



BC HR TASK FORCE
EXPLORATION, MINING, STONE, SAND & GRAVEL

British Columbia Underground Miner Occupational Analysis and Skills Development

Prepared by



The Mining Industry Human Resources Council (MiHR)

on behalf of the

The British Columbia Mining HR Taskforce

June 28th, 2013

Contents

Project Background.....	1
Project Objectives.....	1
Methodology.....	1
Overview of Mining in BC.....	2
Coal Mining in BC.....	5
Underground Mining Occupational Analysis.....	5
Provincial Underground Mining Workforce.....	7
Additional Labour Pressures on Underground Mining Workforce Pool.....	7
Underground Miner Training Programs in BC.....	7
Provincial Mining Skills Development Initiatives.....	7
Regional Workforce Tables.....	8
Centre of Excellence in Mine Training – NWCC.....	9
Current Underground Mine Training Programming.....	9
Provincial Mine Training Developments.....	11
Case Studies of Underground Mine Training Programming.....	13
Underground Mine Training: New Gold and BCAMTA.....	13
Program Overview.....	15
Success Factors and Lessons Learned.....	15
Underground Mine Training: North Island College.....	16
Program Application.....	17
Program Overview.....	17
Success Factors and Lessons Learned.....	18
Alignment of Underground Miner Training with the NOS.....	18
Curriculum Review Process:.....	19
Curriculum Review Key Findings.....	19
Curriculum Gaps in Underground Mine Training.....	19
Soft-Rock Underground Mining Competencies.....	19
Evaluation of Soft-rock Modules.....	20
Summary of Key Findings and Conclusions.....	20
Potential Courses of Action.....	21

Figures

Figure 1 Value of BC's Coal and Base Metal Exports..... 3
Figure 2 Coal Production in BC..... 5
Figure 3 Estimated BC Underground Mining Workforce 7
Figure 4 Mining and Exploration Employment Skills Access..... 8
Figure 5 Underground Mine Training in BC 10
Figure 6 Canadian Dehua International Mines Group 11

Project Background

In 2010, the British Columbia Mining HR Taskforce (the Taskforce) commissioned a study to examine industry demand for credentialed occupations in the areas of Surface Miner, Minerals Processing Operator and Underground Miner. This work involved consultation with BC mining industry stakeholders to assess the level of industry support for creating an occupational recognition program under the Industry Training Authority for the three occupations in collaboration with the Resource Training Organization.

Ultimately, the outcome of this research supported a concentration on the surface miner and minerals processing occupations. Less emphasis was placed on underground miners, given the prevalence of surface miner operations in BC and based on the fact that the forecasted number of workers to be hired in this occupation was relatively small by comparison. At the time, the Taskforce decided to revisit the underground miner occupation in the future.

In October 2012, MiHR and the Taskforce published an updated Labour Market Information report for British Columbia. At the same time, some emerging new mining projects in BC suggested the need to re-examine the skills requirements and available training for underground miners.

Project Objectives

The primary goal of this work was to examine the National Occupational Standard (NOS) – Underground Miner, developed by MiHR in 2009 to highlight the key skill requirements and resulting training requirements.

This work included a validation of the specific skills related to soft-rock underground miners (i.e. coal), an inventory of existing underground miner training programs in BC, and a comparison of these programs with the requirements under the NOS. This information identified the types of training and skills development programs that support getting the right people with the right skills into the emerging jobs in underground mining in BC. The findings from this research will provide the Taskforce with baseline data to support the development of specific recommendations for training and skills development programs in BC that support the underground miner occupations.

Methodology

In order to meet the project objectives, this study included both secondary and primary research elements. The findings from initial secondary research were validated through a series of industry, education, government and community consultations. Primary research methods for this study included telephone interviews, in-person key informant interviews, consultation sessions, and sub-committee

facilitation. The following lists the stakeholder groups and specific organizations and departments that were consulted during the research process.

Key interviews and consultations;

Education

- North Island College
- Northern Lights College
- Institute of Mining Technology BC
- Northwest Community College
- Prairie State Energy Campus, Washington County, Illinois
- British Columbia Aboriginal Mine Training Association (BCAMTA)

Government

- Ministry of Energy, Mines and Natural Gas, British Columbia
- Ministry of Advanced Education
- Ministry of Jobs, Tourism and Skills Training

Employers

- HD International Mining
- Prairie State Energy Campus, Washington County, Illinois
- Quinsam
- Dehau
- New Afton
- Nyrstar, Myra Falls

Overview of Mining in BC

The BC mining and exploration industry is a cornerstone of the provincial economy, and there exists strong government support for the development of socially and environmentally responsible mining operations.

“First, the Ministry is working to create eight new mines and expand nine existing ones by 2015. If this is achieved it is estimated to increase mining revenue by \$1.6 billion, create 7,000 jobs, and generate over \$150 million per year in government revenues”. (BC Jobs Plan)¹.

