



CENTRE OF
TRAINING
EXCELLENCE
IN MINING

SKILLS ROADMAP PROJECT

A Sector Labour Market Partnership

TRAINING ROADMAP REPORT





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Provided by B.C. Centre of Training Excellence in Mining (CTEM).

The views and opinions expressed in this report are those of its author(s) and not
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The artwork on the front cover – The Frog – was gifted to CTEM by Dean Heron.
Dean is a member of the Wolf clan of the Kaska/Tlingit Nation and is a member of
the Skill Roadmap Project Team.

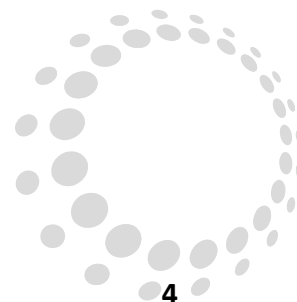
“The frog represents transformation and being the voice and the messenger to carry the work we are doing
forward. The frog depicted here is poised to leap into the future.” ~Dean Heron

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Introduction

BC's mining sector directly employs over 30,000 workers¹ and thousands more through indirect employment and contributes to the economy of local communities throughout BC due to the expenditures of mine suppliers and mine employees living there.

With one of the largest clusters of exploration and mining companies in Canada, BC is recognized as a centre of excellence in exploration and mining-related fields. The Ministry of Energy, Mines and Low Carbon Innovation estimates the total value of mine production in 2020 was \$9.28 billion including coal, copper, gold, industrial minerals, aggregate, molybdenum, and silver². Currently there are 18 active metal and coal mines in BC, 30 industrial mineral mines, 326 active exploration projects (providing an additional \$330 million of expenditure), and over 1,000 aggregate operations near every community in the province.

The sector is dynamic; it is sensitive to global market conditions technology and automation are changing the nature of the work and policy developments are increasing key environmental, social and governance activities. Mining is also experiencing the same changes in the workforce that most industries in the province are experiencing; with more workers leaving the workforce than there are new workers entering it.

2020 was a challenging year as COVID-19 created economic downturns and social uncertainty, impacting both the supply and demand sides.


But as the global economy begins to recover from the pandemic, changes in technology and increased automation continue to provide pressures for the mining sector workforce to evolve its skills to stay current with new technology and innovation that is driving changes in both corporate environments and mining operations. *"Rapid advances in technology innovation, including automation, digitization and electrification, are fundamentally changing how the mining sector operates"*. Automation and robotics are identified as having the most impact in BC, followed by data analytics and the incorporation of electrical and battery-operated vehicles; however, new computer software, artificial intelligence, and the use of drones, virtual and augmented reality, and sensors are all impacting required skills, and in turn, demand for training programs.

Policy developments are also impacting the sector, further evolving the skillsets required by the workforce. Revisions to the *BC Environmental Assessment Act* and the implementation of the *BC Declaration on the Rights of Indigenous Peoples Act (DRIPA)* in 2019, changes to the *Professional Governance Act* in 2021, and the implementation of *BC Mining Tax Incentives 2019* are all impacting the skillsets and training required by the workforce in the mining sector as the sector evolves to take on these key activities and requirements.

Consistent with this, mining is at the forefront of advancing reconciliation with Indigenous peoples and implementation of the *United Nations Declaration on the Rights of Indigenous Peoples (UNDRIP)*. The sector is a key employer of Indigenous people in rural and remote communities, and benefit agreements and revenue sharing provide revenue streams to advance community priorities. The mining sector has been and continues to be a leader in developing and implementing collaborative decision-making and including Indigenous

1 Ministry of Energy, Mines and Low Carbon Innovation. 2022. *Ministry of Energy, Mines and Low Carbon Innovation: Featured Topics*. <https://www2.gov.bc.ca/gov/content/governments/organizational-structure/ministries-organizations/ministries/energy-mines-and-petroleum-resources>

2 Ministry of Energy, Mines and Petroleum Resources. (2021). *British Columbia Geological Survey, Information Circular 2021-01*. Retrieved from https://www.cmscontent.nrs.gov.bc.ca/geoscience/PublicationCatalogue/InformationCircular/BCGS_IC2021-01.pdf



communities in compliance monitoring and verification. These factors are all driving the demand for new and existing workers to increase their skills through training relating to technology and automation, as well as skills associated with increased environmental, social and governance (ESG) priorities.

This Training Roadmap Report provides an overview of technological and aptitude training both available and needed to meet the ongoing evolution of skills and careers in this sector. Findings in this report have been identified through research and engagement with a wide range of subject matter expertise in the mining industry, including industry partners, mining workers, Indigenous communities, Indigenous and non-Indigenous workforce development and service providing agencies, training and education providers, and government agencies.

Opportunities for Use of the Training Roadmap

The Training Roadmap Report utilizes information gathered earlier in the project through primary and secondary research tools. Specifically, a literature review and environmental scan, along with three focus groups, 21 key informant interviews and a survey with nearly 200 responses, were conducted to deepen the understanding of the mining sector workforce. It identified gaps in the research and literature, and the economic, social, labour, technological and policy factors that are shaping and impacting the BC mining sector's skilled workforce and helps to inform this report.

The Training Roadmap is inclusive and representative of diverse perspectives and reflects advancements in technology, innovation, and environmental, social and governance responsibilities. The report elaborates on key themes and findings to date in the overall scope of the Project.

The intended audiences of this report include current, potential, and future mining sector workers; communities; training providers; employers; local, regional, and Indigenous governments; and partnering organizations who support the mining sector.

The Training Roadmap looks at training that is available today and will be needed by the mining sector workforce in the future, including:

- Technological training (e.g., computer and software, information technology operations, and virtual/augmented reality); and
- Aptitude training (e.g., communication, teamwork, collaboration, problem-solving, and creativity).

The Training Roadmap can be used for:

- Charting training pathways for students and workers interested in the sector;
- Determining current training needs and available programming resources for future workers;
- Informing evolving training needs and opportunities for career growth and progression of current workers;
- Highlighting training gaps that may exist for current workers and future workers;
- Providing guidance to training providers who are looking to ensure programming continues to meet the evolving needs of the sector;
- Sharing key factors for training providers and employers to understand in order to recognize and remove barriers to a diverse and inclusive workforce;
- Empowering employers to support and promote workforce engagement, growth, development, and retention;
- Informing ongoing technology requirements;
- Providing guidance for employers to assess current or upcoming training gaps in their workforce;
- Clarifying and informing the environmental, social and governance training requirements for industry (and individual workers) to meet this evolving area of work;

- Informing technology developers and information technology providers on the emerging mining sector technical training needs; and
- Encouraging partnerships between training providers and mining sector employers to increase the effective transition from training to employment.

Additional links to training-related information by other subject matter experts are provided in the Appendices of this report.

For those interested in more information on new and emerging skills in the sector, this project has developed a corresponding Skills Roadmap Report; and for more information on career-related material, readers can refer to the Career Roadmap Report.

Technical Training

The mining industry life cycle (exploration, extraction, processing, closure, restoration) requires a vast and varied workforce; it currently includes more than 120 different occupations, and as a result, the required skills for these occupations vary greatly across these activities.

