

British Columbia Mineral Exploration Review 1998

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Ministry of Energy and Mines
Geological Survey Branch



PHOTOS

- Top Left:** Aerial view looking northerly over the Silvertip zinc-lead-silver deposit. Photo courtesy of Silvertip Mining Corporation.
- Top Right:** Looking northerly towards the Bismark zone, Kaslo Silver project. Old adits just to the left of the white, limestone unit. Photo by T.G. Schroeter.
- Middle:** Looking northerly over Kemess South mine. Open pit on left; camp facilities in centre; mill and mine buildings to right. Photo by T.G. Schroeter.
- Bottom Left:** Looking southwesterly over Huckleberry East zone, porphyry copper mine. Tahtsa Reach in background. Photo courtesy of Huckleberry Mines Ltd.
- Bottom Right:** Aerial view looking westerly over Greenland Creek property, 30 km north of the Sullivan mine, southeastern B.C. Photo by T.G. Schroeter.

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BRITISH COLUMBIA 1998 MINERAL EXPLORATION REVIEW

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INTRODUCTION

The opening of the **Kemess South** porphyry gold-copper mine, in the Toadoggone district, highlighted metal mine developments in 1998. The capital cost of the project, including a new 380 kilometre, 230-kilovolt electric transmission line, was \$480 million. The improved infrastructure is expected to result in increased exploration in the region. The **Blackdome** gold-silver mine re-opened in November after a seven year hiatus in production. Project Certificates under B.C.'s *Environmental Assessment Act* were issued during the year to the **Tulsequah Chief** and the **Willow Creek** mine development projects.

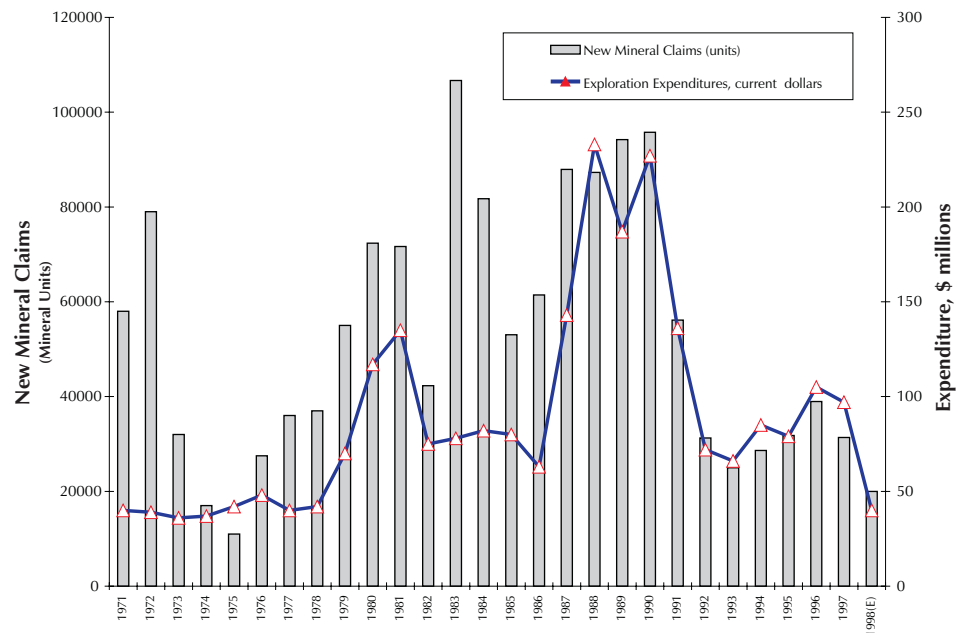
Exploration expenditures in 1998 are estimated to be approximately \$40 million. The number of mineral and placer claim units recorded in 1998 is approxi-

mately 19 100. Figure 1 illustrates the fluctuation of expenditures and recordings of mineral claim units between 1971 and 1998. Drilling in 1998 is estimated to total 200 000 metres.

There were a significant number (approximately 12) of new mineral discoveries reported throughout the province in 1998. Most have been made by prospectors and many can be attributed to improved access afforded by construction of new logging roads.

Several bulk-sampling projects were carried out (*e.g.* **Willow Creek, Kaslo Silver and Blu Starr**). A number of advanced projects are in the Environmental Assessment Process (*e.g.* **Silvertip (Midway), Red Mountain, Bronson Slope, Getty North, Telkwa, Red Chris and Prosperity**). Custom milling facilities exist at a number of sites (*e.g.* **Roberts mill** at Green-

Figure 1...



**Mineral Exploration Expenditures and
Number of New Mineral Claims Recorded in B.C. 1971 -1998**

(Data source: MEM, Minerals, Oil & Gas Branch, and Mineral Titles Branch)

wood and Ainsworth mill at Ainsworth), and a new mill at Salmo was under construction to heap leach gold from the Arlington and Ymir deposits.

Exploration targets in 1998 were varied and the distribution of exploration dollars by target type is illustrated in Figure 2. The biggest change in exploration focus in 1998 has been an increased emphasis on massive sulphide deposits. Massive sulphides (37%), particularly sedex and seafloor hydrothermal types have taken over from vein deposits (22%) as the most favoured target in 1998.

Approximately 33% of exploration expenditures was around minesites, including \$3.65 million at coal mines. An estimated 57% of exploration expenditures was on established or previously drilled properties, and 10% of expenditures was for grassroots/generative programs (Figure 3). Figure 4 illustrates the fluctuation of estimated percentage of exploration expenditures by category of program between 1994 and 1998.

There were approximately 76 exploration projects with budgets in excess of \$100 000. Four projects had budgets over \$1 million. The largest program was by Westmin-Boliden Ltd. at its Myra Falls mine on Vancouver Island. The three others were, Eskay Creek, Bull River and Fording Coal.

Grassroots programs were carried out in:

- the south-central (Interior Plateau) and northwest Toodoggone) areas for bonanza and bulk-mineable epithermal gold deposits;
- the Quesnel Trough (Cariboo to Toodoggone areas) for gold-enriched porphyries;
- the southeast (Sullivan) area for sedex deposits;
- the northwest (Eskay Creek and Tatsamenie Lake) for precious-metal rich seafloor hydrothermal deposits, and Carlin-type and transitional gold deposits; and,
- numerous areas throughout the province in the search for gemstones.

Figure 2 ...

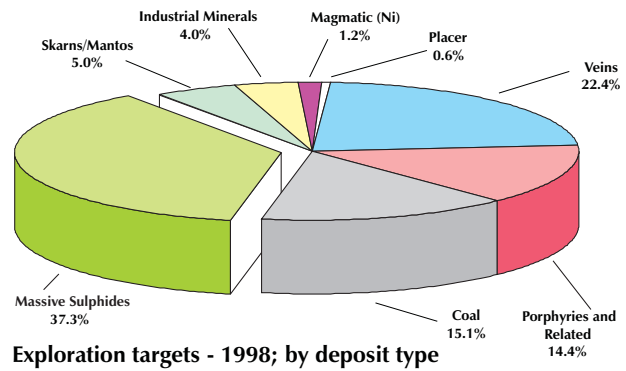
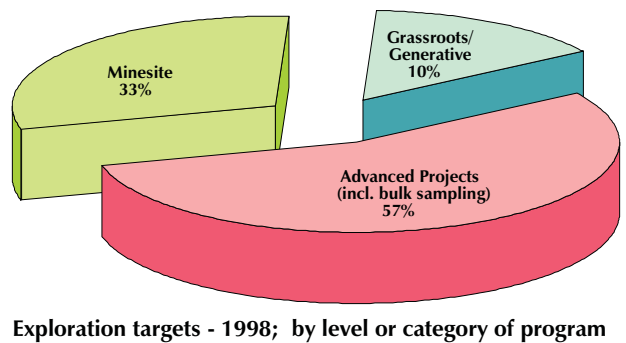


Figure 3 ...



Kennecott Canada Inc. drilled the Findlay Creek and Irishman Creek sedex targets in the southeast, located north and south of the Sullivan mine, respectively. Although results have not been reported, several new claims were recorded in the area and several other properties await drilling. Dia Met Minerals Ltd. completed one deep drillhole on its Paul-Mike sedex target south of Wasa. Hudson Bay Exploration and Development Co. Ltd. conducted small ground follow-up programs on several claim blocks it staked to cover geophysical anomalies in the Babine country in 1997. Homestake Canada Inc. carried out both detailed and regional exploration programs around the Eskay Creek mine and along strike on favourable host stratigraphy. It also examined other areas in the northwest for Eskay Creek-type mineralization. Cominco Ltd. conducted exploration for sedex and replacement deposits in the southeast. Rio Algom Ltd. undertook both property examinations and a grassroots program in the central part of the province.