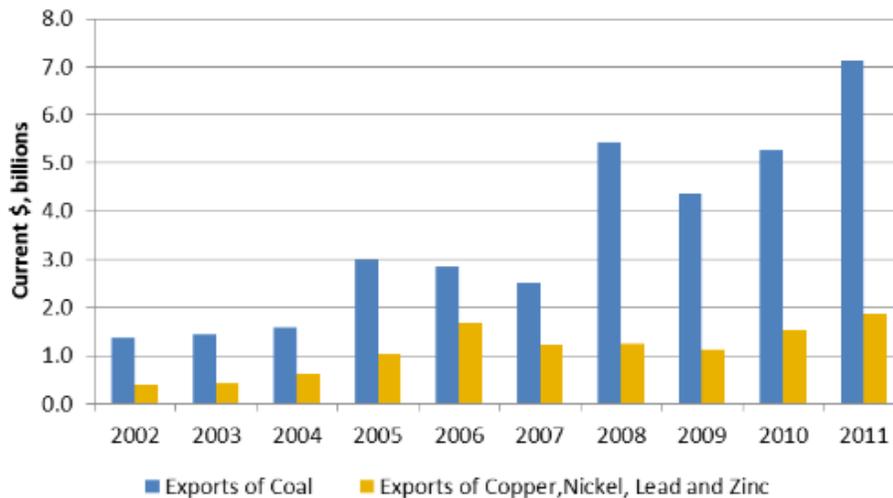
In 2011, the value of BC’s mining production was approximately \$8.6 billion making it the third largest provincial or territorial mining region in Canada². With particular reference to the specific commodities, the value of BC’s coal and base metal exports have been steadily increasing over the last decade. As

¹ <http://investnorthwestbc.ca/sectors/mining>

² <http://mmsd.mms.nrcan.gc.ca/stat-stat/prod-prod/2011-eng.aspx>

shown in Figure 1, coal exports in 2011 exceeded \$7 billion, and BC remains the largest coal producer in Canada. The expanding coal exports in British Columbia can largely be attributed to the increasing demand for coal from Asian markets.

Figure 1 Value of BC's Coal and Base Metal Exports³



Despite the long term forecast for expanding exports, these forecasts should be tempered with the reality of recent market fluctuations in the first quarter of 2013 - resulting in a number of Canadian projects being postponed and some organizations incurring layoffs. These market shifts should be considered in the understanding of the BC mining industry; however, as seen in 2008 and early 2009, the industry has a tendency to recover quickly from economic downturns and organizations need to be proactive in preparing their workforce and financing for the upswing in the market.

With regards to mining operations, the BC mining industry has been traditionally characterized by surface or open-pit mining operations. This can largely be attributed to the significance of the coal industry within the province's commodity mix, and the presence of surface operations (with the exception of Quinsam) at the operating coal mines within the province.

In contrast, there are currently 11 out of the 40 producing mines that have underground operations. These include⁴:

- New Gold, New Afton;
- Imperial Metals Inc., Mt. Polley;
- FortyTwo Metals Inc. (Roca Mines Inc), MAX;
- Barkerville Gold Mines Ltd., QR;

³ http://www.acareerinminingbc.ca/sites/default/files/71666_b_bc_report_web.pdf

⁴ The list of underground operating mines is subject to change and should be referenced only as an indication of producing underground operations.

- Nyrstar Resources, Myra Falls;
- Walter Energy, Inc. Wolverine;
- Hillsborough Resources, Quinsam Coal;
- Huldra Silver, Treasure Mountain;
- Klondike Silver, Sandon Mining Complex, Slocan;
- Bralorne Gold Mines, Bralorne;
- Seabridge Gold, KSM.

For hard rock mines, a number of former surface mines have the potential to be converted to underground production. As seen in gold and copper mines in the province, as the open-pit mining reaches its economic viability, mines may begin the process of exploring the feasibility of underground operations. This strategy is often used in the latter stages of a mine's life. Most open pits which have reached their economic limits are conducive to bulk tonnage mining methods; block caving, sub-level caving, and long-hole stoping.

The New Afton project represents a good example of an open-pit mine which had previously been mined, and is now reinvigorated as an underground mine utilizing block caving methods. Other sites that are considering the feasibility of going underground include; Highland Valley Copper, Mount Polley, Kemess, and Red Chris.

With regards to soft-rock mining, underground operations are being considered as part of the exploratory phases of projects in Northeastern BC and one development on Vancouver Island (Raven Coal). Due to these projects infancy, underground coal mining may become a reality in BC but it is likely 5 – 10 years in the future⁵.

In addition to the coal projects, there are a number of small to medium sized underground metal projects in various stages of the mine development process. Three examples are topical: The Tulsequah Chief proposed mine has recently completed permitting and attracted a foreign investment to proceed, the Treasure Mountain underground project recently began production and the Elizabeth project also attracted an investor making its development more likely. Collectively, this group of operations might represent 6-10 new operations and employment figures of 400-500 employees⁶.

With the increasing evaluation of underground operations at brownfield sites, the development of new soft-rock and hard rock underground operations – there are indications of growing potential for underground mining operations in BC. Collectively, these developments in underground operations may suggest a need to examine underground mining training requirements in BC to help ensure the appropriate competencies are reflected within BC's mining workforce.

⁵ Interview Summary of discussion with Bruce Madu, Director, Minerals Development Office, Ministry of Energy, Mines and Resources, British Columbia - Thursday, February 28 2013

⁶ Interview Summary of discussion with Bruce Madu, Director, Minerals Development Office, Ministry of Energy, Mines and Resources, British Columbia - Thursday, February 28 2013

Coal Mining in BC

The coal mining industry in British Columbia occurs predominately in three areas, the northeastern corridor, the southeastern corridor and in the Comox valley on Vancouver Island. There are currently 10 coal mines in operation in BC, 9 metallurgical coal mining operations and one thermal coal mine. The thermal coal mine, Hillsborough Resources Quinsam Mine, is also the sole operating underground coal mine in the province with the remaining coal mines operating surface or open-pit mines.