Consistent with this, there are a large number of training providers who support the development of new mining sector workers; from exploration, design, construction, to core mining activities, corporate and administrative supports, and on to closure, decommissioning and restoration.

The Centre of Training Excellence in Mining (CTEM) provides a training guidebook as a public resource to support individuals looking at career training for mining employment. The following is an outline of the public institutions that currently offer core mining training programming for mining occupations in BC. This is not an exhaustive list of training and education for the sector but provides a good foundation for anyone looking to take on mining related training.

Educational Institute	Programs and Centres
British Columbia Institute of Technology	<ul style="list-style-type: none"> • Centre for Mine Economics and Business • Mining and Mineral Resource Engineering
Coast Mountain College	<ul style="list-style-type: none"> • School of Exploration and Mining • Certificate in Applied Earth and Environmental Studies • Environmental Geoscience Specialization, Associate of Science Degree
College of New Caledonia	<ul style="list-style-type: none"> • Mining Industry Certificate • Mineral Processing Operator Certificate
North Island College	<ul style="list-style-type: none"> • Underground Mining Essentials
Camosun College	<ul style="list-style-type: none"> • Mining Engineering Bridge Program • Department of Chemistry and Geoscience
University of Victoria	<ul style="list-style-type: none"> • School of Earth and Ocean Sciences
Northern Lights College	<ul style="list-style-type: none"> • Land and Water Resources
Simon Fraser University	<ul style="list-style-type: none"> • Department of Earth Sciences, Geology Stream
University of British Columbia	<ul style="list-style-type: none"> • Mining Engineering Program • Department of Earth, Ocean, and Atmospheric Science • MDRU-Mineral Deposit Research Unit



Douglas College	<ul style="list-style-type: none"> • Geological Resources Diploma Program
Thompson Rivers University	<ul style="list-style-type: none"> • Introduction to Surface, Underground and Mineral Processing Certificate
College of the Rockies	<ul style="list-style-type: none"> • Mining Apprenticeship Program
University of Northern British Columbia	<ul style="list-style-type: none"> • Environmental Engineering Program • Environmental Science Program

The full guidebook can be accessed here: <https://www.minerals.ca/site/assets/files/3454/ctem-guidebook-2016-final-web.pdf>. Appendix C also provides links to other subject matter expertise relating to jobs, skills, and training in the mining sector.

Current Training Needs

As the skills needed to meet the various technical, technological, environment, social and governance requirements of the sector evolve, training will become a critical component of ensuring all workers have the tools to carry out new functions effectively.

Students and new workers will need access to the most current technologies and resources and will succeed best with a combination of classroom and on-the-job training. Workers transitioning from other sectors will be well supported if they are recognized for the transferable skills they bring along with them. Mentorships in the workplace will add value to the experience gained on the job and ensure the transfer of knowledge from more senior workers to those entering the workforce.

Regardless of the chosen career path, a commitment to lifelong learning by workers will be critical to keeping skills up to date and evolving along with emerging technology innovation and ESG requirements.

Greater diversity and inclusion in both trainers and mentors will improve outcomes for women and Indigenous learners. Cultural mentorship from Elders who provide a safe space for life skills; cultural and spiritual support; and wise stewardship provide an important piece to inclusion in training.

Overall, and across occupations, research indicates the following types of training are needed in the mining workforce³:

- Training for technology
- Cultural awareness and cultural safety training, reconciliation, human rights, and anti-racism
- Essential skills training (i.e. reading, numeracy, writing, digital technology)
- Leadership training
- Unconscious Bias Training
- Communications Training (ex. active listening and conflict resolution)
- Driver's License Training
- Equipment Training
- Health and Safety Training
- Diversity and Inclusion Training
- Cultural Mentorship
- Bystander or Allyship Training

3 Centre for Training Excellence in Mining. June 2021. *Skills Roadmap Project Key Findings Report*. P.43.

Mining: Technical Training Available Now and in the Future

Technology is changing how training is made available and delivered

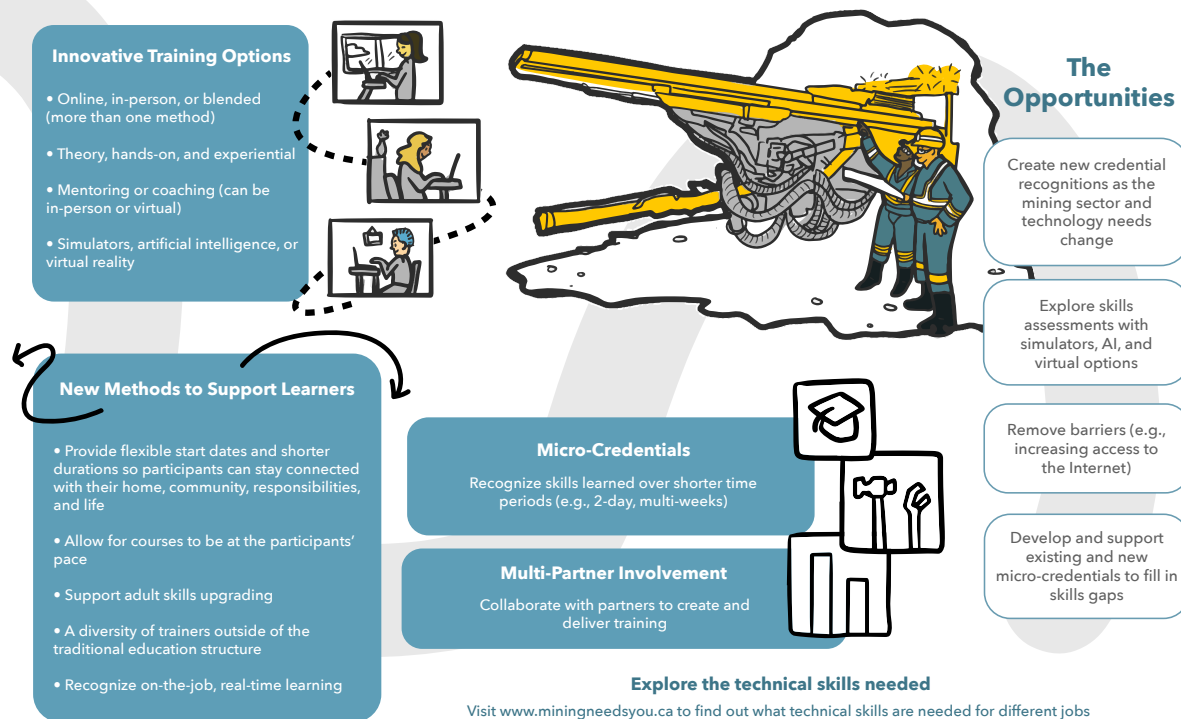


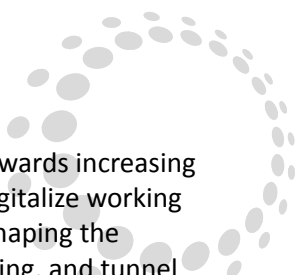
Figure 1 – Technical Training Available Now and in the Future

When asked to prioritize training needed most in the sector, trainer survey responses indicate these to be the top three:

1. Training for technology
2. Cultural awareness and cultural safety training, Reconciliation, human rights, and anti-racism
3. Essential skills training (e.g. reading, numeracy, writing, digital technology)

Impacts on Training Due to Technology Advancement

The impact of technology on training is threefold: advancements in technology are driving the demand for new training to ensure new and current mining sector workers are keeping pace with digitization and automation; technology is providing new and exciting options for training program delivery; and new trainers are emerging from the technology sector allowing for expanded conversations and greater collaboration in training.



