

GOLDSTREAM TOUR (June 26/91)

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Notes by R. Arksey

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Old Noranda workings exist at the 655 and 700+ levels; Noranda just began 770-830 level workings when mine was shutdown. Basically they were mining out the "ore centre zone". Ore persists above and below the old Noranda workings.

Geological reserves are believed to be in excess of 1.8Mt of 4.0% Cu (diluted) and 2.6-2.8% Zn. No zinc circuit is operating at present, however and the zinc goes to tailings! The centre of the ore body varies from 5-6% Cu (as chalcopyrite), but concentrated grades may be up to 30% Cu. Pyrrhotite is ubiquitous. Production is "subsidized" by the recovery of ore boulders (up to 30% ore) which were dislodged from the open pit by Noranda.

Aside: 6-45 tonne truck loads per day (loaded with Cu concentrate) haul to Revelstoke. From there, by rail to Vancouver. June 26 was the day of the first shipment of concentrate to Japan. Milling rate is at approximately 1100 tonnes per day. The official mine opening is scheduled for July 09th, 1991. Significant amounts of gold have been produced from the Goldstream mine in the past. Approximately \$1 million or 1500 to 2000 ounces of gold were produced by the mine. However, since the grade of the concentrate was deemed too low (<0.0195 opt), Noranda-the mine was not paid for gold produced, by Noranda-the smelter!

The open pit is essentially mined out with the exception of a bench and a half (+ ore boulders). Drifts are at the 655, 673 (mill), 700, 715, 770 and 830 levels.

The tour included both the open pit and underground workings. The pit afforded clean exposure of the ore zone and the encompassing stratigraphy. The deposit is within the Metavolcanic Phyllite Unit (V-1) which is comprised of calcareous graphitic phyllite, sericitic phyllite, minor dolomite, limestone and chloritic phyllite (Höy, 1979). This unit has been further subdivided into 7 units. The entire package is believed to be inverted in this area. The tour focussed on the immediate ore-enclosing stratigraphy:

(Units are after Höy, 1979)

Unit 2-The dark banded phyllite is 110-120m thick and is comprised of carbonaceous phyllite with interlayered limestone. The ore zone does extend into this unit for up to 10-15m and may contain up to 15% sulphides.

Unit 3-The garnet zone is extensively sheared and broken. It is very carbonaceous and graphitic, with minor chert bands. The garnet zone may be up to 5 meters thick and has been interpreted to be an exhalative unit. Large retrogressive amphiboles (now actinolite) are abundant within the phyllite unit. Presence of the garnet zone has been used as an exploration tool in the Goldstream area. This zone has a pronounced Mn enrichment (from the spessartine garnet) signature which is discernable in soils.

Unit 4-The grey-green phyllite unit is comprised of very siliceous chloritic and sericitic phyllites with minor clean quartzites and rare limestone layers. Silicification is strongly associated with mineralization, with massive to semimassive sulphides preferentially concentrated around rolled quartz. Quartz occurs as cataclastic clear sweets and blebs within the siliceous phyllites.

Unit 5-The massive sulphide layer varies from 1-8m in thickness, has a strike length of at least 500m and appears sheared at its ends. Generally, the zone is Cu-rich at the western margin and becomes Zn-rich towards the east. However, some vertical zonation exists. Ore is predominant in the core of phase 2 isoclinal folds. The body plunges 34-38° towards the northeast, but pitches and rolls due to superimposed phase 3 deformation. Phase 3 is expressed as shallow, upright open structures. Cross shears have had minimal displacement and area believed to be the result of late phase stresses. These shears end abruptly at the ore zone (*ie.* no offset).

In an attempt to determine the ore extension across the Goldstream River to the west, the **Grolsch zone** was uncovered. This zone carries ore grade mineralization and is expected to add about 200 000 tonnes to the ore reserves. Mine life is estimated at approximately 5 years, but exploration potential appears high and the mine life could extend past this 5 year target should copper and zinc prices improve (or at least, hold).

George Cross

NO.237(1989)
DECEMBER 11, 1989

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BETHLEHEM RESOURCES CORPORATION
(BTH-T,V:BTHM-F-NASDAQ)

PRODUCTION FINANCING AGREEMENT EXPECTED "VERY SOON"
COPPER CONCENTRATE PRODUCTION IN 1990 SPRING
SUBJECT TO FINANCING

Henry G.Ewanchuck, president told the annual meeting of Bethlehem Resources there are three parties very interested in providing the \$5,000,000 needed to bring the Goldstream copper-zinc mine back into production. Each of the parties know the terms of participation and the first to meet the terms will be successful in completing the deal. Completion of the deal is very close. By providing the \$5,000,000 the purchaser will earn a 1/3 interest in the mine and first right to buy the concentrates produced. Detail negotiation of the smelter terms form a part of the financing package. Bethlehem in equal partnership with Goldnev Resources Inc. bought, in July 1989, the

Goldstream mine located 80 km north of Revelstoke, B.C. and 1,360 tonnes per day capacity concentrator for \$5,750,000. Reserves at the mine are 1,860,000 tonnes grading 4.81% copper, 3.06% zinc. In recent months in anticipation of completing a favourable financing agreement Bethlehem has had a small crew working at the mine and mill. Some of the work completed includes: expansion of the fresh water supply system, tailings pond and dam repair, repair and replacement of mine power supply lines; testing and repair of all mill motors and compressors; repair of underground electrical substations. The meeting was told the mine and mill can be in tune-up operation in 90 days from the securing of funding. The mine and mill are scheduled to operate at 1,100 tonnes per day on ore grading 4.8% copper. The president stated the current expectations is concentrate production in the spring of 1990.

The mine reserves are open to extension in two directions. New massive sulphide targets with scattered high precious metal values have been found at several locations in the area to the south of the Goldstream mine. One showing returned 19% zinc, which will be drill tested in Jan/90; another graded 0.138 oz.gold/t which will also be tested. The company has several other exploration projects which were also reviewed.

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ing by Wrightbar se metal potential

50% stake in the southern end of the property.

Wrightbar shares jumped recently to around 70¢ from 37¢ after St. Genevieve issued a press release stating that 400 ft of chalcopryrite, pyrite and quartz had been intersected in a stringer zone 1,935 ft below surface. About 17% of Wrightbar's 12.5 million outstand-

gold output f Addwest

option to purchase the assets of Addwest Gold for \$33 million(US) plus certain royalty payments.

Addwest Gold's assets include properties in California and Montana, but it also owns 60% of the producing Kendall gold mine near Lewistown, Mont.

The open pit, heap leach mining operation is currently owned and

See CANYON, Page 2

ashed up after asset sale

its other North American and European mining assets in exchange for \$24.5 million in cash, including a \$4-million dividend.

As part of the agreement, Westfield also sold to Northgate its 51% interest in Norwest Holdings, a company set up to hold the 15% stake of Westfield and Northgate in an Australian gold producer. In return, Westfield received \$14.5 million (consisting of \$6 million cash and an \$8.5 million debt repayment due to Northgate).

Minority shareholders of Westfield have been critical about the sale of the Choquelimpie mine which is expected to produce 100,000 oz next year at a cost of less than \$200(US) per oz.

The mine produced 25,000 oz gold and 135,880 oz silver in the three months ended Sept 30, com-

paring environmental re

nipeg and Kenora as early as next September.

To date, a low gold price combined with environmental concerns have prevented the junior company from making a mine out of the high-grade deposit which is

ing shares are held by **Belmoral Mines (TSE)**.

Referring to a visual inspection of core, St. Genevieve said the 400-ft intersection, which contains about 20 ft of pyrite and chalcopryrite, "appears to average approximately 1% copper."

The progress so far raises hopes that a massive sulphide deposit, like the one that **Aur Resources (TSE)** and **Societe Miniere Louvem (TSE)** are exploring five miles further east in Louvicourt Twp., will eventually be discovered on the Wrightbar claims. St. Genevieve owns 53% of Louvem.

Prior to the discovery six months ago of a major copper-zinc-silver-gold massive sulphide deposit at Louvicourt Twp., the Aur/Louvem property had not been explored below a vertical depth of 1,000 ft.

With surface drilling still in progress, potential reserves at

See WRIGHTBAR, Page 2

pared with 22,000 oz gold and 130,000 oz silver in the second quarter of this year. With reserves of about 7.7 million tons grading 0.058 oz gold per ton, costs are running at \$217(US) per oz compared with \$225 in the previous quarter.

Westfield now has \$25 million in cash, no debt and about \$40 million in assets due to its 10% stake in Northgate.

According to President Danesh Varma, Westfield has filed a notice of intention to make a normal course issuer bid entitling it to repurchase up to 875,000 of its common shares.

The shares may be repurchased via open-market transactions from Dec 12, 1989, until Dec 11, 1990. Westfield currently has over 17.5 million shares outstanding.

According to Dunlop, terms of reference for the environmental assessment report are being outlined following consultation with officials of the Environment Ministry. After approval of the terms of reference, the company will

Bethlehem to reopen Goldstream copper mine

by John Kilburn

VANCOUVER — Management at **Bethlehem Resources (VSE)** is confident that the Goldstream copper-zinc property, 80 km north of Revelstoke, B.C., will soon be brought back into production.

Bethlehem and **Goldnev Resources (VSE)** purchased the mine this summer from Noranda Minerals for \$5.75 million. The joint venture estimates that the mine could be brought back into production for a total of \$10 million; \$5 million for capital expenditures plus \$5 million for working capital purposes.

Goldstream

From Page 1

has proposed an on-site smelter which uses new technology allowing for a smaller, lower capital cost smelter.

The capital cost of an on-site smelter is estimated at \$13 million and would have a 1-year payback due to savings in the smelting and transport costs as well as higher metal recoveries. Although the plan looks good on paper, the technology is new and has had limited testing as well as the more obvious permitting difficulties. Brian Kynoch, vice-president of engineering, indicated any smelter plans would likely wait until the project was up and running.

The companies hope to finance partially the startup by selling a one-third interest in the project. Although a deal was worked out in September to sell the interest in the property to **Gold Torch Resources (VSE)** for \$5 million, it did not close.

At Bethlehem's recent annual general meeting, Patrick McAndless, vice-president of exploration, indicated that the joint venture was in final negotiations with three parties for the sale of the third interest. He also noted that the company was exploring a number of other financing alternatives which may include a forward sales agreement with an end user.

At fiscal year-end, July 31, Bethlehem had 14.3 million shares issued, working capital in excess of \$2.5 million and no debt.

public and regulatory authorities that the Dupont project has been designed to operate in compliance

The property did produce for a short time in 1984 after Noranda spent over \$70 million developing a mine and mill. At the time, reserves at Goldstream were stated at 4.3 million tons grading 3.69% copper, 2.63% zinc and 0.51 oz silver per ton. The mine was closed after less than a year due to low metal prices as well as poor zinc recoveries which approached 10%.

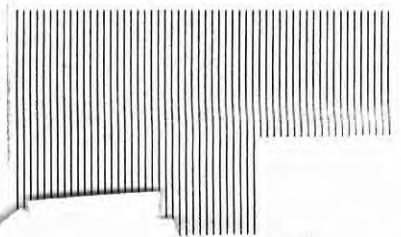
A study by Wright Engineers increased the copper cutoff grade from 2% to 3%, causing a drop in proven reserves to 1.86 million tons grading 4.81% copper and 3.06% zinc. The study also modified the mining method somewhat.

The mineralization is about 10 ft thick and dipping at about 30°. Noranda had been drifting on mineralization, following the dip by benching down and drifting again. Bethlehem plans to drift on mineralization, leaving a 7.5-m pillar which will then be slashed out. This will reduce the dilution caused by a corner of the drift being in waste.

The study estimated a net cash production cost, including freight and smelting charges, of 85¢(US) per lb of copper. Annual copper production is projected at 34 million lb. The study assumed that there would be no zinc production. The company believes that in the past much of the zinc reported to the copper concentrate because of secondary copper minerals causing the sphalerite to behave like chalcopryrite. (Smelters, however, do not pay a credit for zinc in a copper concentrate.) This type of mineralization is not expected to continue to depth. Zinc recoveries could approach 50%, resulting in 8-10 million lb of zinc production per year at a cost of about 40¢(US) per lb.

A large portion of copper's cash production cost (37-40¢ per lb) is attributable to freight and smelting charges. Because of this, Minproc, an Australian metallurgical firm,

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NO.222(1990)
NOVEMBER 16, 1990

George Cross

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GOLDNEV RESOURCES INC. (GNZ-V)

EXPLORATION UPDATE - William Campbell, secretary,
Goldnev Resources Inc., provides an
update on its exploration projects located about 60
miles north of Revelstoke, B.C. Goldnev and 50/50 joint
venture partner BETHLEHEM RESOURCES CORP. (BTH-V,T;

BTHMF-Nasdaq) hold or can jointly earn 100% interests in
the Goldstream, Brew and Montgomery projects.

The Goldstream project encompasses the Goldstream
mine and milling complex. The mine was developed on a
strata-bound copper/zinc deposit which was mined by both
open pit and underground methods from 1983 to 1984, then
shut down due to declining metal prices. Remaining
underground mineable reserves are estimated to be
1,860,000 tonnes averaging 4.81% copper and 3.06% zinc.
Goldnev and Bethlehem bought 100% of the mine and
milling complex and are seeking financing to place the
property back into production. The adjacent Brew
property was staked by the companies to cover extensions
of the favourable stratigraphy to the east, south and
southwest of the Goldstream property. The adjoining
Montgomery property is subject to an option agreement
whereby Goldnev and Bethlehem can jointly acquire a 100%
interest in the R&W claim, which hosts mineralization
similar to the Goldstream project.

The properties were covered by an airborne
geophysical survey in 1990 which traced the Goldstream
stratigraphy to the west of the Goldstream property.
Subsequently, Goldnev signed an option agreement to
acquire a 100% interest in the Jenkins project,
comprised of the F.A.R., F.A.R. No.2, GR 3 and GR 4
claims. Goldnev can earn its interest by paying \$50,000
and issuing 100,000 shares over two years to Fran
Jenkins and Ruby Cameron, who will retain a 2% net
smelter return royalty. Bethlehem will participate by
reimbursing one half of Goldnev's acquisition costs and
contributing one half of exploration costs.

Ground exploration in 1990 concentrated on the
Goldstream and Jenkins projects. The airborne
geophysical survey showed numerous moderate to strong EM
conductors along the stratigraphy hosting the Goldstream
mine, an area selected for comprehensive ground
surveys. About 190 km of grid lines were cut over the
Goldstream stratigraphy, followed by soil sampling,
magnetometer, VLF-EM and horizontal-loop EM surveys
which were completed early in November. Results of the
surveys are being compiled to select drill targets.
Preliminary interpretation indicates there are five
primary target areas for drilling on the Goldstream
stratigraphy outside of the immediate mine area.

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NO.222(1990)
NOVEMBER 16, 1990

George Cross

Reliable

Exploration work on the Montgomery project included prospecting, sampling of existing underground workings and two diamond drill holes totalling 424 feet. The drilling tested the down-dip extension of copper mineralization seen on surface. Hole M090-1 intersected a narrow semi-massive sulphide zone which assayed 0.63 oz.silver/ton, 0.04% copper and 0.05% zinc over 1.0 foot. Hole M090-2 tested the down-dip extension of this mineralization and returned 0.57 oz.silver/ton, 0.11% copper and 0.71% zinc over 1.1 feet. A zone of quartz veining further downhole returned 15.7 feet of 0.64 oz. silver/ton and 0.35% copper. The drill is currently on standby at the Goldstream mine.

