

# Canadian Mine Openings, Closings, Expansions, Extensions and New Mine Developments

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## OVERVIEW

A three-year, global metal price downturn that began in 1997 continued to have a negative effect on mining in Canada in 1999, causing more than double the number of mine closings over mine openings. During the year, 10 mines opened (including 6 new mines and 4 re-openings) and 24 mines closed (including 13 closures and 11 suspensions) (Tables 1 and 2). Six new mines came on stream consisting of 1 gold mine, 1 zinc-copper mine, 2 industrial mineral mines and 2 uranium mines. In addition, 4 mines re-opened, consisting of 2 gold mines and 2 base-metal mines. Of the 24 mine closings, 11 were production suspensions, including 9 gold mines and 2 base-metal mines, and 13 were permanent closures, including 5 gold mines, 5 base-metal mines, 1 coal mine, 1 sodium sulphate mine and 1 uranium mine. Two of the mine openings, both new mines, and two of the mine closings (one suspension and one closure) involved Canadian and foreign joint ventures. In addition, one Canadian junior company joined the rank of producer in Canada in 1999.

The new mines opened in 1999 were: the Shabogamo high-purity silica mine in Newfoundland, the Bell Allard zinc-copper mine and the East Amphi gold mine in Quebec, the Kapuskasing phosphate mine in Ontario, and the McClean Lake and McArthur River uranium mines in Saskatchewan. The mines re-opened during the year included the Hislop West gold mine in Ontario, the Highland Valley Copper mine and the Myra Falls zinc-copper-gold-silver mine in British Columbia, and the Con gold mine in the Northwest Territories.

The most important new mines in 1999, in terms of value of expected production and employment, were McArthur River and McClean Lake in Saskatchewan, Bell Allard in Quebec, and Kapuskasing in Ontario.

The year 1999 marked the closures of nine significant mines in Canada. In Nova Scotia, the Phalen coal mine closed in December as the result of chronic high costs and irreversible damage from roof caving and water problems. In New Brunswick, the Heath Steele zinc-copper-lead-silver mine, which first began production in 1957, closed in October. Mines Gaspé in Quebec also closed in October after 45 years of production. In Ontario, the Detour Lake gold mine near Timmins, in production since August 1983, closed in June. As well, the Levack, McCreedy West and Little Stobie nickel-copper mines in Sudbury closed in the summer. Production at Levack first began in 1913 and both McCreedy West and Little Stobie came on stream in the early 1970s. The Key Lake uranium mine in Saskatchewan, that had produced since August 1981, closed in June. The Snip gold mine in British Columbia closed in May after nine years of operation. Except for the Phalen mine, all of these mines closed due to the depletion of economically mineable ore.

In addition to production suspensions and mine closures, numerous production cutbacks continued throughout 1999, especially at coal mines, which created substantial employment losses during the year. Job losses through production cutbacks amounted to at least 900 in 1999, higher than the 700 estimated for 1998, and the largest such losses since 1992 when 32 mines closed.

In an effort to cut costs, mining consolidations through mine integration continued to take place in 1999, notably the further integration of mining operations at McWatters Mining Corporation's Sigma gold mine (the Sigma-Lamaque complex) in Quebec, at Claude Resources Limited's Seabee gold mine in Saskatchewan, and at Miramar Mining Corporation's Con gold mine in the Northwest Territories.

In 1999, there were at least 11 metal mine expansion and extension projects of significance across Canada (Table 2). Although most of these projects were the continuation of existing programs that began in recent years, many capital programs were revised by the companies involved by using new exploration and development data that are expected to result in higher efficiency and higher production at lower costs, thereby enabling the companies to be more competitive. Important expansion programs that

continued in 1999 were the Carol Lake and Wabush Mines iron ore operations in Labrador; the Doyon and Sigma (the Sigma-Lamaque complex) gold mines and the LaRonde gold-zinc-copper-silver mine in Quebec; and the Campbell gold mine, the McCreeley East and Creighton nickel-copper mines, and the Lac des Îles palladium-platinum-base-metal mine in Ontario. One significant new expansion program was announced in 1999 – the Niobec niobium mine in Quebec.

Despite continued weak metal prices, the decline in the number of mine openings experienced in 1998 (9 mines opened) was halted in 1999 when 10 mines opened. However, the total capital cost for bringing new and re-opened mines into production in 1999, estimated at about \$850 million, is lower than the \$1.4 billion estimated for mines that came on stream in 1998. For 1999, the bulk of the capital investment reflects the capital costs of developing the McClean Lake and McArthur River uranium mines in Saskatchewan whereas, for 1998, the bulk of the capital investment reflected the capital costs of developing the Ekati diamond mine in the Northwest Territories and the Kemess South gold-copper mine in British Columbia. Given the depressed mineral commodity prices and market conditions, the level of capital investment was relatively high in recent years compared with exploration expenditures. However, most of the capital investments in Canada in 1999 were not for the development of gold and base-metal mines. At least another \$250 million is estimated to have been spent on mine expansions and extensions, about the same as in 1998. Preliminary estimates indicate that the total capital investment required for bringing new mines and mine re-openings on stream in 2000 and 2001 will be about the same as, or slightly higher than, in 1999. As at least two world-class mines (one uranium and one diamond) are expected to come on stream in Canada over the next two to three years, capital investment is expected to rise in 2002 and 2003.

## REGIONAL PERSPECTIVE

During 1999, nine provinces and territories experienced mine openings or closings. Quebec, Ontario and British Columbia were particularly hard hit as mine closings in these provinces exceeded mine openings, resulting in large net losses in ore capacity and employment.

### Newfoundland

In Newfoundland, the Shabogamo silica mine near Smoky Mountain was opened in July by Shabogamo Mining and Exploration Co. Ltd., creating some 30 mining jobs. The mine is expected to produce 100 000 t/y of high-purity silica for SKW Canada Inc.'s ferroalloy plant at Bécancour, Quebec, for

10 years. However, with ore reserves of 5 Mt, the mine life could easily be extended beyond 20 years.

### Nova Scotia

The Phalen colliery near Waterford in Nova Scotia, the largest coal mine in the province, closed in December due to irreversible damages caused by underground roof caving. The 6000-t/d underground mine was brought on stream in 1987. However, over the years, production costs were high due largely to the depth of the mine under the ocean floor and frequent roof caving and water problems. More than 600 workers were employed at the mine during the peak production period. At the time of closure, fewer than 450 workers remained on site.

### New Brunswick

In New Brunswick, the Heath Steele zinc-copper-lead-silver underground mine, near Newcastle, closed in October as a victim of lingering low metal prices that accelerated the exhaustion of economically mineable ore. The mine first began production in 1957 as an open-pit mine and, during its 43-year mine life, expanded ore capacity to 3200 t/d from its initial capacity of 1360 t/d. Production at the mine was suspended four times (in 1958, 1978, 1984 and 1993) due largely to low metal prices. As there were no mine openings in 1999, the province suffered net losses of 3200 t/d of daily ore capacity and 300 mining jobs. With the closure of the Potacan potash mine in 1997 and the suspension of production at the Caribou and Restigouche zinc-lead mines near Bathurst in 1998, the Brunswick zinc-lead-copper mine is the only metal mine and one of the two large mining operations left in the province (the other being the New Brunswick Division potash mine near Sussex).

### Quebec

In Quebec, two new mines opened and five mines closed. The \$133 million, 2000-t/d Bell Allard zinc-copper underground mine near Matagami was brought on stream by Noranda Inc. in January, creating 200 new jobs. The mine was developed in time to supply ore to Noranda's nearby Mattagami mill to avoid the shutting down of the company's mining and milling operations at Mattagami Lake. The Matagami Division mines nearly ran out of ore when ore reserves at the Isle Dieu and Norita East mines were depleted at the end of November 1997 and subsequent development ore from the Norita West orebody was insufficient to sustain continuous zinc concentrate production at the mill. The 800-t/d East Amphi open-pit gold mine at Malartic also opened in January, but the pit ore was mined out in eight months. While the result of a feasibility study to develop the underground ore was positive, a production decision, which hinges on the price of gold, has not yet been made. During 1999, the five mine

closings included three closures and two suspensions. The most significant closure was Mines Gaspé. This 5500-t/d copper mine closed in mid-October due to ore depletion after 45 years of production. The small Joubi gold mine near Val-d'Or was mined out at the end of October and the short-lived East Amphi open-pit gold mine ceased operation in August. In addition, production was suspended at the Joe Mann gold mine near Chibougamau and the Francoeur gold mine near Rouyn-Noranda to revamp mining methods in an effort to cut costs. Both Francoeur and Joe Mann have since re-opened for production in February and April 2000, respectively. On balance, Quebec incurred net losses of some 5360 t/d of ore capacity and 650 mining jobs from mine openings and closings in 1999.

## Ontario

In Ontario, two mines opened and nine closed. The 3500-t/d Kapuskasing open-pit phosphate mine near Kapuskasing began production in August 1999. About 100 new jobs were created. It is Canada's first large phosphate mine. Developed over two years at a capital investment of US\$70 million, the high-grade, low-cost mine is expected to supply 100% of the phosphate rock required by the owner's (Agrium Inc.) Redwater fertilizer plant in Alberta to produce monoammonium phosphate for the next 20 years. Prior to the start of production at Kapuskasing, Agrium had relied, since 1986, on imported phosphate rock from Togo, Africa. In addition, the 500-t/d Hislop open-pit gold mine near Matheson re-opened in July through the development of the West Zone. Ore is treated at the company's Stock mill and gold production is estimated to be 20 000 oz/y over less than two years at a cash cost of US\$195/oz. The company plans to use the cash flow to develop the nearby Taylor gold project.

