CAREER ZONE: MINING

Helping High School Students Prepare for a Career in the Mining Sector

BRITISH COLUMBIA | Ministry of Education

CONTENTS

THIS GUIDE

This guide provides general background on the Canadian mining sector, followed by more specific information on a range of job possibilities within three mining sub-sectors.

It also includes sample bundles of high school and post-secondary courses and training to illustrate how high schools, post-secondary institutions and industry partners/employers may work together to develop paths for individual students to follow to help them qualify for a career in mining.

This guide is an introduction only to the job and career possibilities within this sector. More detailed information is available from a variety of general and sector-specific sources mentioned throughout this guide.

WHAT IS A CAREER ZONE?

A Career Zone is a group of courses, certifications and work opportunities that BC high schools can develop to help students in Grades 11 and 12 get ready to pursue a career within a particular industry, while still meeting provincial requirements for graduation.

By working within a Career Zone in high school, students have the opportunity to:

- Select courses that match their specific skills, interests and career goals.
- Acquire work experience relevant to those career goals.
- Obtain industry-recognized certifications.
- Complete college or university courses for a career head start and valuable post-secondary experience.

WHAT'S INCLUDED IN A CAREER ZONE?

Individual BC School Districts are encouraged to develop their own Career Zones, based on local labour market needs, student interests, industry and post-secondary partnerships, and local work experience opportunities.

Where available, Career Zones should include:

- Mathematics, Language Arts and Science courses at the Grade 11- to 12-level.
- An Applied Skills elective at the Grade 11- to 12-level, or a local or provincial trades exploratory course.
- A variety of transition opportunities, including:
    - college/university (dual credit) courses
    - Board/Authority Authorized (BAA) courses
    - Independent Directed Studies
    - Advanced Placement courses, and
    - Work Experience 12A and 12B, as well as other workplace training opportunities, including co-op placements and summer internships.
- Career preparation certifications, such as CPR, First Aid or Workplace Hazardous Materials Information System (WHMIS).

IS THERE ONLY ONE ROUTE WITHIN A CAREER ZONE?

Each Career Zone has a variety of routes within in it for students to reach their career destinations. Depending on each student's specific goals, a Career Zone route may lead from high school graduation to either:

- direct-to-work;
- apprenticeship program;
- college certificate or diploma program;
- college/university degree program.

Direct-to-Work Route

The direct-to-work route helps prepare students to transition immediately from high school to work following graduation.

Apprenticeship route

An apprenticeship is a combination of on-the-job training and classroom learning at a college, technical university or private trades training institution. All apprenticeship training is delivered by skilled, certified trades people with experience in the field.

In BC, successful apprenticeship training leads to a Certificate of Qualification (CoQ) awarded by the **INDUSTRY TRAINING AUTHORITY**, which is recognized across the province. About 50 trades also offer the Interprovincial (IP) Red Seal certificate, which is recognized across Canada.

College route

Students on a college route have decided to pursue a career that requires a college certificate or diploma. Most certificates and diplomas require one to two years to complete, but some may take less time.

College/university route

Following high school graduation, students on a college/university route will enrol in a university (or a degree-granting college) to take a program of study in their career-related area of interest, leading to a degree. This route can take four or more years to complete.

INDUSTRY TRAINING AUTHORITY PROGRAMS

The **ACE-IT PROGRAM** allows high school students to take first level (classroom) technical training in a trade that gives them credit for both high school and apprenticeship or industry training programs. Technical training classes are most often taught at colleges, but can also be offered at school district facilities.

SECONDARY SCHOOL APPRENTICESHIP (SSA) lets students begin the work-based training component of an apprenticeship program while still in high school. Students "earn while they learn," getting credits toward both their high school diploma and apprenticeship on-the-job training. SSA students complete up to 480 hours of work experience that counts toward their apprenticeship and 16 graduation credits.

IS IT POSSIBLE TO CHANGE A ROUTE?