On the Brew project, prospecting work in 1990 led to the discovery of gold mineralization in the southeast portion of the property. Grab samples returned values as high as 0.25 oz.gold/ton and 12.2 oz.silver/ton from semi-massive galena-bearing angular float in the vicinity on the KJ showing, a semi-massive zinc and lead occurrence associated with quartz-muscovite-biotite schists. (SEE GCNL No.195, OCT.9/90, P.2 FOR PREVIOUS INFORMATION)

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BETHLEHEM RESOURCES CORPORATION

(BTH-V,T,;DMMF-Nasdaq)

GOLDSTREAM MINE FINANCED TO PRODUCTION - Henry G. Ewanchuk
president of

Bethlehem Resources Corp. reports an agreement in principle for production financing of the Goldstream copper zinc mine near Pevelstoke, B.C. has been signed, subject to regulatory approval. The mine is held on a 50/50 basis with GOLDNEY RESOURCES INC. (GN7-V).

Financing of up to \$7,000,000 for the mine's reactivation will be provided by Nippon Mining Co. Ltd. and Sumitomo Corporation. In addition to the production restart capital, Nippon Mining will purchase all copper concentrate production of the mine for 6 years under an agreement that also makes provision for advance payments to reduce the mine's working capital requirements.

Nippon and Sumitomo will have the non-cumulative privilege of converting up to 25% of Bethlehem's share of the loan to Bethlehem stock each year at the greater of 70% of the average closing price of the shares during the 30-day period prior to notice of conversion and a minimum fixed prices of 37¢.

As operator, Bethlehem will start rehabilitation work immediately upon formal closing of the transaction, which is planned to take place as soon as possible, probably in December 1990. Reactivation of the production facility is expected to occur at 1,100 tons per day within three to four months after closing of the financing agreement. The first shipment of concentrates should take place two months after reactivation.

The Goldstream mine has reserves of 1,860,000 tonnes, of 4.81% copper and 3.06% zinc, which will provide mill feed for 5 years at the planned milling rate of 1,100 tonnes per day. The resumed operation will produce 65,000 tonnes of copper concentrates, containing about 35,000,000 lbs copper, and 7,000 tonnes of zinc concentrates, containing 7,000,000 lbs zinc, per annum.

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George Cross

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NO. 246(1990)
DECEMBER 20, 1990

WESTERN CANADIA

82M 141

BETHLEHEM RESOURCES CORPORATION (BTH-V)

EARLY CLOSING EXPECTED FOR MINE FUNDING- Bethlehem signed an agreement in principle on 29 Nov 90 with Nippon Mining Co., Ltd. and Sumitomo Corporation to finance the reactivation of the Goldstream Mine, 80 km. north of Revelstoke, B.C. In addition to providing mine rehabilitation funding, Nippon and Sumitomo will purchase copper concentrate for 6 years. The concentrate sales agreement provides for working capital requirements of the mine.

The first shipment of copper concentrates should take place two months after production begins. Henry G. Ewanchuk, president said management and staff are delighted with the prospects of early cash flow from the mine. The Goldstream mine has current reserves of 1,860,000 tonnes, of 4.81% copper, 3.06% zinc, will feed for 5 years at 1100 tonnes per day. The operation will produce 35,000,000 pounds of copper, and 7,000,000 pounds of zinc, per annum.

On the Giant Copper project 30 mi. east of Hope, B.C. the company seeking a joint venture partner to help fund further work on the AM Breccia which contains underground mineable reserves for the northern zone of 3,700,000 tons of 1.17% copper, 0.015 opt gold and 0.6 opt silver. The central portions along with the northern zone of the AM Breccia indicate open pit reserves of approximately 22,800,000 tons of 0.75% copper, 0.012 opt gold and 0.35 opt silver at a stripping ratio of 4.5 to 1. A decision is pending from the B.C. government regarding access to the adjoining Invermay Breccia.



NO.93(1990)
MAY 14, 1990

George Cross

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BETHLEHEM RESOURCES CORPORATION (BTH-V,T,Nasdaq)
GOLDNEV RESOURCES INC. (GNZ-V)

MERGER PLAN TO BE FORMULATED - Bethlehem and Goldnev have agreed to merge to facilitate the development of the 50/50 owned Goldstream copper property, located 60 miles north of Revelstoke, B.C. to production. Independent consultants have been retained to provide fairness opinions on terms of a share exchange ratio. The opinions are expected in two weeks when a shareholders meeting will be called and regulatory approval will be sought.

The Goldstream is a strata-bound copper/zinc deposit with reserves estimated at:
1,860,000 tonnes grading 4.81% copper, 3.06% zinc, or
2,069,000 tonnes grading 4.97% copper, 3.33% zinc.
The mine could resume production in 3 to 5 months, at 1,100 tonnes per day, at a capital cost of \$10,000,000.

Bethlehem is planning exploration in 1990 on the 100%-owned Giant Copper property near Hope, B.C. where geological reserves are 63,700,000 tons grading 0.55% copper, including 3,700,000 tons grading 1.17% copper, 0.015 oz.gold/t. Work is also planned for the 50%-owned Irish Gulch property, Montana, where a breccia pipe carries values in lead, zinc and silver.

Goldnev has interests in: Grew Creek, Yukon, Maggie Creek, Carlin, Nevada and Todd Creek, near Stewart, B.C.

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George Cross

Reliable

NO.112(1990)
JUNE 11, 1990

The second holding in the Iskut River-Eskay Creek area is the 50%-owned Julian Lake project centred nine miles southwest of the 21 Zone deposit of Prime/Stikine. GoldNev's partners, RAVENROC RESOURCES LTD. (RRC-V) and THIOS RESOURCES INC. (THI-V), will be carrying out ground follow-up to a recent airborne geophysical survey, including prospecting, geochemical sampling and mapping with a minimum budget of \$170,000.

Also in B.C., Goldnev and joint venture partner BETHLEHEM RESOURCES CORP. (BTH-V) together hold a 100% interest in the Goldstream Mine project and the adjacent Brew project located about 60 miles north of Revelstoke. The Goldstream mine is a strata-bound copper/zinc deposit which operated from May/83 to early 1984. Remaining mineable ore reserves have been estimated at 2,069,000 tonnes averaging 4.97% copper and 3.33% zinc. The companies are seeking financing to place the underground mine back into production. The Brew project was acquired to cover the southeastern strike extension of the stratigraphy which hosts the mine. A combined magnetic and electromagnetic survey showed an excellent EM response over the Goldstream property. The Goldstream deposit is hosted within a stratigraphic package that has a minimum strike length

of six miles with numerous EM conductors not yet drill tested. Ground follow up will comprise more geochemical surveying, prospecting, mapping, trenching and drilling with a minimum \$1,000,000 in exploration expenditures. (SEE GCNL No.93, 14May90, P.1 FOR OTHER GOLDNEV/BETHLEHEM INFORMATION)

Goldnev granted an option for Barrick Gold Corp. Inc. to earn up to a 70% interest in the Maggie Creek Ranch project at Carlin, Nevada. Barrick will be proposing an exploration program for this year.

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NO.33(1991)
FEBRUARY 15, 1991

George Cross News
Reliable Reporting Rec

BETHLEHEM RESOURCES CORP. (BTH-V,T, BTHMF-Nasdaq)

GOLDNEY RESOURCES INC. (GHNZ-V)

MINE FUNDING TO CLOSE FEB. 15,1991 - Bethlehem Resources
50% operator and
Goldnev Resources 50% have reported Nippon Mining
Co.Ltd. and Sumitomo Corporation have agreed to close
Feb. 15, 1991, the \$7,000,000 financing for the
resumption of production at the 1,100 tonne per day
copper zinc Goldstream mine, 80 km north of Revelstoke,
B.C. The first funds are expected to be advanced March
1,1991. Concentrate production is to resume by the end
of June with the first shipment by the end of August.

Nippon and Sumitomo will have the non-cumulative
option to convert \$875,000 of the loan to Bethlehem into
shares at 70% of the average share trading price in the
30 days prior to the conversion and a minimum of 37¢ per
share. Reserves at Goldstream are 1,860,000 tonnes
grading 4.8% copper, 3.06% zinc.

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BETHLEHEM RESOURCES CORP. (BTH-V,T; BTHMF-Nasdaq)

GOLDNEY RESOURCES INC. (GNZ-V)

ORE GRADE DISCOVERY - Goldnev Resources and 50% joint
ON GOLDSTREAM PROJECT venture partner Bethlehem

Resources report new drill holes have added between 185,000 - 280,000 tonnes to the geologically inferred ore reserves at the Goldstream copper zinc mine 80 km north of Revelstoke, B.C. Hole GS-91M-12, is a stepout drill hole approximately 800 feet down plunge from the furthest previously known extent of the Goldstream deposit. The property has mineable reserves of 1,860,000 tonnes of 4.81% copper, 3.06% zinc. GS-91M-12 intersected massive chalcopyrite, pyrrhotite and sphalerite mineralization at 1288.6 - 1297.2 feet, which averages 6.35% copper, 3.17% zinc, 0.60% lead and 0.81 oz.silver/ton over 8.6 feet.

GS-91M-12 was the first of several holes planned to test the northeasterly trend of the Goldstream deposit on the north side of the Goldstream River. No drilling had been done previously in this area. The mineralized intercept in GS-91M-12 is similar in appearance to the massive sulphide mineralization which comprises the Goldstream deposit. Infill drilling will be required on closely spaced centres to confirm continuity of the mineable reserves to GS-91M-12. The deposit remains open at depth.

Prior to the stepout drilling, holes GS-91D-1 and GS-91D-2 were drilled on the east and west sides of the Goldstream deposit, outside of the defined reserves. These holes were planned to confirm the down plunge trend of the deposit and to test for possible high grade extensions of the Goldstream deposit along strike. To the east, GS-91D-1 returned 14.4 feet grading 0.84% copper. To the west, GS-91D-2 intersected a fault zone where the Goldstream mineralization was expected, and returned no significant results.

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Outside the immediate area of the mine on the Goldstream property, four holes have been drilled on four of eleven geophysical and geochemical targets along the stratigraphy which hosts the deposit. None of these holes returned significant base or precious metal assays.

On the adjacent Jenkins project, drilling has concentrated on the C1 zone, approximately five miles west along strike from the Goldstream mine. It is a previously untested target area defined by the coincidence of gold, copper, and zinc soil anomalies and three of which were abandoned at depths between 157.5 and 195.0 feet prior to reaching the target. These holes returned anomalous base and precious metal results; best assay was 0.074 oz.gold/ton over 3.3 feet in GS-91C-11, and 0.76% zinc and 0.13 oz.gold/ton over 6.6 feet in GS-91C-7. On the C2 zone, a parallel geochemical and geophysical target to the south of the C1 zone, a single drill hole did not encounter significant mineralization.

There are two drill rigs continuing to test the down plunge extension of the deposit. The first rig is drilling in the immediate vicinity of GS-91M-12; the second rig has started a second tier of holes approximately 500 feet further to the northeast of GS-91M-12. Two additional smaller drill rigs are on site to test other targets on the Goldstream and Jenkins properties.

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Goldneve and Bethlehem have announced the rehabilitation of the Goldstream mine will begin 1Mar91, through financing and concentrate sales agreements with Nippon Mining Co., Ltd. and Sumitomo Corporation. It is anticipated that the first shipment of concentrates will be in August 1991.(SEE GCNL No.8, 11Jan91, P.2 FOR PREVIOUS INFORMATION)

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GOLDNEY RESOURCES INC. (GNZ-V)

BETHLEHEM RESOURCES CORP. (BTH-V,T; BTHMF-Nasdaq)

GOLDSTREAM/JENKINS ASSAYS - Murray Pezim, chairman, reports Goldnev Resources Inc. and 50/50 joint venture partner Bethlehem Resources Corp. have additional ore grade assay results from deep drilling on the extension of the Goldstream deposit and the discovery of a new zone of base metal mineralization on the adjacent Jenkins project located 60 miles north of Revelstoke, B.C. At the deep Goldstream target, 7 step-out holes were completed on two tiers of holes across the extrapolated down-plunge extension of the Goldstream deposit. Drill map overleaf P.1.

TIER 1

HOLE NO.	INTERVAL FEET	LENGTH FEET	COPPER %	ZINC %	LEAD %	SILVER OZ/TON
GS-91M-12	1288.5-1297.2	8.6	6.35	3.17	0.60	0.81
GS-91M-17	1414.0-1420.6	6.6	2.28	1.33	.16	.40

TIER 2

GS-91M-18	1604.3-1620.7	16.4	1.10	1.26	.22	.20
GS-91M-20	1587.9-1594.5	6.6	1.20	1.92	.44	.40
GS-91M-21	1729.0-1742.0	13.5	6.04	5.35	.76	.96

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The Goldstream deposit currently has mineable reserves of 1,860,000 tonnes grading 4.81% copper and 3.06% zinc. Drilling on the deep Goldstream target was done assuming the deposit would continue in a predictable manner beyond the deepest previous drilling. Tier 1 was a series of 4 holes (17,12,19 & 16) drilled from NW to SE across the extrapolated trend of the Goldstream deposit, about 250 meters beyond the known extent of mineralization. Hole 17 was a 50-meter step-out to the NW of 12. Hole 19, which was 40 meters SE of 12, cut a 5.6-foot quartz vein with traces of chalcopyrite where the massive sulphide mineralization was expected. Hole 19 was drilled 75 meters southeast of 12. Hole 16 cut 6.6 feet of semi-massive to massive pyrrhotite with traces of chalcopyrite and sphalerite. Tier 2 was a series of 3 holes (21,18 & 20) drilled from NW to SE across the extrapolated trend of the Goldstream deposit, about 150 meters NE of hole 12. Hole 20 was collared 40 meters to the SE of hole 18 and 21 was collared 25 meters to the NW of hole 18. To date, drilling by Goldnev has stepped out a total of some 400 meters along the down-plunge trend of the Goldstream deposit and continues to cut mineralization similar to the deposit, which remains open to depth beyond Tier 2. Potential exists to add further reserves down plunge.