Skills involving advanced technological development are increasing due to the movement towards increasing digitization and automation; it is reported that 84 per cent of employers are set to rapidly digitalize working processes, including significant expansion of remote work⁴. Several key technologies are reshaping the sector, including the use of autonomous vehicles, remote operating centres, automated drilling, and tunnel boring systems⁵. In addition, autonomous vehicles and battery powered electric vehicles are now considered proven technology and are being adopted into the mining landscape, expanding the skillsets required by workers.

Technology is also changing how training is made available and delivered. COVID-19 has had a significant impact on the need for remote learning, which has in turn increased access for training to be delivered remotely using technology. This is having a particular impact on learning options available to those in rural and remote areas of the province, providing that internet infrastructure is established enough to support these applications.

Blended training options— using online/virtual delivery, augmented and virtual reality integrations, as well as simulations, are all ways that technology is assisting learners adapt to new skills and new techniques.

Training on new technology, applications and software is often completed by service providers (e.g. software companies) who provide training to mining operations as part of implementation. Recognizing these companies as trainers provides opportunities for new conversations and collaboration potential as the sector explores how to bring services providers to the training landscape in a sustainable way.

Training for Technology

A study conducted by the Workforce Information Council⁶ defines the high-tech sector as industries having high concentrations of workers in science, technology, engineering, and mathematics (STEM) occupations. Movement towards increasing digitization and automation within the mining sector is creating the need for technology-related jobs.

The BC mining sector will experience a period of time where the in-demand skills of today and those of the future will intersect; therefore, it will become increasingly important to identify those skills that will continue in demand between the current in demand skills and emerging skills. Industry will need to develop strategies that attract and retain new talent and technology workers to the industry, and how best to gear on the job training to meet the changing skills needs in the current workforce.

The World Economic Forum also states the following jobs are emerging in demand due to technology and innovation shifts in the sector⁷:

4 World Economic Forum. (2020). *The Future of Jobs Report*. Retrieved from http://www3.weforum.org/docs/WEF_Future_of_Jobs_2020.pdf

5 Corneau, S. (2019, May 23). *How Can Technology in Mining Protect the Environment?* Retrieved from International Institute for Sustainable Development: <https://www.iisd.org/articles/how-can-technology-mining-protect-environment>

6 Bureau of Labour Statistics. (2016). *The High Tech Industry, What it is and Why it Matters to Our Economic Future*. Retrieved from <https://www.bls.gov/opub/btn/volume-5/pdf/the-high-tech-industry-what-is-it-and-why-it-matters-to-our-economic-future.pdf>

7 World Economic Forum. (2020). *The Future of Jobs Report*, p.142. Retrieved from http://www3.weforum.org/docs/WEF_Future_of_Jobs_2020.pdf

- AI and Machine Learning Specialists
- Data Analysts and Scientists
- Process Automation Specialists
- Robotics Engineers
- Software and Application Developers
- Digital Transformation Specialists
- Remote Sensing Scientists & Technologists
- Management Analysts
- Internet of Things Specialists
- Big Data Specialists



Training for occupations that help the sector integrate data collected on the land to inform better decision-making, and roles that help mines use greener and less energy, reducing emissions, are just some of the emerging training needs within the sector.

Training Delivery Aided by New Technology

Virtual and innovative training is gaining traction in the mining sector, fueled by growing labour shortages, continued development in rural and Indigenous communities and significant investments in new technologies.

The interest in online learning and training has skyrocketed during the COVID-19 pandemic. The Future Skills Centre is investing 1.3 million in a 21 month blended training program led by NORCAT in Ontario that will integrate online learning, virtual reality, equipment simulation training, and the filed competency validation on the actual equipment in an operating mine.

New technologies such as simulations, augmented reality and virtual reality can help individuals to develop confidence and competencies in cost-effective ways for employers. Those learning tools can be designed to align with the kinds of standardized skills definitions, validation and certification approaches described in the Reports, and be particularly beneficial to the many smaller employers who find it a challenge to integrate learning into work on their own. Industry will need the active engagement of organizations that understand their business needs and that foster connections with education and training providers with innovative answers that apply new learning technologies efficiently. More generally, greater collaboration between employers and education and training providers to integrate learning into work, and work into learning⁸ is recognized as a priority.

New technologies such as artificial intelligence (AI) could be leveraged to enable ongoing improvement of both skill definitions and the means of assessing and acquiring them⁹. In 2014, the Mining Industry Human Resources Council (MiHR), in partnership with Northern Lights College, developed a competency based hiring assessment toolkit for employers to support the hiring of new Canadians and immigrants in the occupation of Underground Miner.

Training for Trades-Related Careers

Trades continue to be in high-demand across sectors, including mining. As in other sectors, the skilled trades workforce is aging, with more workers leaving than entering. Yet trades continue to provide a good source of well-paid work that is also adapting to new technologies and innovation.

Skilled trades provide a unique ability to learn on the job – with most trades requiring six to eight weeks per year in a classroom or shop setting, and the remainder on a work site. A Trade Apprenticeship is how new workers gain the knowledge and skills needed for a career in their trade. Most apprenticeships take

8 Future Skills Council, Canada. (2020). *A Learning Nation*, p. 35. Retrieved from <https://www.canada.ca/en/employment-social-development/programs/future-skills/report-learning-nation.html>

9 Future Skills Council, Canada. (2020). *A Learning Nation*, p. 36. Retrieved from <https://www.canada.ca/en/employment-social-development/programs/future-skills/report-learning-nation.html>



about four years to complete. These intervals between classroom learning and on-the-job training make it particularly important for training to stay current with advancements in technology. The top trades in the mining sector (as defined by number of apprenticeships) are¹⁰:

- | | |
|-------------------------------------|-----------------------------|
| 1. Heavy Duty Equipment Technician | 7. Construction Electrician |
| 2. Industrial Mechanic (millwright) | 8. Carpenter |
| 3. Industrial Electrician | 9. Machinist |
| 4. Parts Person | 10. Power Line Technician |
| 5. Truck and Transport Mechanic | 11. Steamfitter/Pipefitter |
| 6. Welder | |

These trades roles are particularly in-demand in rural and remote communities and can be transferable amongst heavy industry (such as oil and gas).

Training for the trades will need to continuously evolve as new technologies and innovations enter the sector – such as the use of electric vehicles, autonomous vehicles, remote operating centres, and automated drilling and tunnel-boring systems¹¹. With these new innovations, computer skills and digital literacy training become an important addition to more traditional trades-related training like mechanics, machining, carpentry, and welding, etc.

