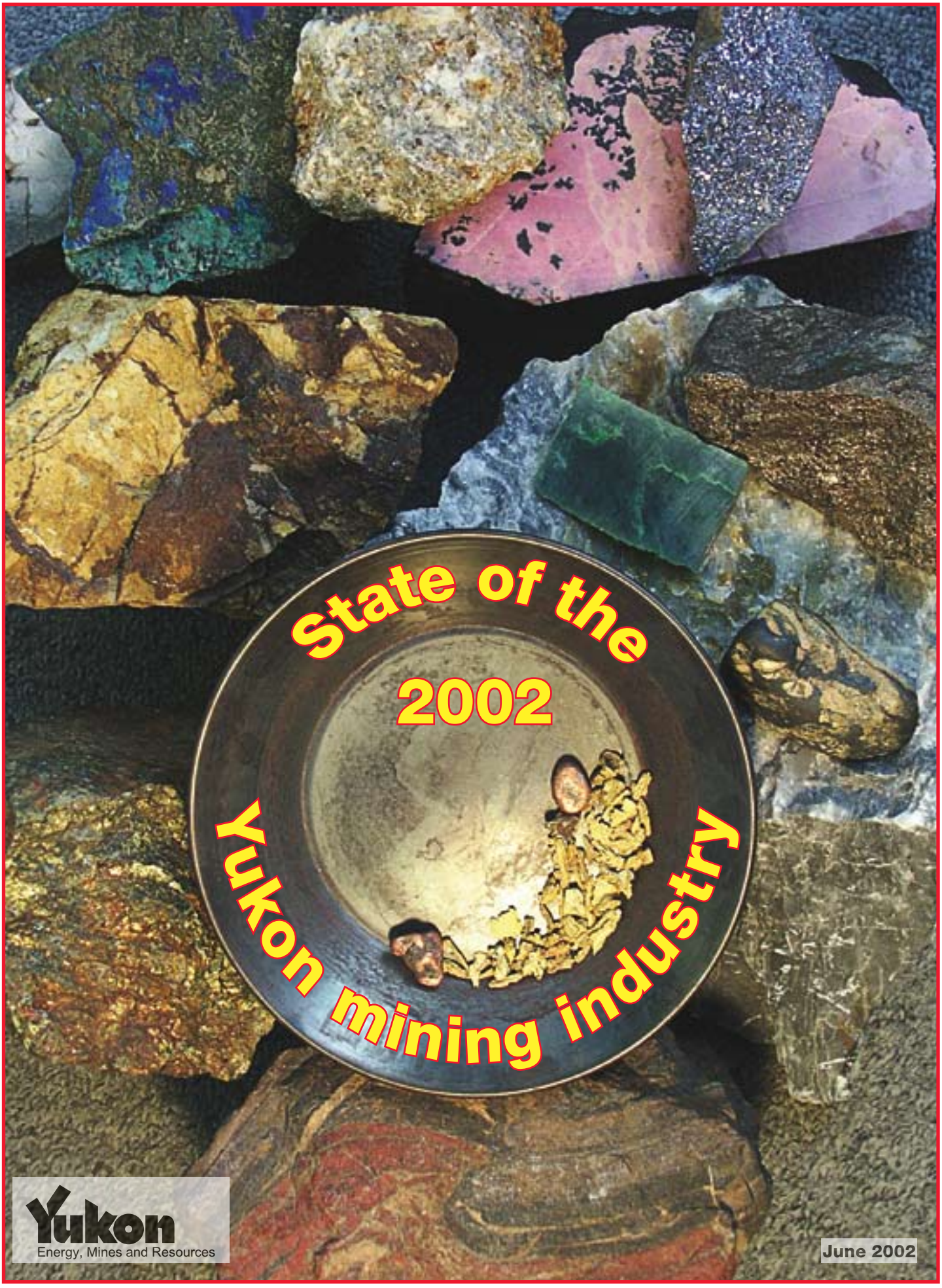

Yukon
Energy, Mines and Resources

June 2002

PREFACE

During development of the Yukon Mineral Strategy and its successor guiding policy, the *MINE Plan,* much information was collected on the various aspects of the Yukon mining industry. The information collected included Yukon mineral production, supply, demand, exploration, taxation, economic impacts, and the role of the Yukon Geology Program in helping develop Yukon's mining industry. Most of the information focuses on various aspects of the economics of the mining industry and, in particular, the importance of the industry to the economic well-being of the Yukon. The information was compiled and published in 1999 as the Yukon Mining Industry: A Background Paper.

This report, *The State of the Yukon Mining Industry — 2002*, is an update of the original 1999 report. The first part of the paper provides an overview of the global mining industry from a supply and demand perspective. Subsequent chapters examine the mining industry at a national, and then, a territorial level. The last part of the paper details various aspects of Yukon's mining industry including the role of the Yukon Geology Program, taxation, mining trends, Yukon government programs to support the mining sector and the mineral resource development disposition status of Yukon's 483,450 square kilometre landbase.

The information in this document is from various sources — some from published sources, some generated by the department. The Department of Energy, Mines and Resources cannot take responsibility for the accuracy of the data provided, but we would certainly like to know of any errors or omissions.

For additional information on the *MINE Plan* or other aspects of the Yukon mining industry, please contact:

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Cover photo by Peter Long

1. Copper nuggets (White River area)
2. Gold nuggets (Dawson area)
3. Magnetite nugget (Livingstone Creek)
4. Nephrite jade (Frances Lake area)
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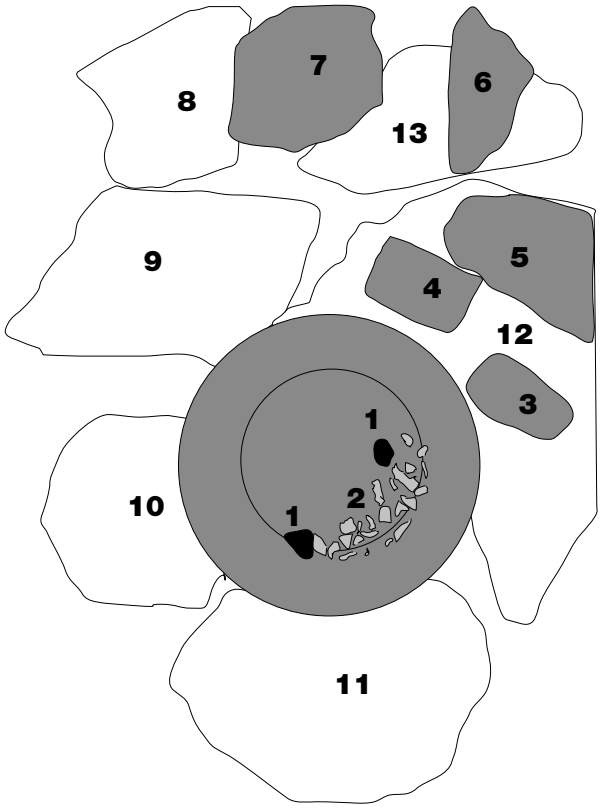
9. Gold oxide ore (Brewery Creek Mine)
10. Chalcopyrite ore
11. Iron Formation (Snake River area)
12. Barite (Faro area)
13. Rhodonite



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INTRODUCTION

The process of exploring for, mining, processing and exporting mineral wealth has generated economic wealth for many civilizations throughout history. The exchange of valuable metals or sought-after minerals like gemstones for foreign currencies has helped finance exploration and infrastructure and established rudimentary economic foundations for emerging nations. Presently, there are more than 7,000 producing mines in the world, providing the raw materials needed for global manufacturing, construction, chemical industries and energy industries.

On a national scale, mining (including mineral exploration, production, metal processing) is a moderately sized, high investment and high-producing sector whose Gross Domestic Product (GDP) contribution to the Canadian economy has remained relatively constant since 1980. The mining and mineral processing sector employed over 400,000 Canadians and contributed $27.4 billion to the Canadian economy in 2000. With about 235 operating open pit and underground mines, Canada remains one of the world's largest mineral exporters. In addition, there is an inventory of over 30,000 known mineral deposits and mineral occurrences, and a large contingent of over 100 potential mines that are awaiting development and production decisions. Less than 10 percent of Canada's vast landmass has been intensively explored for minerals and there is great potential in remote areas like the Yukon for new, large, near-surface deposits.

Ore deposits are not scattered randomly throughout the earth's crust; geology and geography dictate their location. The Yukon is underlain by a tremendous variety of rock types resulting in a complex geology ideal for hosting many types of ore deposits. The business of finding, evaluating and mining these deposits has played a leading role in the development of the Yukon.

The economy of the Yukon is closely tied to the fortunes of the mining industry and is therefore vulnerable to drastic upswings and downcycles. In addition, for almost 30 years, the giant lead-zinc mine at Faro dominated the Yukon economy, accounting for a substantial portion of the Yukon's mineral production and private sector employment. With the closure of the mine in 1998, the Yukon continues to adjust to a post-Faro economy, compounded by a multi-year global downturn in exploration and mining investment. In addition, low prices for gold and higher fuel costs have resulted in some amount of attrition in the placer industry.

Low metal prices over the past several years due to the "Asian crisis" and other factors have globally generated decreased profits, mine closures, layoffs, asset write-downs and corporate take-overs. On a territorial level, this has translated into low employment rates in the Yukon and decreased revenue for those in the mining or mining supply sectors. On a national scale, domestic exploration is below threshold levels for maintaining current production, base metal reserves are in decline and mine closures have been outpacing operations. At the same time, Canada is facing unprecedented competition for mining investment dollars from a number of developing countries.

This paper presents an economic overview of the Yukon mineral industry in a global and national context by compiling technical and statistical information on mineral supply, demand, production, exploration, economic impact and taxation, and examining the role of the Yukon Geology Program in the development of Yukon's mineral industry.

OVERVIEW OF GLOBAL MINERAL SUPPLY AND DEMAND

This chapter provides a brief economic overview of mining, from a supply and demand perspective, focusing on the Yukon's five major metals: gold, silver, lead, zinc, and copper.

MINERAL SUPPLY

The production of metals is a highly competitive global activity. The mining sector includes many producers, each vying for position and profit in the global marketplace. Factors that contribute to a production decision include:

- capital and operating costs,
- metal prices,
- technology,
- labour,
- government involvement,
- market structure, and
- metal uses.

MINERAL CONSUMPTION (DEMAND)

Demand for metals comes about because they are required as inputs in other products. Metals possess certain qualities or attributes that make them valuable, such as strength, conductivity, and resistance to corrosion or ductility. Some of the uses for the five metals important to the Yukon economy are listed in Appendix 1. As is the case with supply, there are several factors that influence the demand for a particular commodity. These include:

- income,
- price,
- price of substitutes and complements,
- technology,
- consumer preferences,
- government activities,
- production rates, and
- marketing.

Table 1
Average annual prices for gold, silver, lead, zinc and copper, 1992-2001

Year	Gold $US/oz	Silver $US/oz	Lead $US/lb	Zinc $US/lb	Copper $US/lb
2001	273.22	4.95	0.22	0.40	0.72
2000	297.11	4.95	0.21	0.51	0.82
1999	278.88	5.22	0.23	0.49	0.71
1998	294.24	5.55	0.24	0.47	0.75
1997	330.98	5.95	0.28	0.60	1.03
1996	387.77	4.73	0.35	0.47	1.04
1995	384.17	5.15	0.29	0.47	1.33
1994	384.00	4.77	0.25	0.45	1.05
1993	359.77	4.97	0.18	0.44	0.87
1992	343.82	3.71	0.25	0.56	1.04
10-year average	**333.40**	**5.00**	**0.25**	**0.48**	**0.94**

METAL PRICES

World markets determine metal prices. Historically, there are two basic approaches to pricing in the mining industry, producer price and commodity exchanges.[1] Producer prices are set by the major producing firms in an industry. These prices change at discrete intervals and have small variances. Commodity exchanges, known for hedging[2] and speculating[3], allow the prices to be set by market forces. Copper, lead and zinc are traded on the London Metal Exchange (LME).

Prices are determined daily through auctions where dealers make bids and offers, resulting in the issue of contracts. The commodity exchange is generally believed to be a much more productive mechanism. Average annual metal prices for lead, zinc, copper, gold and silver are given in Table 1.

Metal prices are a major determining factor of mining production. Producers have the incentive to increase their output up to the point where the costs of producing one additional unit equals the revenue received for selling that unit. Theoretically speaking, a rise in the price of a metal will increase its production, while a fall in price will decrease production.

In the real world, however, production changes are not this immediate. The production response to a change in price is constrained, in the short term, by existing capacity. On average, it takes five to seven years to respond fully to a price increase. By the time a mine expands capacity, metal prices will likely have changed again. It often takes even longer to respond to a price decrease. As mining is a capital-intensive activity with a long production life, companies will often continue to produce through price decreases as long as costs are still met. The end result is that mining companies actually determine production levels, or targets, at the feasibility stage, before production begins. Changes in production targets are difficult and unlikely.

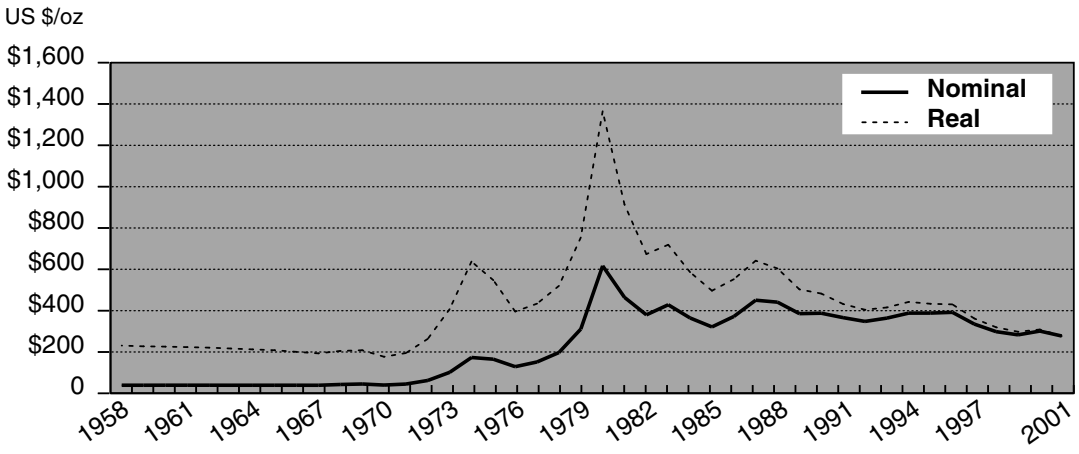
The following figures show annual prices for the Yukon's five major metals over the last 43 years in real[4] and nominal terms. "Real" prices have been adjusted for the effects of inflation, relative to 2001.

Gold price

Gold has been the backbone of the Yukon's mineral industry. The Brewery Creek mine and an estimated 124 placer gold mines contributed to Yukon gold production in 2001.[5] Low gold prices and high fuel prices have continued to result in attrition in the Yukon placer gold industry.

The average price for gold in 2001 was US $273 per ounce (Figure 1).

Figure 1
Gold prices, 1958-2001



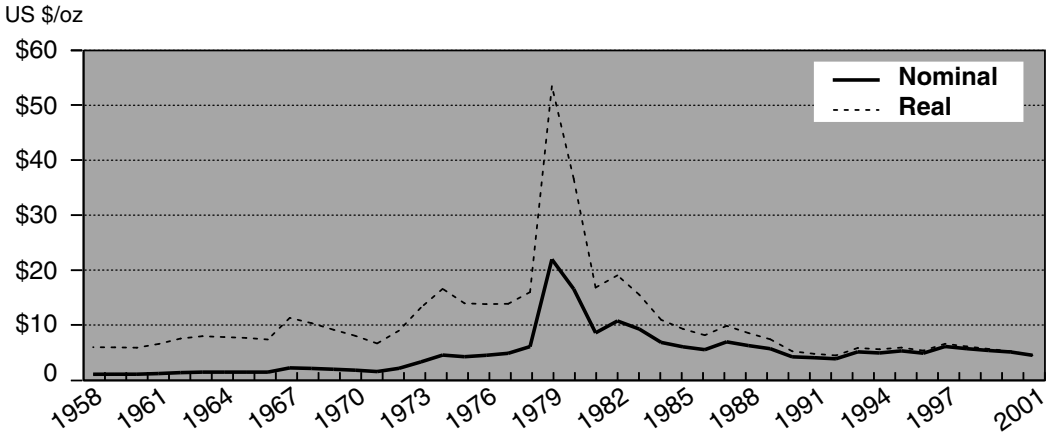
Source: Natural Resources Canada

Silver price

Silver was a significant commodity in the Yukon's past. The primary mining of silver took place at the United Keno Hill mine, which shut down in 1989 due to low silver prices. More often, silver is produced as a secondary commodity from base metal mines. For example, silver was produced at the Faro mine.

The price for silver peaked in 1979. The average price for silver in 2001 was US $4.95 per ounce (Figure 2).