The Government of British Columbia introduced a Mining Exploration Tax Credit in 1998 to assist grass-

roots exploration in the province. Effective August 1, 1998 exploration expenditures made by eligible individuals and corporations in British Columbia qualify for a refundable credit of 20% of qualified expenses for the taxation year.

Figure 4 ...

MINING HIGHLIGHTS¹

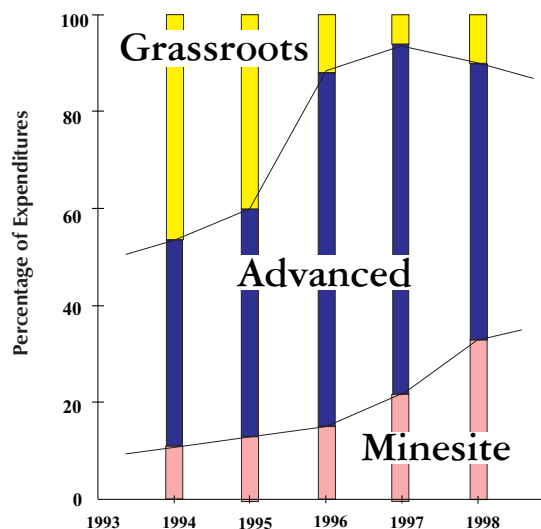
The locations of the fourteen metal, eight coal, ten industrial minerals mines and one tailings project that were in operation in 1998 are indicated in Figure 6. There were two new metal-mine openings (**Kemess South** and **Blackdome**) and one metal-mine closure (**QR**) during the year.

The value of solid mineral production for 1998 is estimated at \$3.006 billion (Table 1). The value of metal production is about 2% lower than in 1997, and lower commodity prices, particularly for coal, resulted in an overall decrease in value of 4.8% from the previous year (Figure 5).

Full production from the **Huckleberry** and **Mount Polley** porphyry copper mines, which opened in late 1997, together with opening of the **Kemess South** porphyry gold-copper mine in the spring of 1998, was partly responsible for an increase in the value of copper production. The devaluation of the Canadian dollar also contributed to this increase. As in 1997, significant increases in silver and gold production from the **Eskay Creek** mine contributed to an increase in the value of silver production and helped offset the loss from the closure of the **QR** mine in March 1998 and the 18-year low gold price.

Clean coal production in 1998 is expected to total about 25.6 million tonnes, with a forecast value of approximately \$1.005 billion, or approximately 34% of the total solid mineral production. The reported value is at the mine portal and does not include rail and port costs, which are paid by the customer.

¹ Production details for the 1998 operating mines will be included in the forthcoming annual publication, "Exploration in B.C."



Estimated percentage of exploration expenditures; by level or category of program.

The forecast value of structural materials at approximately \$420 million, and of industrial minerals at approximately \$45.6 million, represent the status quo for the former and a slight increase for the latter from 1997. There are approximately 1100 construction aggregate operations and 40 industrial minerals mines in the province.

Table 1
1998 FORECAST VALUE OF
SOLID MINERAL PRODUCTION IN B.C.

Commodity	Quantity (millions)	C\$ Value (millions)	Percentage of Total Value
Gold	17.5g	259.7	8.6%
Silver	450g	126.0	4.2%
Copper	280.3kg	720.3	24.0%
Lead	24.1kg	20.0	0.7%
Zinc	167.7kg	292.9	9.7%
Molybdenum	8.0kg	97.0	3.2%
Other Metals		20.0	0.7%
Total Metals		1536.0	51.1%
Metallurgical Coal	23.8t	952.4	31.7%
Thermal Coal	1.8t	52.6	1.7%
Total Coal	25.6t	1005.0	33.9%
Industrial Minerals		45.6	1.5%
Structural Materials		420	14.0%
Total Solid Minerals		3006.0	100.0%

NOTE: Prices are F.O.B. for metals only.
Source: MEI Stats. & NRCan.

Figure 5 ...

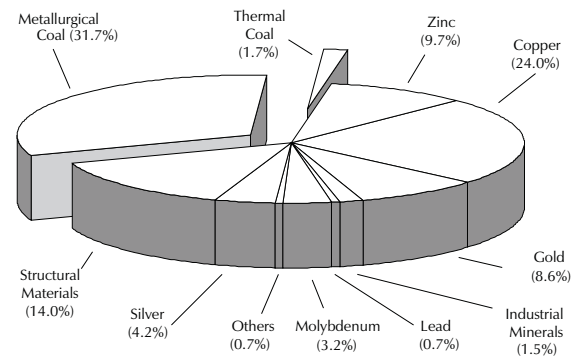
The number of direct mining employees in British Columbia in 1997 was estimated at approximately 12 750, the highest level since 1992. This number is expected to be similar in 1998 due to the 350 and 80 new employees at **Kemess South** and **Blackdome**, respectively, netted against the decrease resulting from mine closures and cutbacks.

Copper represents 24% of total production value, at a projected \$720.3 million, a 2.5% increase from 1997. Gold production is forecast to be 17.5 million grams (562 640 oz) valued at \$260 million, up by about 1.7% respectively from 1997. These increases are primarily the result of increased production of gold from **Eskay Creek**, **Mount Polley** and **Kemess South**.

Silver output is forecast at 450 million grams (14.5 million oz) valued at \$126 million. The value is up about 20% from 1997, primarily as a result in increased production from **Eskay Creek** and a higher price. Zinc production in 1998 is forecast to be 167.7 million kilograms worth \$293 million and lead output is forecast to be 24.1 million kilograms valued at \$20 million. These figures represent decreases in value of 2% for zinc and 50% for lead from 1997.

Many mines had significant exploration programs, some with good results, such as the **Eskay Creek** gold-silver mine and the **Myra Falls** zinc-copper mine.

Figure 6 ...

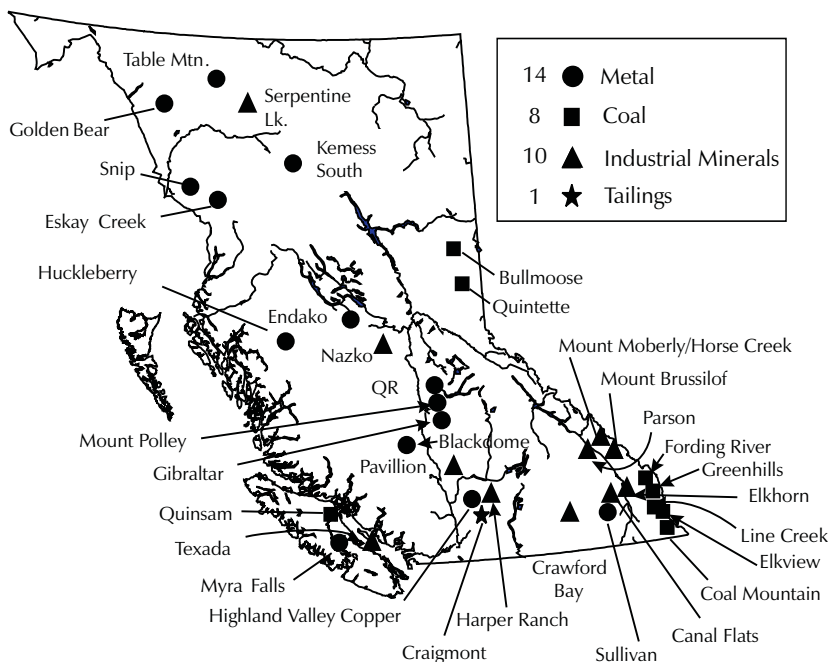


Forecast value of solid mineral production in British Columbia; by percentage of total value - 1998 [see Table 1] (Data Source: MEM; Minerals, Oil and Gas Branch)

EXPLORATION HIGHLIGHTS

Metals

It is estimated that 1998 expenditures on advanced projects and on grassroots projects accounted for 57% and 10% of total expenditures, respectively. **The Bronson Slope, Red Chris, Red Mountain, Silvertip (Midway), Prosperity and Getty North** projects are in the Environmental Assessment Process. Several other advanced projects are nearing entry to the Environmental Assessment Process (e.g. **Cariboo Gold**



Operating Mines in British Columbia - 1998

Quartz, Giant Copper, Specogna, Hearne Hill/Morrison, Isk, J&L and Polaris-Taku) (see Figures 7a, 7b).

