Ministry of Energy, Mines
and Petroleum Resources
Mineral Resources Division
Hon. Anne Edwards, Minister

British Columbia
Mining, Development and Exploration
1995 Overview

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Presented at the 101th Annual
Northwest Mining Association Convention
Spokane, Washington, U.S.A.
December, 1995

Information Circular 1995-9

BRITISH COLUMBIA MINING, DEVELOPMENT AND EXPLORATION 1995 OVERVIEW

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INTRODUCTION

Relatively high prices of copper (US$1.30-$1.40 per pound), gold (US$380-$390 per ounce), molybdenum oxide (US$4-$4.50 per pound) and silver (US$5-$5.50 per ounce) have led to increased value of output (approximately 57%) at existing mines. The **Eskay Creek** high-grade silver-gold mine began direct shipping ore by rail and ocean freight in January 1995. It is the first new metal mine to open in western Canada in several years. The **QR** gold project began production in June 1995. At the **Golden Bear** gold mine, the focus has turned to the potential for heap leaching of lower grade material. Significant new discoveries of both refractory and oxide mineralization have been made. After being in production since 1971, the **Island Copper** copper-molybdenum-gold mine will close in late 1995. Although no exploration or development work was carried out on the **Red Mountain** gold-silver project during 1995, an aggressive program is planned for 1996.

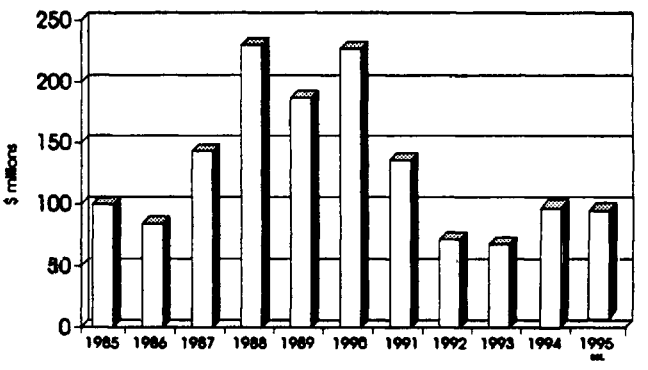
Production decisions are expected soon for the **Mount Polley, Kemess, and Huckleberry** projects, all porphyry copper±gold±molybdenum deposits. Total exploration expenditures in 1995 are estimated to be approximately $91 million. Targets included many of the classic mineral deposit types for which British Columbia is known; for example, **Red-Chris, Akie, Bralorne, Mount Polley, Polaris-Taku, Tsacha,** and porphyries in the **Babine Lake** area. Industrial minerals are receiving increasing attention with 1995 exploration expenditures estimated to be up slightly from 1994. The **Taurus** low-grade gold deposit is being explored for its heap-leach, bulk-mineable potential. The estimate for the number of claim units (approximately 30 000) recorded in 1995 also indicates about the same level of activity as 1994. Several bulk sampling projects were carried out; some obtained revenue sales on a limited basis. A number of advanced projects in the Mine Development Assessment Process (now called Environmental Assessment Process) are in the feasibility stage. Some projects (*e.g.* Cirque, Mt. Milligan and Mount Polley) have received Mine Development Certificates and await production decisions.

In 1995 the British Columbia government allocated approximately $2.5 million for exploration under its **Explore B.C.** program. The program is designed to assist and promote private sector mineral exploration, to extend the economic lives of existing mines and contribute to community stability in existing mining regions. The projects supported in 1995 have produced positive and encouraging results. The government funded an airborne geophysical survey over three specific areas in the East Kootenay region, designed to locate more Sullivan-type targets, as well as others.

REGIONAL TRENDS

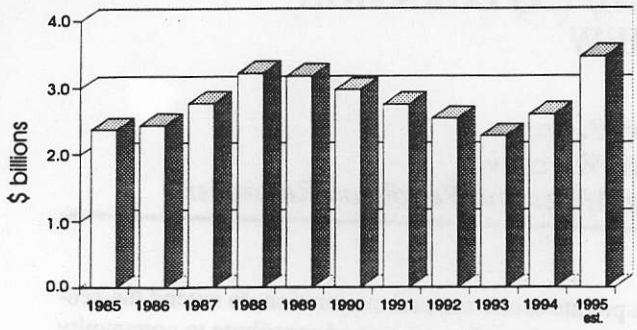
Preliminary estimates (October 1995) indicate that total on-the-ground expenditures on mineral exploration and development projects in British Columbia during 1995 will be approximately $91 million, a decrease of about 9% from 1994 (the inactivity at Red Mountain was a factor). As in previous years, it is estimated that over 40% of this total will be spent in the northwest part of the province. This figure is compiled from estimates made on a project-by-project basis throughout the province, primarily from published sources, and is an estimate of the actual dollars spent on the ground.

Figure 1 illustrates the fluctuation of exploration expenditures over the past decade. The peak year 1988, with expenditures of $225 million, coincided with the height of flow-through funding. In subsequent years, expenditures have shown a steady decline to a low of $68 million in 1993;



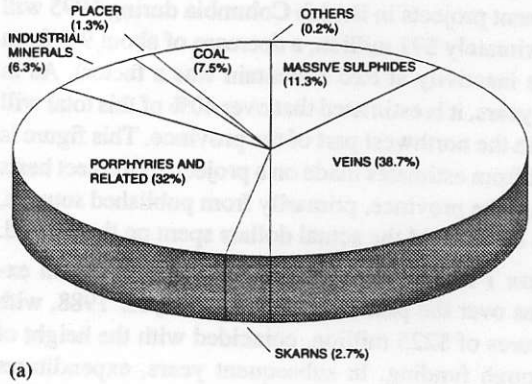
Source: MEMPR Land Management and Policy Branch

Figure 1. Mineral exploration expenditures in British Columbia: 1985 to 1995.

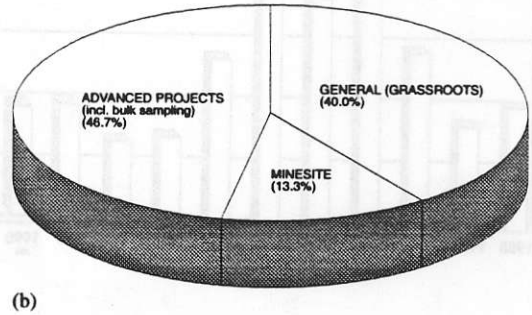


Source: MEMPR, Land Management and Policy Branch

Figure 2. Solid mineral production value in British Columbia: 1985 to 1995.



(a)



(b)

Figure 3. Exploration targets - 1995 (a) by deposit type (%, expenditures); (b) by level or category of program (%, expenditures).

however, a significant increase to $93 million was recorded in 1994. For the same ten-year period, the pattern of exploration spending is broadly similar to changes in the total value of solid mineral production (Figure 2); the latter indicating a much more dramatic increase in 1995.

Exploration targets are varied and include: veins, massive sulphide deposits (volcanogenic, sedex and seafloor hydrothermal), porphyries and related deposits, skarns, industrial minerals, coal, placer deposits and others (Figure 3a).

Approximately 13.3% of exploration expenditures (including 7.2% at coal mines) were at minesites and 46.7% on advanced projects (including bulk sampling), including environmental studies and reclamation programs. An estimated 40% was spent on less advanced and grassroots ('general') exploration programs (Figure 3b). In total, there were approximately 240 projects with budgets in excess of $100 000, up slightly from the 225 projects in 1994. Figures 4a and 4b show the number of projects with expenditures in excess of this figure. The largest program was by American Bullion Minerals Ltd. on the **Red-Chris** porphyry copper-gold project near Iskut, estimated at $6 million. **Red Mountain**, the project with the highest expenditure in 1994, was inactive during 1995 after Barrick Gold Corporation took over; an aggressive exploration and development program is planned for 1996 (pending completion of an option agreement with Royal Oak Mines Inc.).

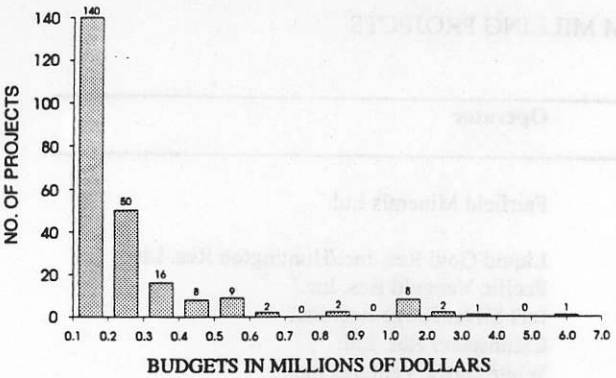
Grassroots programs were carried out in north-central British Columbia in the **Babine** and **Osilinka lakes** areas for porphyries, in southeastern and northeastern parts of the province for sedex deposits, in the **Interior Plateau** region of south-central British Columbia and the **Toodoggone** region of northwestern British Columbia for bonanza and bulk-mineable epithermal gold, in the **Stewart Camp** in the northwest for mesothermal and transitional gold deposits similar to Snip and Red Mountain, and in the **Wells-Barkerville camp** for mesothermal veins and bulk-mineable gold. Exploration expenditures for industrial minerals increased slightly and significantly for coal.

Estimates of the number of new mineral titles recorded (Figure 5) and the number of Free Miner Certificates issued indicate a slight increase over 1994. These indicators are positive, despite relatively constant exploration expenditures and increased global competition for risk capital.

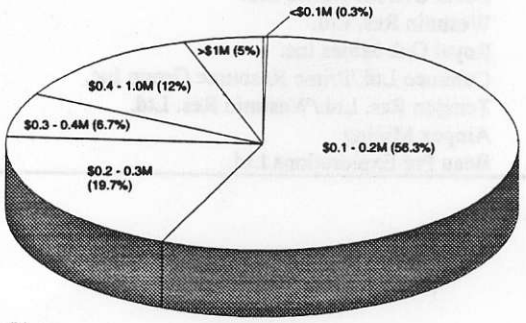
HIGHLIGHTS AT OPERATING MINES

PRODUCTION LEVELS

The locations of the 15 metal mines operating in British Columbia in 1995 are shown in Figure 6. Two new mines (Eskay Creek and QR) were opened during the year. One mine (Island Copper) is scheduled to close. Most mines had significant exploration programs, some with good results. Several small high-grade projects (*i.e.*, **Elk, Iron**



(a)

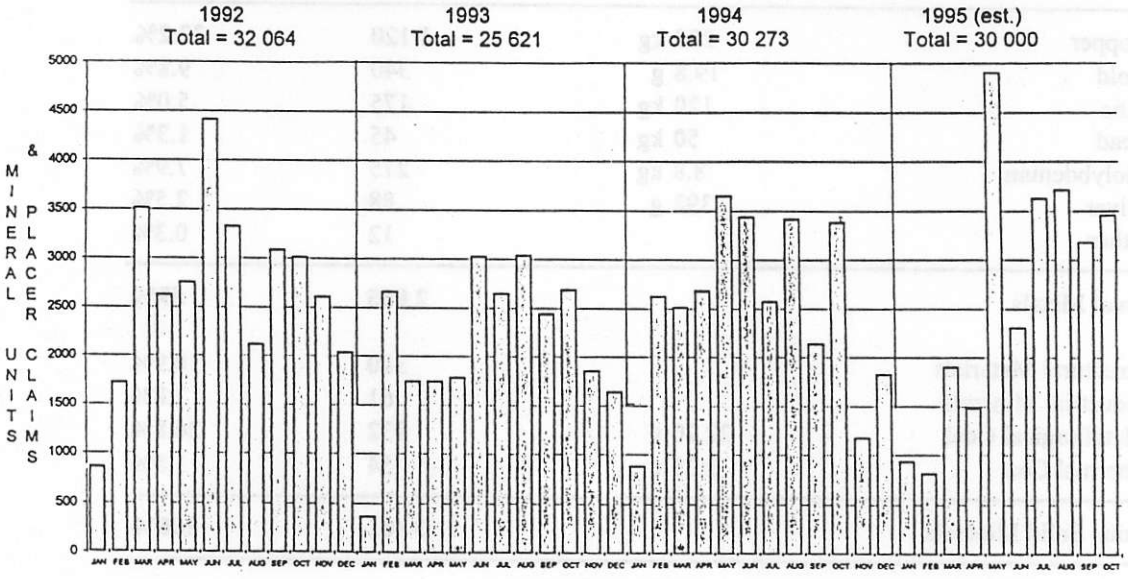


(b)

Figure 4. Estimated number of major projects (>$1000,000) (a) by incremental $0.1M; (b) by percentage of total expended.

Colt, Evening Star, Brett and Engineer) have continued to produce, or plan to produce, using custom milling arrangements (Table 1; *see* also Operations). The **Table Mountain** gold mine continued to operate on a limited basis. The **Golden Bear** mine did not produce in 1995 but an aggressive exploration and development program was carried out (*see* Advanced Exploration and Development Projects).

The forecast value of solid mineral production for 1995 in British Columbia is $3.48 billion, a 38% increase from 1994 (Table 2). Copper represents 32.2%, at a projected value of approximately $1.12 billion, reflecting full production levels for **Similco**, **Gibraltar**, **Ajax** and **Myra Falls** mines (*cf.* 1994). Coal represents 28.4%, at a projected value approaching $1 billion. The production of gold is forecast to be 19.8 million grams (636 600 oz) valued at $340 million, up from 12.6 million grams (405 100 oz) last year, primarily due to significant new production from the **Eskay Creek** and **QR** mines. Silver output is forecast at 392 million grams (12.6 million oz) valued at $88 million, up significantly due to new production at the **Eskay Creek** mine. Zinc production in 1995 is forecast to be 120 million kilograms worth $175 million, lead output is forecast to be 50 million kilograms valued at $45 million. The total metals value is up approximately 57% from the 1994 estimate. Value of production of industrial minerals is forecast to be $61 million; structural materials are expected to account for another $380 million.



Source: MEMPR, Mineral Titles Branch

Figure 5. All mineral tenure recorded by month; January 1992 to October 1995. Note: High value for May 1995 reflects reverted Crown Grant sales and a release of a Regional Geochemical Survey by the Geological Survey Branch.

TABLE 1
ACTIVE AND POTENTIAL CUSTOM MILLING PROJECTS

Mill or Smelter/ Location	Project Name (Potential)	Commodity	Operator
Asarco/Helena, Montana	*Elk	Au	Fairfield Minerals Ltd.
?	(Brett)	Au	Liquid Gold Res. Inc./Huntington Res. Ltd.
Kettle/Republic, Washington	*Iron Colt, Evening Star, Midnight	Au	Pacific Vangold Res. Inc./ Int'l Silver Ridge Res. Inc.
Afton/Kamloops, B.C.	(Alwin)	Cu, Au	Claimstaker Res. Ltd.
Premier/Stewart, B.C.	(Debbie)	Au	White Hawk Ventures Inc.
Premier	(Greens Creek, Alaska)	Au, Cu, Ag, Pb,Zn	Kennecott Corp./Hecla Mining Co./ CSX Energy Corp./Exalas Res.
Premier	(Johnson River)	Au, Cu, Ag, Pb,Zn	Westmin Res. Ltd.
Premier	(Jualin)	Au	Coeur d'Alene Mines Ltd.
Premier	(Porcher Island)	Au	Westmin Res. Ltd.
Premier	(Red Mtn.)	Au, Ag	Royal Oak Mines Inc.
Premier	*Snip	Au	Cominco Ltd./Prime Resource Group Inc.
Premier	(SB)	Au	Tenajon Res. Ltd./Westmin Res. Ltd.
?	(Engineer)	Au	Ampex Mining
?	(Valentine Mtn.)	Au	Beau Pré Explorations Ltd.