Drilling on the adjacent Jenkins project about 5 miles west along strike from the Goldstream mine led to the discovery of the Grolsch zone, formerly the C1 zone with drilling highlights listed below:

HOLE NO.	INTERVAL FEET	LENGTH FEET	ZINC %	LEAD %	COPPER %	SILVER OZ/TON
GS-91C-35	78.7- 85.3	6.6	1.10	-	-	-
And	95.2- 95.1	3.9	2.20	0.75	0.01	0.43
GS-91C-36	108.3-114.9	6.6	1.14	.47	.03	.33
GS-91C-38	219.8-236.2	16.4	.87	.20	.03	.04
GS-91C-39	85.3- 91.9	6.6	1.00	.41	.03	.30
GS-91C-40	128.0-134.6	6.6	3.94	1.54	.04	.91
GS-91C-41	187.0-193.6	6.6	2.07	-	-	-

The Grolsch zone was discovered by additional drilling along strike to the west of hole 14, which cut 6.6 feet averaging 1.31% zinc. A vertical hole, 37,

B2M Cannon

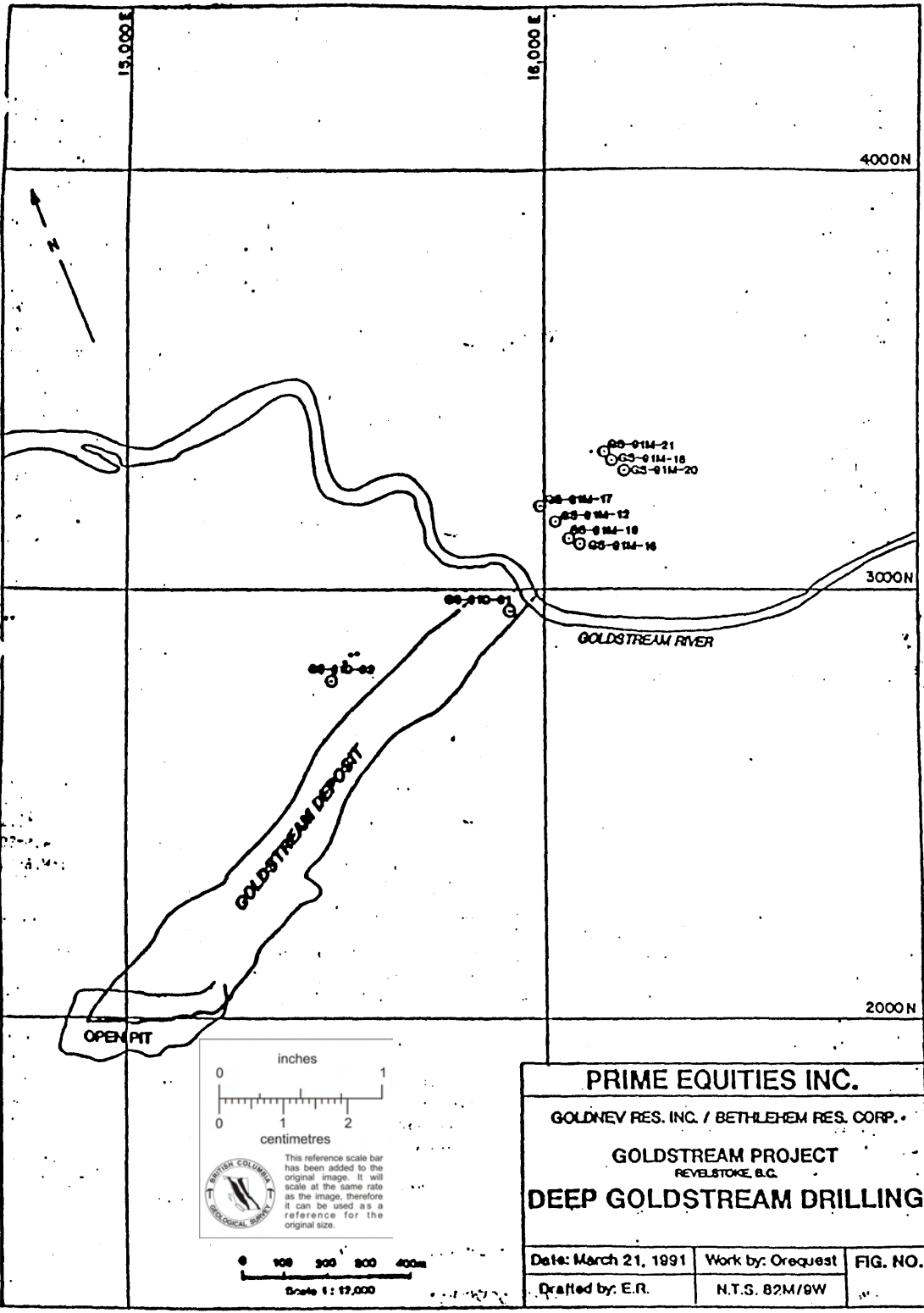


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drilled from the same site as 36, returned no values. Hole 40 is the westernmost hole drilled to date on the Grolsch zone and has returned the best assay, indicating the zone remains open in this direction. The Grolsch zone is comprised of one or more zones of disseminated and banded to locally semi-massive pyrrhotite and sphalerite mineralization within the projected on-strike extension of the stratigraphy hosting the Goldstream deposit. Trace amounts of chalcopyrite and galena have also been found, particularly in the westernmost holes. Ten drill holes have tested the zone over a strike length of about 400 meters and in a down-dip direction for up to 75 meters. Holes 13 and 14 were abandoned in a fault zone. A total of 42 holes totalling 26,282 feet have been drilled on the two projects to date this year. More drilling is planned for the Grolsch zone. (SEE GCNL No.34, 18Feb91, P.1 FOR DETAILED PROJECT DATA)

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Revived Goldstream mine on verge of commissioning

VANCOUVER — The Goldstream mine should be ready for commissioning by mid-May, according to 50% owner and operator, **Bethlehem Resources (TSE)**.

Bethlehem President Henry Ewanchuk said he expected the startup to be on time and within budget.

The Goldstream mine is near Revelstoke, B.C., with the balance of the operation owned by **Goldnev Resources**.

The two companies purchased the mine from Noranda in 1989 for \$5.75 million and proceeded with a feasibility study with a view to bringing the mine back into production.

The Goldstream mine was originally put into production by Noranda in 1983 at a cost of about \$72 million but was forced to close in 1984 as a result of a drop in copper prices and lower-than-expected recoveries.

Noranda did its feasibility based on a copper price of US\$1 per lb. only to watch prices drop to US\$60¢ per lb. after the mine was opened.

Noranda also ran into problems with recoveries due to the oxidized surface ore being mined in the open pit. The oxidized ore lowered zinc recoveries to the single digit level from an expected recovery of about 50%.

Noranda spent a great deal of time and money altering the mill circuit in an attempt to bring up the zinc recoveries before shutting down the operation.

At the time of the mine's closure, minable reserves were reported at 3.5 million tonnes grading 3.51% copper and 2.50% zinc.

Bethlehem plans to mine strictly from underground and increased the cutoff grade to 3% copper from 2%. As a result, ore reserves dropped to 1.86 million tonnes grading 4.81% copper and 3.06% zinc. The reserve figure includes a 30% dilution factor.

Financing for the mine's reactivation was secured from Nippon Mining and Sumitomo in late 1990 although completion of the deal was temporarily delayed by the hostilities in the Middle East.

The two Japanese companies agreed to provide up to \$7 million with an added provision for the advance payment for

concentrates. The advanced payment provision lowers the joint venture's working capital requirements.

Capital cost to bring the mine back on stream is estimated at about \$4.5 million, primarily for underground development work.

Noranda developed the underground down to the 655-metre level with a decline winding down through the ore zone. The ore zone consists of a single continuous bed of massive and disseminated sulphides dipping to the north at about 35° and plunging to the northeast at about a 50° rake. The deposit thickness varies from one to seven metres.

The top of the underground workings sit at the 830-metre level separated from the open pit above by a crown pillar.

Ore reserves do not include the pillar which Ewanchuk estimated contains in the order of 100,000 tonnes.

Subdrifting between the 830-metre level and 770-metre level on 7.5-metre centres has started with ore being stockpiled on surface. Mining will proceed by slashing out the ore between the intermediate drifts.

Tonto Mining was hired as the mining contractor. Brian Kynoch, vice-president of engineering at Bethlehem, said Tonto is paid using formula based on its cost per tonne, as well as the grade.

The initial mining process will be something of an experiment to determine the amount of pillaring required. Ewanchuk said he expected to leave about 15% of the material as pillars, some of which may be retrievable at a later date.

He noted the ground appears to be very stable with no evidence of rock falls in the workings after over six years.

Noranda did do some stopping, removing about 150,000 tonnes of ore. Ewanchuk noted one stope is over 150x30 metres wide and has remained stable.

At a nominal operating rate of about 1,100 tonnes per day, the mine is expected to produce an average of 16.2 million kg (35.8 million lb.) copper and 3 million kg (6.6 million lb.) zinc over the mine's 5-year life.

Ewanchuk noted this production rate was an average, and first-year production would be slightly less due to lower grades in the initial phases.

Production rates assume a 91% recovery for copper and a 30% recovery for zinc. Kynoch noted the zinc recoveries could be increased to 50% although the company's main priority will be to get the mine up and running with primary emphasis on copper production.

He stressed the mine is a copper mine with over 90% of revenue derived from copper.

Including refining, treatment, and transportation costs, cash costs are expected to be in the order of US\$80¢ per lb. If zinc recoveries are increased to 50%, the cash cost would drop to US\$74¢ per lb.

With the copper concentrate expected to average about 26% copper, up to 40% of the cash operating cost is related to transportation costs.

Bethlehem's feasibility study on the project did investigate the possibility of smelting the concentrate on site at a capital cost of about \$13 million. Since the financing agreement included a smelting contract, plans for on-site smelting have been precluded.

The extent of the Goldstream reserves is by no means limited to five years. Earlier this year Goldnev completed two tiers of holes to test the down-plunge extent of the Goldstream deposit.

Although Bethlehem is the operator of the mine, Goldnev is in charge of exploration through a contract with Prime Explorations.

Peter Loughheed, senior geologist at Prime, noted that there was some question as to whether the deposit would continue to depth as it crossed below the Goldstream River, or if a structural feature related to the river would cut it off.

The drilling was successful in extending the deposit about 400 metres down-plunge from the known extent of the reserves, indicating the potential of an additional two years of reserves.

Although the zone remains open at depth, Kynoch and

Ewanchuk were quick to point out that the economics of mining the deposit worsen with depth due to the increased haulage distances. They also noted the use of a shaft would not likely be economic because of the deposit's shallow dip. Further work will be required to determine the economics of mining beyond the known reserves.

Goldnev has been active outside the mine area on joint ven-

ture ground.

Geochemical and geophysical surveys identified a number of targets last year and led to the discovery of the Grolsch zone about eight kilometres west of the Goldstream. Drilling on this zone has encountered a zone of disseminated and banded to locally semi-massive pyrrhotite and sphalerite mineralization.

Further drilling is planned to test the zone to the west.

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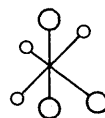
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Lower prices, strong dollar reduce Kerr's net earnings

Reflecting the general economic slowdown of the world's major industrial countries, the first-quarter results of **Kerr Addison Mines** (TSE) were off compared with the same 3-month period in 1989.

Net earnings during the quarter totalled \$5.5 million on net sales of \$44.6 million, down from earnings of \$8.5 million on sales of \$51.3 million last year.

The company attributed the decline to lower prices for zinc and precious metals and the stronger Canadian dollar.

The quarterly results contrast with the company's 1990 earnings picture. Buoyed in large part by the success of its 50.4% owned subsidiary **Minnova** (TSE), Kerr reported improved operating results and increased operating cash flow in 1990.

A member of the Noranda group of companies, Kerr

recorded net income in 1990 of \$17.6 million on net sales of \$211.6 million, compared with income of \$12.6 million on \$131.7 million for 1989.

At Kerr's recent annual meeting in Toronto, President Ian Bayer reminded shareholders of the company's intention to sell its 30.5% interest in oil and gas producer Anderson Exploration. Kerr is hoping to realize \$100 million from this sale.

"Our decision to sell this quality asset is solely based upon our wish to concentrate our funds and management resources on our core business of mining — what we know best," Bayer said.

Kerr's major mining asset, until the company sold it a couple of years ago, is the long-producing Kerr gold mine at Virginiatown in northeastern Ontario.

Colomac mine set to close in June

The Colomac gold mine will be placed on care and maintenance late next month when remaining fuel supplies finally run out, shareholders were told at **Northgate Exploration's** (TSE) recent annual meeting in Toronto.

But the long-term future of the Northwest Territories gold project, held by Northgate's 52% owned affiliate **NorthWest Gold** (AMEX), depends on the outcome of negotiations involving Northgate and three banks owed \$90 million.

After the annual meeting, Northgate President John Kearney said one of the banks balked at a debt rescheduling plan that could have allowed the 200,000-oz.-per-year project to operate throughout 1991.

But Kearney wouldn't reveal which bank opposed the plan or how the others proposed to reschedule the debt. "Colomac will require a gold price of at least US\$425 per oz. and an agreement with the project's bankers regarding the restructuring and rescheduling of its debt in order to reopen," said Kearney. "If they don't agree, I don't know what's going to happen," he told *The Northern Miner*.

NorthWest Gold was scheduled to make quarterly repayments of \$7.5 million on a \$90-million non-recourse project loan starting last December. But due to the slump in gold prices and operating problems at the mine, NorthWest Gold has been unable to repay any of the money it owes. If gold continues to trade at its recent US\$354-per-oz. level, analysts say there is little incentive for Northgate or the banks to work

out a deal, especially as a 1988 mine feasibility study is based on US\$450 gold.

Meanwhile, the 190 employees still on site are managing to sort out many of the early operating problems, according to Kearney. The mill, for example, ran at 1,300 tons below its 10,000-ton-per-day capacity in April and gold recoveries averaged 94% in the first three months of 1991. "We are forecasting that Colomac will produce at least 65,000 oz. this year, about the same as in 1990," said Kearney who declined to reveal what the operating costs will be.

After reporting a 1990 loss of \$118.2 million, due to write-downs on investments, including Colomac, Northgate is still

Goldstream mine starts production

VANCOUVER — After a 7-year hiatus, the Goldstream polymetallic mine near Revelstoke, B.C., is back in production with a new operator.

Equal partners **Goldnev Resources** (VSE) and **Bethlehem Resources** (VSE) recently started up the operation following rehabilitation of the mine and mill facilities.

The operation is sized at 1,200 tons per day, and shipments of copper concentrate are expected to begin by mid-May. The underground mine is operated by Bethlehem, but Goldnev manages exploration activities on the property through Prime Explorations.

Goldstream was first brought into production in 1983 by Noranda, but it closed in less than a year because of low metal prices and metal recovery problems.

Bethlehem and Goldnev were assisted in financing the mine's reactivation by Nippon Mining and Sumitomo Corp. The joint venture partners received the second and final draw-down of the credit facility provided by the Japanese firms in early May. The \$1.72 million will be used to fund working capital requirements.

The Goldstream project is reported to have minable reserves of 2.04 million tons at a diluted grade of 4.81% copper and 3.06% zinc.

Commodity index rises slightly

Metals and minerals prices levelled off after dropping for months and the all-commodity price index of Scotiabank rose slightly in March after five straight monthly drops. Both the metals and minerals and all-items indices are down compared with one year ago.

"Base metal prices steadied in March and, with the exception of aluminum, firmed in April," wrote bank economist Patricia Mohr. "Nickel prices at US\$4.07 per lb. in late April still yield solid profit margins for Canadian producers, whose full break-even costs (including depreciation and interest expense) averaged less than US\$3."

Mohr said a tight supply of high nickel alloy and stainless steel scrap is underpinning primary nickel consumption in Japan, where stainless steel ex-

struggling to turn a profit. The Toronto company reported a loss of \$1.3 million or six cents a share during the three months ended March 31, compared to earnings of \$3.3 million or 15 cents a share in the same period last year.

First-quarter revenues also declined to \$5.7 million from \$10.4 million in the year-earlier period even though overall group production increased to 82,100 oz. from 51,100 oz. a year ago.

Kearney attributed the loss to NorthWest Gold's 42% equity stake in **Sonora Gold** (TSE) which in turn owns 70% of the Jamestown gold mine in California. Regarded as marginal at current gold prices, the operation produced 27,700 oz. in the first quarter at a cost of US\$262 per oz.

At the annual meeting, shareholders approved a special resolution designed to eliminate Northgate's year-end retained earnings deficit of \$44.1 million. Under the resolution, Northgate has reduced its stated capital account in respect of common shares by \$44.1 million to \$61.7 million and adjusted its deficit account to zero.

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Opawica seeks court date with Minnova

A legal dispute over the Lac Shortt gold mine in northwestern Quebec will soon go to trial, according to Opawica Mines (TSE).

