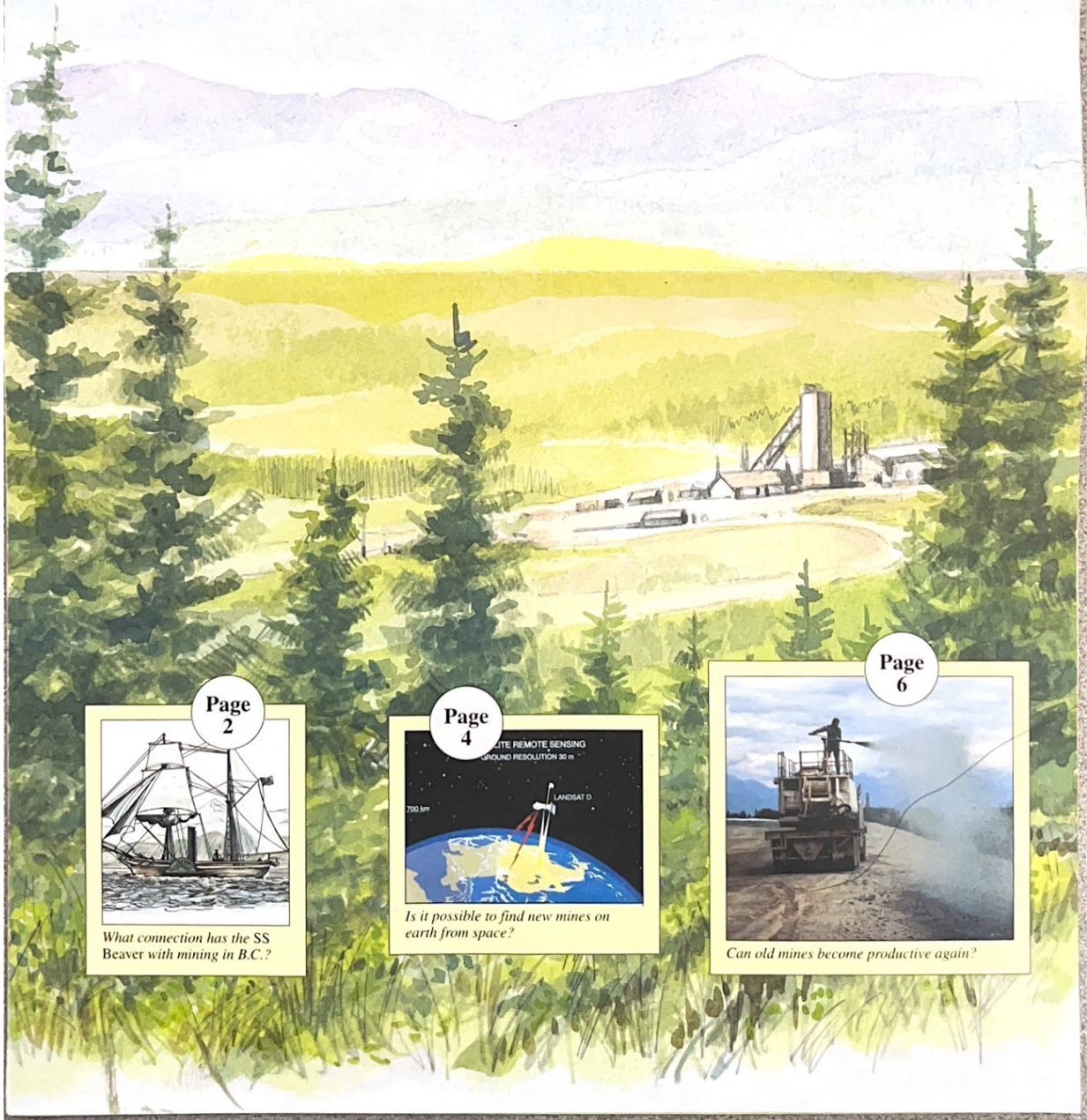


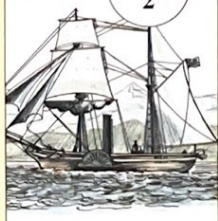


Mining in British Columbia

Leaving a good impression on the land



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2



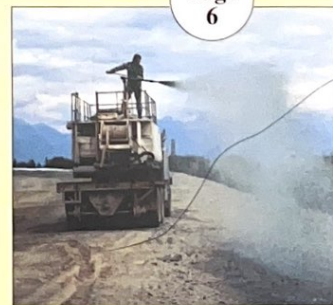
What connection has the SS Beaver with mining in B.C.?

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Is it possible to find new mines on earth from space?

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Can old mines become productive again?

Mining: playing a vital

Opening up the province

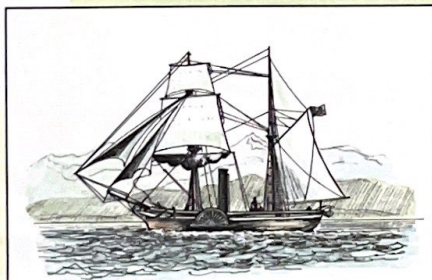
The coastal areas of British Columbia were the first to be colonized after the Spanish and British explorers brought home news of the abundance of fur bearing animals. Later it was the discovery of coal on Vancouver Island that lured many coal miners away from the United Kingdom and Europe. But it was the search for gold that opened up the interior of the province. Places such as the Cariboo, Barkerville,



Williams Lake, Wild Horse Creek and Big Bend were the sites of major gold strikes and men from the United States and Europe flocked to the west to try and make their fortunes. Following along on their heels were the men who established transportation and commercial enterprises to supply the gold

seekers with food and equipment.

Later, as the known and easily worked gold finds diminished, prospectors continued to explore the province to find mineral deposits of lead, zinc and copper and many large coal deposits.

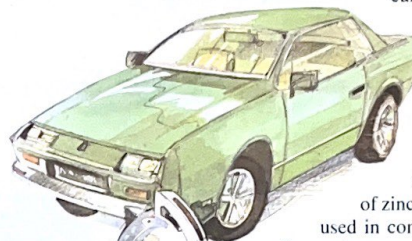


The SS Beaver

