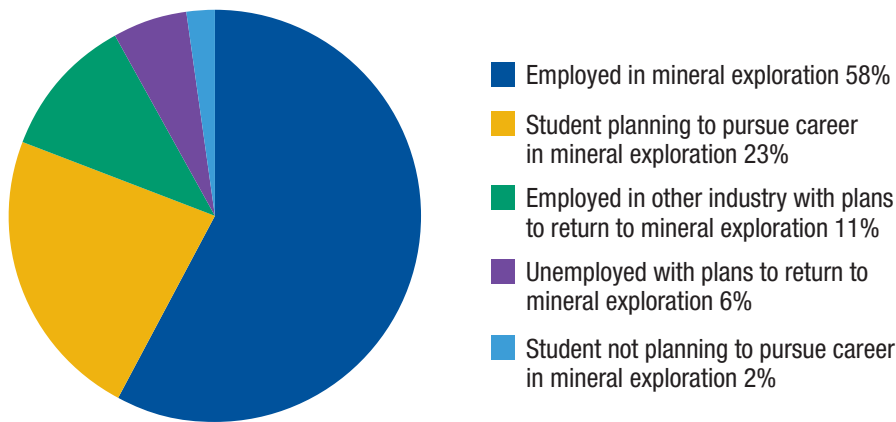
Source: The Conference Board of Canada, MiHR, Summer 2011.

Appendix C: Profile of Questionnaire Respondents

Respondent Profile: Employee Questionnaire

One-hundred-and-twenty mineral exploration employees participated in the online questionnaire. Respondents included students with experience working in the sector; full-time employees; seasonal, temporary and part-time workers; and those currently unemployed from working in the sector.

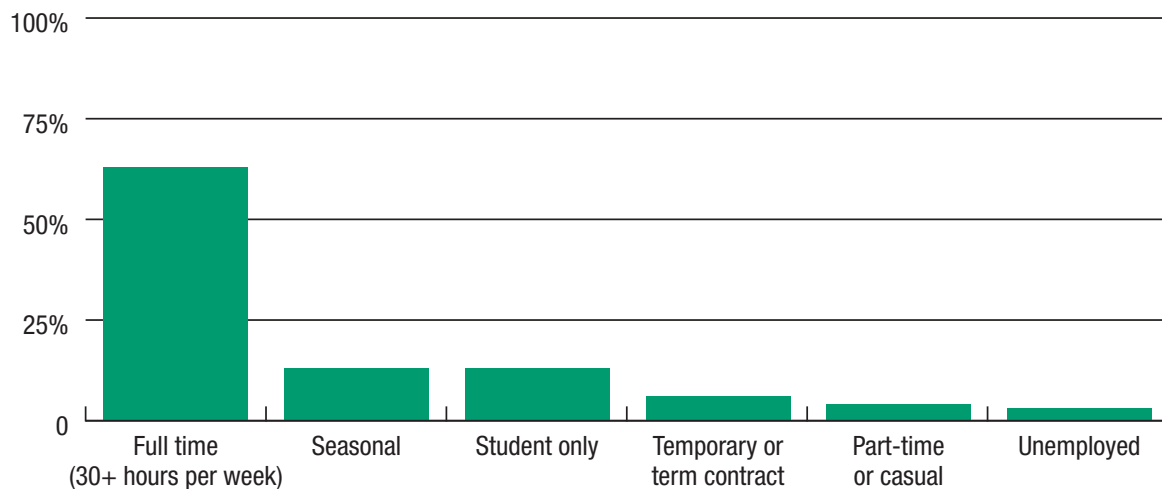
Figure C-1
Profile of Respondents



Source: kisquared, MiHR, Summer 2011.

As shown in Figure C-2, the majority of respondents were full-time employees.

