Mining: Our Northern
A potential barely tapped

Mining contributes many millions of dollars today to the economy of the Northwest Territories. In 1986 alone, the total value of mineral production and exploration exceeded one billion dollars. In that same year, direct contributions to the northern economy through payroll, taxes, and local purchases by the mining and exploration companies exceeded $150 million. Mining is the N.W.T.'s second largest employer, second only to government itself. Today, over 2,000 workers are employed in the northern mining industry, and all of these over 1,000 are Northerners.

The mining industry provides substantial additional benefits to the Northern economy, including payments, and both corporate and personal taxes are paid to government. These returns, as well as transfer payments, which are used to pay for the basic services we Northerners require. As well, for every mine worker, there are at least four more jobs created in the service sector, to support mine and employee purchasing. These jobs provide considerable wage and tax benefits to the northern economy.

The industry is helping to further increase northern benefits. By working with government to provide northern training programs, the industry is providing new career options to our young and rapidly growing population. Increasingly, Northerners are taking advantage of the considerable employment opportunities which exist for professionals and the trades alike in mining.

Mining and Northern development have marched side-by-side since Gilbert Callin's discovery of radon at Great Bear Lake in 1900. His prospecting brought the exploration into the Northern skies. His Eldorado Mine created the Northern Transportation Company, and also provided a market for Norman Wells oil. Later discoveries like the Car gold deposit in Yellowknife and the huge Pine Point lead/zinc deposit sparked the construction of the North's first highway and our only railroad. More recently, the Nanisivik and Polaris operations instigated the construction and operation of the world's highest technology ice-breaking cargo ship, the N.V. Arctic, which plies the waters of Canada's Arctic.

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It's a story every Northerner should know.
Search for minerals opened the North

First, oil, whaling, and such factors as national defence and the need to maintain sovereignty, have all played a part in the Northwest Territories’ development. However, minerals and mining, basically, have produced the modern North.

Long before Sir Martin Frobisher first mined for gold on Baffin Island in 1576, Northern Inuit and Dene had discovered that native copper, easily worked, made for better spear heads or knife blades than bone or ivory.

In 1707-71, nearly two centuries after Frobisher, Samuel Hearne and his native guide Natanoabie made their incredible, eight-month overland journey from Hudson’s Bay to Coppermine, hoping to find the copper from which the Yellowknife Indians made their knives. They did find copper, but disappointingly little.

The North slumbered on, virtually unknown to anyone but for traders, whalers, an occasional explorer and its hardy native peoples.

Then, gold fever swept the Yukon.

The Klondike gold rush and the famous Trail of ’98 created an influx of southerners, all hoping to strike it rich. Most sailed up the west coast to Sitka, Alaska, before heading inland.

Others followed the lakes and river routes of the fur trade voyageurs, north to Great Slave Lake and then down the broad Mackenzie River before striking west over the Mackenzie Mountains.

One of them was a man named E. A. Blakeway. Who he was, and whether he survived the cruel mountain ordeal he faced, the records don’t reveal. However, he did stake some claims as he made his way north, and a sample from one claim, sent to Ottawa for analysis in 1908, assayed 2150 ounces of gold per ton. Today, a mere tenth of that is well worth mining. I think there’s enough of it.

... the North was a difficult territory to reach near the turn of the century. Without improved transportation, its economic deposits would remain undiscovered for some time to come.

Finds like Blakeway’s attracted the interest of the Geological Survey of Canada. In 1900, one of the their geologists, J. McIntyre Bell and his assistant Charles Cornwell, noted evidence of copper and cobalt mineralization on the east shore of Great Bear Lake.

The stage was being set for a major discovery.

However, the North was a difficult territory to reach near the turn of the century. Without improved transportation, its economic deposits would remain undiscovered for some time to come.

Then, in 1920, Imperial Oil Limited bought two Junkers aircraft in the United States, with the idea of flying its workers into Norman Wells, well before spring breakup. While the theory was sound, the effort was a disaster; neither plane got farther north than Fort Simpson before break-up. Only one Junkers finally completed its journey... on foot.

However, that first flight into the N.W.T. had proved aircraft could operate in the North, despite great difficulties. The mining industry was quick to recognize the possibilities of this new, speedy method of transportation to remote areas, and by the mid-1920’s the mining exploration by air was under way all the way to the Arctic coast. The aircraft’s usefulness soon would be proved.

Gilbert Lafline, a successful Toronto prospector and mining promoter, came across J. McIntyre Bell’s report on Great Bear Lake in 1920, while looking over potential areas for exploration. Lafline pegged up immediately when he saw the mention of cobalt bloom, because he knew cobalt was often associated with pitchblende, the ore in which radium was found.

In those days, cancer treatment relied on radium for its radiation source. Radium was a rare commodity, and fetched up to $73,000 a gram, or over $2 million an ounce! At that price, cancer treatment was confined only to those wealthy enough to afford it.

Needless to say, radium was worth looking for, no matter where it was found in the world... even the remote Northwest Territories. In the spring of 1930, Lafline flew in to Great Bear Lake with prospector Charlie St. Paul... and found his pitchblende.

Within four years, his Eldorado Mine was producing radium.

While radium was in high demand, there was little demand for radium’s parent element, uran- sim which accompanied radium in substantial quantities. No one could foresee that in less than ten years, its demand would exceed that for radium, and that Eldorado uranium would prove crucial in ushering in the nuclear age.

While Eldorado created the N.W.T.’s first mining rush, it also provided the first real impetus for the North’s infant oil industry.

Imperial Oil had continued to develop its Norman Wells oil field, but there was no demand for the oil until the Eldorado Mine was built. Soon after the mine went into production in 1933, Norman Wells logically became the source of their fuel.

By 1933 there were 300 people in and around Fort Norman, the settlement which had grown up near the mine. Many of them were prospectors, and most of them were too late on the scene to find any good, unclaimed ground left.

Some found jobs at Eldorado. Others began drifting back south, working their way on river boats, flying if they could afford it, walking if they had no money. Among the latter was a young Torontonian named C. J. Baker and his partner, Herb Dixon. Attracted by prospecting activity, they headed for Yellowknife Bay.

Baker, in 1933, promptly discovered the Yellowknife area’s first mine — the Bunwah Mine on the east shore of the bay, just opposite Latham Island. The Bunwah Mine proved a flash in the pan, it yielded only...
which had created them. Still other deposits, like the Coleman or body, 220 kilometres north of Yellowknife, defined the best efforts of many companies until new techniques for mass production from low-grade ores were developed, many years after the original discoveries.

Gold was the prime target of most N.W.T. prospectors, especially after its price was fixed in 1971. But the discovery of rich deposits of other minerals led to the production of lead, zinc, silver, nickel and tungsten in the N.W.T. as well.