Opawica will be battling for the proceeds of a 7.5% net profit royalty from the mine, which began operating in 1984. To date, the company has not received any money from Falconbridge Ltd. or Minnova (TSE), the mine owners.

Opawica, former owner of the Lac Shortt gold property, claims the two companies are in breach of fiduciary duties and is seeking settlement in a number of ways including return of the property, an accounting of all revenues, expenses and profits, recovery of profits, and \$50 million in damages. Opawica says it has been putting aside cash to fund the legal battle for the past three years and currently has about \$400,000 in the treasury.

Word of the trial decision has affected the share value of Opawica and especially of Sumtra Diversified (COATS), a small company with a 26% stake in Opawica. Both issues have been trading heavily over the past two months and Sumtra has almost doubled in value to \$1.40 since April. But according to Minnova's legal representative, Jeff Snow, the trial will not take place for at least a year, mainly as a result of the heavy case load already before the Toronto courts.

The history behind the dispute dates back to 1979 when Opawica optioned the Lac Shortt property to Falconbridge Nickel Mines in return for a royalty interest in the net production profits. Shortly after the deal was made, Falconbridge turned most of its interest in the mine property over to Minnova, which at that time was called Falconbridge Copper. Minnova now controls 94.2% of the mine, while

Falconbridge retains a 5.8% interest.

The two companies poured their first gold in early 1985 and have been producing ore from the mine since. Opawica waited quietly to reap its share of the profits until, in February, 1987, the first indications of discontent surfaced at the company's annual meeting. One year later, Opawica filed a lawsuit against Falconbridge and Minnova in the Supreme Court of Ontario.

Since then, the companies have been unable to resolve their differences through arbitration, said Opawica President Grant Harper.

"Net proceeds" from a mine can be interpreted in many ways, and it is this difference in interpretation which brought about the current dispute, he said.

Minnova says that Opawica is entitled to a royalty, but says Opawica has not received a payment because Lac Shortt has not yet made a profit. Opawica argues, however, that Falconbridge, in its calculation of net profit, is including costs that are not specified in the agreement. Falconbridge denies any accountability with regard to the royalty payments because Minnova agreed to assume Falconbridge's rights and obligations when it acquired a controlling interest in the mine.

The case bears a striking resemblance to the lawsuit that Zenmac Zinc (ASE) has filed against Minnova for ownership of the Winston Lake zinc mine near Schreiber, Ont. In that dispute, Zenmac is fighting for its claim to a 20% participating interest in the mine. Although Winston Lake has been in production since early 1988, Zenmac has not yet seen any proceeds.

The dispute of Zenmac (and possibly of Opawica) is tied to a takeover of Minnova by Kerr Addison Mines (TSE) in 1986. After the takeover, the new management at Minnova drafted a different joint venture agreement for the Winston Lake mine and produced a schedule of actual and projected preproduction expenditures which "represented a significant and substantial increase over previously provided estimates," said Zenmac (T.N.M., Dec. 7/87).

According to Minnova's annual report, the Lac Shortt mine produced 40,083 oz. of gold at operating costs of \$380 per oz. last year, down from 52,029 oz. in 1988. Current reserves stand at 975,270 tons grading 0.14 oz. per ton. The Winston Lake orebody contains about 2.85 million tons grading 15% zinc, 1.1% copper and 0.03 oz. gold.

Barkhor has Star drilling results

Vancouver-based Barkhor Resources (VSE) has released assay results from the first two drill holes on its Star base metal property, near Cranbrook, B.C.

The company, which is seeking "Sullivan-type" base metal deposits, has an option to earn a 50% interest in the claims by spending \$600,000 on exploration.

The first hole, drilled to a depth of 1,380 ft. cut four narrow intervals with anomalous lead-zinc-silver values. The best intersections from separate sections within the hole were 3.3 ft. grading 4.08% zinc, followed by 6.5 ft. grading 2.38% zinc, 8.52% lead, and 2.18 oz. silver per ton. Two other sections returned 3.3 ft. grading 2.46% zinc, and 5.9 ft. of 1.6% zinc, 1.02% lead and 0.20 oz. silver.

The second hole, drilled at the same location to a depth of 1,414 ft., yielded 16.4 ft. grading 0.62% zinc, 2.3% lead and 0.57 oz. silver in a zone designated the Main Star vein. A second stratiform zone returned values 0.71% zinc, 8.29% lead and 2.19 oz. silver over 20.3 ft.

United Keno board approves sale of shares to BLM Mining

The board of directors of United Keno Hill Mines (TSE) has given the green light to a deal that will see BLM Mining, a unit of Sudbury-based Bhatti Laamanen Mining, acquire Falconbridge Ltd.'s 44.8% stake in the silver miner for \$2.7 million.

All of United Keno's silver mines, which were shut down last year due to low metal prices, are in the Keno Hill-Galena Hill area of the Yukon Territory.

Under terms of the sale agreement, Falconbridge will sell its 3,195,990 shares of United Keno for 85¢ per share for a total sale price of \$2,716,591.

Falconbridge, a unit of Noranda (TSE) and Trelleborg, has also agreed to deposit \$2.4 million in escrow for United Keno to use in connection with maintenance, exploration and development of the company's Yukon properties. The funds, together with accrued interest, will be released semi-annually in amounts of \$500,000 with the first release set for Sept. 1.

In return for escrowed funds, Falconbridge will receive a capped

royalty interest, based on various net smelter returns for all products mined from United Keno's properties. The royalty will be 1% when the silver price averages US\$6.9 per oz., and 3% if the price is greater than US\$9 per oz. No royalties are payable when the silver price is below US\$6 per oz., and the total royalty will be limited to \$7.2 million.

As of Dec. 31, 1989, United Keno reported proven, probable and stockpiled ore reserves totalling 322,000 tons grading 28 oz. silver per ton. An additional 120,800 tons grading 35.4 oz. silver has been classed as possible ore.

As part of the deal, United Keno's one-third interest in the DEF copper deposit, north of Whitehorse, Y.T., will be transferred to Falconbridge which owns the remaining two-thirds interest.

A fairness opinion for the sale transaction was provided by Scotia-McLeod, which deemed the deal to be "fair from a financial point of view" to the shareholders of United Keno. The deal is scheduled to close on July 27.

Golden Pond takes option on nickel prospect near Amos, Que.

Tundra Gold Mines' (VSE) affiliate, Golden Pond Resources (VSE), recently agreed to option what it regards as a promising 17,700-acre nickel property east of Amos, Que.

In 1971, drilling completed on the property by WRIGHTBAR MINES (ME) returned values ranging as high as 760 ft. of grade 0.162% nickel at a depth of 170-1,000 ft.

After staking the claim group last fall, prospectors Peter Ferderber and Don McKinnon commissioned a survey over selective areas of the property which defined a 3,600-ft. east-west trending anomaly.

The anomaly is coincident with a 1,900-ft. copper, zinc, geochemical anomaly, according to Golden Pond geologist John Pike.

Consisting of 177 lots, the property is on the north limb of the Amos anticlinal structure and is

mostly underlain by Keewatin-type volcanic rocks striking east-west.

A large intrusive sill called the Landrienne gabbro-peridotite complex strikes east-west along the centre of the property for approximately 10 miles. It was from within this structure that the nickel values were reported.

Under the option agreement, Golden Pond will pay out \$40,000 cash to the vendors who will also receive 200,000 shares and a 4% net smelter royalty. The agreement also requires Golden Pond to complete a work program consisting of 5,000 ft. of drilling and geophysics.

Pending regulatory approval, Golden Pond says project financing will be obtained via a private placement, public financing and or joint venture. Tundra owns 1.4 million of Golden Pond's 8.4 million issued shares.

Akiko, Goldfields start drilling on Kirkland Lake gold prospect

Joint venture partners Akiko-Lori Gold Resources (VSE) and Goldfields Canadian Mining have begun a summer drill program on their Catharine gold property, 16 miles southeast of Kirkland Lake, Ont. Akiko-Lori has an option to earn a 50% interest in the property from Goldfields (operator) by spending \$1 million over three years.

In northwestern Ontario, drilling has also commenced on the company's Springpole project, 70 miles east of Red Lake. Akiko's partner at Springpole is Noranda (TSE) which completed a deep drilling program last winter designed to evaluate the open pit potential of the Portage gold zone beneath

Springpole Lake. Results were disappointing and the company is now focusing its efforts on other gold zones on the property.

Drilling completed to date has outlined about 7.9 million tons of preliminary reserves grading 0.07 oz. gold per ton in the Portage zone. This summer's work is concentrating on the Main and Fluorite zones identified previously by Goldfields. Akiko has the right to earn a 35% stake in the Springpole claims.

In the Eskay Creek area of British Columbia, Akiko also has a one-third interest in the Lakewater gold property together with partners Tymar Resources (VSE) and Vari-tech Resources (SE). The drilling program at Lakewater is being operated by Prime Explorations.

Goldstream starts work program

VANCOUVER — A sampling and geophysical survey is set to begin on the Goldstream and Brew properties owned jointly by Bethlehem Resources (TSE) and Gold-ven Resources (VSE).

The Goldstream property, 60 miles north of Revelstoke, B.C., hosts a stratabound copper-zinc deposit with an estimated minable reserve of 1.8 million tonnes grading 4.81% copper and 3.06% zinc.

The companies hope to bring the deposit — previously an open pit mine and now closed — back into production as an underground operation at some future date.

Since little work has been done on the property other than in the immediate vicinity of the deposit itself, a program is planned to investigate the strike extension of the deposit's mineralization. The deposit is hosted in a chloritic schist in contact with a marble unit which has been traced for at least six miles. The companies believe it could extend for over 14 miles into the Brew claims.

Budgeted at up to \$1 million, the program will include soil geochemical sampling and ground geophysical surveys as well as trenching to be followed up with diamond drilling.

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Tonto tackles Goldstream improvements

Bethlehem

REVELSTOKE, B.C. — The Goldstream mine, jointly owned by Bethlehem Resources (TSE) and Goldnev Resources (VSE), is located on the Goldstream River, a 69-mile drive up the Columbia River Valley from railhead at Revelstoke, B.C.

The area plays host to more than just mining. Canadian Mountain Holidays runs helicopter skiing tours in the winter out of an old but considerably upgraded bunkhouse a short distance downstream from the mine. Skiers appear willing to share this beautiful valley with both the mine and the logging companies whose clear-cuts appear in a patchwork up the valley.

The deposit is in a north-facing hillside. The ore zone dips to the north at 30-35 degrees and plunges to the northeast at about a 50 degree rake.

The zone consists of a continuous bed of massive and disseminated sulphides with an average thickness of about 10 ft. and a lateral extent of up to 1,200 ft. in the uppermost ore block.

Noranda reached the ore zone with a number of adits into the hillside and developed the deposit by ramping down it to establish main development levels at about 160-ft. vertical intervals.

The ore between the developed levels was to have been mined out by driving a series of connected sublevel drifts with pillars left for support.

Bethlehem, the operator at Goldstream, contracted mining operations to Tonto Mining. Tonto is using the revised mine plan which utilizes sublevel drifts as well, but spaced on about 25-ft. vertical centres. The ore between the sublevels, equivalent to about 36 ft. along the dip of the ore zone, is mined out by what might be described as a drift-and-slash method.

To begin slashing operations, a drop raise is opened between sublevels to create space for blast holes to break into. A fan of holes is drilled to the sublevel below, one hole along the top of the ore zone, one along the bottom, plus one or more holes in-between depending on the thickness of the zone.

The fans are drilled on 4-ft. spacings. Tonto is currently experimenting to determine how many fans can be blasted at one time but is typically blasting one or two at once.

A 10-ft.-wide pillar is left on 115- to 165-ft. centres. Wherever possible, Tonto tries to position pillars at locations where



A miner underground at the Goldstream mine.

Photo by The Northern Miner

the ore zone pinches making them essentially "free."

Depending on the thickness of the ore zone (typically about 10 ft.), a portion of the lower corner of each sublevel is in footwall waste. The slashing operation, therefore, reduces the amount of dilution created by Noranda's mining method.

Tonto has four 4-yd., one 6-yd., and two 2.5-yd. LHDs on site. Ore haulage is handled by two 30-ton and four 15-ton trucks. The mine utilizes underground primary crushing before ore is conveyed into the mill on surface.

Ed Yurkowski, president of Tonto, noted that there is no coarse ore stockpile since crushing operations are located underground. For this reason, he said it is important to have six or seven working areas.

Ore grades can vary from 2.5% copper up to 7% copper and the additional working areas allow the company to blend the high- and low-grade ore.

Head grades are currently running at about 4.05% copper and although Noranda did operate a zinc circuit, the mill is producing only a copper concentrate while metallurgical studies are completed on zinc recovery.

Head grades are expected to increase to over 4.5% copper as the relative amount of slashing increases.

To date about 66,000 tons of development ore have been mined while slashing has amounted to about 29,000 tons. Ultimately, the mine is expected to produce equal amounts of



Photo by The Northern Miner

Prime Equities Chairman Murray Pezim, left, receives a Japanese artifact as a gift to the mine from Yoichi Arai, metals group director for Nippon Mining of Tokyo, during opening ceremonies at the Goldstream mine. Between them is Henry Ewanchuk, president of Bethlehem Resources.

drifting and slashing ore.

The mill utilizes a rod mill and a ball mill for secondary grinding coupled with standard flotation and a re-grind circuit.

Bethlehem is installing col-

umn cells in order to increase copper recoveries to 91% from the current 89%, as well as increase copper concentrate grade to 26% from an average of 23% to 24%.

Placer Dome options claims near Kerr copper-gold deposit

VANCOUVER — Associated companies Kenrich Mining (VSE) and Ambergate Explorations (VSE) recently completed an option agreement allowing Placer Dome (TSE) to earn interests in various claims near the Kerr deposit north of Stewart, B.C.

The properties adjoin or are near Placer Dome's Kerr deposit which has preliminary reserves of 66 million tons grad-

required to explore the property to assess its economic mineral potential.

Placer Dome can earn 60-70% interests in the various properties by making property option payments of \$575,000 and by spending a minimum of \$2.4 million on exploration before the end of 1995. The two juniors would be carried through completion of a feasibility study as to a 30% interest.

Black Swan states reserves for gold project in Australia

VANCOUVER — An updated reserve estimate was released by Black Swan Gold Mines (TSE) for its Whistler gold mine project in Western Australia.

Proven and probable reserves available to the Whistler mill are now reported as totalling 508,000 tons grading 0.15 oz. gold per ton from all sources.

The bulk of this reserve,

grade of 0.1 oz. gold per ton during this period, for a recovery rate of 97.6%.

Black Swan has interests in other mineral properties in Australia.

The company recently signed an agreement allowing a subsidiary of the French company Cogema to earn a 51% interest in the Mungari gold project near Kalgoorlie.

In a separate development,

From Page 1

\$5.75 million. Wright Engineers re-worked a feasibility study on the project, primarily by increasing the mining cutoff grade and altering the mining method.

Prior to closing, Noranda reported total reserves at the mine at 4.3 million tons grading 3.69% copper, 2.63% zinc, and 0.51 oz. silver per ton at a cutoff grade of 2% copper.

Upping the cutoff grade to 3% copper resulted in a drop in reserves to 2.05 million tons grading 4.81% copper and 3.06% zinc. The reserves include a 30% mining dilution.

Based on current reserves, the mine can operate for about five years although recent drilling has intersected ore-grade values about 800 ft. down-plunge from existing reserves. This could add an additional two years to the mine life.

During the fiscal year ending Jan. 31, 1992, Bethlehem expects to produce about 22.2 million lb. copper. The company declined to estimate zinc production since the circuit was not yet in operation.

