Indian and Northern Affairs Canada
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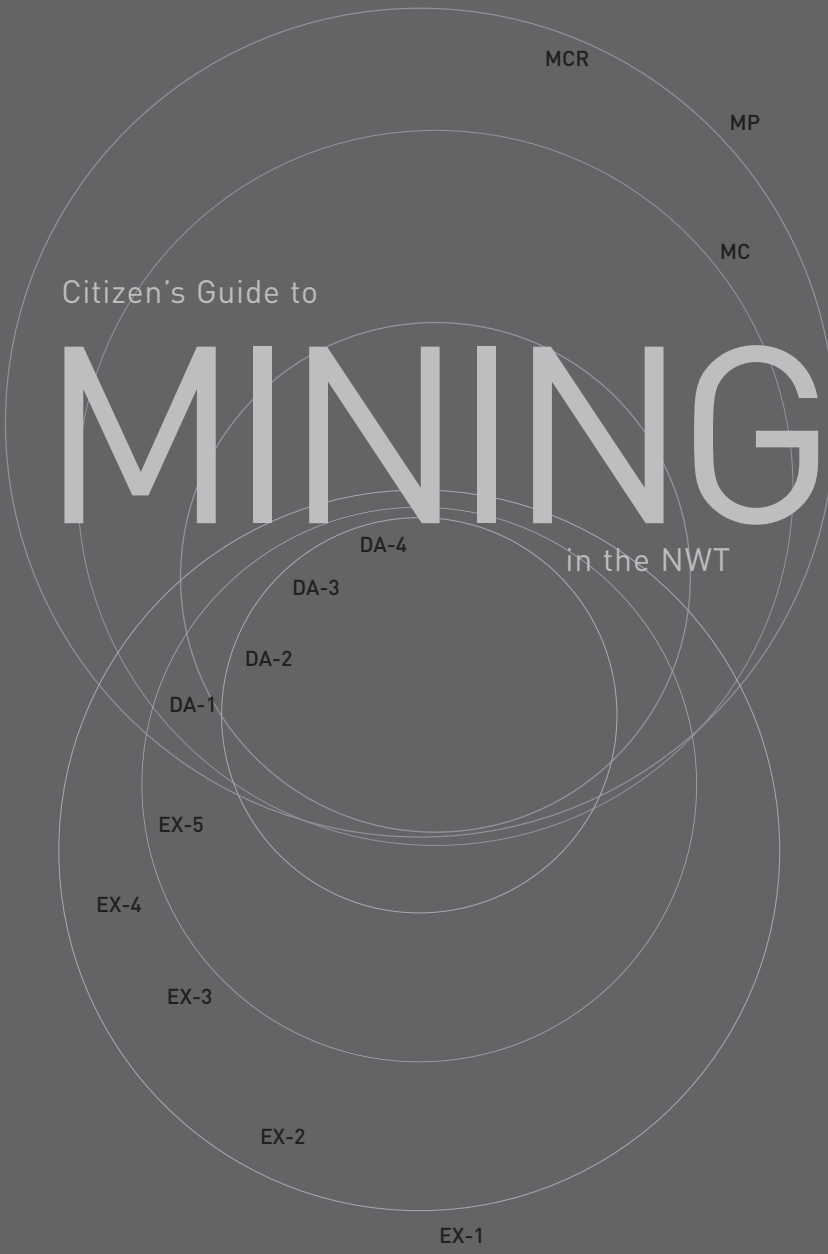


Citizen's Guide to

MINING

in the NWT

THE PURPOSE OF THIS GUIDE

is to explain the mining cycle in the Northwest Territories. External factors that affect the success or failure of mining operations and the distribution of wealth derived from the various phases of the cycle are also discussed.

Canada

HISTORY OF MINING IN THE NWT

The mining industry of the NWT spans more than 70 years and has added to the economic growth of the territory. Much of the infrastructure in the NWT, such as roads, hydro electric power installations and the railroad at Hay River, is directly linked to the development of its mining industry. More recently, the NWT diamond industry has increased interest in mining.