“Coal mining in British Columbia is estimated to contribute just over \$3.2 billion in value-added GDP activity to the provincial economy. Contributions to GDP included \$2.2 billion of direct mine site activity and under \$1 billion estimated from mining supply and other related economic activity. As a percentage of the national coal industry, British Columbia represents 62% of total estimated contributions to national GDP”.⁷

From the 2012 PWC British Columbia mining survey, Figure 2 illustrates the actual production, the number of days the mills were in operation, and the average employment in seven of BC’s operating coal mines⁸. Of the respondents indicated, the largest coal employers in the province were Elkview and Fording River with an average of over 1000 employed at each operation.

Figure 2 Coal Production in BC⁹

Coal Mines	Annual rated plant capacity (metric tonnes)	Actual tonnes produced	% of capacity	Days mill operated	Average employment
Coal Mountain	3,301,000	2,682,000	81%	355	312
Elkview	5,865,000	4,653,000	79%	301	1,037
Fording River	10,096,000	8,920,000	88%	320	1,194
Greenhills	5,100,000	4,509,000	88%	322	617
Line Creek	3,816,000	3,416,000	90%	310	514
Quinsam Coal	1,500,000	566,000	38%	350	281
Walter Energy*	5,500,000	4,530,000	82%	350	889

*Walter Energy includes both the Wolverine and Willow Creek properties

Underground Mining Occupational Analysis

In 2012, MiHR partnered with the BC HR Task Force to publish a labour market report, *British Columbia Hiring Requirements and Available Talent Forecasts*. This research provided MiHR’s hiring requirements and available talent forecasts for BC’s mining industry over a 10 year horizon.

⁷ http://www.coal.ca/wp-content/uploads/2013/02/FINAL_Coal-Association-of-Canada_BC-EIA-Feb-15-2013-1.pdf

⁸ Seven of the ten operating coal mines provided data responses for the PWC’s survey

⁹ based on the table illustrated on page 22 of the PWC publication -

<http://www.pwc.com/ca/en/mining/publications/pwc-mining-survey-bc-2013-04-en.pdf>

Among the occupations considered in MiHR's 2012 report were occupations related to underground mining. Specifically, MiHR's forecasts included three occupations, defined under the National Occupational Classification (NOC) system as:

- Underground production and development miners (NOC I131),
- Underground mine service and support workers (NOC I141), and
- Mine Labourers (NOC I214).

This section provides an overview of the forecasted of hiring requirements and available talent in these three occupations (collectively called UGM – Underground Miners) drawn directly from the 2012 BC Labour Market report.

According to MiHR's forecasting model, the British Columbia mining industry will need to hire between 675 (contractionary scenario) and 1,000 (expansionary scenario) UGMs over the next ten years. The report's baseline scenario projects hiring requirements for UGMs of approximately 845 workers. These hiring requirements are driven largely by replacement needs, given the age structure of the existing mining workforce. MiHR notes that these projections of hiring requirements are very conservative, given the year-over-year volatility of employment in the mining sector. If some of the anticipated growth in underground mining activities described in previous sections of this report materializes, hiring pressures for UGM occupations could actually be significantly higher.

In contrast, the analysis of new available talent shows that UGM occupations in British Columbia are facing significant losses in available talent, especially for Underground Production and Development Miners (NOC I131). The MiHR projections of total new available talent in the three UGM occupations could amount to approximately 730 workers.

Adding to this pressure for BC is the competition for UGMs from other mining operations across Canada. MiHR's soon-to-be published National Mining LMI report, lists all three of the UGM occupations among the top mining occupations for which there simply will not be enough new talent entering the labour pool. These occupations require considerable growth in the labour pool in order to meet the forecasted hiring requirements.

“For mining-industry occupations, for example, underground miners, the responsibility for growing the labour pool falls directly onto the mining industry, along with its partners and stakeholder in education, government, special interest groups and associations” (MiHR, Canadian Mining Industry Employee, Hiring Requirements and Available Talent: 10-year Outlook, 2013).

Provincial Underground Mining Workforce

The following table outlines the current employment levels for underground miners (not including trades or other occupations) at selected mining projects. This data was collected through telephone interviews and supplemented with survey responses, where available.

Figure 3 Estimated BC Underground Mining Workforce

Mine Site	Current # UGM employees
New Afton	180
Quinsam	55
Myra Falls	140
Dehau	N/A
HD Mining	N/A
Mount Polley	10

Additional Labour Pressures on Underground Mining Workforce Pool

Outlying the proposed mining operations within the province of BC, there exists significant pressures on the pool of qualified Underground Miners from competitive industries and projects. Potential sources of strain on the labour pool include developing regional surface operations, such as Red Chris, and sustained competitive labour pressures from the oil sands. Resource and industrial projects should be considered in the assessment of the labour pool in BC as these projects compete for workers with transferable skill sets to Underground Miners.

