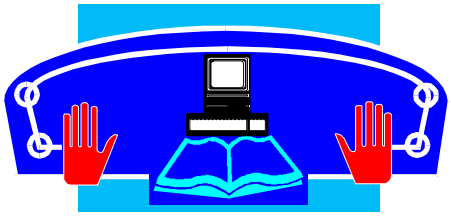

N.w.t. Mineral Sector Report 1991
Type of Study: Industry Development
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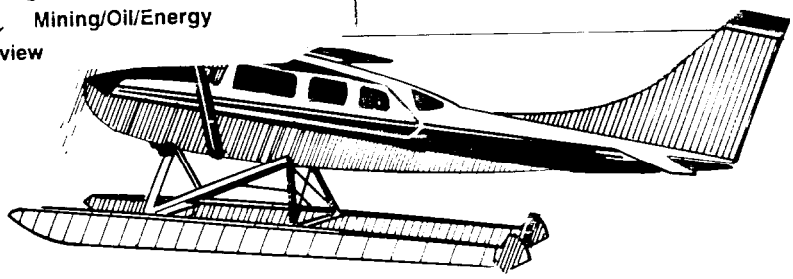
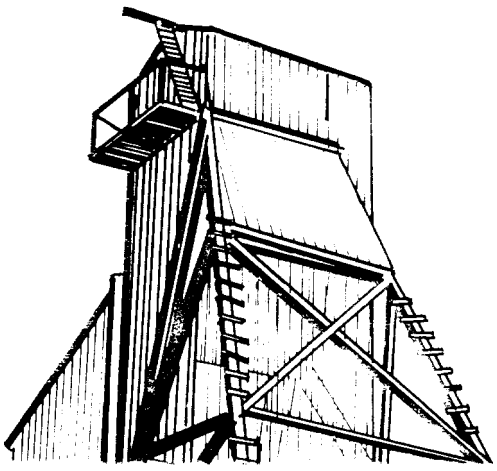
Date of Report: 1991
Author: Gnwt-empr
Catalogue Number: 6-3-33





N.W.T. MINERAL SECTOR REPORT 1991

NWT Mineral Sector Report
1991

Contents

OVERVIEW

The NWT mining industry has done an excellent job in meeting the challenges of falling metal prices during this recessionary period. Mining is the single largest private sector, goods producing, export dollar earning industry in the NWT. Data for 1990 shows mining plus oil and gas account for 26% of the territorial gross domestic product GDP (Figure 1) and 13% of wages and salaries (Figure 2). It is estimated that

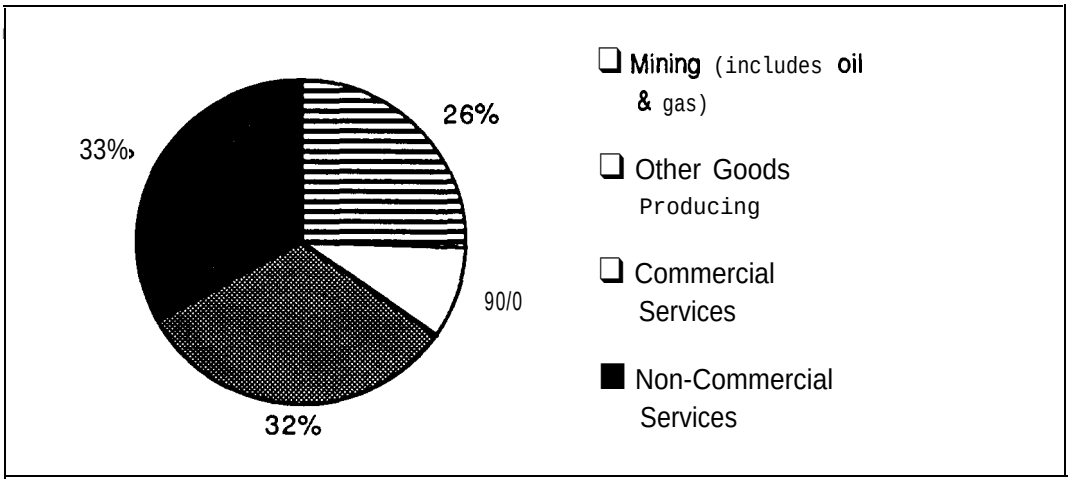


Figure 1: GDP AT FACTOR **COST *BY* INDUSTRY IN *1990 (NWT , Total $1,962 Billion)***
Source - Bureau of ***Statistics, GNWT***

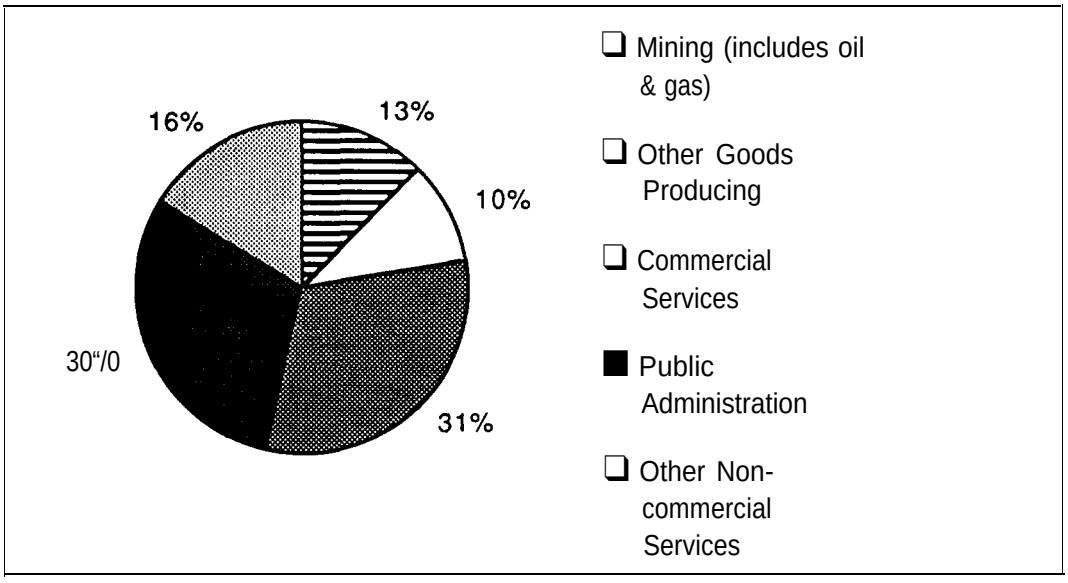


Figure 2: SALARY AND WAGES BY SECTOR 1990 (Total - $1.032 Billion)
Source - Bureau of Statistics, ***GNWT***

mining alone contributes about 3/4 of the 26% GDP number and about $100 million in wages and salaries. The operating mines continue to pay top wages while employing fewer workers to produce more ore than in previous years, however the companies are receiving lower prices for their product and profits are down,

Mineral exploration across Canada has declined dramatically over the past three years, however, the NWT has been able to maintain about 6% of those exploration dollars. The recent diamond staking rush in the central NWT is expected to ensure that our position does not deteriorate; indeed, it is a very bright spot in the Canadian exploration scene. Claims staking covers an area approximately 250 km (kilometers) by 150 km, somewhere between the size of the Netherlands and Switzerland (Figure 3 and 4). It is probably the largest staking rush in North America, bigger than the Kidd Creek mine rush of 1963 or the Hemlo gold rush of 1981.

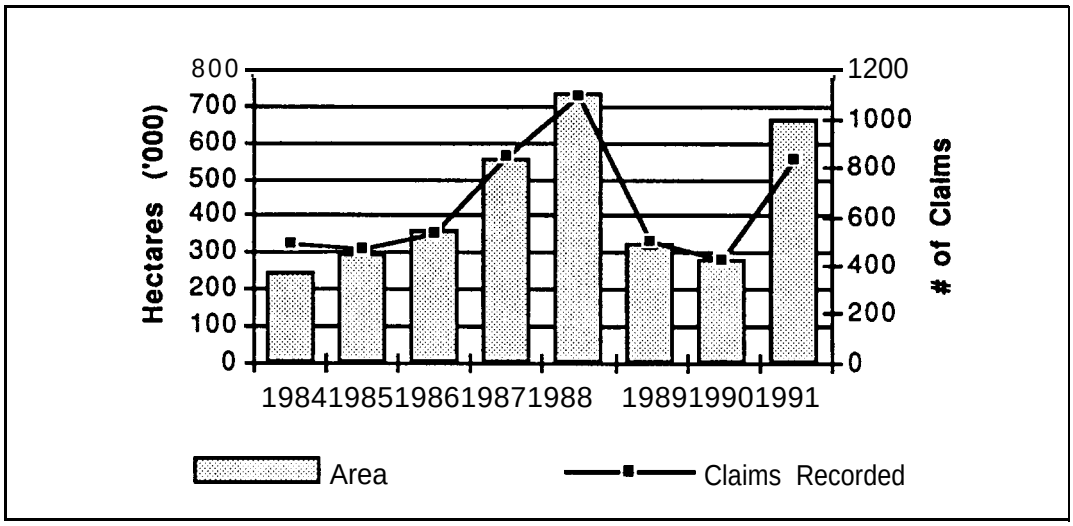


Figure 3: MINERAL **CLAIMS IN** *GOOD STANDING*
Source - Department of Indian Affairs *and Northern Development*

Preliminary production figures for 1991 indicate the NWT remains fifth in value of Canada's metallic mineral production, supplying 5.1% of all metallic minerals. The NWT, in 1991, produced 20.7% of Canada's zinc (1st), 13.1% of its lead (4th), 9.4% of its gold (4th) and 1.6% of its silver (6th).