The NWT has varied mineral potential. This variety has resulted in a consistent contribution from minerals to the territorial economy in contrast to the boom-bust cycles seen in other mining areas dependent on single commodities. The initial contribution from Port Radium and uranium mining around Great Bear Lake was gradually eclipsed by gold mining in the Yellowknife area. As the gold mining industry declined in response to lower prices, its contribution was then exceeded by that from zinc, lead and tungsten from the Pine Point and Cantung mining operations. Resurgence in the gold sector in the 1980's offset a declining base metal sector, while more recently, diamonds have replaced both the gold and base metals sectors.

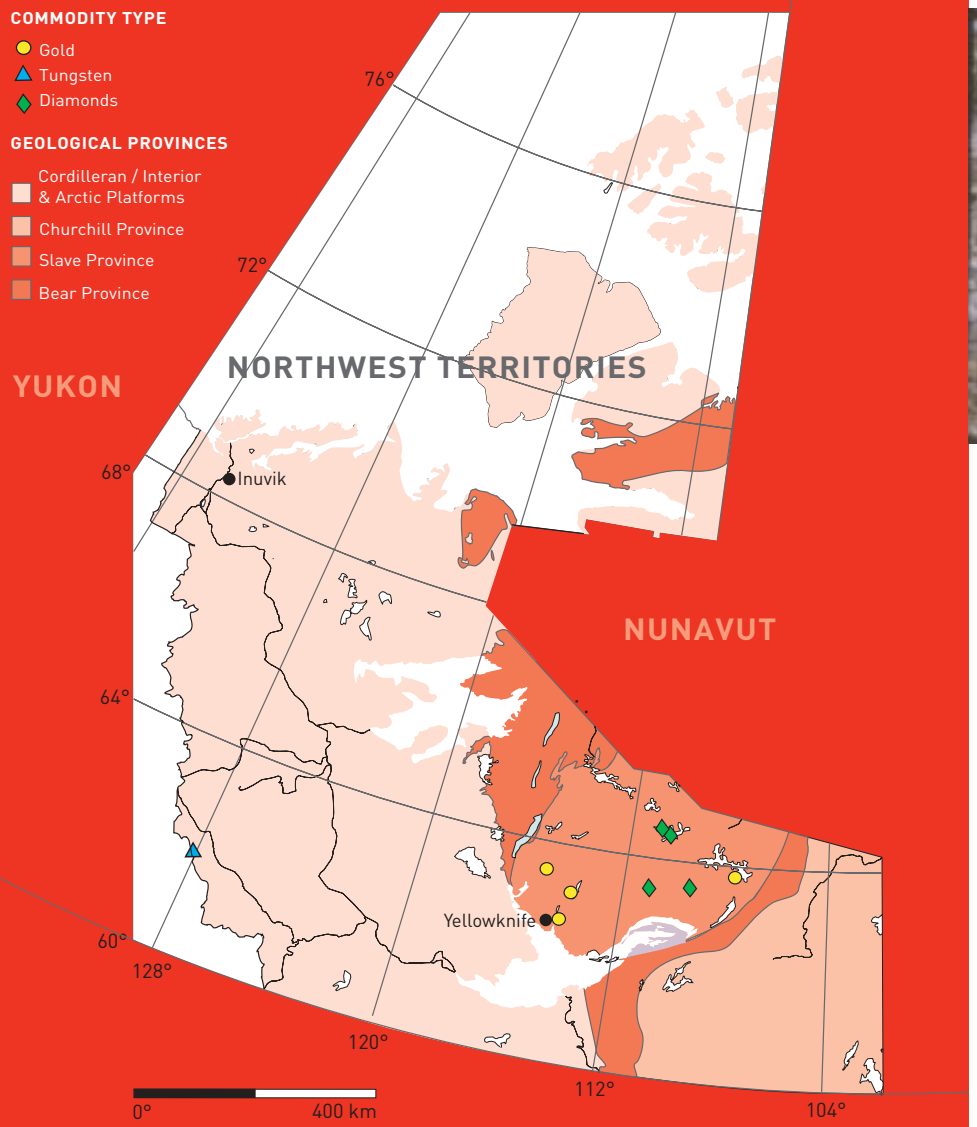
Each of these regional mining developments contributed to the overall economic growth of the NWT. For example, the mines of the Great Bear Lake region helped strengthen the Mackenzie barge system and led to the development of the region's winter road. Gold mining in and around Yellowknife spurred construction of the Mackenzie Highway, the Snare Lake Hydro system and the southern

