

NORTHWEST BRITISH COLUMBIA

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SUMMARY

The year 2002 showed improvement for the mining industry although activity remains at less than historic levels. Exploration spending in the Northwest was \$10.2 million, compared with \$7.2 million in 2001 (see Figure 1). Exploration drilling, which is an indicator of work on advanced properties, increased substantially from 37 932 metres to 57 252 metres in 2002 (see Figure 2). Clearly the most promising statistic is the increase in the number of mineral claims in the region. The number of units staked rose sharply to 10 735 while the number of units lapsed or forfeited declined for the fourth successive year to 3588 (Figure 3). The net increase of 7147 claim units show that optimism has returned at the grassroots level of the industry. The Stewart-Iskut "Golden Triangle" led the way in new activity (the Skeena and Liard mining divisions). New and expired claim units in the Atlin and Omineca mining divisions approximately balanced in 2002.

Production of gold and silver from the Eskay Creek mine increased slightly due to an increased mining rate, but at Endako and Huckleberry mines, the output of molybdenum and copper declined slightly due primarily to the mining of lower grade ores. Mine data, including production and reserves, is shown in Table 1. At Eskay Creek, Barrick Gold Corporation was successful in following up a single drill intercept from late 2001 and defining new reserves, the 44 zone, in 2002. Endako mine benefited from a short-lived spike in the molybdenum price that enabled them to reactivate stripping of waste, which will expose ore and alleviate a slope stability problem. Huckleberry copper mine finished mining the Main pit and started expansion of the East pit.

Exploration in the Stewart - Iskut district was led by Barrick Gold Corp., Heritage Explorations Ltd. and Teck Cominco Ltd. Each spent more than \$1 million dollars on drilling programs in search of a gold-silver deposit similar to Eskay Creek. Barrick found a wide zone of gold mineralization in the 22 zone, 1.5 kilometres south of the mine. Follow up drilling next year may show the drill intersection to be the most promising exploration result in 2002. Heritage (formed by merger with St Andrew Goldfields Ltd.) evaluated its enormous claim consolidation surrounding Eskay Creek but focused its effort on the long-inactive SIB property where it confirmed the presence of high-grade gold-silver mineralization in the Lulu zone. Teck Cominco worked southeast of Stewart on Homestake Ridge. In the Babine district, Pacific Booker Minerals Inc. concluded re-drilling

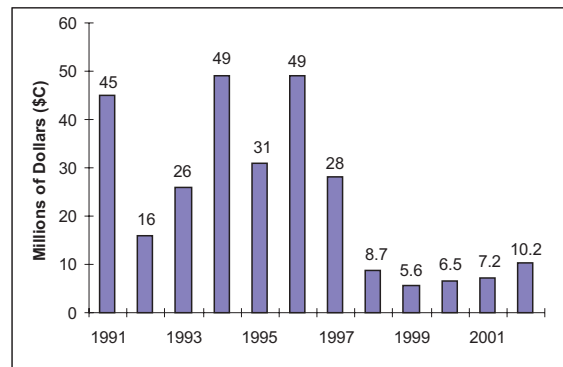


Figure 1. Exploration Expenditures in Northwest British Columbia.

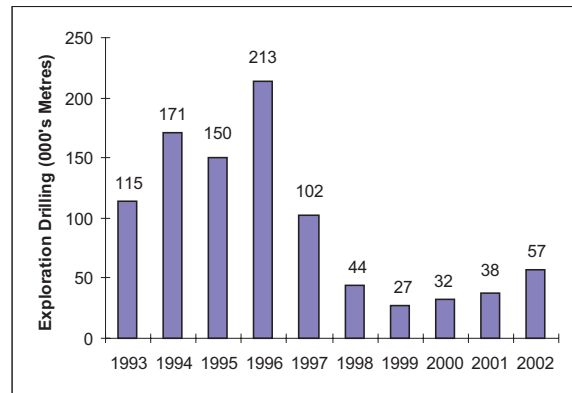


Figure 2. Exploration Drilling in Northwest British Columbia.

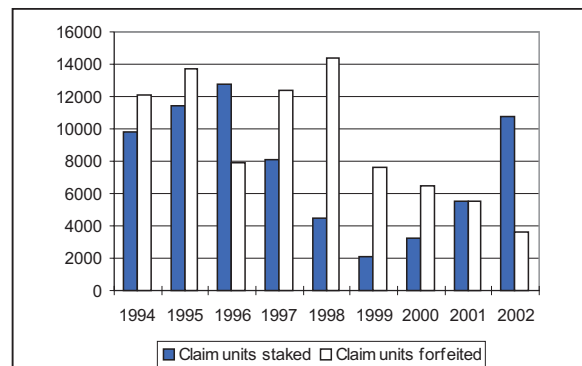


Figure 3. Claim Activity Summary in Northwest British Columbia.

**TABLE 1
MINE PRODUCTION AND RESERVES**

Mine	Operator	Employment	Production (2002)	Reserves	Reference for Reserves
Endako	Thompson Creek Mining, Ltd. & Nissho Iwai Moly Resources Inc.	222	5 239 tonnes Mo	Endako Pit, 46.5 million tonnes at 0.072% Mo Denak Pit, 10.5 million tonnes at 0.075% Mo Stockpile, 26.4 million tonnes at 0.047% Mo (on Oct 1, 2002)	Alan Morrish, pers. comm., Dec 10, 2002
Eskay Creek	Barrick Gold Corporation	316	11 157 kg (358 718 oz) Au, 552 487 kg Ag	Shipping ore, 494 907 tonnes at 51.81 g/t Au, 2604 g/t Ag Milling ore, 805 343 tonnes at 23.38 g/t Au, 918 g/t Ag (on Dec. 31, 2002)	J. Rogers, pers. comm. Feb. 11, 2003
Golden Bear	Wheaton River Minerals Ltd.	21 (seasonal)	70.6 kg (2271 oz)	Closed, undergoing reclamation	
Huckleberry	Imperial Metals Corporation	235	35 032 670 kg Cu, 507 400 kg Mo, 8393 kg Ag, 341 kg Au	36 365 000 tonnes at 0.496% Cu, 0.014% Mo, (on Dec. 31, 2002)	G. Frost, pers. comm. Feb 11, 2003
Fireside	Fireside Minerals Inc.	20 (seasonal)	5 000 tonnes of barite	Not available	

Table Notes: Employment includes all employees and contractors as of December, 2002.