The Freeport's first mine, the North Rankin Nickel Mine, went into production at Rankin Inlet in 1957 and operated until 1962, bringing in materials and supplies and sending its concentrates out by ship. While the mine's life was short, it opened mining's eyes to the possibilities of a supported Arctic operation.

Uranium, was the glamour metal until the late 1950s. The Eldorado Mine produced up until 1960. Another uranium deposit in the Fort Resolution area became the Rainbow Mine and produced uranium concentrates for two years - 1939 - before its reserves were depleted.

As interest in uranium decreased, interest in lead and zinc increased. Lead and zinc deposits had originally been found at Pine Point, on the south shore of Great Slave Lake, in 1952. Detailed exploration revealed the existence of a huge ore body, and in 1951 Pine Point Mines Ltd. was formed by Cominco to develop the property. Seven years later, Cominco had Canada's richest known lead/zinc deposit - but no way of getting the concentrates out at a profit.

"...the discovery of visible gold on the west side of Yellowknife Bay created a frantic rush to get claims staked before freeze-up. The N.W.T.'s first gold rush had begun."

It wasn't until the railway was built from Grimshaw in northern Alberta, in 1964, that production could finally begin. Canada: Tungsten Ltd. had better luck than Pine Point when it discovered the Western Hemisphere's largest tungsten deposit at Tuktoyaktuk, on the N.W.T.
"Opening up and developing frontiers is the history of mining, and of the N.W.T., in whose development mining continues to play a crucial role."

above steel pilings in a basin which had been prepared on the shore in advance. As the tide went out, the barge settled down onto the pilings, and bulkheads hastily filled in the channel to the basin, to prevent the seas' return. The mill was in place.

Production at the Polarisc Mine began the following year. Like Nanisivik, the mine shiploads its concentrates, then ships them out during the short summer navigation season, using the M.V. Arctic. Today, the Polarisc Mill is still known as "The Barge," though it sits high and dry above the sea. And the barge's empty hull has become a million-gallon ball storage tank, safely separated from the mill above it by its concrete deck. Without the engineering ingenuity, the Polarisc Mill would not have been operated.

Innovative thinking is a hallmark of northern mines. In 1962, a group of mining companies decided to develop the Lupin deposit on the shore of Crowapo Lake, in the middle of the barren lands. Using the experience they had gained at their Great Bear Lake silver mine, Echo Bay used air

craft to fly nearly all of the construction materials and mine equipment to the site. A winter road was completed to haul fuel and bulk materials necessary to operate for the next year. Once construction was completed, the cargo aircraft were replaced with a Boeing 727, which flies workers and cargo to and from the mine site.

Echo Bay's innovation paid off handsomely. Despite being the country's most remote and inaccessible operation, the Lupin Mine has become one of Canada's most profitable gold mines.

As much as the lives of mines are controlled by nature, they are also strongly controlled by world commodity markets. Supply and demand dictates the price of metals and minerals, and if zinc, for example, falls into a slump, Nanisivik and Polarisc feel the pinch. Ore reserves decrease, and profits decline. If operating costs increase due to increased wages, overly stringent government requirements, or higher costs of fuel, for example, the lives of our northern mines are threatened. If serious enough, any one of these factors alone could result in the complete shut-down of operations, and substantial losses to our economy.

Over the years, there have been many mining operations that have been brought into production. Some have died from old age, while others have perished due to factors beyond the mine's control. For example:

• The Eldorado Radium mine underwent several rebirths before being mined for radium, then uranium,

• The Radium Mine produced briefly, but is being re-examined.

• The Copper Mountain Mine, now Tecoma, produces copper and silver.

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Northern transportation benefits

When Eldorado Nuclear’s Port Radium mine on Great Bear Lake opened in 1982, it relied on both aviation and marine transportation to support its operation. The mine’s barge operation grew into the Northern Transportation Company Ltd., which now supplies isolated northern communities with fresh groceries and building materials in a dry summer. The mine’s airline, Eldorado Aviation, pioneered large scale on transportation in the NWT.

Similar to the construction of Pine Point Mine instigated the construction of the NWT’s only railroad, to fuel concentrate to the mine’s Port Radium Ltd.

In the earliest days of mining, road technology was developed to bring in freight. This technology is now being used for ice roads to Iruin and Colomac Mine, to Tuktoyaktuk and hoist in Manirac, across the Mackenzie River, and in the Keewatin.

To service the Nanisivik and Padova Mines in the high Arctic, the world’s largest technology ice-breaking cargo vessel, the M.V. Arctic, takes concentrate to European markets. This technology provides the foundation for future ice-capable ships that could service both mining operations and communities in the Keewatin and Communist areas.

Largest deposit...but...

The western world’s largest tungsten mine, the Cantung Mine, is located in the Cordilleran Province. Despite its richness, operations have been suspended ever since the 1960s, with very cheap labor, flooded the market with tungsten. This low price made the Cantung operation non-economic.

Giant Yellowknife Mine opened its Dima mine near the old Tundo Mine in 1983, and produced gold for four years.

The Discovery Mine supported a thriving mining community for 19 years of gold production, until lack of ore forced it to close its doors in 1988.

The Keewatin's only gold mine, the Gullotone Lake Mine, operated for a brief three years until low reserves and high operating costs took their toll in 1984.

The Cantung Mine, despite being the western world's richest tungsten deposits, was shut down in 1986.

The Pharamine Mine, just east of Yellowknife, produced gold for two years during the war, and was rejuvenated by Transmin Resources Ltd. in the 1980s.

Despite the cycles of mine opening / mine closure, the long-term outlook for mining in the North still looks bright.

Just south of Yellowknife, the Far Lake rare earths deposit is waiting to provide its exotic metals to the automotive and aerospace industries.

The Kigpikuk uranium deposit in the Baker Lake area contains enough economic reserves to support a mine. The jobs and benefits are desperately needed in the undeveloped Keewatin districts.

Several gold properties in the Geogia Lake, Nicholas Lake, Meliadine River, High Lake, and Amisk River areas are generating a great deal of interest.

• Substantial base metal resources are known in the Coronation Gulf area. These deposits would be the scene of active mining operations were they in the more accessible southern areas of Canada. With winter road access to these deposits from the coast, and the construction of more ice-breaking cargo carriers like the M.V. Arctic, these deposits could provide substantial benefits to the North.

Opening up, and developing frontiers is the history of mining, and of the NWT, in whose development mining continues to play a crucial role.

Geology

Geology is the study of the earth, including its rocks and minerals.

Geologists study the earth, and its rocks and minerals. They have divided the world’s rocks into four major age groups: from the oldest to the youngest, these are the Precambrian, the Paleozoic, the Mesozoic, and the Cenozoic.

Canada’s geology can be divided into 3 geological regions: the Precambrian Shield, the Platform, and the Mountains. All three regions are present in the North. This makes our mining potential very high and very diverse.