While one student's route within a Career Zone may be direct – straight from high school to an apprenticeship, for example – another student may start on one route but later decide, as the student learns and experiences more, to switch to another. Some may also wish to change direction later, after they have perhaps started a diploma or degree program or even entered the workforce.

As a result, it's helpful for students interested in a particular industry sector to complete as broad a range of core high school courses, sector-specific electives and industry certifications as possible when they are still in high school. Though students can of course pick up credits later, doing them early will ensure they are ready to follow any route at any time.

NOT ALL **INDUSTRY JOBS** ARE IN THE FIELD

In addition to skilled and experienced people who work in the field, every industry needs people who work in the office, in such areas as IT, accounting, health and safety, human resources, investor or customer relations, communications, etc. While general certificates and degrees are available in these fields, it can help to have relevant courses, certifications and work experience within the industry sector.

Every industry also needs leaders: managers, supervisors, executives. Most people occupying leadership roles start by gaining relevant work experience then adding further on-the-job training, additional certifications or advanced degrees.

USEFUL CAREER PLANNING RESOURCES

WORKBC provides profiles of more than 500 different occupations, with details on job duties, education and training required, employment outlook and average salaries or wages. The site also offers a comprehensive database of BC job postings, and a blog featuring trends, job-search tips and employment programs.

EDUCATION PLANNER allows users to compare BC post-secondary programs.

TRADES TRAINING BC helps students and employers find trades programs offered at 14 post-secondary institutions throughout BC.

CAREER ZONE MAP

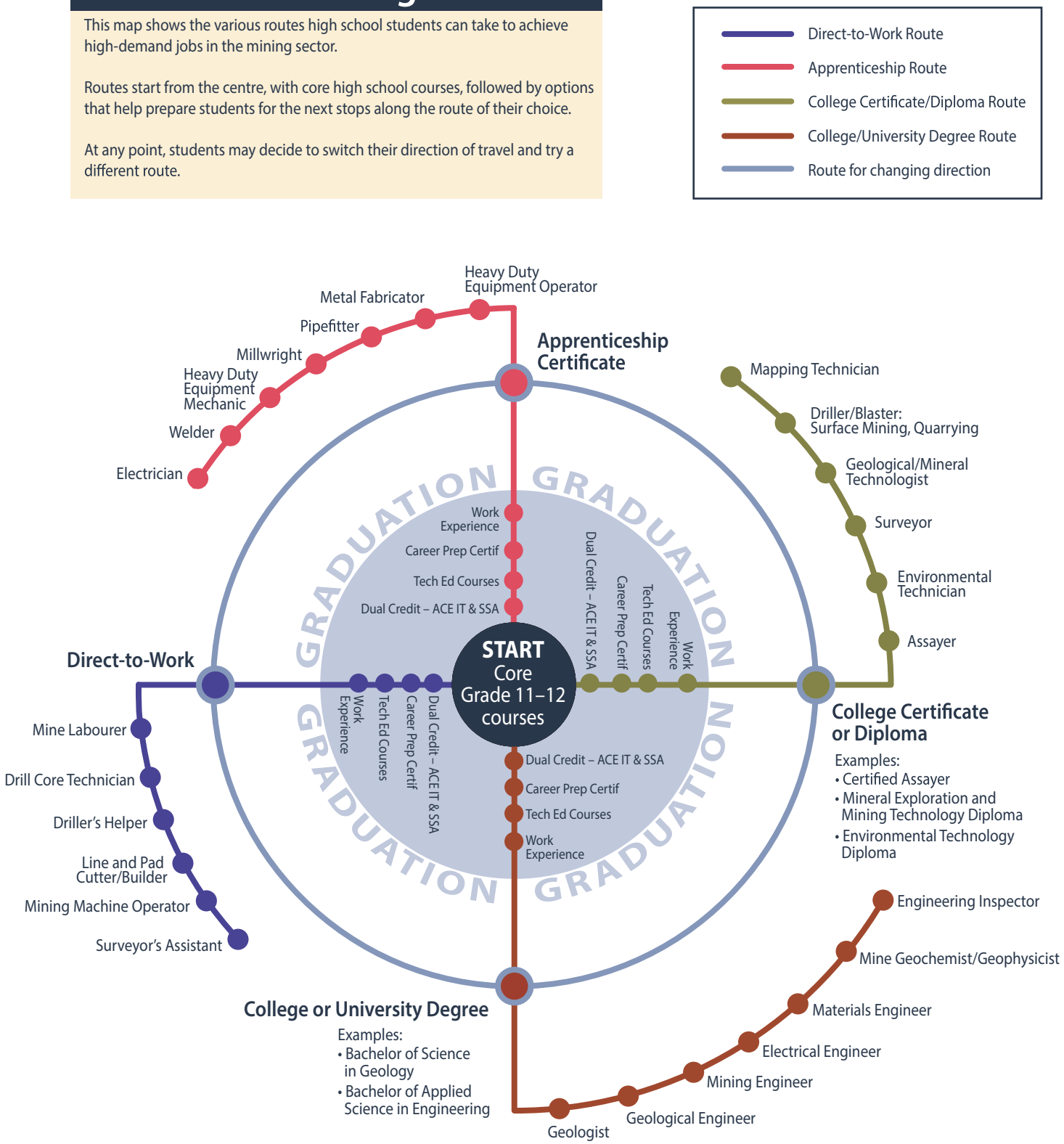
Like a transit map, the chart on the next page shows four possible routes from high school to a range of the most in-demand careers in the mining industry.