When the SS Beaver first arrived on the west coast from Glenhaven, England, she carried a full complement of woodcutters whose job it was to chop down trees to feed the two steam engines. Soon after, when purchased by the Hudson Bay Trading Company, the Beaver operated on coal, mined in the HBC coal mine at Nanaimo. This coal mine supplied coal to many of the steamships that plied the coastal waters. The SS Beaver worked the coast for over 50 years doing a number of tasks under numerous owners before she went aground off Prospect Point in the Vancouver harbour.

Benefiting our lifestyle

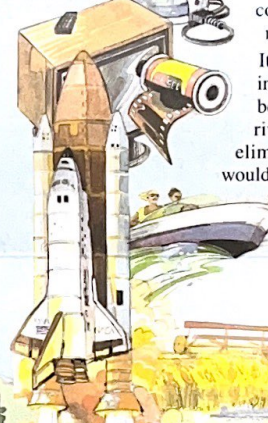
The products derived from mining form a part of everything we use, including energy derived from coal. Minerals such as lead, zinc and copper are common place in our lives. Lead for



car batteries, copper wire for electrical and communications purposes, zinc for rust-protection, skin lotions and medicine are just a few common uses. Other metals such as indium and germanium, which are recovered during the refining

of zinc and lead, are used in complex satellite and space travel communications equipment.

It is difficult to imagine what our lives would be like if all products derived from mining were eliminated from today's modern living. There would be no planes, no trains or trucks, no cars or bikes or stoves or fridges. No computers or skis, golf clubs or golf carts. No knives or forks, not even pins, paper clips, pencils or pens. Minerals play a very important part in our lifestyle.



role in B.C.'s economy

Facts and figures

Approximately 15,000 people are directly employed in B.C.'s mining industry

Another 29,000 in B.C. and other parts of Canada are indirectly employed in supply, contract, transportation and service industries.