**TABLE 2
MAJOR EXPLORATION PROJECTS, 2002**

Property	Operator	MINFILE	NTS	Commodity	Deposit Type	Work Done
Albert Creek	Logan Resources Ltd.		104P/13	Ag, Zn, Pb	Manto, sedex	Mag, 2.5 km; Drill access, 1.3 km; 1 ddh, 556 m
BX	Parkside 2000 Resources Corp. & Goldrea Resource Corp.	104B 291	104B/10W	Au, Ag, Cu	Porphyry, skarn	Geol; Prosp; 9 ddh, 198 m
Del Norte	Teuton Resources Corp.	104A new	104A/4E	Au, Ag, Zn	Vein	Prosp; 7ddh, 365 m
Eskay Creek	Barrick Gold Corporation	104B 008	104B/9W	Au, Ag, Zn, Cu	Epithermal VMS	37 sfc ddh, 13 990 m; U/g ddh, 20 000 m; U/g definition ddh, 10 000 m
Foremore	Roca Mines Inc.	104G 148	104G/2W	Cu, Zn, Ag, Au	VMS	Geol; Prosp; Contour soil geochem; Rock trenching
Homestake Ridge	Teck Cominco Ltd.	103P 016, 047, 091, 210	103P/12E	Au, Ag, Cu, Zn	Epithermal VMS	Geol; Mini-excavator trenching; 21 ddh, 4375 m
Morrison	Pacific Booker Minerals Inc.	093M 007	93M/1W	Cu, Au	Porphyry	20 ddh, 5578 m
Praxis West	Northgate Exploration Ltd.	103O new	103O/9E, 103P/12W	Cu, Zn, Au, Ag	VMS	5 ddh, 1945 m
RDN	Barrick Gold Corporation	104G 144	104B/15E, 104G/2E	Au, Ag	Epithermal VMS	8 ddh, 1126 m; Camp reclamation
SIB	Heritage Explorations Limited	104B 376	104B/9, 10	Au, Ag	Epithermal VMS	Geol; Geochem, 560 bulk silts; Re-log core; 8 ddh, 3071 m
Table Mountain	Cusac Gold Mines Ltd.	104P 070	104P/4	Au	Orogenic gold vein	11 ddh, 2395 m
Thorn	First Au Strategies Corp.	104K 031	104K/10W	Au, Ag, Cu	High sulphidation epithermal vein	Geol; Prosp; 7 ddh, 472 m
Turnagain	Canadian Metals Exploration Ltd.	104I 014	104I/7W	Ni, PGE	Magmatic	IP, 30 km; Drill access trail, 1 km; 7 ddh, 1683 m
William's Gold	Stikine Gold Corp.	94E 092, 150, 182, 183	94E/13	Au	Intrusion-related Gold	Three dimensional IP, 27 km

of the Morrison porphyry copper deposit that enabled a better resource estimate to be made. These and other exploration projects with expenditure exceeding \$100,000 are listed in Table 2 and their locations shown in Figure 4.

Four other discoveries contributed to a level of excitement in the region. At Foremore in the Iskut district, Roca Mines Inc. located a stratabound mineralized zone that may be the previously undiscovered source of polymetallic boulders that attracted previous explorers. Teuton Resources Corp. found a precious metal vein breccia on its Del Norte property that prompted staking of a 40 kilometer-long belt east of Stewart. Discovery of the Joss'alun high grade copper showing, by a B.C. Geological Survey field party working southeast of Atlin, caused three companies to stake claims. Also southeast of Atlin, Rimfire Minerals Corp. and First Au Strategies Corp. discovered silver-gold mineralization in the Oban zone on the Thorn property.

Several prospects with large undeveloped resources came under new ownership. Noranda Inc. acquired the Kerr-Sulphurets copper and gold deposits, Fortune Minerals bought the Klappan coal property, Silver Standard Resources Inc. purchased the Silvertip silver-lead-zinc de-

posit, and the Red Mountain gold deposit was bought by Seabridge Resources Inc. Exploration and/or development activity is anticipated in 2003 on some of these properties, others will be dormant pending higher commodity prices and/or improved infrastructure. Considered a bellwether decision, the Government of British Columbia overturned a legal challenge and restored a Project Approval Certificate to the Tulsequah Chief project owned by Redfern Resources Ltd.

METAL MINES

The **Eskay Creek** underground gold-silver mine (Photo 1), owned by Barrick Gold Corporation, increased the mining rate to 670 tonnes per day (tpd) to increase precious metal output and offset the mining of slightly lower grade ore (see Table 1). The deposit consists of clastic sulphosalt-sulphide beds in the Contact Mudstone (Photo 2), and lower grade stringer ore in the underlying footwall rhyolite. Overlying basalt is unmineralized but intercalated mudstone, above the first basalt flow, contains sulphide and barite-rich gold-bearing horizons which are referred to as hangingwall ore. The orebody is on the west limb of the

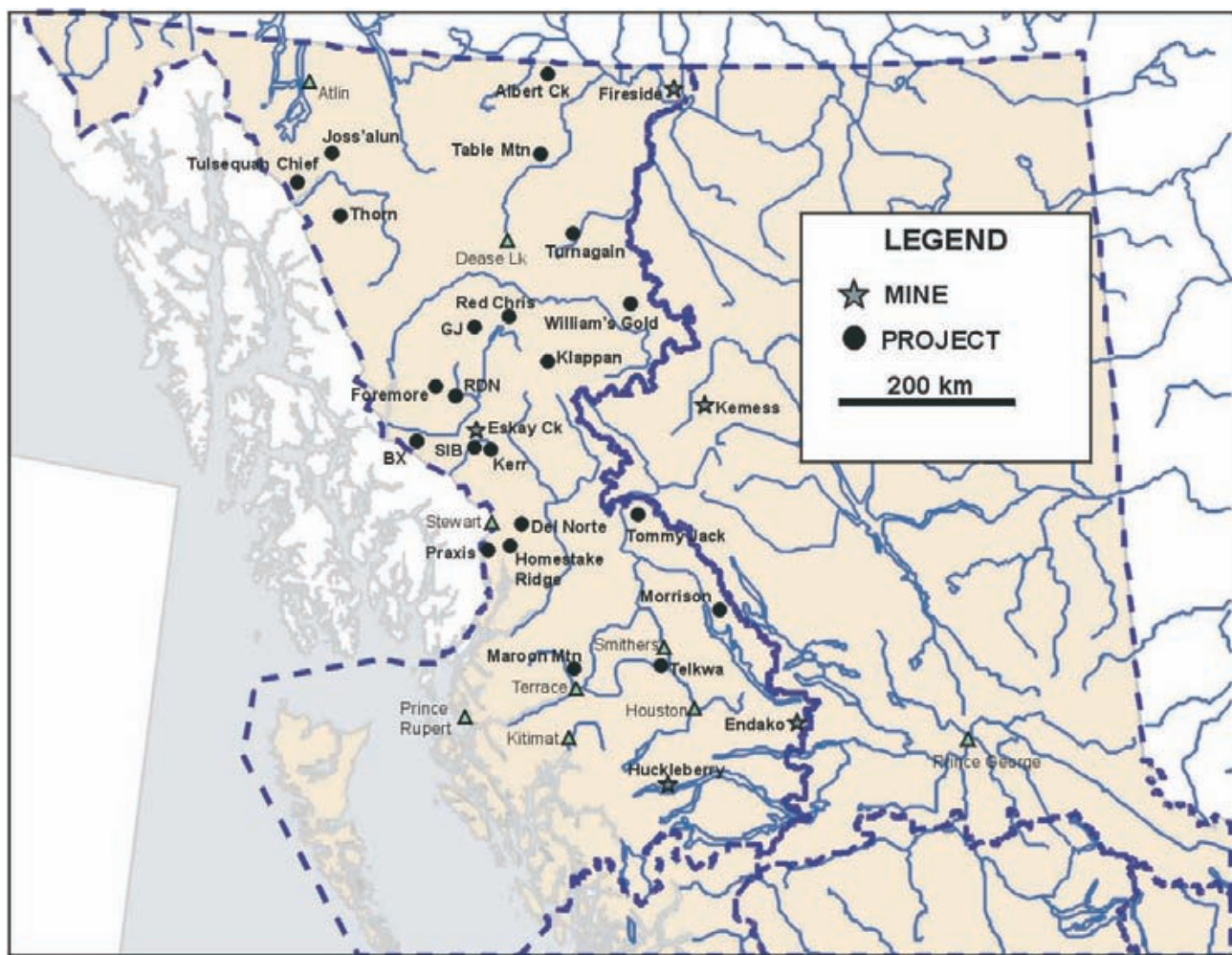


Figure 4. Location map, Mines and Exploration Projects in Northwest British Columbia, 2002