* = Active

TABLE 2
1995 FORECAST VALUE OF MINERAL PRODUCTION IN B.C.

Commodity	Quantity (millions)	C$ Value (millions)	Percent of Total Value
Copper	278 kg	1 120	32.2%
Gold	19.8 g	340	9.8%
Zinc	120 kg	175	5.0%
Lead	50 kg	45	1.3%
Molybdenum	8.8 kg	275	7.9%
Silver	392 g	88	2.5%
Other		12	0.3%
Total Metals		**2 055**	**59%**
Structural Materials		380	10.9%
Industrial Minerals		61	1.8%
Metallurgical Coal	22.20 t	932	26.8%
Thermal Coal	2.25 t	54	1.5%
Total Solid Minerals		**3 482**	**100%**

Source: MEMPR, Land Management and Policy Branch

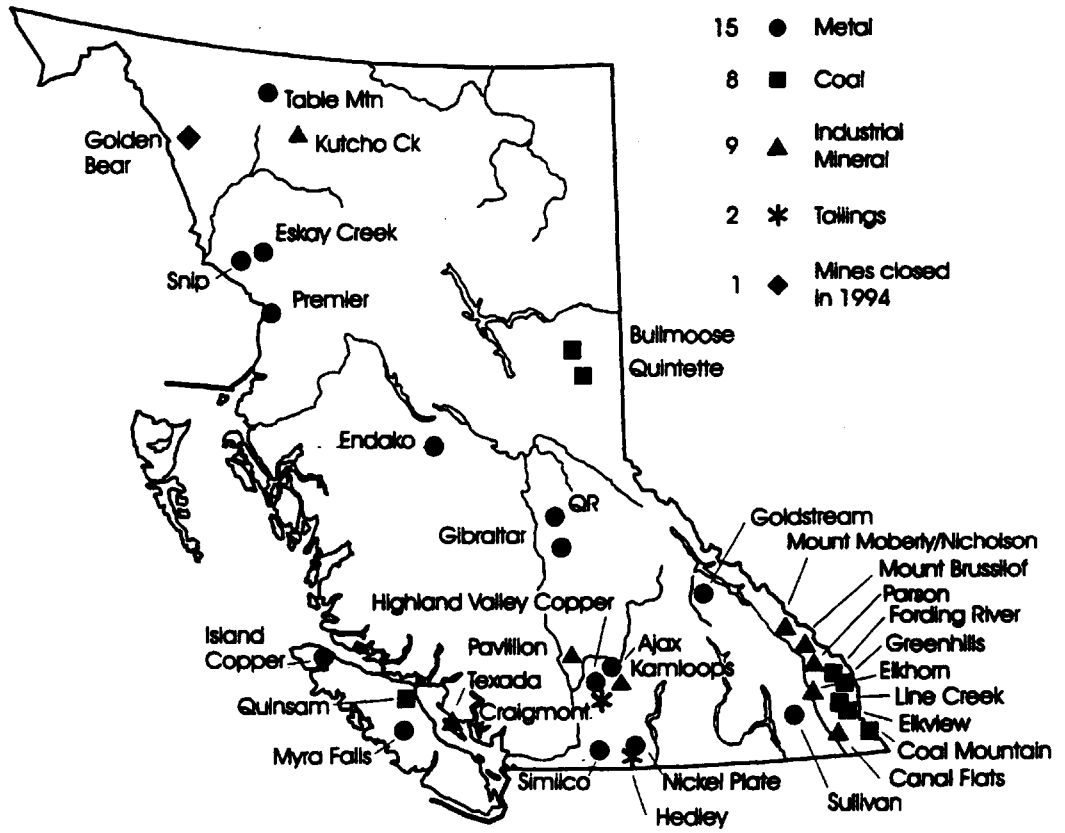


Figure 6. Operating mines in British Columbia - 1995.

OPERATIONS

METAL MINES

The **Eskay Creek** gold-silver mine, operated by Homestake Canada Inc. through 50.6%-owned Prime Resources Group Inc., started commercial production in January 1995 with proven and probable reserves for the 21B zone estimated at 1.09 million tonnes grading 65.14 g/t Au, 2949 g/t Ag, 5.6% Zn and 0.77% Cu. Eskay Creek is the fourth largest silver mine in the world, and one of the highest grade gold and silver deposits ever discovered in North America. Ore is being blended on site, trucked to load-out facilities, and shipped directly to smelters in Quebec and Japan, by rail and ship respectively. Based on a production rate of 245 tonnes per day, Prime expects to produce 6220 kilograms (200 000 oz) of gold and 283 000 kilograms (9.1 million oz) of silver during 1995. In subsequent years, production is expected to average about 300 tonnes per day. Mining dilution, grades, and production estimates have compared favourably with the feasibility predictions. An accelerated mine development program, implemented in April, has made more mining areas available, enabling Prime to optimize ore blending.

Exploration drilling at the minesite resulted in the discovery of high-grade mineralization (NEX zone) in what appears to be an extension of the northeast end of the main 21B zone orebody. Additional drilling is in progress to delineate this zone and underground development will be accelerated. Homestake Canada also completed a five-hole diamond drilling program on its Bonsai target, located 10 kilometres west of the mine, to test for down-dip mineralization over a surface strike length of 580 metres.

Mill start up at the **QR** gold mine, located 70 kilometres by road southeast of Quesnel, was June 1, 1995. Drill-indicated ore reserves were estimated at 1.3 million tonnes grading 4.5 g/t Au. Kinross Gold Corporation has spent over $20 million on construction to date. Operating cash costs are projected at US$220 per ounce gold. Gross revenue is estimated at $90 million in gold, and minor silver, over a five-year mine life, at a rate of about 1150 kilograms (37 000 oz) of gold recovered per year. Three separate orebodies, hosted in a gold skarn, have been discovered to date; there is good potential for additional discoveries. Initially, the Main zone, which contains an estimated 616 760 tonnes grading 4.4 g/t Au, will be mined by open-pit methods; Kinross expects the zone to be depleted at the end of 1996. In 1996 Kinross plans to drive a ramp from the pit wall of the Main zone to the hangingwall of the Midwest zone, a few hundred metres to the west. Production from the Midwest zone, with probable reserves of 440 800 tonnes grading 4.32 g/t Au, is expected to begin in October 1996. The West zone, with probable reserves of

168 700 tonnes grading 6.64 g/t Au, will be mined underground during the latter years of the mine's life. The mill facility was designed for 800 tonnes per day; early operation has achieved rates up to 1200 tonnes per day. Up to 30% of recovered gold is expected to be from gravity concentration, the remainder by flotation and electrowinning methods. Kinross is testing and evaluating the possibility of lowering the cut-off grade to as low as 0.5 g/t Au for ore to be processed by heap-leach methods, which would add significant reserves and mine life to the operation. Preliminary tests are returning encouraging results. A 2000-metre drilling program to test for additional reserves to the east of the Main zone, across Walley's fault, and to the west of the West zone, was planned in late 1995.

The **Snip** gold mine, owned and operated by Cominco Ltd. (60%) and Prime Resources Group Inc. (40%), produced 4000 kilograms (129 000 oz) of gold from 172 000 tonnes of ore milled in 1994. Mining is at a rate of 460 tonnes per day with a 12 g/t cut-off and operating costs are estimated at US$183 per ounce gold. Reserves estimated by Cominco at January 1, 1995 were 625 000 tonnes grading 26.5 g/t Au, sufficient until the fourth quarter of 1998. Recoveries for gold are approximately 35% by gravity circuit and 56% by flotation, for an overall 91% recovery. Concentrate is shipped to the Premier mill near Stewart for further processing. Exploration of the Twin zone has been successful in locating ore up-plunge to the southeast. Exploration continues in that direction, as progressively higher exploration drifts are driven from the spiral ramp as it is developed.

Cominco began a 700-metre underground development program to evaluate the Twin West zone discovered during the past season. The Twin West vein has a northwesterly trend similar to the 150 vein that is currently being mined in the footwall of the Twin vein; it is narrow, but continuous and locally high grade. Ore grade mineralization has been indicated by surface drilling which is progressing towards the Sky fractional claim, part of the Bronson Option from International Skyline Gold Corporation on the western boundary of the Snip claims.

The **Highland Valley Copper** mine, a partnership among Cominco Ltd. (50%), Rio Algom Limited (33.6%), Teck Corporation (13.9%) and Highmont Mining Company (2.5%) milled 43 484 000 tonnes during 1994 at an average daily throughput of 119 135 tonnes. Production totalled 166 400 tonnes of copper contained in concentrate, 60 650 kilograms (1.95 million oz) of silver, 395 kilograms (12 700 oz) of gold, and 1.65 million kilograms of molybdenum. With published reserves of 539.7 million tonnes grading 0.42% Cu and 0.0073% Mo at January 1, 1995, the mine life is estimated to be about fourteen more years. The mine is one of the largest operations in the world and employs about 1160 people. During 1995, Highland Valley Copper completed deep-penetrating reconnaissance induced polarization and resistivity surveys over the Southwest Extension grid and over and adjacent to the JA deposit where a geologic resource of 286 million tonnes grading 0.43% Cu and 0.017% Mo has previously been defined. Anomalies were tested by diamond drilling. At the Lornex pit, the east, southeast and southwest walls were pushed back in order to access deep ore in the southeast corner of the pit. Currently, 80% of millfeed at Highland Valley Copper is from the Valley orebody, 20% from Lornex.

The **Island Copper** mine produced 52 520 tonnes of copper, 1.33 million kilograms of molybdenum, 1138 kilograms (36 590 oz) of gold, and 14 800 kilograms (475 838 oz) of silver from 18 477 000 tonnes of ore milled at a daily throughput of 50 670 tonnes in 1994. BHP Minerals Canada Ltd. ceased mining operations in July 1995 and will finish milling of surface stockpiles by the end of the year. Reserves estimated by the company at January 1, 1995 were 23.4 million tonnes grading 0.33% Cu, 0.02% Mo, 0.16 g/t Au and 1.2 g/t Ag. Some of this material will be left in the south wall of the pit. BHP will continue to implement its closure plan and hopes to complete site reclamation in two years.

During 1994 the Westmin Resources Limited **Myra Falls** mine produced 4097 tonnes of copper, 5147 tonnes of zinc, 136.7 kilograms (4 400 oz) of gold and 4010 kilograms (128 926 oz) of silver from 251 560 tonnes of ore, milled at a daily throughput of 2675 tonnes (Note: the mine re-opened in September 1994 after a 16-month mining hiatus due to a labour dispute). Reserves estimated by the company at January 1, 1995 were 9 717 800 tonnes grading 1.7% Cu, 6.6% Zn, 1.6 g/t Au and 35.6 g/t Ag. Reserves in the Battle zone, which is currently being developed and mined, are 2.5 million tonnes grading 2% Cu, 10.6% Zn, 1.0 g/t Au and 20.3 g/t Ag. There are two other high-grade zinc zones closely associated with the Battle - the Gopher and Gnu, which together total about 700 000 tonnes. The Gopher zone is the source of development ore which has been going to the mill since April 1995. Mill throughput during the second quarter averaged 3505 tonnes per day; operating costs were down, resulting in positive cash flow and a return to profitability.

In a separate program, underground drilling from the Lynx mine into the North Downdrop region, north of the Gap orebody, resulted in the discovery of the Marshall zone. It consists of high-grade ore within H-W stratigraphy. The implications are significant as this is the first discovery north of the North Downdrop fault in this region. It is also above the H-W haulage level about 900 metres northwest of the current Battle zone development. Surface exploration on the Trumpeter zone, located at the eastern end of the property, in late 1994 and January 1995, resulted in a significant increase in geological reserves. Follow-up drilling and underground development are planned for 1996.

At the Gibraltar Mines Limited **Gibraltar** (McLeese Lake) mine, mining and milling resumed in September

1994 after a suspension of operations on December 1, 1993 due to low copper prices. To the end of the year, Gibraltar produced 7100 tonnes of copper in concentrate and 2320 tonnes of cathode copper, from milling of 3 934 500 tonnes of ore at a daily throughput of 35 825 tonnes. Production of cathode copper continued throughout 1994, with 2320 tonnes being recovered. Reserves estimated by the company at January 1, 1995 were 166 259 440 tonnes grading 0.291% Cu and 0.009% Mo. Gibraltar is expected to produce 30 400 tonnes of copper in 1995, at a daily mill throughput of 38 000 tonnes and an average cash cost of about US$0.90 per lb. Reserves in the Pollyana zone have been increased by about 9 million tonnes at a grade of 0.33% Cu, reflecting the results of drilling completed in late 1994 on the GM claims. Drilling during 1995, totalling 3150 metres in 23 core holes, focused on induced polarization targets on two zones: the Pollyana - GM zone immediately east of the Pollyana pit, and the Connector zone between the Pollyana and Gib East zones. The latter was tested for the presence of near-surface oxide ore. In 1995 Gibraltar approved an expenditure of about $1.3 million to recommission the molybdenum circuit. It was restarted in October and is expected to produce about 27 tonnes of molybdenum per month at a cash cost of about $3.40 per pound.

The Homestake Canada Inc. **Nickel Plate** open-pit gold mine produced 2 554 kilograms (82 117 oz) of gold and minor silver from 1 269 800 tonnes of ore milled in 1994, at a daily throughput of 3570 tonnes. Reserves estimated by the company at January 1, 1995 were 2.9 million tonnes grading 2.64 g/t Au. Mining and milling are projected to cease towards the end of 1996. In 1995 Homestake drilled targets near Cahill Creek, testing a northerly trending zone extending from the French mine/Geod Hope areas to the previously mined Canty open pit.

During 1994 the Princeton Mining Corporation **Similco (Copper Mountain)** mine produced 5570 tonnes of copper, 230 kilograms (7390 oz) of gold, and 1000 kilograms (32 825 oz) of silver from 2 752 300 tonnes of ore milled at a daily throughput of 24 500 tonnes (Note: Similco re-opened on August 18, 1994 after a suspension of operations in November 1993 due to low metal prices). During 1995, the mine is forecast to produce 18 200 tonnes of copper, 746.5 kilograms (24 000 oz) of gold and over 3110 kilograms (100 000 oz) of silver at a daily mill throughput of 23 580 tonnes. Reserves estimated by the company at January 1, 1995 were 135 600 000 tonnes grading 0.36% Cu plus gold and silver credits. During 1995 Princeton has milled ore from the low-grade stockpile and from the Ingerbelle East (extension) pit (phase 1), with estimated reserves of 10.8 million tonnes grading 0.32% Cu and 0.24 g/t Au. It was planned that 75% of the millfeed would come from the Ingerbelle pit by August, and this should result in a significant rise in head grades. Elsewhere on the property, Princeton drilled the Alabama zone, and planned to drill-test induced polarization targets on the Diamond Dot, located immediately west of the Alabama zone, P4 and Mill (east of pit 2) zones. The drilling will commence after feasibility studies are completed on Ingerbelle phase 2 or pit 3 expansions.

Production at the Westmin Resources Limited **Premier** gold mine during 1994 totalled 522 kilograms (16 800 oz) of gold and 5280 kilograms (169 700 oz) of silver from 164 175 tonnes of ore milled at a daily throughput of 450 tonnes. In addition, custom treatment, primarily of Snip mine concentrates, yielded additional gold and silver. Reserves estimated by the company at January 1, 1995 were 113 225 tonnes grading 8.23 g/t Au and 85.8 g/t Ag. Current production is 550 tonnes per day, two-thirds from Glory Hole fill recovered via a decline from 515 bench in the open pit, and one-third from pillars and ore on 4-level. Exploration targets underground include 5-level and the West zone above 3-level. Westmin also conducted an intensive assessment of all its holdings in the region.