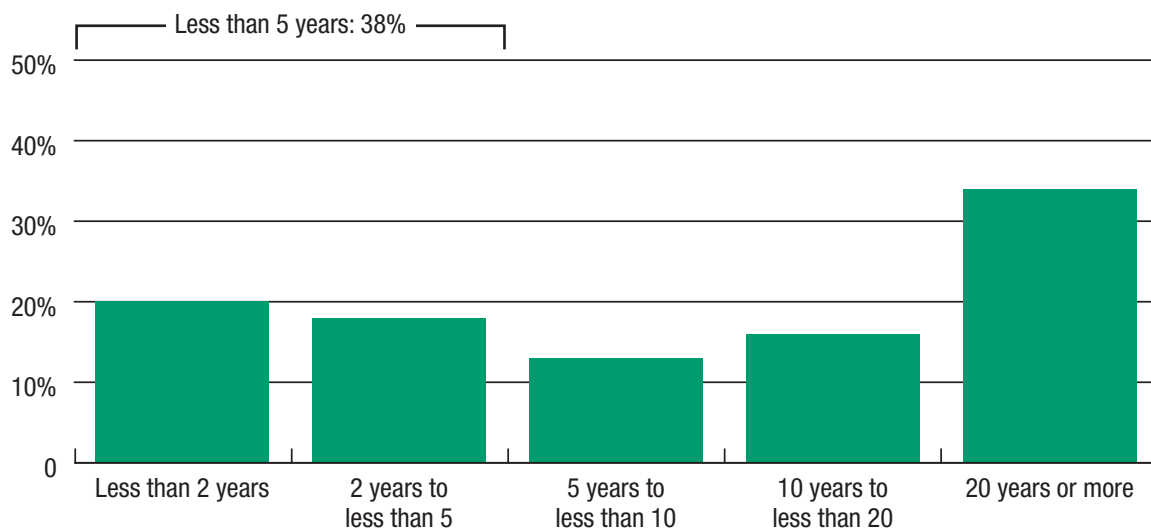
Figure C-2
Employment Status



Source: kisquared, MiHR, Summer 2011.

The sample of respondents is representative of the sector. Thirty-four per cent of respondents have been employed in the exploration sector for more than 20 years, as shown in Figure C-3. Thirty-eight per cent have been employed in the sector less than five years and 29 per cent have been in the sector between 10 and 20 years. This mimics the age demographics of the entire sector and the pattern of mid-career attrition.

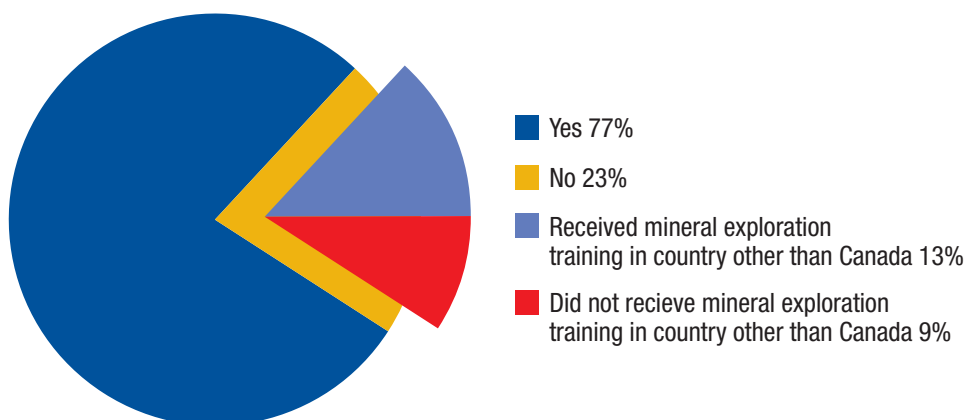
Figure C-3
Length of Time Working in the Sector



Source: kisquared, MiHR, Summer 2011.

Over three-quarters of respondents were born in Canada. Of the group born outside, over half received exploration training outside Canada.