Of the nine mine closings in Ontario in 1999, two were gold mine closures and three were base-metal mine closures. The Detour Lake gold mine near Matheson and the Lakeshore gold tailings operation near Kirkland Lake both closed in June. The Levack, McCreedy West and Little Stobie nickel-copper mines at Sudbury all closed in the summer. All five closed as the result of exhaustion of economic ore. In addition, production was suspended at four gold mines, namely, the Macassa mine at Kirkland Lake and the Madsen mine near Red Lake in June, and the Nighthawk and Pamour mines at Timmins in September. Although final reasons for the suspensions varied, they were largely related to low gold prices. The David Bell concentrator near Marathon was shut down permanently in mid-June to cut costs. Gold ore from the mine is now being processed at the nearby Williams mill.

With net losses of seven mines, some 14 700 t/d of ore production capacity and 900 mining jobs, Ontario's

mining industry suffered the heaviest blow among all provinces and territories in 1999.

## Saskatchewan

In Saskatchewan, two mines opened and two closed in 1999. The two mines opened are both world-class uranium mines. Mining began at the 275-t/d McClean Lake open-pit and underground mine in June. The mine, developed at a capital cost of \$200 million, is scheduled to produce 6 million lb of  $U_3O_8$  (2308 tU) annually. The mill capacity will be expanded to accommodate ore from the Cigar Lake mine, which is under development for production in late 2002. The McClean Lake uranium deposit has an overall mineable reserve of 17 300 tU. The average ore grade is currently running at 2.7%, with underground ore increasing to 4% at a depth of 170 m. The mine is the first Canadian, French and Japanese mining joint venture in Canada with COGEMA Resources Inc. of France holding a 70% controlling interest, Denison Mines Limited of Canada holding 22.5%, and Japanese-owned OURD (Canada) Co., Ltd. holding 7.5%. The \$400 million, 125-t/d McArthur River mine began production in early December. Ore is processed at the Key Lake mill, some 80 km southwest of the mine. With overall reserves and resources outlined at 186 000 tU, including 98 000 tU currently in the mineable category, and an ore reserve grade averaging 17%  $U_3O_8$  and a resource grade averaging 12.03%  $U_3O_8$ , the McArthur River deposit is the world's largest high-grade uranium deposit. Annual production is expected to be 18 million lb of  $U_3O_8$  (6924 t of uranium). The mine is a joint venture between Canada's Cameco Corporation, which owns a 69.805% interest in the project, and French-controlled COGEMA Resources Inc., which owns the remaining 30.195%.

The Key Lake uranium mine at Key Lake in north-eastern Saskatchewan closed in June after 19 years of operation due to ore depletion. The mill has been modified to process high-grade ore from the McArthur River mine, which began production in December (see above). As well, the Horsehoe Lake sodium sulphate operation at Ormiston in the southern part of the province closed in January due to the depletion of brine reserves.

Overall, the two new mines created 650 direct mining jobs and the two mine closures created 300 job losses in Saskatchewan, resulting in a net gain of some 350 new jobs for the province in 1999.

## British Columbia

During 1999, two mines re-opened, production at three mines was suspended and one mine closed in British Columbia. The 4000-t/d Myra Falls zinc-copper mine near Campbell River on Vancouver

Island re-opened in March, one month ahead of schedule. Production had been suspended at the mine in December 1998 due to poor ground conditions that were causing excessive ore dilution which led to lower head grades. During the shut-down, the mine underwent \$15 million of rehabilitation and additional underground development. At full production, the mine produces some 60 000 t of zinc, 20 000 t of copper, 32 000 oz of gold and 1 million oz of silver annually and is one of the most important base-metal producers in the province. The 37 650-t/d Gibraltar open-pit copper mine at McLeese Lake in the southeastern part of the province suspended production in February due to low copper prices, laying off 267 workers. Subsequently, in April, Taseko Mines Limited acquired the mine from owner Boliden Limited and kept it on care and maintenance with the intention to re-open it when copper prices improve. In mid-May, production was suspended at the 125 000-t/d Highland Valley Copper (HVC) open-pit copper-molybdenum mine near Logan Lake in southern British Columbia due to a labour dispute. The mine re-opened in late August after an agreement was reached between the union and the company that ties miners' wages to copper prices. All 1064 mine workers were recalled. The HVC mine is Canada's largest producing copper mine.

The small but relatively high-grade Blackdome underground gold mine near Clinton suspended production in May due to low gold prices. The mine was first brought on stream in 1986 by Blackdome Mining Corporation. Originally outlined ore reserves were depleted in 1990. Claimstaker Resources Ltd. acquired the property in 1995. New ore was subsequently discovered and developed for re-opening in October 1998. After nine years of operation, the 475-t/d, high-grade Snip gold mine near Stewart closed in May. As a result of these mine openings and closings in 1999, the province suffered significant net losses of over 34 000 t of daily ore capacity and 880 mining jobs.

## Yukon

The Yukon's economy continued to suffer in 1999, with another mine closing and no mine openings. Production at the 700-t/d Mount Nansen gold-silver mine near Carmack was suspended in February due to low gold prices. About 50 miners lost their jobs. At the time of closing, ore reserves at the producing ore-body were near exhaustion. Although other ore zones exist and B.Y.G. Natural Resources Inc. intended to develop them for production, the company soon went into receivership. The Yukon now has only one producing mine remaining – the Brewery Creek gold mine near Dawson Creek.

## Northwest Territories

In the Northwest Territories, the 550-t/d Con gold mine in Yellowknife re-opened in June after a year-

long strike. In December 1999, mine owner Miramar Mining Corporation acquired the nearby Giant gold mine from the federal Department of Indian Affairs and Northern Development and announced that it will combine the Con and Giant operations to produce 130 000 oz of gold per year at an average cash cost of US\$260/oz. Production from the Con mine is planned at 100 000 oz/y, with the remaining 30 000 oz from the Giant mine's Supercrest Zone. As a condition of sale, the Giant mine, previously owned by the defunct Royal Oak Mines Inc., was closed in September to facilitate the acquisition by Miramar. The 1000-t/d Giant mine was subsequently redeveloped and re-opened in February 2000 but at a drastically reduced scale. As a part of the corporate strategy to consolidate operations and reduce production costs, the Giant mill was closed and underground activity at Giant was limited to the development and mining of the higher-grade Supercrest Zone, with ore mined being processed at the Con mill. Overall, in 1999, the Northwest Territories incurred a net loss of some 450 t/d of gold ore capacity but few net job losses.

## MINE EXPANSIONS AND EXTENSIONS

Despite continued low metal prices throughout most of 1999, at least 11 significant gold and base-metal mine expansion and extension projects were initiated or undertaken in the year (Table 2): 5 in Quebec, 4 in Ontario, and 1 in each of Manitoba and Saskatchewan. The majority of these projects involved the completion of existing programs and several further extensions at gold mines.

### Quebec

In Quebec, significant quantities of new gold ores continued to be found at depth and in the surrounding areas of the Doyon-Mouska and Sigma-Lamaque mining complexes and at the Kiena and LaRonde mines, resulting in a further extension of the life of these mines. At the end of 1999, ore reserves at the Doyon Division stood at 10.623 Mt grading 6.3 g/t gold, with an additional 3.04 Mt grading 2.8 g/t gold in the measured and indicated categories and 7.94 Mt grading 4.8 g/t gold in the inferred category. Exploration has established that, in general, ore grades are higher at depth. After producing 242 800 oz of gold in 1999, total contained gold in all categories amounted to 3.667 million oz of gold, about the same as the 3.664 million oz in 1998. Capital investment at Doyon was \$4.4 million in 1999 and is expected to increase to \$11 million in 2000 to continue development of the production block on level 12 and to complete the internal shaft and lower levels at Mouska. Production costs at the Division also continued to improve. In 1999, the average cash cost of gold production was US\$203/oz, down 10% from 1998.

A \$256 million expansion and mine life extension program, which started in 1997, continued in 1999 at the LaRonde gold-zinc mine near Val-d'Or. In the Phase 1 expansion program that concluded in 1999, ore capacity was increased to 3265 t/d from the original 1800 t/d, with production reaching the new capacity level in the first quarter of 2000. However, the higher-than-expected ore thickness on zones accessible from shaft 3 caused the company, Agnico-Eagle Mines Limited, to plan a further expansion. A revised Phase 2 capital investment plan, designed in 1999, calls for an additional US\$34 million to further increase the ore capacity to 4535 t/d, increasing expenditures on the two-phase expansion program to US\$218 million. The expansion is expected to result in a greater rate of return and a shorter payback period. At the start of 2000, about US\$120 million remained to be spent over the next 3.5 years. The new mill expansion is expected to be completed by the fourth quarter of 2000. Gold production is expected to more than double the mine's 1998 output of 150 000 oz to 337 000 oz in 2004 at a cash operating cost of US\$104 per short ton (st) after by-product credits, making the mine one of the lowest-cost gold mines in the world. At the beginning of 2000, mine reserves stood at 3 million oz of contained gold, with an additional 3.1 million oz in the resource category. There is good potential to increase mine reserves as major ore zones are open at depth.