portion of the current Echo Bay winter road. The Pine Point mine brought with it a railway and additional hydro development at Talston.

Communities benefit from mineral development in the NWT, for example, from the transportation infrastructure. These benefits are probably more significant over the long term than the direct benefits to communities closest to the mine sites, although the latter dominate during the active life of the mine.

Related to mining however, is the uncertainty about the life of the mine. This is influenced by many factors, most beyond the control of the mining company, so this is difficult to predict. However, in recent years, companies have attempted to better judge the expected mine life through regulatory proceedings before construction. Expert speculation about commodity pricing is still dictated by unpredictable global markets.

NORTHWEST TERRITORIES PRODUCING MINES, 2003



Geology The NWT's geology records four billion years of the earth's history from the oldest rocks in the world, the Acasta Gneiss, to the relatively recent deposits associated with the last ice age. This geology also provides economic deposits of various minerals.

PARTICIPANTS IN MINE DEVELOPMENT

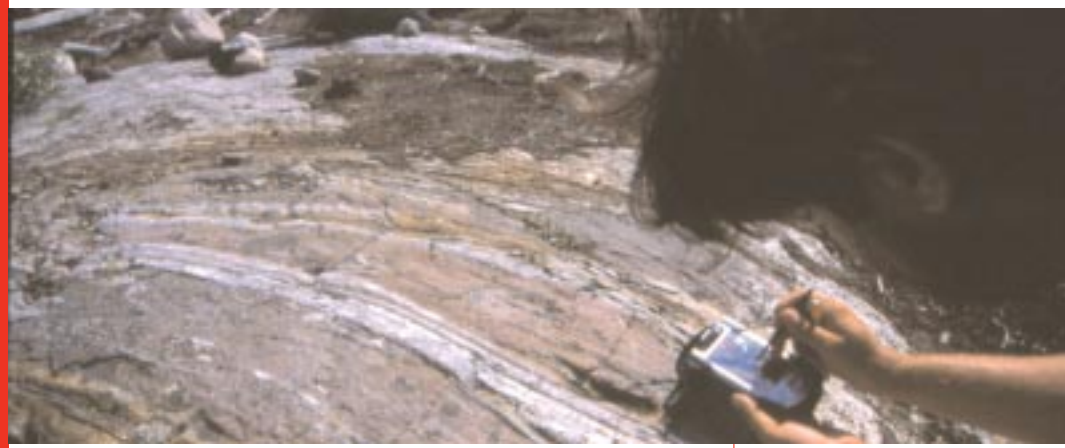


Photo: David Watt Photography

The mining sector is made up of individual or small groups of prospectors; the junior mining companies that raise risk capital on the stock markets or through private investments; the intermediate mining companies with a limited number of operating mines that also make use of stock markets to add to the limited funds generated by production; and, large, multi-national mining companies with numerous operating mines.

Exploration and mine development today require access to capital, cutting-edge technology, and skilled professionals. Prospectors and junior resource companies usually lack the full financial and technical capacity to develop a prospect into an operating mine. However, these people provide more information about the mineral through exploration, before selling the rights to a larger company.

Commodity prices are cyclical, determined by the supply and demand of the global market. The price received is also dependent on the changing value of the local currency versus the US dollar, in which most commodities are traded.

Costs

Mining is high risk. Few discovered mineral deposits become producing mines. Fewer still are profitable in the NWT because of the increased operating costs.