At the **Goldstream** mine, Bethlehem Resources Corporation, which owns a 50% interest and is the operator, produced 13 500 tonnes of copper, 1550 tonnes of zinc, and 4614 kilograms (148 345 oz) of silver from 348 660 tonnes of ore milled. Reserves estimated by the company were approximately 600 000 tonnes grading 4.2% Cu, 2.3% Zn and 18.0 g/t Ag as of January 1, 1995. In mid-July, milling operations were temporarily shut down following slow ramp development and poorer than expected ore recovery in the 250-metre panel. Milling resumed in September and is scheduled to continue until January 31, 1996 when the economic limits of the existing orebody will have been reached. Underground exploration drilling was conducted on the 300-metre and 250-metre levels. A surface drilling program was planned for the fall on the C-1 zone, approximately 10 kilometres west of the mine, where encouraging results were obtained in 1994 drilling.

At the **Ajax** copper-gold mine, Afton Operating Corporation resumed production in September, 1994 after a three-year suspension in operations because of depressed metal prices. Production from the Ajax East pit, which contained approximately 3.63 million tonnes of ore grading 0.46% Cu and 0.34 g/t Au, totalled 3600 tonnes of copper and 245 kilograms (7885 oz) of gold from 931 000 tonnes milled at a daily throughput of 8700 tonnes. Reserves for the Afton-Ajax deposits estimated by the company at January 1, 1995 were 13 200 000 tonnes grading 0.42% Cu and 0.34 g/t Au.

In 1995 Afton announced that it will re-open the Ajax West pit, with about 9 million tonnes of the same grade as Ajax East, extending the mine life from December 1996 to about December 1998. Pushback stripping of the Ajax West pit is in progress, and some ore is already being milled. Definition drilling on the southeast side of the pit has yielded encouraging results. This may allow Afton to redesign and enlarge the final pit. Drilling was also carried out on

the south side of the Ajax East pit. Teck Corporation has also outlined significant resources on the Rainbow porphyry project, located between the Ajax mine and the Afton mill (*see* Advanced Exploration and Development Projects).

At the **Endako** molybdenum mine, Placer Dome Canada Limited produced 6.2 million kilograms of molybdenum in 1994, from 10 385 000 tonnes of ore milled at a daily throughput of approximately 28 500 tonnes. Proven and probable ore reserves estimated by the company were 117 600 000 tonnes grading 0.077% Mo at January 1, 1995; in addition measured and indicated mineral resources were estimated at 147 850 000 tonnes grading 0.061% Mo.

Cominco Ltd. production at the **Sullivan** underground zinc-lead mine in 1994 was 77 200 tonnes of lead, 204 000 tonnes of zinc, and an estimated 26 000 kilograms (835 930 oz) of silver from 1 613 000 tonnes of ore milled at a daily throughput of 8000 tonnes. It was the first full year of operation of the new lead-regrind circuit in the mill, resulting in higher grade zinc concentrates, and improved lead and zinc recovery. Zinc concentrate production was the highest level achieved in the last 30 years. Reserves of broken ore were maintained and totalled approximately 1.6 million tonnes at the end of 1994. Reserves estimated by the company at September 30, 1994 were 13 million tonnes grading 7.91% Zn, 4.53% Pb and 25.69 g/t Ag, sufficient for about another six years of operation. In 1995 Cominco conducted an exploration drilling program including one deep hole to test for the offset continuation of the Sullivan deposit north of the Kimberley fault.

At the **Table Mountain** underground gold mine, Cusac Gold Mines Ltd. produced 489 kilograms (15 722 oz) of gold in 1994 from approximately 31 075 tonnes of ore, milled intermittently at a daily throughput of 275 tonnes. During 1995 Cusac completed a decline to the Michelle high-grade zone and continued to develop the zone, producing about 45 tonnes of development ore per day for blending with the lower grade Bain vein material. The company also believes there is considerable potential both on strike and in well mineralized parallel structures. Drilling continues to explore this zone.

As a result of encouraging drilling results in the Michelle high-grade zone, Cusac is proceeding with completion of the 10 portal, a major underground development project with an estimated cost of approximately $1.3 million, to improve access to the orebody and, ultimately, to increase production. Cusac will advance the partially constructed adit (1570 metres) approximately 915 metres to the target area, with planned completion in the spring of 1996. Meanwhile, mining, development and exploration will continue through the existing decline. The mill is currently processing high-grade material from both the Michelle high-grade zone and the Catherine vein open-pit. The mill has been winterized and is expected to continue operating through most of the winter. Milling resumed in September and gold production, from intermittent daily throughput of 150 tonnes to the end of October, is approximately 300 kilograms (9650 ounces).

COAL MINES

Total clean coal production in 1995 is estimated to be about 24.5 million tonnes, approximately 22.2 million tonnes metallurgical and 2.25 million tonnes thermal. This is a substantial increase over 1993. Prices for both types of coal rose in the early part of 1995 and the nine-month value of coal exported this year may exceed the previous maximum of about $1 billion, reached in 1985. Total expenditure on development and exploration at existing coal mines is forecast to be in excess of $4 million for 1995. There have also been major expenditures to increase plant capacities and total capital expenditures committed to increasing production probably amount to over $50 million.

At the **Quinsam** mine on Vancouver Island, Quinsam Coal Corporation expects to produce 800 000 tonnes of thermal coal in 1995, up from 550 000 tonnes in 1994. Production is planned to increase to 1.2 million tonnes in 1996. The wash plant expansion estimated to cost $2 million, originally scheduled for mid-1996, is currently in progress as a result of the strong demand from Asia Pacific countries. It is expected to come into operation by late November. A successful exploration and drilling program in 1995 has increased reserves to more than 40 million tonnes from the previous level of 35 million tonnes. Next year, Quinsam plans to carry out a major exploration program on the Tsable River property and hopes to develop an underground coal mine.

Production by Fording Coal Limited at the **Fording River** mine is expected to increase to 7 million tonnes in 1995, following the addition of equipment to the plant and other capital expenditures. Over 120 holes totalling 16 000 metres were drilled in 1995 as part of a $750 000 exploration program on Henretta and Turnbull ridges. At the **Greenhills** mine, Fording Coal continues to increase production and plans to sell 3.8 million tonnes of metallurgical coal in 1995 and 4.2 million tonnes in 1996. The plant capacity has been expanded by the addition of new heavy-media cyclone circuits. Eighty exploration drill holes, totalling 12 000 metres, were completed in the Raven and Cougar pits during 1995. Fording Coal has an aggressive expansion program at its **Coal Mountain** mine. Exploration in 1995, consisting of 80 drill holes totalling approximately 13 000 metres, has resulted in the definition of a reserve base of 40 million tonnes of clean coal. Expenditures on new mining equipment exceeded $15 million and extensive improvements are in progress in the plant, at a capital cost of $30 million. Production in 1995 is expected to reach 1.2 million tonnes and is projected to increase to 2 and 2.5 million tonnes in 1996 and 1997, respectively.

At the **Line Creek** mine, Line Creek Resources Ltd. is building a conveyor to move coal 10 kilometres from the raw coal stockpile to the plant. The conveyor will cost about $30 million and will have a capacity of 7 million tonnes per year. When commissioned, operating costs will be substantially reduced. Currently, clean coal production is 2.2 million tonnes metallurgical coal and 0.6 million tonnes thermal coal. A new pit is being developed on Horseshoe Ridge and the haul road to this area is under construction. Approximately 15 000 metres of exploration and development drilling were completed in 1995.

At the **Elkview** mine, Teck Corporation has submitted a new mine plan encompassing Natal Ridge for government approval. The plan will increase production from approximately 2.8 million tonnes per year to 5 million tonnes per year over a period of five to six years. In 1995 exploration was mainly in active pits and consisted of 77 drill holes totalling approximately 10 000 metres.

In the northeast, the **Bullmoose** mine (Teck Corporation, 60.9%; Rio Algom Limited, 29.1%; Nissho Iwai Coal Development (Canada) Ltd., 10%) expects to ship 2 million tonnes of coal in 1995. This includes 400 000 tonnes transferred from the Quintette contract. The arrangement has been renewed for an additional two years, ensuring that Bullmoose runs at the 2 million tonnes production level until at least 1998. During 1995, twenty development holes were completed in the South Fork pit.

The **Quintette** mine, operated by Quintette Coal Limited, had a difficult year and expects to ship 3.8 million tonnes, down from the planned 4.3 million tonnes. Exploration expenditures, estimated at $1 million, were focused on developing reserves for beyond 1998 on Babcock Mountain (35 drill holes) and in the Mesa Extension area (35 drillholes).

INDUSTRIAL MINERALS MINES

British Columbia is endowed with a variety of industrial minerals. Interest in a number of commodities has increased in 1995. There are a nine major mines and more than thirty smaller quarries. These operations are mainly located in the southern half of the province, close to tidewater or major transportation routes. The most economically significant minerals produced in 1994 were sulphur, magnesite, gypsum, silica, barite, limestone end construction materials, with lesser production of jade, diatomite, magnetite, dolomite, dimension stone, pyrophyllite, scoria, slate, flagstone, zeolite, clay and fuller's earth. Sand and gravel pits are located throughout the province. The forecast value of production of industrial minerals in 1995 is $61 million (up from $47.1 million in 1994); structural materials are forecast to account for another $380 million (slightly higher than in 1994).

Sulphur, derived from natural gas, is produced at five extraction plants in the northeast of the province. Production during 1994 totalled 626 525 tonnes.

In the Rocky Mountains, Westroc Industries Limited moved production of **gypsum** from its Windermere quarry to its **Elkhorn** quarry. It has not yet started the proposed Elkhorn II development designed to sustain production at 450 000 tonnes per year. After restructuring for sale of the company, Domtar Gypsum continued to ship gypsum from a three-year stockpile mined from the Canal **Flats** (J4) quarry in 1994.

Baymag Mines Company Limited continued to mine **magnesite** at **Mount Brussilof** at an annual rate of approximately 175 000 tonnes. The magnesite is shipped to a processing plant at Exshaw, Alberta to produce high-quality calcined and fused magnesia. Construction of a new shaft kiln is in preparation at Exshaw and is expected to be in production in 1997, increasing Baymag's output by approximately 70%. The company plans to process and upgrade the lower grade magnesite (approximately 85%) presently wasted. The company also completed a drilling program over its claim block.

The **Mount Moberley** and **Nicholson** mines in the Golden area account for all of British Columbia's high-grade silica production. Mountain Minerals Company Ltd. is producing approximately 80 000 tonnes annually at Moberley for shipment to Springfield, Oregon. Bert Miller Trucking and Contracting Ltd. is producing approximately 60 000 tonnes annually and has started to process the undersize product, accumulating at a rate of some 10 000 tonnes annually, into a variety of fine to coarse aggregate products.

Limestone quarries at Gillies Bay and Blubber Bay on **Texada Island** ship some 5 million tonnes annually to pulp and paper mills, cement plants and lime producers along the coast from Alaska to northern California. White limestone is produced from deposits at **Benson Lake** (80 000 tonnes), **Gillies Bay** (20 000 tonnes) and **Lost Creek** (40 000 tonnes, mostly from the lower adit) and used as a filler in paints and plastics produced in Surrey and Creston. The **Dahl Lake** operation, 30 kilometres west of Prince George, reopened recently, processing approximately 20 000 tonnes of decorative aggregate from its 1994 stockpile. Kode-Jerrat Quarries Ltd. (**Giscome**) sells about 50 000 tonnes of limestone a year to customers in the central part of the province. The company plans to build its own kiln to calcine limestone on site and increase its market value four-fold. Limestone is processed by three cement plants and two lime production centres near Kamloops and Lillooet and in the Lower Mainland. The Continental Lime Ltd. Pavilion Lake plant produces up to 200 000 tonnes of lime per year from its quarry near Cache Creek. The majority of pulp and paper mills produce their own lime from nearby limestone quarries.

Mountain Minerals Ltd. operates the **Parson** mine, British Columbia's only **barite** producer. Current reserves are limited (one to two years); exploration drilling at Parson did not locate additional reserves. Dresser Industries may consider re-opening the **Fireside** property near Watson Lake.

Granite and **marble** are produced by a number of companies. Stone-processing plants are operated by Margranite Industries Ltd. in Surrey, Matrix Marble Corporation in Duncan and Westcoast Granite Manufacturing Inc. in Delta. Margranite is opening a new granite quarry (**Andorsen-Bighorn**) near Boston Bar. Garibaldi Granite Inc. operates the Squamish quarry (Island white granite) and is preparing two sites on the **Ashlu River** for quarrying of granodiorite. In the Grand Forks area, "black" granite from the **San Pedro** property is being shipped to Korea; other potential granite quarry sites are being examined in the area. Granite Creations and Stone Works opened a quarry in black granite north of Harrison Hot Springs. Adera Natural Stone Supplies Ltd. is quarrying a granite on Granite Island, near Sechelt. Mammoth Geological Ltd. started production at its **Tsitika** grey granite quarry on northern Vancouver Island.

Franz Capital Corporation Ltd. has been delivering stone products from its **Kingfisher marble** quarry near Enderby to landscape and brick retail businesses and construction sites in British Columbia and Alberta. The company plans to improve productivity and increase production and sales to approximately 200 tonnes per month. Products manufactured and stockpiled include split stone bricks and marble rock and chips.

Revelstoke Flagstone Quarries and Begbie Flagstone Ltd. are together producing approximately 200 tonnes of mica schist flagstone. Kootenay Stone Centre in Salmo is producing about 4000 tonnes of **quartzite flagstone**.

Clayburn Industries Ltd. of Vancouver is mining relatively small amounts of fireclay from **Sumas Mountain**, and processing **diatomite** and **pyrophyllite** from existing stockpiles. Clayburn plans to mine 200 tonnes of pyrophyllite from Princeton for its refractory brick plant in Abbotsford. Western Industrial Clay Products Ltd. in Kamloops supplies approximately half of the kitty litter market in western Canada, principally from its **Red Lake** property.

Dolomite quarried in the Crawford Bay, Creston and Rock Creek areas is used for soil conditioning, as a component in stucco and roofing materials, and as white, ornamental aggregate rock.

Jade was mined in the Kutcho Creek area by Jade West Resources Ltd. and recovered from the old Cassiar Asbestos dumps by Jedway Enterprises.

TAILINGS

Candorado Operating Company Limited operated the **Mascot Gold** tailings project at a designed rate of 36 000 tonnes per month. The project closed later in the fall. Seven Industries Inc. continues to produce about 60 000 tonnes per year of magnetite by processing the **Craigmont** tailings. The quality of the product has improved and the company is supplying most coal mines in western Canada (except Manalta and Line Creek). The company has filed a conceptual design to create a new tailings storage dam (on top of the old one) which would allow the operation to continue for at least another 15 years.

ADVANCED EXPLORATION AND DEVELOPMENT PROJECTS

METALS

It is estimated that about 47% of total expenditures will be spent on advanced exploration and development projects, including bulk sampling, during 1995. A number of projects advanced to the development or bulk sampling stage. The locations of projects described in this section are shown on Figure 7 and listed, with reserves, in Table 3.