Career Zone: **Mining**

This map shows the various routes high school students can take to achieve high-demand jobs in the mining sector.

Routes start from the centre, with core high school courses, followed by options that help prepare students for the next stops along the route of their choice.

At any point, students may decide to switch their direction of travel and try a different route.



MINING CAREERS

The mining industry involves the discovery, development, extraction and reclamation of precious metals, base metals, industrial minerals, iron ore, coal, stone, sand and gravel.

British Columbia is Canada's largest exporter of coal, and also produces significant amounts of copper, gold and silver, as well as more than 30 industrial minerals used in products ranging from electrical wiring and microelectronics to sunscreen and sporting equipment. More than half of Canada's exploration and mining companies are based in BC, and BC has the largest concentration of exploration companies and geoscience professionals anywhere in the world.

The mining and mineral processing industry provides the equivalent of about 320,000 full-time jobs in Canada, and is responsible for almost four percent of Canada's Gross Domestic Product. More than 30,000 people currently work in BC's mining, mineral exploration and related sectors, more than double the number in 2001.

Over the next 10 years in Canada, an estimated 92,000 new workers will be needed in the mining sector, of which an estimated 16,000 will be in BC, including in related service and supply companies. These workers are needed in occupations ranging from geologists and mining engineers, to accountants, heavy duty equipment mechanics and electricians.

FOR MORE INFORMATION:

MINING INDUSTRY HUMAN RESOURCES COUNCIL

EXPLORE FOR MORE BRITISH COLUMBIA

BRITISH COLUMBIA'S MINERAL EXPLORATION AND MINING STRATEGY

BC CENTRE OF TRAINING EXCELLENCE IN MINING

MINING ASSOCIATION OF BRITISH COLUMBIA

RECOMMENDED ELECTIVES FOR CAREERS IN THE MINING SECTOR

Beyond the core courses required for high school graduation, the mining sector recommends students interested in a mining career take:

- Earth Science 11
- Sustainable Resources 11
- Sustainable Resources – Mining 12
- Locally developed Board/ Authority Authorized (BAA) courses, such as SD#27 – Mining Orientation 12 and SD#91 – Introduction to Mining 11
- Work Experience 12A and 12B

WORK EXPERIENCE 12A AND 12B

With Work Experience 12A and 12B – each 100 to 120 hours long – the community is the classroom. Work site placements help prepare students for the transition from high school to the world of work by providing opportunities to gain valuable workplace knowledge, determine (or change) career goals, and develop job skills.