Figure 2
Silver prices, 1958-2001



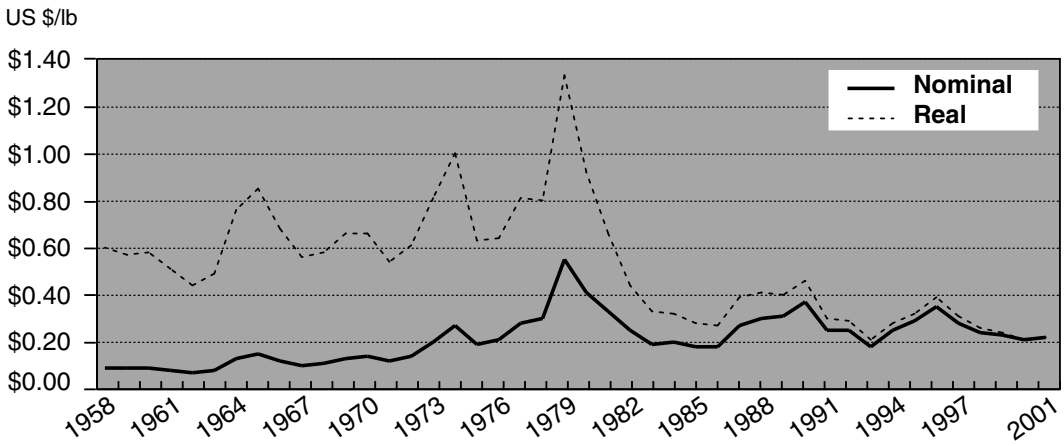
Source: Natural Resources Canada

Lead price

Lead was a primary commodity of the Faro mine and the Sa Dena Hes mine. It is a secondary commodity of silver mines such as United Keno Hill. Lead is a bulk commodity and therefore requires expensive shipping to smelters.

The average price for lead in 2001 was US $0.22 per pound (Figure 3).

Figure 3
Lead prices, 1958-2001



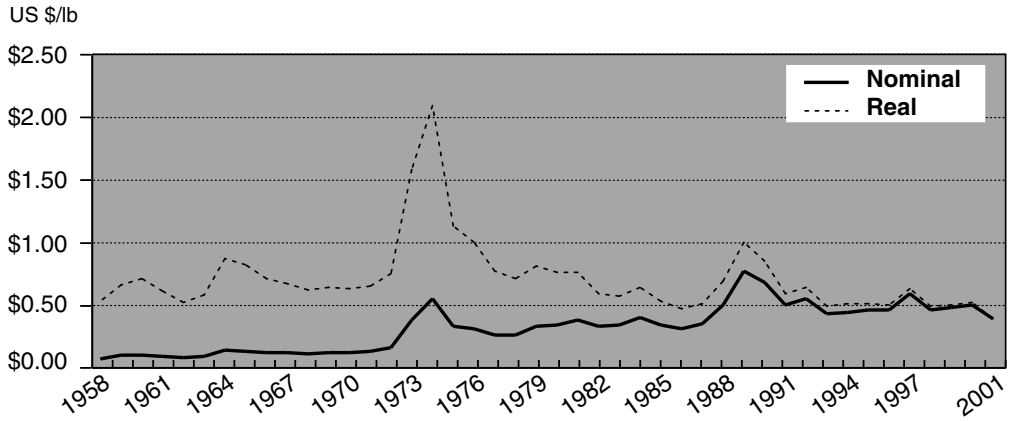
Source: Natural Resources Canada

Zinc price

For most of the past 30 years, zinc has been the most important Yukon mineral in terms of value of mineral production. The major commodity produced at the Faro mine was zinc.

The average price of zinc in 2001 was US $0.40 per pound (Figure 4).

Figure 4
Zinc prices, 1958-2001



Source: Natural Resources Canada

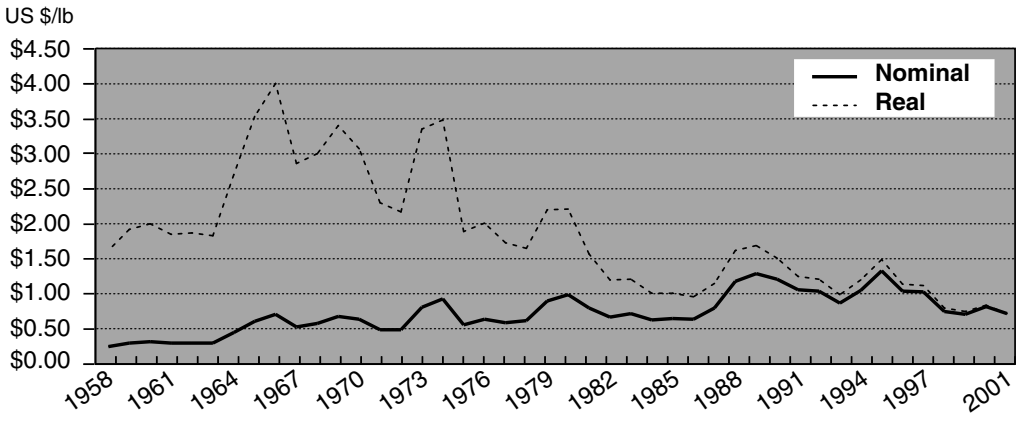
Copper price

Historically, copper has been a very significant Yukon commodity. The Whitehorse Copper mine was a world class deposit and produced from the late 1800s to 1982. There has been no copper mining in the Yukon since the closure of the Whitehorse Copper mine, however several copper projects are currently in the environmental permitting and advanced exploration stages.

Although world demand for copper has been steadily increasing, the technology used to mine copper has made mining increasingly lower grade deposits viable. This technological improvement has lowered production costs, subsequently resulting in the lowering of copper prices. Recent advances in smelting technology may further reduce copper prices.

The average price of copper in 2001 was US $0.72 per pound (Figure 5).

Figure 5
Copper prices, 1958-2001



Source: Natural Resources Canada

EXCHANGE RATES

Since metals important to the Yukon are traded in the global economy, exchange rates have a significant impact on the viability of Yukon mines. Canadian producers benefit from the low exchange rate for the Canadian dollar because they sell their output in US dollars but their production costs are paid in lower Canadian dollars. At the same time, a lower dollar will raise the cost of importing equipment and machinery, a necessary feature in an ever changing, highly competitive and technologically based industry.

Alternatively, any upward trend in the exchange rate will have a reverse effect on the level of exports. Figure 6 gives Canadian exchange rates relative to the US dollar for the period 1958 to 2001.

OUTLOOK FOR METAL PRICES

The following metal price assessment for 2002 was prepared by the Yukon government.

Gold: In early 2002, gold prices rose to over $300 US per ounce for the first time in over two years. Analysts have expressed varying degrees of optimism and scepticism about the recent trend in gold prices, however, the consensus seems to be that the market has improved. Expectations are for gold prices to remain near current levels in the short term.

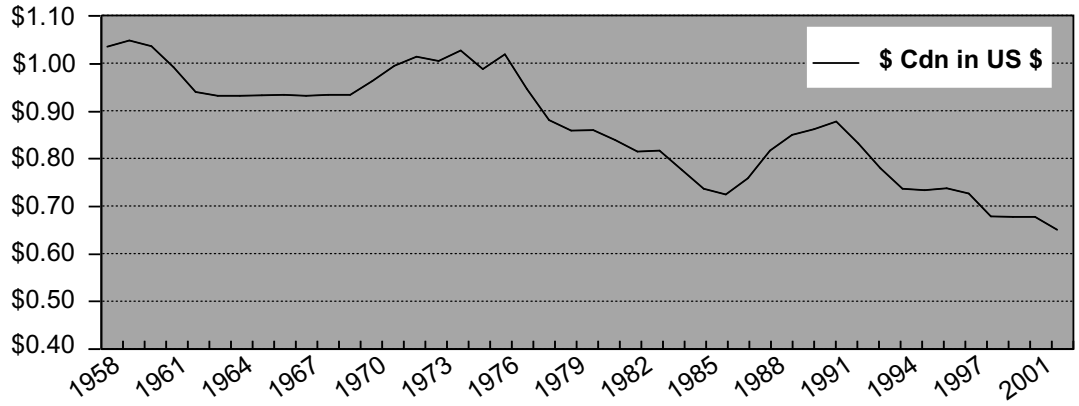
Silver: Silver prices remained low in 2001 reflecting weak industrial demand, especially from the electronics sector. Speculative demand and limited near-term supplies of the metal have recently caused an upward movement in silver prices so far in 2002, but prices are expected to end the year only slightly above last year's level.

Lead: A mild winter contributed to decreased demand for lead from the battery sector in 2001, however, limited supply should support prices over the next year.

Zinc: Strong inventories will keep zinc prices low in the short term until expected global economic recovery stimulates increased manufacturing, specifically, increased motor vehicle manufacturing.

Copper: Inventory build-ups in 2001 subdued copper price growth in 2001. Expected global economic growth in the second half of 2002 should contribute to a modest gain in the price of the metal.

Figure 6
Exchange rates, 1958-2001



Source: Statistics Canada

THE CANADIAN MINING SECTOR

Canada's mining history has played a fundamental role in the development of the nation. Iron mines in Québec in the 1700s generated raw materials for the forging of cooking pots and other "value-added" items. The search for metals in the Canadian frontier was the driving force behind many historic expeditions.

Today, Canada is a world leader in the exploration and mining industry. The mining industry in Canada showed tremendous growth starting in the early 1950s, and concurrent with a growing world economy, over the following 50 years.

The Canadian mining industry is increasingly knowledge-based and technology-intensive, using sophisticated and innovative technology to reduce the inherent risks in exploration, to improve the productivity and competitiveness of mining and processing methods, and to enhance environmental protection.

CANADA'S MINERAL PRODUCTION

The output and value of Canadian mineral production is tracked by the Natural Resources Canada (NRCan) Minerals and Mining Statistics Division.[6] The production figures are broken down by type:

Metals.....gold, silver, lead, zinc, copper

Non-metals.....potash, salt, peat, asbestos, gypsum, sulphur, diamonds, cement, lime

Fuels.....crude oil and equivalent, natural gas, coal

Preliminary figures, released in March 2002, show that the overall value of Canada's mineral production (Table 2) remained steady in 2001, decreasing only slightly by 0.5 percent from a record high $84.2 billion in 2000 to $83.8 billion in 2001. While the value of fuel production remained constant, the combined value of metal and non-metal mineral production (including structural materials) declined by 4.0 percent, from $18.5 billion in 2000 to $17.8 billion in 2001.

Table 2
Value of Canadian mineral production, 1996-2001

	1996	1997	1998	1999	2000	2001	Change (2000 2001)
Metals ($billions)	11,697,467	11,549,178	10,429,061	9,796,502	11,078,874	10,245,403	-7.5%
Newfoundland ($millions)	871,217	966,218	1,046,063	880,764	996,624	788,835	-20.9%
Prince Edward Island ($millions)	-	-	-	-	-	-	0.0%
Nova Scotia ($millions)	-	-	-	-	-	-	0.0%
New Brunswick ($millions)	586,294	657,533	609,944	595,438	522,973	562,326	7.5%
Québec ($millions)	2,223,269	2,288,106	2,200,802	2,237,253	2,248,183	2,157,584	-4.0%
Ontario ($millions)	4,113,101	3,841,788	3,260,809	3,182,572	3,715,804	3,388,065	-8.8%
Manitoba ($millions)	825,385	940,926	808,445	717,862	1,014,484	823,884	-18.8%
Saskatchewan ($millions)	627,834	614,847	551,444	549,489	513,682	699,532	36.2%
Alberta ($millions)	304	176	118	224	256	258	0.8%
British Columbia ($millions)	1,537,248	1,495,315	1,483,721	1,183,004	1,572,066	1,411,796	-10.2%
Yukon ($millions)	402,446	200,587	114,491	58,642	51,942	39,698	-23.6%
Northwest Territories ($millions)	510,369	543,682	353,224	42,208	58,396	54,208	-7.2%
Nunavut ($millions)	n/a	n/a	n/a	349,046	384,464	319,217	-17.0%
Non-metals ($billions)	5,408,089	5,912,392	6,527,184	7,315,406	7,448,509	7,552,306	1.4%
Fuels ($billions)	32,581,337	33,076,735	27,361,484	36,899,691	65,698,594	65,984,676	0.4%
Total ($billions)	49,686,893	50,538,305	44,317,729	54,011,599	84,225,977	83,782,385	-0.5%

Source: Preliminary estimate of the mineral production of Canada, by province
NRCan Minerals and Metal Sector, various years
http://www.nrcan.gc.ca:80/mms/efab/mmsd/production/production.htm

As a subgroup, the value of metal production fell by 7.5 percent from $11.1 billion in 2000 to $10.2 billion in 2001. The decrease is attributable to a 25 percent drop in the value of nickel production, a 25 percent fall in the value of iron ore production and a 23 percent decline in the value of cobalt production. Offsetting those production value declines were increases in the value of platinum group (23 percent) and molybdenum (20.4 percent) production. Gold regained its number one value of production ranking in 2001 with a 3.3 percent increase from $2.0 billion in 2000.

The value of non-metals, including structural materials, increased by 1.4 percent from $7.45 billion in 2000 to $7.55 billion in 2001.

The top non-fuel commodities produced in Canada in 2001 were:

gold .....$2.1 billion
nickel.....$1.8 billion
potash.....$1.6 billion
copper .....$1.5 billion
zinc.....$1.4 billion
iron ore.....$1.2 billion

Canada's contribution to global mineral production

For a small economy, Canada is a significant contributor to world metal production. Table 3 lists mineral production for gold, silver, lead, zinc and copper on global, national and territorial levels. Table 4 summarizes Canada's world ranking in the production of gold, silver, lead, zinc and copper over the last ten years.

Over the last ten years Canada's share of global gold production has remained relatively constant, with a ranking of either fourth or fifth in each of the last ten years. As of 2000, Canada was ranked as the fifth largest mine producer of gold. Canada's ranking for the mine production of silver through the first half of the 1990s was very similar to our ranking for gold. However, Canada's ranking for silver declined to seventh in 1998 where, as of 2000, we remain.

Canada's global share of lead production has also remained steady over the last decade, and as of 2000, Canada was ranked as the world's fifth largest mine producer of lead. After holding down the world leader ranking for mine production of zinc through most of the early 1990s, Canada's ranking began to decline in 1997, and as of 2000, sat in the number three position. The decline in Canada's zinc ranking is due in no small part to intermittent production at, and subsequent closure of, the Faro mine.

Canada's ranking for the mine production of copper has also declined in recent years. Canada was ranked as the fifth largest mine producer of copper in 2000, down from third largest as recently as 1997.

The following information on Canadian production of gold, silver, lead, zinc and copper is taken from Natural Resources Canada, *Minerals Yearbook - 2000*. The figures presented may vary slightly from the production figures in Table 3.

Canadian gold production

In 2000, a total of 2,559 tonnes of gold was produced from mines operating worldwide in over 83 countries. A 2.4 percent decline in Canadian gold output from 158 tonnes in 1999 to 154 tonnes in 2000 was matched by a 2.6 percent decrease in the value of gold shipments, which fell to $2.0 billion in 2000. In 2000, the most recent year for which information is available, three gold mines opened and 13 gold mines closed, leaving 33 operating primary gold mines.

Source of gold production in Canada, 2000

Primary gold mines..... 88 percent of gold production (33 mines)

Base-metal mines..... 10 percent of gold production as a by-product from base metal mining

Placer operations ..... 2 percent of total Canadian gold production

Canadian gold production is expected to have increased by nearly five percent in 2001 due in part to the discovery and mining of high-grade ore at the Red Lake mine in Ontario. For 2002, however, the closures and suspensions of operations announced in 2001 are expected to contribute to a four percent decline in production.