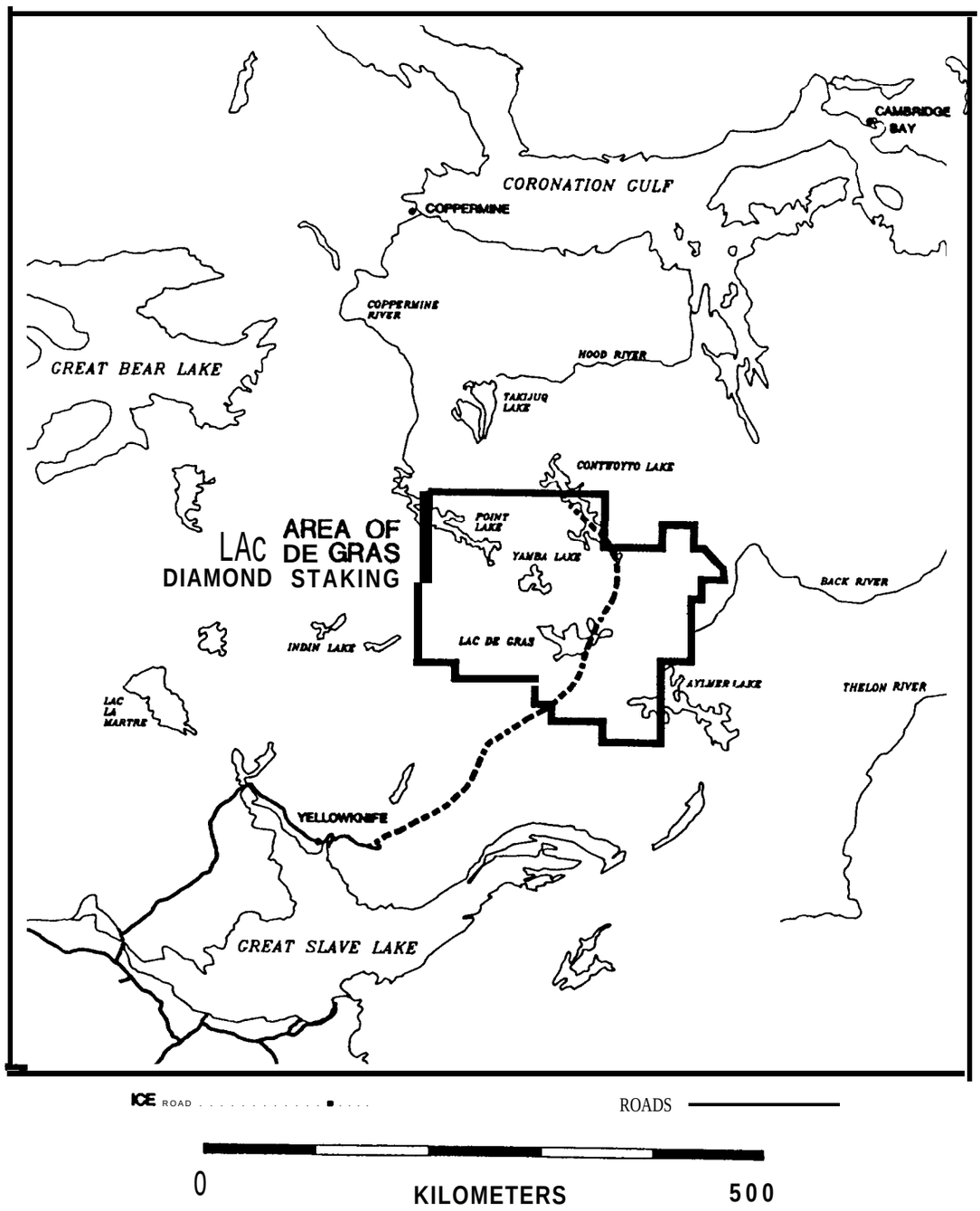


Figure 4: *LAC* DE GRAS DIAMOND *STAKING* RUSH

Figure 5 shows the breakdown of the value of mineral shipments out of the NWT and into the Canadian and world markets. Our zinc and lead concentrates are loaded onto ice-strengthened bulk carriers and shipped to Europe, most of our fuels go via the same bulk carriers to Europe and via pipeline into Alberta, while NWT gold is flown to the Canadian mint, or other precious metal refineries.

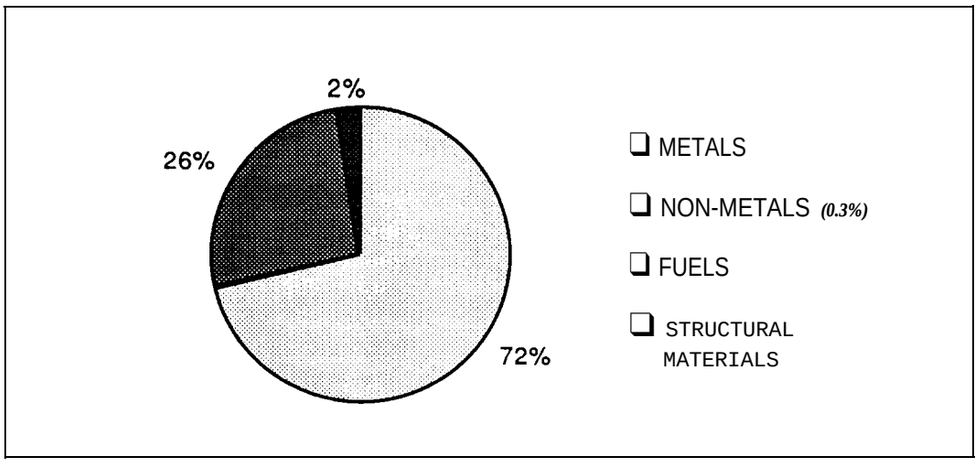


Figure 5: ***VALUE OF NWT MINERAL SHIPMENTS -1990***
Source - Statistics Canada: Canada's Mineral Production Catalogue 26-202

USEFUL *CONVERSION FACTORS*

1000 grams = *1* kilogram = 32.151 ***troy ounces (oz)***
1 tonne = 1.102 short tons
2000 ***pounds = 1 short*** ton
12 ***troy ounces . 1 pound***
1 troy ounce ***(oz)*** = **31.103 grams**

1 troy ounce/short ton = 34.286 grams ***per*** tonne
1 ***sq. km = 100*** hectares = 0.3861 ***sq.*** mile = 247.1 acres
1 sq. mi. = 2.60 ***sq. km***

1991 ***Average U.S.*** Exchange ***Rate = 1.1458***
1991 ***Average British pounds (£) = 2.022 Canadian Dollars***

HISTORY

The NWT has a wealth of gold, silver, lead, zinc, copper, nickel, uranium, tungsten, lithium, cadmium, arsenic, bismuth, antimony, beryllium, rare-earth elements, oil, gas and coal. Mineral development and exploitation began before Europeans arrived in what is now the N'WT. Until the 1920s, Inuit and Yellowknife-area Indians recovered and traded native copper from the Bathurst Inlet and Coppermine River areas. Inuit also mined soapstone to use for artistic purposes, or carve into oil lamps and other utensils.

The first European mining operation was from 1577 to 1578 when Martin Frobisher mined 1800 tonnes (t) of "blacke stone" from Kodlunarn Island near Baffin Island. The supposed gold ore was shipped to England where it was found to be worthless. In 1771, Matonabbee, a Dene chief, guided Samuel Hearne of the Hudson's Bay Company to a copper showing near the Coppermine River, but the showing was of little commercial interest to the Hudson's Bay Company. In the 1890s, local natives led prospectors, traveling overland to the Klondike gold rush, to lead-zinc showings in the Pine Point area. The prospectors lost interest when they realized the ore did not contain precious metals.

Small scale mineral production began in the late 1870s when 14.5 t of mica, graphite and other industrial minerals, worth $120 thousand, were mined from the Cumberland Sound area. Mica and graphite were mined near Lake Harbour on a sporadic basis, between 1909 and 1918. In 1928, 2.7 kilograms (kg) of gold was produced at Term Point on the Whale Cove Peninsula.