To find out more, see the **PROGRAM GUIDE FOR MINISTRY AUTHORIZED WORK EXPERIENCE COURSES.**

Those interested in a college or university route should also consider taking:

- Geology 12 (particularly if interested in a career in mining exploration)
- Math, Physics and Chemistry 11 and 12
- English 12
- Computer Science 11 and 12 (particularly if interested in a technical/technology-related career)

RECOMMENDED CAREER PREPARATION CERTIFICATES FOR CAREERS IN THE MINING SECTOR

Most mining companies require applicants to have at least a high school diploma and a driver's licence. Acquiring relevant career-specific certificates can also ensure students have a better chance of employment – or perhaps a higher level of employment – directly out of high school, college or university.

Certificates recommended by the mining sector include:

- First Aid Level 1
- CPR
- Workplace Hazardous Materials Information System (WHMIS)
- Occupational Health and Safety
- Fall Protection
- Confined Space Awareness

MINING SUB-SECTORS

The mining industry employs people in 120 different occupations. For the purposes of this guide, we have divided the mining sector into three sub-sectors:

- mineral exploration
- open pit and underground mining
- stone, sand and gravel extraction

MINING SUB-SECTOR PROFILE #1: MINERAL EXPLORATION

Mineral exploration occurs before mining can begin. In the first exploration stage, prospectors and geologists evaluate large land areas either by airborne or ground-based mapping or by doing sampling surveys of the Earth's surface. From maps and existing data, they then single out specific areas for more detailed study.

The second exploration stage involves more detailed surveys, including mapping, sampling and diamond drilling (often at great depths) to determine the size and shape of the mineral deposit. Data collection for environmental studies also begins at this stage.

FOR MORE INFORMATION:

ASSOCIATION FOR MINERAL EXPLORATION BRITISH COLUMBIA

EXPLORE FOR MORE BRITISH COLUMBIA

BC CENTRE OF TRAINING EXCELLENCE IN MINING

MINING ASSOCIATION OF BRITISH COLUMBIA

MINERAL EXPLORATION POSSIBILITIES

Route:	Job Possibilities:	Possible Training/ Credentials:

Direct-to-Work	• Mine labourer – see Sample Bundle #1 for a possible route to this career
	• Environmental monitor assistant
	• Camp coordinator/manager
	• Core cutter
	• Field assistant:
	  • brush cutting
	  • soil sampling
	  • geophysical helper
	  • geological helper
	  • environmental assistant
	• Housekeeper/kitchen helper
	• Line and pad cutter/builder
	• Driller's helper
	• Drill core technician
	• Surveyor's assistant
	• Prospector
		• Underground Mining Essentials Certificate – see Sample Bundle #1
		• Environmental Monitor Assistant Certificate – see Sample Bundle #1
		• Short (five day to two week) programs at select BC colleges, including training as a:
		  • Prospector
		  • Driller's Helper
		  • Mining Exploration Field Assistant
		  • Drill Core Technician
		  • Camp Operator
		As well as more general courses, such as:
		  • Introduction to Surface, Underground and Mineral Processing
		  • Introduction to Rigging

Apprenticeship	• Electrician • Welder • Carpenter • Cook/chef • Heavy duty equipment mechanic – see Sample Bundle #2 for a possible route to this career • Heavy duty equipment operator	• ITA Certificate of Qualification • Interprovincial Red Seal Certificate
College Certificate or Diploma	• GIS technician/database manager • Assayer • Environmental technician • Safety attendant • Community relations coordinator • Camp manager • Surveyor	• Mineral Exploration and Mining Technology Diploma • Certified Assayer • Human Resource Management Certificate • Environmental Technology Diploma • Environmental Studies Certificate

College or University Degree	• Geologist
	  • GIS/database manager
	  • exploration
	  • mapping
	  • environmental
	• Engineer
	  • Geological
	  • Civil
		• Bachelor of Science - Geology
		• Bachelor of Science in Engineering
		• Bachelor of Engineering – Geological
		• Bachelor of Engineering – Civil
		• Bachelor of Technology in GIS
		• Bachelor of Science – Environmental Sciences

MINING SUB-SECTOR PROFILE #2: OPEN PIT AND UNDERGROUND MINING

An open pit mine is an excavation or cut made at the surface of the ground for the purpose of extracting ore that is open to the surface for the duration of the mine's life. To expose and mine the ore, it is generally necessary to excavate and relocate large quantities of waste rock.