The most active area in the province was the Southeast, where numerous companies and prospectors explored for massive sulphide deposits, e.g. Kennecott's work on the Findlay Creek project. In the rest of B.C. many programs were focused around areas with mines, and throughout the province there were several new, low-budget regional programs.

Massive Sulphide Deposits

Base and precious metal rich (sedex, volcanogenic and seafloor hydrothermal) massive sulphide deposits were important exploration targets in 1998. The exploration successes at Myra Falls, Tulsequah Chief and Eskay Creek over the past few years testify to the excellent potential for these deposit types. The discoveries of the Wolverine and Kudz Ze Kaya deposits in Yukon-Tanana Terrane in the Yukon, and the successful re-opening of the Greens Creek mine west of Juneau, Alaska, are reminders that the rocks which host these deposits extend into British Columbia.

The largest exploration program in 1998 was at the Myra Falls underground mine. The mine has produced in excess of 20 million tonnes of ore since start-up in 1966, from a number of different orebodies defined along a 6-kilometre long northwest trend, and has ore reserves sufficient for a further seven more years of production. Early in 1998 Boliden Limited took over the operation from Westmin Resources Limited; the new company is named Boliden-Westmin Ltd. In 1998 the company drove a 700-metre crosscut on the 10 level in the Lynx mine to provide drill stations to test for the western extension of the Marshall zone. While driving the crosscut, a series of underground drill holes intersected significant concentrations of barite and massive sulphides in rhyolite at the same stratigraphic level as the Marshall zone, but approximately 600 metres along strike to the northwest. The company is encouraged by these results; it believes the style of mineralization is similar to that found in the high-grade, precious metals rich Gap deposit (and approximately 40 metres above the Battle zone ore). The barite intercepts contain the highest gold and silver values encountered on the property. The target, currently being tested by steeper holes from the end of the drift, is approximately 700 metres

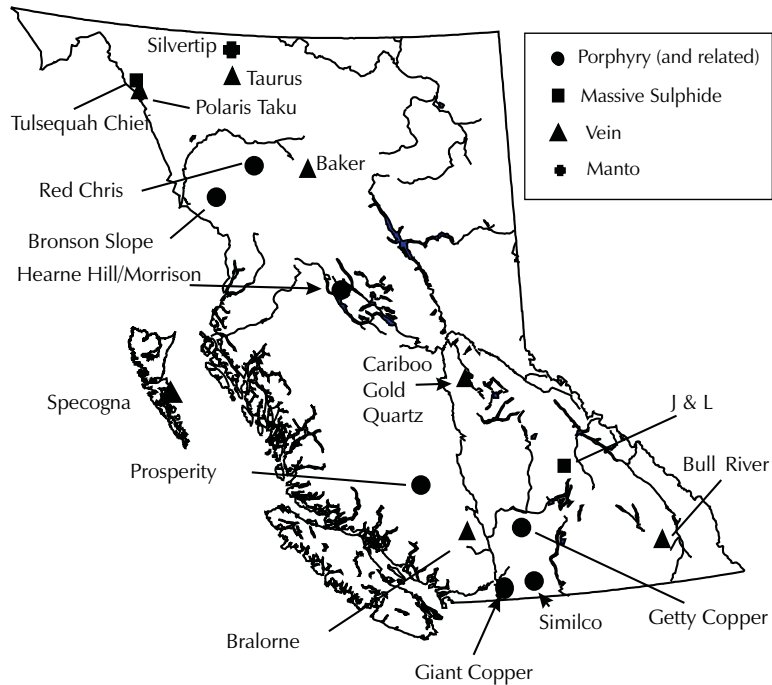
below 10 level. A major drilling program is planned in 1999. Elsewhere on the property, the company carried out a deep-penetrating electromagnetic geophysical survey under Phillips Ridge, and conducted surface diamond drilling from Myra Ridge and from the valley floor to test for extensions of the Trumpeter West mineralization. In mid-November, it announced it will temporarily close the mine between December 1998 and April 1999, for underground rehabilitation work. About 90 of the 450 employees will be affected.

Prime Resources Group Inc. (now 100% controlled by Homestake Canada Inc.) outlined significant new resources in the 21C zone to the west of the main Eskay Creek ore zone (21B), the 21A zone to the south and the Pumphouse zone to the east. The 21C zone, 200 metres west of the 21B zone, consists of auriferous pyrite hosted in rhyolite, approximately 40 metres below the mudstone contact. A resource calculation for the 21C zone is in progress. Elsewhere on the property, Prime tested a number of zones along strike to the south of the 21B zone, including the drilling of five deep (>1500 metres) holes in an area near the Mackay adit and along strike to the south, testing the favourable host stratigraphy.

In March 1998, Redfern Resources Ltd. received a Project Certificate for its Tulsequah Chief polymetallic volcanogenic massive sulphide project. Reserves estimated by the company are 7.9 million tonnes grading 6.35% Zn, 1.27% Cu, 1.18% Pb, 2.42 g/t Au and 100.91 g/t Ag. At full production, milling 900 000 tonnes per year, the mine is forecast to produce 52 620 tonnes of zinc, 10 450 tonnes of copper, 4940 tonnes of lead, 81 000 kilograms (2.6 million oz) of silver and 1910 kilograms (61 400 oz) of gold annually over a minimum mine life of twelve years. The capital cost of the project is estimated at \$160 million; the operation would employ 265 persons. Access is proposed via a 160-kilometre restricted road from Atlin. Redfern has begun the permitting process for road access.

In June 1998, Weymin Mining Corporation contracted H.A. Simons Ltd. to provide a review of the previously completed metallurgical process options, to estimate the capital and operating costs and to determine the economics of its J&L (McKinnon Creek) massive sulphide deposit near Revelstoke. Two options are being considered. The first contemplates all processing taking place at the mine site. The second would involve

Figure 7a ...



mining and a heavy media separation stage at the site and subsequent processing at an off-site facility. The capital cost of the first option would be \$82 million; the second would be \$115 million. Weymin estimates a resource of 3 600 000 tonnes grading 3.0% Zn, 3.0% Pb, 81 g/t Ag and 7.24 g/t Au in its Main zone and 1 000 000 tonnes grading 7.1% Zn, 2.5% Pb and 52.5 g/t Ag in its Yellow Jacket zone. The company proposes to conduct further drilling to increase the current resources. It is looking for a joint venture partner to assist in the development of this project. In 1998, due to the difficulty in raising funding, only a minor prospecting program was carried out.

Several sedex targets were explored in the search for a Sullivan-type deposit in the Purcell Basin of southeastern British Columbia. At the **Findlay Creek** property, Kennecott Canada Exploration Inc., under a joint venture agreement with Eagle Plains Resources Ltd. and Miner River Resources Ltd., completed five diamond-drill holes totaling approximately 1850 metres. The property, 35 kilometres northwest of the Sullivan mine, covers the same stratigraphic sequence which hosts this world-class deposit. The most significant mineralization was encountered in the last hole, collocated on Tourmalinite Ridge. The mineralized interval was intersected well above the Sullivan-horizon, indicating potential for the discovery of mineralization elsewhere in the stratigraphy. The 1998 field program also included detailed geological mapping, contour geochemical soil sampling and prospecting. The **Greenland Creek** property adjoins the Findlay Creek property to the south and is underlain by a similar se-

Advanced projects - Metals, 1998

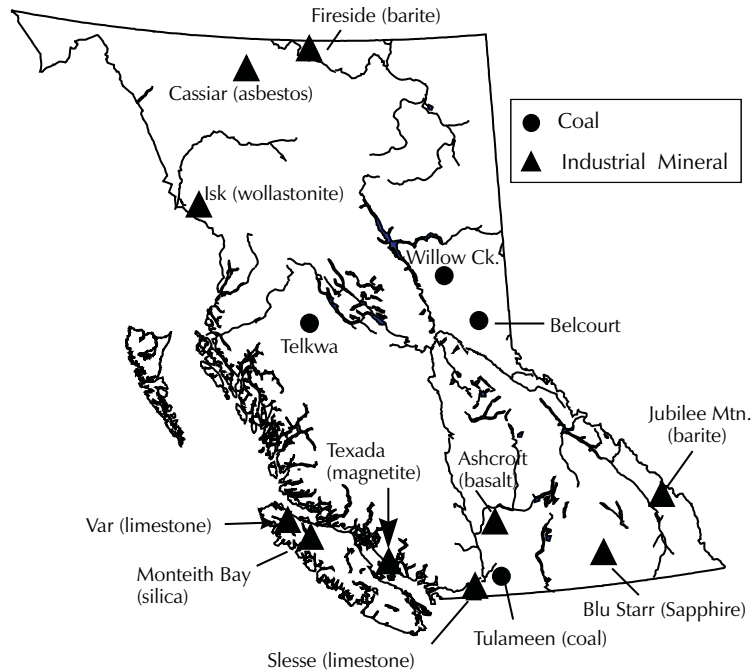
quence of prospective rocks. In mid-November, Kennecott announced the signing of a letter of agreement on this project. At the **Irishman Creek** sedex property, under option from Sedex Mining Corp., Kennecott, drilled a 350-metre extension of its third hole drilled in 1997 on the Panda vent system. The objective was to test a re-interpreted position of the Sullivan horizon.