Opportunities for Enhanced Collaboration on Technical Skills and Careers in Mining

Additional comments on the opportunities for enhanced collaboration on technical skills and careers in mining were provided by the focus group participants. These included:

- Significant opportunity for greater coordination between industry, education, and community to support the technical skills shifts
- How to execute on this collaboration - work-integrated learning opportunities including greater support for apprenticeships, support for EIT/New Graduate programs are a potential solution in that they provide both the opportunity for mines to test new technology – and simultaneously develop future workers technical skills in an applied setting.
- More visibility on successful reclamation, safety and environmental and community partnerships and technology.
- Work with K-12 schools to generate interest in mining, to let them know the extensive technology use and excitement of working in the mining industry, continue the coloration with post-secondary.
- Technical Scholarships for local students including adult learners.


Impacts on Training Due to Environmental, Social, Governance Advancement

The growing body of work around Environmental, Social Governance (ESG) priorities and regulations is shaping the skills and careers required in mining. Environmental, social, and governance are the three central factors in measuring the sustainability and societal impact of an organization. ESG priorities and guidelines can help a mining company navigate and balance the benefits to the planet, people, and profit successfully¹².

10 Data from Mining Association of BC (MABC), Association for Mineral Exploration (AME), and Sand, Gravel, and Aggregate Association in February 2020.

11 Corneau, S. (2019, May 23). *How Can Technology in Mining Protect the Environment?* Retrieved from International Institute for Sustainable Development: <https://www.iisd.org/articles/how-can-technology-mining-protect-environment>

12 Investopedia. (March 2021). *Environmental, Social and Governance (ESG) Criteria*. Retrieved from <https://www.investopedia.com/terms/e/environmental-social-and-governance-esg-criteria.asp>



Increasing regulations on the environmental and social impacts of resource projects has placed new skills and occupational requirements on the mining industry; individuals that possess the skills, knowledge, and the aptitude to navigate complex regulatory environments and effectively engage with the public and Indigenous communities within consultation and assessment processes will be workers that are in-demand in the sector.

The sector is still working towards fully understanding the impacts of this growing space and how careers and training will be impacted by it. What is known is that permitting, inspecting, and auditing functions will increase, as will communication and engagement with local and Indigenous communities and governments. New occupations will be needed, but so will new skills for all workers.

ESG is also driving the need for increased understanding of differing cultures, values, and approaches to environmental management and stewardship. This is increasing the demand for training in cultural awareness, cultural safety, reconciliation, human rights, and anti-racism¹³ for workers across the sector. With increased diversity and inclusion in the workforce, these skills will also be essential to removing barriers experienced by women and Indigenous workers in the sector, increasing long-term career advancement and growth opportunities, and in-turn ensuring a more inclusive and diverse workforce at higher levels in the workforce.

These new and increasing regulations on the environmental and social impacts of resource projects also requires more people to do the work of translating activities on the land to the boardroom and community setting. Individuals that possess the skills, knowledge, and the aptitude to navigate complex regulatory environments and effectively engage with the public and Indigenous communities within consultation and assessment processes will be workers that are in-demand in the sector. It was also an increase in demand for inspectors and auditors of mines and mining activities to ensure progress is being made and compliance met.

An integrated and robust ESG program is important from a regulatory and compliance standpoint., but beyond what must be done, research also indicates that a robust ESG program can serve as an important factor in the ability to retain top talent. A recent study looking at the link between ESG performance and workforce sentiment found that employers with highly satisfied employees score higher on ESG performance¹⁴. These organizations are also more attractive to younger and more diverse workers, who place high value on aligning work with their personal values on social and environmental responsibility¹⁵.

Training for Environment-Related Careers

Training for careers in environmental sciences will need to evolve with the changing technology and innovation landscape, as well as evolving ESG requirements of the sector.

New technologies are allowing for much faster integration of data – with the ability to rapidly integrate information from the field, into the office environment— increasing the ability to utilize and rely on data to inform good decision-making. Telemetry and remote sensing and monitoring systems are just some examples of technologies that will continue to play an increasing role in environmental sciences.

Likewise, as ESG priorities evolve and grow, new and existing workers in the environmental sciences will need increased training in expanded environmental regulatory requirements, as well as increased understanding

13 Centre for Training Excellence in Mining. June 2021. *Skills Roadmap Project Key Findings Report*. P.43.

14 EY. (2020). *ESG and the Workforce Agenda The role and impact of ESG on talent attraction and retention*. Retrieved from <https://www.psac.ca/wp-content/uploads/2020/09/Meghan-Harris-Ngae.pdf>

15 Marsh & McLennan. (2022). *ESG as a workforce strategy*. Retrieved from <https://www.mmc.com/esg-interactive.html>

and training in cultural diversity, Indigenous principles of environmental stewardship, and the ability to integrate this knowledge.

Increasing the presence of Indigenous knowledge-holders, Elders and mentors into training can be a valuable way to effectively incorporate this worldview into classroom and field training.

Training for Community-Related Careers

New and expanded ESG requirements are increasing the engagement, consultation, and collaboration with local and Indigenous communities throughout the life cycle of a mining project, which is in turn increasing the demand for occupations that carry out this important work.

Training in these occupations will focus not only on understanding regulatory requirements, but also in knowing and understanding social, economic and health factors impacting communities before, during and after a mining operation nearby. This is a critical role in supporting mining operations to establish and operate consistent with local values, understanding and input.

As with the other in-demand occupations, incorporating local and Indigenous knowledge-holders, Elders and mentors into training can be a valuable way to prepare these workers for the important part of communicating and creating awareness and understanding of a project; as well as informing decision-makers of important factors to understand, incorporate, or mitigate, when moving forward with a project.

Training to understand the present-day impacts of historical legacies on Indigenous communities; local cultures and protocols; as well as principles for responsible collection, use and distribution of local knowledge and data, are all critical to the success of these workers.

Aptitude Training

“Aptitude is the innate or acquired capacity for something. Aptitudes can range from developed knowledge, learned, or acquired abilities (otherwise known as skills), talents, or attitudes necessary to perform a task. In essence, aptitudes are traits that help us accomplish tasks. Some aptitudes can be taught and developed, like knowledge, skills, or attitudes, but some aptitudes are not teachable, such as talents¹⁶.”

Aptitude training, therefore, refers to those skills that can be learned or developed. Skills can either refer to hard skills like programming, hardware design, and carpentry, or soft skills like negotiating, people management, and social skills.

The following aptitudes will be generally required across the range of mining sector jobs, in addition to the specific technical skills required by each career.

- Communication skills
- Teamwork and collaboration
- Problem-solving ability
- Creativity

16 Comprehensive Academic Operations Platform – APL nextED, March 24, 2020. *Aptitudes, Talents and Skills*. Retrieved from <https://aplnexted.com/aptitudes-talents-and-skills/>



Figure 2 – Aptitude Training Available Now and in the Future

Importance of Identifying and Recognizing Transferable Skills

Assessments can be an important tool in determining which skills and abilities someone has, as well as understanding which skills may need to be developed. Many of the skills identified as crucial to the current and future mining worker, such as critical thinking, creativity, flexibility, out-of-the-box thinking and problem-solving skills, effective communication, collaboration, cultural awareness/cultural safety, and essential skills (e.g., reading, numeracy, writing, digital technology), can be acquired through other work and through life experiences.