Table 3
Global, Canada and Yukon mineral production of gold, silver, lead, zinc and copper

GOLD (tonnes)	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
World mine production	2,122.0	2,227.8	2,244.6	2,239.5	2,175.3	2,278.6	2,440.7	2,463.9	2,516.8	2,559.1
Canada mine production	175.7	161.4	153.3	146.9	152.0	166.4	171.4	165.6	157.8	156.1
Yukon mine production	4.0	4.0	4.0	3.0	5.0	5.0	7.0	6.0	4.0	4.0
Canada % of world mine production	8.3	7.2	6.8	6.6	7.0	7.3	7.0	6.7	6.3	6.1
Yukon % of Canada mine production	2.3	2.5	2.6	2.0	3.3	3.0	4.1	3.6	2.5	2.6
Yukon % of world mine production	0.2	0.2	0.2	0.1	0.2	0.2	0.3	0.2	0.2	0.2

SILVER (tonnes)	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
World mine production	14,464.3	14,517.7	13,817.6	13,863.1	14,323.2	14,838.9	15,869.9	16,505.8	16,855.5	18,022.0
Canada mine production	1,338.8	1,215.4	895.8	767.8	1,284.8	1,308.8	1,224.0	1,195.9	1,246.4	1,203.7
Yukon mine production	87.0	124.0	30.0	1.0	35.0	113.0	38.0	14.0	2.0	1.0
Canada % of world mine production	9.3	8.4	6.5	5.5	9.0	8.8	7.7	7.2	7.4	6.7
Yukon % of Canada mine production	6.5	10.2	3.3	0.1	2.7	8.6	3.1	1.2	0.2	0.1
Yukon % of world mine production	0.6	0.9	0.2	0.0	0.2	0.8	0.2	0.1	0.0	0.0

LEAD ('000 tonnes)	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
World mine production	3,147.9	3,043.2	2,713.3	2,792.8	2,790.2	3,061.0	3,078.2	3,035.2	3,024.5	3,007.6
Canada mine production	276.5	343.8	183.2	170.9	210.3	257.3	186.2	189.8	162.2	148.8
Yukon mine production	93.9	135.7	27.9	-	27.1	90.7	26.6	9.4	-	-
Canada % of world mine production	8.8	11.3	6.8	6.1	7.5	8.4	6.1	6.3	5.4	4.9
Yukon % of Canada mine production	34.0	39.5	15.2	0.0	12.9	35.3	14.3	5.0	0.0	0.0
Yukon % of world mine production	3.0	4.5	1.0	0.0	1.0	3.0	0.9	0.3	0.0	0.0

ZINC ('000 tonnes)	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
World mine production	7,210.7	7,192.9	6,754.6	6,854.9	7,084.2	7,352.7	7,434.1	7,636.4	8,032.1	8,717.9
Canada mine production	1,156.6	1,324.7	1,004.4	1,010.7	1,121.2	1,222.4	1,076.4	1,061.6	1,021.0	996.9
Yukon mine production	149.5	202.3	35.2	-	42.3	146.2	39.1	15.0	-	-
Canada % of world mine production	16.0	18.4	14.9	14.7	15.8	16.6	14.5	13.9	12.7	11.4
Yukon % of Canada mine production	12.9	15.3	3.5	0.0	3.8	12.0	3.6	1.4	0.0	0.0
Yukon % of world mine production	2.1	2.8	0.5	0.0	0.6	2.0	0.5	0.2	0.0	0.0

COPPER ('000 tonnes)	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
World mine production	9,135.3	9,579.7	9,568.5	9,568.2	10,056.8	11,063.9	11,479.1	12,269.7	12,740.4	-13,190.8
Canada mine production	811.1	768.6	732.6	616.8	726.3	688.4	659.5	705.8	620.1	634.2
Yukon mine production	-	-	-	-	-	-	-	-	-	-
Canada % of world mine production	8.9	8.0	7.7	6.4	7.2	6.2	5.7	5.8	4.9	4.8
Yukon % of Canada mine production	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Yukon % of world mine production	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Sources:
1) Natural Resources Canada, World Non-Ferrous Metal Statistics
2) Yukon Bureau of Statistics, Annual Statistical Review
Note: Percentage calculations are based on different data sources and are subject to rounding errors. Figures should be treated as estimates only.

Canadian silver production

A total of 18,022 tonnes of silver was produced from mines operating worldwide in 55 countries in 2000. Canada's volume of silver production declined by 1.1 percent in 2000, decreasing from 1,174 tonnes in 1999 to 1,161 tonnes in 2000. The value of Canadian silver production declined by 5.8 percent between 1999 and 2000, falling from $294.5 million to $277.3 million.

At the end of 2000, there were no primary silver mines operating in Canada. All silver was mined as a by-product of base-metal or gold mining.

Canadian lead production

World mine production of lead totaled 3,007,600 tonnes from mines operating in 38 countries in 2000. In Canada, production of lead decreased from 155,000 tonnes in 1999 to 143,000 tonnes in 2000. The value of lead production declined in the same year by 17 percent to $95.8 million from $115.9 million in 1999.

One of the largest lead-zinc mines in the world, the Faro mine in the Yukon, closed in 1998. It had an annual capacity of 98,000 tonnes of lead in concentrate at full production.

Canadian zinc production

A total of 8,717,900 tonnes of zinc was produced from mines operating in 41 countries around the world in 2000. Canada's mine production of zinc in 2000 totaled 935,700 tonnes, down from 963,300 tonnes in 1999. While zinc output declined, stronger zinc prices in 2000 resulted in an increase in the value of production which rose to $1.6 million from $1.5 million in 1999.

Canadian copper production

World mine production of copper reached 13,190,800 tonnes in 2000 on the strength of production in 46 countries. In 2000, Canadian copper mine production increased to 623,500 tonnes from 581,600 tonnes in 1999. The value of Canadian copper production rose from $1.4 billion in 1999 to $1.7 billion in 2000.

THE ECONOMY

The Canadian mineral industry is a moderately sized sector whose contribution to the Canadian economy has remained relatively constant since 1980. Mining is a high investment and high producing sector creating important foreign earnings for the Canadian economy. The high level of productivity in the mining sector is generated by the high level of investment in Canada by mining companies, very efficient mining technologies developed and used in Canada, and Canada's abundant mineral resources.

Mining and the Gross Domestic Product

The total Canadian Gross Domestic Product (GDP) reached $786 billion in 2000. The minerals and metals industry contributed $27.4 billion, or 3.5 percent of the total Canadian GDP, rising from $25.7 billion in 1999. The minerals and metals industry includes mining and concentrating, smelting and refining, and the manufacture of semi-fabricated and fabricated products.

Mining and Canadian employment

The Canadian mining industry was the source of jobs and economic growth in more than 115 communities in 2000. The 899 mines operating across the country were the backbone of jobs and economic growth in Canada's regional and rural economies. In 2000, the minerals sector

Table 4
Canada's world ranking in the production of zinc, gold, copper, lead and silver

	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Zinc	1	1	2	1	1	1	2	3	3	3
Gold	4	4	5	5	4	4	5	5	5	5
Copper	3	3	3	3	3	3	3	4	5	5
Lead	4	4	5	5	5	4	5	5	5	5
Silver	4	5	5	5	4	4	6	7	7	7

Source: adapted from Natural Resources Canada, World Non-ferrous Metal Statistics

directly employed 401,386 Canadians. This figure includes all four stages of mining. The breakdown of employees for 2000 (forecast)[7] is as follows:

Stage I.....primary mineral production: 53,955

Stage II.....metal production (smelting and refining): 61,175

Stage III.....minerals and metals-based semi-fabricated industries: 101,832

Stage IV.....metals fabricating industries: 184,425

Mining supply and service industries (oil wells, diamond drilling): 9,000

Employment in Stage I jobs (mining) increased by 1.2 percent (636 jobs) in 2000, from 53,319 employees in 1999. While it represents the first increase in Stage I employment since 1995, Stage I employment of 53,995 is still below the long-term (10 year) average of 58,959.

The stagnation in Stage I employment levels is reflective of technological advancements which have enabled the mining and processing of previously uneconomic deposits by lowering production costs, using highly skilled workers and making use of robotics.

Average weekly earnings in the Canadian metal mining sector were $1,169 in 2000, one of the highest levels of any industry in Canada and almost double the industrial aggregate average of $654 (Table 5).

Mining and Canadian exports

Of Canada's total mineral production in 2000, 80 percent, valued at $49.1 billion, was destined for the export market. Overall, Canada's minerals and metals exports represent 12.8 percent of total domestic exports. The Canadian mining industry benefited from a low Canadian dollar in 2000, averaging US $0.67.

The United States is Canada's largest minerals and metals products trading partner, accounting for 71.1 percent of domestic mineral exports. Japan and the United Kingdom were Canada's next largest trading partners, receiving 4.0 percent and 2.5 percent of total mineral and metals exports.

The top minerals and metals exports by value for 2000 were as follows:

iron and steel .....22.5 percent

aluminum .....16.3 percent

gold .....5.3 percent

nickel.....5.0 percent

copper .....4.9 percent

potash.....4.9 percent

coal.....3.7 percent

zinc.....3.4 percent

iron ore.....2.1 percent

Table 5
Canadian average weekly earnings (including overtime), selected industries

	1992	1993	1994	1995	1996	1997	1998	1999	2000
Industrial aggregate*	573	583	593	599	611	623	632	639	654
Forestry and logging	723	726	755	751	777	793	767	768	821
Oil and gas extraction	1,097	1,147	1,172	1,208	1,243	1,253	1,298	1,334	1,352
Mining (except oil and gas)	899	904	922	963	1,002	999	1,053	1,040	1,094
Coal mining	964	974	990	1,028	1,058	1,046	1,138	1,127	1,205
Metal ore mining	960	976	1,002	1,050	1,079	1,053	1,128	1,123	1,169
Non-metallic mineral mining and quarrying	746	739	755	785	825	874	893	883	944
Support activities for mining and oil and gas extraction	741	818	816	817	896	948	978	970	1,014

Source: Statistics Canada, Survey of Employment, Payrolls and Hours
** Industrial aggregate excludes unclassified industries*

Mining and Canadian business

Minerals and mineral products accounted for 68 percent of the total volume handled at Canadian ports in 1999, and 58 percent of total rail revenues that freight generated for the Canadian railway system.[8] Over 600 Canadian consulting and equipment supply companies earn, on average, 30 percent of their overall revenues from Canadian-owned mining companies operating in locations all over the world.

In 2000, Canadian companies spent $42 million on research and development directly related to mining. Spending on research and development related to mining and downstream activities, including metal production and manufacturing, was $323 million in 2000.[9]

The indirect contribution of the mining sector to the Canadian GDP has been estimated at $615 million in goods and services for every $1 billion in output created by the mining, smelting and refining sectors.[10] The $615 million in indirect spending is a result of the multiplier effect.

Canada ranks first in the world for raising financing for mining projects. In 2000, mining companies listed on Canadian stock exchanges raised over $1.2 billion in equity financing which equates to 42 percent of global mining equity offerings. With 1,447 companies listed on its stock exchanges, Canada's equity markets play host to more than half of the world's mining companies.[11]

Many exploration companies may have no substantial revenues from mineral production, relying entirely on the stock market to finance their exploration programs. Canadian expertise at raising risk capital from investors in Canada, US, Europe, Asia and elsewhere has facilitated the penetration by Canadian companies, with interests in a portfolio of more than 6,300 properties, in more than 100 foreign jurisdictions. Investment and exploration by Canadian mining companies in foreign jurisdictions generate new opportunities for domestic equipment and technology manufacturers, as well as engineering, geological and environmental service industries.

MINERAL EXPLORATION SECTOR

Mineral exploration is a multi-stage process that usually proceeds over a relatively long period of time as information is gathered from geological mapping, geophysical and geochemical surveys, diamond drilling and so on. Exploration and development provide the means to sustain the industry's production capabilities. Remote sensing, satellite imagery and other advanced exploration techniques can indicate the existence of ore deposits, but the grade and extent of those deposits can only be determined by drilling and underground sampling. New discoveries often lead to a much better understanding of how ore deposits form. A better understanding of ore deposit formation may ultimately lead to additional discoveries that were not considered remotely likely even a few years ago.

The mineral exploration industry as a whole is characterized by low success rates; anecdotal evidence suggests that only one out of every 1,000 mineral showings results in the discovery of economic grade mineralization. Once discovered, the mineralized zone has a 1-2 percent chance of being assessed as having sufficient economic potential to warrant further development.[12]

Canada's global share of mineral exploration

The global nature of the mining industry has placed Canadian mining companies as leaders in exploration for minerals, both in Canada and internationally.

Canada's reported share of global exploration expenditures differs based on the source of statistical information. Natural Resources Canada uses official statistics for Canada, Australia and the best available data from other jurisdictions in order to calculate Canada's share of the global exploration market.

Canada was ranked first as a destination for mineral investment from worldwide sources by NRCan from 1981 to 1991. Since 1992, NRCan has ranked Canada second behind Australia in terms of exploration investment.

According to NRCan, exploration spending in Canada continued to decline in 2001, falling by $5.4 million to $491.3 million from the 2000 level of $496.7 million.[13]

The Metals Economics Group (MEG) of Halifax, Nova Scotia conducts a proprietary annual survey of worldwide mineral exploration expenditures. This estimate of worldwide mineral exploration expenditures is based on a survey of companies planning to spend more than US $100,000. In 2001, it was estimated by MEG that these

679 companies accounted for 90 percent of worldwide expenditures, and in aggregate, spent $2.2 billion on precious and nonferrous metals exploration.[14]

On the basis of MEG data for the 2000 exploration year, which includes only mining companies with exploration budgets of more than US $3.0 million, Canada is home to more than two-thirds of companies undertaking exploration activities around the world. The distribution of the domicile of mining companies for 2000, by region, is as follows:

Canada ..... 40 percent

Asia-Pacific ..... 24 percent

Africa and Middle East ..... 9 percent

Europe and FSU ..... 9 percent

Latin America and Caribbean ..... 9 percent

United States ..... 9 percent

Planned mineral exploration spending by the larger Canadian-based companies on targets located outside of Canada was pegged at $620 million in 2000, or 70 percent of their total exploration budgets. Spending fell by six percent from $665 million in the previous year.

In terms of the location of exploration spending, Latin America held on to its top position as a destination for exploration spending in 2001 attracting 28.8 percent, or, $US 576 million, of worldwide allocations in 2001.[14] Australia was next with $US 349 million, or 17.5 percent of worldwide allocations. Canada again ranked third in 2001, attracting 16.6 percent of total worldwide exploration spending ($US 333 million). The worldwide allocation of exploration spending was broken down in 2001, by region, as follows:

Latin America ..... 28.8 percent

Australia ..... 17.5 percent

Canada ..... 16.6 percent

Africa ..... 13.8 percent

United States ..... 7.9 percent

Pacific/southeast Asia ..... 6.7 percent

Rest of the world ..... 8.7 percent

THE YUKON MINERAL INDUSTRY

The Yukon is underlain by a tremendous variety of rock types, resulting in a complex geology ideal for hosting many types of ore deposits.

Indeed, mining has been the single most significant industry in the Yukon since the discovery of gold in the Klondike in 1896. For most of the Yukon's short recorded history, the production of metals, from the copper nugget cartel ruled by the "Copper King" in pre-gold rush days, to the heap leach Brewery Creek mine 100 years later, has driven the Yukon economy.

A major factor in the growth of the Yukon mineral industry has been the proximity of an ice-free, deep water port at Skagway, Alaska. In addition, there is a well-developed network of over 4,700 kilometres of roads, and an airport at Whitehorse which handles daily jet traffic from Vancouver. Yukon infrastructure, including the location of the electrical power grid, is shown in Appendix 2.

There are over 2,500 known mineral occurrences in the Yukon.[15] Yukon mineral properties currently being mined, or in the stages of advanced exploration, are shown in Appendix 3. Of the known mineral occurrences, a total of 54 have been in production, ranging from two or three-person jade and hand-mined silver producers to larger, underground or open-pit mines. Since 1960, in the Yukon, there have been 12 significant hardrock mines, involving mill and mine infrastructure construction (Table 6).

In the event that ore stripping activity at the Brewery Creek mine does not resume, and other mines do not resume or commence production, there will be no hard rock mines in operation in the Yukon in 2002. The re-opening of North American Tungsten's CanTung Mine, located just over the Northwest Territories border, in late 2001, has provided some service, supply and employment opportunities for Yukon businesses and individuals.

An estimated 124 placer mines were in operation in the 2001 season. Descriptions of these operations are given in *Yukon Exploration and Geology 2001*, available through Exploration and Geological Services, Department of Indian and Northern Development, and *Mineral Property Update*, available at the Department of Energy, Mines and Resources. They can also be viewed online at yukonmining.com.

YUKON MINERAL PRODUCTION, EXPLORATION AND MINE DEVELOPMENT

The amount and value of Yukon's mineral production are shown in Table 7. Figure 7 shows mineral production in the Yukon by metal. Table 3 lists the Yukon's share of world mine production of gold, silver, lead and zinc.

The Faro lead-zinc mine, Yukon's largest mineral producer and the largest single private sector employer for almost all of the 30 years since the mine opened in 1969, closed indefinitely in 1998. As the Faro mine historically accounted for 70 to 85 percent of the total annual value of the territory's mineral production, Yukon mineral production

Table 6
Significant Yukon mines since 1960

Name	Opening, closing	Main commodity
Brewery Creek*	1996-ongoing	gold
CanTung**	1962-1986	tungsten
	2002-ongoing	
Clinton Creek	1967-1978	asbestos
Faro	1969-1982	zinc, lead, silver
	1986-1993	
	1995-1996	
	1997-1998	
Ketza River	1988-1990	gold
Mt. Nansen	1967-1969	gold, silver
	1975-1976	
	1997-1999	
Mt. Skukum	1986-1988	gold, silver
Sa Dena Hes	1991-1992	zinc, lead
United Keno Hill	1921-1982	silver, lead, zinc
	1983-1989	
Venus	1906-1911	gold, silver
	1970-1971	
	1980-1982	
Wellgreen	1972-1973	nickel, copper
Whitehorse Copper	1967-1982	copper, silver, gold

*In 2001, Brewery Creek undertook heap leach operations only. A production decision for 2002 is pending.
**Cantung is in the NWT but is supplied from Yukon communities.

values have been significantly lower in recent years. In 1996, the mine's last peak year of production, zinc and lead production was valued at $204 million and $96 million, respectively. The total value of Yukon mineral production was $402.4 million in that same year.

Without the production of lead and zinc, the total value of Yukon mineral production had dropped to $58.2 million by 1999 on the basis of gold and silver production. Contributors to the 1999 total included the Brewery Creek (gold, silver) and Mount Nansen (gold, silver) as well as the 171 placer gold mines operating in that year.

With the 1999 closure of the Mount Nansen mine, the total value of Yukon mineral production declined even further, to $51.9 million in 2000. Production in 2000 was from the Brewery Creek heap-leach operation and a reduced contingent of 140 placer operators. The production situation in 2001 was similar to that of 2000, with the Brewery Creek mine and 124 placer operators producing a total of $39.5 million of gold and a very small amount of silver valued at $202,000.