Seven “Provinces” are treasure-houses

The Northwest Territories is further subdivided into seven distinct geological areas, known as structural provinces.

The Precambrian Shield consists of three provinces - the Slave, Bear, and Churchill. They were formed anywhere from 3.5 billion to 660 million years ago. As a whole, the Slave Province contains the oldest rocks. However, both the younger Churchill and Bear Provinces contain fragments of similarly old rocks.

Many of the Precambrian rocks formed the crust of ancient continents which have been worn down over the years. Most recently, these rocks were covered and buried by glaciers which covered most of Canada.

Three Precambrian provinces have had a complex past that includes volcanic activities, chemical reactions, and fracturing, folding, and faulting caused by crustal upheavals. This has tended to concentrate, to free, and, in some cases, to expose their valuable mineral content.

This makes the Slave, Bear, and Churchill Provinces prime targets for prospecting.

The Slave Province contains many gold deposits, including all those being mined today. As well, substantial copper and lead-zinc deposits have also been found, but require transportation to get them to market.

One of the world’s few rare earth deposits is also being investigated for production.

The Bear Province is best known for its uranium and silver, which have both been mined in the past.

The Churchill Province is underlaid by rocks similar to both the Bear and Slave provinces, and thus, the mineral potential of the Keewatin is similarly high. Both nickel and gold have been mined in the past, and recent exploration is proving up gold, uranium, and lead-zinc-copper potential.

Three provinces, the Arctic, Interior, and Hudson Platforms, border the Precambrian Shield. They consist of thousands of feet of relatively undisturbed younger sedimentary rocks which overlie the Precambrian basement. Many of the sediments forming the rocks were laid down under vast seas that once covered the NWT. Others were formed from sediments deposited by streams bringing sand, silt, and gravel from nearby mountains. At one time, the platform rocks probably covered much of the presently exposed Precambrian Shield, but they have been worn, or eroded away since.

The platforms are best known for the lead-zinc deposits they once contained, as these are mined at Pine Point. They also host the bulk of Canada’s oil and gas deposits, including the oil wells of the Norman Wells area.

The Cordilleran Province in the NWT forms the mountainous western boundary with Yukon. This rugged terrain has seen some exploration in the past, and tungsten, silver, lead, zinc, copper, and placer gold deposits are known.

Located in the high Arctic, the Inuvik-Gulf area is the least explored region of the North. Canada’s most northerly mine, the Polaris Mine, is located in this province. In addition to base metals, and coal, this area is also known for its vast, untouched reservoirs of oil and gas.

Vast mineral deposits are known in the Arctic Cordillera.

...prospectors and geologists have discovered everything from precious and base metals to tungsten, coal, rare earths and diamonds. However, geologists have just barely scratched the surface in the North. Plate although some coal has been found. It contains substantial reserves of oil and gas.

While these seven provinces, prospectors and geologists have discovered everything from precious and base metals to tungsten, coal, rare earths, diamonds, and coal. However, while some discoveries have been made, geologists have just barely scratched the surface in the North.

Geological Time Scale

The geological time scale is divided into seven major intervals: the Precambrian, Paleozoic, Mesozoic, and Cenozoic eras. Each era is further divided into periods, epochs, and stages. The Precambrian is the longest period of geological time, making up 90% of Earth's history. The Paleozoic era is divided into five periods: the Cambrian, Ordovician, Silurian, Devonian, and Carboniferous periods. The Mesozoic era is divided into three periods: the Triassic, Jurassic, and Cretaceous periods. The Cenozoic era is divided into the Tertiary and Quaternary periods.

Geological Provinces of the Northwest Territories

The Northwest Territories is divided into three major geological provinces: the Precambrian Shield, the Platform, and the Mountains. The Precambrian Shield is the oldest and most stable part of the territory, making up over 90% of the landmass. The Platform is a younger and more dynamic region, characterized by sedimentary rocks and tectonic activity. The Mountains are the youngest and most dynamic part of the territory, characterized by volcanic and plutonic rocks and active tectonic processes.
Prospecting is high-tech now

There still are people who will pack off into the bush, the barrenlands, or the mountains by themselves in search of mineral riches. Armed only with maps, rock hammers, hand lenses, and enough grub to keep them going until they are picked up, they work as the prospectors of old did.

In the North of today, however, the independent prospector is becoming an endangered specie. Modern prospecting is becoming very complex and costly for one individual. As a result, only large companies that have the financial resources can mount significant exploration programs.

Over the last 20 years, dramatic increases in knowledge in satellite image interpretation, geology, geophysics and geochemistry, has produced a wide range of specialists. The strange term "Explorationists" is often heard now when describing these diverse professionals that make up modern exploration teams.

In the field, too, "high tech" has caught up with exploration. The aircraft, which first made it possible for prospectors to penetrate areas almost inaccessible on foot or by water, has changed the very nature of prospecting itself.

The early prospector, or a couple of men working together, might live in isolated camps for months at a time without seeing another human being, totally dependent on themselves for survival.

Today's prospector usually lives in a comfortable tent camp with such amenities as showers, fresh vegetables and meat, and radio communications with family and friends. Some camps even have satellite television.

Modern prospectors still are no sissies. They still have to trudge miles through swamps, through tangled forests and over jumbled rock. The terrain, the weather and the flies can still be cruel, and the beauty of the barrenlands or the mountains still marks a land in which a twisted ankle, a lost milt or a piece of treacherous ice can prove deadly.

However, it's a rate prospector today who goes into the bush without radio contact with a base camp. An aircraft or helicopter can be on the spot within hours to help if trouble occurs. Most often they work in pairs, for safety's sake.

Modern prospectors often don't spend days getting to the sites they're exploring, or cut firewood or cook meals, either. Often, they work an eight-hour day, flying out in the morning with paper bag lunches, and then being picked up in time for supper at the end of the day.

An eye in the heavens

While still an important tool, aerial photographs are being complemented with satellite images taken from space. Several American and European satellites continually circle the earth taking images in much the same way that a video camera takes television images. Imagery data can be manipulated and enhanced by computers, and in this way provide much more information than can be gained from a photograph with the naked eye. Although the science of satellite imaging is still quite young, it is becoming a valuable tool for explorationists in their search for prospective ores.

The "Bird" eliminates a lot of slogging

Aircraft flying over the land can also collect a great deal of information using sensitive airborne geophysical instruments. While some types of airborne sensors can be mounted in the aircraft itself, others must be towed some distance from it in a long, missile-like container known as a bird. Towing the equipment
in the data could indicate the presence of valuable mineral deposits in the rocks below.

Airborne geophysics is a demanding art for the survey crews who fly these aircraft. The aircraft must fly a grid pattern over the property, the width of each pass depending on the type of survey being conducted. Ideally, a pilot not only keeps his flight lines at exact specifications, but of the

"Airborne geophysical anomalies could indicate the presence of valuable mineral deposits in the rocks below."

some low height above the ground. Over rolling or mountainous terrain, keeping a bird behind the aircraft at constant altitude is no task for technicians with queasy stomachs or pilots with slow reactions or bad nerves.