Mining requires a lot of money over long periods of time to explore, construct, operate, and later, close mines.

Neither companies nor governments regulating the mines have control over the prices received for the commodities being mined.

Photo courtesy of Diavik Diamond Mines Inc./Jiri Hermann

Exchange rates can also affect the mine's ability to continue to operate.

The process of exploration is financially risky. Major mining companies rely on the junior companies to perform the early exploration tasks. These junior companies raise the funds to acquire the rights to the mineral properties and to demonstrate that continued exploration will be profitable. Then, intermediate and major companies often enter the picture, buying into a project for the long-term development, including financing.

An example of this is the NWT's diamond exploration activity in the NWT between 1991 and 2003. Many junior companies and groups of prospectors acquired ground. As properties showed promise, the major companies, such as BHP Diamonds Inc. (Now BHP-Billiton) and Rio Tinto PLC got involved. Of the more than 80 companies involved in diamond exploration in 1994, only a dozen or so are still active here and only one (Aber Diamond Corporation) made the transition from junior to major company.

OVERVIEW OF THE MINING CYCLE

It takes many phases before a mineral property can be developed into a producing mine. The mineral property becomes increasingly valuable as more exploration work provides better evidence of the mineral. Each step along the way depends on the positive results from the preceding one, and raises the question of whether to continue. At any time the operator may decide that the potential rewards are not worth the investment and the rights to the property are abandoned until another operator becomes interested. Often the results of the preceding work are available to subsequent operators.

After the mineral property has been shown to have the right conditions for a potential mine, subsequent activities include engineering, environmental design, securing financing, constructing the mine, and finally, removing the ore from the ground, concentrating the desired commodity and shipping it to customers.

MINING CYCLE

THE RISKS AND ACTIVITIES OF THE MINING CYCLE ARE SHOWN IN THE FOLLOWING TABLE. →→→

Participants in the mining cycle focus on turning a mineral property into a producing mine. These players include: the prospectors, large and mid-sized mining companies with established mine(s), and smaller, junior mining companies. Any of these groups or individuals can be active in any phase of mining, at the same time. Few prospectors actually end up running mines, other than very small-scale operations. A few junior mining companies have successfully operated mines in the NWT, however their focus is generally more on exploration and deposit appraisal. They often favour selling the deposit to a larger mining company with experience running mines. The increased rigour of the permitting and environmental assessment process in the North has made it challenging for smaller companies or individuals to move a discovery through the entire mining cycle.

Photo courtesy of BHP Billiton Diamonds Inc./Jiri Hermann

PHASES

MINERAL EXPLORATION (EX)

Early in the mining cycle the search for mineral deposits may lead to a producing mine. This stage has the highest financial risk but is the least expensive and involves activities with minimal impacts. They include: geological mapping, collecting rock and soil samples, aerial surveys and analysis. Many of the sites are only sampled once and never see additional visits. This stage of exploration involves a lot of office work, reviewing the reports of government geologists or previous efforts by other companies and prospectors over the years. This work can be done without acquiring formal rights to the minerals. Mineral exploration is focussed on specific areas with the best potential for a mineral deposit.

Once some form of rights are acquired, such as a mineral claim or a lease, more intensive and expensive exploration work is undertaken in an attempt to identify a mineral deposit.

Photo: Steve Goff/DIAND

MINERAL DEPOSIT APPRAISAL (DA)

Fewer than ten percent of mineral exploration properties move from the mineral exploration stage to the deposit appraisal stage of the mining cycle. More extensive exploration and analysis will define the characteristics of a mineral deposit during this stage. Depending on the location and the type of mineral, these activities may include: drilling, underground sampling, small scale open pits, and small, on-site processing facilities. Environmental work also takes place along with some engineering pre-design work before a mine is built. The end of this stage is often a feasibility study that may lead to the decision to construct a mine. Costs during the mineral deposit appraisal stage may range from C$5 million to $100 million for large deposits.