PORPHYRY (AND RELATED) DEPOSITS

At the **Mount Polley** copper-gold project, Imperial Metals Corporation (65%) and Sumitomo Corporation (35%) completed soil stripping on the mill site, road access route and tailings dam site, in anticipation of construction start-up in the spring of 1996. Results from 1995 metallurgical test work on fresh ore samples were positive, with improved gold recovery and better concentrate grades than achieved in 1988-1989 tests. A report on this recent metallurgical testing was prepared, together with a revised ore reserve estimate of 81 500 000 tonnes grading 0.30% Cu and 0.414 g/t Au with a stripping ratio of 1.12 to 1. The new estimate takes into account all drilling after the completion of the 1990 Wright Engineers' feasibility study, which calculated mineable reserves of approximately 49 million tonnes grading 0.38% Cu and 0.55 g/t Au. The company expects to make a final construction decision before the end of 1995, on completion of financing arrangements. The overall geological resource is estimated at 230 million tonnes grading 0.26% Cu and 0.34 g/t Au. The capital cost of developing a 16 500 tonnes per day open-pit mine is estimated at $110 million. Annual production is projected at 15 000 tonnes of copper and 2180 kilograms (70 000 oz) of gold. Imperial, in receipt of a Mine Development Certificate issued in October, 1993, has been working on permitting for mine production, and has purchased mining and milling equipment from several sources, including the closed Brenda mine. The company also completed a modest program of widely spaced drill holes to test geochemical and geophysical anomalies peripheral to the main area of interest.

A detailed pre-feasibility study completed in 1995 on the Taseko Mines Ltd. **Fish Lake** porphyry copper-gold deposit was based on an open-pit "reserve" of 675 million

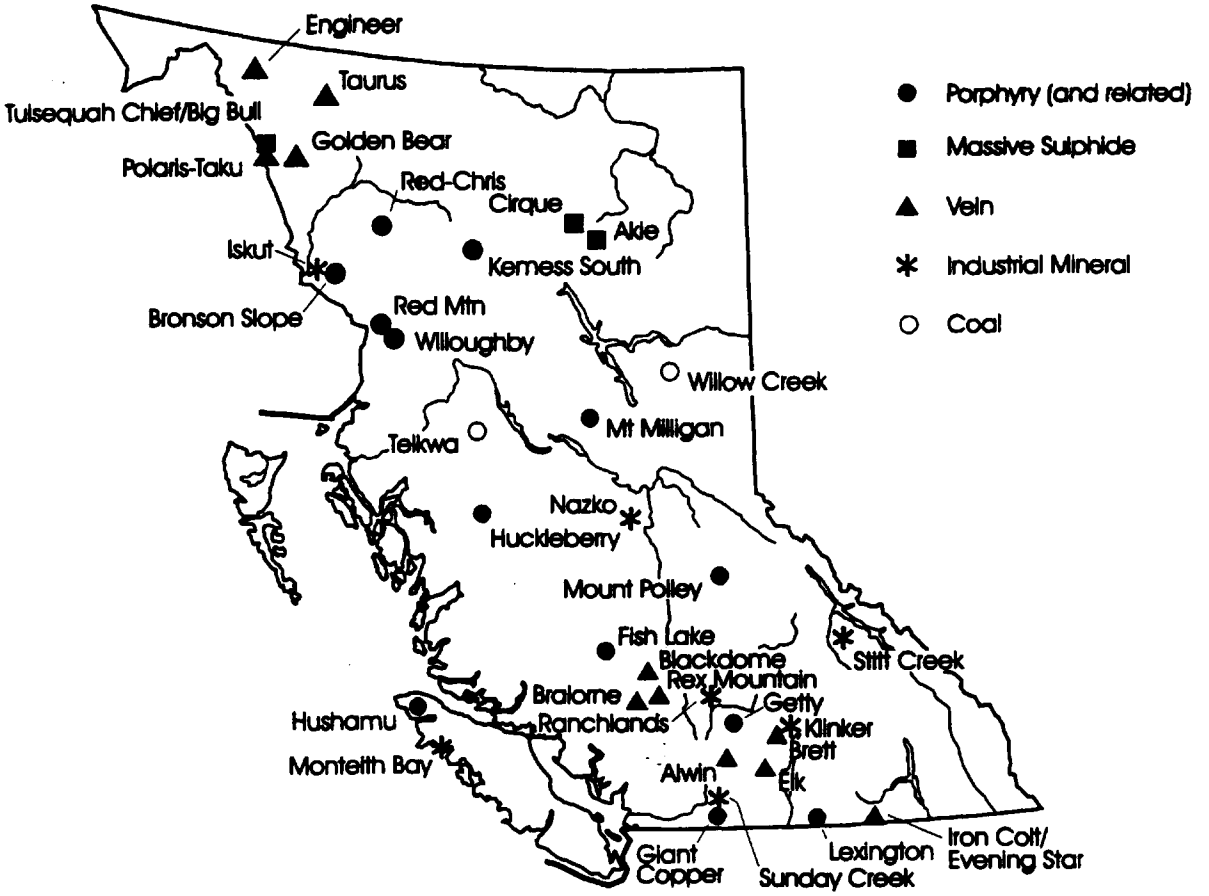


Figure 7. Advanced exploration and development projects in British Columbia - 1995.

tonnes grading 0.236% Cu and 0.435 g/t Au. The company has submitted an application for a Mine Development Certificate. The project renamed Prosperity, is being reviewed under the Environmental Assessment Act.

On the **Kemess South** project, El Condor Resources Ltd. (60%) and St. Philips Resources Inc. (40%) are awaiting the granting of a Mine Development Certificate. Mineable "reserves" are estimated by the companies at 45.5 million tonnes grading 0.2% Cu and 0.75 g/t Au (supergene) and 155 million tonnes grading 0.23% Cu and 0.59 g/t Au (hypogene) for an overall "reserve" of 200.4 million tonnes grading 0.22% Cu and 0.63 g/t Au. Mill throughput is proposed at 40 000 tonnes per day, providing a mine life in excess of 15 years. In August 1995 Royal Oak Mines Inc. embarked on a program to acquire 100% ownership of the Kemess project, as part of an integrated package involving compensation and economic development for mining in British Columbia offered by the provincial government. The effective date for approval of the Plan of Arrangement between Royal Oak and El Condor, St. Philips and Geddes Resources Limited was extended to Jan. 31, 1996 to facilitate the ongoing review process. A 1993 pre-feasibility study on the Kemess South gold-copper deposit by Kilborn Engineering Pacific Ltd. estimated capital costs at $363 million, with annual metal production averaging 2600 tonnes of copper and 6625 kilograms (213 000 oz) of gold. Royal Oak plans to extract and test two 50-tonne bulk samples from two pits (one in supergene, one in hypogene ore). It has placed contracts with Kilborn, which has begun definitive engineering and procurement of equipment for the project.

Jordex Resources Ltd. continued evaluation of its **Hushamu** porphyry deposit located 25 kilometres west of the Island Copper mine.

On the **Huckleberry** porphyry copper-molybdenum project, Huckleberry Mines Ltd. (formerly New Canamin Resources Ltd.) is waiting for a Mine Development Certificate to develop the deposit. Current reserves are estimated at 93.9 million tonnes grading 0.50% Cu, with minor recoverable amounts of gold, silver and molybdenum. The deposit would be mined by two open pits, the Main zone and the East zone. Planned mill throughput is 15 500 tonnes per day for the East zone and 14 000 tonnes per day for the Main zone, producing a total of 27 300 tonnes of copper annually over the anticipated 17-year mine life. Project costs for development, including inventory and working capital, are estimated to be $137 million. In 1995 a consortium of Mitsubishi Materials Corporation, Dowa Mining

TABLE 3
NEW MINES. CLOSURES, DEVELOPMENT AND ADVANCED EXPLORATION PROJECTS

Company Name	Project Name	Commodity	Estimated Tonnes (000s)	Estimated Grade	Reference
New Mines					
Prime Res. Group Inc.	Eskay Creek/ 21B Zone	Au,Ag	1019	65.14 g/t Au, 2949 g/t Ag, 5.6% Zn, 0.77% Cu	Homestake, MDC
Kinross Gold Corp.	QR	Au	1300	4.77 g/t Au	Kinross, MDC
Development					
Cominco Ltd./ Prime Res. Group Inc.	Snip/ Twin West Zone	Au, Ag	27.2	19.54 g/t Au	Prime, 1995
Westmin Res. Ltd.	Myra Falls	Cu, Pb, Zn, Ag, Au	9718	1.7% Cu, 6.6% Zn, 35.6 g/t Ag, 1.6 g/t Au	Westmin Ann. Rpt., 1994
Cusac Gold Mines Ltd.	Table Mtn./ Michelle High-grade Zone	Au	Total resource =	870 kg Au	Cusac, 1994
Closures					
North American Metals Ltd./ Wheaton River Minerals Ltd.	Golden Bear/ Bear Main	Au			
BHP Minerals Canada Ltd.	Island Copper	Cu, Mo, Au			
Advanced Exploration					
Porphyry (and related) Deposits					
Imperial Metals Corp.	Mount Polley	Cu, Au	81 500	0.3 Cu, 0.414 g/t Au	Imperial Metals, 1995
Taseko Mines Ltd.	Fish Lake	Cu, Au	675 000	0.236% Cu, 0.435 g/t Au	Taseko Mines, 1994
El Condor Res. Ltd./ St. Philips Res. Ltd./ Royal Oak Mines Inc.	Kemess South	Cu, Au	200 400	0.22% Cu, 0.63 g/t Au	El Condor, MDAP, 1992
Jordex Res. Ltd.	Hushamu (Expo)	Cu, Au, Mo	173 237	0.27% Cu, 0.34 g/t Au, 0.01% Mo	Jordex, 1992
Huckleberry Mines Ltd.	Huckleberry Main Zone	Cu	30 900	0.48% Cu, 0.07 g/t Au, 2.17 g/t Ag, 0.013% Mo	New Canamin, MDAP, 1994
	East Zone		60 275	0.54% Cu, 0.06 g/t Au, 3.1 g/t Ag, 0.014% Mo	

Placer Dome Inc.	Mt. Milligan	Cu, Au	298 400	0.22% Cu, 0.45 g/t Au	Placer Dome, MDC, 1993
American Bullion Minerals Ltd.	Red-Chris	Cu, Au	157 000	0.48% Cu, 0.37 g/t Au	Amer. Bull., 1995
Princeton Mining	Similco - Ingerbelle East Alabama	Cu, Au	 20 000 20 000	 0.35% Cu 0.31% Cu, 0.16 g/t Au	Princeton, 1994
Gibraltar Mines Ltd.	Gibraltar	Cu	9000	est. 0.3% Cu	Gibraltar, 1995
Royal Oak Mines Inc.	Red Mountain	Au, Ag	2540	12.8 g/t Au 38.1 g/t Ag	Lac Minerals MDAP, 1993
International Skyline Gold Corp.	Bronson Slope	Cu, Au, Ag	90 000	0.75 g/t Au, 0.16% Cu, 4.17 g/t Ag	International Skyline, 1995
Britannia Gold Corp./ Bren-Mar Res. Ltd.	Lexington	Cu, Au	162	8.9 g/t Au 0.96% Cu	Bren-Mar, 1995
Camnor Res Ltd./ Gold Giant Res./ Royal Oak Mines Inc.	Willoughby	Au, Ag			
Getty Copper Corp.	Getty North (Krain) Getty South (Trojan) Getty West (Transvaal)	Cu	 > 50 000	 0.5% Cu	
Getchell Res./ Teck Corp.	Galaxy Rainbow (No. 2 Zone)	Cu, Au Cu, Au	3200 14 100	0.65% Cu,0.34 g/t Au 0.5% Cu	Getchell, 1995 Getchell, 1995
Imperial Metals Corp.	Giant Copper (AM)	Cu, Au	20 700 3400	0.75% Cu, 0.4 g/t Au, 12 g/t Ag 1.17% Cu, 0.5 g/t Au, 20 g/t Ag	Imperial Metals, 1995

Massive Sulphide Deposits

Teck Corp./Cominco Ltd./ Samsung/Korea Zinc	Cirque	Pb, Zn, Ag	24 700	2.3% Pb, 8.5 % Zn, 50.8 g/t Ag	Curragh MDC, 1991
Redfern Res. Ltd.	Tulsequah Chief/ Big Bull	Cu, Pb, Zn, Au, Ag	7200	1.24% Cu, 1.18% Pb 6.32% Zn, 2.41 g/t Au, 99.33 g/t Ag	Redfern, MDAP, 1995
Ecstall Mining Corp./ Inmet Mining	Akie	Zn, Pb, Ag			

Vein Deposits

Bralorne-Pioneer Gold Mines Ltd./ Avino Mines and Res. Ltd.	Bralorne Above 1000 level Below 1000 level 51 vein Loco veins	Au,Ag	 432.5 673 110.7 363	 10.6 g/t Au 8.2 g/t Au 12.7 g/t Au 17.14 g/t Au	Bralorne-Pioneer, 1995
Liquid Gold Res. Inc./ Huntington Res. Ltd.	Brett Bonanza Zone R.W. vein	Au		 68 to 108 g/t Au 41.1 g/t Au	Huntington, 1993
Claimstaker Res. Ltd.	Alwin	Cu, Ag	390	2.5 % Cu	Claimstaker, 1995
Ampex Mining Ltd./	Engineer	Au	27.5 to 45.3	?	Ampex, 1995

Winslow Gold Corp.					
Canarc Res. Corp.	Polaris-Taku	Au	2540	14.1 g/t Au	Canarc, 1995
Fairfield Minerals Ltd.	Elk (Siwash North)	Au	156	36.55 g/t Au, 50 g/t Ag	Fairfield, 1995
Pacific Vangold Res. Inc./ Int'l Silver Ridge Res. Inc.	Iron Colt Evening Star	Au, Ag	907	10.3 g/t Au	Pacific Vangold, 1994
Hera Res. Inc./ International Taurus Res. Ltd./ Cyprus Canada Inc.	Taurus	Au, Ag	130 000	0.96 g/t Au	Hera, 1995
North American Metals Ltd./ Wheaton River Min. Ltd.	Golden Bear Kodiak A Ursa	Au	472 214	4.67 g/t Au 22.6 g/t Au	NAM, 1994 NAM, 1995
Spokane Res. Ltd.	Rex Mountain	Au, Cu			
Claimstaker Res. Ltd.	Blackdome	Au, Ag	71	14.1 g/t Au	

Coal and Industrial Mineral Deposits

Mountain Minerals Co. Ltd.	Ranchlands	zeolite			
Canmark Int'l Res. Ltd.	Sunday Creek	zeolite			
Highland Talc Minerals Ltd.	Goldbridge	talc			
Anglo Swiss Ind. Inc.	Blu Starr	sapphire			
Okanagan Opal Inc.	Klinker	fire opal			
Quinto Mining Corp. Ltd.	Lumby	graphite, sericite			
Canada Pumice Corp.	Nazko	scoria			
New Global Res. Ltd.	Monteith Bay	silica, pyrophyllite			
Super Twins Res. Ltd.	Iakut	wollastonite	2000	80%	Super Twins, 1995
Manalta Coal Ltd.	Telkwa	coal	38 670	thermal	
Globaltex Industries Ltd.	Willow Creek	coal		thermal	

Note: MDC = Mine Development Certificate; MDAP = Mine Development Assessment Process.
Estimated tonnes and grade are "Resources."

Co. Ltd., Furukawa Co. Ltd. and Marubeni Corporation formed a strategic alliance, involving several detailed financial agreements, with Princeton Mining Corporation (which acquired the project by buying New Canamin Resources Ltd. on July 7, 1995) to develop the project. The partners anticipate an early production decision upon development approval, expected by year's end

The Placer Dome Inc. **Mount Milligan** porphyry copper-gold deposit contains resources estimated by the company at 298.4 million tonnes grading 0.22% Cu and 0.45 g/t Au. Capital costs were projected in the $500 to $600 million range in 1993. The company plans to re-examine development options to lower capital costs.