Once the geophysical data have been gathered, computers are used to create various geological maps. Geologists and geophysicists study the maps to find anomalies most likely to represent mineral deposits, and to help them understand the geology of the unexplored rocks.

Airborne geophysical anomalies aren't always proof of mineral wealth below the surface; worthless minerals, barren rock formations, unconsolidated sediments, and even man-made structures all can produce similar readings as a concealed ore body. However, same anomalies are worth investigating more closely.

Once the anomalies of interest have been chosen, they must be accurately located on the ground before further investigation can take place.

The first step for ground study is to establish a grid over the target area. Portable geophysical instruments that can be carried by one or two men are used to take closely-spaced measurements along the grid lines. This will more precisely locate the anomaly.

At the same time, geologists work the grid, mapping and sampling the rocks that are exposed, in order to better understand the geophysical data.

Old methods are still used

To sample the rocks, trenching may be done. Where exposed rock looks interesting, dynamite is used to blast it open and expose unweathered rock to a shallow depth of 1 to 2 meters. Extensive samples are sent back to the assay office for analyses.

Geochemistry: Another tool

Even using geophysics, many mineral deposits are still invisible, especially if they are covered with overburden. To find these deposits geologists often use another tool called geochemistry.

Many ore bodies are surrounded by a host halo of mineralization, created when the deposit was formed, or sometime later by metasomatic processes, groundwater, surface erosion, or even by plant sprouts. As these halos are larger than the ore body, they are easier to find. Not many years ago, chemical analyses were only precise enough to detect the presence of one part of an element in one thousand isolated parts per thousand. Now, however, assays can determine the presence of elements in parts per trillion. Detecting one lonely halo is now a practical reality, making geochemistry increasingly valuable in mineral exploration.

A helicopter conducting a geophysical survey. The aircraft flies at a low altitude, allowing the crew to detect any anomalies in the ground below. The survey involves the use of specialized equipment to collect data on the electrical conductivity of the ground, which can help identify mineral deposits.

A geologist sampling a trench. The trench reveals the stratigraphy of the area, providing insights into the geological history and potential mineral deposits. The samples collected from the trench are analyzed to determine the presence of various elements and compounds.
Incredible odds!
The odds are less than one thousand to one that a good mineral showing will eventually develop into a producing mine.

Diamond drilling
Geophysics, geochemistry, or surface prospecting are tools that can help find an ore body. However, without samples of rock from below the surface, there is no proof that the ore body is really there. To sample anomalies at depth, a diamond drill is used to retrieve samples.

The diamond drill uses a cutting head, or bit, covered with diamond fragments, screwed onto a hollow stem. Diamonds, because of their great hardness, are the keenest cutting tool known. As the bit turns, it cuts a continuous cylinder, or core, of rock. The core is pulled from the drill pipe periodically, and carefully arranged in wooden core boxes, in the order in which it has been recovered.

Reading, or logging, a drill hole is like reading a book. The geologist starts at the top, left-hand side of the first core box, and reads down, row by row. As he logs the hole, the geologist notes the rock types and any mineralization present. From the drill log data, a cross-section is drawn of the ground the drill has penetrated.

Sometimes the target mineral will be visible to the naked eye in the drill core. Most often, particularly in the case of gold, it isn’t; the geologist will select samples taken from the type of rock in which the mineral is most likely to be found and send them out for detailed analysis in an assay lab.

Drilling is frequently bitter work, since much is done in the depths of winter. To prevent environmental damage, heavy drilling rigs are shifted around after the tundra is frozen. Most often in the North, lighter rigs are used, which can be moved by helicopter. This allows year-round drilling.

The atmosphere on a drill site becomes electric as the drill bit nears the suspected ore body, because the odds against success are overwhelming... less than one in a thousand. So even when the returns are exciting, drillers and geologists can’t always be sure what they’ve found will become a mine.

From drilling results, a company will decide whether to develop a mine or, with a sigh, write off all the money it has already spent. Sometimes drilling results are not conclusive. In these cases, the company will bulk sample the deposit. Bulk sampling is the most costly method of underground sampling because it means going underground and literally mining many tons of ore for bulk analyses.

Despite all the tools available to the explorationist, there are still deposits that will not be found with the technology we have available today. With time, science will generate new geological theories, and new electronic technologies that will help the explorationist reveal the location of those elusive targets.

The Tundra Exploration Project.
Mining is not for the faint-hearted.

In 1987, Noranda Minerals discovered what it believed could be a 25 million tonne gold deposit in Nunavut, 240 kilometers northeast of Yellowknife. Extensive drilling that year produced encouraging but inconclusive results.

There was only one way to find out: a go-down, or a hole in the ground. So, taking a deep breath, Noranda and its partner decided to start the largest exploration bulk-sampling effort in Canadian history, at 425 meters deep, with a 900-meter-long exploration drill forming the tip of an inverted "T." The price tag was $30 million.

The first drill was completed in 1989, and more test drilling and sampling was done underground. That confirmed the gold was there. But it also proved the gold content of the ore was too low to mine at existing gold prices.

For $30 million plus $6 million in interest spent on a racially-supplied exploration operation below the shaft, Noranda had a 4-meter hole in the ground... plus the bill for removing all its structures, sealing the shaft and restoring the site to environmentally-satisfactory condition.
Building a mine in the wilderness

A 366 mile ice road links Lupin Mine with Yellowknife.

Echo Bay sets world record!

At the time the Lupin Mine was designed and built, the only access to the region was by air. So, the company purchased a Hercules and a Canadair aircraft, and flew every single item, from parts of plants to the string tables to huge excavators and other vehicles, to the site. From its storage area in Yellowknife, Echo Bay dispatched up to seven Hercules flights per week, 24 hours per day, six days a week, for 20 months. They eventually set a world record for the most tonnage hauled by any Hercules in a 12-month period - 24,000 tons. By the time construction was completed, 22,000 tons of cargo had been transported on more than 5,000 flights. As a consequence of this airlifting wasn’t enough, Echo Bay constructed an overpass on Yellowknife’s 30C. On the access to the terrain leads to reach the mine. For the first year’s operations, 7,500 loads of freight, including 2.5 million gallons of diesel fuel and 7,500 tons of mine supplies, was hauled to the mine site during about 100 winter ice road seasons.

Constructing a mine in the Northwest Territories takes money, brains, courage, patience and faith, in about equal parts - and plenty of each.

First, the engineers have to decide on the most efficient and economic way of reaching and mining the ore body. If the ore body is close to the surface, they may opt for an open pit mine. If that isn’t feasible, they’ll have to mine underground. In some cases they do both.