At the **Corey** property, 15 kilometres south of the high-grade Eskay Creek gold-silver mine, Homestake Canada Inc., under an option agreement with Kenrich Mining Corporation, completed a program of detailed mapping and sampling over the southwestern part of the PRU block as part of its testing of the 12 kilometres of prospective Eskay Creek stratigraphy. Homestake drilled four holes totaling approximately 1260 metres in the Cumberland South area. Elsewhere on the Kenrich block, Kenrich conducted a limited program on the HSOV showing. Several other targets have been identified.

Porphyry and Related Deposits

Between 1991 and the fall of 1998, Taseko Mines Ltd. completed 127 330 metres of drilling in 271 holes on its **Prosperity** (formerly Fish Lake) porphyry

Figure 7b ...



gold-copper deposit. Including all previous companies' drilling, a total of 154 330 metres of drilling had been completed in 447 holes. Independent Mining Consultants, Inc. has calculated a mineable mineral reserve of 633 million tonnes grading 0.253% Cu and 0.466 g/t Au. Pilot plant metallurgical and process programs, including bulk sample testing of the deposit, completed by Lakefield Research Limited, have confirmed detailed process criteria. Independent is now completing a mine plan and a mine production schedule. In April 1998, Taseko received the final Project Report specifications from the Environmental Assessment Office and the company is preparing comprehensive environmental and socio-economic studies for presentation to the government Project Review Committee. At a projected 90 000 tonnes per day milling rate, the company forecasts annual production of 12 940 kilograms (416 000 oz) of gold and 95 795 tonnes (211 million pounds) of copper, over the 25.3 year mine life. Taseko commissioned SNC Lavalin and Kilborn Engineering to undertake a detailed feasibility study of the deposit. As part of this study, a major program of drilling commenced in November, designed to test geotechnical parameters and confirm the known reserve. A Project Report is expected to be submitted in mid-1999, following completion of the feasibility study. Taseko estimates capital costs of \$600 million to bring the mine into production.

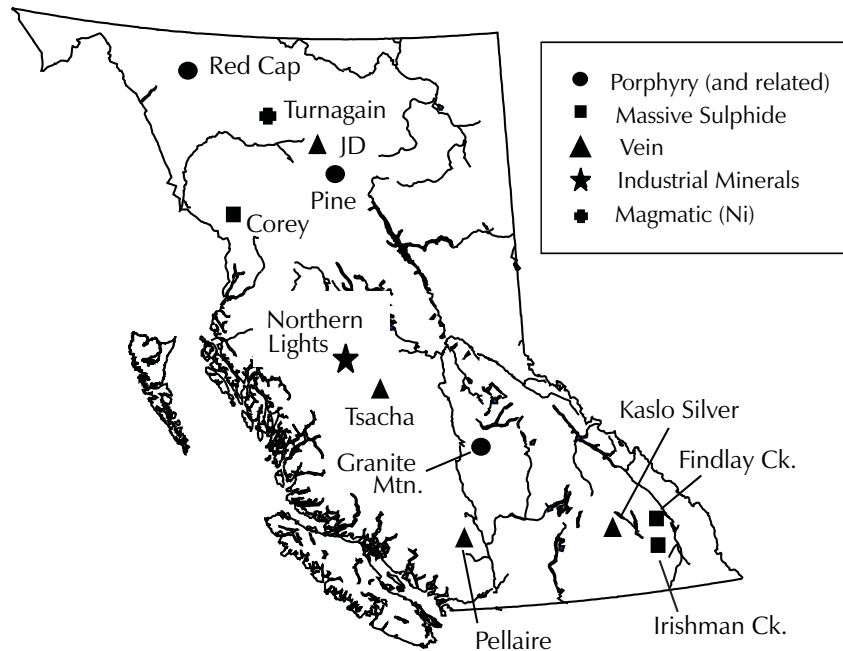
On December 10, 1998, Taseko and the British Columbia Ministry of Energy and Mines and Ministry of Employment and Investment signed a "Cooperative Resource Development Protocol", to facilitate the ad-

Advanced Projects Coal and Industrial Minerals, 1998

vancement of the Prosperity project. The protocol provides a framework for the Company and the Province to develop terms and conditions for the provision of electrical power at a preferred rate to the Prosperity project pursuant to the *British Columbia Power for Jobs Act*. It also provides that the company will undertake a \$5 million engineering feasibility study, identify and study the use of optimum production and environmental technologies. The protocol is intended to assist the company to attract private sector financing for the project.

American Bullion Minerals Ltd. released the results of a new pre-feasibility study for its Red Chris porphyry copper-gold deposit in July 1998. In April, Giroux Consultants Ltd. estimated a new resource of 522.7 million tonnes grading 0.352% Cu and 0.272 g/t Au at a cut-off grade of 0.2% Cu. Furthermore, a company review has identified an "inner core" of 118.9 million tonnes grading 0.584% Cu and 0.470 g/t Au at the same cut-off. These grades exceed values assigned in the previous block model by 18.9% and 19.9% for copper and gold, respectively. American Bullion continued to refine a new strategy for development and mining of the deposit, using a method to take advantage of gravity and selective mining of the higher grade "inner core". The company is currently examining the

Figure 8 ...



project based on a 16 000 to 24 000 tonnes per day milling operation. No significant on-site work was carried out in 1998.

International Skyline Gold Corporation continued work towards the completion of a feasibility study of its Bronson Slope polymetallic porphyry property, adjacent to the Snip mine, and submission of a final Project Report to the provincial government under the *Environmental Assessment Act*. A pre-feasibility study has identified a resource of 79 million tonnes grading 0.17% Cu, 0.48 g/t Au, 2.70 g/t Ag and 0.006% Mo. The project, as currently envisaged, is a 15 000 tonne per day milling operation; capital costs are estimated at \$150 million. No significant on-site work was carried out on the property in 1998.

Getty Copper Corporation announced in January 1998 an updated resource estimate on its Getty North deposit of 72 million tonnes grading 0.3% Cu, including 10 million tonnes of oxidized material grading 0.4% Cu. Preliminary metallurgical studies have shown that leaching resulted in approximately 65% recovery of copper from the sulphide resource. The company is considering processing both the oxide and sulphide ore by SX-EW leaching technology. In the spring, Bateman Engineering conducted a review of available information regarding the Getty North deposit and recommended proceeding to a full feasibility study, after completion of pre-feasibility work. Getty applied for a bulk sample permit in order to obtain oxidized material for pilot leach testing. Stripping began in June in preparation for mining a 1500-tonne bulk

Major Exploration Projects in British Columbia - 1998

sample. Due to difficulty in raising financing, the project was put on hold in July.