During 1995 American Bullion Minerals Ltd. (80%) and Teck Corp. (20%) conducted the largest exploration program in the province on the **Red-Chris** porphyry copper-gold property (111 holes totalling approximately 36 700 metres of diamond drilling at an estimated cost of $6 million). Drilling has traced mineralization over a strike length in excess of 3 kilometres, adding approximately 400 metres of strike length to the Red-Chris deposit, and identifying potential reserves in the Gully and Far West deposits (collectively referred to as the Yellow-Chris zone) in the

western part of the property. At the beginning of the year, Fluor Daniel Wright Ltd. calculated mining reserves, based on a cut-off grade of 0.3% Cu in an open pit 300 metres deep, at 157 million tonnes grading 0.48% Cu and 0.37 g/t Au. Two near-surface, higher grade stockwork copper-gold zones containing 100 million tonnes grading 0.58% Cu and 0.46 g/t Au are potential starter pits. Drilling in phase 1 of the 1995 program has increased the resource base estimated by American Bullion to in excess of 200 million tonnes. The company hopes to delinate an additional 80 million tonnes of ore in the Yellow-Chris zone this year.

The phase 2 program included fill-in drilling in the western part of the Red-Chris deposit to facilitate revision of mining reserve calculations for preliminary feasibility study purposes. On the Far West deposit, which occupies the northern part of the Yellow-Chris zone, copper-gold mineralization has been intersected to a depth of 250 metres over a 700-metre length with widths varying from 150 to 250 metres. This deposit has the highest gold-to-copper ratio so far encountered at the Red-Chris project. Fill-in drilling was also carried out on the Gully deposit to the south in order that this resource can be incorporated in preliminary feasibility study reserve calculations.

Geotechnical drilling was carried out in the fall for proposed tailings impoundment and open-pit design. American Bullion has retained Fluer Daniel Wright to complete a preliminary feasibility study on the Red-Chris project by early 1996.

After evaluating bids on its **Red Mountain** gold-silver deposit near Stewart, Barrick Gold Corporation decided to keep it in its portfolio of properties. No further work was planned for 1995, a stark contrast to the previous owner's (Lac Minerals Ltd.) expenditures in excess of $15 million in 1994. Reserves previously reported by Lac in the Marc and AV zones were 2 539 000 tonnes grading 12.8 g/t Au and 38.1 g/t Ag at a cut-off grade of 3 g/t Au. In August 1995, Royal Oak Mines Inc. embarked on a program to acquire the Red Mountain gold project from Barrick Gold, as part of the same development initiative that led to its acquisition of the Kemess South project. Royal Oak's proposal involved a $3 million work commitment over three years, a 1% net smelter return royalty, payable to Barrick on the first 57 540 kilograms (1 850 000 oz) of gold recovered, and a $10 per ounce royalty on gold recovered in excess of that amount. Subject to completing a positive feasibility study, commercial production could start as soon as 1998. Capital costs of development of the orebody and construction of mining and processing facilities have been estimated at $100 million. Royal Oak plans to create a B.C. Division, with headquarters and offices in northern British Columbia, to carry on exploration, development, construction and administration for the Kemess and Red Mountain properties

International Skyline Gold Corporation initiated several studies required for the preparation of a preliminary feasibility study on its **Bronson Slope** polymetallic porphyry property located adjacent to the Snip mine. The study is expected to be completed by year end.. In August 1995, the company estimated a drill-indicated and inferred inventory of 90 million tonnes grading 0.16% Cu, 0.75 g/t Au and 4.17 g/t Ag, plus the potential for recovery of molybdenum and iron from magnetite. A higher grade potential open-pit starter resource of 17 million tonnes grading 0.23% Cu, 0.72 g/t Au and 3.10 g/t Ag is indicated within this inventory. During 1995 Skyline completed a 610-metre drilling program in the spring and a 2400-metre program in the fall, both designed to confirm previous mineral inventory estimates. Skyline has also re-split and re-assayed over 1800 metres of drill core taken in 1988. New assays from the previously drilled core did not result in any material change in the overall grade or size of the deposit; however, higher grade gold in one hole have prompted the company to consider a reconnaissance drilling program to test the continuity of this possible vein target. The company has applied for a project approval certificate under the Environmental Assessment Act to develop a 12 000 tonne per day open-pit mine.

In the Greenwood camp, in southern British Columbia, Britannia Gold Corporation and Bren-Mar Resources Ltd. widened the Grenoble adit and commenced work on a 700-metre decline to the **Lexington** Main zone containing a drill-indicated reserve estimated at 162 000 tonnes grading 8.9 g/t Au and 0.96% Cu. The decline will provide access for a test mining program. Preliminary bulk metallurgical testing and a base line environmental study are also planned. Mining of approximately 180 tonnes of material is proposed for testing purposes; a larger bulk sampling program may follow if results are positive. Material will be processed at the Roberts mill at Greenwood.

During 1995 Camnor Resources Ltd., under a joint venture agreement with Gold Giant Minerals Inc., drilled twenty-seven core holes totalling 3013 metres on the **Willoughby** gold-silver project adjacent to the Royal Oak Mines, Red Mountain property. Gold Giant has entered into a subsidiary agreement with Royal Oak whereby Royal Oak has been granted the right to acquire up to a 35% interest in the property and the joint venture. The surface drilling program tested the North, Wilby, Willow, Kiwi, North/North and Icefall (Upper and Lower) zones. In order to better explore the North zone, Camnor completed 50 metres of a proposed 100-metre adit, before curtailing the planned excavation of underground drill stations due to a lack of water. This program is scheduled to restart in the spring.

In the northern part of the Highland Valley, southwest of Kamloops, Getty Copper Corporation is conducting an induced polarization survey and drilling program (9150 m) on the **Getty North** (Krain) porphyry copper-molybdenum property. Drilling will test areas of known mineralization, favourable structural areas identified from a comprehensive

remote sensing survey and induced polarization anomalies. Results of the drilling and metallurgical studies will be used to re-evaluate the Krain oxide copper deposit for solvent extraction-electrowinning (leach) processing. The initial target is about 25 million tonnes grading 0.6% Cu (oxide). The degree of mixing of oxide and sulphide minerals will have a significant impact on copper recovery. Nearby sulphide copper deposits are also being examined for processing by conventional milling techniques. The drilling program is expected to continue through the winter; further metallurgical studies will be undertaken and a pre-feasibility study will be commissioned.

In the area between the Afton and Ajax deposits, Teck Corporation (70%) continued to drill-test the **Rainbow** porphyry copper-gold target, under a joint venture agreement with Getchell Resources Inc. (30%). The two-stage exploration and development program was focused on delineating an economic deposit in the previously drilled No. 2 zone (Rainbow zone). The higher grade core of this previously unrecognized, well zoned porphyry system has significant tonnage potential and is the initial priority target. Drilling results indicate mineralization is associated with a strongly altered zone of brecciation adjacent to a north-dipping intrusive dike. The dike is apparently wedge shaped, increasing from 30 metres wide near surface to greater than 100 metres at depth. Copper mineralization has been traced 650 metres along strike and to a vertical depth greater than 300 metres. Copper and gold grades generally increase with depth. The engineering department of Afton Operating Corporation completed a comprehensive review and analysis of substantial archival and recent, phase 1 drilling data on the Rainbow zone, identifying a potential pittable area and areas which require additional drilling information. Afton's engineering department continued to provide technical support during the phase 2 program. Teck and Getchell have completed approximately 6000 metres of drilling in 27 holes. A phase 3 program comprising about 10 diamond drill holes has been recommended to evaluate the new Rainbow No. 22 zone, southeast of the Rainbow No. 2 zone. Recent drilling and assessment of archival data has outlined a potential resource of 14.1 million tonnes grading .5% Cu to a depth of 300 metres.Teck is continuing negotiations with Getchell on the Galaxy property, 1.5 kilometres to the north of Teck's Ajax mine. Getchell reports that property hosts an estimated 3.2 million tonnes grading 0.65% Cu and 0.34 g/t Au.

In 1995 Imperial Metals Corporation conducted a surface diamond-drilling program on the **Giant Copper** deposit east of Hope. It focused on the expansion of the near-surface mineral resource in the AM Breccia zone. Previous drilling and underground development have outlined an open pittable resource estimated at 20.7 million tonnes grading 0.75% Cu, 0.4 g/t Au and 12 g/t Ag. A small underground resource of 3.4 million tonnes grading 1.17% Cu, 0.5 g/t Au and 20 g/t Ag is also estimated. The geological reserve estimated by Wright Engineers in a 1966 feasibility study is 57.8 million tonnes grading 0.55% Cu, 0.28 g/t Au and 6.9 g/t Ag. The 1995 program was designed to increase confidence in the resource calculations for the AM zone. There is significant exploration potential on the property outside the AM Breccia zone (*e.g.* No. 1 Breccia zone and Invermay deposit); however, no work was done on these zones in 1995. In September the provincial government announced the creation of the Skagit Valley Class A Provincial Park. The Giant Copper property straddles the northern boundary of the Skagit Valley area; future access to the site is guaranteed under the Park Act.

MASSIVE SULPHIDE DEPOSITS

During 1995 Redfern Resources Ltd. conducted on-going environmental and socio-economic studies associated with its application for a Mine Development Certificate for its **Tulsequah Chief** volcanogenic massive sulphide deposit. In July, Redfern reported positive results from a $1.5 million feasibility study conducted by Rescan Engineering Ltd. with contributions by a team of independent consulting engineers. The study is based on an initial mineable reserve of 7 200 000 tonnes grading 1.24% Cu, 1.18% Pb, 6.32% Zn, 2.41 g/t Au and 99.33 g/t Ag, which is part of the overall geological reserve of 8 900 000 tonnes. At a production rate ranging from 800 000 to 900 000 tonnes per year, the mine life is estimated to be about 8.3 years. Total capital investment includes preproduction capital of $125 million and ongoing capital costs of $35 million, mainly in the first three years. During full production, annual metal shipments will average 1770 kilograms (57 000 oz) of gold, 71 500 kilograms (2 300 000 oz) of silver, 10 000 tonnes of copper and 51 300 tonnes of zinc. Economic analysis is based on the year-round utilization of a 160-kilometre access road to be built from the minesite northwards to the existing road at Atlin, British Columbia. An alternative access option contemplates the seasonal use of barges on the Taku River, from its confluence with the Tulsequah River to its outlet at the ocean near Juneau, Alaska. Revisions to the feasibility study are anticipated, but Redfern hopes to file an application for a Mine Development Certificate before the end of the year.

In the **Gataga** district, southeast of the Cirque zinc-lead-silver deposit, Inmet Mining Corporation (formerly Metall Mining) continued to explore the depth potential of the **Akie** zinc-lead-silver deposit it holds under an option agreement with Ecstall Mining Corporation. During 1994 Inmet traced the mineralized zone by drilling along a strike length of 1400 metres and to depths of 300 metres. This year the company drilled seven holes totalling approximately 4900 metres to depths in excess of 1000 metres, testing the down-dip extent of deposit. Ecstall currently estimates the dimensions of the deposit to be 1400 metres long by 800 metres deep by 20 metres thick. Considerable other surface exploration work was completed elsewhere on the property

and several large lead-zinc soil anomalies were discovered on strike.

VEIN DEPOSITS

Bralorne-Pioneer Gold Mines Ltd., in a joint venture with International Avino Mines Ltd., plans to re-open the historic **Bralorne** mine encompassing the combined Bralorne, Pioneer and Loco properties, following issuance of a Mine Development Certificate in March 1995. Development and exploration work, together with final permitting application, are in progress. Initial underground mining will be from the formerly producing Bralorne 51 vein area where detailed exploration programs, in recent years, have outlined proven, probable and possible reserves of 570 000 tonnes grading 8.22 g/t Au. Proven and probable reserves above the 800 level and readily available for extraction total 432 500 tonnes grading 10.63 g/t Au. There are also reserves of 673 000 tonnes grading 8.23 g/t Au, proven and possible, between the 1000 and 2600 levels, accessible by dewatering the shaft. The nearby Countless vein on the Looo property has 110 000 tonnes probable and possible reserves grading 17.1 g/t Au. Mining and milling operations are forecast to start at about 225 tonnes per day, increasing to 400 tonnes per day at a later date. The initial capital cost is estimated between $5 and $7 million, based on a 225 tonne per day operation with annual output of 860 kilograms (27 500 oz) of gold at an average cash cost of US$250 per ounce. Over $2 million for underground vein development is included in this cost estimate. Mill tune up was scheduled for November and production at 250 tonnes per day early in 1996. Milling machinery is being assembled at the property and the mill building has been rehabilitated.

During late 1994 and early 1995, an underground drilling program from the 400 level of the Bralorne mine intersected extensions of the Bralorne and Pioneer veins in the 610-metre gap between the two veins which has never been explored. Two of three veins intersected returned encouraging assays over mineable widths. A 13-hole drilling program in 1995 on the Peter, Millchuck and Big Solly veins on the Looo property also returned encouraging results. Bralorne-Pioneer has started to develop the Peter vein underground on the 800 level, 305 metres below the surface. Trenching on the northeast side of the Bralorne property uncovered a new gold-bearing zone, the Maddy zone, over an 850-metre length; follow-up drilling is in progress.

Huntington Resources Ltd. concentrated its 1995 work on mining in the high-grade R.W. gold vein on its Brett property. Closely spaced sampling of the vein returned an average grade of 34.35 g/t Au over a strike length of 51.3 metres and across a true width of 0.44 metre. Drilling in previous programs has tested the vein over a vertical range of at least 25 metres. Mining began in August and continues on schedule; ore is being stockpiled. Huntington is negotiating to custom mill ore offsite. The 240-metre adit has been rehabilitated preparatory to raising and stoping in the Bonanza zone. Previous drilling on the Bonanza zone confirmed earlier grade estimates of 68 to 108 g/t Au.

Claimstaker Resources Ltd. signed an agreement with Afton Operating Corporation whereby it will ship high-grade copper ore from its **Alwin** mine in the Highland Valley to be custom milled by Afton. The company hopes to submit a mining plan and application to re-open the mine and commence underground mining at a proposed rate of 100 tonnes per day. Reserves estimated by the previous owners total 390 000 tonnes grading 2.50% Cu. In January 1995 the underground workings were re-opened to help prepare the No. 4 - North orebody for future production. During 1995, Claimstaker shipped a few thousand tonnes of oversize high-grade copper boulders to Afton.

At the **Engineer** gold mine, Ampex Mining, under an agreement with Winslow Gold Corporation, mined and milled approximately 345 tonnes of vein material from stopes on the Engineer and Double Decker veins during a bulk sampling program. Ampex installed tracks and mobilized equipment to improve mining efficiency. A further program of exploration, limited milling of material from near-surface veins and preparation for dewatering the lower levels on the Engineer vein is planned. The company hopes to bring the 27 500 to 45 300 tonnes of indicated reserves into the proven reserves category.

The Canarc Resource Corporation exploration program on the **Polaris-Taku** gold project in the Tulsequah area involved deep (up to over 730 m) drilling to test the potential of the C-vein and drilling on the North zone. Three new vein intersections were cut by the deep drilling. They are tentatively interpreted to be an extension of the Y-vein system, 6120 metres south and 90 metres below the deepest existing Y-vein reserves. Drill-indicated geological reserves, estimated by an independent study in early 1995, total 2.54 million tonnes grading 14.1 g/t Au. Drilling was also conducted on the North zone where the target is one or more gold-bearing quartz-carbonate vein systems within a favourable alteration zone up to 30 metres thick and over 450 metres long. A total of 27 drill holes have delineated the North zone over a strike length of 670 metres, with an additional 240 metres of strike length indicated by soil geochemical anomalies. The average width of the zone is about 7 metres grading 5.14 g/t Au. The 1995 program has shown that it has a shallow dip with similar gold grades throughout. Bulk underground mining and bioleaching are being investigated for this low-grade ore. A resource estimate for the North zone will be prepared over the winter. Fluor Daniel Wright Ltd. has been retained to carry out engineering, metallurgical, environmental and financial studies to assess the potential for a moderate tonnage, underground gold mining operation.