Understanding and assessing an individual's transferable skills will be critical to understanding their training needs and can reduce time in retraining or preparing people for working in the mining sector.

Prior Learning Assessment Recognition (PLAR) helps identify the transferable skills of workers. PLAR defines processes that allow individuals to identify, document, have assessed and gain recognition for their prior learning. These assessments can:

- Speed up the process of recruitment and training new candidates
- Help people who have been disconnected from job opportunities in the sector re-engage
- Confirm skills and remove barriers (such as Grade 12)
- Pre-screen students to see what their passions are and fit training to what the learner wants
- Identify interests, aspirations, and use that data to develop training programs and opportunities

Assessment also provides an opportunity to connect with individuals who may be disconnected from job opportunities in the sector, allows for faster candidate processing during recruitment and strategic training in support of candidate's skill sets.¹⁷



Training Gaps

In 2018, according to the World Economic Forum, 65 per cent of business leaders (globally and across a range of industries), reported they expected employees to learn new skills on the job; in 2020 that number increased to 94 per cent¹⁸. In addition, there is an increase in occupational groups that require degree qualifications (20 of the 23 enhanced occupations). As the occupational composition of the workforce changes, consideration needs to be given to the fields of education required and the revision of these curriculums to keep pace with the changes¹⁹.

Integrating new technologies into both training programming and into the work environment – especially for small and medium sized employers – can be costly and challenging. Industry will need the active engagement of organizations that understand their business needs and foster connections with education and training providers with innovative answers to apply new learning technologies efficiently. This will drive more and greater collaborations between employers, education and training providers, and communities are needed to integrate learning into work, and work into learning²⁰.

Developing individuals through industry responsive skills and training is a recognized strategy for addressing labour supply challenges and responding to shifts in labour demand. As traditional training and education changes to accommodate the needs of employers and workers, new credential recognition and certification will need to compliment these changing landscapes²¹.

Through these partnerships, particular attention should be paid to addressing key barriers and gaps in training, including those around access to training and their prerequisites (like STEM courses); relevancy of programming and incorporated technology; essential skills gaps like literacy, computer skills and digital literacy; lack of cultural awareness/cultural safety; lack of skills transferability and prior learning; managing training responsibilities around work and/or home life; access to drivers' training; reliable transportation and childcare; accommodations; lack of equipment and infrastructure for training; and lastly, lack of timeliness and connections with employers and employment opportunities.

Emerging Training Opportunities

A new education and training system is emerging alongside the technological changes to the industry that is flexible and works with individual learners. This includes courses outside of the formal classroom setting,

17 Northern Lights College, MiHR, Employer Guide for Hiring New Canadians and Immigrants Occupation: Underground Miner, 2014 <https://iecbc.ca/files/1%20Toolkit%20-%20Employer%20Guide%20-%20Underground%20Miner%20V5%20FINAL.pdf>

18 World Economic Forum. (2020). *The Future of Jobs Report*. Retrieved from http://www3.weforum.org/docs/WEF_Future_of_Jobs_2020.pdf.

19 EY. ((2019). *The Future of Work, Report*, 2019b, p.18. Retrieved from <https://minerals.org.au/sites/default/files/190214%20The%20Future%20of%20Work%20the%20Changing%20Skills%20Landscape%20for%20Miners.pdf>

20 Future Skills Council. (2020). *Canada - A Learning Nation*, p.35: Retrieved from <https://www.canada.ca/en/employment-social-development/programs/future-skills/report-learning-nation.html>

21 Centre for Training Excellence in Mining. (Jan 2021). *Skills Roadmap Project Environmental Scan and Literature Review*.

with flexible start dates and programming that works at the pace of the learner. Shorter-term training is also emerging and is particularly helpful to those already working in the industry as they learn new skills to keep pace with the changes in technology.

Mixed approaches to training delivery, incorporating both theory and applied learning opportunities, are proving successful, as are training programs that are responsive to learners and the variety of individual learning styles. Providing training at home, supported by community, and removing other barriers improves the successful completion of training of those living in rural and remote communities.

Of the nearly 200 people surveyed for this Project, current workers indicated a preference for training that included online courses, mentorship/coaching, and micro-credentialing. Research for this Project also indicates a growing demand for training that speaks to cultural awareness, competence, human rights, anti-racism, and reconciliation.

The Shift to Continuous Learning

What is becoming increasingly clear is that continuous learning is essential for workers to stay current with the evolving practices and technologies in the sector. This Project has identified several new developments in the delivery of training programming that allows for greater ease and flexibility while gaining these new skills.

Diversifying the Credentialing Ecosystem

Micro-credentials are rapid training programs offered by colleges, universities and Indigenous institutes that can help workers get the skills employers require²² and provide one solution to changing workforce training needs. Colleges and Universities are piloting frameworks to recognize these credentials, along with traditional education pathways.

Providing a variety of training options will help current workers integrate these new learnings into their work-life and provide valuable integration of these new skills.

Blended Delivery Methods

Training programs are evolving in their delivery methods. New and current workers can take advantage of a blend of delivery options that allow workers to travel less, incorporate training into their other responsibilities (be it work or home-life) and get valuable practice using new technologies like augmented reality learning and equipment simulations.

Virtual and augmented reality (often based on a real mine site) is providing learners with the experience of applying skills in a setting that replicates the real work.

Through innovative collaborations, training can also be delivered through a combination of online and in-person methods.

Training programs with flexible entry dates or continuous intakes, and programs that incorporate adult skills upgrading further reduce barriers and improve participant outcomes.

22 Government of British Columbia. (2022). *Micro-credentials a gateway to support B.C. Workers*, <https://news.gov.bc.ca/releases/2021AEST0060-001869#:~:text=Micro%2Dcredentials%20recognize%20stand%2Dalone,for%20employment%20or%20learning%20purposes>.

Work Integrated Learning

Students and new workers can gain valuable new experiences through work integrated learning. Partnerships between training providers and employers can provide access to various types of learning opportunities that give students increased understanding and awareness of the workplace. They can include short-term work placements, virtual internships, hackathons, and more.



Figure 3 – Training Pathway

Figure 3 provides an overview of key elements to consider and include when developing successful training pathways for new and current workers. It can be applied to short-term training as well as longer programs. The next section of this report provides expanded detail on each pathway element.

1. Training Development

As employers and training providers work at incorporating the implementation of new technologies into their programs, there is significant opportunity to explore a more collaborative approach to training development that includes employers, workers, educators, trainers, and communities. This includes the development of career awareness materials to support learners in their ability to make informed decisions about their personal career development.

Training that meets learners at their current skills level, and incorporates essential skills such as effective communication, digital literacy, critical thinking, problem solving and working with others, will improve training outcomes and ensure workers are successful in the workplace. Key activities include supporting learners in the development of individual work practices, communications and knowing how to approach supervisors are just some examples of essential skills knowledge and applications that support learners and

workers ability to succeed in mining workplaces.