In the face of continuing low gold prices, ore extraction activities at the Brewery Creek mine were suspended in 2000 and the ore extracted in that year was heap leach processed in 2001. Unless another hard-rock operation commences production later in the year, Yukon mineral production in 2002 could be based solely on placer gold production.

Figure 7 shows that gold mines have historically been the foundation of Yukon's mining industry, producing an estimated 3,000 to 7,000 kilograms of gold annually, valued at between $39.5 million and $98.2 million.

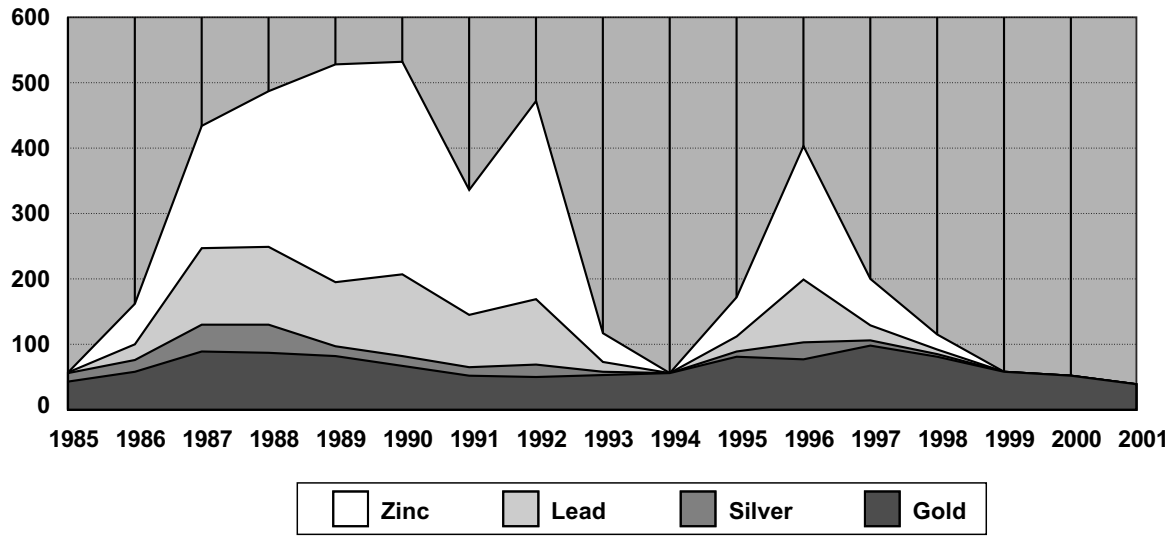
Exploration

Exploration expenditures in the Yukon are monitored by Natural Resources Canada and by Exploration and Geological Services Division, Department of Indian Affairs and Northern Development (DIAND). The Natural Resources Canada figures are based on surveys sent to mining companies and include overhead costs (Table 7). The DIAND estimate is based on field visits and discussions with mining industry contacts.

According to Natural Resources Canada, total exploration spending in Canada was $491.3 million in 2001, an increase of 3.8 percent over the $496.7 million spent in 2000. Recent national spending levels, however, are nowhere near the $1.4 billion peak in Canadian exploration spending experienced in 1988. The Yukon's share of Canadian exploration expenditures was 1.5 percent for 2001, a decrease from its 2.3 percent share in 2000. The Yukon's forecast share of Canadian exploration expenditures in 2002 is estimated at 1.7 percent.

Québec and Ontario were the top two jurisdiction for exploration spending in Canada again in 2001, attracting $111.8 million and $108.9 million respectively. The Northwest Territories and the newly created territory of

Figure 7
Value of mineral production in the Yukon ($ millions)



Sources: Yukon Bureau of Statistics and Natural Resources Canada

Nunavut secured the third and fourth place rankings in 2001 with the NWT garnering $75.3 million in spending and Nunavut $60.4 million.

Exploration spending increased in five jurisdictions in 2001, ranging from 3.3 percent in Manitoba to 19.3 percent in the Northwest Territories. All other jurisdictions experienced a drop in exploration expenditures ranging from 3.2 percent in Nunavut to 44.9 percent in Alberta.

The latest NRCan exploration forecast predicts a 13 percent decrease in overall national exploration spending levels for

Table 7
Yukon mining facts

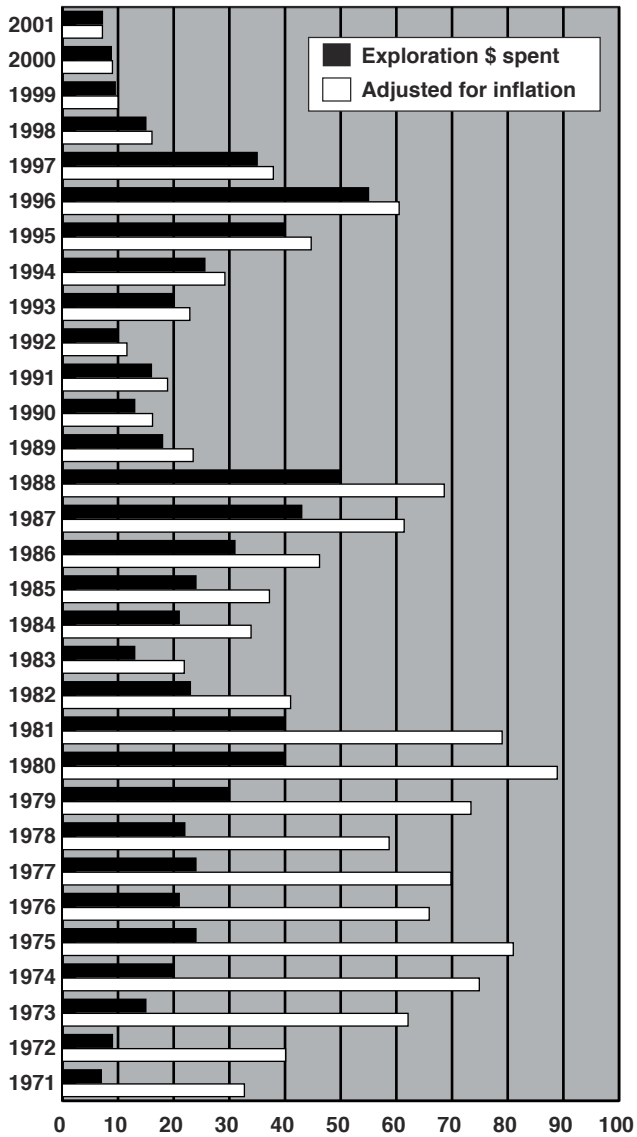
	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Yukon mineral production OUTPUT (tonnes)											
Gold	4	4	4	3	5	5	7	6	4	4	3
Silver	87	124	30	1	35	113	38	14	2	1	1
Lead	93,912	135,688	27,857	–	27,068	90,709	26,625	9,413	–	–	–
Zinc	149,487	202,304	35,204	–	42,293	146,190	39,057	14,984	–	–	–
Yukon mineral production VALUE ($000s)											
Gold	51,573	49,898	52,795	56,406	81,239	76,791	98,150	80,546	58,219	51,602	39,496
Silver	12,890	19,014	5,334	194	8,033	25,699	8,270	3,789	423	339	202
Lead	79,825	99,595	14,597	–	23,414	95,516	23,004	7,380	–	–	–
Zinc	191,194	303,051	43,688	–	59,844	204,374	71,163	22,776	–	–	–
Total	**335,482**	**471,558**	**116,414**	**56,600**	**172,530**	**402,380**	**200,587**	**114,491**	**58,642**	**51,941**	**39,698**
Yukon mining industry share of total real Yukon gross domestic product (includes mining, quarrying and oil wells)	21.3%	27.7%	13.8%	9.5%	14.0%	19.7%	12.4%	10.5%	6.8%	6.1%	n/a
Mineral exploration expenditures ($ millions)											
DIAND	16	10	20	26	40	55	35	15	9.5	8.8	7.2
Natural Resources Canada	16.5	9.7	19.2	25.7	39.3	46.4	40.6	15.5	12.7	11.2	7.2
Yukon share of Canadian mineral exploration	3.1%	2.5%	4.0%	4.1%	5.5%	5.2%	5.0%	2.6%	2.5%	2.3%	1.5%
Mine development expenditures ($ millions)	n/a	n/a	n/a	11	57	54	23	6	6.5	0.6	0.5
Total crude ounces of placer gold	111,972	101,062	108,950	114,479	127,335	109,478	116,383	90,288	87,680	76,507	70,183
Placer gold production ($ millions)	37	34	42	48	53	46	42	31	30	25	24
Number of placer claims staked	1,163	868	1,037	1,357	1,126	908	709	781	1,002	329	297
Total placer claims in good standing	17,801	17,155	17,338	17,464	17,935	17,702	17,537	16,988	16,671	16,890	16,575
Number of quartz claims staked	4,766	4,147	5,032	10,378	14,275	22,685	9,692	5,148	7,258	2,369	1,720
Total quartz claims in good standing	42,989	43,756	40,973	45,030	56,969	71,504	72,723	66,287	61,882	57,095	48,982

Sources: Yukon Bureau of Statistics, Statistics Canada, Department on Indian Affairs and Northern Development
Notes: The GDP classification system changed from the Standard Industrial Classification to the North American Industrial Classification System between 1996 and 1997. Comparisons across the two periods should be made with caution. n/a=not available

2002 to $428 million.[16] The Yukon, however, is expected to see a 2.8 percent increase in exploration spending in 2001-2002. Exploration spending intentions in other areas are mixed for 2001-2002. While Nova Scotia is expected to see a 131.4 percent increase in spending, exploration expenditures are forecast to decline by 63.7 percent in the Northwest Territories. The 2002 exploration outlook for all jurisdictions is described in tables 8, 9 and 10.

The exploration spending data provided by Natural Resources Canada can be linked to major discoveries during the 1990s. The discovery of diamonds in the Northwest Territories in the early 1990s resulted in a spending peak of $195 million for exploration in that jurisdiction in 1996. Diamond exploration expenditures have continued to decline in the Northwest Territories, but increased dramatically in Alberta in the mid and late 1990s.

Figure 8
Yukon exploration expenditures, 1971 to 2001 ($ millions)



Sources: DIAND, Exploration and Geological Services Division

The discovery of the massive Voisey's Bay nickel find in Newfoundland in 1995 had an effect, not only on expenditures in Newfoundland, but also in Ontario and Québec, since spending in those provinces decreased while companies either explored for diamonds or participated in the Voisey's Bay exploration play. To some extent, the Yukon was insulated from the effects of diamond exploration and Voisey's Bay by the discovery of the lead-zinc-copper massive sulphide camp in the Finlayson Lake area. Record staking and subsequent exploration helped the Yukon attract exploration capital during the mid 1990s.

The effects of the Bre-X stock incident and the Asian financial and economic crisis continue to linger. While exploration spending continues its downward trend, the pace of the decline appears to be slowing. The various recently introduced federal, provincial and territorial tax credit measures are likely have contributed to the easing of the downward decline in exploration spending at the national level. Feedback from companies undertaking exploration activity in the Yukon confirm that the Yukon Mineral Exploration Tax Credit has been instrumental in encouraging continued activity in the field.

Exploration expenditures in the Yukon for the period 1971 to 2001, as reported by DIAND, are shown in Figure 8.

Until 1994, senior mining companies accounted for most of the exploration dollars spent in the Yukon. By 1996, expenditures from junior companies doubled compared to senior companies. Junior mining companies, most based out of Vancouver, now account for over half of the exploration dollars spent in the Yukon. In 1999, junior companies were responsible for 65 percent of total exploration spending in the Yukon.

Mines and mine development

There are currently a number of properties either in the environmental permitting process, awaiting an improvement in metal prices or in the advanced stages of mineral exploration.

Subsequent to the conclusion of $6.2 million in development expenditures at the Brewery Creek mine in 1999, mine development spending has been significantly

Table 8
Mineral exploration and deposit appraisal expenditures by jurisdiction ($ millions)
p= preliminary, f = forecast

	1995	1996	1997	1998	1999	2000	2001[p]	2002[f]
Yukon (DIAND)	40.0	55.0	35.0	15.4	9.5	8.8	n/a	n/a
Yukon	39.3	46.4	40.6	20.1	11.2	9.8	7.2	7.3
Northwest Territories	172.1	194.5	150.7	155.6	51.4	63.1	75.3	27.3
Nunavut	n/a	n/a	n/a	n/a	62.1	62.4	60.4	50.2
British Columbia	79.4	104.9	95.8	54.5	35.9	34.8	29.1	28.5
Alberta	10.6	10.8	20.5	27.5	7.2	7.8	4.3	8.1
Saskatchewan	43.8	50.6	49.9	62.1	45.6	39.2	36.1	37.4
Manitoba	32.6	41.2	40.3	29.9	28.1	27.4	28.3	30.1
Ontario	129.7	194.9	176.5	114.8	117.9	89.7	108.9	119.2
Québec	123.3	137.2	168.6	127.1	94.1	100.6	111.8	94.5
New Brunswick	12.7	14.8	12.2	10.1	12.1	10.4	8.4	3.4
Nova Scotia	3.0	6.9	6.7	6.5	3.6	3.1	3.5	8.1
Newfoundland and Labrador	71.1	92.5	58.4	47.9	27.3	24.9	18.1	13.7
Canada	**717.6**	**894.7**	**820.2**	**656.1**	**496.7**	**473.2**	**491.3**	**427.8**
Alaska ($US millions)	34.3	44.7	57.8	57.2	52.3	34.9	22.0	n/a

Table 9
Percentage by jurisdiction of total Canadian exploration
n/a=not available, p= preliminary, f = forecast

	1995	1996	1997	1998	1999	2000	2001[p]	2002[f]
Yukon	5.5%	5.2%	5.0%	3.1%	2.5%	2.1%	1.4%	1.7%
Northwest Territories	24.0%	21.7%	18.4%	23.7%	16.7%	13.3%	15.3%	6.4%
Nunavut	n/a	n/a	n/a	n/a	7.4%	13.2%	12.3%	11.7%
British Columbia	11.1%	11.7%	11.7%	8.3%	8.2%	7.4%	5.9%	6.7%
Alberta	1.5%	1.2%	2.5%	4.2%	2.9%	1.6%	0.9%	1.9%
Saskatchewan	6.1%	5.7%	6.1%	9.5%	8.6%	8.3%	7.3%	8.7%
Manitoba	4.5%	4.6%	4.9%	4.6%	4.5%	5.8%	5.8%	7.0%
Ontario	18.1%	21.8%	21.5%	17.5%	17.3%	19.0%	22.2%	27.9%
Québec	17.2%	15.3%	20.6%	19.4%	22.5%	21.3%	22.8%	22.1%
New Brunswick	1.8%	1.7%	1.5%	1.5%	2.0%	2.2%	1.7%	0.8%
Nova Scotia	0.4%	0.8%	0.8%	1.0%	1.1%	0.7%	0.7%	1.9%
Newfoundland and Labrador	9.9%	10.3%	7.1%	7.3%	6.2%	5.3%	3.7%	3.2%

Table 10
Yearly percentage change in exploration expenditures by jurisdiction
n/a=not available, p= preliminary

	1995-1996	1996-1997	1997-1998	1998-1999	1999-2000	2000-2001	2001-2002[p]
Yukon	18.1%	-12.5%	-50.5%	-36.8%	-22.8%	-27.6%	2.8%
Northwest Territories	13.0%	-22.5%	3.3%	-46.0%	-25.0%	19.3%	-63.7%
Nunavut	n/a	n/a	n/a	n/a	66.8%	-3.2%	-16.9%
British Columbia	32.1%	-8.7%	-43.1%	-24.2%	-15.7%	-16.4%	-2.1%
Alberta	1.9%	89.8%	34.1%	-46.5%	-46.9%	-44.9%	88.4%
Saskatchewan	15.5%	-1.4%	24.4%	-29.8%	-10.1%	-7.9%	3.6%
Manitoba	26.4%	-2.2%	-25.8%	-23.7%	20.2%	3.3%	6.4%
Ontario	50.3%	-9.4%	-35.0%	-23.9%	2.6%	21.4%	9.5%
Québec	11.3%	22.9%	-24.6%	-10.7%	-11.4%	11.1%	-15.5%
New Brunswick	16.5%	-17.6%	-17.2%	0.0%	3.0%	-19.2%	-59.5%
Nova Scotia	130.0%	-2.9%	-3.0%	-18.5%	-41.5%	12.9%	131.4%
Newfoundland and Labrador	30.1%	-36.9%	-18.0%	-34.7%	-20.4%	-27.3%	-24.3%
Canada	24.7%	-8.3%	-20.0%	-23.2%	-6.1%	3.8%	-12.9%

Sources: Natural Resources Canada, DIAND , Yukon Region, Exploration and Geological Services, Alaska State Government, Department of Natural Resources

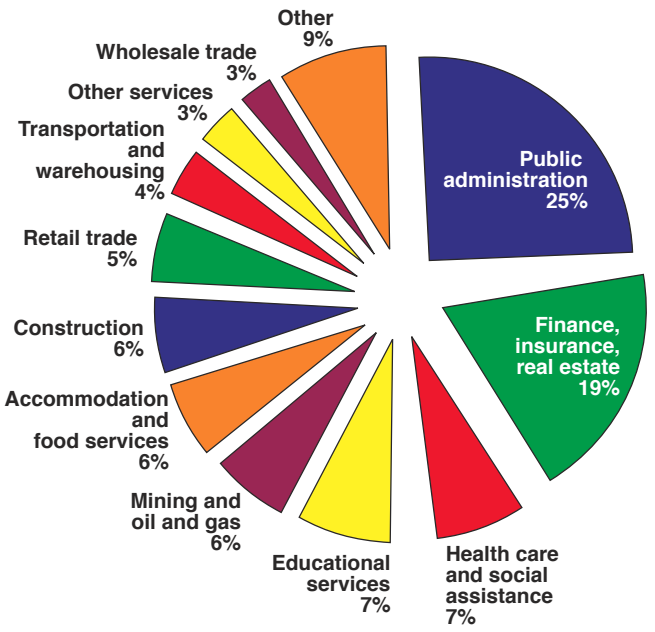
curtailed in the Yukon. In 2000, only $550,000 was spent in the territory on mine development with $200,000 being spent at the Brewery Creek mine and the remainder of mine development expenditures at the Minto project (copper, gold, silver).[17]

The Yukon mine development situation was not any brighter in 2001 with only $500,000 in expenditures incurred. Development spending took place at the Minto project and, late in the year, in the Keno Hill area by A.M.T. Canada Inc., which purchased the historic Keno Hill silver mine in September 2001.[18]

Diamond drilling activity decreased in 2001 with 13 projects undertaken, down from 15 in 2000. Similarly, claim-staking activity, already low in comparison to the long-term average, was also quieter in 2001 with only 1,720 quartz claims staked compared to 2,379 in 2000.