In 1994 Fairfield Minerals Ltd. sold 932 kilograms (29 965 oz) of gold and 1220 kilograms (39 225 oz) of silver recovered from 10 400 tonnes of ore from its bulk sampling program on the Siwash North vein on the **Elk** property and treated at the Asarco smelter at Helena, Montana. Reserves estimated by the company at January 1, 1995 were 156 000 tonnes grading 36.55 g/t Au and 50 g/t Ag. During 1995 Fairfield completed an in-fill program including 7620 metres (217 holes) of underground drilling and 6400 metres (98 holes) of surface drilling on a 10-by-10-metre grid. This work tested about 25% of the widely drilled (50-by-50 metre) Siwash vein system along a strike length of about 335 metres, a width of 150 metres and a vertical depth of 130 metres. Many of the higher values intersected in the drilling are within four distinct shoots, two of which are within 60 metres of surface and may be amenable to open-pit mining. Five deep surface holes explored an area below the underground development; all five intersected the vein structure with gold values to a depth of 260 metres. Open-pit, and a limited amount of underground, mining between 1992 and 1994 netted Fairfield about 1586 kilograms (51 000 oz) of gold from ore averaging 97.7 g/t Au over 0.4 metre. Over the next several months, feasibility studies will determine the economics of an open-pit and/or underground operation. Reconnaissance drilling on five separate vein structures located 0.8 to 3.2 kilometres south of the mine obtained several high-grade but narrow intersections.

In the Rossland camp, International Silver Ridge Resources Inc. and Pacific Vangold Mines Ltd. have been conducting underground development work and mining on the Iron Colt and Evening Star properties. During January and June 1995, the companies shipped approximately 1414 tonnes of gold-bearing ore from the **Iron Colt** to the Kettle River mill at Republic, Washington for custom milling; 21.4 kilograms of gold were recovered. They plan to continue underground drilling throughout the winter. On the **Evening Star**, the operators have received a bulk sampling permit to extract 10 000 tonnes. They expect to produce approximately 70 tonnes of gold ore per day, at an average grade of approximately 17.1 g/t Au from drill-indicated reserves of 907 000 tonnes grading 10.29 g/t Au. Development work, including drifting on the vein, is in progress. Metallurgical testing has been completed and ore will be shipped to the Kettle River mill. Over 1670 tonnes of high-grade ore were shipped during June and yielded 19.4 kilograms of gold; the company intended to ship a minimum 1800 tonnes per month. Elsewhere in the Rossland district, Pacific Vangold and International Silver Ridge plan work on the **Gertrude** claim (surface drilling and drifting from existing workings to intersect the vein), where proven reserves are estimated at 49 000 tons grading 7.9 g/t Au, and on the Buckeye vein, exposed in old underground workings. Also, a four-hole drilling program targeted an untested section of the **Blue Bird/Mayflower** lead-zinc-silver-zone. LRX Capital Corporation is exploring the Baker vein system underground at the **Midnight** gold mine. An underground drilling program tested the extension of this system on strike to the west, and up dip. Drilling intersected mineralization which has been opened by drifting and raising. Bulk sampling is planned.

At the **Tauras** project in the Cassiar camp, Cyprus Canada Inc., under a joint venture agreement with International Taurus Resources Inc. and Cusac Gold Mines Ltd., completed a major drilling program (12 670 m in 78 drill holes) costing some $2.8 million and designed to delineate a large tonnage, low-grade, bulk-mineable (potentially heap-leachable) gold deposit in the vicinity of the Taurus, Sable and Plaza underground workings. International Taurus had completed an induced polarization survey on part of the property west of the mine workings in 1994. Two large anomalies were outlined; they were unlike those associated with the vein zones and their significance was not fully realized until diamond-drill hole 94-56 encountered altered pyritic volcanic rocks assaying 1.43 g/t Au across 45 metres. An additional 30 holes were drilled and numerous intersections, some with significant gold mineralization near the surface, were identified. The gold is contained in three zones (88 Hill, Taurus West and BM) of pyritic quartz veins and carbonate-altered, fine-grained pyritic volcanic rocks approximately 330 metres apart and extending westward onto the property of Cusac Gold Mines.

The discovery of low-grade gold mineralization attracted the attention of several major mining companies, and in April 1995 a joint venture agreement was made with Cyprus Canada Inc. Cyprus conducted a winter drilling program (14 holes) to explore the outlying areas. At the same time, an induced polarization survey was completed over a 5 square kilometre area. Many of the initial 14 drill holes were near, but not in areas with high induced polarization anomalies. The Cyprus summer program started in May with additional induced polarization surveys and diamond drilling. Limited reverse-circulation drilling was conducted, mainly as a check of grades. The results indicate that the mineralization, which is concentrated between a hengingwall basalt and a footwall argillite, is present over a large area, 1.5 kilometres in an east-west direction and 800 metres wide. The mineralized zone, which ranges in thickness from 70 to 150 metres, strikes approximately 070° and dips 20° to the southeast. The quartz vein stwetores within it (which carry higher grades) trend northerly and are steeply dipping. The 'stratabound' zone includes a higher grade portion (2 to 3 g/t Au) within an average grade of 1 g/t Au, based on a cut-off grade of epproximately 0.75 g/t Au. Based on results to date, a consultant to the company estimates the size of the gold deposit to be at least 130 million tonnes grading 0.95 g/t Au. During late 1995 Cyprus will complete menallurgical testing of different ore types. Follow-up drilling on induced polarization targets and closer spaced drilling to test and define a starter pit are planned for early 1996.

Production at the Wheaton River Minerals Ltd./North American Metals Ltd. **Golden Bear** mine during 1994 totalled 980 kilograms (31 500 oz) of gold and 286 (9200 oz) of silver from 88 920 tonnes of ore milled at a daily throughput of 325 tonnes. The mine closed in September of 1994 due to exhaustion of refractory ore reserves in the Bear Main zone. An aggressive exploration program on the Kodiak A oxide ore zone during 1994 increased the mineable reserve to 472 000 tonnes grading 4.67 g/t Au. A Mine Development Certificate for a revised production plan to heap leach the Kodiak A ore has been issued. Unfortunately, heavy rains during the latter part of September and early October forced postponement of the project until 1996.

In the fall of 1994, a new zone (Ursa) of both higher grade refactory and lower grade, potentially leachable oxide ore, was discovered north of the Kodiak A zone. A follow-up program during 1995 has identified a drill-indicated reserve of 214 065 tonnes grading 22.6 g/t Au. The operators hope to mine this zone underground over a two-year period, begining in late 1996, at a rate of 400 tonnes per day. The Ursa deposit is expected to produce 4045 kilograms (130 000 oz) of gold at an estimated total operating cost of US$200 per ounce. A feasibility study is in progress; it will evaluate the potential to process the higher grade ore from both oxide deposits in the existing mill, while utilizing heap-leach extraction methods for the lower grade material.

Mining of the Ursa deposit would be followed by the Kodiak heap-leach project, which would provide a further three to four years of production. The first heap-leach phase would involve the Kodiak A zone and is expected to produce approximately 1400 kilograms (45 000 oz) of gold over a twelve-month period, at a cost of approximately US$190 per ounce gold, not including $5 million previously spent on the project. The first two benches on Kodiak A were mined in late 1994 and the ore stockpiled. Feasibility studies on the Kodiak B and C deposits and the east low-grade stockpile are yet to be completed. Total mineral reserves and resources are estimated at 3.7 million tonnes grading 4.46 g/t Au.

A decline was driven during the fall of 1994 and the spring of 1995 on the Grizzly zone, approximately 400 metres below the mined out Bear Main zone. Geological resources are estimated at 153 000 tonnes grading 20.5 g/t Au. Underground drilling was suspended in the summer due to lower than expected grades and widths of mineralization. Elsewhere on the property, geochemical, geophysical and geological surveys, and trenching west and north-northwest of the Kodiak A zone, have identified several anomalies in carbonate rocks. A follow-up drilling program discovered several new gold-bearing zones. The mine will be on a care and maintenance basis over the winter.

Spokane Resources Ltd. completed a 5800-metre drilling program, designed to extend the zone of gold-copper mineralization on its **Rex Mountain** property, 40 kilometres northwest of Lillooet, both laterally and at depth. The zone has been defined over a strike length of 700 metres, a width of approximately 6.5 metres and to a depth of 100 metres. Results confirm that the mesothermal gold-bearing vein system contains at least three quartz veins in a steeply dipping shear zone. The most significant gold-copper intersections occur within the quartz vein in close proximity to the contact with altered serpentinite (listwanite). Drilling is continuing to extend the system to the west and also at depth. Spokane Resources also plans to evaluate the nearby Shulup property which it recently acquired.

At the **Blackdome** gold mine, Claimstaker Resources Ltd. and joint venture partner Aurison Mines Ltd. conducted a program of drilling and underground drifting in search of new reserves on veins identified by previous drilling and trenching. If successful, the operators believe the existing 200 tonne per day mill could be placed back in production very quickly. The main objective of the underground drilling program from the rehabilitated 1870 level is to test two areas on the No. 18, No. 19 and Ne. 11 veins, where a 1994 surface drilling program intersected high-grade gold mineralization. Prior to 1994, an independent study indicated a possible 70 800 tonnes grading 14.1 g/t Au; the 1994 and 1995 programs are expected to increase this tonnage.

Soil sampling and follow-up trenching in the southeast part of the vein system, located several anomalies, and mineralized quartz float along fault structures. A bulk sample of approximately 900 tonnes will be mined from a surface cut at the top of the No. 11 vein and transported to a mill site stockpile, where it will be processed at a later date.

INDUSTRIAL MINERALS DEPOSITS

Exploration and market interest in industrial minerals continues to increase. In 1995 exploration expenditures are estimated over 4.5 million.

Zeolite beds have been identified in several areas throughout the interior of British Columbia. Mountain Minerals Company Ltd. mined 1000-tonne bulk samples from each of its **Ranchlands** Z-1 and Z-2 deposits near Cache Creek and will ship them to Alberta for test marketing for agricultural applications. The company has indicated its intention to begin limited production from the Cache Creek (Z-1) and McAbee (Z-2) pits at a proposed mining rate of 8000 to 9000 tonnes per year. The material would be shipped to Alberta for processing. Canmark International Resources Inc. is stripping overburden on its **Smuday Creek** zeolite property near Princeton, preparatory to mining a 10 000-tonne bulk sample for market development in the Lower Mainland. The zeolite is a high quality clinoptilolite variety. Canmark has signed a contract with Sun-Ray Resources Ltd. to supply 2000 tonnes of zeolite with an option for an additional 3000 tonnes within a year.

Gemstones are attracting more interest in British Columbia as new discoveries are made. Anglo Swiss Industries Inc. has acquired the **Blu Starr sapphire** property in the Slocan Valley, where previous owners have extracted a large number of gem-quality star sapphires from a corundum showing in the Valhalla Complex. Many of these sapphires have been mounted in jewellery pieces which have been sold through retailers in Nelson. Angle Swiss proposes to carry out detailed mapping and bulk sampling of its extensive land holdings. It will utilize its crushing, milling and laboratory facility located at its Kenville mine property, 30 kilometres by road from the Blu Star deposit.

Gem-quality **acquamarine** has been found in pegmatite dikes in the nearby **Airey Creek** area. High quality black and smoky grey quartz crystals are also common. At the **Klinker fire opal** locality near Vernon, Okanagan Opal Inc. conducted test pitting and some rockhound sales transpired.

Canada Pumice Corporation continued to develop a market for **scoria** from the **Nazko** cinder cone located west of Quesnel. Bulk sampling (2900 tonnes) was conducted, and an application has been made for a Mine Development Certificate for a 100 000 tonnes per year operation.

Continental Lime Ltd. filed for four limestone exploration projects - Vancouver Island, Crowsnest Pass, Giscome and Chetwynd.

Panorama Natural Stone Ltd. plans to quarry the **"Haddington Island" andesite** near Port McNeil. Quadra Stone Co. Ltd. has been sampling its **Beaverdell granite** property. Ava Resources Ltd. initiated road upgrading to access he **Babbette Lake/Wishaw** quartzite property preparatory to test quarrying and sampling, but the program was subsequently postponed until 1996. McBride (**Dome Creek**) Structural Slate Ltd. began clearing a test quarry site on its with potential to produce good roofing slate and other flagstone.

Modest exploration programs for **barite** were carried out on the **Dave-Wall** manto property north of Sirdar by Hunter Resources Ltd. and at **Jumbo Creek** next to the Mineral King lead-zinc property by Birch Mountain Minerals Ltd. The company lost the **Muncho Lake** white barite claims in a dispute over title.

Quinto Mining Corporation Ltd. continues to produce samples for marketing the product from its **Lumby** (Chaput) **graphite** and **sericite** deposit, 37 kilometres east of Vernon. It has applied for a Project Mine Development Certificate under the Environmental Assessment Act. Industrial Mineral Park Mining Corporation mined a 3000 to 4000-tonne bulk sample from its **Black Crystal graphite** property near Slocan. It was shipped to a nearby site, where a flotation mill for the recovery of crystalline graphite will soon be built; start-up is forecast for spring 1996.

Micro Minerals Resources Inc. sampled the **Millie Mack graphite** property south of Naskup. A graphitic shear zone containing an estimated 2 million tonnes of open-pittable graphitic sericite and sericite has been identified. Samples have been sent to research centres in the United States for testing. The company is focusing on developing a low-cost high-volume concrete additive to increase strength and resistance to severe temperature fluctuations.

Consolidated Ramrod Corporation Ltd., in a joint venture with Anvil Resouces Ltd., had planned a bulk sampling program for **diamonds** on their large **Ice** property which includes the Crossing Creek kimberlite near Elkford. Unfortunately, the program was postponed until 1996. Grassroots exploration was also carried out elsewhere in the Rocky Mountains and the Horsethief-Toby Creek area.

The New Global Resources Ltd. **Monteith Bay (geyserite) pyrophyllite-silica** project received a Mine Development Certificate in 1995; however, the company has not yet started commercial operation.

Highland Talc Ltd. continued to work on the northern extension of the Talc Group claims north of Boston Bar. Work on the prospect includes laboratory research and development, pilot-scale testing and a feasibility study.

Pacific Bentonite Ltd. has applied to the government for two bulk sample permits for its **red shale and bentonite** property in the Hat Creek coalfield. It proposes to mine 10 000 tonnes of bentonite and 10 000 tonnes of red shale for sale as landscape rock. Proceeds from the sale of the shale will be reinvested in on-going research and development on a bentonite-based geosynthetic liner that the company is developing.

Cassiar Coal Company Ltd. conducted a 25-hole drilling program totalling approximately 370 metres, to further test its **Stitt Creek** placer **garnet** deposit in the Goldstream mine area, north of Revelstoke. Preliminary results are encouraging.

Super Twins Resources Ltd. discovered and explored four **wollastonite** deposits and a possible fifth (**Iskut** property) on Zippa Mountain, 15 kilometres west of the Snip mine. Early results from sampling at the Cliff zone confirm the high purity of the deposit and its open-pit potential. The wollastonite is hosted by xenoliths and large screens in pyroxenite.