Billions of dollars in revenue are generated annually for the B.C. economy

Many communities throughout B.C. depend on the mining industry. Mining operations exist in virtually all economic regions of the province, generating some 3 to 4 billion dollars a year in gross revenue for B.C.'s economy.

Mineral products are 22 per cent of B.C.'s total exports
Roberts Bank, Prince Rupert, Vancouver and other ports ship an average of 25 to 26 million metric tonnes of mining products per year.

B.C. is a major producer of coal and copper concentrate
Mining operations in the province produce a diversity of other products as well, such as gold, silver, molybdenum, asbestos fibre, zinc, lead and various industrial minerals.

Technical advances open doors for 'high-tech' metals
Recent technological breakthroughs in the fields of medicine, aerospace engineering, electronics, computers and superconductors are now also creating opportunities for high technology metals in B.C.



Safety

When it comes to safety, the mining industry in B.C. is in a class by itself. Statistics from the Workers' Compensation Board indicate that the mining industry is the safest heavy industry in the province today, and over the last number of years accident frequencies in the mining sector have been significantly reduced.

The mining industry is proud of this record, and through continued job training and safety awareness programs for its employees, is striving to improve upon this record in years to come.

Economic impact

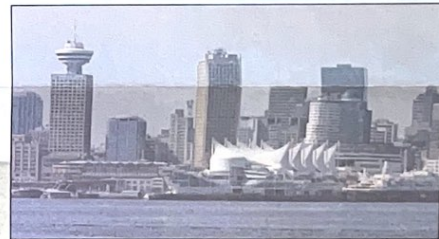
The direct purchases of the mining industry generate additional income and employment in British Columbia and other parts of Canada. Some of the major purchases of goods and services include machinery and office equipment, heavy duty equipment such as trucks, shovels, tires, fuel, diamond drills and blast hole drills, and construction materials used in structures such as mills, offices, service and equipment buildings.

Transportation is another area where the mining industry spends large sums of money. Concentrates and refined metals must get to the market place and supplies and equipment must get to the mine. The use of trains, trucks and ships are essential in the movement of these products.

Careers

Contributing to the success of the mining industry of B.C. are the men and women who work in mining. Only a relatively small number of people work in the direct production of minerals or what most people traditionally think of as miners. Counting those involved directly in ore production, such as drilling, blasting, loading and hauling, the number amounts to approximately 25% of the work force. Add those engaged in concentrating the ore and the staff whose jobs are primarily concerned with production, and the total is still below 40%.

The remainder of over 60% constitutes the service sector composed of men and women whose skills support those who are directly involved in the production of ore and concentrate. This group consists of computer operators, accountants, first aid personnel, mechanics, geologists, surveyors, biologists, supervisors, engineers, carpenters and a host of other trades and professions.



'What it takes to get a new

The start-up

Starting up a new mine can be a long, complex and costly process. Because of the rules and regulations governing all aspects of mining, from exploration through closure, it can take several years and millions of dollars to get a new mine up and running.

Before a mining company can begin exploring for minerals in a given area, it must submit an application for a work permit to the local mines inspector. The application is reviewed by the inspector and, where necessary, other government agencies to ensure all regulations governing exploration activities are met. Upon approval, a work permit is issued and exploration can begin.

Once an area has been explored and identified as viable for mining, the mining company must prepare a detailed plan of its proposed mining activities. This plan must then be presented to and approved by a governing body through the Mine Development Assessment Process.