Key Success Factors

A. Partner Confirmation

Partnerships for successful training development between mining companies and educational institutions, but also with Indigenous and rural communities and other workforce development service providing or research agencies are essential in supporting the mining industry to sustain the current rate of change. These partnerships will have the greatest impact in developing training that is grounded in day-to-day operations within the industry, to support learners in being successful and still ensures the establishment of a solid foundational knowledge required to go into their chosen field. This includes partnerships with smaller organizations who may not have the resources of larger companies but are still a critical component to mining operations overall. Training organizations, communities and employer associations can work together to support the change required for small, medium enterprises.

B. Funding Framework

Ensuring that a funding framework is established early in the development of a training program will help provide guidance and overarching direction. Being clear on the vision and mission of a program will ensure partners have a shared understanding of the need for that training, and that multiple perspective and voices are incorporated into the program at a foundational point. This will be a valuable tool as training development progresses and will ensure key content and factors are maintained throughout the process.

C. Curriculum Development

Curriculum that speaks to the individual learner, allows for self-paced learning, sets a foundation of knowledge, and incorporates new and evolving technologies, legislative requirements, wise practices, and emerging priorities becomes easier when partnerships have been established early on in the curriculum development process. Diverse perspectives, and the incorporation of traditional and cultural knowledge is made easier by these varied partnerships and add value to training development. As technology and innovation rapidly changes the work environment, training materials need to be updated frequently, and refreshed to reflect new ideas and new curriculum design frameworks.

D. Credential Validation

Ensuring that training is supported by industry and training providers is another essential component to successful training. Programs like the Canadian Mining Certification Program (CMCP) through MiHR, (the national mining certification program), supports industry and workers ability to validate experience, knowledge, and skills as they align to the National Occupational Standards (NOS) for occupations that traditionally did not hold certification or credentials. These include underground miner, surface miner, mineral processing operator, diamond driller, frontline supervisor, industry trainer and hoist operator. Programs like the CMCP help to identify and develop curriculum that speaks to a core set of skills that can be applied across the sector, rather than being dependent on a specific mine site or operation.

In 2018, with support from the Canada-British Columbia Labour Market Development Agreement, CTEM led consultation with industry, training providers, and community stakeholders that led to the development of an inaugural provincial entry-level underground miner curriculum. This curriculum is aligned with the *National Occupational Standard for Underground Miner* and enables individuals to document their experience from the beginning of their careers in pursuance of the MiHR Canadian Mining Certification Program. The program is implemented in partnership with a training provider, industry partner and community; for example, Thompson Rivers University in partnership with New

Afton recently delivered the underground miner training for a cohort of new underground miners in 2020.



2. Training Implementation

The successful implementation of training is another critical component to preparing workers for the sector. Ensuring that participant selection, wrap-around supports and core skills, delivery methods and certification, skills validation and evaluation are reflective of both the individual worker and the demands of the industry employer, will be key. Again, relying on input from multiple partners: education and training providers, industry employers, Indigenous and rural communities, service providing agencies and current workers themselves, ensures a well-rounded and comprehensive approach.

Addressing and mitigating challenges that are preventing in-community learning such as adequate funding, infrastructure, access to qualified trainers and cultural safety, are also key factors in successful training implementation.

Key Success Factors

E. Participant Selection

Ensuring training is a good fit for participants is an important component to the successful delivery of a program. Trainers, educational institutions, community employment and training workers can all help support students in making informed decisions by sharing self-assessment and screening tools to ensure students' passions, interests and natural talents match the expectations of the training and subsequent careers in mining.

Meeting individual learners at their level of skills and comfort, focusing on building relationships between the trainer and the learner, and understanding individual learning needs and styles will also help in the participant selection process.

F. Skills for Success and Common Competency

Incorporating essential skills/skills for success into program delivery is helping individuals learn critical sector wide skills – such as digital literacy, effective communication, critical thinking, and problem-solving skills – that are proving to be more and more essential in the workforce as it changes and adapts to new technology, innovation, and legislative requirements. Focusing on identifying and supporting common competencies will ensure new workers skills are transferable between mining operations. Students also benefit from upgrading skills to ensure their numeracy and literacy skills match the requirements in the industry. Identifying the individual learners' competencies and matching upgrading supports (rather than providing upgrading at a standardized level), increases participant success.

G. Training Delivery

Training delivery methods can be as critical to a program's success as the content itself. Increasingly, research is pointing to the need for flexible delivery formats, methods, and timelines. Adult learners, especially, commonly have additional care and family responsibilities which can be challenging to balance with training expectations. Formats that are delivered over shorter periods of time and require less time away from community, or can be accessed from home, and work at the pace of the individual learner, all help increase participant success.

Creating opportunities for blended delivery; theory, practical experience, in the classroom, virtually

and on the job site, allow participants to learn key competencies and skills, and at the same time gain valuable experience in applying these skills in a real setting. Blended delivery methods also ensure training meets the needs of a range of learners and learning styles.

Aligning training delivery timelines with job openings/opportunities – and still allowing learners enough time to gain their skills – will further improve the successful transition to employment and ensure students' skills remain current and timely. Mentorships, internships, experience working through real life/on-the-job problems all help provide additional supports in the transition from training to employment.

The COVID-19 pandemic has been a time when opportunities for remote learning has increased dramatically, providing expanded training access to those living in rural and remote communities. Building on these lessons learned will further improve the successful training of those living away from large centres.

H. Training Certificate

Certification of training is essential for participant success; training that is validated by industry, accredited, and certified allows for standardized credentialing and assurances to both employers and workers that training meets the needs of the sector. It is also a key component to skills transferability and recognition within and outside of the sector.

I. Skills Validation

Assessing a student's knowledge and ability to perform the tasks learned during training is another important component to successful training implementation. If partnerships with industry employers are established early in the training pathway, and on-the-job or on-site applied skills training is built into the delivery, skills validation can occur on actual equipment, further strengthening the connections between training and working environments, and between students and employers.

J. Evaluation

Lastly, incorporating an element of skills evaluation to a training program ensures consistency. It also promotes the development of standardized evaluation criteria as partners and collaborators explore the specific elements requiring evaluation.

Providing safe, culturally relevant evaluation parameters is an added benefit of having multiple partners in the development and delivery of training programming and can increase the successful completion and evaluation for a wider range of students.

3. Training Program Participation and Success

Layered throughout the development and delivery phases of the Training Pathway are several key factors that can further increase overall participant success. These speak to specific barriers to participation that research has revealed and are discussed below.

Building strong relationships with individual learners – focusing on the individual and their attributes, rather than their barriers first and foremost – is critical to empowering and enabling learners to be successful. Empowering learners to make informed choices, supporting their interests and passions while removing barriers to their participation will provide the greatest likelihood of success.

Key Success Factors

K. Addressing Transportation Challenges

Access to safe, reliable transportation is a key enabler in ensuring participant success. Drivers' training and licences provide critical training commonly required in many mining related careers and provides greater access to the training and job site. This is particularly important in rural and remote areas where training and job sites may not be accessible by public transportation, and where driving instruction and testing are several hours away.

Incorporating drivers' training into other training programming can be a valuable way to reduce barriers in rural and remote communities and increase participation and completion rates.

L. Addressing Socio-Economic Factors

Other socio-economic factors – such as access to childcare, family and care responsibilities, lack of social and community supports, access to health and wellness supports and services and income levels – also have an impact on training program access, and can commonly be barriers to registration, participation and successful completion if not addressed and supported throughout the process.