In the Babine camp, Booker Gold Explorations Ltd. completed a resource estimate for its Hearne Hill porphyry/breccia copper-gold deposit. It estimates a drill-indicated resource of 4 230 000 tonnes grading 0.60% Cu and 0.186 g/t Au, based on a 0.3% Cu cut-off grade, for the high-grade Bland and Chapman breccia zones. In late 1997, Booker concluded an option agreement with Noranda Mining and Exploration Inc. on the Morrison porphyry copper-gold deposit, which adjoins the Hearne Hill property to the north. Booker estimates a drill-indicated resource on the Morrison property of 123 200 000 tonnes grading 0.38% Cu and 0.203 g/t Au, based on a 0.3% Cu cut-off. Booker completed a limited drilling program on the Morrison property in January 1998; the project was subsequently put on hold due to difficulty in raising funds. The company estimates a combined indicated resource for Morrison and Hearne Hill of 127 430 000 tonnes grading 0.39% Cu. The nearby Bell mine, closed since 1992, has remaining resources estimated at 70.4 million tonnes grading 0.44% Cu and 0.2 g/t Au.

Imperial Metals Corporation is conducting a feasibility study for a six-year, 1800 tonne-per-day open-pit

and underground copper-gold-silver mining operation at its **Giant Copper** property, with milling at its **Similco mine**. It estimates a mineral resource of 45 373 026 tonnes grading 0.47% Cu, 0.38% g/t Au and 11.19 g/t Ag in the AM and Invermay deposits. In late 1997, the company filed an application to the government for a 10 000-tonne bulk sample permit. It hauled some material to its Mount Polley mill for metallurgical testing in 1998. As a result of depressed commodity prices and the difficulty in raising funds, this project was put on hold in 1998.

In early 1998, Imperial Metals Corporation merged with Princeton Mining Corporation. Its **Similco** copper-gold mine, which has been on standby since November 1996, has an estimated resource of 128 794 000 tonnes grading 0.397% Cu with gold and silver credits and potential for further expansion of resources. Imperial is evaluating a long-term plan involving the possible re-opening of Similco, including the possibility of milling ore from its Giant Copper property.

At the **Pine** porphyry gold-copper property in the Toodoggone district, approximately 22 kilometres north of the Kemess South mine, Stealth Mining Corporation continued drilling, focusing on the northwest side of the zone over an area approximately three kilometres long and one kilometre wide. The company postulates that the porphyry system has been influenced by a late-stage, gold-enriched event. Coincident geochemical and geophysical anomalies were outlined north of the Findlay River. The company is looking for a joint venture partner to continue exploration and development of this large property.

On the **Granite Mountain** porphyry copper property, north of the Gibraltar mine, United Gunn Resources Ltd. and Oakmont Ventures Ltd. conducted exploration on six separate grids. Two new areas containing significant porphyry copper mineralization were discovered. The Bysouth showing and the Rick showing are located 8.5 kilometres and 1.5 kilometres north and northwest of the Gibraltar mine, respectively. United Gunn completed preliminary I.P. surveys over these zones, prior to drilling planned in 1999.

In the Tulsequah area in the Northwest, Xplorer Gold Ltd. drilled eleven holes into the **Red Cap** copper-molybdenum porphyry system, which has a precious metals overprint. The company is testing the

potential for a high-grade zone with sufficient gold, cobalt and silver values to support bulk-tonnage underground mining.

Precious Metal Bearing Veins and Bulk-Mineable Deposits

Epithermal and mesothermal vein deposits offer potential for both large tonnage, low-grade operations and lower tonnage high-grade deposits. For example, in November 1998, Prime Resources Group Inc. produced its one millionth ounce (31 100 kilograms) of gold from the high-grade **Snip** mine. The mine started production in 1991 and is scheduled to cease operating in the second quarter of 1999. It ranks as the eighth gold producer in the province historically.

At the **Specogna** (formerly Cinola) epithermal gold deposit, on Misty Mountain Gold Ltd.'s Harmony Gold property on Graham Island, Queen Charlotte Islands, a metallurgical testing program was initiated late in the season. In late 1997, a deep drilling program intersected intervals of the auriferous hydrothermal breccia, up to 53 metres wide, at depths of 400 metres. In addition, an induced polarization survey has outlined a strong chargeability anomaly extending 500 metres north from the Specogna deposit. The 1998 sampling program was designed to provide additional material (approximately 4 tonnes) for ongoing bio-oxidation testing. Based on 80 000 metres of drilling in 538 holes, and using a 1.2 g/t Au cutoff grade, the open-pit mine model provides for processing of 33.5 million tonnes grading 2.11 g/t Au, followed by processing of 19.2 million tonnes of stockpiled material grading between 1.2 and 0.8 g/t Au.

During 1998, Canarc Resource Corporation continued to search for a joint venture partner and other financing for its **Polaris-Taku** (New Polaris) gold project in the Tulsequah area. In 1997, due primarily to the Bre-X fiasco, Canarc lost the financing it needed to complete a feasibility study; it was approximately 60% complete at the time. The company currently estimates a resource of 3 270 000 tonnes grading 13.7 g/t Au. No on-site work was conducted in 1998 due to lack of funds.

Bralorne-Pioneer Gold Mines Ltd., in a joint venture with Avino Mines and Resources Ltd., continued to seek financing to put its **Bralorne** gold mine back

into production. Existing geological resources above the 800 level (main haulage tunnel) are estimated by the company at 432 500 tonnes grading 10.63 g/t Au. Since 1995, when it received a Mine Development Certificate for the project, the company has discovered seven new veins, has conducted additional diamond drilling and nearly completed construction of a new gold recovery mill.

At the **Pellaire** (formerly Lord River) gold telluride deposit, in the Taseko Lakes area, International Jaguar Equities Inc. conducted a bulk-sampling and exploration program in 1998. A 1-tonne surface sample will be used to complete column-leach and metallurgical test work to assess the feasibility of a heap-leach operation. If this work has positive results, the company intends to include the construction of a pilot-scale (up to 10 000 tonnes) heap-leach test pad in its 1999 exploration and development program. Eleven surface and underground holes were drilled in 1998, testing the No. 3 and No. 5 veins. International Jaguar conducted a reconnaissance exploration program in the region, as well as a limited program of mapping, geochemistry and geophysics on the nearby Chita porphyry copper-gold target. The regional exploration program discovered a new porphyry copper showing, the Northwest Copper prospect.

In the Wells-Barkerville area, famous for both its lode and placer gold production, International Wayside Gold Mines Ltd. continued exploration on its **Cariboo Gold Quartz** mesothermal vein-gold property. In July 1997 the company estimated a mineral resource of approximately 3 million tonnes grading 3.5 g/t Au, at a cut-off grade of 1 g/t Au, above the 1200 level of the mine. During 1998, underground and surface drilling continued to test the Rainbow, Pinkerton and Sanders zones. The objective is to define a mineable open-pit reserve. In the fall, the company focused its exploration drilling on the BC vein, in an effort to outline underground pockets of higher grade mineralization. With the completion of the 1200-level exploration and development program, a contract was let to Geologic Systems Ltd. for a revised mineral resource calculation.

In the Toadoggonne district, northwest of the recently opened Kemess South mine, Sable Resources Ltd. completed a modest drilling program testing the vein B extension, the West Cirque zone and the New Zone areas at the **Baker** mine. It also trenched an area

north of the mined-out vein A, in an attempt to locate the source of a recently discovered high-grade float boulder. Sable also outlined approximately 8000 tonnes grading 12 g/t Au equivalent in an extension to the JM zone of the **Shasta** mine. Waste rock was drilled and blasted; ore will be trucked to the Baker mill for processing. Elsewhere in the Toadoggonne, on the **JD property**, AGC Americas Gold Corporation and Antares Mining and Exploration Corporation completed an eleven-hole drilling program, designed to test the extension of the Creek zone and the newly discovered Orest zone, a parallel zone to it. The companies now interpret these zones to be related to a porphyry system with gold-silver-zinc-lead mineralization occurring within a quartz-carbonate stockwork.

During 1998, Bul River Mineral Corporation completed a major program of underground development at the **Bull River** copper-silver-gold prospect, where quartz-ferrocarbonate with chalcopyrite and pyrrhotite veins in fractures are hosted by Middle Aldridge Group siliciclastic rocks. The veins range from 0.3 to 6 metres in width. The 16% decline has progressed to approximately 2.7 kilometres from the portal; the company reports that drilling from the new underground development into the area of the potential resource has verified its surface drilled mineral zone model. Cross-cutting vein systems from the 3, 5, 7 and 9 levels is planned between July and September, 1999.

At the **Taurus** gold project, adjacent to the Table Mountain mine in the Cassiar district, Cusac Gold Mines Ltd. signed an option and joint venture agreement with International Taurus Resources Inc. A key term of the agreement includes the right for Cusac to mine up to 250 000 tonnes per year from the Taurus property, subject to a net smelter return royalty to International Taurus. Ore will be milled at Cusac's Table Mountain facility. Previous work on the Taurus project, by Cyprus Amax Ltd. and International Taurus, developed a drill-indicated resource of 13.9 million tonnes grading 1.01 g/t Au.