In 1900, Geological Survey of Canada (GSC) geologists J. McIntosh Bell and Charles Camsell noted copper and cobalt mineralization on the east shore of Great Bear Lake. After reading Bell's report, Gilbert Labine flew to Great Bear Lake and made the discovery that lead to the NWT's first staking rush and the opening of the Eldorado Mine at Port Radium; the first mine in the N'WT. The mine opened in 1932 and operated intermittently until 1982. Total production was 6808 t uranium, 46,930 kg silver, 226,800 kg cobalt, 127 t nickel, 99.8 t lead, 1,292 t copper and 450 grams (g) radium (worth $200,000/g in the 1930s).

It was with the development of the Eldorado Mine that the NWT first began to realize the indirect benefits of non-renewable resource development. The mine was supplied by aircraft and barge, and the mine's barging operation eventually evolved into the Northern Transportation Company Limited. The Eldorado Mine was one of the first markets for the oil produced from the Norman Wells oil field, at a time when there was no other demand for these products. The Canol Road, the first highway built in the NWT, was established between Norman Wells and Whitehorse to transport oil needed in the Pacific during World War Two (wWII).

The NWT's first gold rush began in the early 1930s. Although Yellowknife's first gold mine, the Burwash Mine, was discovered in 1933, it was Norman Jennejohn's discovery of visible gold on the west side of Yellowknife Bay that prompted the gold rush. The CON claims were staked and the Nerco Con Mine poured its first gold brick in 1936.

A second gold rush began in 1938 following the discovery of visible gold in the Indin Lake area. WWII put a temporary halt to exploration and development activities, but these activities resumed with full vigour after the war resulting in the discovery of Giant Mine's deposit in 1944. Giant Mine poured their first gold brick in 1948. Other gold mines including the Ruth, Tundra, Camlaren, Salmita, Discovery, Cullaton Lake, and Colomac mines have operated and shut-down during the last 50 years. Since 1928, more than 450 t of gold has been produced from more than 25 mines. Between 1939 and 1965, gold was the leading commodity produced in the NWT.

Other types of mineral commodities have been commercially exploited in the NWT including tungsten and zinc. Production of tungsten began in 1962 from the Western World's largest tungsten deposit at the Cantung Mine on the NWT-Yukon border. The Pine Point base metal mine opened in 1964, the Nanisivik Mine in 1976, followed by the Polaris Mine in 1982. On an annual basis, since 1965, the total value of lead and zinc production has surpassed gold, and continues to do so despite the closure of Pine Point.

These mines established the NWT as an important Canadian mineral producer and proved that remote locations are not necessarily a barrier to development. In fact, the mining industry has played a leading role in opening up and developing frontiers in the NWT. Much of the transportation infrastructure in the north was built between the 1940s and 1970s in response to various socio-economic needs, usually stemming from mineral development activities. The Mackenzie Highway, built in 1949, followed the winter tractor train route from Grimshaw Alberta to Hay River that was used to haul supplies used by the NWT mining industry. The construction of the Pine Point Mine made it feasible to construct the NWT's only railroad, used to haul Pine Point concentrates for smelting in BC.

The lack of transportation infrastructure has impelled the mining industry to provide innovative solutions for their transportation problems. Echo Bay Mines Limited, drawing from their experience at Eldorado, flew most of their construction materials and mine equipment to the Lupin Mine site during development in the early 1980s. The mine constructs a winter road from a point east of Yellowknife to bring the year's supply of fuel and bulk materials to the mine. Transportation benefits accrue to all NWT residents as the mining industry solves their transportation problems. Renewable resource industries such as tourism, outfitting and hunting have benefited from access to remote locations provided by mining industry ice roads and air strips. Colomac's winter road temporarily reduced costs of shipping goods to the community of Snare Lake. The mining industry is now a participant in a Government of the Northwest Territories (GNWT)-federal transportation study which will determine the feasibility of developing a marine facility on the Coronation Gulf. Such a facility would not only allow development of mineral deposits such as Izok Lake, but would provide another transportation hub for trans-shipping goods to remote communities.

EMPLOYMENT TRENDS

For 1991, national employment in mining was trending downward; the trend for the NWT was also slightly down from 1990 (Figure 6). This decline in employment is explained by: the closing of NorthWest Gold Corporation's Colomac gold mine, where approximately 350 people were employed during the full operational stage; down-sizing by Treminco Resources Limited's Ptarmigan Mine of about 20 positions and Echo Bay Mines Limited's reduction of 50 at their Lupin operation. The other four producing mines have remained close to their 1990 figures for 1991 employment levels. Over the last ten years, NWT mine employment has averaged 2285 full-time positions, with between 9 and 10% of these filled on a contract basis. In 1991 the mining industry directly employed 1856 full-time employees, of which 172 were contract positions and 140 were Aboriginal people. During the same period, roughly 55% of these positions were filled by Northern residents. The closing of the Colomac operation was the principal reason for the considerable drop in Aboriginal peoples' employment from 225 in 1990 to 140 in 1991.

Aboriginal employment at NWT mines averaged approximately 10% for 1991. A slow upward swing is anticipated in this segment over the next few years as education and skills levels are increased and as the mining industry continues to increase its efforts to employ local people.

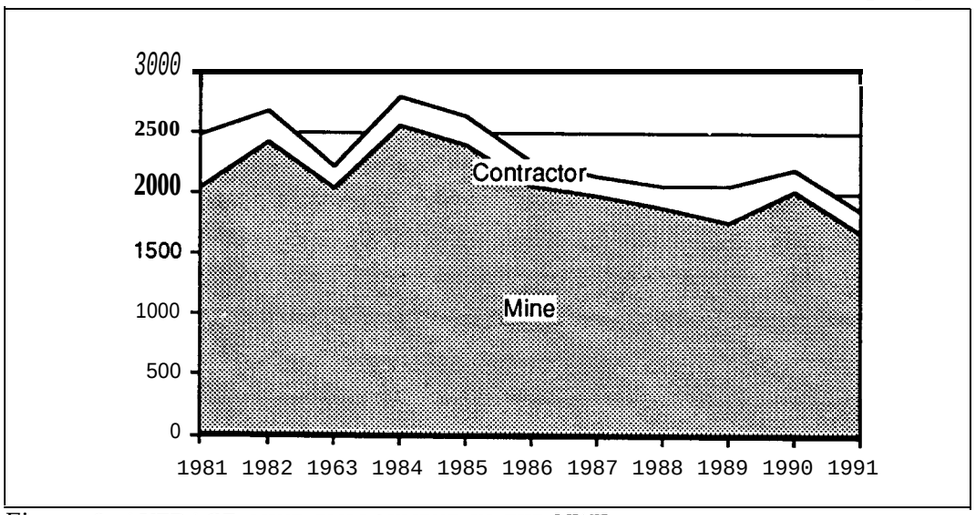


Figure **6: AVERAGE** ***MINE EMPLOYMENT IN THE NWT***
Source - Bureau of Statistics, GNWT

CURRENT MINING OPERATIONS

NERCO-CON MINE (NERCO CON MINE LIMITED)

Nerco Con Mine exceeded their 1990 production of 3,642.7 kg by 5%, pouring a record of 3,828.6 kg of gold in 1991. The operation milled 332,297 t of ore grading 12.3 grams per tonne (g/t) gold at a 94% recovery rate. The company's 1991 annual report states that due to a decrease in ore grade and adverse currency exchange rates, cash costs at the Nerco-con Mine rose 970 to approximately US$254 per ounce.

Mill capacity has been expanded from 910 tonnes per day (tpd) Up to 1090 tpd; further expansion is being considered. Construction of a $20 million autoclave circuit, adjacent to the existing mill, is slightly ahead of schedule and should be in operation by August 1992. This pressure oxidation process will allow mining of near surface refractory ore zones on the property and the recovery of gold by reprocessing materials.

GIANT MINE (GIANT YELLOWKNIFE MINES LIMITED)

Giant Yellowknife Mines Limited, owner of the Giant Mine in Yellowknife, was amalgamated in June 1991 by Royal Oak Resources Limited, along with three interrelated companies, into a new medium sized gold producer - Royal Oak Mines Limited. The new company has two operating mines producing about 6220 kg of gold per year, 5 properties in advanced exploration or development stages and over 100 mineral properties across Canada.

A little less than a year after purchasing the Giant Mine and other Canadian assets of Giant Resources Limited (Australia), Royal Oak Mines Limited became debt free. This was done by cutting administrative costs, productions costs at Yellowknife and Timmins, and by selling off their gold future-sale contracts.

Giant's 1991 gold production was 3,184.9 kg from 386,000 t of ore, for an average grade of 8.2 g/t.