Photo 1. Workers at the portal of the Eskay Creek gold-silver mine

Eskay anticline and continues into the fold nose. Mudstone-hosted ore contains problematic levels of mercury, antimony and arsenic so that high-grade ore is treated off-site at smelters in Japan and Quebec. Mudstone-hosted ore at the north end of the deposit, the NEX area, and footwall ore contain much lower levels of these toxic elements and are acceptable for treatment in an on-site flotation mill. Smelter ore is custom-blended to minimize treatment penalties at each smelter. A six month-long (and continuing) strike at the Horne smelter in Quebec necessitated an approximate 10% reduction in the 340-tpd rate of mining of smelter ore. Mining of ore with the highest content of precious metals and deleterious elements was deferred because Eskay Creek mine has no ore storage capacity. The mine compensated by increased production of mill ore, such that the mill operated at 10% above its scheduled rate of 330 tpd. By year-end, adjustments were made so that planned mining rates were resumed. Cut-off grades are 12 to 15 g/t gold equivalent for ore to the mill, depending on mining characteristics, and 30 g/t gold equivalent for smelter ore. Gold production cost, net of silver credits, was \$US 42 per ounce (to end of third quarter). In 2002, Eskay Creek produced 116 581 tonnes of smelter ore containing 74.36 g/t Au and 3515 g/t Ag, and 116 013 tonnes of mill ore containing 28.5 g/t Au and 1430 g/t Ag.

Surface facilities at Eskay Creek were expanded and improved once again. Cramped working conditions were alleviated by enlarging the office and warehouse facilities. Flotation cells were added to the mill. Problems at the subaqueous outfall of the new tailings pipeline, described in EMBC 2001, were corrected by divers in MacKay Lake and the system now operates as designed. Additions to staff include two more grade control/ exploration geologists (bringing geologic complement to eleven) and a geotechnical engineer. These additions reflect the close



Photo 2. Eskay Creek ore, fine sulphosalt-sulphide beds in mudstone

grade control supervision that is required by geological complexity, and the added importance of effectively dealing with difficult ground conditions as the production rate increases.

Development of the north-plunging NEX zone continued with a 1300 metre advance of a spiral ramp system which includes a northerly 460 metre hangingwall drift. The drift afforded drill positioning to follow up on the exceptional intercept in the last hole of the 2001 surface exploration program which returned 50 g/t Au equivalent over 17 meters (*see* EMBC 2001, page 4). The 2002 underground drilling delineated a new resource, named the 44 zone, that could add several months to the mine life. The area is structurally complex, lying within closely faulted and tightly folded mudstone and rhyolite in the hinge of the Eskay anticline. Continued exploration of deep footwall targets, for example the intersection of the Pumphouse fault with an amygdaloidal horizon at the top of the footwall dacite (EMBC 2001, p. 4), awaits additional development of the ramp. This drilling is anticipated 2003.

The mine was also successful in delineating additional reserves west of the main stoping area within the 800 metre-long 21C zone. At the beginning of the year, reserves were estimated to be 112 000 tonnes at 19.4 g/t Au and 403 g/t Ag, within a larger resource of 237 000 tonnes grading 17.1 g/t Au and 520 g/t Ag. Mineralization is controlled by a northerly fault that cuts the mine sequence, possibly a splay of the graben-bounding Andesite Creek fault. Ore is developed in footwall rhyolite adjacent to the fault and, in overlying horizons, as a stacked series of stratabound zones that extend away from the fault (I. Dunlop, J. Rogers, pers. comm., 2002). The 21C Contact mudstone, 21C barite and 21C hangingwall mudstone ore zones portray an intriguing, smaller-scale replica of the 21B orebody, and demonstrate the interaction of structural and lithologic ore controls at Eskay Creek. With respect to mining, the company is optimistic that it will be more successful in overcoming difficult ground conditions in 21C South reserve block than it was in its trial mining last year in the 21C North block.

North of the 21C zone, deposit appraisal drilling in the Water Tower zone converted a geologic resource of 87 000 tonnes grading 20.8 g/t Au and 500 g/t Ag into a mining re-

serve. The Water Tower zone was discovered and the resource was estimated in 2001 but results of 2002 drilling are not yet available. Mineralization is proximal to the same fault as the 21C zone. Gold occurs in the footwall rhyolite along the contact of a thin mafic body that is rooted against the fault, but it is uncertain if the mafic unit is a volcanic flow or a dike.

Exploration expenditure at Eskay Creek made it the largest project in the region once again. Exploration drilling is conducted from underground on a year-round basis and from surface on a seasonal basis. Promising areas are quickly taken to the next stage of appraisal, resource definition and detailed drilling for mining (eg. Water Tower, 44 and 21C zones). The total of all drilling at Eskay Creek amounted to 45 000 metres in 2002, of which 33 990 metres is classed as exploration and included in Figure 2. Target areas drilled from surface include the NEX trend (“deep Adrian” area), the east limb of the Eskay anticline, the MacKay zone and the historic 22 zone. In the NEX area, two promising intersections were obtained north and west of 44 zone. The 22 zone is 1.5 kilometres south of the mine site in an area of historic trenching and shallow underground development (the Emma adit driven by Tom MacKay in 1932). One of two holes drilled late in the season returned 64.1 g/t Au equivalent over 4.7 metres, within a wider zone that assayed 6.2 g/t Au equivalent over 80.1 metres (I. Dunlop, pers. comm., 2002). Dunlop states that the intersection appears to be analogous to the 21C and Water Tower zones, consisting of steeply west-dipping, structurally controlled stibnite-sphalerite-electrum-pyrite mineralization in the rhyolite. A considerable portion of the 2003 drilling program will continue to test the 22 zone and similar targets to the south. The property boundary with the SIB claims is 3 kilometres south.

Endako is a porphyry molybdenum deposit within an early Cretaceous granite batholith. The Endako open pit mine has operated for 32 years and is a low-cost producer. The pit is elongated west-northwest, it measures 650 metres by 230 metres, and is 250 metres deep (Photo 3). The mill normally processes 28 000 tonnes per day, the total for the year was 9 593 303 tonnes of ore containing



Photo 3. Endako open pit, showing the ore conveyor from the in-pit crusher and the area of instability on the south pit wall.