Underground mining involves digging into the earth to reach buried ore deposits, which are then brought up to the surface through a network of tunnels and/or shafts. Underground mining includes drift mining, which uses horizontal access tunnels; slope mining, which uses diagonally sloping access shafts; and shaft mining, which uses vertical access shafts.

FOR MORE INFORMATION:

MINING INDUSTRY HUMAN RESOURCES COUNCIL

EXPLORE FOR MORE BRITISH COLUMBIA

BC CENTRE OF TRAINING EXCELLENCE IN MINING

MINING ASSOCIATION OF BRITISH COLUMBIA

OPEN PIT AND UNDERGROUND MINING POSSIBILITIES

Route:	Job Possibilities:	Possible Training/ Credentials:

Direct-to-Work	• Mine labourer – see Sample Bundle #1 for a possible route to this career
	• Open pit/underground mine service or support worker
	• Environmental monitor assistant
	• Mining machine operator
	• Dispatcher/radio operator
	• Driller's helper
	• Drill core technician
	• Long-haul truck driver
	• Heavy equipment operator
	• Surveyor's assistant
		• Underground Mining Essentials Certificate – see Sample Bundle #1
		• Environmental Monitor Assistant Certificate – see Sample Bundle #1
		• Short (five day to two week) programs at select BC colleges, including training as a:
		  • Driller's Helper
		  • Drill Core Technician
		As well as more general courses, such as:
		  • Introduction to Surface, Underground and Mineral Processing
		  • Introduction to Rigging
		• Once a student has been hired, many open pit/underground companies will offer opportunities to pursue certificates, including:
		  • Transportation of Dangerous Goods Certificate
		  • Truck Driver Certificate
		  • Heavy Equipment Operator Certificate

Apprenticeship	• Metal fabricator • Millwright • Welder • Instrumentation mechanic • Pipefitter • Cook/chef	• ITA Certificate of Qualification • Interprovincial Red Seal Certificate
College Certificate or Diploma	• Geological/mineral technologist • Environmental technician • Driller/blaster – surface mining, quarrying • Central control and process operator – mineral/metal processing • Inspector and tester – mineral and metal processing • Transportation route and crew scheduler • Drafting technologist/technician • Mapping technician • Supervisor – mining and quarrying • Mineral processing operator • Electrical and electronics engineering technologist/ technician • Land survey technologist/ technician • Construction estimator	• Electrical Engineering Technology Diploma • Mineral Exploration and Mining Technology Diploma • Architectural and Building Technology Certificate • Geomatics Engineering Technology Diploma • Human Resource Management Certificate • Environmental Technology Diploma • Environmental Studies Certificate

Route:	Job Possibilities:	Possible Training/ Credentials:

College or University Degree	• Mine geologist/geochemist/ geophysicist
	• Surveyor – land survey technologist
	• Engineer:
	  • Geological
	  • Mining
	  • Civil
	  • Mechanical
	  • Materials
	• Mine supervisor/manager
	• Biologist
	• Inspector in public and environmental health and occupational health
	• Engineering inspector
		• Bachelor of Engineering – Geological
		• Bachelor of Engineering – Mining
		• Bachelor of Science – Geological
		• Bachelor of Engineering – Civil
		• Bachelor of Engineering – Mechanical
		• Bachelor of Technology – Geomatics
		• Bachelor of Science
		• Bachelor of Applied Science
		• Bachelor of Science in Engineering

ON-THE-JOB POSSIBILITIES

The **CANADIAN MINING CERTIFICATION PROGRAM (CMCP)** is a national program that recognizes and certifies the skills and competencies of workers in undesignated occupations in the mining industry.