Planning

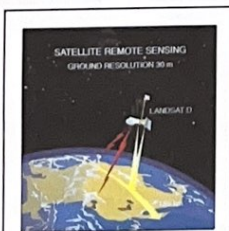
With the exception of a very few unexpected or lucky finds of ore, most searches for that elusive ore body start with the examination of government geological maps which give preliminary clues by identifying areas where there is potential for mineral occurrences. From this starting point specific locations are pinpointed for more detailed examination.

Exploration

There are many different ways to explore a specific area. The old tried and true method is to send in a team of geologists to survey and map the territory and to make use of the sciences of geology, geophysics, geochemistry and mineralogy. Larger areas



are generally covered by aerial surveys which measure variations in physical properties of the earth which might indicate mineral concentration. Encouraging data instigates the use of diamond drilling to bring up actual cross section samples from the suspected mineral deposit.



Recent technological advances have taken the exploration process into outer space where satellites using non-photographic sensors produce special images of the earth. These images are then downloaded onto computers and processed to give various types of digital images of the targeted areas.



Mine Development Assessment Process

The first official coordinated review process governing mining operations in British Columbia was established in 1976 with regulations for coal mines. Shortly afterward, a similar review process was developed for metal mining companies, and in 1984 these two processes came together to form the Mine Development Review Process.

During 1991, the Mine Development Review Process was further enhanced to become the Mine Development Assessment Process through the proclamation of the Mine Development Assessment Act.

The MDAP lays out a number of regulations and conditions which must be met by mining companies in order for them to carry out their mining activities. These conditions cover all aspects of the mining process and ensure that the company has given careful consideration to and made provisions for the social, economic and environmental impacts of its mining activities.

The MDAP is guided by the Mine Development Steering Committee, comprised of senior staff from key provincial agencies including the Ministry of Energy, Mines and Petroleum Resources which is the lead agency. Other important players in the MDAP are provincial and federal review agencies, local governments, native and special interest groups and the general public.

Under the MDAP mining companies are required to present a detailed plan of their proposed mining operation to the Mine Development Steering Committee for approval. Included in the plan must be measures for protecting and caring for the environment throughout the mining process and plans for reclaiming the land upon closure of the mine. And to further ensure that reclamation projects are part of the mining company's plans, companies must post a reclamation bond with the government before they begin their mining activities.

Only once all the conditions of the MDAP have been met, does a mining company receive approval and permits to proceed with the development and operation of the new mine.

Stages in the process

Prospectus/Pre-Application

- Describes proposed mine project and identifies potential impacts.
- Government agencies, local governments, native groups and the public review the prospectus and provide terms of reference for the company's application.

Application

- Contains project plans, and assessment of environmental and socio-economic impacts, and proposed mitigation plans.
- Reviewed by federal and provincial government agencies, local government, native groups and the public.
- Terms of reference may be set for further studies to be conducted prior to a disposition decision.

Disposition Decision

Application may be:

- accepted and a mine development certificate issued.
- referred to an assessment panel, modified, or rejected.

Mine Development Certificate

- Granted when all policy issues are resolved and all technical issues are known to be resolvable by affordable means.
- Decision is made by the Ministers of Mines and Environment.

Permits, Licences and Approvals

- Permits, licenses and approvals necessary to construct, operate and reclaim a mine are only issued after mine development certificate is granted.

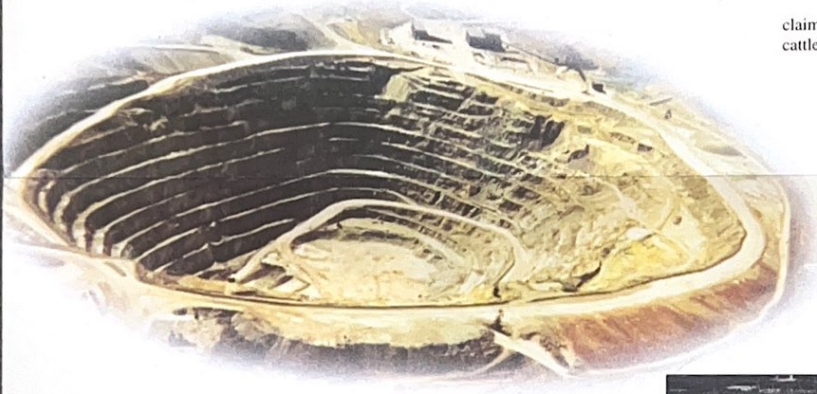
mine up and running'