Since acquiring the Kiama mine and the Sigma-Lamaque complex from Placer Dome North America in 1997, McWatters Mining Inc. embarked on a US\$23 million expansion and reserves extension program to increase ore reserves and production and to cut costs. During 1999, significant new ore, including that from the Sigma 2000 ore zone, boosted the near-surface ore reserves at Sigma-Lamaque to 16.3 Mt grading 3.02 g/t gold, or 1.6 million oz, in the first quarter of 2000. An additional 12.5 Mt grading 1.18 g/t gold are in the measured and indicated category. Another 33 Mt of mineralized material has also been identified along extensions of existing ore zones. This new reserves base is in stark contrast to the former ore reserves of 3.8 Mt grading 3.28 g/t gold. McWatters is spending \$1.9 million to expand the Sigma mill capacity to 3000 t/d from the current 2000 t/d by July 2000. Another \$2 million has been budgeted to further expand the mill capacity to 4000 t/d by the second quarter of 2001. As a result of capacity expansion, gold production from the complex is expected to rise to 155 000 oz in 2001 from 82 000 oz in 1999. Cash operating costs are expected to drop to US\$180/oz in 2002 from US\$243/oz in 1999. The company is contemplating a further capacity expansion to an ultimate 7000-t/d level.

A \$1.1 billion, six-year comprehensive capital investment program announced by the Iron Ore Company of Canada (IOC) in October 1998 continued in 1999. About 60%, or \$650 million, of the investment will be

spent on upgrading and expanding the company's Carol Lake (Labrador West) mine, concentrator and pellet plant operations, and \$361.5 million will be spent on refurbishing and reactivating the pellet plant at Sept-Îles, which was mothballed in 1982. The plant, scheduled to re-open in 2002, will create 140 long-term jobs and require up to 700 workers during the refurbishing phase. Overall, the capital investment program is expected to result in modernized, better integrated and expanded IOC operations in Labrador and Quebec.

A \$15.7 million, two-phase capital program launched in 1998 to deepen the production shaft and to develop deep ore at the Niobec niobium mine near Chicoutimi was under way in the third quarter of 1999. With the addition of new reserves in the lower or "third" block, total mine reserves now stand at 10.6 Mt grading 0.52% Nb<sub>2</sub>O<sub>5</sub>, sufficient to sustain the mine life until at least 2010. Initial production from the Phase 1 program is expected to start in the fourth quarter of 2000. Capacity will be increased by 20% as the market warrants. The Phase 2 expansion, to begin at an unspecified date, will increase production by another 20%. Key capital costs for the production expansion in Phase 1 will be about \$4.7 million and, for the further expansion in Phase 2, less than \$2 million. Production is expected to be 2400 t of contained niobium in 2000, up from the 2300 t in 1999 and 2177 t in 1998.

## Ontario

In Ontario, major expansion and extension programs occurred at several precious and base-metal mines. Higher palladium prices and exploration success in 1998 have encouraged North American Palladium Ltd. to embark on a major capital program to expand production at its Lac des Îles palladium mine near Thunder Bay. The expansion program will see the mine's open pit enlarged and the mill capacity increase to 15 000 t/d from the current 2400 t/d by mid-2001. At the start of 2000, ore reserves stood at 74.2 Mt grading 1.64 g/t palladium, 0.18 g/t platinum, 0.14 g/t gold, 0.07% copper and 0.06% nickel with a mine life of 11 years. Annual production at the expanded rate is expected to be 248 900 oz of palladium, 24 200 oz of platinum and 19 100 oz of gold, plus copper, nickel and cobalt credits, at an average cash cost of US\$131/oz of palladium. The total capital cost of this expansion program is estimated at US\$126.5 million. The mine is Canada's only primary palladium producer and is the second largest primary palladium mine in North America.

The US\$51 million depth development program at the Campbell gold mine at Balmertown that started in 1997 was nearing completion in 1999. The 1820-m-deep circular Reid shaft, originally scheduled to be completed in mid-1998, was completed and commissioned one year later. The shaft provides a second,

more efficient underground access and enables exploration drilling to greater depths. However, a significant part of the mine property remains to be explored and a number of existing ore zones could be expanded. Ore reserves as of December 31, 1999, were 4.044 Mt grading 14.5 g/t gold, or 1.89 million oz, sufficient for more than seven years of production at the current rate. The mine is expected to maintain the current 300 000-oz level of gold production in 1999, at a cash cost of US\$140/oz, maintaining Campbell's status as one of the lowest-cost gold producers in Canada.

Impressive exploration successes in recent years at Goldcorp Inc.'s Red Lake gold mine, adjacent to the Campbell mine, catapulted the mine to the development stage in the fall of 1999. The mine, where production was suspended since a strike broke out on June 23, 1996, is scheduled to re-open in November 2000. The capital cost for redeveloping and re-opening the mine is estimated at US\$56 million. The discovery of the rich High Grade Zone was the key for its redevelopment into a world-class high-grade gold mine. Gold production is projected to be 240 000 oz/y at a cash cost of US\$88/oz, which would make this the lowest-cost gold mine in Canada. As of December 31, 1999, ore reserves at the mine were estimated to contain 2.9 million oz of gold. About 2.32 million oz of the gold reserves were contained in 1.70 million st (or 1.54 Mt) of ore reserves grading 1.37 oz/st in the newly outlined High Grade Zone. The remaining reserves of 570 000 oz (0.6 million oz), in ore with an average grade of 0.36 oz/st, were in the sulphide zones that run parallel to the High Grade Zone. Goldcorp Inc., the owner and operator of the mine, continued to discover and outline exceptionally high-grade ores in 2000 and has indicated that, while the High Grade Zone has been given top priority for development in 1999, drilling outside the zone will be given prominence in 2000.

In the Sudbury area, major expansion and ore reserves extension work continued at two of Inco Limited's mines. A \$194 million capital program to fully develop the McCreedy East nickel-copper mine and to expand ore production capacity since its opening in 1996 was completed in 1999. When in full production, the mine is expected to produce 14 500 t/y of nickel and will be one of the lowest-cost nickel-producing mines in Ontario. The US\$125 million, two-phase expansion and extension program at the Creighton nickel-copper mine moved into high gear in 1999. The goal of the program is to extend the mine life at Creighton to about 20 years. Phase 1, which began in late 1998, will develop proven reserves of 2.8 Mt grading 3.45% nickel and 2.97% copper located between the 7400 and 7660 levels. Production from these ore reserves is scheduled to start in 2001 and to continue through 2013. Phase 2 will develop 3.1 Mt of probable reserves grading 3.62% nickel and 3.25% copper that are situated

between the 7660 and 8180 levels for production between 2005 and 2019. When fully on stream, annual production from Creighton is expected to be 10 900 t of nickel, 9500 t of copper and 28 000 oz of platinum group metals. Creighton, together with Copper Cliff North, Copper Cliff South and McCreedy East, are Inco's four key and lowest-cost mines in the company's Ontario Division. With the closure of the Shebandowan mine near Thunder Bay in 1998, all of Inco's producing mines in Ontario are in the Sudbury area.

## Manitoba

In September 1999, Harmony Gold Mining Company Limited launched a \$6 million capital program to expand its Bissett (formerly San Antonio) gold mine northeast of Winnipeg to increase production and to cut costs. The mill capacity is expected to increase to 900 t/d from 635 t/d in 2000, with the cash cost dropping to US\$220/oz from US\$278/oz prior to the expansion in 1999. Production is planned at 60 000 oz/y. At the start of 1999, ore reserves stood at 2 Mt grading 8 g/t gold. The expansion program also includes further delineation drilling to increase ore reserves.

## Saskatchewan

In early 1999, the Currie Rose gold property adjacent to the Seabee gold mine near La Ronge was brought on stream, integrated with the Seabee mine. The addition of Currie Rose boosted Seabee's mine reserves to 507 000 t grading 8.56 g/t gold, with an additional 346 000 t in the possible category. Exploration has also identified a resource potential of 1.5 Mt on the Seabee/Currie Rose property and high-grade mineralization has been encountered during underground development at Currie Rose.

## British Columbia

An expansion was under way at the Cassiar asbestos operation at Cassiar in 1999. By the end of October 1999, the mine had reached commercial production with its milling capacity expanded to produce 40 000 t/y of chrysotile fibre from tailings and low-grade stockpiles. Cassiar Mines and Metals Inc. (formerly Minroc Mines Inc.), owner of the Cassiar operation, is examining the possibility of a magnesium extraction operation on site.

## Northwest Territories

At the Ekati diamond mine at Lac de Gras, development is under way to expand production. The plan is to bring the Koala and Misery pipes on stream in 2002 and to double diamond production soon thereafter. Current production comes mainly from the Panda pipe open pit, which runs at 9000 t/d of ore throughput, producing 3 Mct/y of diamonds.

Overall, the major mine expansion and extension programs described above indicate that, despite continued weak metal prices, many mining companies in Canada continue to discover new ore at existing mines that enable them to extend mine lives and expand production. Expansion also enables the mines to reduce production costs and to stay competitive and economically viable. Although in the majority of cases such expansions or extensions seldom resulted in large increases in new jobs, a significant number of new jobs, both during the construction phase and the long-term operating phase, were created in Quebec at the Niobec mine and at the Sept-Îles iron plant in connection with IOC's overall modernization and expansion of its iron ore operations in Labrador and Quebec in 1999. A significant number of new jobs can be expected at the Lac des Îles mine in Ontario in 2000.