Programming that helps students manage their responsibilities and reduce barriers will be more successful in providing training opportunities to a more diverse and inclusive talent pool. Providing funding for training programs, materials (including technology and internet supports), work clothes, transportation, childcare, and accommodation (if necessary), can help reduce costs to those who may not otherwise be able to afford the training. Offering programs that have flexible schedules (including evenings and weekends) and allow students to stay at home or in the community can further improve access.

M. Addressing Gender Barriers

Research indicates that women face particular challenges and barriers in entering and staying in the mining sector, and that identifying and reducing barriers faced by female participants can improve access and successful completion of programming. Women tend to carry more of the family and care responsibilities mentioned above; making these critical to address in order to have more women in the workforce.

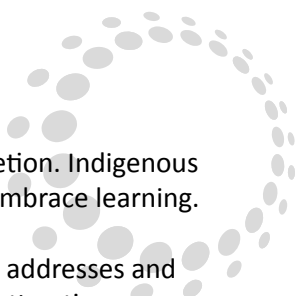
Supporting training programming for all mining workers (at all levels within the organization) that help to undo gender stereotyping and misogynistic behaviours and attitudes, and increases awareness of harassment and complaint resolution processes, will further create a work environment that all workers can thrive in.

N. Addressing Racial Barriers

Indigenous peoples face barriers to accessing and successfully completing training programming and also commonly face disproportionately more of the socio-economic barriers to training and employment, making these critical factors to address when attracting and supporting Indigenous peoples into training programming.

The complexity of the social, economic and health barriers that impact Indigenous peoples disproportionately create additional challenges with regards to accessing and completing training. Having Indigenous trainers can be an important inclusion in creating understanding the specific barriers faced by Indigenous students; cultural and family responsibilities that need to be tended to; learners





who may have a fear of success or failure, which can lead students to quit before completion. Indigenous learners need to feel safe within learning spaces, safe to make mistakes and be able to embrace learning.

Again, training programming for all mining workers (at all levels of the organization) that addresses and works to undo stereotypes, racism, cultural bias, and assumptions will be important for attracting more Indigenous peoples into the workforce and create a more inclusive and diverse workforce.

O. Building Inclusion and Diversity

Normalizing women and Indigenous peoples in the mining workforce is key to making both the learning and working environment attractive to these key sources of talent.

Training that invests in people, providing soft skills in addition to technical skill development; includes female and Indigenous perspectives; and is understanding of and responsive to the people it serves not only demonstrates leadership in inclusion and diversity, but adds valuable perspectives to the important work happening within mining and further develops the sector in line with increasing environmental, social and governance priorities and legislation.

Having a gender and cultural lens on training materials will help to increase underrepresented participation. This can be accomplished by establishing partnerships with communities and service providing agencies early in the training development stage.

Indigenous and/or female instructors are needed, as these instructors provide positive role models for young people. Therefore, training promotion should include pictures of a diverse workforce.

Cultivating and supporting local instructors to work alongside those who may travel in from outside the region can be an important part in ensuring learners are understood and supported.

P. Location and Remoteness Factors

Rural and remote locations across the province continue to feel the impacts of being away from larger centres and bigger training institutions. Smaller populations in rural areas make the cost of training infrastructure considerably more expensive per capita and often means less access to current technology and other important infrastructure. Smaller numbers also mean fewer course selections are offered, making it difficult to ensure students have the required prerequisite courses before entering post-secondary training. For example, to enter engineering, a student requires high school physics (Physics 12) but many high schools in northern B.C. do not offer Physics 12, and students from those schools need to go through remedial programs prior to being able to apply which puts a barrier in the way of their progress.

The COVID-19 pandemic has been a significant contributor in exploring and utilizing blended training delivery models, including virtual and online delivery. In remote locations where internet service is stable and reliable, this is an important addition to how learners can access training.

Other ways to support learners in rural and remote communities include providing student care packages that include a computer and other high priced items that may present barriers; training trainers in the companies to focus on the job training; involving local instructors for blended training delivery options; and having out-of-town instructors travel in to provide training rather than requiring students to travel out for training.



Q. Infrastructure Deficits

Lack of infrastructure – technology-related as well as physical – continues to be a barrier faced in many rural and remote communities. Lack of reliable cell and internet service, and high costs of these services, impacts access to virtual and online training programs, reducing the number of flexible training options available to learners in rural and remote areas. Working in collaboration with local communities in the development and implementation of training programs will be helpful in understanding and finding practical solutions to these potential barriers.

This same lack of infrastructure and access to technology also impacts local instructors to stay current with advancements in technological training. Again, creating partnerships with industry providers to support both learner and instructor training can be a practical solution to overcoming this barrier.

4. Participant Employment

The end goal in training for new workers is that training has prepared a learner for the workforce and is set up to access employment in their chosen field; in other words, employment is commonly the end goal of workforce development training. Research indicates that programs that support the connections between learners and employers and ensuring training lines up with emerging and ongoing training opportunities, are both critical factors in increasing employment for new workers.

Another critical factor in this equation is the timing and availability of relevant, flexible, and timely short-term training for workers who are already employed and looking to require new skills.

Key Success Factors

R. Timing of Training

Ensuring that training programs are offered in a way that they provide enough time for students to complete programming, manage life events that may arise and still line up with emerging career opportunities is important to ensuring the successful placement of new workers into employment. Too much time in between training and employment can mean that students lose motivation and become disengaged with the opportunity; it can also lead to workers using their new skills in other sectors where the jobs may be readily available. Early engagement and collaboration between industry partners, communities and training providers is a good way to ensure timing of available training lines up with the start of work.

S. Work Integrated Learning

Building in work integrated learning options is another great way to further the connections between employers and learners. This gives both parties a chance to get to know each other and decide if the opportunity is a good fit. There are many things about a job and a prospective worker that are not apparent or clear until someone is in the work environment. For example, a new worker may have prior life experience that makes them skilled or suitable for a particular activity that has not been identified in the classroom and provides additional understanding for an employer. Likewise, a work environment may prove more interesting than a classroom or virtual setting and this may not become apparent to a learner until they get to apply their knowledge on-the-job. Again, ensuring a component of the training occurs on-the-job is an important part of the training development process and will best be done with multiple partners at the table.



T. Career Development Supports

Both industry partners and training providers can be instrumental in helping current workers identify the types of training required for the emerging skills required in a worker's occupation. Ensuring that career development supports are available to workers on an ongoing basis, provides the space for conversations around upskilling and ongoing/lifelong learning, and helps workers better align training with their career progression.

Developing ongoing career advancement training options locally is another way to ensure that training becomes a lifelong goal for workers, and they know that they are supported in progressing in their career.

U. Flexibility

Providing flexibility in work scheduling and flexible options for short-term training such as self-directed training options, virtual and online courses, in-person, and on-the-job training for groups of workers and integrating training into the ongoing work environment are all options that provide greater ease, uptake and support to workers who want to expand their knowledge and skills.