At the **Tsacha** epithermal gold property, in the southern Interior Plateau region south of Vanderhoof, Teck Corporation and Corona Gold Corporation resumed drilling on a series of north-striking, steeply dipping, auriferous quartz veins. For one of these, the Tommy vein, Teck estimated a resource of 440 000 tonnes grading 8.5 g/t Au, using a 5 g/t cut-off. This re-

TABLE 2
NEW MINES, CLOSURES, DEVELOPMENT AND
ADVANCED EXPLORATION PROJECTS - 1998

Company Name	Project	Commodity Name	Estimated Tonnes (000s)	Estimated Grade	Reference
<i>New Mines</i>					
Royal Oak Mines Inc.	Kemess South	Cu, Au	200 400	0.22% Cu, 0.63 g/t Au, 0.008% Mo	Royal Oak, 1996
Claimstaker Res. Ltd./ Jipangu Ltd.	Blackdome	Au	238	13.03 g/t Au, 37.03 g/t Ag	Claimstaker, 1998
<i>Development</i>					
Fireside Minerals Ltd.	Fireside	Barite	5200		Fireside, 1997
<i>Closures</i>					
Kinross Gold Corporation	QR	Au	—	—	
<i>Advanced Exploration</i>					
Porphyry (and related) Deposits					
Taseko Mines Ltd.	Prosperity (Fish Lake)	Cu, Au	633 000	0.253% Cu, 0.466 g/t Au	Taseko Mines, 1998
American Bullion Minerals Ltd.	Red Chris	Cu, Au	118 900	0.584% Cu, 0.47 g/t Au	American Bullion, 1998
Imperial Metals Corp.	Similco - all zones	Cu, Au	128 794	0.397% Cu, 0.155 g/t Au (est.) 1.576 g/t Ag (est.)	Imperial Metals, 1998
International Skyline Gold Corp.	Bronson Slope	Cu, Au, Ag	79 000	0.48 g/t Au, 0.17% Cu, 2.70 g/t Ag, 0.006% Mo	International Skyline, 1998
Imperial Metals Corp.	Giant Copper (AM & Invermay)	Cu, Au, Ag	45 373	0.47% Cu, 0.38 g/t Au, 11.19 g/t Ag	Imperial Metals, 1998
Booker Gold Expl'n. Ltd./	Morrison	Cu	123 200	0.38% Cu, 0.203 g/t Au	Booker Gold, 1998
Noranda Mining and Expl'n. Inc.	Hearne Hill	Cu	4230	0.6% Cu, 0.186 g/t Au	
Getty Copper Corp.	Getty North Getty South	Cu Cu	72 093 36 000	0.31% Cu 0.47% Cu	Getty, 1998
Massive Sulphide Deposits					
Redfern Res. Ltd.	Tulsequah Chief	Cu, Pb, Zn, Au, Ag	7910	1.27% Cu, 6.35% Zn 1.18% Pb 2.42 g/t Au 100.9 g/t Ag	Redfern, 1996
Weymin Mining Corp.	J&L	Zn, Pb, Ag, Au	3600 (Main)	3.9% Zn, 3.0% Pb, 81 g/t Ag, 7.24 g/t Au	Weymin, 1997

Company Name	Project	Commodity Name	Estimated Tonnes (000s)	Estimated Grade	Reference
			1000 Yellow Jacket	7.1% Zn, 2.5% Pb, 52.5 g/t Ag	
Vein Deposits					
Bralorne-Pioneer Gold Mines Ltd./ Avino Mines and Res. Ltd.	Bralorne Above 800 level	Au, Ag	432.5	10.6 g/t Au	Bralorne Pioneer, 1996
International Wayside Gold Mines Ltd.	Cariboo Gold Quartz	Au	3080	3.5 g/t Au	International Wayside, 1998
Canarc Res. Corp.	Polaris-Taku	Au	3270	13.7 g/t Au	Canarc, 1997
Misty Mountain Gold Ltd.	Specogna (Cinola)	Au, Ag	33 500	2.11 g/t Au	Misty Mtn., 1998
Bul River Mineral Corp.	Bull River	Cu, Au, Ag	5300	2.25% Cu, 36.0 g/t Ag, 12 g/t Au	Bul River, 1998
Intn'l Taurus Res. Inc. /Cusac Gold Mines Ltd.	Taurus	Au	13 900	1.01 g/t Au	International Taurus, 1996
Skarn/Manto Deposit					
Imperial Metals Corp.	Silvertip (Midway)	Zn, Pb, Ag	2570	8.8% Zn, 6.4% Pb, 325 g/t Ag 0.63 g/t Au	Imperial, 1998
Industrial Mineral Deposits					
Mountain Minerals Company Ltd.	Ranchlands	zeolite			Mountain Minerals, 1996
Canmark Int'l Res. Ltd.	Sunday Creek	zeolite			Canmark, 1995
Okanagan Opal Inc.	Klinker	fire opal			Okanagan, 1995
Monteith Bay Res.	Monteith Bay	silica			Monteith Bay, 1998
Whitegold Res. Corp.	Isk	wollastonite	1020	58.14%	Whitegold, 1998
Cassiar Mining Inc.	Cassiar	asbestos, magnesium	17 000	>4% fibre	Cassiar, 1998
Ava Res. Ltd.	Wishaw	quartzite			Ava, 1995
Bul River Mineral Corp.	Aspen	feldspar			Bul River, 1998
IG Machine & Fibres Ltd.	Slesse	limestone			IG Machine, 1998
IG Machine & Fibres Ltd.	Ashcroft	basalt			IG Machine, 1998
Highwood Res. Ltd.	Jubilee Mtn.	barite			Highwood, 1998
Anglo Swiss Res. Inc.	Blu Starr	sapphire, garnet, graphite			Anglo Swiss, 1998
IMP Ind. Min. Park	Black Crystal	graphite	1500		IMP, 1998
Coal Deposits					
Luscar Ltd.	Telkwa	coal	50 000	thermal	Manalta, 1997
Pine Valley Coal Ltd.	Willow Creek	coal	15 600	metallurgical	Pine Valley, 1997
Quinsam Coal Corp.	T'Sable River	coal	38 478	thermal	Quinsam, 1996
Pacific West Coal Ltd.	Tulameen	coal	21 000	thermal	Pacific West, 1997
Western Coal Corp.	Belcourt	coal	103 200	metallurgical	Western Coal, 1998

Note: Estimated Tonnes and Grade are "Resources"

source lies above a diorite sill which cuts the vein at a depth of approximately 120 metres. Several holes, drilled beneath this sill in 1998, cut the vein at a depth of approximately 120 metres and encountered similar style mineralization, adding potential to increase the resource. Drilling also targeted the Larry vein which parallels the Tommy vein approximately 150 metres to the east, where previous drilling has yielded encouraging results.

At the **Kaslo Silver** silver-lead-zinc property on Keen Creek, east of the historic Slocan silver camp, Cream Minerals Ltd. continued diamond drilling along a 9-kilometre shear zone, testing five areas (Silver Bear, Gold Cure, Bismark, Gibson and Cook South) with previously known mineralization. Over the past 20 years, local prospector Eric Denny has consolidated ownership of the claims which cover both high-grade, vein mineralization, and also massive sulphide replacement mineralization located where limestone units intersect the main shear zone(s) (*e.g.* Cork zone). These shear zones average 25 metres in width. Drilling specifically tested for ore shoots below the mine workings on the Cork zone. The company also began assessing the high-grade dumps on the property, for possible processing at the newly renovated, nearby Ainsworth mill. Surface exploration identified an additional six drill targets along the strike of the main shear at north end of the property. A late-season, 760-metre drilling program focused on the Bismark and Cork North zones. The latter will be explored for its replacement-style mineralization at depth and along strike.