The number of quartz and placer claims staked between 1991 and 2001 is shown in Table 7.

Figure 9
Yukon Gross Domestic Product, by industry – 2000



Source: Statistics Canada

IMPORTANCE OF MINING TO THE YUKON ECONOMY

Gross Domestic Product

On a national scale, the Yukon has relatively little influence on the Canadian economy. The Yukon Gross Domestic Product (GDP) accounts for less than two-tenths of one percent of Canadian GDP.

The Yukon remains a small and specialized economy which is strongly dependent on mining. As a result, the Yukon's GDP is volatile and can fluctuate wildly depending on changes affecting the mining industry.

Figure 9 shows the significant influence of mining activity. With the final closure of the Faro mine in 1998, the mining industry's relative contribution of value-added activity to the territorial economy has decreased significantly. In 1997, the mining, quarrying and oil well industries contributed 12.4 percent to total Yukon GDP. After successive declines in 1998 and 1999, the contribution of the mining, quarrying and oil well industries had declined to 6.1 percent, less than half the 1997 level.

Total Yukon GDP, by industry basis

2001 (estimate) ..... $1,054 million

2000..... $1,033 million

1999 ..... $1,027 million

The latest economic outlook from the Yukon government notes that the territory's mining industry "continues to face difficulty in raising investment funds and is struggling with continued low metal prices[19]."

In the absence of continued production at the Brewery Creek mine in the summer of 2002, the Outlook notes that the value of mineral production will be sustained solely by placer gold production. Yukon hard-rock mine workers have found employment at the CanTung mine in the Northwest Territories which resumed production in January, 2002. The mine's owner, North American Tungsten Ltd., estimates that of the 130 people working at the mine, a total of 60 people are from the Yukon.

Additional hard-rock activity may take place in the coming summer in the Keno Hill area where A.M.T. Canada Inc. plans to reprocess existing tailings and undertake an environmental cleanup. In the longer term, the company anticipates small-scale mining of silver deposits within two to three years, with up to 100 people employed.

Employment in the Yukon mining industry

There are two sources of information regarding the number of people employed by the mining industry in the Yukon. Census data from 1986, 1991 and 1996 includes information on the number of people employed in mining (Table 11). The data shows that 940 people indicated that they were employed in the mining industry in 1996. A total of 215 people indicated that they were employed in 1996 in service industries incidental to mineral extraction.

The other source of employment information, an annual summary of employment, production and accident statistics, is prepared by the Occupational Health and Safety branch of the Yukon Workers' Compensation Health and Safety Board. The information is based solely on information compiled from workers' compensation forms and other, less quantitative survey methods and does not capture the full spectrum of direct mining industry employment (Table 12).

Table 11
Yukon employment in mining (including milling), quarrying and oil well industries

	1986	1991	1996
Total employment	915	990	1,180
Mining industries	730	805	940
Crude petroleum and natural gas industries	25	20	–
Quarry and sand pit industries	–	20	20
Service industries incidental to mineral extraction	155	140	215

Source: Statistics Canada, 1986, 1991 and 1996 Censuses, Labour Force 15 years and over by industry division

Table 12
Employment in the Yukon mining industry

		1996	1997	1998	1999	2000
Hardrock mining	Average number employed	863	494	243	201	88
	Person years	911	489	279	224	92
Placer mining	Average number employed	333	324	n/a	160	154
	Person years	224	224	n/a	121	148
Exploration	Average number employed	155	152	n/a	126	171
	Person years	104	101	n/a	121	164

Source: Yukon Workers' Compensation Health and Safety Board
n/a=not available

Wages in the Yukon mining industry

The book, *Rock Solid*, (Dungan, 1996) presents statistical information on average wages for Canadian workers in the mining industry. On average, workers in the Canadian mining industry make 1.7 times the business sector average.

The report, "The Mining Industry in British Columbia – 2000," by PricewaterhouseCoopers, states that employees of the mining companies surveyed receive the following average salary and benefits per employee:

Average salary per employee..... $66,300

Average benefits per employee..... $11,500

Total salary and benefits per employee..... $77,800

Benefits may include medical, dental and life insurance, company pension plan, holiday and vacation pay, Workers' Compensation, Canada Pension Plan, and unemployment insurance.

According to census data collected by Statistics Canada, the average employment income in the Yukon for all mining, quarrying and oil well workers was $33,395 in 1995. The average full-time and full-year worker wage in 1995 for workers in the Yukon mining, quarrying and oil well industries was $47,229.

Yukon world exports

With the closure of the Faro lead-zinc mine in 1998, the Yukon's contribution to Canada's total world exports dropped steeply. Over the last 10 years, the value of the Yukon's international exports was highest in 1992 at $221.0 million before swinging down to $7.6 million in 1994 with the temporary closure of the Faro mine. The value of exports peaked again in 1996 at $185.1 million before dropping again to its 2000 level of $20.5 million. Lumber produced from coniferous wood replaced mineral production as the primary driver of the value of Yukon world exports.[20] Table 13 shows the contribution of the Yukon mining industry to Yukon world exports over the 1992 to 2000 period.

Table 13
Mining industry share of total Yukon world exports 1992-2000 (%)

1992	98.6%	1995	93.6%	1998	46.6%
1993	76.0%	1996	98.8%	1999	4.4%
1994	0.2%	1997	92.9%	2000	10.4%

Source: Industry Canada, Trade Data On-line, http://strategis.ic.gc.ca
Note: does not include oil and gas exports.

With the absence of lead and zinc exports, the relative ranking of other exports has increased. Table 14 lists the top 25 Yukon exports for 2000 and their percentage of the total value of exports in the preceding four years. Only two mineral commodities were included in the top 25 in 2000: gold in unwrought form and gold powder.

While not a top 25 export in 2000, natural barium sulphate, known as barite, has ranked among the top 25 exports as recently as 1998. Barite is mined in some years in the Ross River area by H. Coyne & Sons Limited and exported into Alaska as a drilling mud. This Yukon export's closest competitor is in Nevada, making transportation costs a competitive advantage.

The values for world export of gold (in both unwrought and powder form) would certainly be higher on a domestic export basis. However, Yukon gold is a domestic, rather than an international export which is typically sent to other Canadian provinces before being exported internationally.

Table 14
Yukon top 25 world exports, 1996-2000, percentage of total value of Yukon world exports

	1996	1997	1998	1999	2000
Lumber (thickness >6mm) – coniferous wood	0.1	2.6	20.2	45.1	54.2
Gold in unwrought form (non-monetary)	0.0	0.2	1.6	3.3	10.4
Mechanical front end shovel loaders	–	0.0	–	3.6	7.5
Prefabricated buildings (''industrialized buildings'')	–	0.0	0.8	4.9	2.2
Wood (lumber) continuously shaped – coniferous	0.0	0.3	0.2	–	2.0
Original sculptures and statuary in any material	0.0	0.0	1.8	1.3	1.7
Natural bitumen and asphalt; asphaltites and asphaltic rocks	0.0	0.0	–	0.4	1.7
Liquefied petroleum or hydrocarbon gases – propane	0.1	0.2	3.0	1.4	1.7
Doors, windows, their frames and threshold for doors – of plastics	0.1	0.2	2.0	1.8	1.4
Dumpers designed for off-highway use	–	–	–	2.8	1.3
Construction equipment – self-propelled	–	–	–	0.2	0.8
Mobile drilling derricks	–	–	–	–	0.8
Laminated beams/arches, panels and prefabricated partitions – wood	0.0	0.1	0.5	0.2	0.7
Motor vehicles – spark ignition – cylinder capacity more than 3000 cc	–	–	0.9	0.9	0.7
Bulldozers and angledozers – track laying	–	–	–	2.8	0.7
Other products of animal origin – unfit for human consumption	0.1	0.1	3.4	0.7	0.7
Wooden telephone poles, fence posts, other wood in rough – not treated	–	0.0	–	0.2	0.6
Gold powder (non-monetary)	–	–	0.2	0.2	0.6
Furnace burners – other than for liquid fuel, including combination burners	–	–	–	0.0	0.5
Other live animals (including fishing bait)	0.0	0.0	0.2	0.0	0.5
Collections, collector's pieces of various scientific disciplines	0.1	0.1	1.3	0.0	0.5
Mechanical shovels and excavators with a 360-degree revolving superstructure	0.0	0.1	–	5.6	0.5
Ash and residues containing metals or metallic compounds nes	–	–	–	–	0.5
Other wheeled tractors nes	–	0.0	–	–	0.4
Fish nes, live	–	–	–	–	0.4
Sub-total	0.5	4.0	36.2	75.4	93.0
Others	99.5	96.0	63.8	24.6	7.0

Source: Industry Canada, Trade Data On-line (http://strategis.ic.gc.ca)
Notes
1) nes=not elsewhere specified
2) The methodology for calculating world exports does not require that products be produced or manufactured in the province or territory of export.

Indirect benefits

There is little up-to-date statistical information regarding spin-off benefits, such as indirect spending and employment generated by the Yukon mining industry. Reliable data on which to base estimates of the indirect impact of mining has not been collected since 1990. While 1996 input-output data, which would more accurately reflect the current structure of the Yukon economy, is being assembled by Statistics Canada, it had not been released at the time of writing.

In 1994, the Yukon government, together with the Dawson City Chamber of Commerce and the Klondike Placer Miners' Association developed an Economic Profile for the Dawson City area in order to gain an understanding of the relative contribution of the key sectors to the local economy.[21] The modern economy of Dawson City revolves around seasonal placer mining and tourism activities. As outlined below, the study showed, on a local scale, the importance of placer mining to the economy of Dawson City.

- The incomes earned by miners are much higher than those earned by service sector employees.
- Mining is a capital intensive industry that uses more expensive inputs to production than are used in service based or government activities.
- Placer mining payroll and the amount of purchases made from within the community are well in excess of those made in any other sector, since it is uneconomic for mining operations to go outside the Dawson City area for purchases of fuel, parts and equipment servicing.
- Placer mining provides the most employment in the Dawson City area.

MINING TRENDS IN THE YUKON

Mining, as with most industries, is dynamic and changes with social and economic trends. These changes affect the way actual physical mining is conducted, the support infrastructure around the mine and the feasibility and economics of mining certain deposits. In the last 30 years, there has been a move to mechanized and large-scale mining, the introduction of heap leach and solvent extraction technologies, and a departure from construction of mine townsites.

In terms of productivity measures, the mining, primary metals and quarrying industries were among the top ten in annual average total factor productivity over the period 1984 to 1998. Total factor productivity in the mining sector grew at three times Canada's overall productivity growth rate of 0.95 percent between 1984 and 1998 clocking in at 3.1 percent.[22]

POTENTIAL FOR NEW DISCOVERIES

The Yukon still has potential for the discovery of near-surface world class mineral deposits (MacKenzie, 1988). The recent success at Kudz Ze Kayah and subsequent successes in the Finlayson Lake area confirm this; however, in recent years, overall new discoveries are on the decline.

The large expenditure peak in the early 1980s can be attributed to very high world metal prices at the time. From 1984 to 1990, a federal tax incentive program to increase the flow-through share allowance caused large amounts of money to be spent in the Yukon. Although the program helped generate mineral exploration expenditures, the design of the program was such that it put constraints on the expenditure of funds to support exploration programs. This resulted in exploration work which was not always planned in advance and the ability for follow-up was at times restricted.

MINING TECHNOLOGY

Mining has become increasingly efficient, and new technologies have made lower-grade deposits economically viable. General process efficiency and streamlining have made large-volume mining viable in short time periods. These trends are reflected in the commodity prices which have been on a consistent downward trend. Natural Resources Canada's $US Metals price index fell through the 1990s by approximately 20 percent.[23] The overall price declines are not due to reduction in value, but reflect the competitive nature of mining commodities at consistently lower prices.

Bulk mining

Bulk mining refers to the processing of large tonnage of ore, typically using large ore trucks in combination with shovels or loaders. In the Yukon, a specific example of this technology is the development of low-grade, high-tonnage heap leach operations at Brewery Creek, where very large scale bulk mining is required to make the low-grade deposit viable. Brewery Creek has proven bulk mining technology to be successful in the Yukon.

Cyanide heap leach and solvent extraction

A recent and significant technological development is the use of cyanide heap leach and solvent extraction processes. Both processes involve the application of an acidic fluid to large volumes of mined rock to extract metal.

Cyanide heap leaching and solvent extraction processes reduce capital and operating costs and result in making mining of low-grade deposits economically feasible. This technology has lower power requirements since only primary crushing is required, as opposed to a full-scale crushing, grinding and extraction circuit. For example, the Brewery Creek project requires only three MW of power, where if mined by conventional methods would require at least 11 MW. At the Dublin Gulch property, waste heat from an on-site diesel electric plant or from an auxiliary fuelled furnace could feasibly be used to heat the acidic fluid.

As demonstrated at Brewery Creek, this technology works very well when combined with bulk mining methods, as large volumes of rock can be mined and processed, at a marginal cost.

The solvent extraction method used to extract copper has somewhat higher power demands since copper is liberated from the pregnant solution by electrowinning. Yet, this power demand is still lower than that of conventional milling. For example, a feasibility study for the Carmacks copper deposit, using solvent extraction, calls for an electrical demand of 7.2 MW where conventional milling of this deposit would require power on the order of 13 MW.

MINE INFRASTRUCTURE

The most significant change in mine infrastructure is the abandonment of the mine town. Mine operations have almost totally switched to the use of on-site camps, with workers staying at the camp during work rotations, and then returning to their home towns for the furlough rotation.

All modern mines in the Yukon and Alaska have used the on-site camp model. The construction of a complete town site now is too high a cost and liability, especially in light of shorter mine project lives. Compliance with impact and benefits agreements, local hire, and First Nation hiring policies, make it more likely that mine workers will be increasingly staying in the neighbouring community.

MINING AND THE ENVIRONMENT

Many mining companies have changed their operations because of increased environmental awareness and improved technology. At the exploration stage, improvements include larger helicopters and smaller diamond drilling equipment, negating the creation of new access roads into properties. Mining development operations include plans that respect habitat and migration requirements of wildlife, and technology that encourages energy efficiency and reduction of releases to air and water. Ideally, mine closures are captured within well-developed reclamation plans designed to return mine sites to viable and, wherever practicable, self-sustaining ecosystems.

MINING TAXATION

Canada has a long tradition of providing special income tax rules to foster investment in mineral exploration and development. However, these federal rules have become less generous, especially after the tax reforms of 1972 and 1987.

Canadian provinces have the right to control and manage mineral resources, and impose taxes or royalties for minerals extracted. Provincial and territorial governments use fiscal measures, through their income tax or mining tax regimes, to assist the mineral industry in manners that meet their particular goals.

There is a "three-tier" system in place to tax Canadian mining operations.

1. Federal corporate income tax: based on taxable income. Taxable income is the total income of the taxpayer less allowable deductions and exemptions.
2. Provincial/territorial corporate income tax: based on the same taxable income as the federal tax.
3. Provincial/territorial mining taxes, royalties or duties: levied against production profits or revenues.

Specific taxes and royalties for the mining sector are currently under the jurisdiction of the federal government. The Government of Yukon will assume responsibility for mining sector taxes and royalties on April 1, 2003 with the transfer of authority for the administration of mineral resources from the Government of Canada.

FEDERAL INCOME TAX

The federal government imposes a federal corporate income tax on mining operations. The net federal corporate income tax rate for resource income is 29.12 percent. The general corporate tax rate which applies to most sectors has been reduced by three percent over the last two years, and will be further reduced over the next two years by another four percent. The general tax rate changes do not, however, apply to resource income. The Government of Canada, in its December 2001 budget, notes that resource income is excluded from the general tax rate changes as the resource sector benefits from a number of tax measures specific to the industry.[24]

Taxpayers involved in mining exploration and development are eligible to claim federal taxation provisions. These federal provisions are provided in Appendix 5 and include Resource Allowance, Canadian Exploration Expenses (CEE), Canadian Development Expenses (CDE), Flow-Through Shares, Foreign Exploration and Development Expense (FEDE), Capital Cost Allowance (CCA), Accelerated Capital Cost Allowance, deductions for Mine Reclamation Funds and the new federal Exploration Investment Tax Credit.