There’s also the question of access to the property, to move supplies and equipment in, and in the case of a mine producing very large volumes of minerals, too expensive to fly out, to ship out the product.

Transportation systems are limited in the North. The NWT has only a rudimentary highway system, and all of that in the west. There’s a four, sometimes-five-month navigation season on the Mackenzie River system; four to five months in which Arctic waters are open to shipping; and a railroad which serves the south shore of Great Slave Lake.

Unless a company is lucky enough to be developing a mine near one of those existing transportation routes, it will have to construct a winter road to its property. Besides flying, which is a costly proposition, it has no other way to move bulky, heavy

Echo Bay Uses a Rooting 737 for Moving Workers & Supplies.

Huge powerhouses

Like a community, a remote mine needs power, and plenty of it. Colomac, with its huge mill designed to process 10,000 tonnes of low-grade ore per day, requires a much electric power as that needed to supply the needs of Yellowknife. Needless to say, to generate this power requires on-site storage of over 34,000,000 litres of diesel fuel.

Construction at Colomac Mine Site.

icicle, with howling winds a
drawn road can disappear in a
matter of minutes, and with weak
ice a truckload of vital-added
machinery can wind up on the
bottom of a frozen lake ... hope-
fully without its driver. Waiting
for equipment to arrive at the
mine site can be a rapid aging
process.
Mining the ore

Open pit more than a hole in the ground

Building an open pit sounds simple enough. It isn't.

Designing the shape of the pit itself takes many calculations. It costs just as much to mine waste rock as it does to mine ore. But a mine makes no money on waste rock. Therefore, the engineers' objective is to reach as much of the ore body as possible while removing the least amount of waste rock.

The pit's sides have to slope inward gradually enough to prevent their collapse.

This is done by excavating benches, which form a series of giant steps around the circumference of the pit.

Roads lead down from one bench to the next to give access to the self-propelled drills and loaders, and the huge rock-hauling trucks. The grade of these roads has to be gradual enough for the equipment to handle as the pit grows deeper.

At Colomac, after removing the overburden of waste rock, soil, and vegetation which covered the ore body, the mine had to drill, blast, load, and haul away three tonnes of waste rock for every tonne of ore it mined.

Processing of 10,000 tonnes of ore per day, the mine's production target, would mean removing 30,000 tonnes of waste rock DAILY.

Underground mining gets more complex

Where removing overburden would be too costly or inefficient to reach the ore, the decision is made to mine the orebody underground.

Where the terrain is relatively flat, a vertical shaft sunk down to the orebody provides the shortest route to underground. Access carries men to and from the workings, while skip transports ore and waste to surface. Many underground mines today use large, rubber-tired diesel machines too large to fit in the shaft. Gentle sloped spiral ramps or declines must be blasted down through the rock some distance from the shaft, to drive these vehicles underground. In some mines, like the Polarx Mine, the orebody is shallow enough to access with a straight decline that also houses a conveyor belt to carry ore to the surface.

The ore body is developed by intersecting it at various levels blasted out and away from the shaft at different depths. Thus, the 2000 level intersects the orebody 2000 feet below surface.

From the levels, the miners blast various tunnels called crosscuts and drifts, through the rock to access the ore body at several locations. Drifts run parallel to the ore body, while crosscuts cut across the ore body. Additional tunnels, called raises, are blasted up to adjacent levels, and are used for access by men and equipment, for ventilation, and for moving rock to lower levels.

Ore mined on various levels is dumped down ore chutes which often feed a primary crusher and ore storage bin located at the bottom of the shaft.

The skip picks up its load of ore from the storage bin and takes it to surface. The mine headframe that we are so familiar with, sits over the shaft and hoists the large pulleys over which the car ble modification for the skip and cage run.

Other methods may also be used to access the ore body, for hilly or mountainous terrain, as at Nareskari, an entrance tunnel may be driven straight into the hillside.
Mine rescue

New industries take safety on the place seriously as the mining industry does.

"Mine operators and workers are aware that underground can be a potentially hostile environment because conditions constantly change on a daily basis" says Greg Moir, Mine Training Coordinator at Naica Coe Mine in Yellowknife.

"All mines must continue to train employees to address workplace concerns, hazards, safety programs and awareness, as well as to prepare for emergency procedures and provide appropriate protective equipment."

The key to any mine's emergency preparedness or response is a well trained mine rescue organization that can respond quickly and effectively in an emergency.

The team, or teams, depending on the size of the operation are carefully chosen from volunteers. The members of mine rescue teams bring workers from a tremendous pool of pride. Team members are trained in first aid, firefighting, breathing apparatus, and rescue and life saving skills - training that prepares them for nearly any emergency.

In each event, rescue teams from across the N.W.T. get the chance to show just how good they are at the annual N.W.T Mine Rescue Competition held in Yellowknife. About half of the competition involves simulated emergency situations, some of which are based on real situations that have happened in the past.

In the past, a Territorial champion team has been difficult for the judges. The performances have been exemplary, and the high level of expertise at the ready display.

Mine Rescue Teams provide expertise which mine workers can take comfort in.

An Underground Truck at Naica Coe Mine.

A Drill Jumbo Drilling Hole Pattern on Working Face.

Mining. This is largely waste rock mining of raises, drifts and crosscuts. Stoping miners, on the other hand, mine the ore itself from working areas called stopes. To mine rock, miners drill a pattern of holes into the rock. These holes are loaded with explosives which, when detonated, blow the rock out of the empty stope. Track-mounted or rubber-tired equipment is then used to haul the broken rock away.

Broadly speaking, there are two ways to mine an orebody, depending on its width. For narrow orebodies, the miners use hard-operated jack-leg and stoper drills, while in wider orebodies, wider self-propelled, rubber-tired jumbos, or tracked longhole drills are used. In some narrow orebodies, electric trains called tugs haul the ore away, while in wider orebodies, rubber-tired loaders called scrapers, or RHGs (for road haul-dumpers) are more commonly used.

Exploration is also conducted underground. Diamond drilling from locations both underground and on surface continues throughout the life of the mine. Geologists log and sample the drill core, and plot their findings on underground maps of the mine. This cuts down thoroughly the shape, size and grade of the orebody, well before the miners are sent in underground exploration is essential, for if so new are beyond that already known can be found, the mine’s days are numbered.