Bethlehem has not released a final capital cost for the project although the joint venture has drawn down its full allotment of \$6.25 million under the financing agreement. Terms of the loan agreement call for the joint venture to pay back the funds from 70% of the project's cash flow. Further capital expenditures will be required between years two and five, including a ramp deepening estimated at about \$6 million and a tailings dam extension valued at about \$1.6 million.

At a cash cost excluding financing charges of \$93.60 per ton, the mine is expected to produce a cash operating profit of \$14.09 per ton or about \$5.6 million per year. Revenue projections are based on an average head grade of 4.8% copper, 3.0% zinc, recoveries of 91% for copper, 30% for zinc, a copper price of US\$1 per lb. and a zinc price of US50 cents per lb.

Based on the estimates, Bethlehem would have a yearly cash flow before financing charges of 18 cents per share (using 15.5 million shares outstanding) while Goldnev's cash flow would amount to about 27 cents per share (using 10.3 million shares outstanding).

A US10-cent move in the price of copper has a 3- to 4-cent effect on Bethlehem's cash flow per share and roughly a 5-cent effect on Goldnev's cash flow per share.

Bethlehem last traded at the 50-cent level while Goldnev is sitting at the 60-cent level. Shareholders of Goldnev recently received an offer for all their stock from Prime Equities (VSE) on the basis of five Prime shares in return for four Goldnev shares.

Van Ollie raises exploration funds

Marchmont & MacKay, underwriter for Van Ollie Explorations (CDN), has exercised a compensation option to purchase 1.36 million common shares of Van Ollie at 13 cents per share.

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r 500,000 tonnes grading
zinc, 8.1% lead and 109
silver.

se reserves are contained
See YUKON, Page 2



Photo by The Northern Miner

Henry Ewanchuk, president of Bethlehem Resources, at the Goldstream mine portal.

82M141

Goldstream back in operation thanks to Japanese financing

by John Kilburn

REVELSTOKE, B.C. — Arranging financing appears to have been the trickiest part of bringing the Goldstream underground copper-zinc mine back into production after a 7-year hiatus.

Joint owners **Bethlehem Resources** (TSE) and **Goldneve Resources** (VSE) searched for over a year before funding was secured through Japanese firms, Nippon Mining and Sumitomo Corp.

With engineering and feasibility work essentially done, full-scale rehabilitation of the mine was completed in nine short weeks, three weeks ahead of schedule for a mid-May startup.

The mine and mill are currently running at about 1,270 tons per day producing in the order of 98,000 lb. copper in

concentrate per day.

Concentrate haulage is contracted to Arrow Transportation Systems. Arrow averages about four 44-ton trucks per day to the CP Rail load-out in Revelstoke. CP has 30 cars assigned to Goldstream concentrates which are hauled to Vancouver Wharves for shipment to a Nippon smelter in Japan.

The Goldstream mine and mill were built in the early 1980s by Noranda which spent over \$70 million on their development. The mine operated for a short time in 1984 before low metal prices and poor zinc recoveries forced its closure.

Despite a jump in copper prices in the late 1980s, the mine sat dormant until Bethlehem and Goldneve purchased the property in early 1989 for

pg 1 See BETHLEHEM, Page 20

Gold mines' 'hidden' costs edging higher

If it weren't for forward sales, more than half of North America's top gold producers would have reported pretax losses in the first quarter, says a recent report by Yorkton Natural Resources.

North American Gold Shares points out that while cash costs may seem low in relation to the price of gold received, total costs — including general expenses, exploration expenses, royalties and depreciation — are moving perilously close to and even exceeding the price at which producers are able to sell their gold.

Some of the profit crunch can be attributed to the gold price which, at US\$371, turned in one of its worst quarterly averages since 1986. But added costs associated with aging mines, investment in new technology, and environmental regulations are also narrowing the gap between expenses and returns.

Using a sample of 15 mining companies, the research group calculated that profit margins have fallen by more than 50% since 1987 even as production has doubled. Just four years ago, the group of 15 cleared an average of US\$130 for every ounce of gold they produced. By the end of 1990, the same producers were banking only US\$56 per oz.

Four of Canada's top producers, **LAC Minerals** (TSE) and subsidiary **Bond International Gold** (NYSE), **Galactic Resources** (TSE) and **Agnico-Eagle Mines** (TSE) are among the worst performers. When total costs, including depreciation, are taken into account, they were all losers in the first quarter. Agnico, suffering from a combination of high costs (US\$478 per oz.) and a low selling price (US\$364 per oz.), racked up a whopping deficit of US\$114 per oz.

Still with the help of its large, high-grade Hemlo mines, See COSTS, Page 2

ooms over strategic Ellison claims

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George Cross

Reliable A

NO. 135(1990)
JULY 13, 1990

WESTERN CANADIA

GOLDNEV RESOURCES INC., (GNZ-V)

BETHLEHEM RESOURCES CORPORATION (BTH-V,T,Nasdaq)

GOLDSTREAM PROGRAM RESUMED - Goldnev Resources Inc. 50%
and Bethlehem Resources

Corporation 50% will resume exploration of the Goldstream Mine and adjacent Brew projects, 60 miles north of Revelstoke, B.C. by Aug. 1, 1990, in a program budgeted at a minimum \$1,000,000.

The Goldstream Mine is a stratabound copper-zinc deposit that operated from 1983 to 1984 when weak base metal prices forced its closure. Since then, the mine and mill complex has been kept up on a care and maintenance basis. Goldnev and Bethlehem purchased the mine and milling facilities in 1989 and are planning to place the deposit back into production as an underground operation. Current mineable ore reserves are estimated at 1,860,000 tonnes of 4.81% copper and 3.06% zinc.

The deposit is hosted in a chloritic schist in contact with a marble unit. A recently completed detailed compilation project combining geological, geochemical and geophysical data shows this stratigraphy can be traced for at least 6 miles of strike length, and possibly for over 14 miles. The Brew Project claims were staked to cover this previously unrecognized folded southeastward extension of the mine's rock units. At least two other copper-zinc showings, the Brewster and Brew, and possibly a third, the Ice Showing, occur along this stratigraphy. The latter occurs approximately ten miles along the projected strike of the Goldstream rocks to the southeast. It is comprised of massive sulphide boulders which have returned gold assays of up to 0.138 oz./ton. Previous workers report assays from nearby float samples of up to 1.2 oz/ton gold.

A 1990 EM survey located numerous targets along the projected strike of the mine stratigraphy.

The new program will include: line cutting, soil geochemical and ground geophysical surveys with a budget of about \$510,000 for both the Goldstream and Brew groups. Diamond drilling is expected to start near the end of August.

82 M 141

NO.110(1991).
JUNE 7, 1991

George Cross News

Reliable Reporting

BETHLEHEM RESOURCES CORP. (BTH-V,T)

GOLDNEY RESOURCES INC. (GNZ-V)

GOLDSTREAM MINE PROGRESS REPORT - Bethlehem Resources 50%
and Goldney Resources

50% have reported on progress at the Goldstream mine, 60 km north of Revelstoke, B.C. Production for May was 2,833 dry metric tons of copper concentrate containing 1,542,060 pounds of copper, which exceeded expectations of 455 DMT containing 250,775 lbs. copper. Although the grade was lower than expected at 3.14% copper, steps are being taken to increase it to over 4% for June. To 4Jun91, 80 truck loads containing about 3,000 DMT of copper concentrate have been shipped. About 2,000 DMT are in a Vancouver Wharves warehouse awaiting shipment to Japan. The first advance payment for 1,000 DMT has been received with the second payment expected shortly. The first shipment to Japan of some 5,000 DMT of copper concentrate, with a payable value net of smelter and refining charges of about C\$2,000,000 at current copper prices, is expected to leave Vancouver in early July. (SEE GCNL No.86, 3May91, P.2 FOR PREVIOUS PROJECT INFORMATION)

82M 141

BETHLEHEM RESOURCES CORPORATION (BTH-V,T)

SOME FURTHER DETAIL ON - Henry G. Ewanchuck president GOLDSTREAM MINE OPERATION and Brian Kynoch, vice president and chief operating officer, in a brief interview following the June 6, 1991, annual meeting of Bethlehem Resources, provided some additional information on the operation of the 50%-owned Goldstream mine, 60 km north of Revelstoke, B.C. Goldnev Resources Inc. owns the other 50% of the mine. The rehabilitation was completed three weeks ahead of schedule, in early May, and at or near the budgeted cost of \$4,530,000. While the plant has a capacity well in excess of 1,200 tonnes per day, the objective is to operate at 1,100 tonnes per day with a head grade in the 4% copper range. Copper recoveries have exceeded 95% several times in the first operating weeks with the objective to maximize copper output by operating in the 92% to 95% range to produce a 22.5% to 25% copper concentrate. At these rates the mine will produce 36,000,000 pounds of copper in 12 months.

At these production rates, and at US\$1.00 per pound the mine is forecast to produce a cash flow of \$2,800,000 or 18¢ per Bethlehem share which could payout the \$3,500,000 Bethlehem share of the production loan in 15 months. At a price of US\$1.20 per pound of copper, the Bethlehem share of cash flow increases to \$4,000,000 and the potential payout reduces to 11 months. At US\$1.00 per pound for copper, Bethlehem's earnings per share have been forecast at \$0.08 per year and at \$1.20 per pound the earnings per share are forecast at \$0.16 per share. (SEE GCNL NO.78, APRIL 23, 1991 FOR DETAIL OF THE CASH FLOW AND EARNINGS PROJECTIONS.)

The meeting was told the mine has reserves for five years with reserves open to extension. In the third year of production, 1994, definition drilling of these reserves will be started and at the same time drilling for further extensions will start. Exploration of some of the good targets in the mine area will resume when debts have been reduced and cash flow warrants.

The Giant Copper property, located 30 miles southeast of Hope, B.C., has received approval from the B.C. Ministry of Energy Mines and Petroleum Resources and from the B.C. Ministry of Lands and Parks to proceed with mineral exploration on the section of the Giant Copper property included within the Skagit Valley Recreational Area. The company is seeking a partner to participate in the exploration of the property.

82M (41)

Noranda seeks Heath Steele backing

The recent 10-month-long strike at the Brunswick zinc-lead mine near Bathurst, N.B., has forced **Noranda (TSE)** and 67% owned affiliate **Brunswick Mining & Smelting (TSE)** to look for help in expanding its nearby Heath Steele operation.

Information packages have already been sent to possible bidders in Europe, Japan and the U.S., and Noranda may be tempted to sell the entire operation if it receives a high enough offer, says Michael McSorley, Noranda's vice-president of business services.

Held 75% by Noranda and 25% by Brunswick Mining, Heath Steele produced 95,427 tonnes of zinc concentrate and 25,371 tonnes of lead concentrate from the B zone and near-by Stratmat property in 1990.

Prime moves to acquire Goldnev

VANCOUVER — Already the owner of 36.7% of the outstanding shares of **Goldnev Resources (VSE)**, **Prime Equities (VSE)** plans to acquire the balance under a recently announced takeover offer.

Prime is offering Goldnev shareholders five common shares of Prime Equities in exchange for every four Goldnev shares held.

In addition to the 3.8 million shares already owned (equal to 36.68%), Prime owns warrants to purchase up to 1.2 million shares (730,000 at 68 cents and 470,000 shares at \$1.28). Goldnev also agreed to settle \$260,000 in debt to Prime through the issuance of 477,942 shares which will increase Prime's holdings to 39.5% of the company.

Prime's offer is open until Aug. 9 and is not contingent on a minimum tender. Odlum Brown has been retained to prepare an independent evaluation of the offer.

Goldnev's major asset is a 50% interest in the recently commissioned Goldstream copper-zinc mine near Revelstoke, B.C.

The underground mine is expected to produce an average of 35.8 million lb. copper and 6.6 million lb. zinc per year over its current 5-year life.

Prime Equities recently traded at the 69-cent level giving the offer a value of approximately 84 cents, a 30% premium to Goldnev's price at the 65-cent level.

Feasibility done on Sphinx project

A feasibility study carried out on the Duvay heap leach gold project north of Amos, Que., concludes that total costs would be \$10.43 per ton. **Societe Miniere Sphinx (VSE)** reported.

Direct recovery costs for work such as crushing, stacking, leaching, gold-ore stripping and gold refining are \$6.69 per ton, President Michel David said. Direct mining costs such as blasting, loading and transport for crushing account for the balance.

David said the study, prepared by Casmyr Engineering, proposes a 504,000-ton-per-year operation with a stripping

However, Noranda is planning to spend \$16 million to accelerate mine throughput to 3,000 from 2,400 tonnes per day by developing the C zone, one kilometre from the Heath Steele mill.

Noranda was also planning to spend \$6 million this year to conduct exploration within the vicinity of the C zone and on other targets on the Heath Steele and Stratmat properties. But, the lengthy strike at the Brunswick mine near Bathurst has reduced the amount of money that Brunswick Mining has available for exploration, and the joint venture has trimmed its 1991 budget to around \$4 million.

As a result, cash-conscious Noranda is looking for an additional partner to come into the joint venture and spread the exploration risk, explained Bill Graham, the resource giant's manager of exploration for Eastern Canada.

As 1.85 million tonnes of 7.6% zinc and 1.5% lead have already been outlined in the C zone, Graham says there is a good chance that more ore can be proven up around the Heath Steele mine.

Starting in September, the joint venture will undertake a phase-one development program involving the dewatering of Heath Steele's old A pit, and rehabilitation of the ramp connecting the A pit to the new C zone.

Depending on results of phase one, the partners could reach deeper ore in the C zone by rehabilitating the 400-metre No. 4 shaft and installing a new hoisting plant.

Julian Baldry, base metals analyst at Nesbitt Thompson Deacon Inc. in Toronto, expects Noranda to have no trouble finding a company willing to purchase a joint venture interest at Heath Steele.

Crew, Moraga state reserves on Vancouver Island property

VANCOUVER — A preliminary reserve estimate was released by **Crew Natural Resources (VSE)** for the Red Dog copper property on northern Vancouver Island.

The project is near a producing copper mine, and is being developed under the terms of an option agreement between **Crew and Moraga Resources (VSE)**. Moraga is earning a 45% working interest and can acquire an additional option to earn a further 5% working interest.

Based on a report by an independent engineering consultant, the Red Dog property is now estimated to contain a preliminary reserve of about 203 million tons grading 0.17% copper, 0.006 oz. gold per ton and 0.004% molybdenum. The report concluded that this reserve would grade a copper equivalent of 0.334% above a 0.2% copper equivalent cutoff.

The reserve calculation study used block modelling techniques utilizing all available drill data.

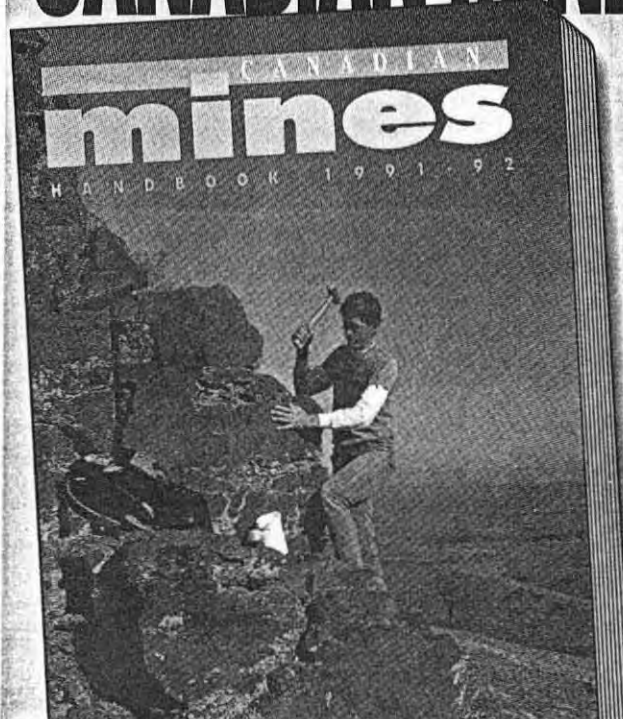
The engineering study also examined a preliminary pit layout for the Red Dog Hill zone which concluded that the optimized pit would contain 45.25 million tons grading 0.26% copper, 0.006% molybdenum and 0.01 oz. gold per ton, or 0.52% copper equivalent (above a 0.2% copper equivalent cutoff).