Appendix A - Project Background

The Ministry of Energy, Mines and Low Carbon Innovation (previously Ministry of Energy, Mines and Petroleum Resources) established the BC Mining Jobs Task Force (Task Force) in February 2018 as part of the Province's focus to create and sustain good jobs throughout BC. The Task Force worked with First Nations, the mining industry, and communities to develop recommendations on possible actions government could take to bring more certainty to the mining sector and create good jobs for people today, tomorrow, and beyond. The Task Force looked at all aspects of mineral exploration and mining in BC and its Final Report²³ provided 25 recommendations to government on measures it might implement to achieve the Task Force's vision of making British Columbians proud of its growing mining industry as the backbone of an inclusive, progressive, and low carbon economy. In January 2019, the Office of the Premier issued a News Release saying the provincial government is "moving forward with" the Task Force's recommendations²⁴.

One of the Task Force's recommendations was to collaborate with the Ministry of Advanced Education and Skills Training (AEST) on the development and implementation of a cohesive roadmap for enhanced mine sector training to meet the mining sector's future skills and labour needs through a collaborative, inclusive, innovative, and geographically focused approach.

In November 2020, the BC Centre of Training Excellence in Mining (CTEM) was successful in its proposal to oversee the Skills Roadmap Project (the Project) to help understand how best to meet the mining sector's future skills and training needs. This project is a collaboration between representatives from across the BC mining industry – and will support the development of a forward looking and responsive strategy for enhancing mining sector training.

The Project is funded by the Province of British Columbia and Government of Canada through the Sector Labour Market Partnerships (SLMP) Program through the Ministry of Advanced Education and Skills Training (AEST) and brings together diverse perspectives from across British Columbia who have an interest in the training and workforce outcomes within the BC mining industry. The mining industry is inclusive of the full life cycle (exploration, extraction, processing, closure, restoration) and includes the suppliers and contractors side of the industry.


The Skills Roadmap Project consists of primary and secondary research guided by consultation and collaboration with 141 participants from industry, organized labour, professional associations, post-secondary institutions, government, and Indigenous communities. This research provides the foundation for the development of skills, career, and training roadmaps (contained in this and two other Roadmap Reports) to support individuals, communities, post-secondary training providers, and industry to meet the mining sector's future skills and training needs.

About the BC Centre of Training Excellence in Mining

The B.C. Centre of Training Excellence in Mining (CTEM) is a province-wide virtual hub that facilitates collaborative and innovative training solutions for the mining industry and B.C. communities. Its mission is to connect industry, students, communities, and training providers to meet their respective employment

23 British Columbia Mining Jobs Task Force. (2018). *Mining Jobs Task Force Final Report*. Victoria: BC Government. Retrieved from https://www2.gov.bc.ca/assets/gov/business/natural-resource-industries/mineral-exploration-and-mining/memp_10535_task_force_report_final-rev.pdf

24 Office of the Premier. (January 28, 2019). *Government acts on Mining Jobs Task Force recommendations*. <https://news.gov.bc.ca/releases/2019PREM0006-000099>



needs by playing a leading role in determining industry skills requirements, facilitating related training, and supporting partners. It was announced by the Ministry of Advanced Education in November 2012 and became operational in May of 2013. It is funded primarily through grants from the government of British Columbia with additional support from partners.

Guided by the values of collaboration, inclusivity, innovation, support, responsiveness, and respect, CTEM works to bring together all parties interested in mining training to:

- foster innovation to improve outcomes;
- build partnerships to create more effective programs;
- enhance the competitiveness of British Columbia's mining sector;
- build awareness of all the training options for careers in mining;
- match students/job seekers and employers; and
- support other appropriate initiatives that will continue to build on a provincial reputation for producing highly skilled workers.

More information on CTEM can be found in Appendix B.

About the Skills Roadmap Project

The Project creates a set of deliverables that respond in full to the BC Task Force recommendation to *create a cohesive roadmap for enhanced mine sector training to meet the mining sector's future skills and labour needs* and support the recommendations to focus on women and Indigenous representation in the mining sector.

It has two primary objectives:

1. Establish and provide an analysis of labour market information from a literature review, environmental scan, and primary data collection to identify gaps between current skills and training in the BC mining sector workforce and the skills and training that will be required to meet the sector's future needs; and
2. Develop skills, career, and training roadmaps (in report and graphic form) to support individuals, communities, post-secondary training providers, and industry that will assist them in adapting to meet the mining sector's future skills and training needs.

To accomplish these objectives, the Project has relied on guidance and expertise of a wide range of subject matter experts who have provided context and feedback on the research collected. Over 120 subject matter experts participated in the meetings. Committees included:

- Project Governance Committee
- Training Providers Sub-Committee
- Regional, Golden Triangle Sub-Committee
- Indigenous Sub-Committee
- Women Sub-Committee

Input has also been gathered from 197 survey participants, three focus groups and 21 key informant interviews. Participants in these activities included workers, trainers and educators, employers, governance, partnering organizations and community members.

Appendix B - BC Centre of Training Excellence in Mining



BC CENTRE OF TRAINING EXCELLENCE IN MINING



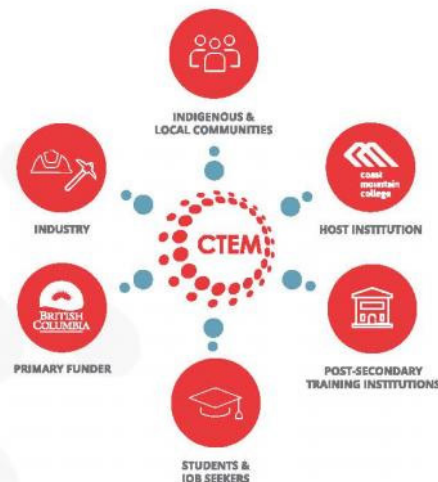
*Facilitating collaborative and innovative
training for BC's mining industry.*

**CTEM connects industry, students, job seekers, training providers,
and communities to meet their respective needs by:**

- playing a leading role in understanding industry skills requirements,
- facilitating industry driven training, and
- building alliances and supporting partners.

Quick Facts

- Provincial organization, established in 2012
- \$1.5M of grants complements \$1M of in-kind industry support
- Project successes have been used in other jurisdictions nationally and internationally



Impact

- Resources provided to 200 communities across BC
- Projects are strategic, collaborative, and specific in scope
- Organizational values are: collaborative, inclusive, innovative, supportive, responsive, and respectful

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TWITTER: @CTEM_BC
FACEBOOK: @CTEMBC





Appendix C - Additional Resources

1. Mining Industry Human Resources Council: www.mihir.ca
2. The Canadian Mining Certification Program: www.mihir.ca
3. Centre of Training Excellence in Mining: www.bc-ctem.ca
4. The B.C. Mining Career Pathways Guidebook: <https://mineralsed.ca/site/assets/files/3454/ctem-guidebook-2016-final-web.pdf>
5. WorkBC: www.workbc.ca
6. Industry Training Authority: www.itabc.ca
7. Association of Mineral Exploration BC: www.amebc.ca
8. Mining Association of BC: www.mining.bc.ca
9. Engineers and Geoscientists BC: www.egbc.ca
10. Canadian Apprenticeship Forum: www.caf-fca.org
11. Skills Canada BC: www.skillscanada.bc.ca



CENTRE OF
TRAINING
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IN MINING