Permits and licences may be required at the various stages. In the NWT, a company will require a land use permit if operations such as drilling or trenching are expected or if a multi-year camp facility is required. A water licence may also be required at this stage. Many deposit appraisal projects may actually meet the definition of a mine site from the perspective of the *Mine Health and Safety Act,* especially if underground bulk sampling work is involved.

Photo courtesy of BHP Billiton Diamonds Inc./Jiri Hermann

MINE CONSTRUCTION (MC)

This part of the mining cycle requires the most money, often between C$50 - $500 million in the NWT, though sometimes as high as $1 billion for some projects. A company does not usually commit to construction until the details of all permitting and regulatory requirements are known. The feasibility study is then returned to the shareholders of the company for approval. This may delay the project, sometimes by several years, if there has been a significant change to the general economy or to the company's financial situation.

Photo courtesy of BHP Billiton Diamonds Inc.

MINERAL PRODUCTION (MP)

Once construction is complete, mineral production begins. Most mining companies look for a ten-year life to allow adequate time to recover exploration and construction expenses. During this period the operation is constantly being evaluated against new information from the ongoing analysis of the deposit and any changes in the economic viability of the mineral. There is also regular updating of the mine's operational practices to reflect changing marketability of the mineral deposit and incorporating new technology. The long operating lives of some mining operations can result is significant changes to the scope and scale of activities.

Photo: Sharon Clarke/DIAND

MINE CLOSURE & RECLAMATION (MCR)

Mining companies operate in an environment where mineral prices are unpredictable and are based on the demand for the product in the global marketplace. When demand drops too low, companies may stop operations if the cost of production is more than the price received.

Closed and abandoned mines are a concern to industry and to government because of the environmental liability and the high cost of reclaiming a mine site.

Photo: Sharon Clarke/DIAND

	EX-1	EX-2	EX-3	EX-4	EX-5	DA-1	DA-2	DA-3	DA-4	MC	MP	MCR
	Exploration planning.	Regional surveys.	Prospecting and surveys.	Verify anomalies and showings.	Discovery and delimitation.	Deposit definition.	Project engineering.	Project economics.	Feasibility study and production decision.	Construction and mine preparation.	Production and marketing.	Mine closure, site restoration and reclamation.
OBJECTIVES	Select target areas for exploration. Establish exploration objectives and strategies.	Find regional and more localized anomalies. Select significant targets.	Acquire properties. Confirm presence, exact location and characteristics of anomalies.	Acquire additional properties as required. Investigate anomalies. Find mineral showings.	Justify deposit appraisal program on discovered mineral deposit.	Acquire data for engineering planning.	Obtain realistic plans, schedules, investment costs and operating cost estimates for all aspects of the project.	Define parameters and carry out economic, financial and socio-political evaluation of the project.	Validate data. Decide whether to proceed and obtain required permits.	Complete mine development and construction on schedule and within budget.	Achieve planned rate and specifications of commercial production on schedule and within budget.	Restore site to environmentally acceptable condition.
ACTIVITIES	Office work, legal and political analysis.	Airborne and satellite survey and data purchase. Prospecting. Appraisal and selection of anomalies.	Ground-based geological and geophysical prospecting and surveys. Review and selection of significant anomalies.	Geological mapping and other surveys. Limited trenching, cutting line grids and claim staking.	Detailed mapping. Trenching, drilling, ground surveys and initial environmental baseline work.	Mapping, sampling and drilling. Detailed environmental and site surveys.	Pilot tests and engineering. Cost estimates for mining, processing, infrastructure, environmental protection and restoration.	Market studies and risk analysis.	Extensive due diligence review and evaluation of geological, engineering, environmental, economic, legal and site data.	Mine construction and detailed start up plan.	Surface and/or underground mining, processing and environmental monitoring.	Environmental restoration and monitoring.
RESULTS	Exploration projects.	Regional anomalies.	Local anomalies.	Mineral showings.	Mineral deposit.	Deposit appraisal.	Deposit appraisal.	Deposit appraisal.	Mining project.	Mining complex.	Mineral production.	Restored site.
INVESTMENT	Low but increasing.	Low but increasing.	Low but increasing.	Low but increasing.	Low but increasing.	Much larger and increasing.	Much larger and increasing.	Much larger and increasing.	Much larger and increasing.	Large to very large.	Large to very large.	Large to very large.
RISK LEVEL	Very high but decreasing risk of failure and financial loss.	Very high but decreasing risk of failure and financial loss.	Very high but decreasing risk of failure and financial loss.	Very high but decreasing risk of failure and financial loss.	Very high but decreasing risk of failure and financial loss.	High but decreasing risk of failure.	High but decreasing risk of failure.	High but decreasing risk of failure.	High but decreasing risk of failure.	Low to moderate industrial risk.	Low to moderate industrial risk.	Low to moderate industrial risk.