## IMPACT

In 1999, new mines and re-openings brought on stream some 137 000 t of daily ore capacity and created 2700 mining jobs. However, about 202 000 t/d of ore capacity and 4850 jobs were lost from mine closures and production suspensions, resulting in a net loss of 14 mines, significant net losses of 65 000 t of daily ore capacity, and more than 2850 direct mining jobs, the greatest losses since 1992. Although the Highland Valley Copper mine appeared to have contributed to most of the gains and losses during the year, it did not result in any net gain or loss in capacity or employment as the mine closed and then re-opened before year-end 1999. The real causes for most of the net gain in ore production capacity in 1999, therefore, came from two new mines, the 2000-t/d Bell Allard zinc-copper mine in Quebec and the 3500-t/d Kapuskasing phosphate mine in Ontario, as well as from the re-opening of the 4000-t/d Myra Falls zinc-copper mine in British Columbia. In comparison, most of the net loss in capacity came from the closure of the 6000-t/d Phalen coal mine in Nova Scotia; the 3200-t/d Heath Steele zinc-copper-lead-silver mine in New Brunswick; the 5500-t/d Mines Gaspé copper mine, the Levack, McCreedy West and Little Stobie nickel-copper mines that together amounted to 9000 t of daily ore capacity, and the 3500-t/d Detour Lake gold mine in Ontario; and the suspension of the 37 650-t/d Gibraltar copper mine in British Columbia and the 1000-t/d Giant gold mine in the Northwest Territories. These mines also accounted for the bulk of the mining employment losses due to mine closings in Canada in 1999 (about 2430, or 64%). In addition, production cutbacks also resulted in substantial job losses during the year, especially at gold, base-metal and coal mines. Total job losses due to production cutbacks during the year were estimated at more than 900, nearly a 30% increase over the number of

losses in 1998 and the third consecutive year of job losses due to cutbacks at producing mines across Canada. Although a significant number of jobs were created in Canada each year between 1994 and 1997 from mine expansions and extensions, fewer than 100 jobs were estimated to have been created this way since 1998 to help offset the negative impact of job reduction through production cutbacks. However, expansions and extensions enable mines to retain a number of mine workers whose jobs would otherwise have been eliminated through production cutbacks.

Mine openings ensure immediate access to new or redeveloped sources of economic mineral supply, new production capacity and capability, and new mining jobs. They not only reflect Canada's mine-building ability, but also its attractiveness in the face of globalization and global competition. In 1999, mine openings continued to contribute significantly to Canada's total minerals and metals production. At full capacity, production from new and re-opened mines in 1999 is expected to add some 5.38 t (173 000 oz) of gold, 31.1 t (1 million oz) of silver, 29 000 t of copper, 160 000 t of zinc, 9232 t of uranium (24 million lb of  $U_3O_8$ ), 1.1 Mt of phosphate rock, and 100 000 t of high-purity silica annually (Table 3) to Canada's total mineral production. While most of the new gold production (58%) will come from the Con mine in the Northwest Territories, most of the silver (>90%) and copper (69%) will come from the Myra Falls operation in British Columbia and the new zinc production will be entirely from the Bell Allard mine (63%) in Quebec and from Myra Falls (37%). All of the new uranium production will come from the McClean Lake and McArthur River mines in Saskatchewan. All of this new production is essential for offsetting production losses from mine closings and for maintaining Canada's mineral production from existing mines. Except for the two small gold mines in Quebec and Ontario, most of the new mines are expected to have a mine life of more than five years. A mine life of at least 15 years can be expected at the McArthur River uranium mine.

Table 4 shows that new and re-opened mines in 1999 have also added over 26.5 t, or 851 850 oz, of gold reserves; 391 t, or 12.57 million oz, of silver reserves; 149 700 t of copper reserves; 963 000 t of zinc reserves; and 203 300 t of uranium reserves to Canada's total reserves of these metals. In addition, some 8.4 Mt of phosphorous pentoxide and 5 Mt of high-purity silica reserves have been added. All of the new metal reserves are essential for replenishing depleted reserves due to production and for sustaining Canada's minerals and metals production capability. While phosphorous reserves added diversification to Canada's mineral production, the new uranium reserves firmly ensure Canada's position as the world's largest long-term supplier.

## NEW DEVELOPMENTS EXPECTED TO BECOME MINES IN 2000

Preliminary estimates, based on mine development activities in 1999 and in the first quarter of 2000, indicate that at least 10 mines could come on stream during 2000. However, few will be new mines; most will be re-openings. Among the most promising new mines are the Magnola magnesium operation (by processing asbestos tailings) in Quebec and the Chisel North zinc-copper project in Manitoba. Mine re-openings will likely include the Francoeur and Joe Mann gold mines and the Saint-Onge wollastonite mine in Quebec, the Red Lake and Stock gold mines in Ontario, the Giant gold mine in the Northwest Territories, and the Lupin gold mine in Nunavut. In fact, production had already resumed at the Joe Mann, Francoeur, Saint-Onge, Stock and Giant mines in the spring of 2000. All of the mine re-openings underwent redevelopment work to redefine ore reserves, cut costs and streamline operations.

In addition, several previous mine expansion and extension projects, as well as new ones that were initiated in 1999, are expected to continue in 2000 with others likely be announced during the year. These expansions and extensions, together with new mine developments, are central to sustaining mining and production in Canada. In the face of weak prices for many minerals and metals and without having to resort to layoffs, mine expansion remains an effective option by which production costs can be lowered and productivity increased at an existing mine. Such an option is especially beneficial for mines that have significant new ore discoveries, for example, the LaRonde, Sigma and Norbec mines in Quebec and the Campbell, Red Lake, Lac des Îles, Copper Cliff North, Copper Cliff South, McCreedy East and Creighton mines in Ontario.

## OUTLOOK

The metal price down-cycle from 1997 to 1999 not only caused a major drop in metallic mineral exploration worldwide, but also negatively affected mine development in Canada and in most parts of the world. This was reflected in the declining number of mine openings in Canada's traditionally strong areas of gold and base metals during the period. In addition, coal mining in Canada was hit hard by lingering weak metallurgical coal prices, which plummeted further to below the US\$40/t (f.o.b.) level in early 2000. Throughout 1999, Canadian companies continued to respond by closing high-cost mines, consolidating operations by integrating mines, cutting back on production to keep marginal operations afloat (which included extended summer shut-downs), and postponing mine openings and developments.

Gold and base-metal prices have shown signs of recovery since the summer of 1999, partly due to the gradual recovery of the Asian economy from the Asian financial crisis and partly due to the positive announcements of the International Monetary Fund (IMF) and European central banks on controlled gold sales. However, other factors, including continued and substantial quantities of planned gold sales by major European central banks and a generally low investor confidence in gold mining since the Bre-X incident, compounded by growing attractions towards investment in the high-tech industry, will continue to cloud the future of gold. Nevertheless, the Asian recovery and growth of the key developing economies around the world will help strengthen the global economy and boost demand for minerals and metals. Under this scenario, metal prices, including those for gold, are expected to strengthen. This will have a positive effect on mine openings and closings in Canada in the foreseeable future. As indicated above, at least 10 mines are likely to open in 2000. With some 10 mines likely to close in the year, the overall mining scene in Canada will likely be more stable in 2000 than in 1999. Capital investment for mines to open in 2000 is expected to exceed \$900 million, which is higher than the \$850 million for 1999.

*Notes: (1) Information in this review was current as of June 15, 2000. (2) This and other reviews, including previous editions, are available on the Internet at [http://www.nrcan.gc.ca/mms/cmty/index\\_e.html](http://www.nrcan.gc.ca/mms/cmty/index_e.html).*

## NOTE TO READERS

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**TABLE 1. MINE OPENINGS AND CLOSINGS IN CANADA, 1999**

Province/ Territory	New Mines			Mines Re-Opened			Mines Suspended			Mines Closed		
	Precious Metals	Base Metals	Other Minerals/ Metals	Precious Metals	Base Metals	Other Minerals/ Metals	Precious Metals	Base Metals	Other Minerals/ Metals	Precious Metals	Base Metals	Other Minerals/ Metals
Newfoundland	–	–	1	–	–	–	–	–	–	–	–	–
Nova Scotia	–	–	–	–	–	–	–	–	–	–	–	1
New Brunswick	–	–	–	–	–	–	–	–	–	–	1	–
Quebec	1	1	–	–	–	–	2	–	–	2	1	–
Ontario	–	–	1	1	–	–	4	–	–	2	3	–
Saskatchewan	–	–	2	–	–	–	–	–	–	–	–	2
British Columbia	–	–	–	–	2	–	1	2	–	1	–	–
Yukon	–	–	–	–	–	–	1	–	–	–	–	–
Northwest Territories	–	–	–	1	–	–	1	–	–	–	–	–
Canada, total by commodity group	1	1	4	2	2	–	9	2	–	5	5	3
Total Canada		6			4			11			13	

Source: Natural Resources Canada, based on company reports.

– Nil.

Note: The above table includes the East Amphi open-pit gold mine in Quebec that opened in January and closed in August, and the Highland Valley Copper mine in British Columbia that suspended production in May and re-opened in August.