Due to delays in permitting and the lateness in the season, Great Pacific Pumice Inc. postponed its production of **pumice** from the **Pum** property near Mount Meager until June 1996. The property has possible reserves of 5 to 20 million tonnes. A 20-year mine and reclamation plan has been approved and a Mine Development Certificate granted in the spring of 1995.

Global Metals Ltd. drilled 29 shallow holes on its **Green jade** property on the north side of O'Ne-el Creek in

north-central British Columbia. The company estimates that 2.8 million kilograms of nephrite jade and tremolite exist within the area tested.

COAL

Advanced exploration expenditures outside existing coal mine leases are estimated at $1.5 million in 1995. The increase in metallurgical and thermal coal prices has stimulated a number of companies to explore for additional coal reserves.

At the **Telkwa** thermal coal project, Manalta Coal Limited conducted an extensive exploration program south of the Telkwa River, designed to better define reserves in the Tenas Creek area, to better delineate the reserve potential of the license block as a whole and to explore the Cabinet Creek area. A total of 83 holes were drilled at a cost of around $1 million. Preliminary indications are that the Tenas Creek and Cabinet Creek areas are complicated by normal faulting; additional drilling will be required to fully evaluate these areas. Coal quality is very good, with high heat value, low sulphur content and locally clean enough not to require washing. The company continues to evaluate production feasibility. Geological reserves in the main deposit are estimated to be 38.7 million tonnes contained within four pit areas.

There was no exploration activity at the Globaltex Industries Inc. **Willow Creek** coal property. Mitsui Matsushima Co. Ltd. is conducting a due diligence examination which was expected to be be completed by the end of the year. The initial mine plan, as proposed by Globaltex, contemplates a production level of 600 000 tonnes per year, beginning in 1997, with a minimum 15-year life. The mine would produce metallurgical and low-volatile thermal coal for the export market.

In southeast British Columbia, McGillivray Mining Ltd. undertook exploration and test mining on its **Loop Ridge** metallurgical coal property in the Crowsnest Pass. A 10 000-tonne bulk sample was mined and trucked to the Elkview plant for washing. It is hoped that a minimum of 400 000 tonnes can be mined from the property over a period of two to five years, and sold raw to the Elkview mine.

HIGHLIGHTS OF GRASSROOTS METAL EXPLORATION

Gold-enriched porphyry copper and porphyry-related gold deposits, polymetallic massive sulphide deposits (volcanogenic, seafloor hydrothermal and sedex), and vein deposits (epithermal and mesothermal) accounted for approximately 82% of 1995 exploration expenditures in British Columbia. The remainder were directed to coal, industrial minerals, skarns and less traditional targets such as sedimentary copper and ultramafic-associated nickel. Of the total estimated $91 million exploration expenditures, approximately 40% fits into the less advanced to grassroots category addressed in this section. Although most of the programs were focused in and around areas with mines or known showings and existing infrastructure, several new, relatively low budget, regional programs were conducted throughout the province. The diversity of targets, their large size (some world class such as Highland Valley Copper and Sullivan), and the profitability of smaller, higher grade deposits such as Eskay Creek and Snip, continue to make British Columbia a good place to explore. The properties reported on are shown on Figure 8 and listed in Table 4, with estimated reserves, where available.

PORPHYRY AND PORPHYRY-RELATED DEPOSITS

The **Babine Camp** was very active in 1995. Hera Resources Inc. conducted a 43-hole diamond drilling program, totalling 9450 metres on the **Nak** porphyry copper-gold-molybdenum prospect, 30 kilometres northeast of the Bell mine, at an estimated cost of about $1.5 million. Much of the property was also covered by induced polarization surveys, resulting in the identification of several anomalous zones yet to be drill tested. At the **Hearne Hill** deposit, located close to the Bell mine, Booker Gold Explorations Ltd. continued to diamond drill high chargeability and low resistivity targets. The drilling encountered previously unknown mineralization in an area to the northeast of the mineralized zone explored by Texas Gulf Sulphur Company in the 1960s and by Booker Gold over the past few years. Copper and gold values are very encouraging . Drilling on this new zone is now expected to continue throughout the winter. Elsewhere, Hera Resources Inc. optioned the **Trail Peak** prospect and Northern Dynasty Exploration Ltd. signed an agreement to explore the **Enhs** prospect. The **Hautette** prospect was also being evaluated. Teck Corporation conducted a regional airborne geophysical survey over the Babine area in the fall.

On the **Lorraine** copper-gold-silver deposit, Lysander Gold Corporation, under an agreement subject to a back-in right held by Kennecott Canada Inc., conducted a 24-hole, 2900-metre drilling program focused on the Upper Main zone where previous operators had outlined a preliminary resource of 4.5 million tonnes grading 0.75% Cu and 0.34 g/t Au. Lysander envisages a small-tonnage, high-grade operation. The 1995 program also included the collection of seven bulk samples from the mineralized talus apron in the valley. The company believes that the talus may represent the eroded upper part of the Upper Main zone. Preliminary metallurgical testing has been initiated

Spokane Resources Ltd., under an option agreement with Rio Algom Limited, completed a large program of geochemical, geophysical (induced polarization and magnetic) surveys and geological mapping during 1995 on the **Mac** porphyry molybdenum-copper deposit, 100 kilometres east of Smithers. The program confirmed the presence of a large mineralized porphyry system in excess of 3.5 kil-

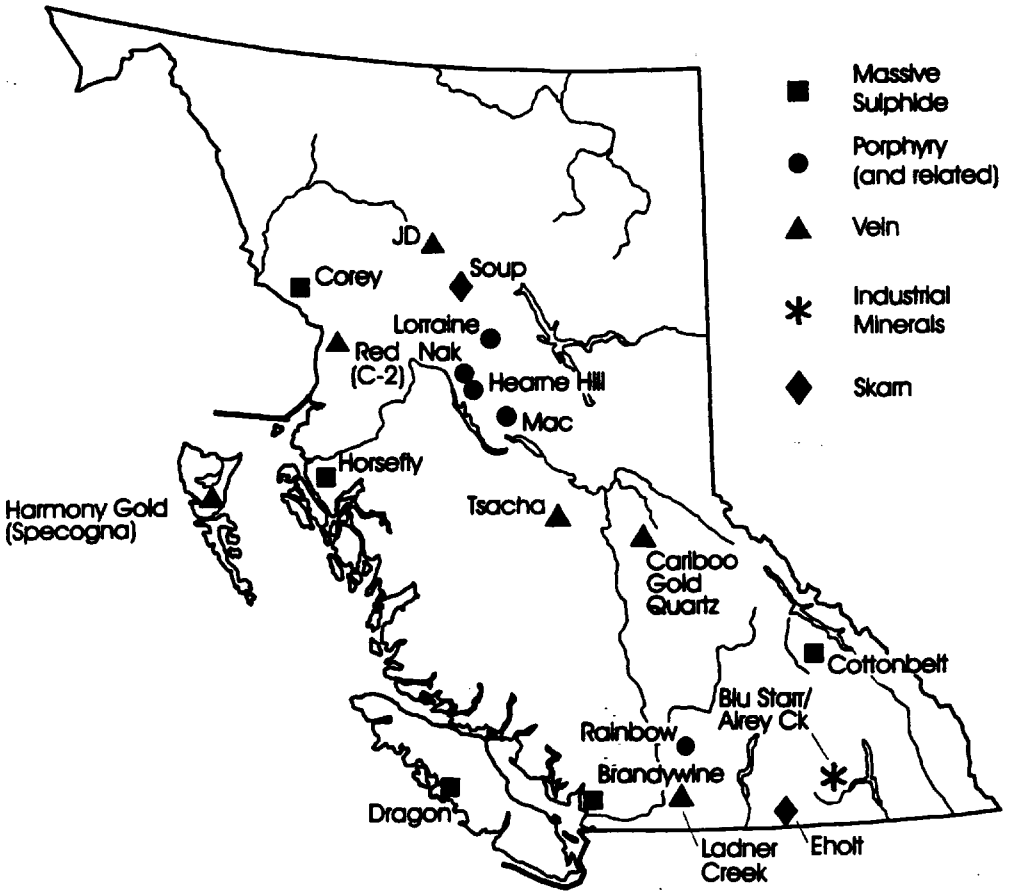


Figure 8. Major exploration projects in British Columbia - 1995.

ometres long and up to 2 kilometres wide. Late in the fall, Spokane completed an eleven-hole drilling program totalling approximately 2000 metres, designed to extend and further test the mineralized zones discovered by previous diamond drilling on the Discovery or Camp zone, and within the Northern or Pond zone, and to test the Southern or Peak zone.

PRECIOUS METAL BEARING VEINS AND BULK-MINEABLE DEPOSITS

Exploration targets in this category cover a broad spectrum of hydrothermal, epigenetic mineral deposits. They include high-level epithermal and deeper level mesothermal deposits.

In the northern Toodoggone district, AGC Americas Gold Corporation drilled in excess of 100 diamond-drill holes, totalling more than 8800 metres, most on the Finn zone on its JD polymetallic gold-silver property. Estimated expenditures totalled approximately $1.6 million. The Finn zone was partially delineated by closely spaced shallow drill holes; an open-pit resource will be calculated by the company over the winter months.

In the Blackwater River area in the Interior Plateau region of central British Columbia, Teck Corporation carried out a two-phase diamond drilling program on its **Tsacha** epithermal gold-silver vein target. The main mineralized quartz-carbonate vein (Tommy) strikes north and is vertical; it has been traced along strike for approximately 575 metres, over widths ranging up to 8 metres, and down dip to approximately 120 metres. Hostrocks are Jurassic Hazelton Group welded rhyolitic tuffs. Several other quartz veins and stockwork zones are known to occur parallel to the Tommy vein. To the east, on ground now held by Phelps Dodge Corporation of Canada Ltd., a quartz vein up to several metres wide has been reported. To the south of the Blackwater River, Phelps Dodge has been exploring its extensive land holdings covering epithermal gold targets, including the **Clisbako** and **Baez** properties.

On the **Harmony Gold** project on Graham Island, Queen Charlotte Islands, which includes the Specogna (ex-Cinola) gold deposit, Romulus Resources Ltd. undertook a widespread multiparameter airborne geophysical survey and regional geochemical surveys under an arrangement with Misty Mountain Gold Ltd. Geological re-interpretation of the Gold Creek and Juskatla volcanic complexes has suggested many previously unrecognized exploration targets within the area. Since 1970, when the Cinola deposit was discovered, over $40 million has been spent on this property. This work has defined an open-pit mining resource of 31.3 million tonnes grading 2.2 g/t Au. Previous

TABLE 4
1995 EXPLORATION HIGHLIGHTS

Company Name	Project Name	Commodity	Estimated Tonnes (000s)	Estimated Grade	Reference
Massive Sulphide Deposits					
Doromin Res. Ltd./ Westmin Res. Ltd.	Dragon	Cu, Pb, Zn, Ag, Au			
La Rock Mining Corp.	Brandywine/ Dave's Pond	Cu, Zn, Au			
Ecstall Mining Corp./ Atna Res. Ltd.	Horsefly Ecstall	Cu, Zn, Ag	6350	0.6% Cu, 2.5% Zn, 0.5 g/t Au, 20 g/t Ag	Atna, 1994
CanQuest Res. Corp.	Cottonbelt	Zn, Pb, Ag	725	11% (Pb + Zn), 58.3 g/t Ag	
Kenrich Mining Corp.	Corey	Au, Ag, Zn, Pb			
Porphyry (and related) Deposits					
Hera Res. Ltd.	Nak	Cu, Mo, Au			
Booker Gold Exploration Ltd.	Hearne Hill	Cu, Au	180	1.7% Cu	Prospectus MDAP, 1992
Spokane Res. Ltd./ Rio Algom Ltd.	Mac	Mo, Cu			
Lysander Gold Corp./ Kennecott Canada Inc.	Lorraine	Cu, Au	10 000	0.67% Cu, 0.34 g/t Au	Kennecott, 1993
Skarn Deposits					
Orvana Minerals Corp.	Eholt	Cu, Au			
Hemlo Gold Mines Inc./ Athlone Res. Ltd./ Vital Pacific Res. Ltd.	Soup	Au			
Vein Deposits					
AGC Americas Gold Corp.	JD	Au			
Teck Corp.	Tsacha	Au, Ag			
Romulus Res. Ltd.	Harmony Gold (Specogna)	Au	31 300	2.2 g/t Au	
Gold City Mining Corp./ International Wayside Mines Ltd.. Mosquito Cons. Gold Mines	Cariboo Gold Quartz - Sanders Zone Rainbow Zone	Au	690 907	3.84 g/t Au 4.53 g/t Au	Gold City, 1995

Note: MDAP = Mine Development Assessment Process. Estimated tonnes and grade are "resources."

work focused almost entirely on outlining a bulk-mineable, low-grade gold deposit; the current focus on the Specogna deposit is the potential for high-grade (bonanza) gold zones that could be mined underground. Initial follow-up surface diamond drilling, consisting of 7600 metres in 57 holes, will more clearly define the vein orientation to allow reassessment of this potential. Detailed clay analyses and fluid-flow regime studies have recently been conducted in order to assist in the identification of higher grade targets.

In the **Wells-Barkerville** area, famous for both its lode and placer gold production, International Wayside Gold Mines Ltd., together with joint venture partners Mosquito Consolidated Gold Mines Ltd. and Gold City Mining Corporation, conducted an underground exploration drilling program from the 1200-level in the Rainbow zone of the **Cariboo Gold Quartz** mine. The main objective was to outline a zone of gold vein mineralization in the up-plunge projection of the Rainbow zone, which could be mined by open-pit methods. Drilling, from both underground and surface, tested the easterly strike extension of productive veins in the hangingwall of the Rainbow fault. Drilling during 1995 suggests that mineralized veins in the Rainbow zone (one of five zones and similar to the adjoining Sanders zone where previous surface drilling has outlined open pittable resources in excess of 690 000 tonnes grading 3.84 g/t Au) extends to surface. Drilling also indicates that the limestone, host for the replacement ore (the mainstay of both the nearby Island Mountain and Mosquito Creek gold mines), extends to surface; the potential for development of this type of ore is now being examined. Exploration to date on the Rainbow zone has partially defined a zone 120 metres long, 36 metres wide, over a 60-metre vertical height from the 1300-level to the surface. The company estimates "reserves" at 907 000 tonnes grading 4.53 g/t Au. The Pinkerton zone and B.C. vein targets were also explored.

Elsewhere in the Wells-Barkerville area, Gold City Mining Corporation has assembled a very large land holding (**WellBar** project) extending from the Cariboo-Hudson mine in the south to the Mount Tom area in the north. It plans to explore this ground for both high-grade gold reserves in and around existing deposits and for low-grade, bulk-tonnage deposits. Synthetic aperture radar and Dighem 1 Power airborne surveys were successful in identifying a number of geophysical anomalies not previously explored for lode gold. In particular, three very large radiometric anomalies coincident with historically rich placer gold deposits have been targeted for follow-up drilling later in the fall. Numerous electromagnetic and magnetic anomalies have also been identified. Extensive trenching in previously unexplored or poorly explored areas has not resulted in any new discoveries fitting the company's low-grade, bulk-tonnage model. It will now concentrate on trenching and drilling on known gold deposits such as the **Cariboo-Hudson** and **Black Jack (Williams Creek)**, and on new targets generated by the airborne geophysics and soil geochemical surveys. Deposit modelling and mine design, using data from prior operations, are part of the on-going pre-feasibility work.