Skarn/Manto Deposits

In April 1998, Silvertip Mining Corporation, a subsidiary of Imperial Metals Corporation, filed an Environmental Assessment Process application for the Silvertip (formerly Midway) high-grade precious and base metals deposit, near the B.C.-Yukon border. The company estimates a resource of 2 570 000 tonnes grading 325 g/t Ag, 6.4% Pb, 8.8% Zn and 0.63 g/t Au. It considers that there is potential for expansion of this resource and proposes to develop an open-pit and underground mine to feed a 2000 tonne per day dense-media plant and flotation mill, producing high-value lead and zinc concentrates. In 1998 the company focused on permitting issues associated with the process application. It also conducted a geophysical program to investigate favourable geologic environ-

ments for manto/chimney mineralization in the dolomitic Tapioca sandstone, which underlies the McDame limestone.

Magmatic Nickel

At the **Turnagain** ultramafic-hosted, disseminated nickel-cobalt showing, 70 kilometres east of Dease Lake, Bren-Mar Resources Ltd. completed a five-hole drilling program in conjunction with a bore-hole EM orientation study. Also, a laboratory testing program consisting of concentrate production, pressure-leaching studies, solvent extraction and electrowinning is in progress. Nickel-bearing sulphides have been intersected on the property up to 490 metres in depth over a strike length of 3.7 kilometres. The target is a bulk-tonnage (in excess of 225 million tonnes) nickel-cobalt deposit suitable for open-pit mining.

Coal Deposits

During 1998, off-lease coal exploration was undertaken at **Telkwa, Willow Creek, Belcourt, Tulameen, McGillivray Creek and Middle Mountain**.

At the **Telkwa** thermal coal project, Manalta Coal Limited (now Luscar Ltd.) spent approximately \$520 000 on in-fill drilling, geotechnical drilling and drilling for acid rock drainage samples. Drilling was in the proposed pit east of Goathorn Creek and in the Tenas Creek area. The in situ resource of the Telkwa property is estimated to be 125 million tonnes. The mineable reserve, contained in six separate pits, is estimated to be 50 million tonnes. Luscar intends to continue with Manalta's plan to apply for an Environmental Assessment Certificate. It proposes to produce between 1.0 and 1.5 million tonnes per year over a 23-year mine life, employing 211 persons.

In the Northeast, at the **Willow Creek** project, Pine Valley Coal Limited has plans for a 900 000 tonnes per year operation for 15 years, based on a 15.6 million tonne reserve of metallurgical and thermal coal. The company received a Environmental Assessment Project Certificate in the spring of 1998. The property is in the process of being converted into a coal lease and construction is planned for 1999. During 1998 there were two bulk-sampling programs at Willow Creek, to provide samples for customers. In one program, 200 kilo-

grams were collected for testing as a PCI coal; in the other program, 600 kilograms were obtained for testing the carbonization characteristics of the coal and its applicability as a semi-soft coking coal. At present, there are no plans for additional exploration prior to a commitment to start production.

At the **Belcourt** property in the northeast, about 100 kilometres south of Quintette, Western Coal Corporation conducted a drilling program on the Holtlander reserve area to confirm structure, coal seam thickness and basic coal-quality data. A more detailed exploration program is planned for 1999. To date, a resource of about 18 million tonnes has been outlined, with the potential for additional resources in the Red Deer area of the property.

At the **McGillivray Creek** property in the Southeast, Fording Coal Limited mined a bulk sample of about 30 000 tonnes, which was shipped to Coal Mountain Collieries for test washing. In addition, a modest exploration drilling program was completed to better delineate the structure and provide more coal-quality data. Fording also conducted a modest drilling program on its **Middle Mountain** project, north of Coal Mountain Collieries.

Pacific West Coal Limited proposes to mine about 100 000 tonnes per year of high-volatile C to B bituminous coal on the **Tulameen** property. In 1998 it spent approximately \$395 000 on drilling, preparation of a site for a 10 000-tonne bulk sample, and on environmental studies. It plans to sell coal to local cement plants and to truck product to Vancouver and Washington State.

INDUSTRIAL MINERALS DEPOSITS

In 1998, industrial minerals exploration expenditures are estimated at approximately \$1.5 million, down from the \$3.0 million spent in 1997. An \$8-million pilot plant, to recover short-fibre asbestos from the **Cassiar Asbestos tailings** (17 million tonnes), has been assembled by Cassiar Mining Inc., a wholly owned subsidiary of Minroc Mines Inc. The plant produced at a rate of 1000 tonnes of fibre per month between August and October 1998. It uses a wet-milling technology. The company plans to expand the plant to a capacity of 50 000 tonnes of fibre per year. The capital cost of this phase is estimated at ap-

proximately \$23 million. The tailings reclamation operation is expected to continue at this rate for 13 years. A Japanese trading company, Kakiuchi Co. Ltd., will help finance the capital costs and will market the product. Cassiar is also examining the potential to recover magnesium metal, by leaching cleaned serpentine which is estimated to make up approximately 20% of the tailings pile. The company also receives a modest cash flow from the sale of approximately 50 to 100 tonnes of nephrite jade annually. It plans to employ up to 60 people at the site in 1999.

In early 1998, Whitegold Resources Corporation completed a feasibility study on its **Bril** deposit, part of the **Isk wollastonite project**. A reserve is estimated by Rescan Engineering Ltd. at 1.02 million tonnes of 58.14% wollastonite (using a 50% grade cut-off) which would support a 20-year mine life. A geological resource is estimated by the company at 20 million tonnes; the property contains five other surface deposits. The company has not yet applied to enter the Environmental Assessment Process.

IMP Industrial Park Mining Corporation continued market studies for **graphite** from its **Black Crystal** property, near Slocan. In 1998, the company completed a mapping program over its low-grade, crystalline graphite prospect. The favourable zone is over 1800 metres long and 85 metres wide. Two promising zones were identified: a 360-kilogram bulk sample was taken from the No. 1 zone for metallurgical testing and grade determination.

Anglo Swiss Resources Inc. continued sampling and evaluating the economic potential of the **Blu Starr/Blu Moon sapphire** properties and other prospects in the Slocan Valley. The gemstones occur in core gneisses of the Valhalla complex within the Omineca Crystalline Belt. Gem-quality **aquamarine** has been found in pegmatitic dikes in the Valhalla Gneiss Complex near **Airey Creek**, west of the Slocan Valley. During 1998, Anglo Swiss announced the discovery of gem-quality garnets, an additional sapphire occurrence, an iolite gemstone (water sapphire) occurrence, and a large mineralized area containing crystalline graphite and new zones of aquamarine beryl. The company shipped approximately 1000 carats of rough, gem-quality garnet to three separate cutting facilities in Sri Lanka to evaluate the quality of the faceting. Total extraction over the summer exceeded 250 000 carats of rough garnet

TABLE 3
1998 EXPLORATION HIGHLIGHTS

Company Name	Project Name	Commodity	Estimated Tonnes (000s)	Estimated Grade	Reference
<i>Massive Sulphide Deposits</i>					
Kennecott Can. Expln. Inc./Miner River Res. Ltd./Eagle Plain Res. Ltd.	Findlay Ck./Greenland Ck.	Zn, Pb, Ag			Miner River, 1998
Kenrich Mining Corp./Prime Res. Gp. Inc.	Corey	Au, Ag, Zn, Pb			Kenrich, 1998
Kennecott Can. Expln. Inc./Irishman Ck. Sedex Mining Corp.		Zn, Pb, Ag			Sedex, 1997
<i>Porphyry (and related) Deposits</i>					
Stealth Mining Corp.	Pine	Cu, Au	70 000	0.15% Cu, 0.57 g/t Au	Stealth, 1998
United Gunn Res. Ltd./Oakmont Ventures Ltd.	Granite Mtn.	Cu, Mo			United Gunn, 1998
Xplorer Gold Ltd.	Red Cap	Cu, Mo, Au, Co			Xplorer, 1998
<i>Vein Deposits</i>					
Cream Minerals Ltd.	Kaslo Silver	Ag, Zn, Pb			Cream, 1998
Teck Corp./Corona Gold Corp.	Tsacha	Au, Ag	440	8.5 g/t Au	Teck, 1996
AGC Americas Gold Corp./JD Antares Mining and Expln. Corp.		Au			
Sable Res.	Baker	Au			
International Jaguar Equities Inc.	Pellaire (Lord River)	Au			International Jaguar, 1998
<i>Magmatic Deposits (Ni)</i>					
Bren-Mar Res. Ltd.	Turnagain	Ni, Co, Cu			Bren-Mar, 1998
<i>Industrial Minerals</i>					
Bruce Holden	Northern Lights	opal			—

from about 2 tonnes of pegmatite. The new sapphire showing, **Sapphire Hill**, has a surface area approximately twice the size of the Blu Starr showing. Sapphire crystals were cleaned and prepared for shipment to Sri Lanka for heat treatment to optimize their colour and clarity. Anglo Swiss also sorted and stockpiled facet-grade iolite material. The company staked placer claims along the Slocan and Little Slocan rivers, and plans to test the potential for placer gemstones.