MINERAL MANAGEMENT

Photo courtesy of Diavik Diamonds Inc./Jiri Hermann

Minerals can be found above and below the earth's surface. Those found below are referred to as sub-surface minerals. Management of the sub-surface mineral resources of the NWT is the responsibility of the federal government and of designated organizations in settled claim areas where sub-surface resources have been transferred.

The Department of Indian Affairs and Northern Development administers the legislation and related regulations, policies and agreements for managing sub-surface rights including advising industry about government expectations and providing a way for the public to give input into decision-making.

In the NWT, the Crown owns most sub-surface mineral resources. Development of these resources is contracted out to private industry with the government collecting a share through royalties, fees and taxes. Development of "private" sub-surface mineral deposits, such as those transferred in land claim agreements, are subject to agreements between the owner and private industry.

The disposition of mineral rights to the private sector in the NWT occurs through the *Territorial Lands Act* and the Canada Mining Regulations. Major legislation, policies and agreements governing mineral management in the NWT can be viewed at the following departmental website: www.nwtmineralspathfinder.com

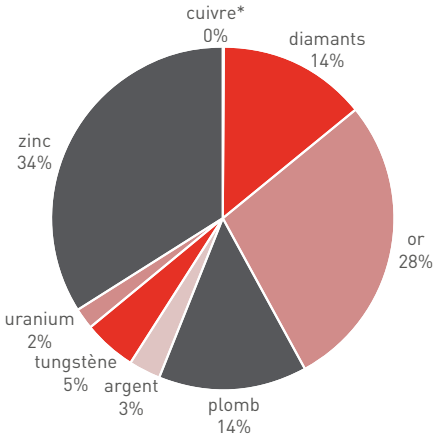
Concern for the environment has led to new legislation that protects the North's natural resources. Meeting environmental standards is a requirement for developing a mine in the NWT and accepted by industry as the normal cost of doing business. It is government's responsibility to ensure that the legislation, policy and regulations all serve the public interest by supporting responsible sustainable development.

BENEFITS FROM MINERAL EXPLORATION

Revenues are generated throughout the mineral development cycle, however the amounts and distribution vary. In this phase junior mining companies or groups of prospectors raise money on the stock market to fund exploration, or larger companies use profits from operations located elsewhere to fund work. From an industry perspective, the only revenue generated, not in actual dollars, is the discovery of a deposit that will be reflected in prices of company shares. Revenue can also be created for a company if a deposit is sold at this stage, but only if the price received is greater than the money spent exploring for the deposit.

Governments and communities, however, receive benefits from the expenditures incurred by industry through income and sales taxes from employees and purchases from local businesses contracted to complete work. Government also receives income from various fees for services and for permits, licences, and recording data. Technical data is filed with the government and can be collated and used for other purposes or for attracting renewed investment later.

TOTAL COMMODITY VALUE FOR NWT (1932-2002)



Cuivre	$57,655,848.99
Diamants	$2,952,410,210.00
Or	$5,887,263,710.97
Plomb	$2,926,884,234.76
Argent	$729,038,129.10
Tungstène	$1,034,069,625.41
Uranium	$380,866,354.69
Zinc	$7,284,775,411.49

*valeure du cuivre est 0.0027%

MINERAL DEPOSIT APPRAISAL

In this phase of the mining cycle additional money is obtained from investors buying shares in the project. The work at this point involves the assessment of the long-term viability of the mineral deposit to determine if it may be profitable to mine. This phase involves more expenditures than the exploration phase and is a major cost to industry, although some may gain from the sale of a deposit if the price received is more than what was spent on exploration.