The timing of workforce development is crucial to ensuring the additional pressures on the labour pool are managed. Skills development takes time, and challenges in transitioning trainees to effective employees should not be underestimated. In order to manage skill readiness, employers need to be engaged with training providers prior to recruitment of their workforce. It is recognized that building collaborative partnerships throughout the mine lifecycle is essential to ensuring that employers have the right number of people with the right skills at the right time.

Underground Miner Training Programs in BC

Provincial Mining Skills Development Initiatives

“Under the BC Jobs Plan and BC Skills and Training Plan, government is actively working to ensure that British Columbians have the skills they need to be first in line for jobs in the province through an

investment of \$75 million for new capital and equipment to complement \$500 million in annual investments in employment and skills training programs”¹⁰.

In addition to the funding allocated through the BC Taskforce, the provincial government invests in the following skills initiatives (outlined in Figure 4) that are directly related to the mineral exploration and mining industry.

Figure 4 Mining and Exploration Employment Skills Access¹¹

Employment Skills Access

Employment Skills Access provides tuition-free, group-based training at public post-secondary institutions in response to regional priorities. Highlights related to the mining sector include the following

Underground Mining (North Island College), a four-month program for participants to address labour shortages and skills gaps in underground mining;

Mining Fundamentals (Northern Lights College), a 12-week program to prepare people from Chetwynd for entry-level positions at a surface mine operation;

Mothers to Miners (Northern Lights College), a 12-week program for women from Tumbler Ridge to prepare them for entry-level positions at a surface mine operation (students are primarily trained in haul truck driving);

Introduction to Geographical Information Systems (University of Northern BC), a three-month certificate program for 14 participants. Designed for workers with little or no experience, this program will provide a broad skill set for employment in the oil and gas and mining sectors; and

Northern Skills Training Pilot, an 18-month essential skills training initiative to upgrade the skills of 840 forestry and mining workers in northern B.C.

Regional Workforce Tables

In April of 2013, the provincial government announced increased access to regional training opportunities through a one-time funding of \$7 million to 19 post-secondary institutions. This funding came through the Canada-British Columbia Labour Market Development Agreement. As part of the overall funding, \$1 million was being provided to support short-term training that aligns with the outcomes from the Regional Workforce Tables. Additionally, \$900,000 has been allocated to support short-term training initiatives related to the activities of B.C.’s Centres of Training Excellence.

¹⁰ http://www2.news.gov.bc.ca/news_releases_2009-2013/2013PREM0050-000697.htm

¹¹ <http://www.bcjobsplan.ca/wp-content/uploads/MiningStrategy2012.pdf>

The Regional Workforce Tables occurred from January 2012 – January 2013 in Terrace, Dawson Creek and Cranbrook. The purpose of these forums was to bring together educators, industry and community to plan the alignment of existing regional training programs with local employment opportunities.

Centre of Excellence in Mine Training – NWCC

There are currently two BC Centres of Training Excellence that were established under the BC Skills and Training plan, one focused on mining, and one focused on oil and gas. Northwest Community College (NWCC) is the lead partner of the Centre of Excellence in Mine Training, a virtual establishment. It is envisioned that NWCC will act as a centre point of contact to support educational collaboration in mining and exploration training and skills. The Centre received \$400,000 from Advanced Education, and held an initial stakeholder workshop on May 23, 2013. From the initial workshop, it was proposed that the strategic planning process for the Centre commence in the fall of 2013.

Current Underground Mine Training Programming

British Columbia is home to both private and public training organizations which provide mine training programming. Figure 5 highlights the current Underground Miner Training programs being offered in British Columbia.

Figure 5 Underground Mine Training in BC

Training Provider	Program Status	Program
North Island College	Open	Underground Mining – offered through Continuing Education, no fee for ESA applications
New Afton/BCAMTA	Open	Underground Mine Program
Institute of Mining Technology of BC (Canadian Dehua International)	Developing	Underground Mine Training – in process of applying as a private college in the province
Northern Lights College	Developing	MOU with HD Mining to build underground miner program, currently have mine induction training
British Columbia Institute of Technology (BCIT)	Programs of Note	AMTP – bridge into Mining Technology Diploma Program
Thompson Rivers University (TRU)	Programs of Note	Mining Skills for an Entry Level Workforce
Northwest Community College	Programs of Note	Driller Blaster for Mining (under development), Heavy Equipment Operator Foundation - new, Heavy Equipment Operator Technician - Apprenticeship, Intro to Trades - new, Mining and Minerals Processing Operator Training (under development), Drill Core Technician Basic Training, Surface Diamond Driller's Helper, Prospector Basic Training, Mining Exploration Field Assistant, Introduction to Metal Leaching and Acid Rock Drainage, Workforce Exploration Skills Training
College of New Caledonia	Programs of Note	Mining Industry Certificate
College of the Rockies	Programs of Note	Mining Apprenticeship Program

Provincial Mine Training Developments

In response to the increasing demand for coal miners in BC, mining employers, training institutes and other stakeholders have taken actions to increase skills training in the province. The following training initiatives represent education and industry skills collaborations at various stages of development. These initiatives should be considered as part of the overall mine training landscape in the province of BC.