TABLE 2. MINE OPENINGS, RE-OPENINGS, EXPANSIONS, EXTENSIONS, SUSPENSIONS AND CLOSURES IN CANADA IN 1999

Mining Project	Location	Province/Territory	Ore Capacity (tonnes/day)	Employment during Mine Life <sup>1</sup>	Date of Opening, Re-Opening, Expansion, Suspension or Closure	Mine or Plant Type	Main Commodities	Companies	Remarks
<b>NEW OPERATIONS</b>									
<b>Precious Metals</b>									
East Amphi	Malartic	Que.	800	30	January	O/P	Gold	McWatters Mining Inc.	The East Amphi open-pit gold operation began production in January 1999 and was completed in August of the same year, mining some 125 042 t of ore grading 5.53 g/t gold to produce some 21 563 oz of gold. McWatters Mining acquired the property in January 1998 for \$3 million. In September 1999, a feasibility study revealed an underground mining plan to develop ore reserves at depth. The company believes that an underground mine could be brought into production in nine months once a production decision is made. The total capital cost of developing an underground mine is estimated at \$10 million. The mining plan calls for an 800-t/d production rate that could be increased to 1000 t/d by adding additional trucking capacity. At a 97% mill recovery rate based on actual recovery of the open-pit ore, which was processed at the company's Sigma mill nearby, annual production would be about 60 000 oz of gold. The average cash operating cost is estimated at US\$183/oz and the total cost at US\$225/oz. The mine could support 50-60 mining jobs. As of September 29, 1999, total probable reserves stood at 1 124 600 t, or 183 000 oz, grading 5.07 g/t gold. In addition, there are more than 1 Mt of indicated resources (195 000 oz) grading 5.91 g/t gold and 2.7 Mt of inferred resources (461 000 oz) grading 5.2 g/t gold.
<b>Base Metals</b>									
Bell Allard	Matagami	Que.	2 000	250	January	U/G	Zinc, copper	Noranda Inc.	The mine began production in January 1999 and reached commercial production at 65% of its designed operating capacity of 2000 t/d in January 2000. It was brought on stream at an estimated capital cost of \$133 million. Ore is processed at the company's concentrator at Matagami. At the start of production, ore reserves stood at 3.2 Mt grading 13.77% zinc, 1.5% copper, 48 g/t silver and 0.68 g/t gold. The mine life is estimated at five years. Planned annual zinc production is about 100 000 t. The mine was developed to replace the Isle Dieu and Norita East mines, which were closed in 1997. In late February 2000, operations at the mine were suspended due to a malfunction of the hoisting skip that caused damage to the shaft compartment. However, production had resumed in early April after successful repairs were made.

**Other Minerals and Metals**

Shabogamo	Smoky Mountain	Nfld.	375 <sup>e</sup>	30 <sup>e</sup>	July	O/P	Quartz (high purity)	Shabogamo Mining and Exploration Co. Ltd.	After successful bulk sampling and finalization of a supply contract in 1998, the mine was brought on stream in July 1999. Production is planned at 100 000 t/y of high-purity quartz and will supply SKW Canada Inc.'s ferroalloy plant at Bécancour, Quebec, for 10 years. As of July 1999, quartz reserves stood at 5 Mt. Shabogamo also has acquired the mineral rights to the old L M & E iron oxide stockpiles and deposits on both sides of the Quebec-Labrador border near Schefferville.
Kapuskasing	Kapuskasing	Ont.	3 500 <sup>e</sup>	100	August	O/P	Phosphate	Agrium Inc.	Mining began at the Kapuskasing open-pit mine in Ontario in July 1999 with production start-up in August. It is Canada's first phosphate mine. The high-quality phosphate deposit was developed over two years (since September 1997) at a cost of US\$70 million. At the start of production, ore reserves were estimated at 22 Mt grading 38% P <sub>2</sub> O <sub>5</sub> . The phosphate rock mined is processed at the company's Redwater, Alberta, plant, which was modified to process it into phosphate fertilizer. The high-grade, low-cost mine is expected to supply 100% of the phosphate rock required by the Redwater plant for approximately 20 years. The Redwater plant has an annual production capacity of 650 000 t of monoammonium phosphate (MAP). Procuring phosphate rock constitutes about 70% of the plant's production cost. The original Kapuskasing deposit was drilled in 1954 by Continental Copper as a base-metal project. The property was acquired by Agrium when it merged with Viridian Inc. in December 1996. Prior to the start of mining at Kapuskasing, Agrium relied, since 1986, on imported rock from Togo, Africa.
McArthur River	McArthur River	Sask.	125	450	December	U/G	Uranium	Cameco Corporation and COGEMA Resources Inc.	The McArthur River uranium mine came into production in early December 1999. Ore is processed at the Key Lake mill (located some 80 km southwest of the mine), which was revamped in June 1999 to handle blended ore grading 4% U <sub>3</sub> O <sub>8</sub> . Mine production is planned at 18 million lb/y U <sub>3</sub> O <sub>8</sub> (6924 tU). Cameco Corporation owns a 69.805% controlling interest and is the mine's operator. COGEMA Resources Inc. owns the remaining 30.195%. The mine was developed at a capital cost of \$400 million. It is the world's largest and highest-grade uranium deposit. As of December 31, 1999, its overall reserves and outlined resources stood at 186 000 tU with 98 000 tU currently in the mineable category. While the ore grade of ore reserves averages 14.7% U (17% U <sub>3</sub> O <sub>8</sub> ), the resource grade averages 10.2% U (12.03% U <sub>3</sub> O <sub>8</sub> ). There is significant potential to delineate additional reserves.

TABLE 2 (cont'd)

Mining Project	Location	Province/Territory	Ore Capacity (tonnes/day)	Employment during Mine Life <sup>1</sup>	Date of Opening, Re-Opening, Expansion, Suspension or Closure	Mine or Plant Type	Main Commodities	Companies	Remarks
<b>NEW OPERATIONS (cont'd)</b>									
<b>Other Minerals and Metals (cont'd)</b>									
McClellan Lake	McClellan Lake	Sask.	275 <sup>e</sup>	200	June	O/P & U/G	Uranium	COGEMA Resources Inc., Denison Mines Limited and OURD (Canada) Co., Ltd.	Production began on June 22, 1999, by feeding stockpiled uranium ore from the JEB pit into the McClellan Lake mill and the first barrel of yellow cake was produced on July 12. The mine was developed at a capital cost of \$200 million. It is the first Canadian, French and Japanese mining joint venture in Canada in which COGEMA Resources Inc., the majority owner of the project, holds a 70% interest, Denison Mines Limited holds 22.5%, and OURD (Canada) Co., Ltd. holds 7.5%. The McClellan Lake uranium deposit has an overall mineable reserve of 17 300 tU. The designed open pit runs from 20 to 145 m in depth. Currently, the overall ore grade averages 2.7%, with underground ore increasing to 4% at a depth of 170 m. The operation involves open-pit mining at the Sue A, B and C orebodies and underground mining at McClellan. Production is planned at 6 million lb U <sub>3</sub> O <sub>8</sub> (2308 tU) annually. The mill capacity may be expanded to mill Cigar Lake ore. The Cigar Lake mine is scheduled to come on stream in 2002.
<b>RE-OPENINGS</b>									
<b>Precious Metals</b>									
Hislop West	Matheson	Ont.	500	25	July	O/P	Gold	St. Andrew Goldfields Ltd.	Open-pit mining began in July 1999 and gold production commenced in August. The main source of ore came from the near-surface Hislop West Zone, which was outlined in early 1999. At the start of production, ore reserves stood at 325 000 t grading 3.4 g/t gold. Ore is processed at the company's Stock mill about 30 km west of the mine site. Gold production is estimated at 20 000 oz/y over less than two years at a cash cost of US\$195/oz. The Hislop property hosted an underground mine, which operated between 1991 and 1994 and produced 35 200 oz of gold. The company hopes to use the cash flow from the current operation to re-open the Stock mine and to develop the nearby Taylor project.
Con	Yellowknife	N.W.T.	550	250	June	U/G	Gold	Miramar Mining Corporation	The mine re-opened in June 1999 after a year-long strike that began in May 1998. In December 1999, Miramar acquired the Giant gold mine (previously owned by the now-defunct Royal Oak Mines Inc.) at Yellowknife from the federal Department of Indian Affairs and Northern Development (DIAND) and announced that it will combine the Giant and Con operations to produce 130 000 oz/y of gold at a lower cash cost of US\$260/oz, which is lower than the previous cost at the Giant and Con mines. Annual gold production from the Con mine is planned at 100 000 oz with the remaining 30 000 oz coming from Giant's higher-grade Supercrest Zone. In integrating the Con and

Giant operations, ore mined from Giant will be trucked to the Con mill and processed in the flotation/autoclave circuits. As part of an agreement with the City of Yellowknife and the Government of the Northwest Territories (GNWT), Miramar will sell part of the Giant property to the City of Yellowknife, and DIAND and the GNWT will provide funding to a maximum of \$500 000 per year for exploration at the Giant and Con properties.

**Base Metals**

Highland Valley Copper <sup>2</sup>	Logan Lake	B.C.	125 000	1 064	August	O/P	Copper, molybdenum, gold	Cominco Ltd., Rio Algom Limited, Teck Corporation, and Highmont Mining Company	Production at the Highland Valley Copper mine, Canada's largest open-pit mining operation, was suspended on May 15, 1999, due to a labour dispute as a result of low copper prices. It re-opened in late August after an agreement was reached between the mine and the union that ties workers' pay to the price of copper. The mine reached its normal capacity in early October.
Myra Falls	Campbell River	B.C.	4 000	360	March	U/G	Zinc, copper	Boliden Limited	Production at the Myra Falls operation was suspended in December 1998 due to poor ground conditions that led to the dilution of ore and lower head grades. About four fifths of the work force remained on the job during the suspension. Satisfied with rehabilitation work and additional underground development, which cost just under \$15 million, Boliden re-opened the mine for production in March 1999. At the start of resumption of production, ore reserves at the mine stood at 6 785 000 t grading 7.7% zinc, 1.5% copper, 0.4% lead, 35 g/t silver and 1.4 g/t gold. At full capacity, the mine is expected to produce 60 000 t of zinc, 20 000 t of copper, 32 000 oz of gold and 1 million oz of silver.