Ventilation is very important in an underground mine, as both men and equipment need air to work safely. Large fans and compressors on surface send millions of cubic metres of air underground. Ventilation engineers ensure that air flows freely and smoothly through the interconnecting levels, shafts, raises, and stopes.
Recovering the metals: milling

Ore is a mixture of valuable minerals and waste rock, called gangue. These must be separated and concentrated in a plant called a concentrator or mill. The first step in the treatment of ore is to reduce its size. In the mine itself, explosives first break the ore into large pieces. From an underground crusher, or from trucks hauling from an open pit, these pieces are brought to the mill. Here, they are crushed to a smaller, more manageable size. Conveyors carry the crushed ore to large rotating steel drums, called grinding mills, where it is mixed with water. Grinding breaks the smaller ore mineral grains free from the wossick rock, and reduces the ore to a mixture of powdered ore minerals, gangue minerals, and waste rock. By adding water, transporting the finely ground rock four through the mill becomes much easier and cheaper, as pipes and pumps can be used. There are four types of grinding mills commonly used, named after the grinding medium they use to accelerate the crushing. Ball mills are half-filled with iron balls, while rod mills contain long steel rods. Agglomeration mills are so named because they rely only on the grinding action of the constantly-rotating ore itself. The fourth type, the semi-autogenous or SAG mill, is an agglomerate mill containing balls. Which type of mill a mine will use depends on the characteristics of the ore. The powdered rock flour and water mixture which emerges from the grinding mills is treated by one or more processes, including leaching, gravity separation, and flotation. Were the process stops depending on what minerals the ore contains. The cheapest method for recovering gold and silver is to separate the precious metals from the gangue by using one of their density differences. A trommel is an example of this pre-gravity separation process. These chemicals are used for dissolving only the ore minerals, in large leaching tanks. Once the precious metals are dissolved in the solution, the tailings are removed. The pregnant solution can then be treated with other chemicals that causes the precious metals to precipitate, or come out of the solution. They can then be separated from the solution, using filters. A Shaking Table Uses Gravity to Separate the Gold. The Operator is Collecting the Gold grains at the end of the table. Gold concentrates, on the other hand, is produced in much smaller quantities than base metals concentrates. This, it can be smelted at the mine itself. Wherever possible, chemical solutions are recycled, to be used several times, before being heated to over 10,000 degrees Celsius. When the precipitate melts, the heavier molten gold and silver settles to the bottom, while the lighter molten silver is forced upwards. The molten metals are then cast into ingots, to be reprocessed. After crushing, milling reduces the ore to a flour size.

Leading edge technology at Norco Con! Norco Con Mine is the first pressure oxidation circuit at the Con Mine. The addition of pressure oxidation to the mill circuit required the construction of an autowave vessel and structure to house it, as well as an oxygen plant and total cost of nearly 250 million. While pressure oxidation technology is expensive, it is forecasted to be cost-effective. The pressure oxidation circuit is the first of its kind in North America. The pressure oxidation circuit is the first of its kind in North America.

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Environmental protection is a priority

Not many people outside the mining industry are aware of the exhaustive process which is involved in constructing a mine and bringing it into production in the N.W.T. today.

In many ways, finding an ore body which can be economically developed, doing the exploration work which is needed, arranging the financing, and constructing the mine itself are the EASY tasks - despite the risks, hard work and frustration involved in each phase of that work.

Meeting stringent environmental protection requirements before mining is allowed to begin is only half the story. Throughout the whole life of the mine its operations will be continuously monitored to ensure that emissions of waste materials are kept within safe limits. And when the mining operation ceases, the mine must ensure it leaves behind a properly-reclaimed site which will not become an environmental hazard in the future.

The approval process is a tough one. In the N.W.T., mining comes under three federal acts, the Northern Inland Waters Act, the Fisheries Act, and the Territorial Lands Act. Through the permitting process, all interested parties are provided the opportunity to participate.

A detailed evaluation of projected environmental effects must be carried out and submitted for submission to the N.W.T. Water Board. In addition, baseline studies to document, amongst other things, fisheries resources, wildlife, water quality, vegetation and stream and lake sediments are mandatory. These will help identify any significant wildlife or fisheries resources, and rare, threatened, or endangered plants or animals that could be affected by mine development.

A surveillance network program is incorporated into the water license, and prescribes where and when water samples are to be collected over the project area. These samples will be analyzed for a variety of parameters by an independent lab, or an approved onsite laboratory. These analyses will serve any potential environmental problems.

Results, with a full report, are submitted monthly to the N.W.T. Water Board.

Emergency Response Plans must be drafted, that identify specific operating and response procedures to mitigate environmental impacts. Potential impacts could include such things as fuel spills, and chemical spills, and would also spell out safe practices for their handling and management.

To add to all of this, an abanwill and restoration plan must be submitted for approval. This plan will identify procedures for ensuring site stability and minimizing long-term environmental impact. The plan will address the removal of all buildings and equipment from the site, and the decommissioning of the tailings containment area to ensure future protection.

Exploration, with its minimal impact, is also subject to strict environmental regulation. In the Keewatin, for example, caribou and their calving grounds are carefully protected. Permits are required for any mining or exploration activity within certain areas during calving season. All work must stop if calving animals or cows with newborn calves appear. The ban includes such activities as blasting, low-level flying and the use of snowmobiles or all-terrain vehicles.

Mining is not the only industry to be hit by unexpected problems in the areas of pollution and contamination, but it is one industry which has faced up to the challenge. Mining decided early to take a proactive stance and to work with government around the Lupin Mine.

Water Sampling at Norra Coo Mine.

Echo Bay Mines' Environmental Policy

Echo Bay Mines is committed to good environmental practices and to minimized environmental impact in the course of exploration, development and processing of mineral resources.

They pledge to conduct their operations in "compliance with all applicable legislation providing for the protection of the environment, employees and the public." Where no legislation now exists, cost-effective management practices will be implemented "to advance environmental protection and to minimize environmental risks."

Environmental protection has added to the cost of Northern mining, but it pays benefits, too - to the N.W.T., its people and the mining companies themselves.
Mining is the North's second-largest employer

As an industry, mining is the N.W.T.'s second-largest employer. Only government creates more jobs. Of the 2,000 people who work in the mining industry in the N.W.T. today, not all are miners, nor by a long shot. They represent some 37 trades and a whole range of professions, and at a highly-mechanized mine like Lupin, 60 per cent of them work above-ground.

Mining offers top wages in the North. The average wage for the whole mining industry is more than $45,000 per year. A top miner may earn over $100,000 a year.

A partial list of trades employed in the mines includes carpenter, diesel mechanic, draughtsman, electrician, heavy-duty mechanic, instrument mechanic, machinist, millwright, mine mechanic, pipeline fitter, plumber, power engineer, stationary engineer, steam engineer, warehouseman and welder.

You need a full administrative staff to operate a mine, including managers, secretaries, computer operators, safety and security staff, and clerks. At remote sites, nurses, cooks, housekeepers, transportation specialists, and even weather observers are required.

There are the professional people, most of them engineers, geologists or accountants. They are the people who make a mine from a discovery and then ensure the mining operation remains profitable. They determine the most cost-efficient way of reaching the ore body, how to mine it economically and efficiently, and how to process the one and recover the maximum mineral content at the lowest cost.

Those are the people who actually work on the mine sites.