Memorandum of Understanding HD Mining and Northern Lights College:

As part of a multi-year plan, “HD Mining has signed a Memorandum of Understanding (MOU) with Northern Lights College to train local workers in long-wall mining operations. Under the scope of activities outlined in the MOU, Northern Lights College and HD Mining will”¹²:

- Develop a relevant curriculum;
- Develop relevant simulation modules; and
- Identify partners for program infrastructure.

The multi-year training plan is intended to shift the make-up of the HD Mining Workforce, “following the start of production, every year, 10% of the workforce will be transitioned to Canadian workers. This means that after 5 years of production, the mine would have a 50% Canadian workforce of approximately 300 workers, and after 10 years of production, the mine would have a full Canadian workforce of 600 workers.”¹³

Institute of Mine Training British Columbia (IMTBC)

Canadian Dehua International Mines Group Inc. is a mining company engaged in coal investment and development in British Columbia. Dehua and its partnering organizations are invested in the following projects in North Eastern BC.

- Gething Project
- Murray River Project
- Bullmoose River Project
- Wapiti River Project¹⁴

The following table highlights the organizations structure, partnerships and significant coal projects.

Figure 6 Canadian Dehua International Mines Group

Cooperative Enterprises
Kailuan Group
Shougan Group
Huiyong Holdings Group Co., Ltd.
Hebei Iron & Steel Group., Ltd.
Shangdong Energy Group Co., Ltd.
Co-partnership Company

¹² <http://www.hdminingintl.com/resources/pdf/transition.pdf>

¹³ <http://www.hdminingintl.com/resources/pdf/transition.pdf>

¹⁴ <http://www.dehua.ca/projects.asp>

HD Mining International Ltd.
Kailuan Dehua International Mines Group
Canadian Dehua Lvliang International Mines Group Inc.
Wholly-owned Subsidiaries
Institute of Mining Technology BC
Canadian Dehua Drilling Ltd.
Canadian Dehua Yukon Company.

To meet the impending labour needs Canadian Dehua International Mines Group is in the initial stages of developing an educational institute. It is proposed, that the Institute of Mine Technology of British Columbia (IMTBC) will provide underground mine training within the province of BC with initial intake of students planned for January 2014. IMTBC has submitted a provincial application of registration under the Private Career Training Institutions Agency (PCTIA).

In efforts to develop the institute’s curriculum, IMTBC has been actively pursuing partnerships with local provincial colleges and schools, and has pursued partnerships with education institutes with coal expertise in the USA, including Pen State University.

Based on a prior learning assessment, the program will include a series of training modules that will allow for trainees to customize their learning experience.

The new training institute - will focus on the training and development of two key workforce groups;

- Unemployed
- Aboriginal people

The program is envisioned to include both coursework and a practicum. It is suggested, that the practicum will provide a bridge to employment for the graduating trainee. Once graduated, the students will be presented with an opportunity to work at a Dehua mine site in BC, and career development support will be provided. It is anticipated that students may return to the institute during the development of their career to upgrade their training (management, supervisory roles, etc.). Partial or complete tuition may be reimbursed as part of the employment contract.

Tuition fees for the program will likely fall within the range of \$17,000–\$22,000, and the location will likely be within the lower mainland. The location, infrastructure and specific technologies utilized within the training institute were not determined at the time of this research; however, technology investments will likely include the investment in simulation training. At time of report, IMTBC was currently establishing a program advisory committee.

The Immigrant Employment Council of BC – Employer Innovation Fund - Northern Lights

In 2013, the Immigrant Employment Council of BC announced the awarding of \$1.4 million from the Employer Innovation Fund to assist employers, educators, and community partners for initiatives that integrate skilled immigrants into BC workplaces. As part of this funding, Northern Lights College received funding for the development of occupational performance standards and trail competency assessments

from non-trades occupations in the Oil & Gas and Mining industries. This project is collaborative between the industry partners and the college.¹⁵

Trend in investment in Simulator Training

Employers and educators indicated a strong interest in the evaluation and purchase of training simulators to support mine skills and training programs within the province. This reinforces recent provincial and employer sponsored investments in training simulators. In May of 2013, NWCC received \$573,380 in funding for the purchase of ten Heavy Equipment Operator virtual training simulators¹⁶. Similarly, the College of the Rockies received \$1.7 million in a federal government grant for five haul-truck training simulators¹⁷.

Case Studies of Underground Mine Training Programing

Underground Mine Training: New Gold and BCAMTA

New Afton mine is located west of Kamloops, within the asserted traditional territories of the Tk'emlúps and Skeetchestn Bands. The New Afton Participation Agreement with local First Nations ensures preferential treatment for business owners from the bands and their business partners,¹⁸ and preferential hiring for equally qualified job candidates.

In response to internal hiring requirements for underground workers, the initial need for Underground Mine Training was recognized by New Afton. Built in alignment with the National Occupational Standard, New Afton developed and ran this Underground Mine Training program; providing training to newly hired employees.

BCAMTA Established

In January 2010, a group of industry, First Nations communities and organizations, education and government partners were awarded funding through a Human Resources and Skill Development Canada, Aboriginal Skills and Employment Partnership (ASEP) grant. This grant along with industry contribution supported the development of the British Columbia Aboriginal Mine Training Association (BCAMTA).