0.0726% Mo. Molybdenum production amounted to 5 239 101 kilograms, an average recovery of 75.6%. Ninety-five percent of the flotation concentrate is converted to molybdc oxide in an on-site roaster. The balance is upgraded and sold as ‘ultrapure’ (a trademarked product containing 99.15% molybdenum sulphide). In 2002, Endako began roasting concentrate from the Los Pelambres and Highland Valley Copper mines on a toll basis. Endako benefited from a sharp increase in molybdenum price in June. The price gradually declined but by year-end molybdenum was still trading above \$3 per pound, appreciably higher than during the past three years when Endako was compelled to introduce many cost-cutting measures, including an in-pit crusher and deferral of stripping, to remain in operation.

Slope instability on the south wall of the Endako pit, which began in 2000, expanded in extent during 2002. A 3.8 million tonne project to strip material from the upper benches was initiated to unload the South Basalt fault, the primary cause of the stability problem. Ultimately, an additional 15.5 million tonnes of waste rock must be removed from the south wall to provide access to the 46.5 million tonnes of reserves remaining in the Endako pit. Minor pit wall instability results from an east-northeast striking fault (one of a set spaced 300 metres apart that transect the Endako pit obliquely) that dips north at such an angle that it undercuts benches on the south wall. The fault is intersected by a closely-spaced joint set sub-parallel to the south wall that dips steep east to northeast, toward the pit, resulting in a wedge failure zone. More extensive instability is related to the South Basalt fault, the structure that marks the hangingwall of the orebody. The South Basalt fault strikes east-west, dips steeply south and tracks across the south wall of the pit, about one third of the distance above the pit floor. Flat to gently dipping molybdenite-bearing gouge zones below the fault provide detachment surfaces at the base of the south wall. Impermeable kaolinite alteration in the fault zone impounds groundwater and adds to the driving force (A.V. Chance, private report for Endako Mines Ltd., 2002). Movement caused by this block-sliding mechanism temporarily disrupted mining over a 300 metre horizontal distance within the pit in 2002 (photo 3).

Two exploration holes 1.5 kilometres northeast of the Endako pit were drilled late in 2001 and found strong argillic alteration overprinted on a weak quartz-molybdenite stockwork. Follow-up work is warranted but was postponed.

Huckleberry is a porphyry copper deposit related to the late Cretaceous Bulkley intrusions. Copper mineralization, which occurs in two zones one kilometre apart, is developed within a granodiorite stock and related dike, and also in adjacent hornfelsed and fractured volcanic rocks. The mill processed 7 421 715 tonnes grading 0.534% Cu and 0.014% Mo, recovering 88.4% of the copper and 47.5% of the molybdenum. Concentrate is trucked to the port of Stewart for shipment to Japan. Mining of the Main zone ended in early May, somewhat abruptly, when the combined effects of high spring run-off and pit wall failure caused the mine to abandon the remaining one-half million

tonnes of ore in the bottom of the pit. The second mining phase in the East pit required increased capacity to remove waste rock and 150-ton haul trucks were acquired. Waste rock with potential to generate acidic runoff is dumped into the Main Pit which will be flooded upon closure. The East pit expanded east of the 150 fault. The trend of the ore zone is 110° and the 150 fault caused more than 100 metres of right lateral oblique displacement. Mining encountered a greater depth of oxide copper than was anticipated from exploration data. However, mill losses due to oxide copper minerals were more than offset by mining of ore of better grade than anticipated from the upper benches, 0.5 to 0.6% copper rather than 0.4% copper. Differences from the exploration model resulted because dissolution of gypsum-filled fractures near the surface caused poor exploration core recovery from the highly broken rock.

Wheaton River Minerals Ltd. continued reclamation of the **Golden Bear** mine site. Rinsing of the Totem heap leach pad resulted in recovery of 70.6 kg of gold, raising total recovery from the pad to 91.6%.

MINERAL EXPLORATION

SMITHERS-HOUSTON-BABINE AREA

Pacific Booker Minerals Inc. completed its three year program of 60-metre grid drilling of the **Morrison** porphyry copper deposit (93M 007) and subsequently released an open pit resource calculation. This Babine district deposit is centred on an Eocene biotite-feldspar porphyritic granodiorite stock. The stock was emplaced into mid-Jurassic sedimentary rocks of the Bowser Lake Group along the graben-bounding Morrison fault. Based on 82 holes (22 824 metres of drilling) and using a 0.3% copper cut off, an independent consultant estimates the Morrison deposit contains:

- A measured plus indicated resource of 62 121 000 tonnes at 0.46% Cu and 0.22 g/t Au, and
- An inferred resource of 8 937 000 tonnes at 0.52% Cu and 0.21 g/t Au.

The total estimate, 71.0 million tonnes grading 0.47% Cu and 0.22 g/t Au, is at a 1.15:1 strip ratio. The Morrison resource estimate is very similar to the life-of-mine production from the Bell deposit, which was 77.2 million tonnes of 0.47% Cu and 0.26 g/t Au, but the strip ratio is higher, that at Bell was 0.75:1.

Telkwa Gold Corporation drilled six holes on their **Del Santo** property (93L 025) southeast of Smithers, to test EM anomalies for VMS mineralization. The property is underlain by the Nilkitkwa Formation of the Hazelton Group. The holes, collared north and west of holes drilled in 1998, penetrated magnetic and amygdaloidal mafic volcanic rocks that are variably altered to epidote, calcite and hematite. An intercalated layer of aphanitic felsic volcanic rocks containing disseminated pyrite was cut in one hole. On nearby Dome Mountain, Consolidated Rich Resources Inc. agreed to explore the Dome claims of Guardsmen Re-

sources Inc., but were unable to fund proposed trenching of the Gem and Eagle showings (93L 284, 285).

Separately owned claim groups on the **Tommy Jack** (94D 031) gold prospect 95 km north of Hazelton were optioned by International Kodiak Resources Inc. (from Lorne Warren) and Gold City Industries Ltd. (from Alan Raven). Gold and silver occur in sulphide veins, containing galena, sphalerite, chalcopyrite, pyrrhotite, pyrite, tetrahedrite and ruby silver. The veins are adjacent to fine grained dikes and sills, thought to be derived from an unexposed Bulkley granodiorite pluton that intrudes sandstone and shale of the Bowser Lake Group. Noranda drilled 35 holes (2452 metres) at Tommy Jack in 1986 and 1987 targeting, in part, gold-silver-lead soil anomalies. Soil anomalies may be derived from a shallow blanket of glacial till, and not be a primary dispersion from bedrock. The direction of ice transport is uncertain because the property is at the intersection of north-south and east-west valleys. Gold City discovered a new vein occurrence by hand-trenching a self-potential anomaly (due to graphite in the veins) identified by Alan Raven with the assistance of a Prospector Assistance grant several years ago. International Kodiak compiled geologic data but deferred exploration.