Crew noted that the stripping ratio for such a pit would be low as the deposit is mineralized virtually from surface, with waste rock consisting of internal dykes and a thin soil layer.

More drilling is planned for the Red Dog and Slide Creek zones this year, and other prospective zones will be explored in future programs so that the overall reserve potential of the property can be assessed.

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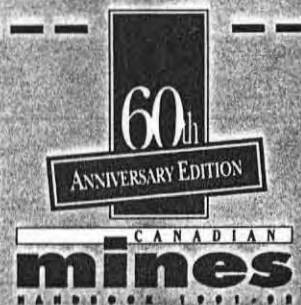
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Goldnev and BETHLEHEM RESOURCE CORPORATION (BTH-Y) are negotiating to purchase from Noranda an interest in the Goldstream mine and facilities at Revelstoke, B.C. Noranda would retain a 15% net profits interest. Goldnev and Bethlehem would form a 50/50 joint venture to place the deposit back into production. Goldnev currently has a prospectus offering in process with Canarim that will provide project financing.

The Goldstream mine is a strata-bound copper-zinc deposit. A 1,500 tonnes per day mill started operations in May 1983, with ore being drawn from both open pit and underground sources. Mining ceased in early 1984 due in part to low metal prices.

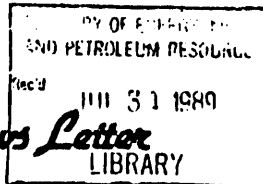
The remaining mineable reserves have been reassessed by two independent consulting firms using a higher cutoff grade and modified mining methods from those employed by Noranda. Orcan Mineral Associates Ltd. estimated reserves of 2,069,000 tonnes averaging 4.97% copper and 3.33% zinc. Wright Engineers Limited calculated reserves of 1,860,000 tonnes grading 4.81% copper and 3.06% zinc. The mine workings and mill are in good condition, and it is estimated that the property could be reactivated in 3 to 4 months.

8ZM141

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WESTERN CANADIAN INVESTMENTS

BETHLEHEM RESOURCES CORPORATION

(BTH-V,T-BTHMF-Nasdaq)

**NEGOTIATIONS TOWARD PRODUCTION FULL SPEED AHEAD
FOLLOWING COMPLETION OF MINE PURCHASE**

Following formal closing of the purchase of a 100% working interest in the Goldstream mine by a 50-50 joint venture of Bethlehem Resources and Goldnev Resources Inc. on July 21, 1989, crews have started clean up of the yard, buildings, mining equipment and milling machinery towards resumption of production.

The Goldstream copper-zinc mine and 1,500 ton per day capacity concentrating plant is at 665 meters elevation, along Goldstream Creek, accessible by all weather main haulage logging road, 14 km east of the highway to Mica Dam, 90 miles north of Revelstoke, B.C.

After Bethlehem signed a letter of intent to purchase the Goldstream in April 1989, part of the due diligence carried out included research of the regional geological potential. This due diligence resulted in the staking of an additional 13,900 acres of favourable geology to the south and west of the purchased Goldstream property of 81 claims, 11,590 acres. While Noranda had held much of the surrounding area at various times only limited regional exploration was carried out since the emphasis had been on achieving production. Bethlehem's preliminary indications include the location of several mineralized beds geologically similar to the Goldstream. The new areas may well be related to the ore reserve area. Mapping and sampling continues on the new claims.

Noranda operated the plant for 11 months from May 1983 to April 14, 1984, to process 429,659 tons grading 3.41% copper, 2.23% zinc. The Noranda mine closure resulted largely from lower prices for copper, which were about 60¢ U.S. per pound at the time. Copper recoveries, after mill tune-up were 88% and zinc recovery was in the 10% range, using an 83% minus 200 mesh grind. The low zinc recovery was complicated by being very fine grained and intergrown with iron pyrrhotite, plus being mixed with oxide copper minerals in the open pit. More recent metallurgical research indicates a recovery of 30% of the zinc can be confidently forecast. The test work also suggests a 50% zinc recovery is possible under optimum conditions.

Noranda invested some \$72,000,000 in mine preparation including an open pit at 920 meter elevation, plus four stoping levels to the current lowest level at 655 meters. The underground crushing plant includes a 175 ton per hour capacity, 36 inch by 48 inch jaw crusher and a 5.5 foot cone crusher located at the 632 meter level and conveyors to surface feeding a 1500 ton per day flotation concentrator. The installation includes a 120 person single room camp and a recreation facility, 5 km west of the mine, built at a capital cost of about \$3,400,000. After 3 months of mine and mill evaluation it is estimated a crash program could achieve production in 9 weeks. The mine sampling and production evaluation was executed by Tonto Mining Services Ltd. Bethlehem has estimated a three or four month program could realistically achieve sustained production of 1,100 tonnes per day to mine and process 385,000 tonnes of 4.46% copper ore in the first 12 months.

The financing requirements to place the deposit

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into production including working capital are estimated at \$10,000,000, excluding the \$6,000,000 acquisition costs paid to Noranda. A small but significant portion of the costs to renewed production is forecast to be raised by sale of surplus operating equipment. The balance of the funds will be raised by equity funding by the partners, inventory bank loans, and perhaps smelter advances now under discussion. The partners are considering offers from third parties interested in participating in the operation. Meetings have been held with governmental agencies toward possible grants or loans as the mine is in a depressed area with 15% unemployment. About 120 jobs will be created when the mine resumes production.

The Goldstream ore zone is classified as a "Besshi" type with copper, zinc, iron mineralization. The current mineral inventory calculated by Bethlehem is 2,000,000 tons, sufficient for 5.4 years of production at projected rates, grading 4.8% copper, 2.7% zinc, 0.6 oz. silver/t. This is using a 3% copper cutoff and 2.5 meter minimum mining width. When the production decision was made in 1981, Noranda had calculated a mineral inventory of 4,343,700 tons grading 3.69% copper, 2.63% zinc, 0.51 oz. silver/t. Portions of the mineral inventory will be reclassified as ore with: changes in the price of copper; increased copper content upon detail drilling; lower production costs as operating experience is gained etc.

The deposit, shaped like a flattened rod, is within a sequence of deformed sedimentary and volcanic rocks at a particular stratigraphic horizon, concordant with, but dipping across the other rock units. The sequence of rocks from hanging wall to foot wall are: dark banded phyllite, garnet zone, grey green phyllite, massive sulphides, grey green phyllite, and metamorphic limestone.

The mineralization consists of a single continuous bed of massive and disseminated sulphides varying in thickness from 1 to 8 meters. The average thickness is 3 meters. The eastwest strike length varies from 340 meters at the outcrop to 180 metres at depth. The average dip is 33° to the north and the rake is 45° off of true dip. Total drilled dip length is 1050 meters for a vertical depth of 550 meters from the outcrop to the deepest drill hole intersection. The deposit is open at depth.

Under the purchase agreement the Bethlehem/Goldnev joint venture receives 100% of the cash flow until all capital and purchase costs are repaid with interest. Bethlehem is operator. Then Noranda is entitled to a 15% net profits interest until all of Noranda's capital costs and accrued interest are repaid. When Noranda has been paid out the original prospectors are entitled to a 35% net profits interest.

Bethlehem Resources paid for its share of the mine purchase from working capital which reduced the uncommitted funds on hand to about \$3,000,000 with 14,527,736 shares issued. To fund the purchase Goldnev Resources made an offering of 2,600,000 units at \$1.05 each underwritten by Canarim Investment Corp. The Goldnev private placement of June 22, 1989 of 200,000 shares at \$1.75 did not proceed. On July 6, 1989, Goldnev reported the private placement sale of 325,000 units at \$1.25 each for proceeds of \$406,250, with one year warrants at \$1.35 each. These financing increased the post consolidated shares to 5,211,604, or about 7,485,000 fully diluted.

82M141

BETHLEHEM RESOURCE CORPORATION(BTH-V,T-BTHMF-Nasdaq)

GOLDNEY RESOURCES INC.(GNZ-V)

GOLD TORCH RESOURCES LTD.(GTJ-V)

PRIME RESOURCES CORPORATION(PMR-V)

ONE THIRD MINE PURCHASE TO - Douglas E.McRae, president
PROVIDE PRODUCTION FUNDING of Gold Torch Resources has
reported the acquisition of

a 33.3% interest in the Gold Stream copper-zinc mine,
owned as to 100% working interest 50-50 by Bethlehem
Resources and Goldnev Resources. Gold Torch has agreed
to pay \$5,000,000 for the 1/3 mine interest. When this
purchase is completed the mine will be owned 1/3 by each
of Bethlehem, operator, Goldnev and Gold Torch. The
mine is located at 665 meters elevation, along Goldstream
Creek, 90 km north of Revelstoke, B.C.

On July 21,1989, the formal closing took place for
the purchase by Bethlehem and Goldnev of the Gold Stream
mine from Noranda for \$6,000,000. After the Bethlehem
Resources' purchase price and costs to production are
repaid Noranda is entitled to a 15% net profits interest
until all of Noranda's capital costs plus interest are
repaid. When Noranda has been paid out the original
prospectors are entitled to a 35% net profits interest.

Bethlehem has estimated it will cost \$10,000,000
including working capital, excluding the \$6,000,000
purchase price, to bring the mine to production at 1,100
tons per day. Reserves are currently estimated at
2,000,000 tons grading 4.8% copper, 2.7% zinc, 0.6
oz.silver/t. It has been estimated that a crash program
could achieve production about Oct.30,1989. (SEE MUCH
MINE DETAIL GCNL NO.145, 28Jul89).

The \$5,000,000 to be paid by Gold Torch, together
with funds now on hand from the sale of the Gold Stream
mining camp and surplus equipment, and bank lines for
working capital are estimated to be sufficient to achieve
production without further funding. Bank lines for
working capital have been discussed with several banks
but have not yet been subject to detailed negotiation.

Prime Resources has agreed to buy 1,000,000 escrow
shares of Gold Torch from Carlo Civelli and Douglas
McRae. It has been proposed that Murray Pezim, Art
Clemiss, John Ivany and Larry Page become directors of
Gold Torch. Gold Torch recently appointed Fredrick B.
Kaufman a director who will now resign following the
change of control. Prime Equities have agreed to arrange
all suitable financing for Gold Torch.

On June 1,1989, Gold Torch reported cancellation of
the proposed private placement of 1,300,000 units, post
split, at 64¢ each announced March 3,1989 to Algemene
Bank Nederland Schweiz & Credit Commercial de France
(Suisse) S.A. On Dec.22, 1988 Gold Torch completed a
private placement sale of 300,000 pre-split units at 52¢
each including warrants to purchase 600,000 split shares
at 31¢ each until Nov.29,1989. Gold Torch shares
started trading on a sub-divided basis one old for two
new shares on March 6, 1989, when there were 4,343,502
shares issued, including 1,500,000 shares in escrow.

82M141

NO.162(1989)
AUGUST 23, 1989

WEST

Goldnev and Bethlehem to re-activate Noranda's Goldstream copper mine

VANCOUVER — Prime Capital's **Goldnev Resources** (VSE) is planning to get into the base metal business by reactivating the Goldstream copper-zinc mine near Revelstoke, B.C.

The company also has a number of gold projects, including the Maggie Creek Ranch property in Nevada, the Grew Creek project in the Yukon, and the Todd Creek and Julian Lake projects in northwestern British Columbia.

But because the Goldstream project has the most immediate prospects for production, Goldnev and partner **Bethlehem Resources Corp.** (VSE) are busy negotiating the purchase of the Goldstream mine and related facilities with current owner, **Noranda Minerals**.

After negotiations are concluded, Goldnev and Bethlehem will form an equal joint venture to place the project back into production. Noranda will retain a 15% net profit interest royalty.

Corona Corp. (TSE) will also have an indirect interest in any production as it owns a 10.4% equity position in Goldnev following the recent name change and consolidation of Golden Nevada Resources shares into Goldnev shares on a five-to-one basis.

According to Goldnev President John Ivany, the mine workings and mill are in good condition and the property could be reactivated in three to four months.

The mill has a 1,500-tonne-per-day capacity, and has been closed since 1984 after an operating run (both open pit and underground reserves were processed) of less than a year. Poor metal prices were cited as one of the reasons for the closure.

Gold Vessel to earn 49% of Manitou bet

Gold Vessel Resources (ASE) recently agreed to earn a 49% stake in **Societe Miniere Louvem's** (TSE) former Manitou base metal mine in Bourlamaque Twp., east of Val d'Or, Que.

From 1942 to 1979, before the slump in base metal prices, 7.5 million tons of zinc-silver ore from the property at an average grade of 4.52% zinc, 3.65 oz silver and 0.033 oz gold per ton was extracted from the property. An additional 3.6 million tons of copper was also produced from 1955 to 1971.

The agreement allows Gold Vessel to make staged payments in

Remaining mineable ore reserves were recently re-assessed by two independent consulting firms using a higher cut-off grade and modified mining methods from those used by Noranda.

Orcan Mineral Associates estimated 2.06 million tonnes averaging 4.97% copper and 3.33% zinc, while **Wright Engineers** calculated reserves of 1.86 million tonnes grading 4.81% copper and 3.06% zinc.

Elsewhere, Goldnev recently optioned its Maggie Creek Ranch project in Nevada's Carlin Trend to **Barrick Gold Exploration**, allowing Barrick to earn up to a 75% interest by contributing a total of \$8.95 million (US) in stages over a number of years.

Previous work on the 125-sq mi Maggie Creek Ranch property has outlined a geological reserve estimated at 2.5 million tons averaging 0.021 oz gold, plus numerous other targets that remain untested.

Goldnev now has a 100% interest in the Grew Creek project near Faro, Yukon, after it renegotiated an agreement with former partners **Noranda Exploration**, **Hemlo Gold Mines** and **Brenda Mines**. Noranda retains a 15% net profits interest in any production from the Main zone deposit, and also has a back-in right (to 50%) in any other deposits developed on the property.

The Main zone is reported to contain a geological inventory of 852,100 tons averaging a cut and diluted grade of 0.260 oz gold and 0.98 oz silver at a cut-off grade of 0.058 oz gold.

A pre-feasibility study to determine the potential of the Main zone deposit for an economic mining operation was recently completed which is reported to have summa-

lion would bring Gold Vessel up to 49%.

According to Louvem, zinc-silver ore mined from the property was contained within massive sulphides. "Although less massive, the copper zones were also sulphide-rich containing mainly chalcopyrite and pyrite," the company said.

The agreement is subject to regulatory approval.

NovaGold placement

NovaGold Resources (TSE) has completed a private placement of shares through **Swiss Canada Capital**. The company sold 750,000

shares, estimated that there is potential for a "small, but attractive" mining operation. Goldnev plans more work on the feasibility of bringing the deposit into production.