Through this funding allocation and industry contributions, BCAMTA and its partners have provided training-to-employment plans covering a broad range of opportunities including: academic upgrading,

¹⁵ <http://www.iecbc.ca/our-initiatives/employer-innovation-fund/eif-funded-projects#NLC>

¹⁶ <http://nwcc.typepad.com/connections/trades/>

¹⁷ <http://beaconnews.ca/edmonton/2013/03/college-of-the-rockies-gets-1-7-million-from-ottawa-for-mining-training/>

¹⁸ <http://www.newgold.com/properties/operations/new-afton/sustainability-and-environment/default.aspx>

job specific training and apprenticeships, retention counseling and other on the job support for Aboriginal people¹⁹.

Highlighting the importance of industry-led skills training, the specific Underground Mine training partnership with BCAMTA was developed after the training program was created and implemented at the New Afton mine site. New Afton is represented on the Board of Directors and played a significant role in the founding of BCAMTA. The partnership between BCAMTA and New Afton has been very successful; BCAMTA provides the critical link between the needs of the employer and the needs of the community of potential employees.²⁰

BCAMTA Training Process

BCAMTA has worked with New Afton and other partners in candidate assessment, support, and training program development that integrates cultural traditions and experiential learning.

“The programs not only develop appropriate skills and training, they build confidence and self-esteem too. These elements are critical to producing long-term benefits for the individuals, communities and companies who are committed to long-term working relationships.”²¹

The BCAMTA training process is a responsive process that is set into action by a recognized employment need.

- 1) Employment need and opportunity is identified by First Nation or Mining Industry partner (ex. New Afton).
- 2) The skills and qualifications for the employment opportunities are determined.
- 3) The Capacity of the First Nation community to meet the need is examined.
- 4) Training Gaps are determined, and training programs are designed, implemented by post-secondary partner.
- 5) Program coaching support is provided throughout.²²

Aboriginal applicants apply to BCAMTA and a Test of Workplace Essential Skills is conducted (TOWES). To ensure readiness to learn, BCAMTA includes program screening in their ‘Pathways to Success Program’, this process includes prior learning assessment for essential skills and training plans to mitigate any essential skill gaps in reading, comprehension, document use etc. Once assessed, qualified applicants are recommended to programs such as the Underground Mine Training Program offered in partnership with New Afton.

¹⁹ <http://www.bcamta.ca/latest-news/2010/01/british-columbia-aboriginal-mine-training-partnership-launched>

²⁰ http://www.newgold.com/files/documents_properties/new_afton/2011_New_Afton_Sustainability_Report.pdf

²¹ http://www.miningandexploration.ca/britishcolumbia/article/the_bc_amta_will_continue_to_provide_valuable_services/

²² Summary of BCAMTA Training to Employment Presentation;

http://www.resourcesnorth.org/downloads/BC_Aboriginal_Mine_Training_Association-Nadine%20Israel.pdf

Program Overview

The Underground Mine Training Program is an 8 week program that provides training on;

- mine greenfield exploration
- development production method
- equipment
- safety
- legislation
- culture of the mine
- Mechanics.

The Underground Mine Training program's development team recognized the need for the program to include both theory and experiential training elements, and to minimize the time lag between theory, experiential learning, on-the-job training and full employment. This included establishing the need to apply the theory in a working mine, including bringing a trainee onto a functioning site. Reducing the time lag and ensuring smooth transition for trainees allows for the retention of key learning outcomes, and ultimately the ability to more efficiently build competence.

With regards to training infrastructure, the New Afton mine sites provides a critical opportunity for experiential training, while Thompson Rivers University supports the program delivery by providing training spaces and educational resources on their campus (located just 10km from the New Afton mine site).

Success Factors and Lessons Learned

- *Work through detractors by continuously supporting the program and the learner's development, and demonstrate success early on to build momentum.*
- *Strong industry connection and willingness to customize program for employer needs while respecting and supporting the learner and community.*

In alignment with the program's focus on removing gaps between theory, experiential learning and employment, ongoing coaching and feedback support is provided by BCAMTA to the learners. This ongoing support enables the trainee, BCAMTA, the employer and supportive educational institutes to mitigate and manage any learning or participation barriers. This highly integrated level of support and stakeholder partnership has resulted in extremely strong program completion rates and employment retention rates.

Another success of this program is in the flexibility of the providers. The program is a living thing – and can be adjusted to meet the needs of the employer, community, and learner. To meet recent employment needs the program was reduced from 8 weeks down to 6 weeks.

There have been efforts to balance both team building within the training cohort, and ensuring individualized learning experiences. For example, during their first on-site orientation, efforts have been made to ensure the complete training class attends together, and as the program progresses smaller working groups develop. To do this, the equipment trainers separate the larger class into smaller working groups and rotate them through pieces of equipment at the mine site. This approach has provided a more enriching experience for the learner and reduces the impact on operations at the site.

The program utilizes flexible training options to ensure the learner and the mine site mutually benefit from the training program. For example, when opportunities are presented learners may work with a supervisor to job shadow in their interactions with suppliers, or for other special projects at the mine.

This program has not been applied in a soft-rock setting to date, but there is flexibility to develop the program to include soft-rock modules. Currently the program is being considered for customization for surface mining. The initial intake of students was over 25 learners, and to date there have been over 120 individuals trained through the New Afton Underground Mine Training program; and approximately 40 of these individuals are BCAMTA graduates.