Tenajon Resources Ltd. commenced exploration of the Sleeper silver showing on the **Silver Streak** property acquired from Ed and Jerry Westgarde and Barry Hofsink. Tetrahedrite, minor galena and sphalerite, but negligible pyrite, accompany vuggy calcite and quartz in a crackle-brecciated zone exposed along a forest service road south of Houston. The host rock is feldspathic tuff of the Telkwa Formation. Sampling by Tenajon of the vendors' hand trench returned 191 g/t Ag, 0.26% Cu, 0.30% Pb and 0.15% Zn over 16.7 metres. Late in the year, Tenajon undertook excavator trenching based on an interpreted northeast trend to the mineralized zone but results are not yet available. Equity Silver Mines Ltd. explored the Sleeper showing from 1990 to 1992, when it was named the Eric property, and drilled 19 holes. Drilling results are poorly known because the work was not filed for assessment. Equity had limited success in extending the zone based on an assumed shallow southwest dip (D. Hanson, pers. comm., 1992) but Tenajon interprets a different structural trend.

Several prospectors undertook drilling on their own properties. Wes Moll completed one hole on both the **Crow-Raven** porphyry copper prospect south of Houston and the **Harry Davis** copper-zinc-silver prospect north of Houston. Gary Thompson performed a 12-kilometre vertical loop EM survey and drilled two holes on his **Rox** claims 80 kilometres south of Houston. The target is fault-controlled gold-silver vein mineralization. Fifty kilometres west of Smithers, near Mulwain Creek, Regis Plante drilled two holes targeting a copper vein on the **Regis** claims.

TERRACE-KITIMAT AREA

Seymour Exploration Corp. explored the auriferous Bear quartz vein (103I 029) on **Maroon Mountain**, 35 km north of Terrace. Historic sampling returned gold grades between 0.2 and 106 g/t over vein widths between 0.3 and 1.5 metres. Two holes were drilled by Seymour. The first

cut 0.6 metres of quartz-pyrite-sphalerite-galena vein that assayed 26 g/t Au but the second hole did not intersect the vein and may not have been drilled far enough. The quartz vein, or a family of veins in similar structures, extends west to the Black Wolf showing (103I 030) and east to Gold Cap (103I 028) for a total strike extent of 1500 metres. Over that distance, the vein(s) follow a bedding-parallel fracture located 15 to 50 metres below a distinctive 35-75 metre thick cobble conglomerate. The host rocks are turbidite greywacke of the Bowser Lake Group that are folded, penetratively deformed and metamorphosed to biotite-andalusite grade. The vein(s) contain sporadic scheelite and are associated with a narrow aplite dike, implying derivation from a nearby Tertiary pluton.

At the **Morningstar** prospect (103P 034), a Bulkley granodiorite stock with porphyry molybdenum mineralization intrudes Bowser Lake Group sedimentary rocks. Dwight Herbison and Larry Noble drilled a single hole to test auriferous arsenopyrite veins peripheral to the stock.

Southern Rio Resources Ltd. acquired the **Dani** claims on Hawkesbury Island in the Ecstall volcanosedimentary belt from prospectors Shawn Turford and Ralph Keefe. Southern Rio contracted Equity Engineering to do a brief geological appraisal. Also in the Ecstall belt, CSS Exploration Inc. conducted a limited geochemical program on the **Iuxta** property, acquired immediately prior to the RGS release in 2001.

STEWART DISTRICT

Mineral claims owned by Teck Cominco Limited in the upper Kitsault and Illiance River area comprise the **Homestake Ridge** and **Big Bulk** properties. A detailed geological mapping program in 2001 at Homestake Ridge (103P 091, 210, 214) identified drill targets for a precious metal enriched VMS deposit analogous to Eskay Creek. Precious and base metal veins on Homestake Ridge lie on the inverted limb of an anticline that is overturned to the south. Twenty-one holes were drilled (Photo 4), mainly from aphyric flow-banded rhyolite in the structural hanging wall through a sequence containing graphitic mudstone and siltstone with tuffaceous rhyolite interbeds into a volcanoclastic basalt debris flow. High-level intrusions of hornblende-feldspar porphyry andesite, with rare K-feldspar phenocrysts, grade into quartz-phyric felsite bodies that invade the section up to, and including the basal portion of the basalt unit. Pyrite, sphalerite, arsenopyrite and galena intersected in the basal 15 metres of the mudstone and, less commonly, near the top of the rhyolite, are interpreted to be early diagenetic (G. Evans, pers. comm., 2002).

Teck Cominco optioned the Big Bulk property to Canadian Empire Exploration Corp. The 351 claim unit property covers a felsic volcanic unit within the Betty Creek Formation that hosts a series of mineral occurrences including Leftover (103P 047), a high-silver massive sulphide prospect, and the Big Bulk subvolcanic intrusion (103P 016). Surface chip samples at Big Bulk by Prism Resources Limited in 1980 returned 0.715% Cu and 1.75 g/t Au over 13 metres. Canadian Empire plans a drilling program in 2003.



Photo 4. Graeme Evans (centre) showing drill core from the Homestake Ridge project to Mines Branch personnel Bruce Graff and Doug Flynn

Praxis Goldfields Inc., a private company, optioned the western portion of its **Praxis** property 25 km south of Stewart to Northgate Exploration Limited. Northgate drilled five holes in the Section Ridge area, to test strong electromagnetic anomalies within Salmon River Formation mudstone for volcanogenic mineralization. The mudstone overlies pillow basalt, a stratigraphic setting correlative with the Anyox copper massive sulphide district. Northgate's second drill hole intersected 0.67% lead and 0.39% zinc over one metre near the top of the volcanic sequence, but the strong EM response is attributed to graphite seams parallel to bedding in the overlying mudstone (D. Kuran, pers. comm., 2002).

Praxis Goldfields Inc. retained the eastern portion of its Praxis claims, the Rhyolite Ridge area south of Ashwood Lake. Two holes were drilled to explore the geochemically anomalous contact between the mudstone and overlying rhyolite. The rhyolite, of similar mid-Jurassic age to the Eskay Creek rhyolite, is comprised of various flow-banded, brecciated and altered phases. One hole intersected a narrow zone of disseminated sphalerite, the other was stopped where the favourable stratigraphy is truncated by younger intrusive rocks (D. Kuran, pers. comm., 2002).

On its **Del Norte** property, Teuton Resources Corporation discovered a quartz-cemented breccia, mineralized with coarse sphalerite and galena and containing appreciable gold and silver. The new showing is located at the margin of a wasting icefield on the ridge between Nelson and

Del Norte creeks, about 500 metres southeast of the LG showing (104A 161). The breccia zone lies along the contact of a granitic dike emplaced into pyritic black mudstone of the Salmon River Formation. The weighted average of three closely-spaced drill intercepts across the 10 metre-wide zone is 5.07 g/t Au and 210 g/t Ag, compared to the outcrop sample that returned 6.14 g/t Au and 631 g/t Ag.

Seabridge Resources Inc. purchased the **Red Mountain** gold deposit (103P 086) from Wheaton River Minerals Ltd. During its ownership of the property, Wheaton River relogged drill core and studied ore controls leading to a resource estimation of:

- 1.26 million tonnes grading 8.01 g/t Au (measured)
- 340 000 tonnes grading 7.04 g/t Au (indicated)
- 350 000 tonnes grading 7.45 g/t Au (inferred).