Goldnev has earned its 50% interest in the Todd Creek project near Stewart, B.C., and is now a joint venture partner with **Noranda** (operator) and **Brenda Mines**.

Gold and copper mineralization was outlined in three extensive quartz-sericite alteration zones associated with major fault structures on the property.

Since 1987, 47 holes have been drilled on the property. Results include: 26.7 ft of 0.202 oz gold; 38.4 ft of 0.258 oz; 39.2 ft of 0.233 oz; 3.3 ft of 0.705 oz and 12.5 ft of 0.116 oz gold. Noranda is about to start a drill program to further test the three zones.

Since acquiring an option to earn a 100% interest in the Julian Lake project in the Eskay Creek region, Goldnev granted an option to **Ravenroc Resources** allowing it to acquire 50% of the property.

An airborne geophysical survey was completed earlier this year and a program of remote sensing, reconnaissance and detailed mapping, prospecting, soil and stream sediment sampling, and diamond drilling is planned for this season.

Metina opti

Metina Development associate **Manridge I** (TSE) have acquired a 49% interest in the **Mishibishu Lake**, Wawa, Ont. **Central** (TSE) is the property

The claims are adjacent to **Caribbean Resources** property on a significant gold discovery made by **Hemlo Gold**

Geochemical soil sampling completed last year by **Noranda** on the **Metina** claims yielded values for base metal sulphides, etc. The property also contains

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□**MERLAND EXPLORATIONS LTD:** The company surrendered 80,438 acres in Saskatchewan during 1975. Plans are to concentrate on areas which are more attractive both economically and politically. It expects 1976 will be a boom year for oil and gas exploration in Alberta and BC and in the US. The company has an anticipated capital expenditure of \$6-million in 1976. It has formed Merland Resources Inc to handle its American interests.

□**NICOLA COPPER MINES LTD:** The company has acquired Amcan Nuclear Corporation of Grand Junction, Colorado and now holds the M-W uranium group of 53 claims covering 1,000 acres.

A test shipment from the claims averaged 0.26% uranium and 1.0% vanadium. Sixteen holes had been drilled by early September. A further three-phase exploration program costing \$35,500 was expected to begin by mid-September.

□**NORTH ATLANTIC RESOURCES:** A \$21,500 exploration and development program will be undertaken on the Takiyuak Lake properties, 250 miles north of Yellowknife, Northwest Territories, in which the company holds 50% interest.

The company has also acquired an option to purchase 100% interest in the Tick No. 1 and No. 2 mineral claims in the Burrell Creek-Franklin Mining Camp area, Greenwood MD, BC. A two-phase exploration program has been recommended including prospecting, geochemical silt sampling and trenching, diamond drilling.

□**NORANDA MINES LIMITED:** An engineering and underground examination of the company's copper prospect in the Goldstream Valley, near Revelstoke, BC, will cost an estimated \$1.5-million. The primary objective is to drive a tunnel 400 metres long to determine the mining method and obtain metallurgical samples.

The company estimates the mineralized contains more than 3-million tons ore averaging 4.4% copper, 3.2% zinc and 0.6 oz/ton silver.

□**PAMOUR PORCUPINE MINES:** The company has laid off 200 employees, including both staff and hourly. It has been necessary to quicken the reduction of its operation in the Porcupine because of the low price of gold. At the Schumacher division, mining below the 3875ft level will cease. The reset of the divisions will focus on higher grade mining, at current rates of production, with direct services limited to that needed to maintain production requirements. Continuation of this phase-down program could result in further work force reductions if the price of gold drops again. The company hopes representations made to the federal and provincial governments will result in some support for the gold mining industry during the weak price period.

□**RAYROCK MINES LIMITED:** Although the company's revenue is currently from oil and gas production and investment income, its 1976 exploration budget is geared to the search for uranium in Canada and base metals and uranium in the western US. A uranium project underway in the Marian River area of the Northwest Territories includes mapping, prospecting and ground radiometric surveys on optioned ground and on claims staked by the company.

Avoca's Irish copper mine, controlled by Discovery Mines, a Rayrock affiliate, has stepped up operations while negotiations for financing continue.

Net earnings for the six months ended 30 June 1976, were \$100,189 or 5¢/share compared with a loss of \$1,080,154 or 24.2¢/share for the same 1975 period. Working capital at the report date was \$1,121,518.

□**REEVES MACDONALD MINES:** The company's status remained unchanged during the first six months of 1976. Operations are completely shutdown and efforts to interest others in a mining venture involving adjoining properties have been unsuccessful. The company says recent changes in BC mining legislation may help to rekindle interest in exploration and development program. It is appealing an assessment of \$19,939 for 1974-75 mineral land taxes over the method used by the government to allocate operating costs.

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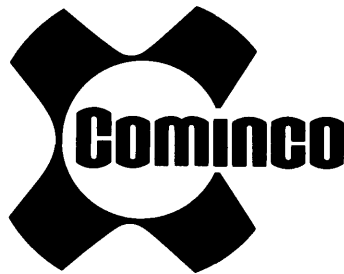
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Goldstream. Open pit blast when the ore is broken into small pieces of more than eight tons (four tons for additional recovery).



Goldstream. Slope preparation drilling; photo shows slope of back which follows top of ore zone

Noranda's Goldstream mine a welcome newcomer

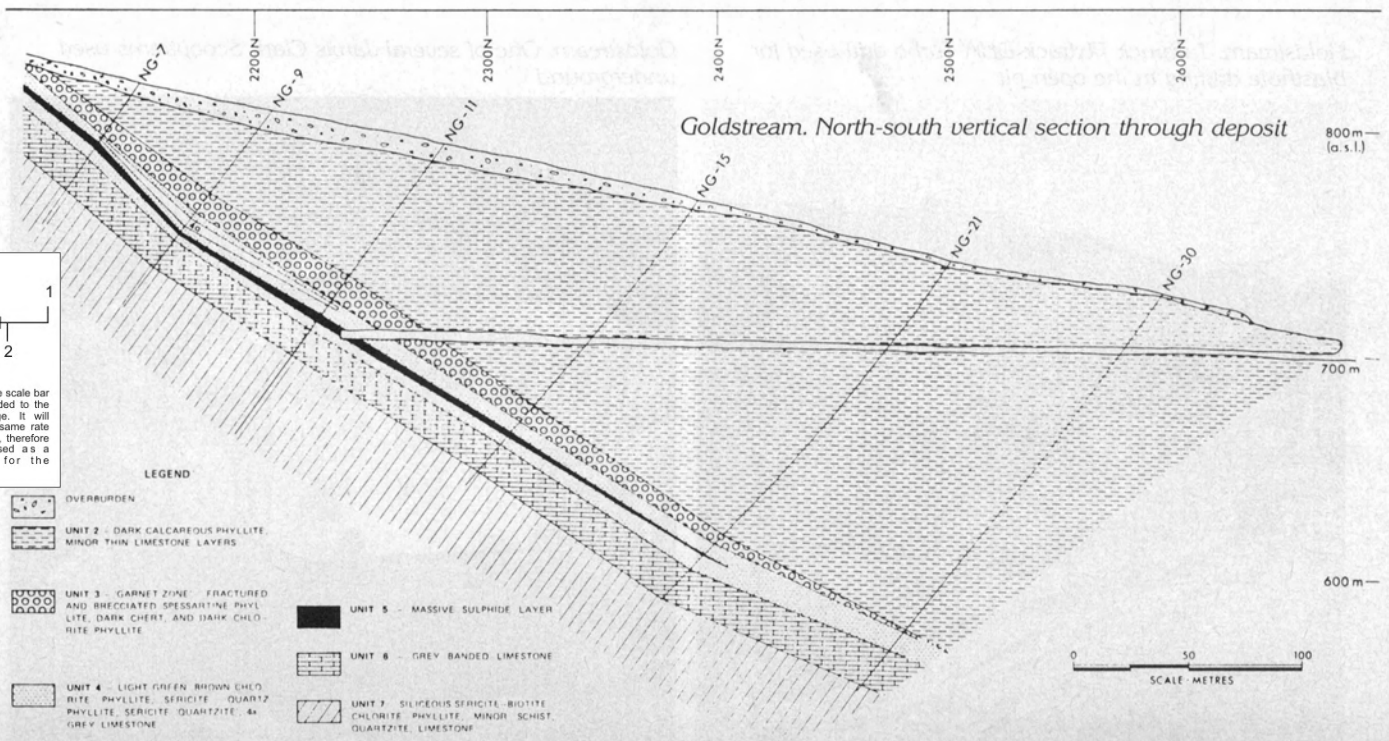
The opening of the new Goldstream mine of Noranda Mines Limited, north of Revelstoke, British Columbia, is a very welcome sign in 1983, after a period in which mine closures were almost weekly news. That Goldstream is an underground operation (principally) and that the orebody is mainly copper and zinc may seem even more unusual in these times of low metal prices and poor

markets, not to mention rising operating costs.

The dimensions and attitude of the orebody also require some ingenuity and flexibility in planning the mining method, but work has proceeded gradually since 1976 (with several postponements of production dates) until it appears that the mine can produce with better economics than the large open pit mines of the

Babine Division (Bell and Granisle), in BC, which have been closed for some time.

Goldstream is a relatively small operation, aiming at 75,000 tonnes/year of 25% copper concentrate and 12,000t/y of 50% zinc concentrate. The ore grades are fairly high at 3.7% copper and 2.7% zinc in a sulphide deposit which averages 200 metres wide and

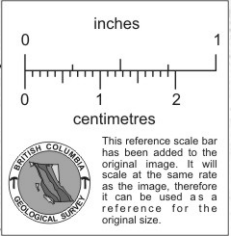
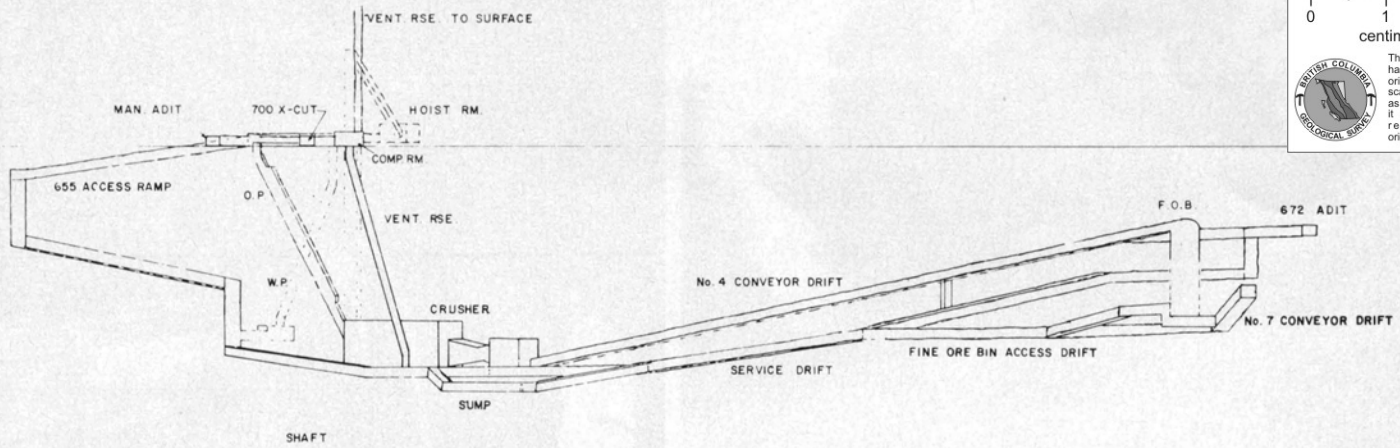


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This reference scale bar has been added to the original image. It will scale at the same rate as the image, therefore it can be used as a reference for the original size.

82M141



Goldstream. Elevation, looking south, shows location of main 700m adit and crusher station

2-8m thick. Proven reserves (at May 83, when the mine opened) indicated a mine life of more than eight years (with hopes for additional reserves).

DISCOVERY

The Goldstream deposit is a stratabound high-grade copper-zinc massive sulphide orebody which occurs within an extensive belt of metasedimentary and metavolcanic rocks. It was a new discovery, made by prospecting, and the mineralization was not exposed at surface. The regional geology is complicated.

The Goldstream River is a tributary of the Columbia River system, and flows westward out of the Selkirk Mountains. The river valley lies 600-650m above sea level, is typically U-shaped, and is flanked north and south by 2400-2700m mountain peaks.

In the 1860s placer gold was

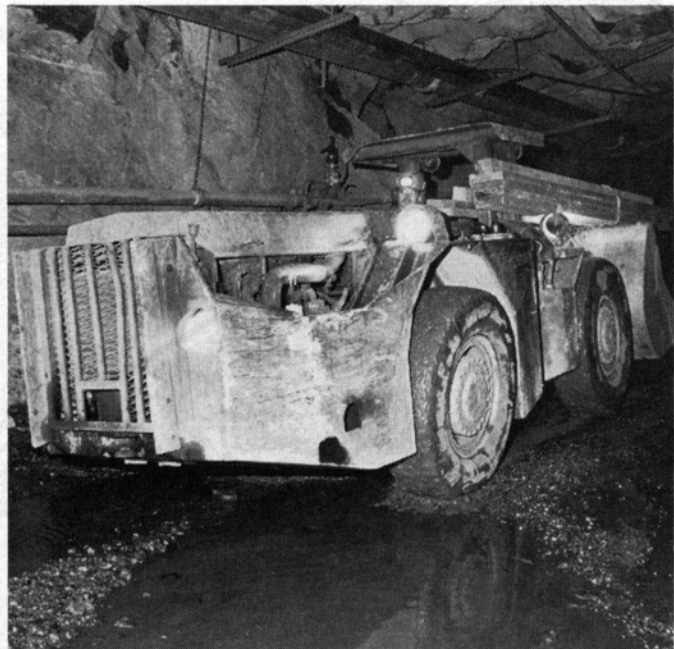


Goldstream. (From left) Jim Smith, mine manager; Betty O'Keefe, Noranda Mines Limited; Frank King (who staked the first claims); Mrs King

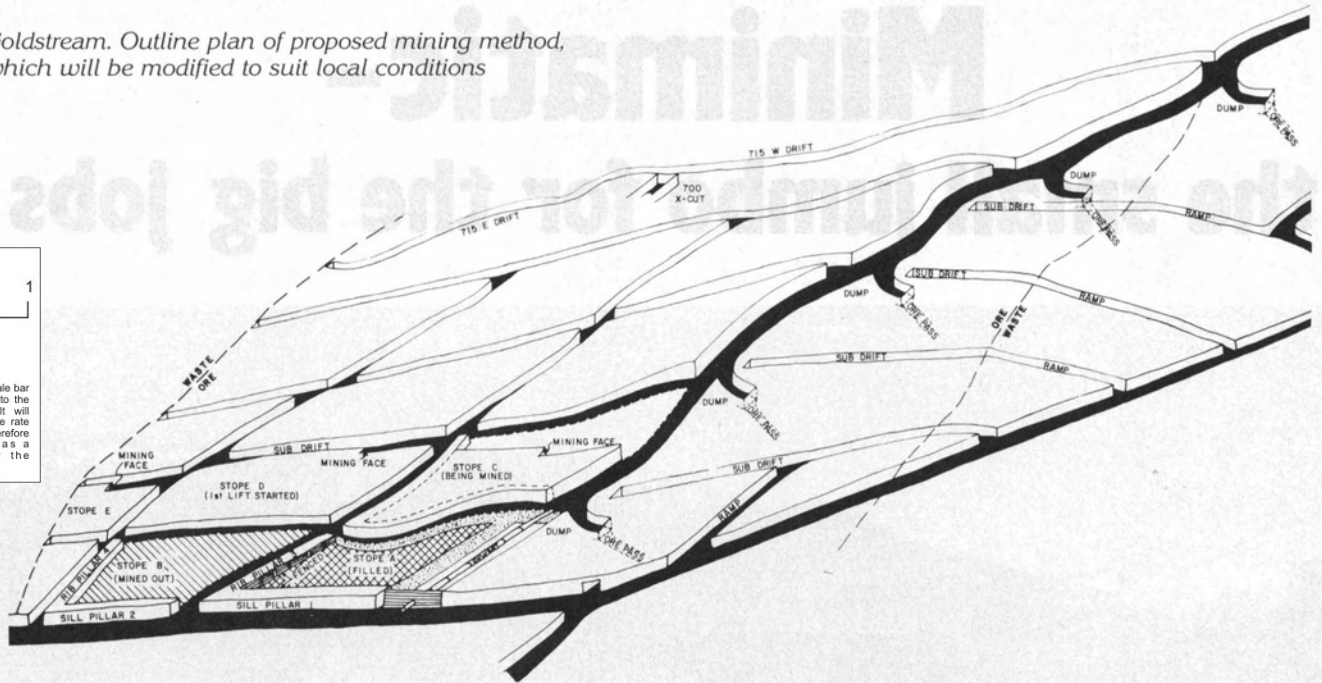
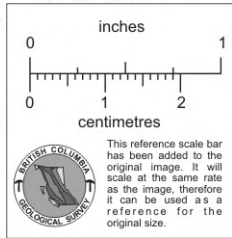
Goldstream. Tamrock Fixtrack DHA Turbo drill used for blasthole drilling in the open pit



Goldstream. One of several Jarvis Clark Scooptrams used underground



Goldstream. Outline plan of proposed mining method, which will be modified to suit local conditions



discovered in the Goldstream and several of its tributary creeks, and at one time there was a community of several thousand people within sight of the present Goldstream office and concentrator site.