**EXPANSIONS AND EXTENSIONS**

**Precious Metals**

Doyon	Cadillac	Que.	3 500	453	1994-2000	U/G	Gold	Cambior inc.	Since its purchase of the remaining 50% interest in the Doyon mine that it did not already own from Barrick Gold Corporation in 1998, Cambior inc. has embarked on a cost reduction and reserve extension program. In 1999, the Doyon Division, which includes the Doyon and Mouska mines, produced a total of 242 800 oz of gold at an average cash cost (direct production costs) of US\$203/oz, representing a 10% decrease in costs compared to 1998. However, there was a significant change in mining reserves at the Doyon mine, partly due to a revision in the mining plan and more conservative extraction parameters in certain sectors, particularly in the pillars located in the upper portion of the mine above level 8. The average grade of the proven and probable reserves above level 8 is 5.8 g/t gold, while the reserves below level 8 have a higher average grade of 6.7 g/t gold. The result was a shift of ore reserves categories. As of December 31, 1999, ore reserves at the Doyon Division stood at 10.623 Mt grading 6.3 g/t gold, with an additional 3.04 Mt grading 2.8 g/t gold in the measured and indicated categories and 7.94 Mt grading 4.8 g/t gold in the inferred category. Total contained gold in all categories amounted to 3.667 million oz, compared to 3.664 million oz in 1998. In 1999, capital investment in Doyon totaled US\$4.4 million. This will be increased to US\$11 million in 2000 to continue development of the production block on level 12 and to complete the internal shaft and lower levels at Mouska.
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TABLE 2 (cont'd)

Mining Project	Location	Province/Territory	Ore Capacity (tonnes/day)	Employment during Mine Life <sup>1</sup>	Date of Opening, Re-Opening, Expansion, Suspension or Closure	Mine or Plant Type	Main Commodities	Companies	Remarks
<b>EXPANSIONS AND EXTENSIONS (cont'd)</b>									
<b>Precious Metals (cont'd)</b>									
Kiena	Val-d'Or	Que.	1 700	195	1997-2002	U/G	Gold	McWatters Mining Inc.	Since acquiring the Kiena and Sigma mines from Placer Dome North America in September 1997, McWatters Mining Inc. has embarked on a US\$23 million program to reduce costs, develop newly discovered deep ore zones, and extend the mine life at Kiena and at the Sigma-Lamaque complex. In 1999, the Kiena mine produced 86 602 oz of gold at a cash operating cost of US\$212/oz, compared with 82 000 oz from the Sigma-Lamaque complex at a cash operating cost of US\$243/oz. Total production from Kiena and Sigma-Lamaque is expected to rise to 250 000 oz/y of gold by 2002, and could reach 400 000 oz/y within three to four years (also see Sigma below).
LaRonde	Val-d'Or	Que.	3 265	296	1997-2004	U/G	Gold, zinc, copper, silver	Agnico-Eagle Mines Limited	Since the discovery of extensive gold-silver-copper-zinc mineralization at depth, the company embarked on a shaft-sinking (Shaft No. 3) and capacity expansion program to increase production. In its Phase I expansion program, which started in 1997, the mine's ore capacity was increased from the original 1800 t/d to 3265 t/d in 1999, with production reaching the capacity level in the first quarter of 2000. However, higher-than-expected ore thicknesses in zones accessible from Shaft No. 3 forced the company to plan a further expansion. A revised Phase II capital program was designed in 1999 to increase the ore capacity to 4535 t/d. Although the revised plan will require an extra US\$34 million, which will increase the total capital cost of the two-phase expansion program to US\$218 million, the expansion is expected to result in a greater rate of return and a shorter payback period. About US\$120 million of the US\$218 million remains to be spent over the next 3.5 years. An expansion of the mill capacity to 4535 t/d is expected to be completed by the fourth quarter of 2000. At this rate, LaRonde's annual gold production is expected to triple, to 337 000 oz, in 2004 at a cash operating cost of US\$104 per oz, making the mine one of the lowest-cost gold mines in the world. Current mine reserves stand at 3 million oz, with an additional 3.1 million oz in the mineral resource category. As major ore zones are open at depth, there is good potential to further increase ore reserves.

Sigma	Val-d'Or	Que.	2 000	300 <sup>e</sup>	1997-2002	O/P and U/G	Gold	McWatters Mining Inc.	<p>The company acquired the Sigma, Lamaque and Kierna gold mines from Placer Dome North America in September 1997. The Sigma-Lamaque complex consists of the Sigma No. 1 underground mine and the Sigma No. 2 and No. 3 open-pit mines. Since the acquisition, the company has embarked on a US\$23 million cost-cutting, mine-life extension program at both Sigma and Kierna. New resources added include the Sigma 2000 discovery. In February 1999, the main mining activity at Sigma was suspended at the underground operation for an anticipated five-month period due to high costs and low gold prices. About 179 of the complex's 250 employees were laid off. However, selective mining of previously developed high-grade zones underground continued and were proven to be low cost at below US\$200/oz. As well, a \$5 million near-surface exploration program in the fall of 1999 has resulted in boosting the near-surface reserves at Sigma-Lamaque to 16.3 Mt grading 3.02 g/t gold, or 1.6 million oz, in the first quarter of 2000. In the measured and indicated resource category, an additional 12.5 Mt grading 1.18 g/t gold lies near the surface. Another 33 Mt of mineralized material has been identified along extensions of existing ore zones. This new reserve base, mostly near Sigma, is in stark contrast to the year-end 1999 surface reserves of 3.8 Mt grading 3.28 g/t gold at Sigma-Lamaque. In preparation for increased production from the open pits, McWatters is spending \$1.9 million to expand the Sigma mill capacity to 3000 t/d from the current 2000 t/d by July 2000. Another \$2 million has been budgeted to further expand the mill capacity to 4000 t/d by the second quarter of 2001 to accommodate 3600 t/d of ore from open pits at Sigma-Lamaque and 400 t/d from underground at Sigma. The company is contemplating an ultimate goal of 7000 t/d of mill capacity. In the fourth quarter of 1999, the Sigma-Lamaque complex produced 19 420 oz of gold at a cash operating cost of US\$207/oz, compared with 20 153 oz at a cost of US\$330/oz during the same period in 1998. As a result of the mill expansion, gold production from the complex is expected to reach 155 000 oz in 2001 from 82 000 oz in 1999. Cash operating costs are expected to drop to US\$180/oz in 2002 from US\$243/oz in 1999.</p>
Campbell	Balmertown	Ont.	1 540	365	1997-1999	U/G	Gold	Placer Dome North America	<p>In 1999, the US\$51 million depth development project for the 1820-m-deep circular shaft (Reid shaft) at the Campbell mine was completed and the shaft was commissioned. The new Reid shaft provides a second, more efficient underground access and allows for exploration drilling to greater depths. A significant part of the mine property remains to be explored and a number of existing zones are likely to be expanded. In 1999, the mine produced 262 015 oz of gold, a decrease of 14% from 1998 due to lower head grades. The average cash production cost was US\$165/oz, 22% higher than a year before, due to higher milling costs and the commissioning of the new Reid shaft. Ore reserves as of December 31, 1999, were 4.044 Mt grading 14.5 g/t of gold (or 1.89 million oz), sufficient to support 7.6 years of production at the current rate.</p>

TABLE 2 (cont'd)

Mining Project	Location	Province/Territory	Ore Capacity (tonnes/day)	Employment during Mine Life <sup>1</sup>	Date of Opening, Re-Opening, Expansion, Suspension or Closure	Mine or Plant Type	Main Commodities	Companies	Remarks
<b>EXPANSIONS AND EXTENSIONS (cont'd)</b>									
<b>Precious Metals (cont'd)</b>									
Lac des Îles	Thunder Bay	Ont.	2 650	128	1998-2001	O/P	Palladium, platinum group metals, nickel, copper, gold	North American Palladium Ltd.	Exploration successes in and around the Roby and Twilight zones since 1998 have encouraged the company to embark on a major mine expansion program at Lac des Îles. The program will see the mill capacity increase to 15 000 t/d from the current 2400 t/d. Ore feed will be supplied from the enlarged pit, which hosts proven and probable ore reserves of 74.2 Mt grading 1.64 g/t palladium, 0.18 g/t platinum, 0.14 g/t gold, 0.07% copper and 0.06% nickel, based on a cutoff grade of 0.92% palladium-equivalent. Commissioning of the new capacity is expected to occur in mid-2001. When completed, the mine-site work force is expected to increase to 250 from the current 128. The mine life is estimated to be 11 years. The expansion is expected to more than triple annual production to 248 900 oz of palladium (5% of the world's annual palladium supply), 24 200 oz of platinum and 19 100 oz gold, plus copper, nickel and cobalt credits by 2002. Cash production costs over the mine life are pegged at US\$131/oz, net of by-product credits but excluding royalties. The total capital cost of the planned expansion is estimated at US\$126.5 million. This capital investment has a planned payback of about 2.5 years and an after-tax internal rate of return of 26.6%. In early April 2000, the company received a US\$90 million loan from three Canadian banks for the expansion. The company plans to finance the remainder through equity. Kaiser-Francis Oil, which owns 17.4% of North American Palladium Ltd. and is the company's largest shareholder, has agreed to cover any cost overrun during development. The Sheridan Platinum Group holds a 16.8% interest in the company. The mine is Canada's only primary producer of palladium.
Bissett	Winnipeg	Man.	635	155	1999-2000	U/G	Gold	Harmony Gold Mining Company Limited	In September 1999, the company launched a \$6 million capital expansion program at the Bissett gold mine in eastern Manitoba to increase production and to cut costs. Under the expansion plan, the mill capacity will be increased from 635 t/d to 900 t/d with the average cash cost dropping to US\$220/oz from US\$278/oz prior to the expansion in 1999. The expansion will create 40 new jobs, increasing the total work force at the mine to 195. Some of the expansion budget will also be used for another round of delineation drilling and for additional trackless equipment for operations below the present 32 level. The mine was closed in December 1997 when Rea Gold Corporation, the mine's previous owner, declared bankruptcy. Harmony Gold Mining Company Limited, a South African-controlled company, purchased the mine in the spring of 1998 and re-opened it in June 1998. At the start of 1999, ore reserves were estimated at 2 Mt grading 8 g/t gold. Production is planned at 60 000 oz of gold annually.