Figure C-4
Respondent Nationality and Country of Training

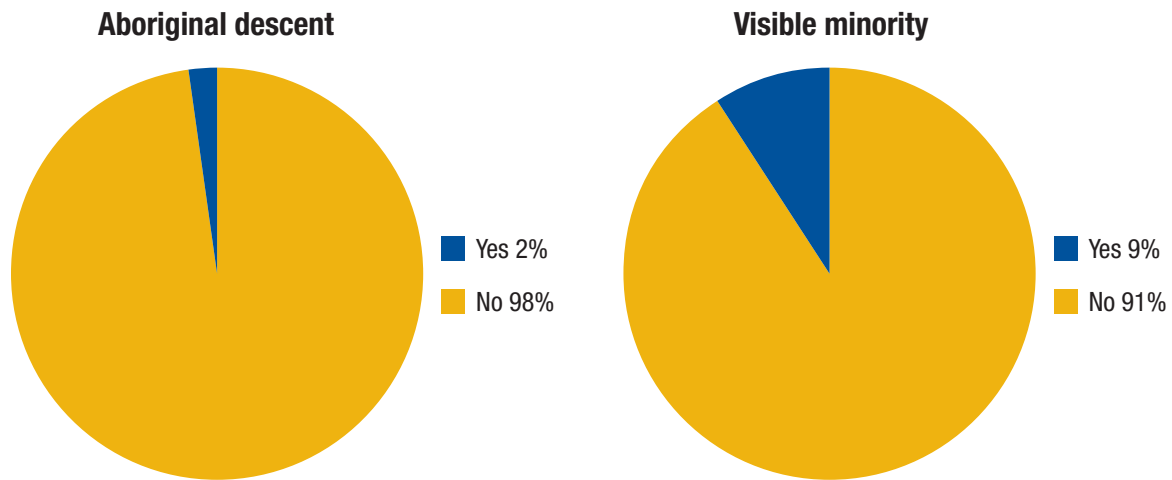


Source: kisquared, MiHR, Summer 2011.

Two per cent of respondents indicated that they are of Aboriginal descent and nine per cent were visible minorities.

Figure C-5

Diversity of Respondents

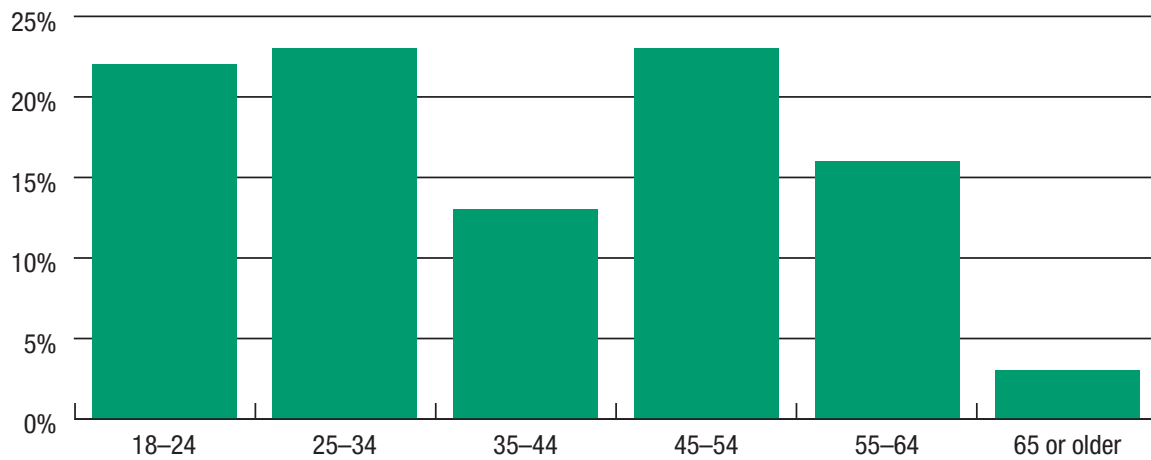


Note: N=117
Source: kisquared, MiHR, Summer 2011.