Governments receive income from taxes paid by employees and from the purchase of supplies, plus fees for permits and licences. Additional technical data may be collected, which may result in additional work in the future. This work can result in substantial opportunities for nearby communities depending on the scale of the appraisal work.

MINE CONSTRUCTION

In this phase large amounts of money are required for construction of the facilities for production activities. This would include all costs associated with permitting and environmental assessment of the proposed mine, and is probably the most expensive phase of the mining cycle for industry. A combination of profits from other mines owned, money from the issuance of shares and money borrowed from banks is commonly used to fund the project.

Governments earn income from personal income tax of employees, sales taxes and indirect benefits created by the intensive but short lived construction activity. The local construction industry benefits while other local businesses may win substantial contracts for services and supplies. In recent years, various First Nations in the NWT have negotiated Impact Benefit Agreements with the operators of producing mines to ensure compensation for any loss of traditional lifestyle caused by the mine construction, and enable these smaller communities to compete for business, employment and training activities. Governments have also negotiated broader socio-economic arrangements with mining companies that aim to enhance opportunities for all northerners. DIAND's 'Agreements and Plans' poster is available by contacting the Communications, Marketing and Consultation Directorate at (867) 669-2576.

MINERAL PRODUCTION

This is the only part of the mining cycle where the private sector sees a profit, if all other factors are favourable. In the other parts of the cycle, gains for investors on property sales are offset by properties that do not make it to production.

Governments receive income through royalties and various taxes and fees. Even when the mine or company operating it is not in a profitable position, governments still receive revenue through personal income taxes, sales taxes and indirect activity created by the mine production facilities.

Photo courtesy of Diavik Diamond Mines Inc.

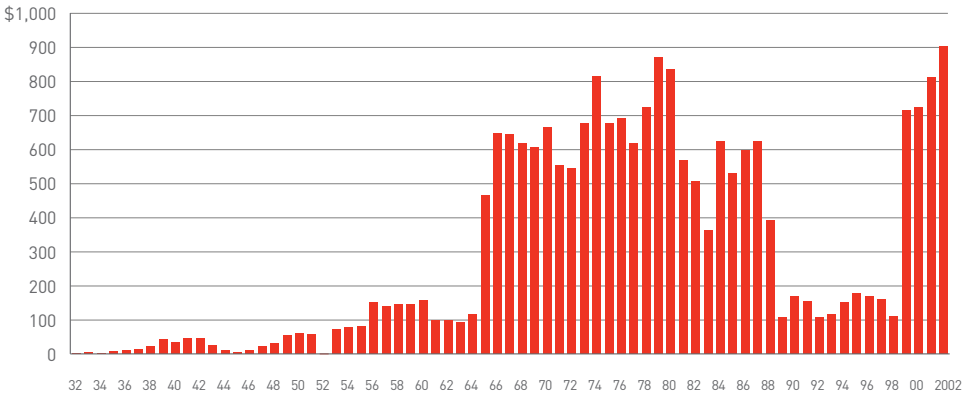
MINE CLOSURE AND RECLAMATION

Mining companies operate in an environment where mineral prices are unpredictable and are based on the demand for the product in the global marketplace. When demand drops too low mining companies may temporarily stop operations if the cost of production is more than the price received.

Although the mineral sector can contribute to sustainable development, individual mines involve a non-renewable resource and will eventually close permanently.

Closing mines can be costly. Mines can have long lives, for example, gold has been produced in Yellowknife for over 60 years. Compared to the costs of start-up or production, mine closures can be expensive. The older the mine is, the more complex its mix of infrastructure. This combination of equipment or processes is reflective of changes in technology during the life of the mine. This variety of processes can result in problems if there are materials on site which are known to be hazardous by today's standards. In some instances it may cost more to demolish and reclaim an old building site than it did for the original construction because of the presence of this mix of materials.