Mining exploration creates hundreds more jobs. You need prospectors, labours, geologists, geophysicists, geotechnicians, drillers, assayers, surveyors, claim-strikers, road-builders, blasters and expediters, pilots and cooks to explore for minerals.

Mining provides employment for many other support services, including local businesses ranging from the grocery store to the fuel company. When a mine orders its annual fuel supply, it usually does so in terms of millions of litres, and its food and other supplies by the tonne.

Four of the NCC's Can mine's 15 hoist operators are women ... and Can has found women better suited temperamentally to that demanding work than most men.

Many of the people in the N.W.T.'s mines have come North from the provinces, and many work fly-in, fly-out operations, maintaining their homes in the south and working rotating shifts. But more and more Northerners are finding employment in the mines today, many a native Northerner among them.

When it came to hiring northern mines were always quick enough to hire Dene and Inuit as strikers, woodcutters, caretakers or handyman. The bush or barren lands held few tenures for people who lived off the land; they were obviously better for that kind of work than southerners.

However, for the more skilled jobs such as miners, millwrights, engineers and other technical staff, it was necessary to hire skilled workers from the south, rather than hire local people - most of whom had only a few years of schooling.

There were sporadic efforts to change that situation, but not much of an organized approach. When North Rankin Nickel Mines opened at Rankin Inlet in 1957, for example, the federal government thought the project would be ideal for creating jobs for Inuit who'd been moved into Rankin from outlying communities and camps.

It apparently crossed no one's mind that not all Inuit ... any more than the average person on the street in southern Canada ... would jump at the chance of becoming a miner.

The federal government tried again when Nanisivik opened, with the federal government as a partner. This time, the government was more cautious. It established a series of training and employment goals aimed at creating a work force which would be 60 per cent native.

Though Nanisivik's native employment never reached 60 per cent, native employment has not been a failure, either; it has averaged 20 to 30 per cent Northern workers since it went into production and has produced a surprising number of qualified native pumpmen through its apprentice system.

Over the years it has employed nearly every able Inuk from nearby Arctic Bay. As well, practically every powerhouse operator is a Nanisivik graduate.

Nanisivik's prize graduate is Joshua Kangsoq of Arctic Bay. He worked at Nanisivik for seven years as a heavy equipment operator, then used the money he'd saved to buy a small cottage in Arctic Bay.

Today Joshua and his wife, Nasting Aabling, own Arctic Bay's only hotel and coffee shop, a general store, a taxi business and tourist operation. He's also agent for First Air, holds the Territorial fuel distribution franchise, handles booking of Nanisivik employees who live in Arctic Bay, and has a snowmobile dealership.
"Fly-in" operations

"Fly-in, fly-out" or commitment mining operations are generally the rule for remote mining operations in the modern North. Miners and other workers shift between mining camps for two weeks "in" and two weeks "out" to mine sites and then commute. The miners accept responsibility for flying their own industry and out to both northern and southern mines. In the early days of N.W.T. mining companies built whole townsites to accommodate not only their workers but their families, as well. They had to if they hoped to hire the skilled people they needed. The townships of Fort McPherson, Great Bear Lake, and Inuvik are typical of those operations. See opposite page.

Other mines, like Cominco’s Polaris lead/zinc mine or Echo Bay’s Lupin gold mine, take pride in their success in hiring good northern employees.

Part of that success is the result of continuing government pressure to "fly North." Northerners’ own realization that education is the route to follow for well-paid, skilled jobs is another factor.

A more important factor, however, has been the Northern mining industry’s recognition of the value of a stable N.W.T. workforce, and the active support of training programs, such as the N.W.T. apprenticeship program, educational upgrading and mining training through Arctic College.

Fly-in, fly-out mining has proven a boon, too, to many native Northerners reluctant to give up the comparative freedom of life on the land for the structured hours of the wage economy. Rotating shifts allow native mine employees to enjoy the best of both worlds: the good wages and working conditions of mining and, in their time off, the opportunity to return to the traditional lifestyle and to retain those skills.

When Cominco opened its Polaris Mine on Little Cornwallis Island, it was prepared for heavy turnover among its N.W.T. workers. What it never expected was that it would be producing a steady stream of Northern journeys through apprenticeship training which takes three to four years to complete — or that Dene and Inuit people from the Yellowknife area would become some of its most reliable long-term employees.

Jimmy Beaulieu, a Dene from Yellowknife, is typical of the native journeyman Polaris has produced. Jimmy, whose two brothers work with him at Polaris, is already a qualified heavy equipment operator. Now, he’s completing his apprenticeship as a heavy equipment mechanic.

Lupin Mine hires over 30 workers from Coppermine, including tradesmen, mill workers, miners and heavy equipment operators. John Ivaruk of Coppermine, lead hand on the night surface crew, has been at Lupin since construction of the mine began in 1979. Ivaruk employs Dene and Inuit and native workers from Yellowknife, Rae-Edzo and Dettor, as well. Turnover among Lupin’s Inuit employees is almost negligible, says personnel manager Doug Willy. As a result of his success with the Coppermine employees, Echo Bay Mines recently began hiring and training workers from Cambridge Bay.

When Neptune Resources Corporation decided to go ahead with its open-pit Colomac gold mine north of Yellowknife, it took one more step forward in the area of hiring and training Northerners for mining jobs. In a novel move, they made an agreement with local Dene to hire 25 per cent of its employees from among native residents in the mine area. With PCL, Construction Northern, the prime construction contractor, they hired construction workers, wherever possible, from the North. So doing, they tried to identify Dene workers who, though lacking in formal education, showed ability and willingness to learn on the job. PCL made a point of hiring supervisors who had had experience in working with native people, and provided cross-cultural training for those who had not.

Neptune set up a native employment office and hired a Dene employment officer to visit local Dene communities from which it hoped to recruit much of its labour force. PCL put these recruits in the sort of constructive jobs — welding, pipelining, plumbing, electrical, carpentry — which would teach them skills useful later, during mining.

As each trade completed its phase of the construction work, PCL moved the best of its native workers into other trades whose work was continuing. When construction was finished, in early 1990, the mine had a group of native Northerners with practical skills for mine jobs, and the potential, through educational upgrading, to become trade apprentices.

Some of these people — particularly, young people who had grown up on the tundra with their parents — had only a Grade 5 or 6 education. Colomac gave them the chance to change their whole lives for the better.

There were about as many native employees on Northern mine payroll as there were women, 20 years ago. It’s a far different story today.
Mines operating in the N.W.T.

Six mines were in full production in the Northwest Territories at the start of 1992. Mineral production in the N.W.T. in 1991 included:
- Copper: 16,562 tonnes
- Silver: 19,000 tonnes
- Lead: 34,033 tonnes
- Zinc: 222,024 tonnes

In 1991, the total value of mineral production exceeded $500 million. This was down sharply from the nearly $1 billion in 1989, and is due to lower metal prices and the shut-down of the Pine Point Mine.