ISKUT DISTRICT

Heritage Explorations Ltd. became the operating company to explore a 2200 unit claim consolidation in the Iskut district. St. Andrew Goldfields Ltd. and Zebrex Holdings Inc. hold a controlling interest in Heritage. The property largely surrounds the Eskay Creek holdings of Barrick Gold Corp. and covers favourable folded stratigraphy from the McKay syncline eastward to the McTag anticlinorium, including the Treaty Creek and Bonsai prospects optioned from Teuton Resources Corp. Heritage undertook an ambitious digital compilation to build a comprehensive topographic, geological, geochemical and geophysical model to explore for, in particular, Eskay Creek-type precious metal mineralization. Some 300 assessment reports spanning decades of previous exploration were digitized and studied by a team of geologists. Consultant Peter Lewis helped to rationalize stratigraphic nomenclature that has evolved over time. From their study of the Eskay Creek area, Heritage concluded that the primary control of mineralization is structural, and that lithology, such as receptive mudstone, is a secondary factor (interestingly, there is now greater recognition of the importance of structural ore controls at Eskay Creek). Heritage Resources identified two parallel, northeasterly mineralized corridors. The field program, partly funded by Kinross Gold Corp., included a property-wide stream geochemical program and detailed work on the SIB claims.

The **SIB** claims of Heritage Explorations lie on the west limb of the Eskay anticline and cover the southern half of a nine kilometre chain of gossanous mineralized zones associated with the Eskay Creek rhyolite. The most notable target is the Lulu zone (104B 376) where a Heritage drill hole cut 19.5 g/t Au and 1602.9 g/t Ag across 11.7 metres, closely matching the intersection in a nearby 1990 drill hole. Mineralization in the Lulu zone consists of pyrite, stibnite and sphalerite with minor gold, pyrrargyrite and arsenopyrite within an intra-rhyolite mudstone unit. Other mudstone horizons, including one at the base of the rhyolite (the McKay mudstone) are also known to contain gold-silver mineralization. However, the Contact Mudstone, the unit that hosts the Eskay Creek deposit at the top of the rhyolite, is not well developed. Two other targets, North SIB

(the MacKay adit area) and Battleship Knoll, are in an area in which alternating claims are owned by Barrick Gold and Heritage Resources. A single hole at Battleship Knoll encountered 8.24 g/t Au and 16.8 g/t Ag over 1.4 metres. Four holes at North SIB targeted an anticline in the McKay mudstone where it is cut by a thrust fault. This was regarded as the favourable structural site intersected by a 1990 drill hole that returned 41 g/t Au over 3.0 metres but no significant mineralization was found. More work is planned on these targets and the TV, AP, Lance, Bonsai, Tarn, Jeff and Noot prospects.

Barrick Gold Corporation acquired the **RDN** property (104G 144), 40 km north of Eskay Creek mine, after Newmont Exploration of Canada terminated its agreement with Rimfire Minerals Corp. The property is underlain by similar rocks with a comparable geochemical signature to those that host the Eskay Creek deposit (*see* EMBC-2001, page 65-71). Barrick encountered difficult drilling conditions and were able to complete only two of eight holes. The other holes terminated short of their target depth and drilling was postponed until 2003 when the work will resume with a modified procedure. The Jungle anomaly, a prime target, remains untested. Surface work was carried out in other areas and additional claims were staked along the projection of favourable stratigraphy.

Roca Mines Inc. made significant progress in solving the enigma of polymetallic sulphide boulders on the **Foremore** property (104G 148). The More glacier, which is two kilometres wide and ten kilometre long, divides into two snouts 5 kilometres apart, each marked by an extensive outwash moraine containing a variety of mineralized boulders. Roca's prospecting program tested a new interpretation by glaciologist Wayne Savigny that the boulders came from a collapsed lateral moraine from a side glacier. The property is underlain mainly by deformed Paleozoic mafic to felsic volcanic rocks, siliclastic sedimentary rocks and limestone. Intrusive rocks of Paleozoic and Mesozoic ages are also present. Lorne Warren discovered a pyrite-sphalerite-galena-arsenopyrite stringer zone that is stratabound over a 100-metre length within sericite-altered intermediate volcanic rocks (Photo 5). The zone lies on the



Photo 5. Geologists examine stratabound mineralized zone discovered on the Foremore property by Lorne Warren, top left.

margin of a 50-metre wide snow-filled gully and trends toward an EM anomaly. Channel sampling and other follow-up work will take place in 2003.

Northgate Exploration Limited carried out a brief geological examination of its newly acquired **Rest** claims, located along the long-lived Forrest Kerr fault. Major accumulations of Salmon River Formation pillow basalt along the fault to the north on the RDN claims and south on the PBR property, suggest the Forrest Kerr structure was a rift fault and therefore prospective for Eskay Creek-type mineralization.

On the **BX** claims, Parkside 2000 Resources Corp. explored gold-bearing vein, stockwork and magnetite skarn occurrences (104B 290, 291, 362, 364) associated with the early Jurassic Lehto stock 6 kilometres southeast of the former Snip gold mine. The pluton is the same age as the Red Bluff stock and the ore deposit setting on the BX property may be comparable to the Twin vein at Snip and porphyry copper-gold mineralization at Bronson Slope. Parkside, under an earn-in agreement with Goldrea Resources Corporation, undertook a drilling program but were unable to complete their holes due to broken rock.

A number of property acquisitions point to new exploration projects in 2003. Noranda Exploration Inc. optioned the **Kerr-Sulphside** property from Seabridge Resources Inc. Placer Dome Inc. estimated the Kerr deposit to contain 140.8 million tonnes grading 0.75% Cu and 0.36 g/t Au and Sulphurets to contain 54.8 million tonnes grading 1.02 g/t Au (total of measured, indicated and inferred resources in both deposits). Noranda will begin a property-wide exploration program in 2003. Rimfire Minerals Corp. staked the **Adam** property on widespread copper-gold mineralization (104B 079, 209) in a fault-controlled monzonite dike near the confluence of the Unuk and South Unuk rivers. Rimfire conducted a brief field program, to assess work by previous explorers who reported a chip sample grading 0.60% Cu and 1.28 g/t Au across 18.9 metres within a 1.5 kilometre long copper-gold soil anomaly. Newcastle Minerals Ltd. acquired claims on the **Phiz** (104B 165) and **Snip North** (104B 312) gold occurrences located 5 km west and 4 km north respectively of the Snip gold mine. Between 1988 and 1991, some 97 holes totaling 9565 metres were drilled at Snip North and 25 holes were completed at Phiz, but the work was not filed for assessment. Newcastle located core and drill records, and is compiling the data in search of untested targets. And finally, Hathor Exploration Ltd. acquired some 1280 claim units by staking in the Eskay-Granduc area.