TOTAL MINERAL PRODUCTION VALUE BY YEAR (1932-2002)
(Millions of Dollars)



The work involved in mine closure provides specialized business and employment opportunities. Due to the length of time required to close a mine, the generated employment can result in economic opportunities, although on a smaller scale than those associated with production. Skills are often specialized but also applicable to other mine sites.

Mine remediation takes a long time or the site may seem to never be completely cleaned up. Although it is rare to see a site restored to its original condition, there are examples of mines that have been rehabilitated to a level where a range of uses are possible, such as wetlands, new industrial uses, tourist sites, ornamental gardens, and recreational facilities.

Increased public attention on mine closures has resulted in strengthened regulations. For example, new mines must include plans for closing into original designs and make changes to the mine closure plan over the operating life. Older mines are dealt with case by case.

The closure of a mine is a direct cost to a mining company. If the mine closes because of financial difficulties created by low commodity prices or the bankruptcy of the company owning it, then the closure phase can result in a cost to government. Even during the mine closure phase the mine can still create some value for the local and broader community in the form of jobs involved in reclamation and the taxes paid by those employed. The closure phase can take years, in some cases, decades. Sometimes increases in commodity prices and/or changing technology can result in new mining activity on old sites in various stages of reclamation.

Regulators and industry have learned a great deal about what happens after a mine closes. Much of this has come about through partnerships between industry, government and other stakeholders, monitoring various mine sites in different stages of closure. Abandoned mines are a concern to industry and to government because of the environmental liability and the high cost of reclaiming a mine site. There have been increased efforts to address some of the more hazardous sites. DIAND has developed a new policy to strengthen federal standards for the protection of the environment through the reclamation of producing mines in the NWT, and the cleanup of mines abandoned many years ago.

For more information, consult DIAND's Mine Site Reclamation Policy for the Northwest Territories at: www.inac-ainc.gc.ca/nr/prs/m-a2002/02176bk_e.html

SUMMARY OF MINERAL INDUSTRY WEALTH MANAGEMENT

Some aspects of mineral exploration and mine development have recently been incorporated into cost accounting models. This includes a measure of short and long-term degradation of various environmental components, and positive and negative short and long-term socio-economic impacts. While there is consensus on the importance of measuring and tracking these costs and benefits there is currently no agreement on how to do this or on how to interpret results. The development of the NWT diamond industry has generated much discussion around these complex matters.

THE CHALLENGES OF MANAGING WEALTH FROM MINERAL DEVELOPMENT CAN BE SUMMARIZED AS FOLLOWS:

1) The Creation challenge - creating wealth from mineral development in an economically efficient manner incorporating current social environmental, social and cultural preferences.
2) The Distribution Challenge - who receives the wealth created, and how it is shared
3) Management of broader economic and political effects of the wealth creation,
4) The investment challenge - sustaining the benefits of mineral wealth created.

Within each of these four areas and throughout each of the phases of the mineral cycle, three key players, industry, governments and the public continuously interact. Wealth created by mineral development is distributed in many forms with the traditionally controversial mineral royalties and corporate tax components only comprising a portion of the total flow.[1]

DIAND'S ROLE

The Department of Indian Affairs and Northern Development (DIAND) participates in mineral development in the NWT. DIAND's Mineral and Petroleum Resources Directorate is responsible for the disposition and administration of mineral and oil and gas resources for the region. It promotes investment in resource development while ensuring those resources are managed wisely.

The department encourages the participation of, and provides information and advice to, all interested groups, including industry, Aboriginal groups, communities and government.

For more information, contact:

Mineral and Petroleum Resources Directorate
DIAND
Box 1500
Yellowknife, NT, X1A 2R3.

Phone: (867) 669-2571 Fax: (867) 669-2705
http://www.inac-ainc.gc.ca

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