Gold

Four of the N.W.T.’s six producing mines are gold mines. They are:

Con Mine

The Nenako-Con Mine in Yellowknife produced its first gold in 1938, and set an annual production record of 120,092 ounces in 1991. Since then, the mine has produced continuously since 1938 except for a two-year shutdown in 1943, due to the war. First built and operated by Consolidated Mining and Smelting Company Ltd. (now Cominco), the Con Mine was sold to Nenako Inc. in 1986. Its 6000 level is more than 15 kilometres deep and its workings extend under Great Slave Lake and the City of Yellowknife. Mining is by air-and-tilt, shrinkage, and longhole stoping methods, and access is via two external shafts and two winzes. The Nenako-Con mine processes 1200 tons of ore per day and recovers an average of 2,800 ounces of gold per week at a feed grade of 0.33 ounces per ton. Recently, the mine completed the construction of Canada’s second high-tech, environmentally-sensitive, automotive unit for treating arsenic-bearing, refractory ore as well as to treat wastes remaining from earlier mining.

Giant Mine

The Giant Mine, now owned by Royal Oak Mines, Inc., is located in Yellowknife. It poured its first gold brick in 1948, and its 10,000th brick in 1986, becoming one of the largest gold mines in the world at that level of production. Giant is an underground operation, although several open pits were mined recently. Mining is by cut-and-fill, shrinkage, and open stoping. The refractory, arsenic-bearing ore must be treated by roasting. Annual production exceeds 37,000 tons at 0.32 ounces per ton. Giant has a work force of about 330.

Lupin Mine

Echo Bay Mines’ Lupin Mine is located on the shores of Cartwright Lake, 90 kilometres south of the Arctic Circle and 400 kilometres northeast of Yellowknife. It is the mining industry’s most northerly gold mine, outside of the Soviet Union. The commerical operation went into production in 1962, and in 1991 the mine set a production record of 166,877 ounces gold. Mining is by mechanized longhole stoping. Its 2.000 ton/day mill produces an average of 200,000 ounces of gold per year. About 12 per cent of its 450 employees are Northerners, including Inuit crews from Coppermine and Cambridge Bay, and Diene and Marts from the Yellowknife area.

Prismag/Tom Mines

Tremiico’s Prismag and Tom Mines are located 15 kilometres east of Yellowknife. In 1983, Tremiico drove a decline on the Tom property to develop gold reserves for small-scale mining. In 1987, they purchased the northern Prismag Tom Mine, originally mined briefly during the Second World War. Production was initially channelled to the Giant Mine mill for processing. In 1990, Tremiico opened its own 200 ton/day mill. In 1990, Tremiico drove a decline to access the "C" vein, located between the Prismag and Tom veins. Additional work has been carried out on the Tom vein in 1991. Since 1983, Tremiico has mined and processed approximately 250,000 tons at an average grade of 0.030 oz. per ton from the three veins. The mining currently employs 22 persons, although employment levels have been as high as 60 employees.

Lead/Zinc

Our two lead/zinc mines are the Polaris Mine, on Little Cornwallis Island, 1,600 kilometres northeast of Yellowknife, and Nanisivik Mine, on the northern tip of Baffin Island.

Nanisivik Mine

Nanisivik Mine has been producing since 1976. It processes about 710,000 tonnes of ore per year. Mining is by room and pillar, trackless, and mechanized cut-and-fill methods, with access through an adit. The mill can process 2,000 tonnes of ore per day, and produces zinc and lead concentrates which are stock...
Minerals are very important to us

Many of the things we need to live, and most of those that make life more comfortable, depend directly or indirectly on minerals taken from the earth. Food and water supply, shelter, clothing, health aids, transportation and communication, a wide variety of products used at home, at play and at work, all depend on the mineral industry.

To grow most of our food we need fertilizers made from minerals. Fertilizers also help the growth of plants such as cotton and linen which are used to make much of our clothing.

In the North, where many of us hunt for food, we need guns and bullets made from metals. To transport food to our tables we need trains, airplanes, trucks, boats, and snowmobiles - all made from such metals as aluminum, steel, copper, and zinc.

To cook our food, we need metal pots and pans, knives and forks.

We watch television sets which are made from cables, wires, and electronic components, all made from metals or minerals. The sockets, and the satellites they carry into space for telephone and television services, are made from metals.

Water is pumped through copper pipes, by brass pumps, and drains through copper pipes into steel sewage tanks. The wiring in our homes and office buildings is copper or aluminum, the walls are gypsum. Steel beams are made from iron, carbon, and chromium, and the lumber may have been treated with chemicals made from minerals. Our homes sit on gravel or concrete foundations that are built from materials taken from the ground.

We need metal rigs, drill pipes and assorted equipment to drill the oil wells to get gas for our metal snowmobiles, boats, cars, and trucks, and coal, oil and uranium to provide us with electricity. Metals make the molds needed to produce the plastics which are so common today.

Glass in our windows, and the ceramics in our sinks, toilets and bathtubs are all produced from minerals. Lead and zinc are used in batteries that are so necessary to power our vehicles, radios, and portable stereos.

We need mining!

Each year, every North American requires 40,000 pounds of new minerals. At this level of consumption, the average newborn infant will need a lifetime supply of:

- 795 pounds of lead, primarily for automotive batteries, solder and electronic components.
- 7.57 pounds of zinc, as an alloy with copper to make brass, as protective coatings on steel and in chemical compounds in furniture and paints.
- 1,500 pounds of copper for use mostly in electrical motors, generators, communications equipment and wiring.
- 3,393 pounds of aluminum for various uses, from automotive frames to building foils, chain, aircraft.
- 32,700 pounds of pig iron for kettles, ovens, automobile, ships and large buildings.
- 26,550 pounds of clay, for making bricks, paper, paint, glass and pottery.
- 28,210 pounds of salt for cooking, plastics, highway de-icing, and detergents.
- 5,283,010 pounds of stone, sand, gravel and cement, for building roads, homes, schools, offices and factories.

To reduce mining activity, as some people who should be doing something about it, zinc, must first understand what we want and need.

If it can't be grown, it has to be mined!

Few people realize that if it cannot be grown on our farms, taken from the sea or the forests, or the barren lands, it must be mined.
The future

The potential for growth in the northern mining industry is very great. As the least amount of geological mapping and research has been done in the N.W.T., mapping has now become a priority. As our geological knowledge improves, we can expect that more and more valuable mineral deposits will be discovered.

Canada will need the mineral riches of the North, and the mining industry is busily pursuing ways of tapping those riches economically. Confident it can find the answers.

The challenge for the mining industry of the 1990's will be to add to the strong tradition of innovation shown in the past, especially in the areas of environmental protection and northern training and benefits. It is a challenge the mining industry is fully confident it can meet successfully.
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