YUKON CORPORATE INCOME TAX

The Yukon government levies its own corporate income tax, which applies to companies that have a presence, or a "permanent establishment," in the Yukon. The Yukon's corporate tax rate is 15 percent for large businesses and six percent for small business. Unlike jurisdictions located south of 60° (but similar to the Northwest Territories and Nunavut), the Yukon does not levy a corporate capital tax. Federal and provincial/territorial corporate tax rates are shown in Table 15.

Table 15
Federal and provincial/territorial corporate income tax rates, 2002*

Federal corporate net tax rate (resource income)	29.12%
Provincial/territorial general corporate income tax rates	
Yukon	15.0%
Northwest Territories	14.0%
Nunavut	14.0%
British Columbia	13.5%
Alberta	13.0%
Saskatchewan	17.0%
Manitoba	16.5%
Ontario**	11.0%
Québec	8.9%
New Brunswick	16.0%
Nova Scotia	16.0%
Prince Edward Island	16.0%
Newfoundland	14.0%

Sources: (1) Alberta Budget 2002 (Fiscal Plan 2002-05), March 19, 2002.
(2) Northwest Territories Budget 2002, February 20, 2002.
** based on rates known as of February 26, 2002*
*** applicable to mining income*

YUKON MINING ROYALTIES

Mining royalties for Yukon mining operations are under the jurisdiction of the federal government. A mine operator in the Yukon is required to pay a mining royalty to the Government of Canada since the Yukon does not currently have administrative or constitutional authority in the area of mineral resources.

Yukon metal mine operators with mine output valued at more than $10,000 in a calendar year pay a graduated rate of tax on "net profit." The annual royalty is computed as follows:

1. The tax rate applied to the annual net profit in excess of $10,000 and up to $1 million is three percent;
2. On the excess above $1 million and up to $5 million, the tax rate is five percent;
3. On the excess above $5 million and up to $10 million, the tax rate is six percent; and
4. On the excess above $10 million, a proportional increase in the tax rate for each additional $5 million is applied.

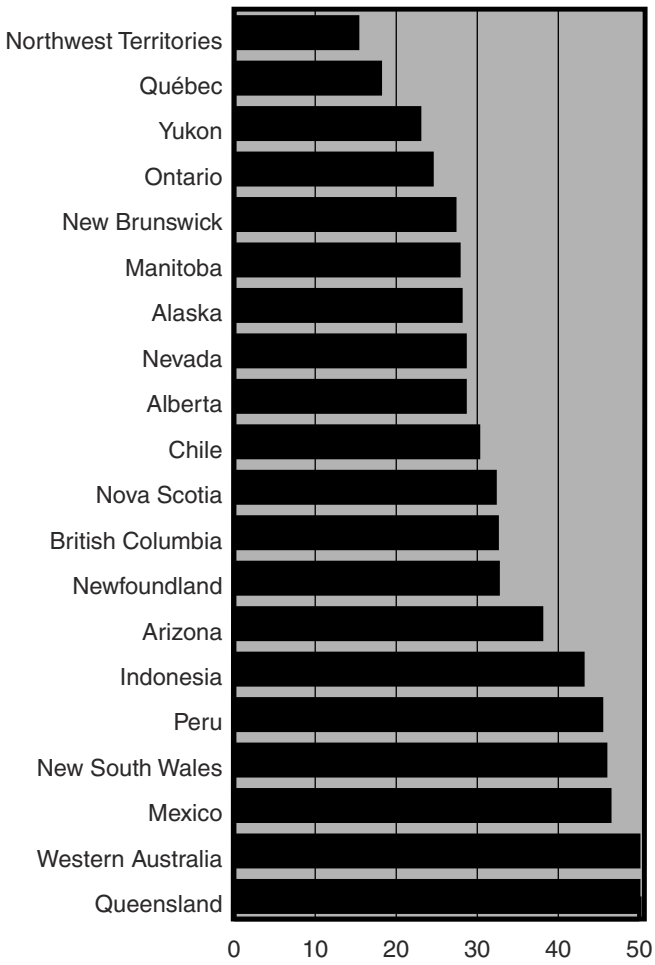
Provincial and territorial mining taxation rates are shown in Table 16.

Table 16
Territorial and provincial metal mining taxation or royalty rates*

Province/ territory	Mining tax rate
Yukon	0% of net profit under $10,000 3% of net profit under $10K to $1M, plus 5% of net profit under $1M to $5M, plus 6% of net profit under $5M to $10M, plus 1% of net profit, each additional $5M
NWT/Nunavut	The lesser of: a) 13% of output value, and b) 0% of output value under $10K, plus 5% of output value $10K to $5M, plus 6% of output value $5M to $10M, plus 1% of output value, each additional $5M to maximum rate of 14% on output value in excess of $45M
British Columbia	2% on net current proceeds, plus 13% on cumulative net revenue
Alberta	greater of 1% of mine mouth revenue or 12% of net profits after full cost recovery
Saskatchewan	12.5%
Manitoba	20.0%
Ontario	14.0%
Québec	12.0%
New Brunswick	2% on net revenue plus 16% on net profit in excess of $100,000
Nova Scotia	Greater of 2% net smelter return or 15% of net income
Newfoundland	Mine profit is subject to 15% tax. Additional deductions are available.

**current as of January 2002*

Figure 10
Average effective tax rates for base-metal operations (10 percent internal rate of return) (based on 1997 data)



Note: Natural Resources Canada uses a model that calculates tax payments that would be incurred by a typical mine during its entire life. This model includes federal and provincial corporate income taxes, the large corporations tax, as well as mining taxes and royalties.

Source: 1997 data provided by Natural Resources Canada. Brewer, Bergevin and Arseneau (1997). Brewer, Bergevin and Kitts (1993). From Mintz Report on Business Taxation

Gold royalty

Yukon placer gold producers are required to pay a royalty on all gold exported from the territory. Similar to the mining royalty, the gold royalty is paid to the federal government. The royalty is computed at the rate of 2.5 percent of the value of the gold as fixed by the Governor in Council. The value of gold has been fixed at $15 per ounce since early this century. As a result, the current gold royalty is $0.375 per ounce of exported gold.

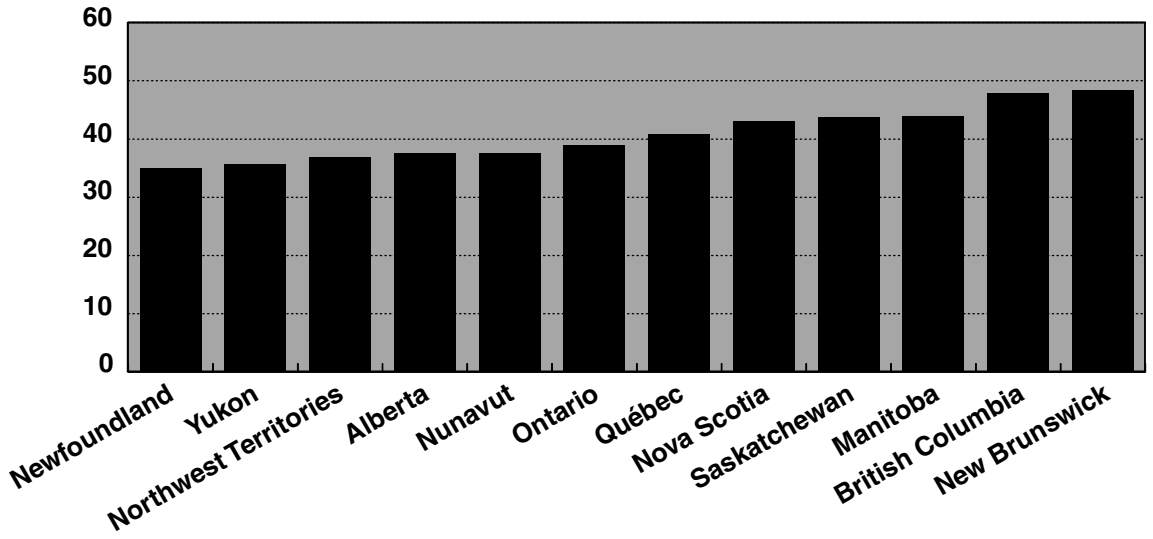
COMPARISON OF MINING TAXATION REGIMES

Provincial and territorial mining tax and royalty regimes vary wildly. It is difficult to compare between jurisdictions the effects of special provisions such as accelerated write-offs, deferred tax payments, tax holidays, super write-offs and other incentives.

One way to compare the effectiveness of a jurisdiction's mining taxation regime is to create a hypothetical mine, and then compare, across jurisdictions, the taxation burden on the hypothetical mining operation for a set period of time. The average effective tax rate for base metal operations with a 10 percent pre-tax inflation-adjusted internal rate of return on capital in various jurisdictions was studied, based on data for 1997, by Natural Resources Canada and presented in the Mintz Report on Business Taxation (Figure 10).

Figure 11 shows the calculated total effect of federal and provincial income tax, capital tax and mining tax burden for a hypothetical Canadian gold mining operation. This figure is adapted from a model presented in the PricewaterhouseCoopers publication, Canadian Mining Taxation, and is based on provincial and territorial mining taxation regimes in place as of November 2000. The results show that the Yukon rates as second lowest in Canada for mining taxation burden on a hypothetical gold mining operation.

Figure 11
Ranking of tax burden by jurisdiction on a hypothetical gold mining operation



Source: PricewaterhouseCoopers, Canadian Mining Taxation 2001

YUKON LAND STATUS

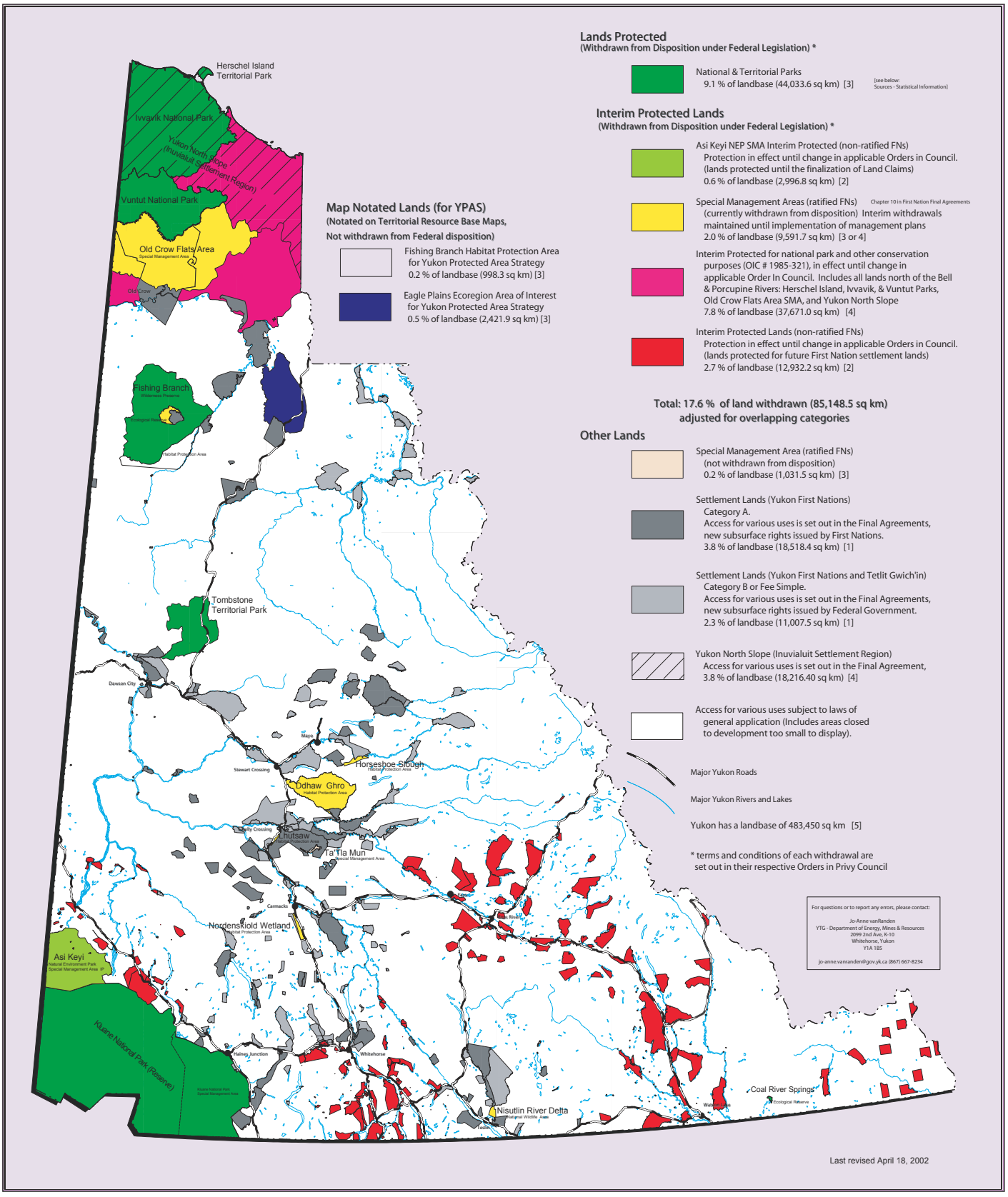


Figure 12
Yukon land status map. Please see yukonmining.com for the most current version of this map.

YUKON LAND STATUS MAP - DATA		Area sq. km.		Colour on map
Lands protected; currently withdrawn from disposition (under federal legislation)				
Parks	Herschel Island Territorial Park	113.0		green
	Ivvavik National Park	9,695.6		
	Vuntut National Park SMA	4,376.1		
	Kluane National Park Reserve	22,158.6		
	Kluane National Park SMA		C&AFN's Traditional Territory portion of existing Kluane National Park	
	Coal River Springs Territorial Park	16.1		
	Fishing Branch Wilderness Preserve	5,355.7		
	Tombstone Territorial Park SMA	2,152.2		
	Fishing Branch Ecological Reserve SMA	166.3		
	Total	**44,033.6**	9.1% of Yukon	
Interim protected lands; currently withdrawn				
SMAs non-ratified FN	Asi Keyi Natural Environment Park	**2,996.8**	0.6% interim protected Nov 2000	olive green
SMAs ratified FN	Ddhaw Ghro Habitat Protection Area	1,610.1		yellow
	Horseshoe Slough HPA	77.0		
	Lhutsaw HPA	32.1		
	Nordenskiold Wetland HPA	77.4		
	Old Crow Flats Area SMA	7,742.1	SMA portion outside Vuntut National Park (SMA overlaps with park)	
	Nisutlin River Delta National Wildlife Area	53.0		
	Sha'Washe & Surrounding Area		too small to display	
	Peel River Watershed		area not delineated (no maps in appendix B of FA)	
	Total	**9,591.7**	2.0% of Yukon	
Other interim protected lands (IP)	IP in northern Yukon (PC# 1985-321)		[37,671 sq. km., 7.8%] Entire IP - All land north of Porcupine River including all parks, SMA and ISR	purple
		15,592.2	3.2% IP excluding all parks and SMA	
	Land claims IP (future settlement lands)	12,932.2	2.7% subject to change with on going negotiations	red
		28,524.4	5.9% of Yukon (total adjusted for overlapping categories)	
Total currently withdrawn		**85,146.5**	**17.6% of Yukon land base**	
Other lands				
SMAs ratified FN	Ta'Tla Mun SMA	33.2	0.01%	tan
First Nation Settlement Lands	Category A lands	18,518.4	3.8% (FNs administer new subsurface rights)	dark grey
	Category B lands	11,007.5	2.3% (subsurface not withdrawn)	light grey
Inuvialuit FA	Yukon North Slope (ISR) hatched on map	18,216.4	3.8% (currently withdrawn due to PC# 1985-321)	hatched
Map notated lands (for YPAS); not currently withdrawn				
	Fishing Branch Habitat Protection Area	998.3	0.21%	outlined
	Eagle Plains Ecoregion Area of Interest	2,421.9	1%	dark blue
Yukon total land base		**483,450**		

- all SMAs listed above are existing Chapter 10 SMAs for a Yukon First Nation
- map produced using MapInfo Professional version 5.0 in Transverse Mercator Projection North American Datum 1983 Grid Zone 8

The Yukon land status map identifies those Yukon lands which may be subject to conditions of use and access other than those set out in federal laws of general application. The terms and conditions of use which applies to those lands vary and are set out in their relevant legislation.

This map is a generalized graphical representation of areas that are appropriate to be displayed at a 1: 2 000 000 scale; smaller areas are not shown. The accuracy of the digital information is adequate for the representation at this scale but the data should not be used at a more detailed scale. This data is not to be used for statistical analysis, nor should it be used to resolve boundary issues.

This map reflects our best understanding of the current status of the various Yukon lands portrayed. Every effort has been made to ensure accurate representation of the type, size, and location of designation. However, it does not constitute a legal opinion. For clarification, readers should consult with the various agencies responsible for the administration of those lands.