The age profile of respondents, as shown in Figure C-6, was representative of the age profile of the sector—showing a clear bimodal distribution with a large cohort of both young and mature workers.

Figure C-6

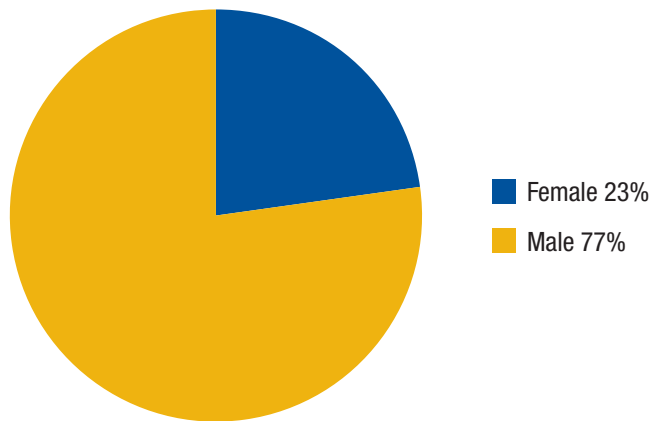
Age Profile of Respondents



Source: kisquared, MiHR, Summer 2011.

The gender breakdown of respondents (at approximately 20 per cent women) also mirrored that of the sector.

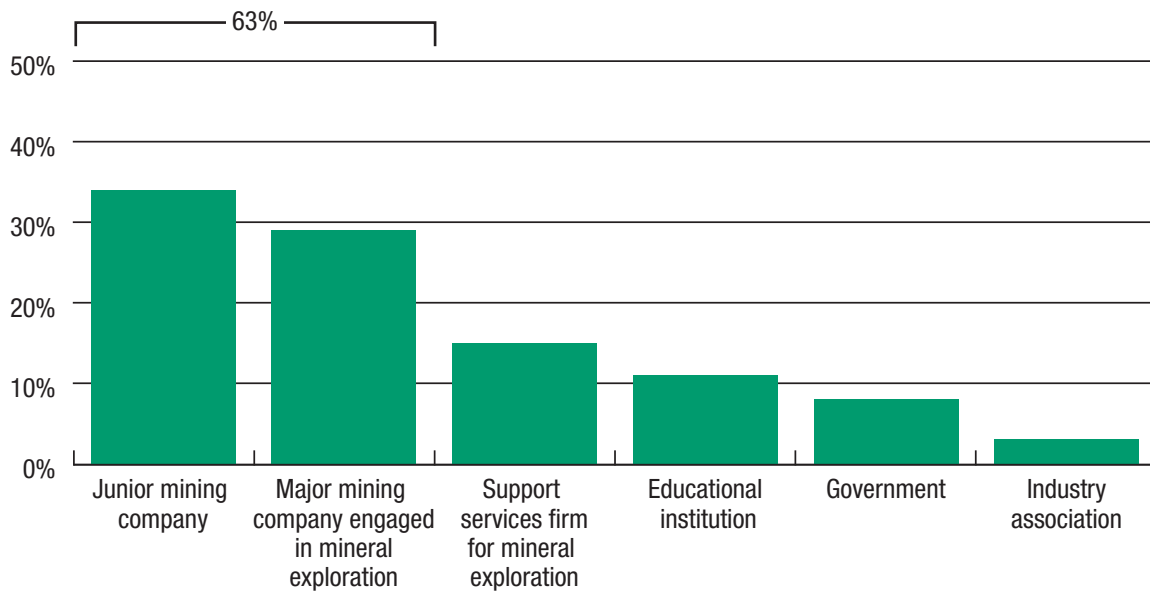
Figure C-7
Gender Profile of Respondents



Note: N=116
 Source: kisquared, MiHR, Summer 2011.