Seabee	La Ronge	Sask.	650	140	1998-1999	U/G	Gold	Claude Resources Inc.	In 1999, the mine produced 54 100 oz of gold at a total cash cost of US\$193/oz. Considerable development occurred on the Currie Rose property immediately west of the mine between the 110 and 290-m levels. Claude Resources Inc. now owns 100% of the Currie Rose property subject to a 30% net profits interest payable to Currie Rose Resources Inc. after pay-out of development and exploration expenditures incurred by Claude Resources Inc. to bring the property into production. The Currie Rose project was brought on stream in early 1999 at a mining rate of 30 000 t/y of ore. The mined ore is treated at Seabee. The addition of Currie Rose boosted the total ore reserves at Seabee. As of March 2000, the combined ore reserves amounted to 507 000 t averaging 8.56 g/t gold, with an additional 346 000 t in the possible category. Exploration has also identified a resource potential of 1.5 Mt on the Seabee/Currie Rose property. New high-grade mineralization encountered during underground development on the Currie Rose property has been particularly encouraging.
<b>Base Metals</b>									
Niobec	Chicoutimi	Que.	2 250		1998-2001(?)	U/G	Ferroniobium	Teck Corporation and Cambior inc.	In 1998, the partners launched a \$15.7 million capital program to deepen the mine shaft, to develop ore reserves in the lower or third block (which contains 7 Mt grading 0.73% Nb <sub>2</sub> O <sub>5</sub> ), to develop a ramp, and to install a new crusher at the Niobec underground mine. With the addition of these new reserves, total mine reserves now stand at 10.6 Mt grading 0.52% Nb <sub>2</sub> O <sub>5</sub> , sufficient to sustain the current production rate until the mid-2010s. A positive feasibility study, completed in the third quarter of 1999, supported the expansion of mine production to capture the rising market for niobium. Initial production from the Phase I expansion is expected to begin in the fourth quarter of 2000. The project will slowly ramp up, increasing capacity by 20% as the market warrants. A second-phase expansion, to begin at an unspecified date, will increase output by another 20%. Capital costs for the first phase will be \$4.7 million and for the second phase, less than \$2 million. Production in 2000 is expected to total 2400 t of contained niobium, up from 2300 t in 1999 and 2177 t in 1998.
Creighton	Sudbury	Ont.	3 500 <sup>e</sup>	525	1998-2001 (Phase 1) 2001-2005 (Phase 2)	U/G	Nickel, copper, cobalt, precious metals	Inco Limited	A US\$125 million, two-phase mine expansion program for the Creighton mine in Sudbury, as announced in April 1998, continued in 1999. The program aims to develop a 6-Mt high-grade, low-cost nickel-copper deposit at the Creighton mine over the next two decades. The first phase, currently under way, will develop proven reserves of 2.8 Mt grading 3.45% nickel and 2.97% copper located between the 7400 and 7660 levels. Production from this ore is expected to begin in 2001 and continue through 2013. In 1999, the total capital costs incurred on the project amounted to US\$12 million. The second phase involves the development of 3.1 Mt of probable reserves grading 3.62% nickel and 3.25% copper. This ore, situated between the 7660 and 8180 levels, is expected to be mined between 2005 and 2019. In contrast, the current average grades of the Ontario Division mines are 1.3% nickel and 1.2% copper. When in full production, this Creighton Deep project is expected to produce 10 900 t of nickel, 9500 t of copper and 28 000 oz of platinum group metals annually.

TABLE 2 (cont'd)

Mining Project	Location	Province/Territory	Ore Capacity (tonnes/day)	Employment during Mine Life <sup>1</sup>	Date of Opening, Re-Opening, Expansion, Suspension or Closure	Mine or Plant Type	Main Commodities	Companies	Remarks
<b>EXPANSIONS AND EXTENSIONS (cont'd)</b>									
<b>Base Metals (cont'd)</b>									
McCreedy East	Sudbury	Ont.	2 700	180	1996-1999	U/G	Nickel, copper, cobalt, precious metals	Inco Limited	A \$194 million capital program to fully develop the mine and to expand ore production capacity since its opening in 1996 was completed in 1999. By the end of 1999, daily ore capacity had reached the 2700-t level. Inco has designated McCreedy East as one of four key mines in its Ontario Division. The other three, Creighton, Copper Cliff North and Copper Cliff South, are all in the Sudbury area. When in full production, McCreedy East could produce some 14 500 t/y (32 million lb) of nickel and will be one of the lowest-cost nickel-copper producers in the company's Ontario Division.
<b>SUSPENSIONS</b>									
<b>Precious Metals</b>									
Francoeur	Rouyn-Noranda	Que.	400	90	September 25	U/G	Gold	Richmont Mines Inc.	Production was suspended on September 25, 1999, due to low gold prices and high costs. During the suspension, the mining method was changed to the long-hole method from the more expensive room-and-pillar method; production at the mine resumed in February 2000.
Joe Mann	Chibougamau	Que.	1 360	140	September	U/G	Gold, copper	Campbell Resources Inc.	Production was suspended in September 1999 due to low gold prices, high costs and poor ground conditions that led to excessive dilution of ore grades. The mine re-opened in April 2000. During a six-month suspension, the mining method was changed to the less expensive cut-and-fill method from shrinkage and long-hole mining methods. In 1999, the mine produced 51 300 oz of gold at a cash operating cost of US\$292/oz as well as 1.065 million lb of copper. Gold production in the nine operating months of 2000 is forecast to be 63 500 oz at a cash cost of US\$225/oz, increasing to 90 000 oz in 2001. In 1999, total capital development costs of shaft deepening and a change in the mining method at Joe Mann amounted to \$1.2 million. Capital development costs for 2000 are estimated at \$3.6 million.
Macassa	Kirkland Lake	Ont.	1 100	160	June 14	U/G	Gold	Kinross Gold Corporation	Production was suspended in June 1999 due to low gold prices.
Madsen	Red Lake	Ont.	500	80 <sup>e</sup>	June 17	U/G	Gold	Claude Resources Inc.	Production was suspended in June 1999 due to low gold prices, high costs and lower ore grades of previously outlined ore reserves. Exploration is under way to define higher-grade zones such as the No. 8 Zone.

Nighthawk	Timmins	Ont.	815	(see Pamour)	September	U/G	Gold	Kinross Gold Corporation	The mine was closed in September 1999 by previous owner Royal Oak Mines Inc. due to financial difficulties that forced the company into receivership in April 1999. On December 24, 1999, Kinross Gold Corporation purchased the Timmins assets of Royal Oak, which included the Nighthawk mine, for US\$5 million (also see Pamour below).
Pamour	Timmins	Ont.	2 720	265	September	O/P & U/G	Gold	Kinross Gold Corporation	The mine was closed in September 1999 by previous owner Royal Oak Mines Inc., due to financial difficulties, which forced the company into receivership in April 1999. On December 24, 1999, Kinross Gold Corporation purchased the Timmins assets of Royal Oak, which included the Pamour mine, for US\$5 million (also see Nighthawk above).
Blackdome	Clinton	B.C.	180	50	May	U/G	Gold	Claimstaker Resources Ltd. and Jipangu Inc.	Production was suspended in May 1999 due to low gold prices. The mine was first brought on stream by Blackdome Mining Corporation in May 1986. Mining was suspended in December 1990. The mine was re-opened in October 1998 by the present owners with Claimstaker being the operator.
Mount Nansen	Carmack	Yukon	700	50	February 17	O/P	Gold	B.Y.G. Natural Resources Inc.	Production at the Mount Nansen gold mine was suspended in February 1999 in response to directions from the Water Resources Branch of DIAND. At the time of suspension, ore was nearly exhausted at the producing orebody. As well, the company was conducting exploration on the breccia pipe and Flex Zone while awaiting renewal of the water licence to continue mining and milling until the company went into receivership in March 1999.
Giant	Yellowknife	N.W.T.	1 000	260	September	U/G	Gold	Miramar Mining Corporation	Production at the Giant gold mine was suspended on October 5, 1999, to meet a condition of sale of the mine to Miramar Mining Corporation. The transaction was completed in December 1999. The mine was previously owned by Royal Oak Mines Inc., which became insolvent in April 1999. Miramar has since redeveloped the mine for production in February 2000 at a reduced ore production rate of 275 t/d to complement production from its nearby Con mine. Currently, production at the Giant mine comes mainly from the Supercrest Zone. Ore is processed at the Con mill as the Giant mill was mothballed. Gold production from the zone is expected to be 30 000 oz/y over the next 30 months, during which time the company will examine other potential areas for possible development. The combined Con and Giant production over the next three years is planned at 130 000 oz of gold annually.
<b>Base Metals</b>									
Gibraltar	McLeese Lake	B.C.	37 650	267	February 28	O/P & leaching	Copper, molybdenum	Taseko Mines Limited	Production at the Gibraltar copper mine was suspended by its former owner, Boliden Limited, in February 1999 due to low copper prices. In April 1999, Taseko Mines Limited acquired the mine from Boliden and has since kept it on care and maintenance awaiting better and more stable copper prices to re-open the mine.