TURNAGAIN-STIKINE AREA

After a three-year hiatus on the **Turnagain** project, exploration resumed for a bulk-tonnage nickel-cobalt-platinum-palladium deposit (104I 014) in the Turnagain ultramafic complex. Canadian Metals Exploration completed an induced polarization survey and seven core holes, bringing the total to 26 holes drilled on the property since 1996. Complete assay data for three holes was available at the time of writing and had similar results. For example, hole 7 averaged 0.26% Ni, 0.02% Co, 0.03% Cu and 39 ppb plati-

num plus palladium over 414 metres. Higher grades were encountered over shorter intervals, beginning at 302 metres in the third hole 16 metres of 0.71% Ni, 0.017% Co, 0.13% Cu and 183 ppb platinum plus palladium were cut. The Turnagain intrusion is characterized as a zoned (Alaskan type) body by the B.C. Geological Survey and is located adjacent the Turnagain River, 110 kilometres east of Dease Lake.

Stikine Gold Corporation, a private company, entered into an option agreement to acquire 70% of the **William's Gold** property (94E 092) from Rimfire Minerals Corp. Formerly known as the Bill (*see* EMBC, 2001), the property is located 290 km north of Smithers. Auriferous arsenopyrite-pyrite-quartz veins with bulk tonnage potential are likely related to a buried intrusion, evidenced by structural and magnetic data. Stikine Gold performed a three-dimensional induced polarization survey. This new technique provided targets for a drill program anticipated in 2003. The company also plans to expand the IP survey northward over an area of gold-bearing float.

West of Kinaskan Lake on the **GJ** property (104G 034), International Curator Resources Ltd. performed an induced polarization survey between two previously explored areas. Porphyry copper showings one kilometre apart lie at the west end of the Groat (alkalic) monzodiorite stock. Work between 1970 and 1990 included several phases of mapping, geochemistry, geophysics, and 52 diamond drill holes, with a best intercept of 0.70% Cu and 1.9 g/t Au over 68 metres. The Groat stock and attendant porphyry copper mineralization belongs to the same plutonic suite as the Red stock at the Red Chris copper-gold deposit. North and east of GJ on the Kinaskan plateau, some 528 units were staked by Viceroy Resource Corp. as the **QC** claims, and subsequently transferred to Royal County Minerals Corp. Work in 2002 focused on two of seventeen mineral occurrences identified by previous exploration of the claim area. New areas of gold-silver-copper-zinc mineralization were discovered in quartz veined intrusive rocks west and southeast of the Gordon Vein (A. Travis, pers. comm., 2002). Rock sampling within the Horn East soil gold anomaly located quartz-veined float with up to 6.95 g/t Au.

Dissident shareholders of American Bullion Minerals Ltd., owner of the inactive **Red Chris** deposit (104H 005), ousted company management on December 30 and began formation of a new management group. Red Chris is estimated to contain 522.7 million tonnes at 0.35% Cu and 0.27 g/t Au with a higher grade core of 118.9 million tonnes grading 0.58% Cu and 0.47 g/t Au. The new group is not in favour of a draft agreement, negotiated by previous management, to sell 70% of the Red Chris deposit and are investigating whether the proposal is binding.

John Poloni staked new mineral claims over the lapsed **Eaglehead** porphyry copper system (104I 008). The Camp, Pass and Bornite zones are strung out over a 3 kilometre distance. Based on work carried out between 1972 and 1982 various operators estimated resources in these deposits as 2.7 million tonnes at 0.45% Cu, 11.8 million tonnes at 0.52% Cu and 16 million tonnes at 0.65% Cu respectively.

Significantly, a 6.3 metre intercept grading 7.13% Cu at the eastern extremity of the drilled area, has yet to be followed up. Poloni re-logged drill core stored on the claims and re-established a grid to facilitate further exploration.

Eagle Plains Resources optioned the mineral claims 65 kilometres southwest of Telegraph Creek that were newly staked over lapsed claims that covered part of the **Copper Canyon** alkalic porphyry copper-gold deposit (104G 017). Exploration in 1990 identified an inferred resource of 32.4 million tonnes grading 0.75% Cu, 1.17 g/t Au and 17.1 g/t Ag in the Central zone at Copper Canyon. Silver Standard Resources Inc. and Stikine Copper Limited continue to hold claims over part of the deposit.

CASSIAR AREA

At the **Table Mountain** gold mine, Cusac Gold Mines Ltd. reactivated exploration of the Bain vein, east of where it was mined. Between 1993 and 1995 the Bain vein produced about 55 000 tonnes of ore with a recovery grade of 14 g/t gold. From west to east, the Katherine, Bonanza and Bain veins represent faulted segments of a single structure (M. Glover, pers. comm., 2002). The Eileen fault displaces the eastern continuation of the Bain vein some 300 metres, termed the 'Bain Gap'. Drilling and concurrent modeling confirmed the fault gap and improved the resource estimate in the eastern extension of the Bain vein to a mining reserve of 22 000 tonnes containing 33.78 g/t gold. Vein width averages 1.45 metres. Exploration drilling 300 to 400 metres further east failed to intersect the Bain vein, results suggest there may be another vein gap caused by similar style displacement on the Lily fault. Cusac proposes to contract mine the East Bain reserve and continue exploration in 2003. In the same district, Navasota Resources Ltd. signed a letter of intent with International Taurus Resources to earn a 70% interest in the **Taurus** gold property (104P 010, 012). The agreement is scheduled for completion in early 2003.

Logan Resources Ltd. drilled a single hole on its **Albert Creek** property, to test a coincident strong magnetic and silver-lead-zinc silt and soil geochemical anomalies. Geophysical modeling indicated a large, conformable magnetic body. The target was a manto or sedex deposit at the inferred contact between McDame Group limestone and Earn Group clastic sedimentary rocks. The geochemical anomaly was identified by a government Regional Geochemical Survey (RGS) some 20 years ago but not explained, despite exploration programs by Falconbridge Nickel Mines Limited and Total Erickson Resources Ltd. The hole by Logan Resources intersected carbonaceous and pyritic mudstone and limestone to 527 metres, then serpentinite, the cause of the magnetic response.

Silver Standard Resources Inc. obtained the **Silvertip** silver-lead-zinc prospect (104O 038) from Imperial Metals Corporation in exchange for a combination of cash and shares. Silver Standard will continue to hold the property on a care and maintenance basis until commodity prices improve.

ATLIN AREA

The **Tulsequah Chief** project, owned by Redfern Resources, received a Project Approval Certificate from the Minister of Energy and Mines and the Minister of Sustainable Resource Management. The approval allows for development of a 2250 tonne per day underground copper, lead, zinc, gold and silver mine, and construction of a 162 km access road from Atlin.

First Au Strategies Corp. funded a drilling program on the **Thorn** gold-silver prospect (104K 031) under an agreement with Rimfire Minerals Corporation. High sulphidation enargite-tetrahedrite-tennantite-pyrite mineralization is associated with intense sericite-clay alteration and a Cretaceous biotite-quartz-feldspar porphyry that intrudes coeval volcanic rocks. Drilling was directed at some of the numerous high-grade veins on the property. Two holes on each of the I and Tamdhu zones delineated steeply south-dipping structures but with lower grade than those found on surface; the best intercept was 3.05 g/t Au, 454 g/t Ag and 3.65% Cu over 1.65 metres in the Tamdhu zone. Another drill target was the newly discovered Oban breccia zone which is 300 metres in diameter. Although three shallow drill holes returned only elevated metal values, it remains a prime target for continued drilling in 2003 because of its tonnage potential.