Establishing the mine

Once the MDAP has been completed and the mining company has been given approval to proceed, the establishment of the mine can begin. This involves recruiting and training of the labour force, construction of mine buildings including offices, storage facilities, mills, crushers, conveyors, equipment sheds, service buildings and labs. Additional work is necessary to establish waste areas, tailings ponds, power lines, roadways, the many ancillary facilities required, and development of the pit.

The pit

Open pit mining is carried out when the ore body is close to the surface. Overburden (soil) is removed and stockpiled for later use in reclaiming the land. Any waste rock on top of the orebody is drilled, blasted and transported to dumps which are later revegetated using the overburden as a growth medium.



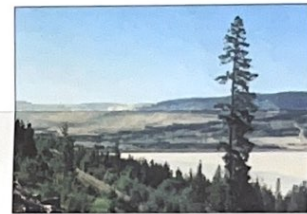
Removing the ore

Each stage of the mining operation is planned by a team of engineers and geologists who estimate the mining sequence and pit design. Drilling and blasting frees the ore for removal by large shovels and trucks. The ore is trucked to primary crushers where the large boulders are reduced in size to manageable chunks that can be transported by conveyor to the concentrator.



The tailings pond

In the pond the coarser particles sink to the bottom leaving relatively clean water that is pumped back to the concentrator. Tailings ponds are eventually reclaimed and may be used to grow forage for domestic cattle and wildlife.



Community benefits

Mining communities thrive throughout the province. The majority of the workforce comes from towns in the vicinity of the mine. In addition many mines contribute to these towns by supporting or building recreational facilities, sponsoring scholarships and providing other community services, and in some cases, where a mine is in an isolated site, building the entire town.



The concentration process

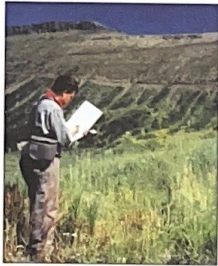
In the concentrator the ore is fed into large grinding mills that further reduce the particle size to that of a near flour-like consistency. The reason for this fine grinding is to release the valuable mineral particles (concentrate) from the host rock (waste). The next stage in the concentration process involves the pumping of the finely ground ore as a slurry into flotation cells and cyclones where chemicals are added to facilitate the separation of the mineral particles from the host rock particles. Once the separation has been made, the mineral particles are dewatered, dried, and stored to await shipment to smelters in either Canada or offshore. The waste particle slurry known as 'tailings' is pumped into ponds for storage.

World markets

Coal and mineral concentrates from British Columbia mines are shipped to destinations throughout the world. The bulk of material shipped from British Columbia is consumed by smelters in Japan and the Far East. Many products such as cars and appliances purchased from these countries are made from mineral concentrates mined in British Columbia.

‘What it takes to shut

Reclamation is an ongoing process



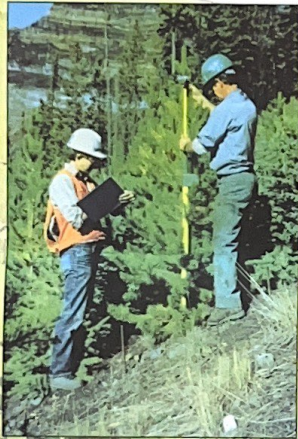
The word ‘reclamation’ is not a new word to the mining industry of B.C. In fact, mine reclamation legislation was first enacted in 1969. In addition the Mine Development Assessment Process includes requirements for ongoing reclamation of active minesites and for post-closure reclamation.