This map can be used as a background layer to which additional land use interests may be added.

This document was developed in consultation with Claims and Indian Government (INAC), Claims Research and Implementation (INAC), Land Claims Secretariat (YTG), and various Mining Recorder Offices (INAC Northern Affairs).

SOURCES

Statistical information
(refers to notation on map legend)
[1] Umbrella Final Agreement (CYI) (Allotment of Settlement Land, p.85)
[2] Land Quantum History & Allocation (Land Claims Secretariat, YTG)
[3] Environment, YTG
[4] Digitized polygons (EMR, YTG)
[5] Yukon Statistics Booklet

Designation
Umbrella Final Agreement (CYI)
Yukon First Nation Final Agreements
Gwich'in Comprehensive Land Claim Agreement
The Inuvialuit Final Agreement
Yukon Parks Act
National Parks Act
Yukon Park System Plan
Privy Council Orders of Canada

Cartographic representation
Yukon First Nation Final agreements for Settlement Lands and SMAs
Land Claims (LCIS) YTG for interim protected lands (1:250 000 paper maps)
Department of Environment (YTG) - (GIS website: First Nation Settlement Lands, Parks & Protected Areas) for digital version of selected settlement lands, parks and ecological reserves
Department of Energy, Mines & Resources (YTG) for digital version of selected settlement lands and interim protected lands

The Yukon has a landbase of 483,450 square kilometres. As of April 18, 2002, 17.6 percent of the Yukon's land base has been withdrawn from disposition for new mineral resource development activities under federal legislation. When Yukon First Nation Category 'A' Settlement Land is taken into consideration, an additional 3.8 percent of Yukon's land base is currently not available for staking under the Quartz Mining Act's "free entry system." The Yukon Land Status Map is shown in Figure 12.

Responsibility for the disposition of mineral rights in the Yukon currently rests with the federal government. Authority for the management of Yukon's mineral resources is scheduled to be transferred from the federal government to the Yukon government on April 1, 2003. After that time, mineral rights will be issued by the Yukon government's Department of Energy, Mines and Resources.

PROTECTED AND INTERIM-PROTECTED LANDS

The 17.6 percent of the Yukon's land base withdrawn from federal disposition consists of national and territorial parks and Interim Protected lands. Protected lands are referenced in statute, such as the federal Canada National Parks Act. Interim Protected Lands are classified into four categories for purposes of:

- future First Nation settlement lands,
- Special Management Areas (SMAs) pursuant to implementation of management plans,
- SMA for a future First Nation Final Agreement, and
- for national park or other conservation purpose (Privy Council # 1985-321).

First Nation settlement lands

Under provisions of the Yukon First Nation Final Agreements, other lands in the territory, while not withdrawn from federal disposition, do not allow unrestricted access for the purposes of mineral exploration.

Category 'A' settlement land

On Category A settlement land, a Yukon First Nation has complete ownership of the surface and subsurface. In other words, Yukon First Nations have rights equivalent to fee simple to the surface of the lands and full fee simple title to the sub-surface.

This means that Yukon First Nations have the right to use the surface of the land and the right to use what is below the surface, including minerals. New subsurface rights are issued by First Nations. Access for various uses is set out in the First Nation Final Agreements.

Category 'B' settlement land

On this type of land, a Yukon First Nation has complete ownership of only the surface or top of the land. In other words, Yukon First Nations have rights equivalent to fee simple to the surface only. There is no right to mines and minerals, but there is a specified substances right, that is, the right of the Yukon First Nation to take and use certain specified substances (e.g., sand, gravel) without payment of royalties. New subsurface rights are currently issued by the federal government; after April 1, 2003 they will be issued by the Yukon government.

Special Management Areas

Yukon land may also be withdrawn from disposition under the chapter 10 provisions of the First Nation Final Agreements. A Special Management Area is an area within the Traditional Territory of a First Nation and may be identified and established for a variety of conservation purposes that are consistent with a government interest and First Nation interest. The creation of a SMA will not necessarily lead to the withdrawal of land from disposition and access for exploration activity.

Yukon Protected Areas Strategy (YPAS)

The Yukon Protected Areas Strategy has a primary objective of protecting representative areas of Yukon's ecoregions. Each area is to be capable of maintaining biodiversity. The initiative is part of a Canada-wide commitment to protect biodiversity.

The first of several steps towards representing an ecoregion is to select an "area of interest," an area which meets the needs for representativeness, ecological viability, and naturalness. Areas with high mineral potential and existing mineral potential will be avoided wherever possible. Resource assessments must be completed as part of the process of identifying areas of interest. Should mining claims be affected, government will offer compensation based on fair market value. An intention of YPAS is to ensure reasonable access for resource development. Areas of interest are not withdrawn from disposition for new mineral development activities. However, once the final park boundaries are determined, these areas will be withdrawn.

There are 23 ecoregions in the Yukon. Several of the ecoregions span borders between the Yukon and its neighbours, British Columbia, the Northwest Territories and Alaska. Three of the cross-boundary ecoregions which are less than 10 percent contained in the Yukon will not be represented as part of YPAS. A total of seven ecoregions are already represented in existing protected lands. With the announcement of the Eagle Plains area of interest in February 2002, there are 12 ecoregions that require adequate representation, as of March 2002. Ecoregions may be represented by parks or SMAs.

YUKON GOVERNMENT SUPPORT FOR THE MINING INDUSTRY

The Yukon provides direct exploration incentives in terms of tax credits or contributions for exploration programs. Table 17 compares the size of direct exploration incentives across jurisdictions to companies for exploration programs of $50,000 to $2 million.

GOVERNMENT PROGRAMS AND INCENTIVES

The Yukon government provides support for the mining industry by providing the following programs, incentives and services:

- Yukon Geology Program,
- Yukon Mineral Exploration Tax Credit,
- Yukon Mining Incentives Program,
- Yukon Energy Infrastructure Loans for Resource Development Program,
- Yukon Mining Environment Research Group, and
- other assistance.

Yukon Mineral Exploration Tax Credit

The Yukon Mineral Exploration Tax Credit provides for a refundable tax credit equal to 25 percent of eligible mineral exploration expenses incurred by qualified individuals and companies conducting off-mine-site mineral exploration in the Yukon. For eligible mineral exploration expenditures incurred between April 1, 1999 and March 31, 2001 the credit rate was 22 percent. Qualifying expenditures incurred between April 1, 2001 and March 31, 2003 receive credit at an improved rate of 25 percent. Taxpayers file for the credit when they complete their individual or corporate income tax forms.

Yukon Mining Incentives Program

The Yukon Mining Incentives Program is designed to promote and enhance mineral prospecting, exploration and development activities in the Yukon. The program's function is to provide a portion of the risk capital required to locate and explore mineral deposits. The program consists of four modules:

1) Grassroots – prospecting

Qualified prospectors may apply for up to $10,000 per year to cover basic operating expenses while searching for new mineral occurrences in the Yukon. One hundred percent of approved expenses are reimbursed.

2) Grassroots – grubstake

Companies or individuals providing prospectors with a grubstake (basic operating expenses while searching for new mineral discoveries in the Yukon) may apply for a contribution of up to $10,000 per prospector, per year. A total of 75 percent of approved expenses are reimbursed.

3) Focused – regional

Individuals, partnerships or junior companies undertaking basic exploration work directed at appraising the potential of an under explored area may apply for a contribution of up to $15,000 per year. Up to 75 percent of approved expenses are reimbursed.

4) Target evaluation

Individuals, partnerships or junior companies undertaking basic exploration work directed at appraising the potential of an unevaluated occurrence or target may apply for reimbursement of 50 percent of approved expenses up to a maximum of $20,000.

The intent of this funding is to allow prospectors to evaluate new occurrences following discovery and to prepare them for option or sale. Projects must have budgets of less than $100,000.

Since 1986, the Yukon Mining Incentives Program (YMIP), has helped provide some of the risk capital for prospecting and initial target evaluation of exploration projects.

Prior to 1993, there were two separate programs, Prospectors Assistance Program (PAP) and Exploration Incentives Program (EIP). In 1993, they were combined into YMIP. Analysis of YMIP program data over the 1993 to 2001 period shows that clients receiving funding typically spend a total of 81 percent of their exploration budgets on Yukon-based goods and services.

Table 17
Comparison of direct mining incentives – Canadian jurisdictions
(government grant programs for mineral exploration and refundable tax credits for mineral exploration)
- assume all exploration expenditures are eligible, and all projects qualify for grant programs

		$50,000 program	$100,000 program	$500,000 program	$1,000,000 program	$2,000,000 program
Yukon	**Yukon Mining Incentives Program** (up to 50% of eligible expenses to a maximum of $20,000 available for exploration programs of $100,000 or less)	20,000	20,000	-	-	-
	Yukon Mineral Exploration Tax Credit (refundable tax credit of 25% on grassroots exploration expenditures (calculated on balance after YMIP grant deduction) in the Yukon available to eligible companies)	7,500	20,000	125,000	250,000	500,000
	Total Yukon Mining Incentives	27,500	40,000	125,000	250,000	500,000
British Columbia	**Mineral Exploration Tax Credit+** (refundable tax credit of 20% on grassroots exploration expenditures in B.C.)	10,000	20,000	100,000	200,000	400,000
Manitoba	**Mining Exploration Assistance Grant Program** *All regions* (unless excepted, see below) (25% grant on eligible expenditures, cap of $300,000 per recipient per fiscal year)	12,500	25,000	125,000	250,000	300,000
	Northern Superior/other northern areas, (35% grant on eligible expenditures, cap of $400,000 per recipient per fiscal year)	17,500	35,000	175,000	350,000	400,000
	Lynn Lake/Leaf Rapids Area (35% grant on eligible expenditures, cap of $400,000 per recipient per fiscal year, program subject to annual renewal)	17,500	35,000	175,000	350,000	400,000
Québec	**Québec Refundable Tax Credit (junior companies)+** (refundable tax credit on 40% of eligible exploration expenses made by an eligible exploration company (i.e., a junior) within Québec or 45% if expenses are incurred in Québec's Near North or Far North)					
	Junior - Québec (40%)	20,000	40,000	200,000	400,000	800,000
	Junior - Québec Near North or Far North (45%)	22,500	45,000	225,000	450,000	900,000
	Québec Refundable Tax Credit (senior companies)+ (refundable tax credit on 20% of eligible exploration expenses made by an eligible producer (i.e., a senior) within Québec or 25% if expenses are incurred in Québec's Near North or Far North)					
	Senior - Québec (20%)	10,000	20,000	100,000	200,000	400,000
	Senior - Québec Near North or Far North (25%)	12,500	25,000	125,000	250,000	500,000
	Québec Mineral Exploration Assistance Program (grants of up to 50% of costs up to a maximum of $50,000 or, $100,000 if project located in Near North)++					
	Québec	25,000	50,000	50,000	50,000	50,000
	Québec Near North	25,000	50,000	100,000	100,000	100,000
New Brunswick	**New Brunswick Exploration Assistance Program** (grants of up to 50% of costs to a maximum of $40,000)	25,000	40,000	40,000	40,000	40,000
Newfoundland	**Junior Company Exploration Assistance Program** (grants of 50% of eligible costs to a maximum of $100,000 per project)	25,000	50,000	100,000	100,000	100,000

+ Jurisdictions which offer both refundable tax credits and flow-through share enhancements do not permit the use of more than one measure for the same exploration expense
++ Projects not eligible for funding if another form of government financial assistance is received. The Northwest Territories, Ontario and Nova Scotia provide direct assistance only at the prospecting level. Nunavut, Alberta, Saskatchewan and Prince Edward Island provide no direct exploration incentives.

Yukon Mining Incentive Program facts[25]

Total amount of YMIP funding 1993-2001:
$4,468,173

Total amount spent on exploration by YMIP clients, 1993-2001:
$10,440,618

Total amount of YMIP exploration budget spent on local goods and services, 1993-2001:
$8,335,449

Percentage of YMIP exploration budget spent on local goods and services, 1993-2001:
80.6 percent

Total number of mineral claims staked under the YMIP program:
5,982 claims

Precious metal properties found or re-evaluated under YMIP:

- Arc-Stroker claims
- Brewer Cr. placer
- Caribou Creek
- Dragon Lake
- Dublin Gulch
- Freegold
- Horn
- JRV
- Killerman Lake
- Longline
- McQueston
- Montana Creek
- Mount Nansen
- Mount Skukum
- Poker Creek
- Ruby
- Sprague-Sun

Base metal properties found or re-evaluated under YMIP:

- Andrew
- AZ
- Bigtop
- Cameron
- Dromedary
- Ellen
- Java
- Marg
- Mars
- Maui
- Monster
- Rein/Taiga
- Rusty Springs
- Sa Dena Hes
- Wellgreen
- Williams Creek

Gemstone properties found or re-evaluated under the YMIP:

- Arctic Jade

Energy Infrastructure Loans for Resource Development Program

This program assists the resource development sector in the Yukon by helping defer the capital cost of building energy infrastructure. The program provides loans to companies to help them create infrastructure to meet their energy needs.

Yukon Mining Environment Research Group

The Mining Environment Research Group is a voluntary working group created to encourage and promote research into mining and environmental issues in the Yukon. The group is made up of government agencies, mining companies, Yukon First Nations and non-government organizations. Participants bring their resources and knowledge to work cooperatively on mining environmental issues and projects. Members of MERG identify undertakings which have general application across the Yukon and assist financially or in-kind on a project-by-project basis.

Other assistance

In certain circumstances, the Yukon government will provide infrastructure assistance for mining projects nearing production. For example, in 2001, approximately $730,000 was spent to re-open and upgrade a portion of the road to the Yukon/NWT border in support of resumption of production at the CanTung mine. An additional $450,000 was allocated for maintenance of the road on an annual basis under the terms of a joint road maintenance agreement with the mine's owner, North American Tungsten Corp. Ltd.

FOOTNOTES

[1] There are arguments for and against each of these two options. For further reading see *Pricing of Metals*, by Margaret E. Slade, 1988.

[2] Hedging occurs when an investor, attempting to eliminate the risk of price movements, sells a quantity of a commodity not yet needed in the forward market. If, in the following period, the price of the commodity drops, the investor has offset some of the loss as the commodity has already been sold (to a speculator). If the price rises, the investor has gained a profit offset by the amount needed to honour the forward contract.

[3] A speculator purchases commodities from investors to be sold at a later date for a profit. Speculators take on a higher level of risk than is preferred by investors who are more risk averse. Speculators gamble that prices will increase enough to enable them to make a profit.

[4] Real prices are derived from current-day, or nominal, prices by accounting for the effects of inflation.

[5] *Yukon Exploration and Geology – 2001*, pg. 27.

[6] See Natural Resources Canada's website at www.nrcan.gc.ca/mms/efab/mmsd

[7] *Facts and Figures 2000*, Mining Association of Canada.

[8] *Facts and Figures 2000*, Mining Association of Canada.

[9] *Facts and Figures 2000*, Mining Association of Canada.

[10] Dungan, 1996, *Rock Solid*.

[11] *Facts and Figures 2000*, Mining Association of Canada.

[12] Supplement to Mining Journal, February 19, 1999, p.12.

[13] Natural Resources Canada, *Exploration and Deposit Appraisal Expenditures, by Province and Territory, 1999-2002*.

[14] Metals Economics Group, "Exploration spending drops to its lowest level in nine years" (press release), November 1, 2001. The MEG survey methodology changed after 2000 to include companies with exploration budgets of more than US $100,000. Prior to the 2001 survey, only companies with exploration budgets in excess of US $3.0 million were included.

[15] Yukon MINFILE, 1999.

[16] Natural Resources Canada, *Exploration and Deposit Appraisal Expenditures, by Province and Territory, 1999-2002*.

[17] Yukon Geology Program, *Yukon Mineral and Exploration Overview, 2000*.

[18] Yukon Geology Program, *Yukon Mineral and Exploration Overview, 2001*.

[19] Yukon Department of Finance, *Yukon Economic Outlook 2002*.

[20] Industry Canada, Trade Data On-line (http://strategis.ic.gc.ca)

[21] Yukon Department of Economic Development, *Dawson City Economic Profile, 1994*.

[22] Global Economics Limited, *Mining Innovation: an Overview of Canada's Dynamic, Technologically Advanced Mining Industry*, page 8.

[23] Global Economics Limited, *Mining Innovation: an Overview of Canada's Dynamic, Technologically Advanced Mining Industry,* page 3. Factor productivity is a measure of the contribution of an input factor (e.g., labour, machinery) to the total output of a production process relative to the contribution of the same input factor when used in another production process.

[24] Department of Finance, *Budget Plan 2001*, Annex 2

[25] Yukon Mining Incentives Program data provided by Ken Galambos, Mineral Development Geologist, Yukon Geology Program.

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APPENDIX 1: USES OF METALS

Gold

Gold is a bright, shiny yellow metal known for its great density, extreme ductility, high resistance to corrosion, beauty and its scarcity. As it is the least chemically active of all metals, gold usually occurs in the free or un-combined state. Although most often found in veins or dispersed in bedrock, gold is also found as "placer" deposits in the sand or gravel along streams and is sometimes recovered as a by-product of base-metal mining. The value of this precious commodity is measured in carats, with 24-carat representing pure gold.