Currently, workers who have gained significant on-the-job experience in the mining industry can pursue, in many cases on the job site, a Canadian Mining Certification Program (CMCP) certificate as a:

- Underground Miner
- Surface Miner
- Mineral Processing Operator, or
- Diamond Driller

MINING SUB-SECTOR PROFILE #3: STONE, SAND AND GRAVEL EXTRACTION

Large stone quarries and sand and gravel operations exist near virtually all population centres. These operations use large earth-moving equipment, belt conveyors and machines specifically designed for crushing and separating various sizes of aggregate.

Aggregate is a broad category of coarse particulate material used in construction and as base material for foundations and roads. It includes crushed stone, such as limestone, granite or marble, as well as sand and gravel.

FOR MORE INFORMATION:

BRITISH COLUMBIA STONE, SAND AND GRAVEL ASSOCIATION

EXPLORE FOR MORE BRITISH COLUMBIA

BC CENTRE OF TRAINING EXCELLENCE IN MINING

SAND, STONE AND GRAVEL EXTRACTION POSSIBILITIES

Route:	Job Possibilities:	Possible Training/Credentials:
Direct-to-Work	• Mine labourer – see Sample Bundle #1 for a possible route to this career • Environmental monitor assistant • Heavy equipment operator • Control room operator (milling) • Maintenance helper • Crusher helper	• Underground Mining Essentials Certificate – see Sample Bundle #1 • Environmental Monitor Assistant Certificate – see Sample Bundle #1 • Short (five day to two week) programs at select BC colleges, including general courses, such as: • Introduction to Surface, Underground and Mineral Processing • Introduction to Rigging Once a student has been hired, many extraction companies will offer opportunities to pursue certificates, including: • Transportation of Dangerous Goods Certificate • Truck Driver Certificate • Heavy Equipment Operator Certificate
Apprenticeship	• Industrial instrumentation mechanic • Industrial electrician • Pipefitter/steamfitter • Heavy duty mechanic • Industrial Mechanic (millwright)	• ITA Certificate of Qualification • Interprovincial Red Seal Certificate
College Certificate or Diploma	• Electrical process control technologist • Mechanical engineering technologist/technician – see Sample Bundle #3 for a suggested path to this career • Mine surveyor • Mining technologist • Environmental technician • Executive assistant • Human resources manager • Accounting clerk	• Mechanical Engineering Technology Diploma • Mineral Exploration and Mining Technology Diploma • Geomatics Engineering Technology Diploma • Human Resource Management Certificate • Environmental Technology Diploma • Environmental Studies Certificate • Bookkeeping Specialty Certificate
College or University Degree	• Electrical engineer– see Sample Bundle #4 for a suggested path to this career • Senior maintenance planner • Environmental engineer • Mining engineer • Environmental management systems coordinator	• Bachelor of Science in Engineering • Bachelor of Engineering – Electrical • Bachelor of Engineering – Mining • Bachelor of Science – Environmental Sciences • Bachelor of Technology in GIS

MINING SECTOR CAREER ROUTES – SAMPLE BUNDLES

The four sample bundles of high school and post-secondary courses and training that follow illustrate how high schools, post-secondary institutions and industry partners/employers may work together to develop a particular route for students to follow.

SAMPLE BUNDLE 1: DIRECT-TO-WORK – MINE LABOURER

This bundle shows a route already developed to meet a specific local need. It models how other high schools could work with a post-secondary institution and an industry partner to develop similar routes, using dual credit courses, to meet recognized needs.

North Island College offers an industry-recognized, 14-week **UNDERGROUND MINING ESSENTIALS** certificate program that prepares graduates for entry-level employment in mining. The program is designed for individuals with limited experience, who have a desire to work in the field and gain the fundamental skills to pursue entry-level positions in the mining sector. High school students can begin – and possibly even complete – the certificate while still in high school. (Northwest Community College's **SCHOOL OF EXPLORATION AND MINING** also offers the dual credit **ENVIRONMENTAL MONITOR ASSISTANT PROGRAM**, as well as short – five day to two week – programs in becoming a driller's helper, drill core technician, field assistant, camp operations, etc.)