LUPIN MINE (ECHO BAY MINES LIMITED)

The Lupin Mine is 400 km northeast of Yellowknife, 90 km south of the Arctic Circle. The mining operation is supported by an Edmonton based Boeing 727 jet and a 600-km long winter road from Yellowknife, all but 35 km across frozen lakes. The winter road is usually open for standard tractor-trailer haulage of supplies from late January to early April. Between 700 and 900 round trips, each taking 48 hours, bring more than 90,000 barrels of diesel fuel and 28,600 t of bulk supplies to the mine.

Since start-up in 1982, the mine has produced more than 52,875 kg of gold; current reserve figures indicate at least 3.8 million tonnes (Mt) of ore at an average grade of 10.1 g/t of gold, for a total of 38,878 kg of gold, remain in the ground. The Lupin mine shaft is 1,230 m deep, ore reserves are defined to a depth of 1170 m below surface and ore has been mined from as deep as the 640 m level.

Production statistics for 1991 are 659,530 t of ore mined and milled (1,800 tpd) at an average grade of 10.7 g/t with a 94% recovery rate, yielding 6,745 kg of gold. The stated cash production cost/oz of gold is US$242.

PTARMIGAN MINE (TREMINCO RESOURCES LIMITED)

The Ptarmigan Mine, a 180 tpd operation 15 km northeast of Yellowknife, milled 52,710 t of ore grading 9.7 g/t of gold to produce 463.4 kg of gold.

COLOMAC MINE (NORTHWEST GOLD CORPORATION)

The Colomac gold mine suspended operations in early July 1991, having begun production in May 1990.

Built at a cost of about $166 million, the design capacity of the operation was 9100 tpd at an average grade of 1.9 g/t gold yielding about 6,220 kg of gold per year, over a projected eight year mine-life. At the start of production, reserves stood at 24.2 Mt grading 1.9 g/t of gold with the initial production from a higher grade core of 15.8 Mt grading 2.1 g/t gold.

The operation employed 350 people, approximately 25% from nearby native communities; it is currently on care and maintenance with two people on site.

From start-up in May to 1990 year-end, Colomac had milled 1.4 Mt at an average calculated grade of 1.7 g/t with an estimated recovery of 89.7%; gold production was 2,163 kg. For the first six months of 1991, both grade (2.19 g/t gold) and recovery (94%) increased; gold production was 2302 kg.

POLARIS MINE (COMINCO LIMITED)

Polaris Mine reports the following production data for the last three calendar years:

	1991	1990	1989
Milled (t):	1,023,295	1,017>52	1,069,295
Grade:			
% Lead	3.5	4.0	3.2
% Zinc	14.1	14.4	12.5
Concentrate Shipped (t):			
Lead	41,012	**48,225**	39907
Zinc	224,499	227,141	210,125
Metal In Concentrate (t):			
Lead in Lead Concentrate	**32,080**	**37,688**	**30,985**
Zinc in Zinc Concentrate	**139,224**	**142,419**	**128,750**

NANISIVIK MINE (CONWEST EXPLORATION COMPANY LTD.)

In 1991, Nanisivik Mine milled 704,800 t of ore versus 716,400 t in 1990, producing 98,200 t of zinc concentrate containing 54,800 t of zinc metal. The 1990 figures were 100,700 t of concentrate containing 56,200 t of zinc metal. The mine also produced 17 t of silver.

PRODUCTION TRENDS

Examination of historical value of production trends for the NWT mining industry indicate an increased dependence on just two commodities in 1991, zinc at 5370 and gold at 42%, when compared with 10 years ago (Figures 7 and 8). The increased dependence results from the closure of both the Cantung tungsten mine in 1986 and the Pine Point lead-zinc mine in 1989, and in 1990 from the cessation of lead-zinc ore concentrate shipments from Pine Point's stockpiles.

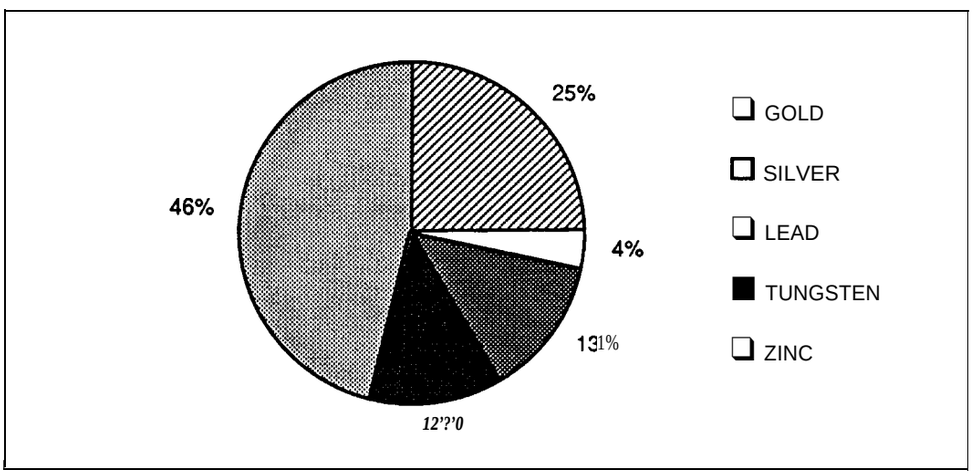


Figure 7: VALUE OF NWT METAL SHIPMENTS 1981
Source - Statistics Canada: Canada's Mineral Production, *Cat.* 26-202

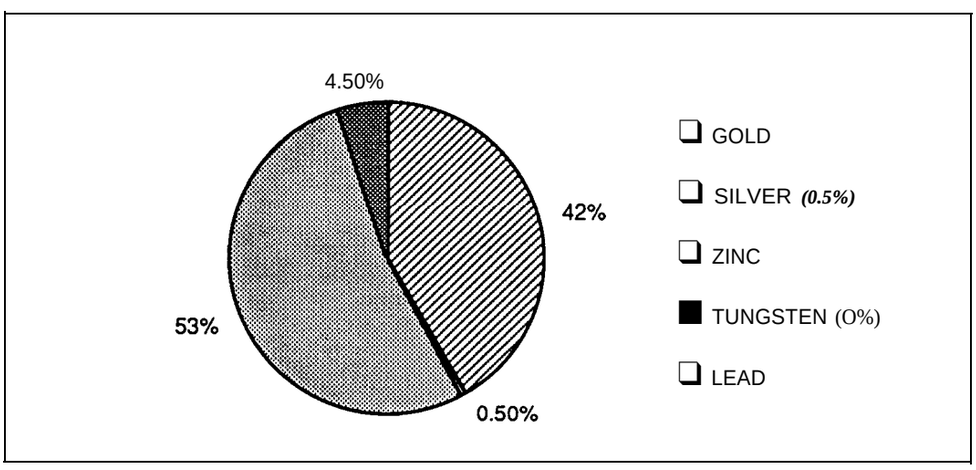


Figure 8: *VALUE OF NWT METAL SHIPMENTS 1991*
Source - Mineral Policy EMR, Canada

In order for NWT operating mines to remain profitable during the current period of low metal prices (see "Metal Prices"), companies have had to increase production capacity and/or cut operating costs. As a result there were some layoffs and one mine closure, during 1991.

NWT mines shipped 223,030 t of zinc and 16,561 kg of gold in 1991 compared to 218,230 t of zinc and 15,557 kg of gold in 1990, however, the value of that production fell from 420.5 to 279.0 million dollars for zinc and from 223.8 to 220.7 million dollars for gold. The two operating zinc mines produced 53% of the value of NWT metal shipments in 1991 while five gold mines produced 42%; the remaining 5% is by-product lead (4.5%) and silver (0.5%) from the zinc mines.

ZINC & LEAD

Total NWT zinc production in 1991 increased a marginal 2% over the 1990 figure, to a total of 223,024 t, according to preliminary data; about 72% is attributable to Cominco Limited's Polaris Mine and 28% to the Nanisivik Mine owned by Conwest Exploration Company Limited. Polaris' ore contains about 3.5% lead yielding about 32,080 t of lead in lead concentrate shipped while the 14.1 % zinc ore resulted in the shipment of about 139,224 t of zinc in zinc concentrate, in 1991.

Figure 9 shows the 1981 to 1991 fluctuations in NWT zinc production,

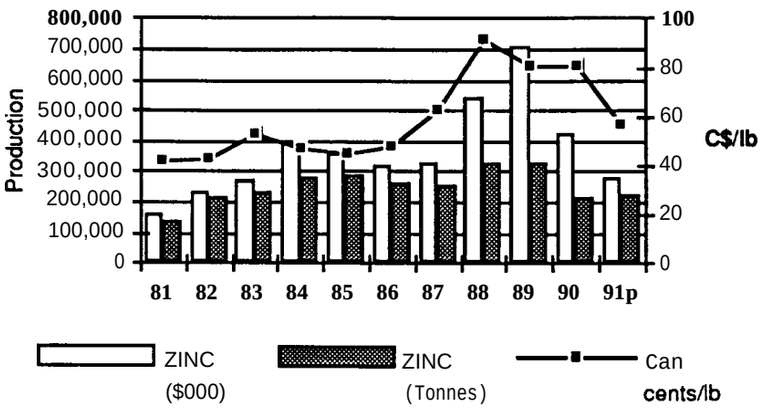


Figure **9: ZINC *PRODUCTION AND VALUE IN NWT IN COMPARISON* TO ZINC *PRICES***
Source - Statistics ***Canada:*** Canada's Mineral ***Production Cat. 26-202; London*** Metals Exchange ***cash lead price & Bank of Canada exchange rates***

the world price per pound of zinc metal and the total annual value of NWT zinc production. Despite the small increase in metal production for 1991, the value of that production actually fell 33.7%, from about 420.5 to 279.0 million dollars.