A mine cannot proceed in B.C. without the company having first determined how the mine will be reclaimed — and reclaimed to the sat-

isfaction of the provincial government.

But it goes beyond the reclamation of tailings ponds, the monitoring of water quality, and the resloping, seeding, and planting of waste dumps. The B.C. mining industry goes beyond making exhausted minesites look green.

The industry is concerned with the quality of that green. Is the vegetation that has been chosen sustainable? Is the mix of grasses right? What balance of trees, partial cover and grassy slopes will make good habitat for animals? What are the relative strengths of the various types of native vegetation on the particular types of broken rock? These and many more questions are considered and answered by the site environmental team and the revegetation and reclamation consultants



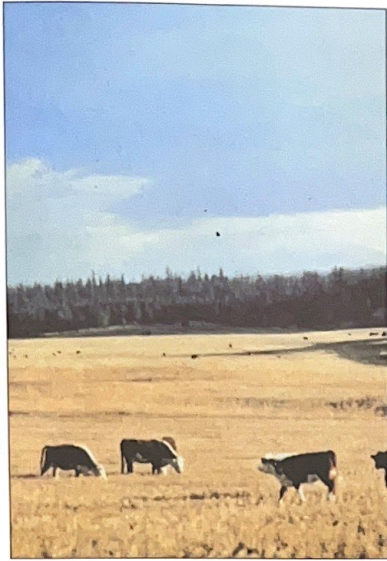
DOUGLAS FIR



LOGEPOLE PINE



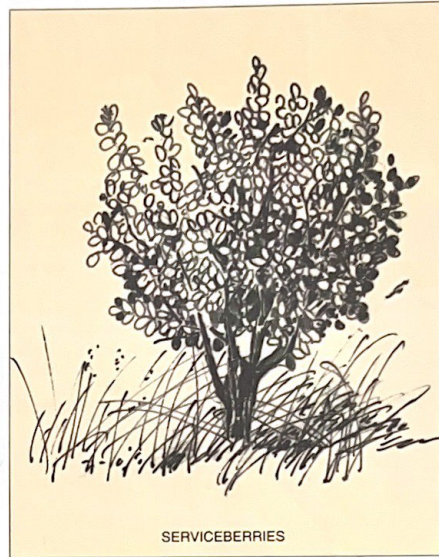
down an old mine'



who provide their expertise and services to the mining industry.

The process of reclamation is not left entirely to the time of mine closure. Reclamation is an ongoing and integral part of the daily mine operation. Each year certain requirements must be met with regard to reclamation of areas of the minesite that have been worked. Some mines have their own greenhouse facilities, where they grow stocks for revegetation.

After the closure of a mine, many of the areas have already been reclaimed. The remaining task is to dismantle and clear away all the buildings and the equipment and proceed to reclaim the remaining disturbed areas. Within a short time and with help from Mother Nature, the entire minesite will be in an acceptable state either for wildlife habitat, productive pasture, grazing land or some other designated use at least as valuable as the area was before mining began.



SERVICEBERRIES



ORYZOPSIS HYNENOIDES

Elk round-up



Some open pit mines, because of forage provided by ongoing mine reclamation, have such a proliferation of wildlife around the site, a check for the presence of wildlife must be made prior to blasting. One reclaimed area is so populated with elk, that the company participates in an elk round-up and the airlift of roughly 200 animals to new locations every few years.

About the future of mining...



The mining industry, and many other resource-based industries in the province of British Columbia, are faced with a great challenge in the 90's and into the future.

Because present day society relies heavily on minerals and metals for most of the technologies and conveniences which sustain our modern lifestyles, the search

for and development of new orebodies is crucial.

To ensure a continuing supply of minerals from our existing resource base, the minerals industry must have access to as much land as our province can offer.

In the final analysis, actual mining occupies a very small percentage of the land base.

Once an orebody is discovered, it takes many years and many millions of invested dollars before actual extraction and processing can begin.