TABLE 2 (cont'd)

Mining Project	Location	Province/Territory	Ore Capacity (tonnes/day)	Employment during Mine Life <sup>1</sup>	Date of Opening, Re-Opening, Expansion, Extension, Suspension or Closure	Mine or Plant Type	Main Commodities	Companies	Remarks
<b>SUSPENSIONS (cont'd)</b>									
<b>Base Metals (cont'd)</b>									
Highland Valley Copper <sup>2</sup>	Logan Lake	B.C.	125 000	1046	May 15	O/P	Copper, molybdenum, gold	Cominco Ltd., Rio Algom Limited, Teck Corporation, and Highmont Mining Company	Operations were suspended in May 1999 due to a labour dispute. The mine re-opened in late August and commercial production resumed in October. It is the largest copper mine in Canada.
<b>CLOSURES</b>									
<b>Precious Metals</b>									
East Amphi	Malartic	Que.	800	30	August	O/P	Gold	McWatters Mining Inc.	The mine closed in August due to the depletion of open-pit ore reserves. Production began in January 1999. The company has yet to decide on whether to develop an underground mine on site, depending on the outlook for gold.
Joubi	Val-d'Or	Que.	100	45	October 31	U/G	Gold	Western Quebec Mines Inc.	The mine closed in October 1999 due to the depletion of ore reserves. Production began in October 1989.
Lakeshore tailings	Kirkland Lake	Ont.	1 360	50	June 14	Tailings	Gold	Kinross Gold Corporation	Production ceased in June 1999 due to low gold prices rendering the remaining reserves uneconomical. At the time of closure, only about four months of tailing material remained.
Detour Lake	Matheson	Ont.	3 500	240	June 15	U/G	Gold	Placer Dome North America	The mine closed in June 1999 due to the depletion of ore reserves. Production began in August 1983.
Snip	Stewart	B.C.	475	180	May	U/G	Gold	Homestake Canada Inc.	The mine closed in May 1999 due to the depletion of ore reserves. Production began in January 1991.
<b>Base Metals</b>									
Heath Steele	Newcastle	N.B.	3 200	303	September 30	U/G	Zinc, copper, lead, silver	Noranda Inc.	The mine closed at the end of September 1999 due to the exhaustion of economically mineable ore. Production first began in 1957.
Mines Gaspé	Gaspé	Que.	5 500	630	October 14	U/G	Copper	Noranda Inc.	Copper operations at the Mines Gaspé mine ceased in October 1999 due to the depletion of economically mineable ore. Production first began in 1955. During the course of 45 years, several mines were developed at this mining division including, notably, the Needle Mountain and Copper Mountain open-pit and underground mines. A low-grade copper-mineralized material stockpile remains but it is uneconomical at current copper prices.

Levack	Sudbury	Ont.	3 600 <sup>e</sup>	100 <sup>e</sup>	July	U/G	Nickel, copper, cobalt, platinum group metals, gold, silver	Inco Limited	The mine closed in July 1999 due to the depletion of economically mineable ore.
McCreedy West	Sudbury	Ont.	2 000	100	July	U/G	Nickel, copper, cobalt, platinum group metals, gold, silver	Inco Limited	The mine closed in July 1999 due to the depletion of economically mineable ore. Production began in 1974.
Little Stobie	Sudbury	Ont.	3 400 <sup>e</sup>	106	August	U/G	Nickel, copper, cobalt, platinum group metals, gold, silver	Inco Limited	The mine closed in August 1999 due to ore depletion. Production began in January 1971.
<b>Other Minerals</b>									
Phalen	New Waterford	N.S.	6 000 <sup>e</sup>	433	December 19	U/G	Coal	Cape Breton Development Corporation (CBDC)	The mine closed due to high costs and irreparable damage as a result of underground roof caving and water leakage problems. Production began in 1967. CBDC, which is 100%-owned by the Canadian government, also owns and operates the nearby Prince Colliery. Privatization of the company is currently being considered.
Horseshoe Lake	Ormiston	Sask.	n.a.	n.a.	January 31	Surface, brine	Sodium sulphate	Ormiston Mining and Smelting Co. Ltd.	Production at the Horseshoe Lake sodium sulphate brining operation ceased in January 1999 due to the depletion of brine reserves.
Key Lake	Key Lake	Sask.	630	316	June	O/P	Uranium	Cameco Corporation	Mining ceased at the Key Lake uranium mine in April 1997. However, the mill continued to process stockpiled mine ore until June 1999. Since November 1999, the mill has been processing high-grade uranium ore from the McArthur River mine, which began production in December. The McArthur River mine is the world's largest, high-grade uranium deposit. Mining first began at the Key Lake mine in August 1981.

Source: Natural Resources Canada, based on company reports and communications with companies.

<sup>e</sup> Estimated; O/P Open pit; U/G Underground; t Metric tonne.

1 Employment refers to workers on the company's payroll and to contract workers at an operation, or at an operation prior to its closure. 2 Mine closed and re-opened in 1999.

Note: A mine that closed and re-opened in the same year is shown under both categories.

**TABLE 3. NEW PRODUCTION FROM MINE OPENINGS IN CANADA IN 1999**

Mining Project	Main Commodities	Estimated Annual Production <sup>1</sup>						Other Minerals/Metals
		Gold	Gold	Silver	Silver	Copper	Zinc	
		(g)	(oz)	(g)	(oz)	(t)	(t)	
<b>NEW OPERATIONS</b>								
<b>Precious Metals</b>								
East Amphi open pit	Gold	653 000	21 000			-	-	-
<b>Base Metals</b>								
Bell Allard	Zinc, copper	-	-			9 000	100 000	-
<b>Other Minerals/Metals</b>								
Shabogamo	Silica	-	-			-	-	100 000 t silica
Kapuskasing	Phosphate	-	-			-	-	1 100 000 t phosphate rock
McArthur River	Uranium	-	-			-	-	18 000 000 lb U <sub>3</sub> O <sub>8</sub>
McClellan Lake	Uranium	-	-			-	-	6 000 000 lb U <sub>3</sub> O <sub>8</sub>
<b>RE-OPENINGS</b>								
<b>Precious Metals</b>								
Hislop West	Gold	622 000	20 000			-	-	-
Con	Gold	3 110 000	100 000			-	-	-
<b>Base Metals</b>								
Myra Falls	Zinc, copper, gold, silver	995 300	32 000	31 103 000	1 000 000	20 000	60 000	-
Planned total		5 380 300	173 000	31 103 000	1 000 000	29 000	160 000	100 000 t silica 1 100 000 t phosphate rock 24 000 000 lb U <sub>3</sub> O <sub>8</sub>

Source: Natural Resources Canada, based on company reports and communications with companies.

- Nil.

Note: Production was suspended at the Highland Valley Copper operation on May 15, 1999. However, it resumed production at the end of August in the same year and, therefore, is not included in the above table.

**TABLE 4. NEW ORE RESERVES FROM MINE OPENINGS IN CANADA IN 1999**

Mining Project	Main Commodities	Proven-Probable Ore Reserves <sup>1</sup>		In-Situ Metal Reserves							
		Tonnage	Grade	Gold	Gold	Silver	Silver	Copper	Zinc	Lead	Other Minerals
		(tonnes)		(g)	(oz)	(g)	(oz)	(t)	(t)	(t)	(t)
<b>NEW OPERATIONS</b>											
<b>Precious Metals</b>											
East Amphi open pit <sup>1</sup>	Gold	125 042	5.53 g/t gold	691 400	22 230	-	-	-	-	-	-
<b>Base Metals</b>											
Bell Allard	Zinc, copper	3 200 000	13.77% zinc 1.5% copper 0.68 g/t gold 48 g/t silver	2 174 100	69 900	153 588 900	4 938 000	48 000	440 600	-	-
<b>Other Minerals</b>											
Shabogamo	Silica	5 000 000	Silica	-	-	-	-	-	-	-	5 Mt silica
Kapuskasing	Phosphate rock	22 000 000	38% P <sub>2</sub> O <sub>5</sub>	-	-	-	-	-	-	-	8.36 Mt P <sub>2</sub> O <sub>5</sub>
McArthur River	Uranium	186 000 tU		-	-	-	-	-	-	-	186 000 tU
McClellan Lake	Uranium	17 300 tU		-	-	-	-	-	-	-	17 300 tU
<b>RE-OPENINGS</b>											
<b>Precious Metals</b>											
Hislop West	Gold	325 000	3.4 g/t gold	1 105 000	35520	-	-	-	-	-	-
Con	Gold	1 110 156	11.726 g/t gold	13 026 100	418800	-	-	-	-	-	-
<b>Base Metals</b>											
Myra Falls	Zinc, copper, lead, silver, gold	6 785 000	7.7% zinc 1.5% copper 0.4% lead 1.4 g/t gold 35 g/t silver	9 499 000	305 400	237 475 000	7 635 000	101 700	522 400	27 000	-
Total				26 495 600	851 850	391 063 900	12 573 000	149 700	963 000	27 000	5 Mt silica 8.36 Mt P <sub>2</sub> O <sub>5</sub> 203 300 tU

Source: Natural Resources Canada, based on company reports and communications with companies.

- Nil.

<sup>1</sup> The East Amphi open-pit gold mine was opened and closed during 1999. As its open-pit ore reserves lasted only for eight months of production, the mine has no impact on Canada's gold reserves beyond 1999. Although the Highland Valley Copper operation closed in May 1999, it re-opened three months later. There was no impact on Canada's copper reserves on a year-end reporting basis. Therefore, the mine is not included in the above table.