DIRECT-TO-WORK – MINE LABOURER

A sample bundle of courses for a student interested in entry-level employment in mining might look like this:

Core High School Courses, plus Electives such as:	Career Preparation Certificates at North Island College:	Dual Credits at North Island College	Credential
Earth Science 11 Sustainable Resources 11 Sustainable Resources – Mining 12 Locally developed Board/ Authority Authorized (BAA) courses, such as SD#27 – Mining Orientation 12 and SD#91 – Introduction to Mining 11.	OFA-010 Occupational First Aid (OFA) Level 1 OFA-001 Workplace Hazardous Materials Information System (WHMIS) MVO-069 Transportation of Dangerous Goods (TDG) CTQ-010 Construction Safety Training Systems – 09 (CSTS) FAC-021 Red Cross Standard First Aid with CPR Level C GAS-010 H2S Alive TRD -016 Aerial Lift Safety Also recommended: • Fall Protection • Confined Space Entry	MIN-100 Introduction to the Mining Industry MIN-101 Mining Health and Safety MIN-102 Fundamentals of Mining Technologies MIN-103 Introduction to Mining Skills MIN-104 Emergency Mining Procedures MIN-105 Worksite Readiness	Underground Mining Essentials Certificate

SAMPLE BUNDLE 2:

APPRENTICESHIP – HEAVY DUTY EQUIPMENT MECHANIC

Through a Heavy Duty Equipment Mechanic Apprenticeship, students learn how to maintain, manufacture, overhaul, recondition and repair equipment powered by internal combustion engines or electricity. This equipment might include graders, loaders, shovels, tractors, trucks, forklifts, wheeled and tracked vehicles of all types used in the mining industry, as well as the energy, construction, logging, sawmill and manufacturing industries.

More information on a career as a Heavy Duty Equipment Mechanic:

Career profile: **WORKBC**

Training providers: **EDUCATION PLANNER** or **TRADES TRAINING BC**

Apprenticeships: **INDUSTRY TRAINING AUTHORITY**

The Heavy Duty Equipment Mechanic Apprenticeship Program takes four years and includes 6,000 workplace hours and 720 in-school hours of training.

Students interested in becoming a Heavy Duty Equipment Mechanic may either:

- take a Foundation (pre-apprenticeship) program at a college or university while in high school (dual credit), then go into a Heavy Duty Equipment Mechanic Apprenticeship Program, starting at Level 2, or
- go directly after graduation into a Heavy Duty Equipment Mechanic Apprenticeship Program, starting at Level 1.

APPRENTICESHIP – HEAVY DUTY EQUIPMENT MECHANIC

Core High School Courses, plus Electives such as:	Career Preparation Certificates	Dual Credits at College/University	Heavy Duty Equipment Mechanic Apprentice Program	Credential
Earth Science 11 Sustainable Resources 11 Sustainable Resources – Mining 12 Locally developed Board/Authority Authorized (BAA) courses, such as SD#27 – Mining Orientation 12 and SD#91 – Introduction to Mining 11. Note: Some employers may require English 12, Math 12 and Physics 11	CPR First Aid WHMIS Fall Protection Confined Space Entry	Heavy Duty Mechanic Foundation: • Available at colleges/ universities across BC: see Trades Training BC • Employer not required • Goal is to gain experience and familiarity with the trade and make it easier to find an employer to sponsor the apprenticeship	Levels 1 – 4: • Must have an employer and be registered with the Industry Training Authority • Available at colleges/ universities across BC: see Trades Training BC	Certificate of Qualification (Red Seal) and Certificate of Apprenticeship

SAMPLE BUNDLE 3:
COLLEGE DIPLOMA – MECHANICAL ENGINEERING TECHNOLOGIST

Mechanical engineering technologists and technicians support a wide variety of processes in machinery and power transfer systems. People in this occupation help design, develop, test and maintain power generation and power conversion plants, machines, components, tools, industrial robotics, heating and ventilating systems, mining operations and equipment.