Okanagan Opal Inc. continued marketing **precious opal** from the **Klinker** property near Vernon.

Mining companies, as well as individual prospectors, are evaluating new **dimension stone** properties. Northwest Landscape Supply Ltd. is considering applying for a lease on its Spumoni claim on Brohm Ridge, following successful marketing of basalt facing-stone in Whistler. Near Golden, a zone of bedded, **dark pink quartzite**, 50 metres thick, and suitable for ashlar and

other split-stone products, is being evaluated. Ava Resources Ltd. continued testing its attractive pink, banded **Wishaw** (Kakwa) **quartzite** deposit, east of Prince George. It may attempt to market split-stone and tiling products in the Lower Mainland.

A small shipment of blocks for processing from the **Aspen** claims near Mackenzie was made to test the market. Near Galloway in the Southeast, Bul River Mineral Corporation continued to test the market for the **syenite building-stone** product from its **Aspen** property. It drilled a number of holes and block modeling continues.

In Chilliwack Valley, I.G. Machine and Fibres Ltd. extracted a 35 000-tonne bulk sample of **limestone**, and conducted a diamond drilling program to confirm and expand the resource of its **Slesse** project. The limestone will be shipped to company's plant in Sumas, Washington to be used in manufacturing asphalt shingles. At full production the plant is expected to produce approximately 240 000 tonnes annually.

On **Texada Island**, Consolidated Van Anda Gold Ltd. completed construction of a processing mill and has approval to process a 10 000-tonne bulk sample of **magnetite** from the Paxton pit area. The mill will initially produce magnetite as a heavy medium for use in the coal industry. Magnetite has also been successfully tested as a **sandblasting abrasive** and would be a substitute for silica sand. A small amount of material was milled in 1998.

Continental Lime Ltd. advanced its proposed 250 000-tonne per year **chemical limestone**, **Var quarry**, on Rupert Inlet near Port Hardy. During 1998, the company built roads and drill pads in preparation for a 6000-metre drilling program scheduled to start in early 1999. It is also proceeding with baseline environmental work, First Nations consultation and feasibility studies.

At the **Monteith Bay silica** site on western Vancouver Island, Tilbury Cement Ltd. completed a limited work program in preparation for mining in 1999.

With a contract to supply roofing granules to IKO Industries Ltd. plants in Sumas, Washington and Calgary, Alberta, I.G. Machine and Fibres Ltd. (a subsidiary of IKO) has applied for a permit to mine 24 900 tonnes per year of **volcanic rock** from its **Ashcroft**

quarry. The quarry and crushing/screening plant would require 60 to 70 full-time jobs and a capital investment of \$20 million. A small bulk sample was taken in 1998.

Several barite showings between Jubilee Mountain and Brisco were trenched and drilled in 1998.

GOVERNMENT INITIATIVES

The Government of British Columbia introduced a number of new measures in 1998, to assist mineral resource planning, exploration, and development and continued the successful Prospectors Assistance Program and field programs of the Geological Survey Branch. Highlights are as follows:

- Introduction of the *Mining Rights Amendment Act*, recognizing the right to mine, and assuring access to mineral tenures, providing for the right to compensation when tenures are expropriated for parks, and ensuring timely permitting of projects.
- Introduction of the *Mineral Exploration Code*, creating a one-agency approach for permit approvals, and applying environmental protection standards designed specifically for exploration.
- Introduction of the **British Columbia Mining Exploration Tax Credit Program (METC)**, a refundable program worth approximately \$7 million in 1998/99, rising to \$9 million in 1999/2000 and future years. Effective August 1, 1998 expenditures made by eligible individuals and corporations conducting grassroots mineral exploration in British Columbia may qualify for a 20% refundable credit.
- The province streamlined the criteria for determining which projects require a full environmental assessment review under the *Environmental Assessment Act*. The changes resulted in the following new, reviewability thresholds. In addition, the definition of 'mineral mine' was amended to remove industrial minerals and transferred them to the construction stone and industrial mineral quarries category.

Mining Projects	Previous Threshold	New Threshold
Coal Mines	100 000 t/yr	250 000 t/yr
Mineral Mines	25 000 t/yr	75 000 t/yr
Cons't Stone/IM	25 000+ t/yr	250 000+ t/yr

- To encourage new mine development in the province, the **New Mine Allowance Initiative** which provides for a one-third gross-up of the capital costs of new mines was extended for 10 years to new mines that begin production before January 1, 2010.
- The **Prospectors Assistance Grant Program (PAA)** is designed to promote grassroots prospecting for new mineral deposits in British Columbia. It contributed up to 75% of eligible costs of an approved project to a maximum of \$10 000. Fifty-two grants were awarded in 1998. Several new discoveries were reported by recipients. Approximately \$40 000 were also issued to seven industry organizations to help them deliver training programs to prospectors. The Ministry also provided basic prospectors training. The budget of the PAA program was \$500 000.
- The **Geological Survey Branch** programs focused on regions where significant mineral potential is indicated: Devonian-Mississippian massive sulphide deposits in northern British Columbia, Robb Lake, Toodoggone (Kemess), Babine, Sitlika, Kootenay Terrane (Eagle Bay) and Gibraltar. A project investigating the existence of and potential for Carlin-type deposits (*e.g.* at Golden Bear) continued. Several smaller scale projects were carried out on coal and industrial minerals. Results of these programs are expected to encourage base and precious metals exploration.
- The release of **Regional Geochemical Survey (RGS)** data for the Mesilinka (94C) map area, as well as archived data for the Hazelton (93M) and Manson Creek (93C) map areas, in July 1998, resulted in claims being staked.
- The **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 the Smithers (93L) and Prince George (93G) map areas completed its fifth and final field-mapping year.
- A proposal for a new bedrock mapping NATMAP “**The Ancient Pacific Margin Project**”, co-sponsored by the Geological Survey of Canada, the Geological Survey Branch, the Yukon Geology Program, and the United States Geological Survey, was made in 1998. The proposal will focus on the

epicratonic terrains (Kootenay and Yukon-Tanana) of the Cordillera.

- The **ARIS** (assessment reports), **MINFILE** and **Map Place** databases were upgraded and made easily accessible to clients, on the Ministry’s website (<http://www.em.gov.bc/geology>).
- The Ministry reorganized the **Vancouver Mineral Development Office** to better assist clients with exploration, development, land-use planning, tenure and permitting procedures.

OUTLOOK FOR 1999

The financial crisis in Asia and Russia, coupled with spreading economic weaknesses, and difficulties for junior mining companies in raising risk capital is expected to continue to have a dampening effect on global exploration and development.

The search for sedex deposits in the southeast part of the province is expected to intensify, following up at the **Findlay Creek**, **Greenland Creek** and **Irishman Creek** projects.

Interest in the potential for discovery of deposits similar to the **Pogo** and **Fort Knox** orebodies, currently being exploited in Alaska, is expected to intensify in British Columbia, especially in the Kootenay Terrane and Shushwap Metamorphic Complex.

Positive exploration results at the **Eskay Creek** mine will continue to attract attention to the potential for strataform, gold-enriched (seafloor hydrothermal) deposits. Volcanogenic polymetallic sulphide deposits (*e.g.* **Myra Falls** and **Tulsequah Chief**) offer small to medium tonnage and high-grade potential, particularly those enriched in precious metals. Despite a planned closure between mid-December and April 1, 1999 Boliden plans an aggressive exploration and development program at its Myra Falls mine in 1999.

There is good potential for the discovery of lead-zinc skarn (*cf.* Broken Hill, Australia) mineralization, particularly in the area northwest of Revelstoke.

Exploration for Carlin-type gold mineralization is expected to increase in the Tatsamenie Lake area (*e.g.* **Golden Bear**) and in the Queen Charlotte Islands (*e.g.* **Specogna**).

The infrastructure and mineral resources and potential of the **Premier mine** continue to be examined by interested parties with potential mines along the Coast. Development decisions for the **Telkwa** and **Willow Creek** coal projects are expected in 1999.

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