For 1990, the NWT was third in Canada in zinc production, at 218,241 t; in 1991, preliminary figures indicate the NWT may be first, with about 20.7% of total Canadian production.

Figure 10 shows the 1981 to 1991 fluctuations in NWT lead production, the world price per pound of lead metal and the total annual value of NWT lead production. Lead production fell 31% in 1991 from 45,588 t to 31,403 t while the total annual value of that production fell 52% from 55.7 to 26.7 million dollars. The steep decline in lead production was due to cessation of lead shipments from Pine Point's stockpiles. Current lead production in the NWT is as a co-product or by-product of the two primary zinc mines, Polaris and Nanisivik.

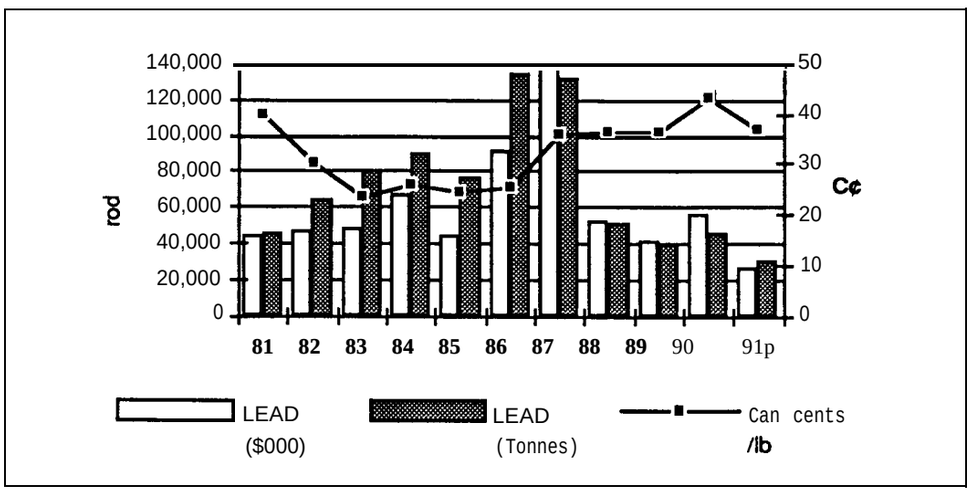


Figure 10: LEAD PRODUCTION AND ITS VALUE IN NWT IN COMPARISON TO LEAD PRICES

Source - Statistics Canada: Canada's Mineral *Production Cat. 26-202; LME cash price & Bank* of Canada exchange rats

GOLD

NWT **gold production** continued to rise from 1989 **through 1990 and into 1991 (Figure 11).** Giant, Nerco-Con and Lupin **mines all achieved** incremental increases in gold output. Production **from the** Colomac Mine came on stream in the later half of 1990 and ran through the first half of 1991, before shutting down.

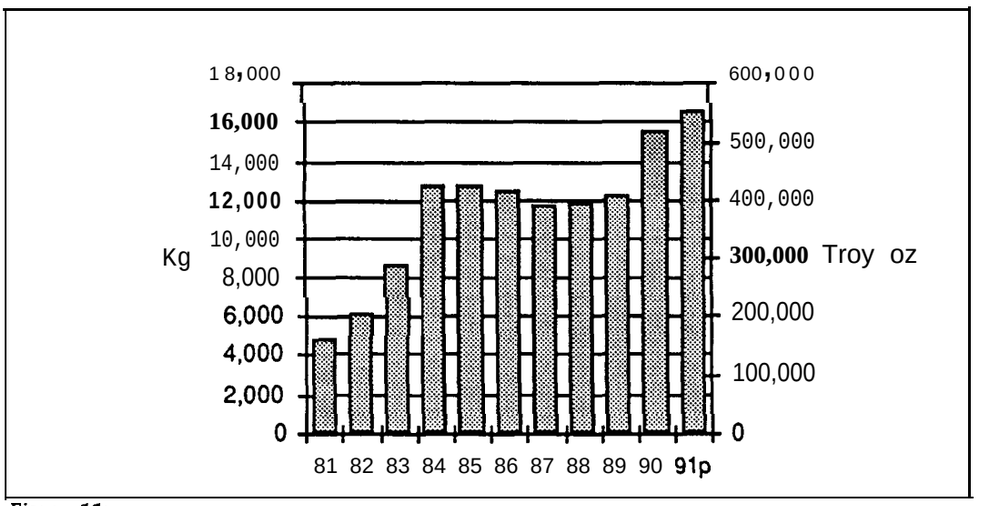


Figure 11:
NWT GOLD SHIPMENTS
Source - Statistics Canada: ***Canada's Mineral Production Cat. 26-202***

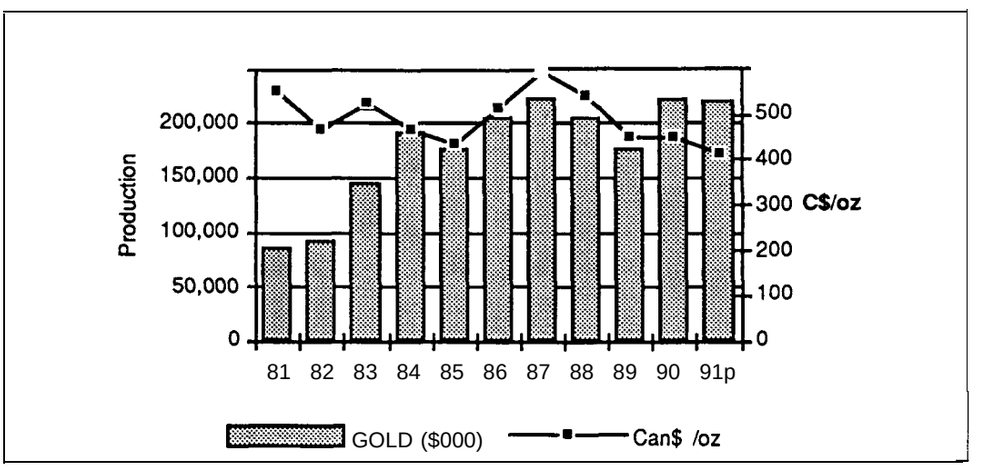


Figure 12: ***GOLD PRODUCTION VALUE AND PRICE***
Source - Statistics Canada: Canada's Mineral Production Cat. 26-202; Handy & Harman and Bank of Canada exchange rates

Current estimates of 1991 NWT gold production is 16,562 kg, up from 15,557 kg in 1990 and 12,208 kg in 1989 (Figure 12). The dollar value of that production reflects the declining price of gold in Canadian dollars per ounce of gold: $220.7 million in 1991 ($415 /oz), $223.7 million in 1990 ($448/oz) and $177.2 million in 1989 ($452 /oz).

The 1991 preliminary estimates for Canadian gold production indicate the NWT is fourth, with about 9.4% of production. Within the NWT, gold accounts for about 42% of the value of our metal shipments.

Gold remains a favourite exploration target for prospectors and mining companies alike. Favorable geology, low land acquisition costs, high expected success rates, the high unit value of gold production and the lowest royalty rates in Canada encourage explorationists to work in the NWT.

METAL PRICES

GOLD

Gold started on a January high of US$391/oz and slid all year to a low of US$344/oz in September, recovering slightly to US$360/oz by December 1991 (Figure 13). Gold has been trading at or below $US430/oz since September 1988.