The B.C. Geological Survey mapping project led by Mitch Mihalyuk in the Nakina area discovered a new high-grade copper showing at the head of Horsefeed Creek, 75 km southwest of Atlin. Named **Joss'alun**, semi-massive chalcopyrite and pyrite is conformable within mafic volcanoclastic rocks of the Cache Creek Group. Chip samples assayed 7.33% Cu across 0.35 metres and 3.35% Cu across 0.9 metres. Copper Ridge Explorations Inc., Imperial Metals Corporation and Tenajon Resources Corp. acquired claims soon after the discovery was announced.

Stirrup Creek Gold Ltd. expanded its claim holdings over the **Adanac** molybdenum deposit at the head of Boulder Creek, 25 kilometres east of Atlin, and re-formulated geologic data to assess potential for a plutonic-related gold deposit. The company carried out rock and soil sampling and a magnetic survey.

On the outskirts of Atlin, Gary Lee excavated trenches on the **Beavis** (104N 007) prospect to extend epithermal gold veins. At **Yellow Jacket** (104N 043) on Pine Creek in the Atlin placer district, Lenard Diduck excavated 245 metres of trenches in search of lode gold. Results are not available.

The **Golden Eagle** property of Marksmen Resources Ltd. comprises two claim groups located east and west of Tutshi Lake. East of the lake, the Carbonate and Camp zones (104M 071) are areas of anomalous gold and copper in rock and sediment samples in carbonate and chlorite-altered mafic volcanic rocks of the Stuhini Group. The target is a VMS deposit or an epigenetic deposit related to the Llewellyn fault. West of the lake, the Tannis zone contains Cretaceous intrusive-hosted vein-type gold mineralization (104M 074, 075). In addition, work by the B.C. Geological Survey indicates Jurassic felsic volcanic rocks have poten-

tial to host VMS mineralization. Marksmen performed IP and limited magnetic and geochemical surveys.

INDUSTRIAL MINERALS AND GEMSTONES

Fireside Minerals Limited mined 6500 tonnes of barite ore from the Bear East pit on the **Fireside** property (94M 003), which is 125 km east of Watson Lake. Barite that remained from 2001 was ground and bagged at the company's plant in Watson Lake and sold to finance startup. Due to a weak market, only 1500 tonnes of barite mined this year was processed, the balance was stockpiled at the mine site. Jigs at the mine, normally used to upgrade the barite, were not operated.

Nephrite jade was produced from two properties in the Turnagain River area east of Dease Lake. Jedway Enterprises Ltd. was contracted by Polar Gemstones to mine and ship 60 tonnes from **Polar Jade**. Jedway shipped 40 tonnes of jade that had been mined in prior years from the **Blue J** property near Kutcho Creek. Jedway also mined and shipped about 22 tonnes of jade recovered from the Cassiar waste dump, under agreement with **Cassiar Mines & Metals Inc.** The Jade West Group markets the jade, mainly to Chinese and Korean buyers.

There was little activity on precious opal projects in the region. Cantec Ventures Inc. terminated its option of the **Firestorm** opal property 20 km west of Burns Lake. Operator status reverted to the Schaefer family who reclaimed the access trail and exploration trenches. No work was conducted on the **Whitesail** opal property south of Huckleberry mine although the owners continue to market previously mined material.

Pacific Ridge Exploration Ltd. announced recovery of a microdiamond from a kimberlitic diatreme dike on its **Xeno** property (94L 017) located near the Turnagain River about 140 kilometres east of Dease Lake. The diamond measures 0.38 by 0.30 by 0.25 mm and was obtained by caustic fusion of a 32 kg sample collected in 2001 during investigation of occurrences of rare earth elements. The diatreme occurs in a complex of Paleozoic alkalic rocks and carbonatite 15 kilometres west of the Rocky Mountain Trench, an area underlain by continental crust. Pacific Ridge intends to deal the project to a diamond exploration company.

PLACER MINING

Placer gold mining in the Atlin and Dease Lake areas continued at a reduced level for the third year. Many operators remain idled by the low gold price, high cost of fuel, and scarcity of shallow paydirt. There were 24 mining projects in the region, similar in number to last year, and 34 exploration projects, an increase from 2001. There were two reclamation projects in 2002.

In the Atlin district, **Ruby Creek** continued to be the main area of activity with about 40 workers at three operations. Attracted by the success of Ruby Gold Ltd., two other companies began mining through Quaternary basalt, 30 to

50 metres thick, in search of rich placer gravel underneath. The basalt comprises three columnar-jointed flows locally separated by a red scoria horizon. Stripping of basalt waste rock requires conventional mine equipment; tank drills, loaders and 35 to 50 tonne haul trucks. Sisters Resources excavated a 50 metre wide strip along the left (east) bank of Ruby Creek upstream from the Ruby Gold pit. About 15 000 cubic metres of gravel was washed, one-half the expected quantity. The centre of the paleo-channel containing more gold is thought to be further into the bank. There was not enough time in the field season for Sisters Resources to complete another stripping cycle, so they moved their mining equipment to Otter Creek. Further upstream on Ruby Creek, a joint venture between West Coast Paving Co. Ltd. and Westrail Construction Ltd. excavated a 50 metre deep test pit based on the results of a fence of five exploration holes. The paychannel is indicated to be 55 metres wide and 9 metres thick. Pelly Construction Ltd. took over as operator of the Ruby Gold joint venture and did a 7-metre setback of the pit high wall.

There was increased mining on **Thibert Creek** in the Cassiar district, and encouraging test work to suggest that mining will continue for many years. Operating a floating wash plant, Taiga Ventures sluiced about 60 000 cubic metres of gravel on lower Thibert Creek. Angel Jade Mines Ltd. outlined a large area of paygravel in the alluvial fan at the mouth of the creek, near the north end of Dease Lake. Testing indicates acceptable gold grade and favourable operating costs, so that a large operation is planned. Historic and recent testing suggest recovery of platinum group elements (palladium, platinum and osmiridium) may contribute substantially to the proceeds. Wesley Gwilliam and Trio Gold Ltd. tested further upstream on Thibert Creek and along its tributaries, Vowell and Cache creeks. Michael Swenson continued to mine on **Dease Creek** and is investigating the amount of platinum group elements in his concentrate.

COAL AND ENERGY PROJECTS

Fortune Minerals Limited acquired the immense **Klappan** anthracite coal property from Conoco Canada. Measured and indicated resources are 260 million tonnes primarily in the Lost-Fox deposit. Inferred and speculative resources total an additional 2.54 billion tonnes in four deposits. Fortune Minerals contemplates a mining rate of a one-half to two million tonnes per annum, marketing premium coals for water purification, cooking briquettes and metallurgical applications. A more direct road link to Stewart than the existing 410 km route and a local market for thermal power generated from high ash fine coal would be of particular assistance to project economics. The nearby Red Chris deposit might provide such an opportunity.

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