Through the Mine Development Assessment Process, a precise and costly plan covering start-up to finish must be in place. The development of the new mine is carefully monitored every step of the way by Federal and Provincial regulatory bodies to assure compliance with approved mining plans and environmental protection measures.

British Columbians are increasingly interested in the integration of environmental management with our economy so that not only present, but future generations may enjoy the benefits of life in this natural resource-rich province.

In the process, the concept of sustainable development has come to play a critical role in developing a strategy to protect our economy and our environment.

Sustainable mining may seem to many incongruous in that resources are removed, forever, from the resource base. New resources are, however, continually being discovered, new resources are being created below the earth's surface and new technologies are evolving to both discover and develop our hidden resources.

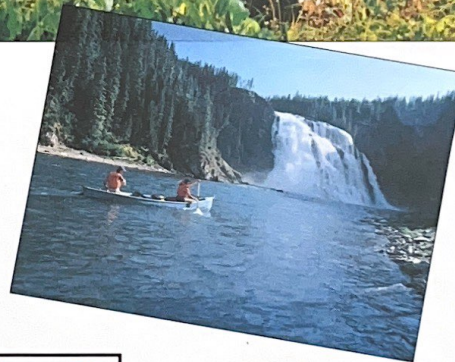
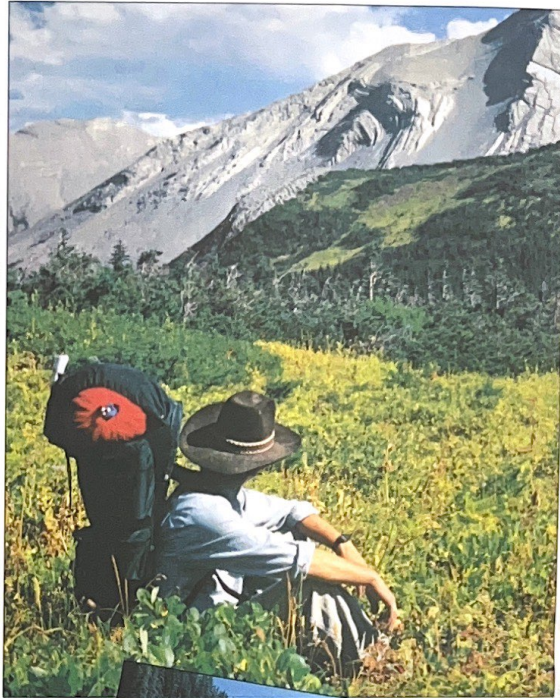
While each operating mine does have a finite life, the actual supply of minerals is virtually inexhaustible.

It is seen as the mining industry's mandate, in a democratic society, to continue to locate and develop these hidden resources to provide for the material needs of our society, the economic needs of our province and its citizens and to conduct these activities with the highest regard for our environment.

Sharing this responsibility with the minerals industry are governments at all levels, along with each member of the public.

Each of us has an obligation to make good decisions and judgements about all the facets of mining, from the search for the minerals to the final disposition of the minesite.

In the end, we are all custodians of the natural resources of this province, so we must all share in the responsibilities for making prudent and wise determinations on the integrated use of the land for the people of today and generations long into the future.



Information?

Would you like more information about the mining industry? The Mining Association of B.C. can help. Fill out this form and send it to us and we will forward the information requested. I would like to know more about:

Name _____
 Address _____
 City _____
 Province _____
 Postal Code _____

- Exploration for Minerals
- Underground Mining
- Open Pit Mining
- Processing of Minerals
- Mine Development Assessment Process
- Careers in Mining
- Safety in the Mining Industry
- Applied Science and Technology in the Industry
- The Economic Contribution of the Industry
- Minerals in our Every Day Lives
- Reclamation Projects
- Mining and the Environment
- Another Topic? _____

Mail to:



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 Vancouver, British Columbia, V6E 3X1