Results and Key Metrics

- 120+ graduates from the New Afton Underground Mine Training Program; approximately 40 BCAMTA graduates
- 533 BC AMTA candidates currently working in the mining and exploration industry;
- 23% self-identified Aboriginal workers at the New Afton mine
- 65% of BCAMTA candidates have transitioned from unemployment
- 1579+ candidates registered
- 150+ First Nation bands represented (122 BC-based First Nations)
- 1:3 Female to Male ratio
- 43% of BCAMTA candidates are under the age of 35

Awards and Recognition

- Recipient of the 2013 BC Mining HR Diversity Award (BCAMTA and New Afton)

Underground Mine Training: North Island College

In 2011, in response to a government announcement of Employment Skills Access (ESA) funding and forecasted regional labour needs, North Island College applied for a funding grant to support the development and facilitation of an Underground Mine Training Program at the Campbell River College Campus. In December of 2011, North Island College received \$1.9 million for a number of ESA

programming initiatives – including the Underground Mine Training Program. This ESA funding ends in the fall of 2013.

As part of the funding application, local mining employers were contacted by the college and consulted in the development of the training program. These employers included Quinsam Coal, Myra Falls and Raven Coal (currently in permitting).

The foundation for the Underground Mining curriculum was purchased from instructors who developed the New Afton Underground Training program. The curriculum was then further developed and refined in partnership with a team of highly skilled regional subject matter experts with particular experience in soft-rock mining. Many of these subject matter experts are also hired by the college as instructors in the delivery of the program.

Program Application

As part of funding requirements under the ESA program, individuals that qualify for program access are unemployed but are not currently collecting employment insurance. The tuition for the programming is subsidized through the programming and as a result program participants do not pay tuition. The program has completed five intakes of students, and each cohort has consisted of 12-15 learners. In anticipation of the ESA funding agreement ending in the fall of 2013, the college will be shifting from a restricted program access to open enrollment and a tuition based model for students. It is anticipated that open enrollment for the program will commence in January of 2013.

Program Overview

The Underground Mining Program at North Island College focuses on the following key areas.

- Introduction to the Mining Industry
- Mine Health and Safety
- Fundamentals of Mining Technologies
- Introduction to Mining Skills
- Emergency Mining Procedures
- Worksite Readiness

There is strong support from the instructors and the educational institute to provide a balance of both in-class and experiential training opportunities for the learners; with an emphasis on making the program as applied as possible.

Within the training environment the college has incorporated experiential learning outcomes throughout the program, and continues to refine the delivery of training modules through multiple feedback avenues. These include connecting with the local employers, reviewing learning outcomes of

students on a consistent basis and updating core curriculum in response to the instructors, employers, and student feedback.

Success Factors and Lessons Learned

Work Experience and Transitioning to Employment

One of the key challenges that North Island has experienced is ensuring students receive meaningful work placements. These work placements are to be completed as part of the students' practical experience in the program. Both work experience and on-site training or orientation have been challenging to coordinate, as there are often operational limitations that have occurred for the mine sites – making it challenging for them to have students on site.

In addition, there have been few employment placements of recent graduates within the mining industry in the region. Immediate hiring needs in the region are limited as Raven Coal undergoes initial permitting process, and the existing mines are staffed to capacity. From discussion with the college, graduates have been more successful in gaining employment within the oil and gas sector and other industrial and mining opportunities outside of the region.

Through the cohorts, North Island College has found ongoing coaching and support for the trainees from the beginning of the program and through completion to be a significant factor in program completion and the graduates' abilities to obtain employment upon completion. As ESA eligible students often face multiple barriers, strong pre-assessment to ensure commitment from students, combined with the flexibility to provide additional resources and support throughout the training process is crucial to the student's success. North Island College performs continuous evaluation and development of the program, through feedback from the instructors, educators, industry and students.

Alignment of Underground Miner Training with the NOS

As part of this research work, both BCAMTA and North Island College participated in an assessment process to determine alignment of the Underground Miner Training programs with the existing National Occupational Standards (NOS) for Underground Miners.

From the interviews and consultations with both training providers it was made clear that both programs were developed using the NOS for Underground Miners as the guiding standard for curriculum development.

Curriculum Review Process:

Both training providers reviewed the curriculum matrix, which outlines the key learning outcomes for each competency within the standard, and then completed a self-assessment of their curriculum. This assessment was conducted by referencing the sections of curriculum that aligned with the specific learning outcomes.

Curriculum Review Key Findings

- Current programing in the province is reflective of the Underground Miner (NOS).
- For each program, it was identified that learning outcomes are achieved through a mix of theory and application
- The process of curriculum analysis and subsequent audit of the programing was valued by participating educational institutes, as it provided context for further program amendments, and was seen as the initial step towards national accreditation of the training programs.
- It was noted that Industry endorsement and maintenance of NOS is key to ensuring learning outcomes and ultimately program validity is aligned with industry employer needs.

Curriculum Gaps in Underground Mine Training

Through the scan of current programs in BC there exists a shortage of training options to fill the anticipated demand for Underground Miners. It was acknowledged that the focus of programing (soft-rock/hard-rock) was a significant factor in determining the skill set and expected employment opportunities for graduates. There exist specific technologies that are being utilized by colleges and industry – including simulators where it is unclear of the industry validation of these resources and the extent of coordination in investment within the province. In addition, employers' future needs for workers with experience and knowledge of specific mining methods –namely long-wall soft-rock mining may be an identified gap in the available training within the province.