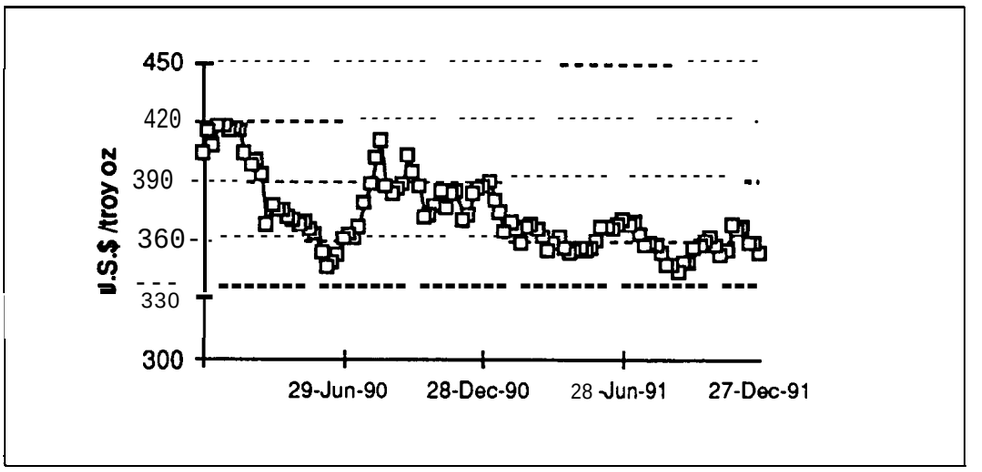


Figure 13: *GOLD WEEKLY CLOSING PRICES*
Source - London P.M. Fixing, Market fax Infoservices Ltd.

The January high was a remnant of world uncertainty during the 1990 Kuwait war and subsequent bombing of Iraq. The price fall was due to the ease in world tensions and a return to the recessionary pressures in the world economy, most notably North America, as well as declining gold purchases and/or new gold sales by Middle East traders.

The decline and fall of communist USSR also pushed down the price of gold, as it was assumed a good portion of their huge gold reserves would be sold into the market in support of their failing economy. Late in 1991, Russia released estimates that their gold reserves stood at 217 t, well below the 725 to 1630 t assumed by many, if not most, analysts. The US C.I.A. had estimated the USSR gold reserves at more

than 1815 t; the real number may be closer to 660 t. These lower estimates diminish the threat of massive sales into the gold market, relieving some of the downward pressure on the price of gold.

Gold is expected by analysts to continue trading in the $US330 to $US370/oz through 1992. Recently, the demand for fabricated gold jewelry has shown strength when gold drops to $US340 and weakens above $US380/oz. At around 1815 t, in 1990, gold jewelry is the largest demand side product or end-use in the gold supply - demand equation. This demand exceeds the Western World gold production of about 1630 t per year. Jewelry accounts for about 75% of total demand for gold.

Gold at $US350/oz is near the cost of production for many North American, Australian and South African gold operations. Below $US350 these mines become uneconomic and companies will either enter into future-sales (hedging) contracts, effectively capping upward movement in the price of gold, or cease production, thereby removing capacity from the market and decreasing downward pressure on the price of gold. Producers 'hedge' or forward-sell a portion of their gold production to provide themselves some assurance of a minimum income level over the life of the contract.

In the past five years, Western World gold production has been rising due to successful exploration across North America based upon new theories for the formation of gold deposits, massive exploration stimulated by favourable Canadian tax incentives and successful new application of heap leach technology to the low cost recovery of gold, primarily in the USA and Australia. The growth rate of new gold production capacity on the market has slowed and is expected to level-off over the next two to three years.

ZINC

1991 was a poor year for zinc; as goes the steel industry, so goes zinc. World recessionary pressures pushed the price of zinc from a high of US$1263/t in January to a low of US$991/t in October/November 1991 (Figure 14). This is in contrast to 1990, during which zinc traded above $US1500/t for at least 7 months and at lows of about $US1300/t.

As an economic recovery takes hold, zinc prices should recover.

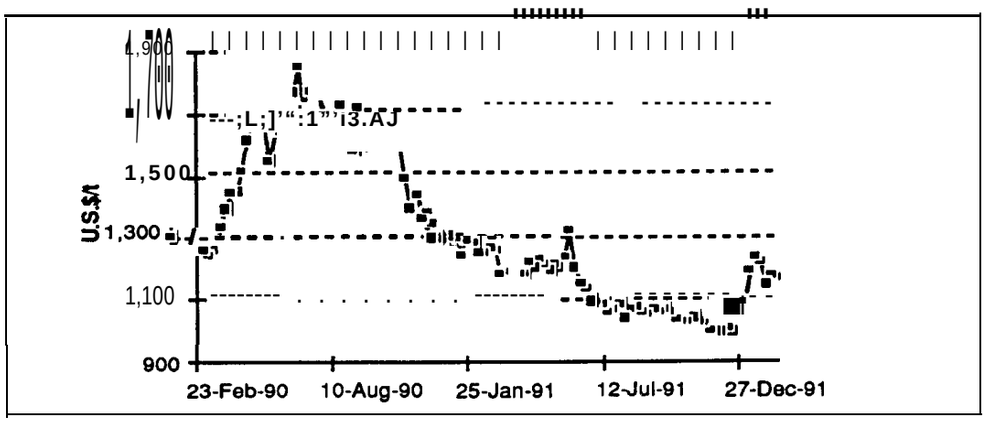


Figure 14: ZINC WEEKLY CLOSING PRICES ($US/t)
Source - London Metals; Market fax Infoservices Ltd.

LEAD

In 1991, lead traded in between E282/t (November) and £353/t (May) levelling off following the dramatic 1990 decline from £800/t (March) to £330/t (December (Figure 15).

Approximately 60% of lead consumption has been for lead - acid batteries for motor vehicles. A high percentage of production is as a by-product of zinc, copper or silver mines rather than as the primary product, hence the supply and pricing of lead is heavily influenced by the economics of other metals, rather than those of lead itself. The Western World consumes about 5.5 Mt of lead annually; scrap metal recycling recovers approximately 2 Mt.

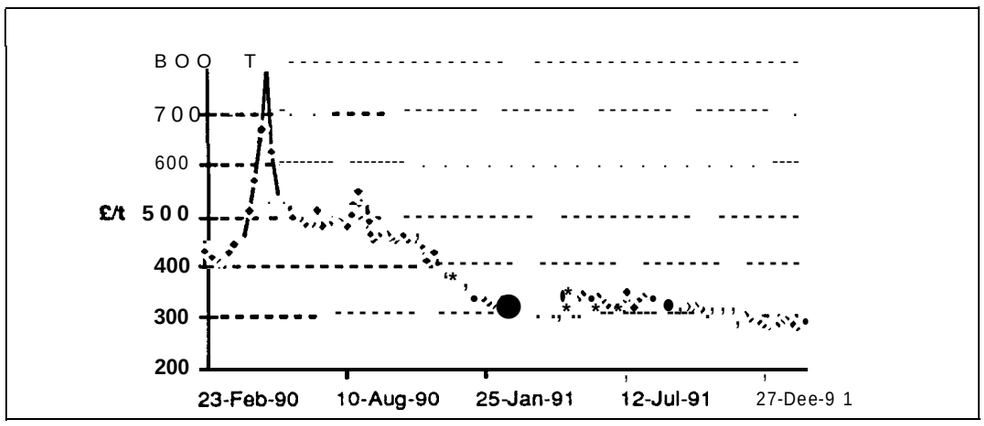


Figure 15: LEAD WEEKLY CLOSING PRICES (Pound Sterling/t)
Source - London Metals; Marketfax Infoservices Ltd.

SILVER

Silver dropped from $US4.18/oz in early January 1991 to $US3.60/oz in February, rose to $US4.51/oz in June and fell back to $US3.82/oz in December (Figure 16).

Data for the mid-1980's indicates total world silver consumption exceeds primary silver production by 15 to 20%; shortfalls are covered by secondary sources such as salvage or recycling, sales from private stocks, central banks or centrally planned (communist) economies and demonetarized (old) coinage.

The principal end-uses for silver are photography, electrical/electronic components and investment demands. Developing technologies and substitutions threaten the industrial use of silver.

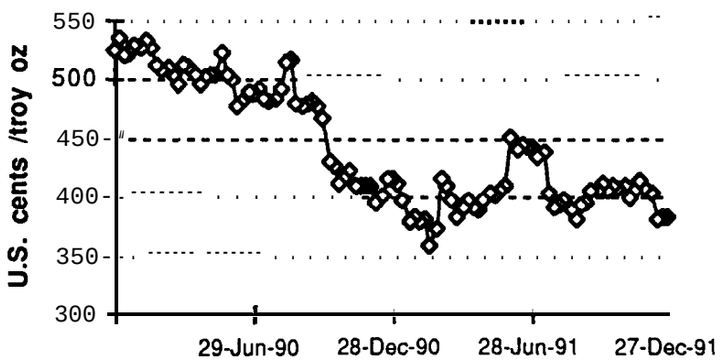


Figure 16: SILVER WEEKLY CLOSING PRICES
Source - Handy & Harmon, Market fax Infoservices Ltd.

EQUITY MARKETS

Canada's five equity markets, and in particular the Toronto (TSE) and Vancouver (VSE) stock exchanges, have provided much of the venture capital required to conduct mineral exploration and development in the NW'T.

The TSE and VSE indices of activity (composite, gold & silver, metal mines) along with such statistics as historical record of equities trading (volume, value, transactions, financing, new listings) all provide insight into the ability of Canadian mineral exploration companies to raise venture capital. Venture capital intensive companies everywhere require new cash investments to carry on their high risk business.