South of Red Mountain in the Stewart Camp, Teuton Resources Corporation and Mimvita Enterprises Ltd. have entered into an agreement with Homestake Canada Inc. and Prime Resources Group Inc. on their new **Red (C-2)** high-grade gold discovery. Disseminated native gold and minor amounts of chalcopyrite, galena, pyrite and erythrite are hosted by shear-controlled veins and stockworks. Eighty-one trenches tested a 150 by 570 metre portion of a northwesterly trending zone. A late-season diamond drilling program of 13 holes totalling 1067 metres tested both sulphide-rich and hematite-rich mineralization.

Athabasca Gold Resources Ltd. started underground development on the Idaho zone and surface drilling in the McMaster zone on its **Ladner Creek** (Carolin) gold property, 18 kilometres northeast of Hope. The targets are turbidite-hosted, mesothermal, epigenetic deposits, similar to those mined during 1982 to 1984. Preliminary results from both areas of drilling are encouraging.

POLYMETALLIC MASSIVE SULPHIDE DEPOSITS

Base and precious metal rich (sedex, volcanogenic and seafloor hydrothermal) massive sulphide deposits were very important targets in 1995. The success of projects at **Myra Falls** (Battle/Gap zones), **Tulsequah Chief/Big Bull**, **Eskay Creek** and **Akie** over the past few years testifies to the exploration potential of these deposit types. The new Wolverine discovery in the southeastern Yukon and the re-opening of the Greens Creek mine west of Juneau, Alaska are reminders that the rocks which host these deposits project into British Columbia.

On the **Dragon** polymetallic 'Myra Falls-type' prospect, located near Gold River, which Westmin Resources Limited holds under an option agreement with Doromin Resources Ltd., it conducted geological mapping and geochemical sampling of favourable Sicker Group rocks either side of the Muchalat River. Several new areas of massive sulphide mineralization and alteration associated with lead-zinc soil anomalies and airborne geophysical anomalies were identified over a length of 3.5 kilometres to the south of the Main showing and to the east for over 4.5 kilometres. Three drill holes totalling 722 metres tested coincident geochemical anomalies and alteration zones, approximately 2.5 kilometres south of the Dragon massive sulphide showings (Falls, North and Dragon).

During 1995, La Rock Mining Corporation focused its work on diamond drilling programs on the Dave's Pond zone on its **Brandywine** property, 110 kilometres north of Vancouver. This zone is one of seven geologically similar gold targets on the property, hosted by sheared rhyolitic and andesitic rocks of the Gambier Group. The drilling ex-

panded the potential gold reserves in the Dave's Pond zone, and also tested a large gold geochemical anomaly in soils, coincident with an electromagnetic anomaly, approximately 450 metres along strike to the southeast. A winter drilling program of over 2200 metres began in late October to test an area 450 metres to the southeast of the Dave's Pond area.

Exploration on the **Horsefly** property, 80 kilometres southeast of Prince Rupert, by Ama Resources Ltd., under a joint venture agreement with Ecstall Mining Corporation, included a ground electromagnetic survey and follow-up diamond drilling. The geophysical survey indicates several strong conductive anomalies coincident with a sequence of mineralized rhyolitic volcanic rocks more than 2 kilometres long. The drilling (1075 metres in eight holes) tested the Horsefly and Steelhead showings which lie immediately east of the Packsack deposit and approximately 15 kilometres southeast of the Ecstall (Red Gulch) deposit within the Ecstall River felsic volcanic belt. Disseminated, laminated and semimassive pyrrhotite, pyrite and chalcopyrite were intersected in altered volcanic rocks.

At the **Cottonbelt** lead-zinc-copper-silver-gold massive sulphide project in the Revelstoke area, CanQuest Resource Corporation drilled the Cottonbelt showing and the Bass showing, about 1 kilometre to the north. Encouraging results are reported. Mineralization has been traced on surface for a distance of 10 kilometres within both limbs of the west-dipping Mount Grace syncline. Drilling partially defined two stratabound zones of massive to semimassive sulphides in the west limb. Also, drilling around the old Cottonbelt workings is designed to increase a previous resource expand the existing reserve estimated at 725 000 tonnes grading 11% combined lead and zinc and 58.3 g/t Ag.

At the **Corey** property, 10 kilometres south of the high-grade Eskay Creek gold-silver-zinc-copper mine, drilling of 22 core holes by Kenrich Mining Corporation, resulted in the discovery of significant stratabound massive to semimassive gold-silver-zinc-lead mineralization (Hutchings horizon) in the TV zone. Mineralization is hosted by a footwall rhyolite unit and overlying breccia and black mudstone, similar to the stratigraphy hosting the Eskay Creek deposits. Soil geochemical surveys have outlined significant anomalies coincident with induced polarization anomalies, over approximately 800 metres of the projected strike length of the mineralization. The TV zone has been traced up to 1500 metres on strike with widths over 90 metres. Other targets on the property include the Bench, Battlement and Cumberland zones. Two new high-grade gold veins were also discovered on the GFJ prospect varying in width from 0.25 to 1.2 metres.

SKARN DEPOSITS

In the Greenwood camp, Orvana Minerals Corporation drilled the **Eholt** skarn target in the spring. Extensive, strong sulphide mineralization containing significant gold and copper values within the large (1 by 1.5 km) skarn system was encountered over a strike length of 750 metres and widths ranging from 10 to 40 metres. An eleven hole drilling program was completed in the fall. The geology is similar to that at the Phoenix deposit, 10 kilometres on strike to the south.

In north-central British Columbia, Hemlo Gold Mines Inc. drilled four holes on the **Soup** property, under an option agreement with Vital Pacific Resources Ltd. (75%) and Athlone Resources Ltd. (25%). Unfortunately, due to technical problems, none of the holes reached target depth. The holes were drilled on coincident airborne potassium radiometric and ground magnetic anomalies in an area of quartz-magnetite stockwork associated with diorite intrusive into andesitic flows, up-dip from a hole which intersected 5.4 g/t Au and 0.1% Cu over 40 metres and ended in mineralization grading 2.5 g/t Au. The fourth hole cut two sections of gold-copper mineralization within magnetite-silica stockworks, apparently above the target zone.

OTHER TARGETS

Both property-scale and regional exploration programs for sedimentary copper deposits were conducted in the southeast part of the province (*e.g.*, Junction property). Northwest of Fort St. James, nickel and copper occurrences associated with ultramafic rocks were explored.

INITIATIVES IN BRITISH COLUMBIA

Several new or continuing government programs that will influence future mineral resource planning, exploration and development in British Columbia were active during 1995.

- **Explore B.C.**, part of a five-year $100 million program to provide significant tax reductions and exploration incentives to assist and promote private sector mineral exploration in British Columbia, continued in its second year of a three-year, $13.5 million program. The program, involving $2.5 million in 1995 expenditures, is designed to provide part of the risk capital required by mineral exploration companies to finance their programs, to extend the economic lives of existing mines and contribute to community stability in existing mining regions. It has three components:
  (1) Mineral Exploration Incentive Program - (MEIP) provides grants to eligible exploration companies or individuals, to cover up to one-third of eligible exploration expenses on properties with identified economic potential. Maximum assistance is $150 000 per project. In July, 57 exploration and mining companies were awarded grants totalling $1.45 million under the MEIP program. This figure includes grants totalling approximately $235 000 to nine industrial mineral projects.

(2) Accelerated Mine Exploration Program - (AMEP) provides grants to mining companies to cover up to one-third of eligible exploration expenses at existing mines. Maximum assistance is $150 000 per project. Grants totalling approximately $415 000 were awarded to eleven projects under the AMEP program.

(3) Grassroots Mineral Incentive Program - (GMIP) provides grants to exploration companies or individuals to cover up to one-third of eligible expenses for grassroots exploration. Maximum assistance is $150 000 per project. Under the GMIP program seven grants totalling approximately $208 000 were awarded.

- The **Prospectors' Assistance Grant Program** is designed to promote grassroots prospecting for new mineral deposits in British Columbia. It will contribute up to 75% of eligible costs of an approved project to a maximum of $10 000. Sixty-eight grants were awarded in 1995 from a budget totalling approximately $500 000.
- This is the final year of the **Federal/Provincial Mineral Development Agreement**, which coordinates the efforts of Canada and British Columbia to strengthen and diversify the province's mineral industry. Activities sponsored under the agreement, most of which were in the write-up stage, include the funding of geological, market and technology studies.
- The new **Environmental Assessment Act** was proclaimed in 1995. It builds on the strengths of the previous Mine Development Assessment Act in establishing a process through which the potential effects of projects are identified and means of preventing or mitigating adverse impacts are developed and evaluated.
- A provincial initiative which includes a **partnership with B.C. Trade Development Corporation** to promote the marketing of industrial minerals in the province, Pacific Rim countries and Europe.
- Creation of an **Advisory Council on Mining**, a multi-stakeholder group of industry, labour, environmental and government groups, that advises the Minister on the implementation of the Whitehorse Mining Accord within British Columbia. The objective is to develop initiatives that will reverse the decline in the industry's competitive position.
- The **Geological Survey Branch** programs focused on regions where existing mines are expected to close in the next few years (northern Vancouver Island, East Kootenays and northern Selkirks) and in areas with significant identified potential (Interior Plateau, Gataga, Tatogga, and Babine). Results of these programs are expected to encourage base and precious metal exploration in these areas and elsewhere.
- The **Mineral Potential Mapping Initiative** will see completion of 1:250 000-scale mineral potential maps for the province in 1996. These data are being used in many land-use decisions.
- A multi-year project to develop an inventory of sand and gravel resources will assist the Ministry in managing the aggregate resources in the province.
- Implementation of the joint strategic plan developed by the British Columbia Geological Survey Branch and the Geological Survey of Canada in 1994.
- Completion of part of the Geological Survey Branch **"Mineral Deposit Profiles"** project to describe the types of mineral deposits found around the world, with special emphasis on examples and deposit characteristics relating to British Columbia.
- Discussions continued with the First Nations, spearheaded through the Treaty Commission in British Columbia, designed to provide them with a more equitable role in mineral exploration and development decision making within their traditional territories.
- Initiation of a new five-year **Nechako Plateau - Babine Porphyry Belt NATMAP** program by the Geological Survey Branch and the Geological Survey of Canada in the Nechako River (93F), Fort Fraser (93K) and parts of Smithers (93L) and Prince George (93G) map areas. In addition, there will be a Regional Geochemical/National Geochemical Reconnaisance survey in parts of the project area. The project will capitalize on geological, geochemical and geophysical surveys conducted under the Canada/British Columbia Mineral Development Agreement (1991-1996).
- Initiation of a $600 000, multi-parameter **airborne geophysical survey**, funded by the provincial government, over three specific target areas in the East Kootenay region of southeastern British Columbia. The objectives are to identify possible Sullivan-type orebodies and other targets.
- Completion of a **Regional Geochemical Survey** of the Cry Lake (104I) map sheet during 1995, with results to be released in 1996.
- Bill 13, which amends the **Mineral Tenure Act**, will streamline regulations, including those pertaining to bulk sampling and the acquisition of industrial mineral rights.
- As a result of the proclamation of the **Forest Practices Code of British Columbia** Act on June 15, 1995, the Ministries of Energy, Mines and Petroleum Resources; Forests; and Environment, Lands and Parks initiated a comprehensive review of mineral exploration practices

and permitting procedures to develop standards compatible with Forest Practices Code.

SUMMARY AND OUTLOOK FOR 1996

Many of the signs that indicated an upswing in the mining industry in British Columbia in 1995 continue to be valid for 1996. Solid mineral production value in 1995 is estimated at $3.48 billion, the highest value to be recorded in over 30 years. Most of the estimated 9% decrease in exploration expenditures in 1995 is attributed to the lack of expenditures at the Red Mountain project where in excess of $15 million were spent in 1994. Claim staking in 1995 maintained pace with the 1994 levels; increased levels are expected in 1996. The number of valid Free Miners Certificates is up slightly in 1995 and is expected to rise again in 1996. Two new metal mines, Eskay Creek and QR, opened in 1995 and production decisions for several other advanced projects may be made in 1996 [*e.g.* Kemess, Huckleberry and Golden Bear (re-open)]. The Island Copper mine will close in 1995. Successful exploration and development projects at several mines have increased reserves and mine life (*e.g.*, Snip, Table Mountain, Myra Falls and Ajax). Many smaller gold projects utilized custom milling facilities by obtaining the necessary permitting for bulk sampling; potential for other such projects will be important in the future. Production from southeastern coal mines increased significantly, with a strong demand for metallurgical coal. Several major expansions (*e.g.*, Quinsam, Fording River, Greenhills, Line Creek and Coal Mountain) were undertaken and bode well for the future of these operations. In general, the level of less advanced, grassroots exploration remained relatively high in 1995 at around 40% of total expenditures; this is expected to increase slightly in 1996.

Several advanced projects will receive further work in 1996, provided relatively high metal prices are sustained and uncertainties in land-use policies and First Nations' negotiations are dealt with in an orderly manner.

The many copper and gold-bearing porphyry deposits discovered during the 1960s and 1970s (*e.g.*, **Red-Chris, Huckleberry, Lorraine**) will continue to be explored and developed. Sedex (*e.g.*, **Akie**) and volcanogenic polymetallic sulphide (*e.g.*,**Tulsequah Chief**) deposits offer small to medium tonnage and high-grade potential, particularly those enriched in precious metals. The stratiform, gold-enriched (seafloor hydrothermal) **Eskay Creek**-type deposits are examples of low-tonnage, but potentially extremely profitable, high-grade targets. The transitional setting, which includes vein and skarn deposits related to porphyry systems (*e.g.*, **Red Mountain, Willoughby, Snip**), offers similar small to medium tonnage and high-grade potential.

The potential for bulk-mineable (heap-leachable) gold deposits will continue to be examined. Current exploration and future development at the **Golden Bear** mine continues to be focused on the heap-leaching characteristics of recently discovered "no seeum" gold mineralization associated with silicified limestones and dolomites. In the Cassiar gold camp, the **Taurus** gold property will continue to be explored for its bulk-mineable potential. The potential for heap leaching low-grade material is also being investigated at the **QR** gold mine.

The completion of the access road into the Eskay Creek mine, and the infrastructure associated with the new mine development, will continue to assist other exploration programs (*e.g.*, Corey, Bonsai) in the region. The increase in exploration expenditures on industrial minerals is forecast to continue, with new discoveries made and new markets being developed. The release of results from both the Regional Geochemical Survey carried out in the Cry Lake map area and the airborne geophysical surveys carried out in the East Kootenay region are expected to attract considerable attention. In general, the long-term outlook for mineral markets is very good throughout the Pacific Rim; British Columbia is well positioned to compete.

ACKNOWLEDGMENTS

This report has benefited from information provided by the Regional Geologists with the Land Management and Policy Branch, based in five offices throughout the province. They are: Paul Wojdak in Smithers, Ken MacDonald (acting) in Prince George, Mike Cathro in Kamloops, Paul Wilton in Cranbrook and Robert Pinsent in Vancouver. Dan Hora and Barry Ryan, both with the Geological Survey Branch in Victoria, provided summary information on industrial minerals and coal, respectively. Klaus Brueckl, of the Land Management and Policy Branch in Victoria, provided mineral production statistics. Mineral tenure statistics were provided by Rick Conte of the Mineral Titles Branch in Vancouver. Bob Lane and Marjorie Hunter, both with the Geological Survey Branch in Vancouver, produced the maps and graphs and typed the manuscript, respectively. John Newell, Gib McArthur and Ron Smyth provided careful and critical reviews of the manuscript. Janet Holland's work on the layout and typesetting, and her efforts to ensure that all last-minute changes and revisions were included, are greatly appreciated. Most importantly, the Ministry appreciates the contributions of data to this review article by the exploration and mining community in British Columbia.