The diversity of the students or trainees should be considered moving forward to ensure under-represented labour groups (women, new Canadians, Aboriginal Peoples, and youth) are accessing Underground Mine training in the province.

Soft-Rock Underground Mining Competencies

The Underground Miner NOS was developed over a three year period between 2006 and 2009 by a pan-Canadian panel of industry subject matter experts. The National Occupational Standard Development Committee was comprised of job incumbents and trainers, specialized in underground mining. The NOS

has been revisited twice since 2009, ensuring that it remains current and relevant to the profession across the country.

In 2010, a smaller group of stakeholders from the Potash industry worked on developing a set of custom competencies for soft-rock underground miners. At the commencement of this research work, the soft-rock modules had yet to be validated by other soft-rock producers such as coal and salt.

Evaluation of Soft-rock Modules

In order to evaluate the soft-rock modules in the coal environment, subject matter experts (SME's) were contacted and two evaluation sessions were held to provide review of the soft-rock modules and their applicability in the underground coal environment.

The following organizations participated in the soft-rock module evaluations;

- Quinsam Coal, Campbell River, BC, Canada
- Power State Energy Campus, Missouri, Illinois, US

It should be noted, that due to the lack of Canadian underground operational coal mines, an American organization was contacted to ensure vigorous evaluation of the soft rock competencies. The subject matter experts from Illinois, USA included a senior manager that had extensive experience in both the US and Canadian underground coal mining.

Detailed amendment recommendations were recorded and will be reviewed by the National Occupational Standards Committee for inclusion in the revised standard.

The key areas of review that were identified through the consultations include;

- Ventilation
- Inclusion of hazardous gases
- Inclusion of equipment, soft-rock mining methods
- Electrical safety

Summary of Key Findings and Conclusions

This research process involved consultation with industry, educators, government and community stakeholders. Through an occupational analysis the need for strategic training of underground miners within the province was identified. There has been significant interest in the development of new underground projects in the province, coupled with exploring the feasibility of increasing or developing underground mining operations at current surface mines.

These new and proposed projects are not without uncertainty, as the process of mine planning to production can be lengthy and is sensitive to a variety of external factors. Despite cautious optimism,

the need for underground miners in the province is still a reality as the sector braces for significant retirements particularly within the Underground Mining occupational category. In order to meet these replacement needs, BC will need to develop new underground miners through a combination of developing skilled workers within the province, and attracting skilled workers from other regions.

The inventory of current Underground Mine Training programs illustrates a need for further training development. To date, there are only two active underground mine training programs in the province. An analysis of these programs revealed a strong link between the programming and the National Occupational Standard, combined with a strong recognition of the value of industry-educational partnerships.

When strong industry-education partnerships exist, skills training is initiated by industry need and characterized by continuous and open dialogue from program inception to program evaluation. These partnerships ensure that graduates of the program are connected to meaningful work practicums and practical training experiences. Ultimately, the measurement of any educational and industry partnership is the capacity of skills training graduates to transition from 'trainee' to 'employee'.

Efficient transition from skills training to employment is essential and the challenges in ensuring that transition further illustrates the value of provincial workforce planning. Consistent and coordinated industry communication will ensure industries needs have a united voice with workforce and hiring needs, skills training and foreign credential recognition.

The alignment of current underground training in the province with the National Occupational Standard will ensure mining employers' workforce needs are addressed through the training curriculum. From the onset of initial training through the progression of skills recognition, linking training programming to the NOS sets learners and workers on a path towards national certification of their skills.

Through the soft-rock module validation sessions, revisions required to the National Occupational Standards have been articulated to ensure that specific skills, knowledge and abilities for underground soft-rock (coal) miners can be incorporated into the National Occupational Standard for Underground miners. In addition, these validated soft-rock competencies can now be used to ensure that the BC training programs under development are able to directly address the specific requirements related pending coal operations in the province. This will help to ensure not only a growing stock of newly trained soft-rock underground workers but will also enable BC to capitalize on experienced underground miners who require supplemental training to support their knowledge of the specialized skills required for underground coal mining.

Potential Courses of Action

In conclusion, the following proposed courses of action were presented to the subcommittee for discussion and as a basis for developing recommendations on future Underground Mining skills development in the province;

- Endorse the NOS in the development and review of mining training curriculum in the province;

- Revive the BC Mining Industry Educator Forum (last held in Kamloops in 2010);
- Support for the development of Centre of Training Excellence in Mining – advocate for the inclusion of an Underground Mine Training advisory committee;
- Advocate for collective and coordinated industry and education validation of simulators (not just individual education and employer partnerships);
- Scope and assess international training partnerships (long wall mining - ex. USA, China, Australia, etc.);
- Explore potential for soft-rock UGM certification (coal) and/or accreditations pilots;
- Encourage migration and mobility within Canada of qualified workers (eg. recruitment of CMCP certified miners that are transitioning from closing mines);
- When training and mobility options within BC and Canada are exhausted, there may still be a need to seek skilled workers from outside of Canada, depending upon the speed with which anticipated projects come into production. In this case, the BC-endorsed National Occupational Standard for Underground Miner should be used as the bench-mark to assess the skills and experience of internationally trained and experienced workers.