Respondents worked mainly in junior or senior mining companies, with just over a quarter working in support-services firms, education, government or industry associations.

Figure C-8
Type of Employer



Note: N=100
 Source: kisquared, MiHR, Summer 2011.

Respondents participated in a variety of exploration activities, as shown in Table C-1.

Table C-1

Main Exploration Activities Performed by Respondents

ACTIVITIES	%
Gathering, interpreting and mapping geophysical data	68
Drilling or minerals other than oil and gas	67
Evaluate future economic viability of mineral exploration findings	52
Providing physical, chemical and other analytical testing services related to mineral exploration activities	38
Performing other support activities for the mineral industry not already described	35
Providing advice and assistance to mineral exploration organizations on environmental issues	25
Other	17

Note: Percentage total exceeds 100% because multiple responses were accepted. N= 100.
Source: kisquared, MiHR, Summer 2011.

Respondent Profile: Employer Questionnaire

Fifty-six mineral exploration employers participated in the online questionnaire for employers. Respondents included employers in diamond drilling; surveying and mapping; evaluation of reserves; analytical testing services; other support services; and industry associations. The sample of employers was representative of the sector.

Table C-2

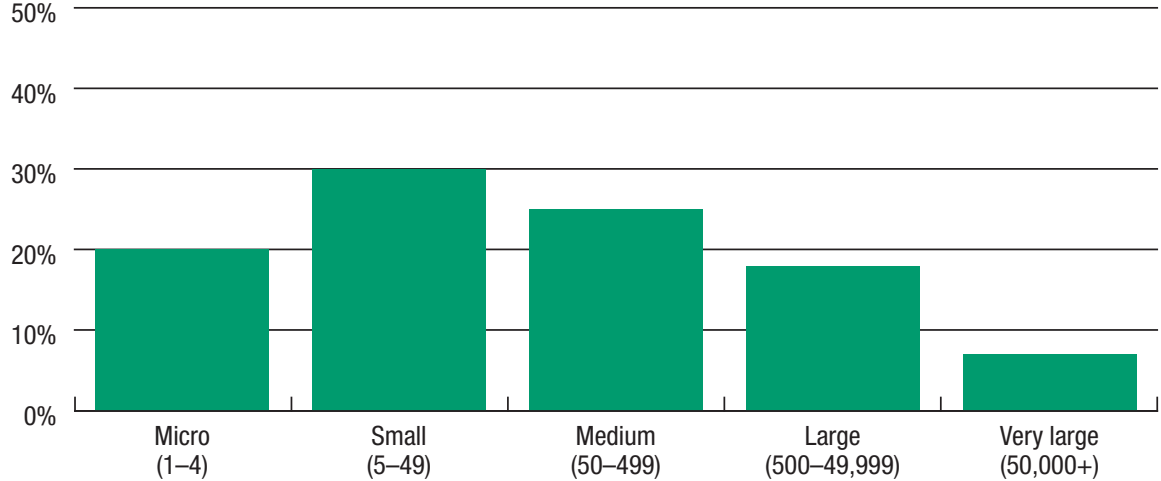
Main Activities of Employers

ACTIVITIES	%
Diamond, test, prospect and other types of drilling for minerals other than oil and gas	70
Gathering, interpreting and mapping geophysical data	54
Evaluate future economic viability of mineral exploration findings	52
Performing other activities for the mining sector not already described	36
Providing advice and assistance to mineral exploration organizations on environmental issues	23
Providing physical, chemical and other analytical testing services related to mineral exploration activities	18
Other	18

Note: Percentage total exceeds 100% because multiple responses were accepted.
Source: kisquared, MiHR, Summer 2011.

As shown in Figure C-9, the majority of employers were small- and medium-sized enterprises. The sample also included larger employers (major mining companies and consultancies).

Figure C-9
Size of Organization



Source: kisquared, MiHR, Summer 2011.



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