A job as a technologist/technician generally requires a two-year college diploma of technology or a technician certificate, followed by certification from the Applied Science Technologists and Technicians of British Columbia (ASTTBC).

Okanagan College is one of several post-secondary institutions to offer a Diploma in Mechanical Engineering Technology. Students in School Districts No. 19, 22, 23, 53, 58, 67 and 83 (where Okanagan College has an agreement to offer dual credit courses) may apply to take courses in Industrial Trades and Services, including mechanical engineering technology. The program includes on-the-job work experience, where students alternate periods of paid employment with academic study.

More information on a career as a Mechanical Engineering Technologist or Technician:

- Career profile: **WORKBC**
- Training providers: **EDUCATION PLANNER**
- Professional organization: **ASTTBC**

COLLEGE DIPLOMA – MECHANICAL ENGINEERING TECHNOLOGIST

Core High School Courses, plus Electives such as:	Career Preparation Certificates	First-Year Dual Credits at Okanagan College	Okanagan College Diploma Program	Credential
Earth Science 11 Sustainable Resources 11 Sustainable Resources – Mining 12 Locally developed Board/Authority Authorized (BAA) courses, such as SD#27 – Mining Orientation 12 and SD#91 – Introduction to Mining 11 Computer Science 11 or (strongly recommended) 12 Geology 12 (particularly if interested in a career in mining exploration) Math, Physics and Chemistry 11 and 12	CPR First Aid WHMIS Fall Protection Confined Space Entry	MECH 131 MECH 133 MECH 134 MECH 136 MECH 139 MATH 135 For course details, see Okanagan College	First year includes a four-month Co-op work term	Diploma in Mechanical Engineering Technology

SAMPLE BUNDLE 4:
UNIVERSITY DEGREE – ELECTRICAL ENGINEER

Electrical and electronics engineers plan, engineer, design, research, evaluate, test, operate and maintain power systems and complex electronic circuits. People in this occupation work with:

- large-scale electrical systems such as generation, power transmission distribution and control of main and auxiliary systems, and/or
- smaller-scale electronic systems, including computers and integrated circuits as part of monitoring and control systems, and communication networks and systems.

Electrical and electronics engineers must complete a bachelor's degree in electrical or electronics engineering or in an appropriate related engineering discipline. They must also be registered with the Association of Professional Engineers and Geoscientists of British Columbia (APEGBC). Participation in an undergraduate co-op/internship program or applicable summer employment is highly recommended.

Employers include large mining companies, electrical utilities, communications companies, manufacturers of electrical and electronic equipment, consulting firms, government, and a wide range of manufacturing, processing and transportation industries.

UBC is one of several BC post-secondary institutions to offer a degree in electrical engineering.

More information on a career as an Electrical Engineer:

- Career profile: **WORKBC**
- Training providers: **EDUCATION PLANNER**
- Professional organization: **APEGBC**

UNIVERSITY DEGREE – ELECTRICAL ENGINEER

Core High School Courses, plus Electives such as:	Career Preparation Certificates	Dual Credits	UBC Degree Program	Credential
Earth Science 11 Sustainable Resources 11 Sustainable Resources – Mining 12 Locally developed Board/ Authority Authorized (BAA) courses, such as SD#27 – Mining Orientation 12 and SD#91 – Introduction to Mining 11 Mathematics 11 Computer Science 11 or (strongly recommended) 12 Geology 12 (particularly if interested in a career in mining exploration) Math, Physics and Chemistry 11 and 12 English 11 and 12, plus a language Approved social studies course	CPR First Aid WHMIS Fall Protection Confined Space Entry	APSC 122 APSC 150 CHEM 154 ENGL 112 MATH 100 MATH 101 MATH 152 PHYS 157 PHYS 158 PHYS 159 PHYS 170 For course details, see the UBC calendar	The Electrical Engineering Program begins in second year of undergraduate studies after completing the required First Year Engineering courses. Students may apply for the Engineering Co-op Program at the beginning of their second year. For program details, see UBC	Bachelor of Applied Science – Engineering