The most common use of gold, comprising 80 percent of the total world supply, is in jewellery, coins and ornamentation. Another 10 percent is used in other sectors such as electronics and dentistry while the remainder is purchased by investors.

Canada is the world's leading user of gold for coins, as is evidenced in the Maple Leaf bullion coin series. Gold is also known internationally for its use by governments as a monetary reserve.

Silver

Silver, also a scarce precious commodity, is a brilliant grey-white metal which takes a fine finish. It is soft and malleable and resistant to corrosion. It is known for being the best conductor of electricity among metals.

The greatest user of silver is the photographic industry which uses over 40 percent of total industrial consumption. Silver is also used for ornamentation or jewellery, and is often combined with copper to make it harder and stronger. Silver compounds are found on both photographic film and paper.

Nearly 25 percent of total silver use occurs within the electrical industry. Silver is used in electrical components like contacts and conductors in equipment that demands dependability such as satellites, spacecraft and guidance systems.

As an alloy with cadmium or zinc, silver is used in the high performance batteries of aircraft and spacecraft. Other uses include glass coating, dentistry and medicine. Finally, silver plating, the process of coating other metals with a thin layer of silver, is popular for decorative purposes.

Lead

Lead is a dense, malleable, bluish-white metal known for its corrosion resistance. It is found in both mined ore and in recycled scrap materials.

Lead is most commonly used in lead-acid storage batteries found in automobiles, forklifts and baggage carts. Battery production consumes around 65 percent of total lead production in the Western World. The average car battery contains about 10 kg of lead.

Lead is also commonly used as a pigment in paint, adding toughness and flexibility to the paint coating. Lead is found in chemicals, including lead-based stabilizers in PVC products and lead oxides in ceramics and high quality crystal and glass.

As an alloy with tin, lead is used in soldering for plumbing and electronic applications. The construction industry has historically made use of lead for roofing, piping and caulking. These uses have declined in recent years, although lead is often used as a sound barrier in office buildings, schools and multiple unit dwellings. Lead provides an effective shield in X-ray equipment and a protective sheath in underground and underwater cables.

Zinc

Known as "The Protector," zinc is a bluish-grey metal used around the world for such divergent purposes as galvanizing, die-casting and brass manufacturing.

The galvanizing process, accounting for over 40 percent of annual world consumption, uses zinc as a cost-effective coating for iron and steel, forming a protective layer against rust and corrosion. The greatest consumer of galvanized steel is the automobile industry, using anywhere from 11 to 17 kilograms of zinc per automobile. Galvanized steel is also commonly used in the construction industry for roofing and siding, as well as in heating and ventilation ducts.

With a relatively low melting point and significant fluidity, zinc is useful in die-casting that requires rapid, assembly line shaping of small and intricate objects.

Brass, an alloy of copper and zinc, is used in plumbing, heat exchange equipment and decorative hardware. Zinc also forms a component of dry-cell batteries, manufactured rubber, white paint, agricultural products, cosmetics and medicinal products.

Copper

Copper has a long history of use because of its easy workability, softness, resistance to corrosion and attractive colour and texture. In the modern era, copper use has increased even further due to its high conductivity of heat and electricity, its good tensile strength and mechanical properties and its non-magnetic attributes.

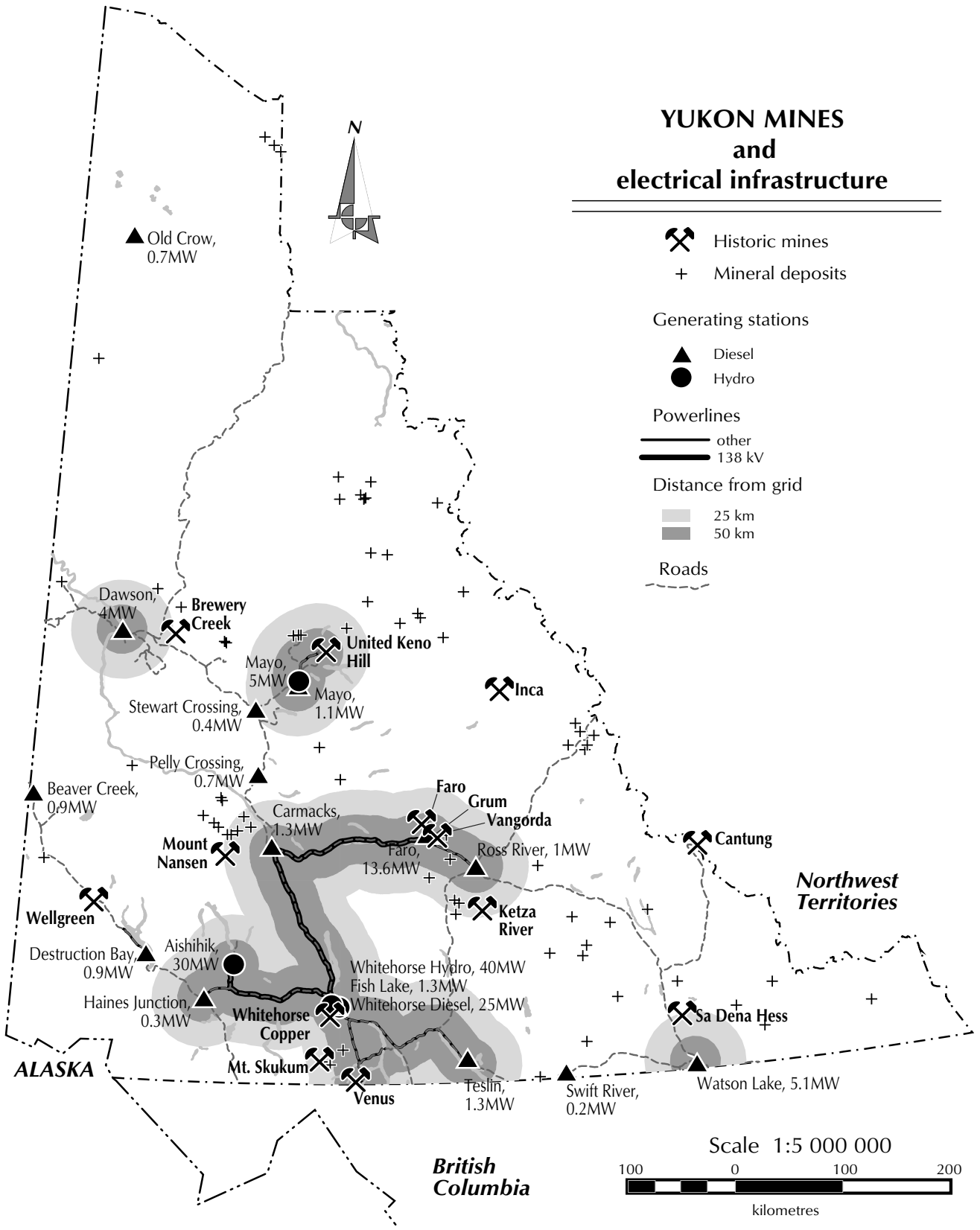
With the advent of many alloys, the use of copper has increased substantially. In addition to being alloyed with zinc to form brass and with tin to form "true" bronze, copper is also commonly combined with aluminum, silicon, nickel and many other metals in small quantities. The various purposes of alloying include improving hardness, resistance to corrosion or ease of manufacture.

The most common use of copper is for electrical applications. More than half of Canada's consumption of copper is found in copper wire. The brass mill industry, the second largest user of copper, manufactures pipe, plate, sheet and strip, rods, bars and shapes which may be used directly or become part of further manufacturing. Other uses of copper include ship building, architecture, chemical and food-processing industries, house construction and agriculture.

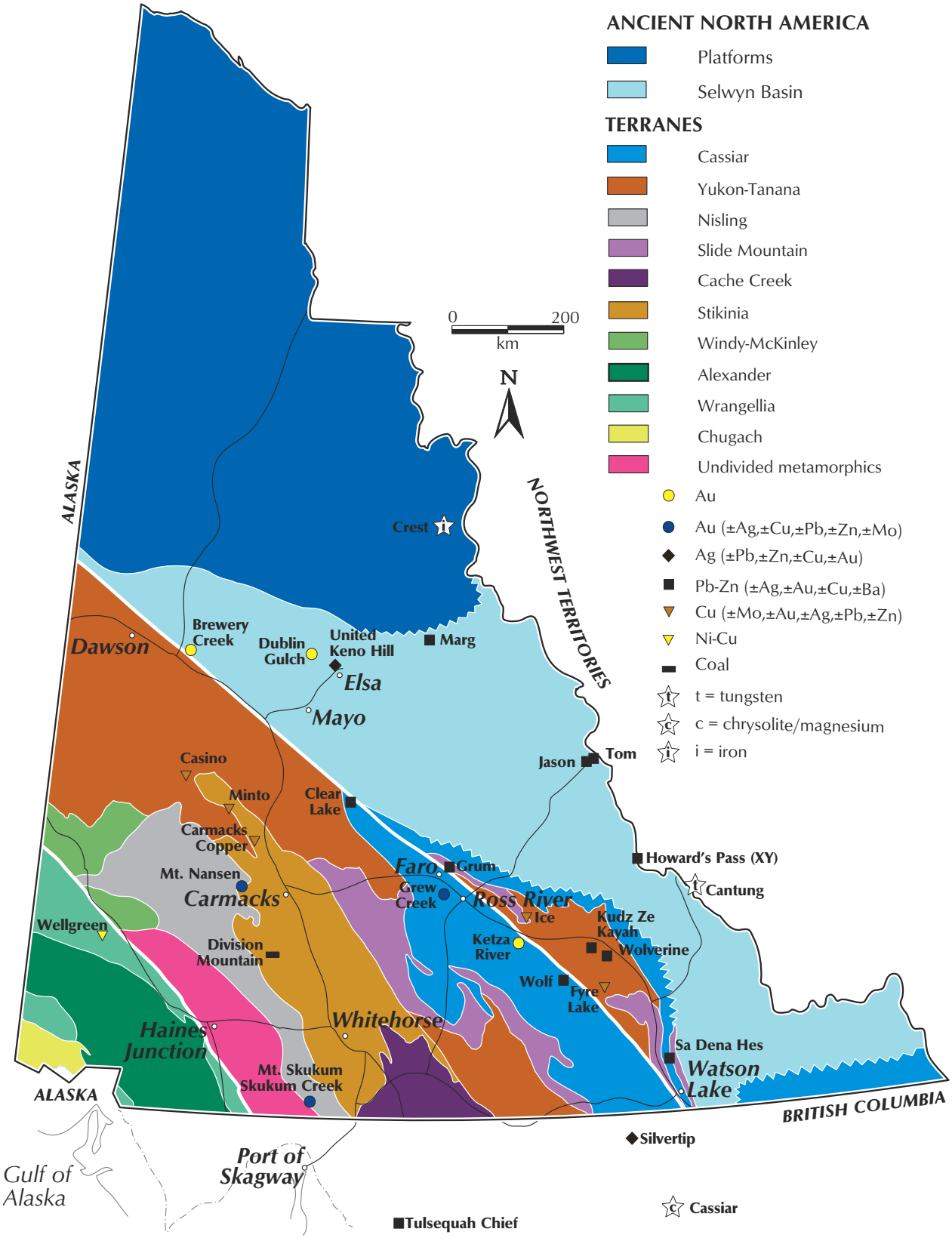
Sources of information

- *Canadian Minerals Yearbook, 1997, Natural Resources Canada*
- *International Lead and Zinc Study Group*

APPENDIX 2: INFRASTRUCTURE MAP



APPENDIX 3: MINES, DEVELOPMENT AND ADVANCED EXPLORATION



APPENDIX 4: FEDERAL MINING TAXATION PROVISIONS

FEDERAL INCOME TAX PROVISIONS

Resource Allowance
Instead of being able to deduct provincial/territorial mining taxes or royalties a corporate taxpayer can deduct, as a resource allowance, 25 percent of resource profits.

Canadian Exploration Expenses (CEE)
Canadian exploration expenses are those related to prospecting, geological, geochemical and geophysical surveying, drilling, trenching and feasibility studies for the purpose of determining the location, extent or quality of a mineral resource.

A taxpayer may deduct 100 percent of the CEE. Any unused balance may be carried forward indefinitely in a cumulative tax pool, known as Cumulative Canadian Exploration Expenses (CCEE), which can be claimed in a later year.

Canadian Development Expenses (CDE)
Canadian development expenses are those incurred to sink or excavate a mine shaft, main haulageway or similar underground work, after a mine is in production. The cost of any Canadian mineral property also qualifies as a CDE.

CDE are accumulated in a pool called the Cumulative Canadian Development Expenses (CCDE). The taxpayer may deduct up to 30 percent of the unclaimed balance in that pool at the end of each year and carry forward unclaimed balances indefinitely.

Foreign Exploration and Development Expense (FEDE)
Canadian firms involved in foreign resource activities are allowed to build up a balance or pool of foreign exploration and development expenses. Each year they are entitled to deduct from this balance an amount up to their foreign resource income. If they have little or no foreign income they can still deduct up to 10 percent of the balance and apply this amount against Canadian-source income of the firm.

Capital Cost Allowance (CCA)
Most capital assets acquired by mining and oil and gas companies are included in Class 41, which allow a depreciation rate of 25 percent on a declining balance basis.

Accelerated Capital Cost Allowance
In addition to the normal 25 percent rate of depreciation accorded to Class 41 assets, the accelerated capital cost allowance (ACCA) can provide for an additional depreciation allowance of up to 100 percent of asset cost.

The ACCA allows for the full write-off of capital costs before a mine starts to pay income tax.

Qualifying Environmental Trusts
Reclamation fund payments are deductible by the taxpayer in the year that the contribution is made. Payments received from the trust are included in the taxpayer's income in the year that they are received. Income earned by the trust is taxable each year at corporate income tax rates.

Flow-through shares
Flow-through shares are a mechanism by which a company can raise financing for expenditures on exploration and development. Junior mining companies, for example, have no revenue against which to expense their CEE. The company can renounce the expenses and let them flow-through to the purchaser of shares in the company.

Investors in flow-through shares get an immediate 100 percent tax deduction for the amount of money invested in the shares. There is always the added possibility that the exploration venture will be a successful one and the value of the shares will go up. Note, however, that the adjusted cost base of a flow-through share is deemed to be zero. As a result, the sale of the share for any amount greater than zero will create a taxable capital gain.

From 1983 to 1989, an additional 33 1/3 percent tax benefit (on top of the 100 percent CEE write-off) was introduced which made investment more attractive. In 1989, the additional 33 1/3 percent depletion was terminated. A grant system, Canadian Exploration Incentive Program (CEIP) was designed to replace it but was never introduced. CEIP would have provided cash grants to investors, in the order of 30 percent of qualifying exploration expenditures financed with flow-through shares.

FEDERAL FLOW-THROUGH SHARE ENHANCEMENT

The federal government, in its October 2000 mini-budget, introduced an investment tax credit to supplement the existing flow-through measure. The credit is designed to stimulate investor interest in the mineral exploration sector by providing a tax credit of 15% of eligible expenses. This can be applied against a taxpayer's federal income tax otherwise payable for the taxation year during which the investment is made. The Exploration Investment Tax Credit (EITC) is non-refundable but can be carried back three years and forward ten years. Credits amounts received are taxable in the year following claim. Expenses eligible for the credit are more restricted than expenses eligible for regular flow-through share renunciations. The EITC applies to eligible expenditures incurred between October 17, 2000 and January 1, 2004.

Use of the EITC will reduce a taxpayer's Cumulative Canadian Exploration Expense account. Taxpayers residing in provinces that provide additional exploration incentives are allowed to claim them in combination with the EITC, but the use of any tax credit offered by a province will reduce the amount of expenses eligible for the EITC and the amount of deductible CEE.

PROVINCIAL FLOW-THROUGH SHARE ENHANCEMENTS

To date, three provinces have introduced measures intended to supplement the federal Exploration Investment Tax Credit. In Ontario, the 15 percent federal credit is boosted by a 5% provincial credit, while in Saskatchewan the federal credit is enhanced by a 10 percent provincial credit. British Columbia chose to build on its Mineral Exploration Tax Credit by allowing the 20 percent refundable METC available to exploration companies to be passed on to flow-through investors, retroactive to August 1, 1998.

A fourth province, Québec, announced the termination of its flow-through share system in favour of improved refundable tax credit measures in its 2001/02 budget. The province has since decided, however, to continue to offer flow-through share incentives until December 31, 2003. Under the Québec approach, an individual may deduct as much as 175 percent of certain qualifying exploration expenses in certain locations for provincial tax purposes. In addition, Québec also allows an exemption for deemed capital gains on flow-through shares. This means that while the adjusted cost base of a flow-through share is deemed to be zero, any capital gain on the sale of the share is exempted from tax.

OTHER PROVINCIAL/TERRITORIAL MINING TAX MEASURES

In addition to the federal income tax measures available to the mining industry, Canada's provincial and territorial governments also offer a variety of industry-specific measures. The measures are provided through a wide assortment of mechanisms which are generally of two types, a) income tax measures, or b) modifications to mining tax/royalty regimes. As the various measures are exceptionally complex in their purpose and application they are not discussed here. Readers are referred to the PricewaterhouseCoopers publication, *Canadian Mining Taxation*, which contains thorough descriptions of the various measures on a jurisdiction-by-jurisdiction basis.