However, total VSE financing for 1991 were only $399.7 million, down from $455.7 million in 1990, $642.3 million in 1989 and $1,037.8 million in 1988 and $1,363.7 million in 1987. The inability of the market to attract new investment dollars, and especially the high risk venture capital dollars, directly impacts on field expenditures in search of new mineral deposits.

The last three years have been devastating for raising new resource sector directed venture capital, as shown by data for flow-through share (FTS) financing on the Vancouver stock exchange:

YEAR	FTS FINANCING ($ Millions)	FTS$ AS % FINANCING	TOTAL #OF FINANCING	#OF FTS FINANCING
1991	**14.2**	**4.2**	**64**	**5**
1990	**92.0**	**20.1**	**70**	**8**
1989	**92.7**	**14.9**	109	37
1988	327.9	31.6	162	65
1987	306.9	22.8	231	102

Composite indices gauge the performance of all industries in the market, but are influenced by the performance of larger companies. Gold, Silver, Metal Mines, Resource and Venture indices on the TSE and VSE measure the performance of resource based companies including juniors. The relative performance of all of these indices can indicate how mining companies are faring in relation to the market in general.

Following the steep decline in composite indices on the Toronto (TSE - 20%) and Vancouver (VSE - 30%) stock exchanges during 1990, markets showed moderate recoveries early in 1991, stabilizing to trade within relatively narrow ranges for the rest of the year. The TSE 300 Composite Index rose from the 3200 level to about 3550 in February; it then traded between 3450 to 3600 for most of the year, closing up 9% at 3505 on a year-end rally (Figure 17). The VSE Composite Index started at an historical low of 494 in January, rose to a high of 587 in April and closed the year at 548, up 11%; for much of the year it traded in the 555 to 575 range.

Relatively positive indicators in the 1991 composite indices are not reflected by the TSE Gold and Silver Index, up 2%, or the Metal Mines Sub-Index, down 5%. Similarly, the VSE Daily Resource Index declined 27%, from 605 in January to 444 in December, while the VSE Venture Index fell 17%, from 525 in May to 435 in December. This suggests that mining companies are not experiencing the moderate recoveries shown in the composite indices.

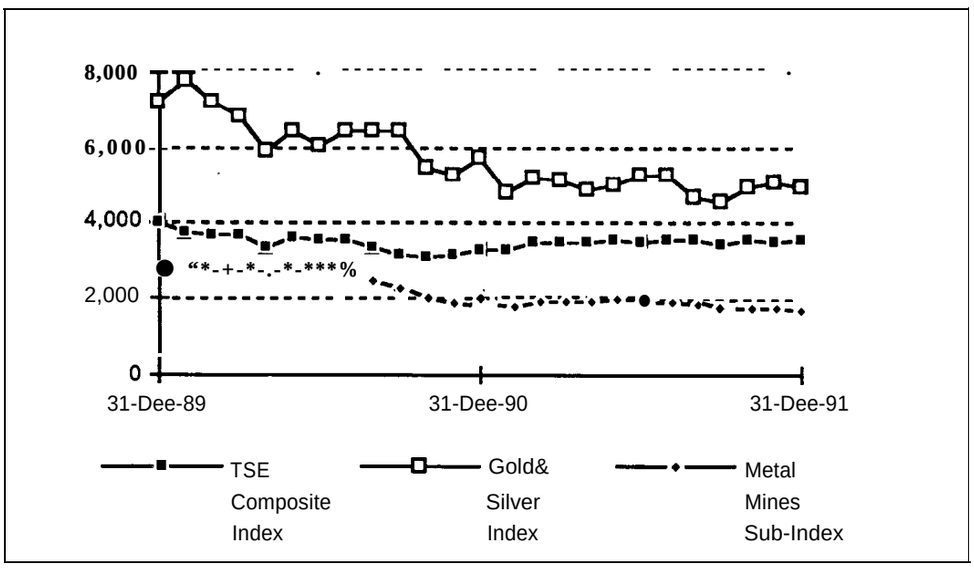


Figure 17: ***TORONTO STOCK EXCHANGE INDICES***
Source - Marketfax Infoservices Ltd.

CANADA - NWT MINERAL INITIATIVES

The Canada - NWT Economic Development Framework Agreement was signed in February, 1991. Under the Agreement, the federal Department of Indian Affairs and Northern Development (DIAND) and the GNWT will cooperate in the development and delivery of a number of Economic Development Initiatives.

Four of these initiatives fall under the title of the Mineral Initiatives. The four Initiatives have a total budget of $8.2 million over the term of the Agreement, 1991-1996, divided as follows:

I	Geoscience Initiative	$7.5 million
II	Technology Initiative	$200,000
III	Information Initiative	$200,000
IV	Prospectors Initiative	$300,000

Each Initiative has both budgetary controls and funding targets for each NWT region. A Management Committee has been established to oversee the four Initiatives. Committee members are from: Energy, Mines & Petroleum Resources (EMPR), GNWT; NWT Geology Division, DIAND; Mineral Policy Sector, Energy, Mines and Resources Canada (EMR Canada); and Economic Development & Tourism, GNWT. The General Manager of the NWT Chamber of Mines is an advisory member of the Committee.

EMPR is responsible for the implementation of the Initiatives. A Mineral Initiatives Office (MIO) has been established to coordinate their delivery. In addition, an advisory committee will oversee the development and delivery of projects.

GEOSCIENCE INITIATIVE

The purpose of the Geoscience Initiative is to: assist and encourage mineral exploration by adding to a systematic modern information base on the relation between mineral deposits and geology in sufficient detail to identify areas most favorable for economic mineralization.

EMPR and DIAND will be delivering 60% of the Geoscience Initiative while the Geological Survey of Canada (GSC) will be running the remaining projects.

The Geoscience Advisory Committee (GAC) provides technical advice and support for the projects, with representation from EMPR, GNWT; NWT Geology Division, DIAND; and the GSC, EMR Canada.

The approved geoscience projects include fifteen regional mapping projects, six mineral deposits studies and two data compilation projects (Figure 18). The projects will be reviewed every year at the annual Geoscience Forum by the GAC.

TECHNOLOGY INITIATIVE

The purpose of the Technology Initiative is to: assist NWT businesses in the development of imovative technologies, to improve mining and processing operations, and to adapt the operations to northern conditions.

The Technology Advisory Committee consists of representatives from: Safety and Public Services, GNWT; NWT Geology Division, DIAND; Canada Centre for Mineral and Energy Technology (CANMET), EMR Canada; and the Mineral Industry (Royal Oak Mines Limited, Giant Mine). CANMET will be managing the projects, providing technical and scientific support under this Initiative.

Projects under the Technology Initiative should address at least one of the following questions: reducing the environmental costs of mineral industry activity; increasing prospects for more efficient operation of existing mines; and for the development of mineral deposits.

INFORMATION INITIATIVE

The purpose of the Information Initiative is to: inform and educate the public about the role of the mineral industry in the NWT economy, and opportunities for participation by NWT businesses and residents, with a view to encouraging interested residents to take advantage of income and employment opportunities available in the industry.

CANADA - NWT GEOSCIENCE INITIATIVE PROJECTS

EM&PR / DIAND

1	CAMSELL LAKE	1991	1996
2	SQUALUS LAKE	1991	
3	AMOOGAMOOGA LAKE	1991	
4	KAMINAK LAKE	1991 - 1996	
5	FISHING LAKE	1991 - 1996	
6	ANIALIK RIVER	1991 - 1996	
7	POINT LAKE	1991 - 1996	
8	WINTER LAKE	1991 - 1996	
NWT - WIDE	COMPUTERIZED MINERAL SHOWINGS DATABASE	1992 - 1996	

GEOLOGICAL SURVEY OF CANADA
CONTINENTAL GEOSCIENCE

A	INDIN - SOUTH WOPMAY	1991 - 1996	
B	COURAGEOUS LAKE	1991 - 1996	
C	HIGH LAKE	1991 - 1996	
D	MINTO INLIER	1991 - 1995	
E	HURWITZ - KAMINAK	1991 - 1995	
F	GIBSON - MELADINE	1991 - 1996	
G	EOE BAY	1991 - 1995	

GEOLOGICAL SURVEY OF CANADA
MINERAL RESOURCES

H	GREAT BEAR MAGMATIC ZONE	1991 - 1996	
I	HIGH LAKE/COURAGEOUS LAKE	1991 - 1996	
J	KEEWATIN METALLOGENY	1991 - 1996	
K	REDBED COPPER	1992 - 1994	
NWT - WIDE	KIMBERLITES	1991 - 1994	
NWT - WIDE	GOLD IN IRON FORMATION	1991 - 1996	
NWT - WIDE	MINERAL RESOURCES MAP	1991 - 1996	

Figure 18: CANADA - NWT GEOSCIENCE IMITATIVE PROJECTS

The Information Advisory Committee has representatives from the following organizations: EMPR, GNWT; NWT Chamber of Mines; Education, GNWT; NWT Geology Division, DIAND; and MIO. This committee also oversees the Prospectors Initiative.

Projects under the Initiative will attempt to educate the public about the mineral industry, promote career opportunities and identify business opportunities for residents of the NWT. Proposed projects include a updated NWT Mines and Minerals map, posters, videos and teaching aids and supplies such as rock kits.

PROSPECTORS INITIATIVES

The purpose of the Prospectors Initiative is to: encourage NWT residents to acquire training and become experienced prospectors.

The Prospectors Initiative has been designed to develop an educated and experienced group of northern prospectors who will give local communities a stake in the mineral industry. Training courses and workshops will be offered; employment incentives and grubstakes may be offered.

EXPLORATION

GENERAL SUMMARY

Indicators of exploration levels such as exploration expenditures, and **area** of claims staked, number of active projects, and total prospecting permits issued, suggest a continuing decline from exploration levels of previous years. While the decline parallels the decline occurring throughout Canada, the NWT has successfully maintained the level of approximately 6% of Canadian exploration expenditures it has maintained over the past six years.

Total Canadian exploration expenditures have dwindled from $1.4 billion in 1988 to $646 million, the result of: continuing low commodity prices, a poor investment climate, unfavorable tax structures and significantly increased exploration expenditures by Canadian companies in the USA and overseas. At present, these concerns are paramount to regional concerns such as native land claims, interim land protection, devolution or possible division of the NWT, which are not considered to be contributing factors to the current reduction in exploration investment.

According to the NWT Chamber of Mines' annual survey of exploration companies, $29.64 million was spent on exploration in the NWT. Total expenditures on a regional basis were: Mackenzie region, $18 roil- . lion; Keewatin, $5.73 million; and Arctic Islands, $5.91 million. Although total NWT-wide exploration expenditures declined 22% from $38.03 million in 1990, the overall decline was an expression of reduced activity in the Mackenzie Region and the Keewatin where expenditures decreased 35% to $23.73 million from $36.47 million in 1990. In the Arctic Islands, exploration expenditures increased from $1.46 million in 1990 to $5.92 million in 1991.

Over the past ten years the total area covered by claims in good standing had been decreasing. This downward trend reversed late in 1991, due to a staking rush at Lac de Gras, which continued into 1992. During 1991 an area covering 666,374 ha was staked, and claims covering an area of 449,179 ha lapsed. Claims in good standing at the end 1991 to-

tailed 15,255 and covered 2,796,609 ha. The total number of permits in good standing declined from 106 in 1990 to 91 in 1991.

The staking rush, prompted by a diamond discovery at Lac de Gras, began late in the year and is not reflected in 1991 statistics. The rush has been referred to as the largest staking spree in Canadian history. At the time this publication went to press, the area staked around Lac de Gras had expanded to more than 22,800 km^2, an area three times larger than the area staked during the Hemlo gold rush of the early 1980s (Figure 4).

EXPLORATION

Exploration expenditures in the Arctic Islands increased more than four fold from the previous year. A total of 5,500 ha of ground was staked in the Arctic Islands. Four companies were active, carrying out exploration on Victoria Island, Little Cornwallis Island, Cornwallis Island, northern Baffin island and central Baffin Island. **Noranda Exploration Company Limited,** in a joint venture with Highwood Resources Limited and **Aber Resources Limited,** explored for copper-cobalt-silver near Hadley Bay, northeast Victoria Island. Airborne and ground geophysical surveys, geological mapping, prospecting and diamond drilling (19 holes for 2400 m) was completed. At Mary River, 250 km southeast of Nanisivik Mine and 140 km south-southwest of Pond Inlet, **Nanisivik** Mines Limited drilled 6 holes (500 m) to test for base and precious metals.

In the Keewatin, 38,500 ha of claims were staked, 17 exploration programs tested gold targets and one evaluated a uranium target. **Asamera Minerals Incorporated and Comaplex Resources Corporation continued work on claims and permits in the Meladine River area, 18 km north of Rankin Inlet. A 5270 m diamond-drill program and ground geophysical surveys tested** auriferous **iron formations in the Discovery Zone and the Western Lands project area. The drilling on the Discovery Zone outlined a zone grading 13.4 g/t gold, 4 m wide, to a depth of 300 m along a strike length of 180 m. Urangesellschaft (Canada) Limited in conjunction with PNC Exploration (Canada) Company Limited and Daewoo Corporation performed geophysical surveys and drilled approximately 10,900 m on uranium prospects in the Judge** Sissons-Schultz **Lake areas.**

Forty-two projects were carried out in the Slave Structural Province during 1991. Targets were polymetallic massive sulphides (four projects), diamonds (two projects), base metals (one project), and gold (thirty-five projects). The area of claims staked in the Slave Province increased from 87,000 ha in 1990 to 519,700 ha in 1991.

Dia Met Minerals Limited and **BHP-Utah Mines Limited announced that 81 diamonds had been found in a 59 kg sample of kimberlite intersections from core drilled from claims near Lac de Gras. Subsequent to the announcement, the initial 3,500 km^2 block of claims in the Lac de Gras area was surrounded by an additional 19,300km^2 of claims. During 1991, Dia Met and joint-venture partners BHP-Utah conducted airborne and ground geophysics, and sampling of till and eskers. Results indicate nearby sources of kimberlitic material. One anomaly was drill tested.**

A **1500 t** bulk sample mined in 1990 from the DAF deposit and test-milled at Burnt Island, 120 km northeast of Yellowknife, was moved to Treminco Resources Limited's Ptarmigan mill for processing. The grade of the ore was 19 g/t gold.

Ger-Mac Exploration Limited collared a new portal on the MON property, 50 km north of Yellowknife, and drifted 70 m to intersect the main vein, completed exploratory drilling, 63 m of drifting and two 10-m raises, and mined a 550 t ore sample. The company reports reserves of 7000 t with a mineable grade of 13.3 g/t gold.

Golden Marlin Resources Limited and joint venture partner CAMECO continued drilling geophysical targets beneath the waters of Yellowknife Bay near Yellowknife. These targets are thought to express the continuation of the ore deposit mined at the Nerco-Con gold mine.

Base metals and rare earth elements were the exploration targets of eight projects carried out in the Bear Province. Aber Resources Limited has received encouraging copper and gold assays from a previously reported uranium showing on the eastern shore of Great Bear Lake. The total area staked in the Bear Province was 51,300 ha.

In the southeastern Mackenzie District, and the Great Slave Plain, five exploration projects were carried out.

ADVANCED EXPLORATION

BHP-Utah Mines Limited continued gold exploration of their ULU claims in the High Lake Belt, 550 km north of Yellowknife. Geological and geophysical surveys were conducted, and completed 21,000 m of drilling.

The George Lake Joint Venture (**Homestake** Mineral Development Company and Kerr-McGee Corporation) completed 28,690 m in 140 holes of detailed diamond drilling on 2 of their 5 auriferous iron-formations in the George Lake Belt. The project is 45 km south of Bathurst Inlet and 525 km northeast of Yellowknife. To date, $25 million has been spent on exploration. The joint venture also worked on an engineering feasibility study which was completed in January 1992.

Reconnaissance geological mapping, prospecting, and geophysical surveys were carried out on the Nicholas Lake deposit. The property is 160 km north-northeast of Yellowknife and 80 km southeast of Snare Lakes. Preliminary reserves are estimated at 429,000 t grading 15.78 g/t gold. **Athabaska** Gold Resources Limited, holding 60% of the interest, is arranging financing to buy out Chevron Minerals Limited's 40% interest. Royal Oak Mines Limited has acquired rights to one third equity interest in Athabaska Gold and financed their $800,000 exploration program.

Operating mines (including Colomac) continued surface exploration of their mine lease areas. **Nerco** Con Mine Limited's work included mapping, lithogeochemical sampling and diamond drilling. Three drill holes near Kam Point tested for the extension of the Campbell shear, and a series of exploration holes were drilled from Back Bay and Fault Lake, close to the Giant mine property. **Treminco** Resources Limited continued exploration of the Tom and Ptarmigan mine properties by drilling. **Cominco Limited undertook geological mapping, geophysical surveys and diamond drilling for lead-zinc deposits near the Polaris Mine, on eastern Truro Island and prospective areas on** Cornwallis **Island. NorthWest Gold Corporation completed geophysics and drill** programs **on the** Colomac **mine lease and adjacent claims, discovering Zone 24 which was stripped, sampled and drilled. Royal Oak Mines Limited completed prospecting, sampling and compilations to define drill targets in the North Belt, north of the Giant Mine. Echo Bay Mines Limited continued exploration of their Lupin mine leases and adjacent claims.**

Sources

The following agencies can be contacted for more information about the mineral industry in the NWT:

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