Hardrock exploration in the area (1890-1930) disclosed some interesting properties, on which some work has since been done from time to time. The only producer was the Mastodon, which mined and milled 15,000 tons grading 9.5% Zn, 0.5% Pb, and 0.2oz Ag in 1960.

During construction of a logging road in 1972 some angular float assaying up

to 5% Cu was found, but the source was not located. In September 1973, Frank King, of Vernon, staked claims to cover the mineralized float. With his new partners, Gordon and Bruce Bried, of Kamloops, more work was done, leading to extensive trenching and the drilling of 22 X-ray holes.

Noranda had followed the progress this (1974) work, and optioned the property at the end of December 1974. Noranda Exploration carried out extensive drilling, sampling, and other survey work, leading to an underground program which started in April 1976.

The program of tunnelling and drifting

included a 400m adit at the 700m elevation, drilling drifts, and ore drifts. Samples and data from the program were used in further engineering and metallurgical studies.

DEVELOPMENT

In January 1980, the BC government approved development of the Goldstream orebody, and Noranda later announced plans to proceed towards production of copper-zinc concentrates, with major construction to start in the spring of 1981. It was estimated that the property would be producing by the third

Goldstream. Tamrock Minimatic DH107L drilled the first round

Goldstream. Two Tamrock Minimatic H107L electro-hydraulic drill jumbos will be used for underground mining development



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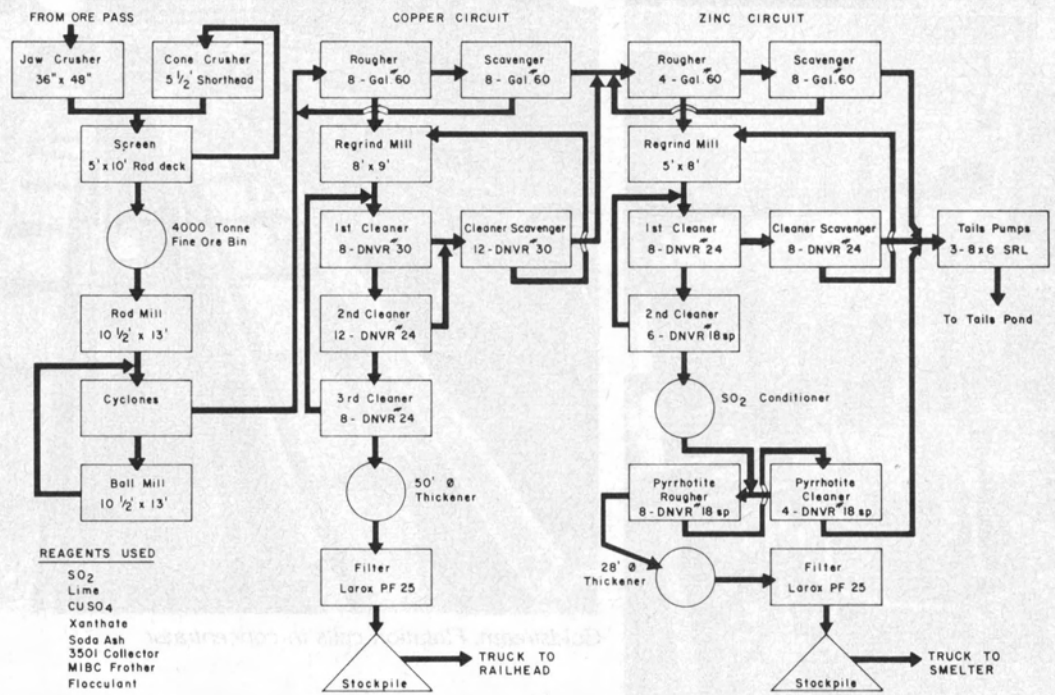
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Goldstream
Concentrator flowsheet



quarter of 1982 at a cost of some \$62-million.

The original plans for the mine included a proposed dam and hydro-electric plant to be built and operated by Noranda to supply power to the mine. Detailed engineering modified the design and raised the cost of power above that which could be supplied by BC Hydro. Power is supplied by a 69kV line from Mica Dam.

During 1981, construction of the concentrator and service buildings, and a permanent camp, were essentially completed. Work was planned to develop a small open pit and an underground

mine to start up in November 1982 at 1500 tons/day.

By the end of 1982, the construction and equipment installation phase was nearly complete, but mine development was extended to a start-up date of 1 May 1983, partly in the hope that metal prices might improve.

Development of the property was originally postponed from 1977 (when the feasibility work was completed) to 1980, because of poor metal prices. The development cost was about \$70-million.

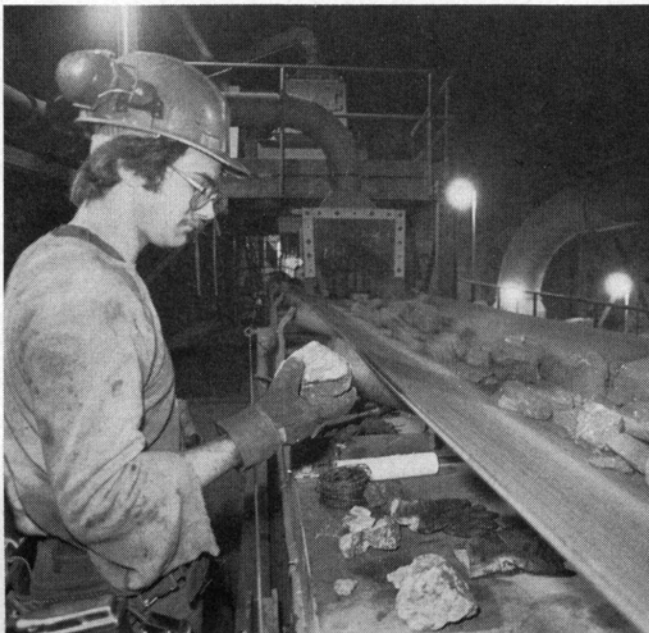
CURRENT OPERATIONS

An accompanying diagram shows a

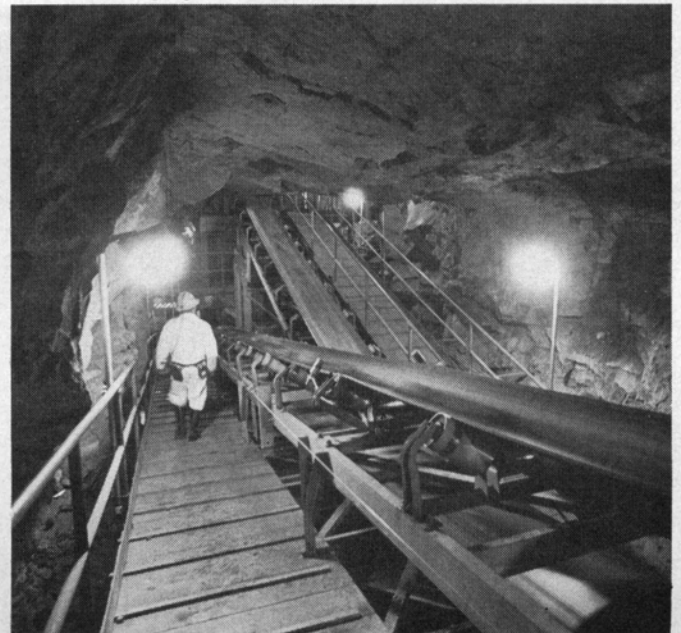
section through the Goldstream deposit and the 700m access adit. The top of the orebody is very close to surface (about 830m elevation), and is being mined as an open-pit operation. Some 400,000 tonnes (or about half the mill feed through 1984) may be mined from the pit, before production comes entirely from underground operations.

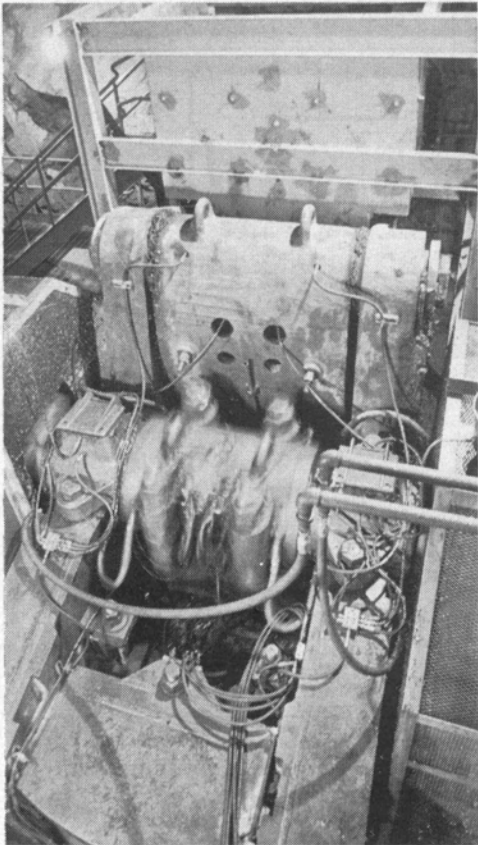
The underground mining method, as mentioned above, has to be flexible in concept, but is based on a stepped room excavation to follow the run of the ore zone. The rooms are backfilled, and pillars are recovered, as mining progresses.

Goldstream. Conveyor from screens returns oversize to crusher



Goldstream. Conveyors are part of underground crushing and screening system





Goldstream. Nordberg primary crusher in the underground station



Goldstream. Flotation cells in concentrator

The ventilation compressor room is on the 700m level, from which the 655 access ramp leads to the underground crushing and screening complex. From the higher levels, now being developed, ore passes are provided.

When mining moves below the crusher level, it is possible that a hoist (at 700m level) and vertical shaft will be used for raising ore from the deeper levels.

The ore is crushed underground to $\frac{1}{2}$ in and taken by a 150m conveyor to a fine ore bin and the concentrator on surface. After grinding in rod and ball mills, copper and zinc are separated by flotation. The process includes a reverse

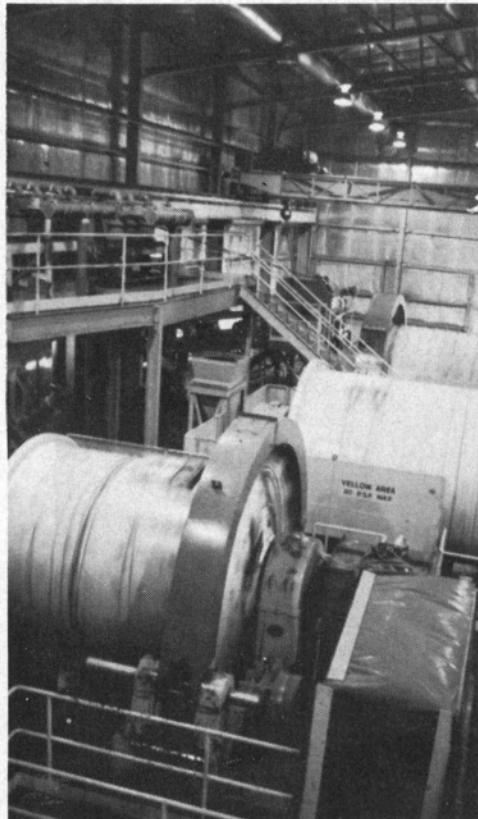
flotation in which copper is depressed and the waste floated.

Current operations (May/June 83) produce some 200 tonnes/day of copper concentrate (shipped to the smelter at Noranda, Québec) and 30t/d of zinc concentrate, which is trucked to Trail, BC, for treatment in the Cominco smelter.

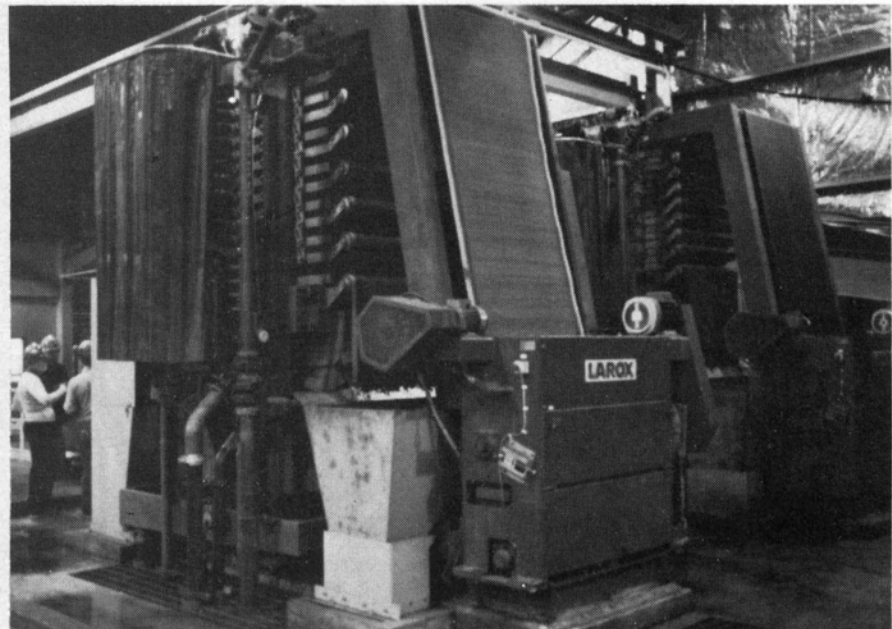
Workforce at the mine (May-June 83) was about 150 people, and not more than 210 are expected during the life of the mine.

Staff. J B (Jim) Smith is mine manager, Goldstream Mining Division; he has been responsible for work on the property since 1976, and was project

Goldstream. Rod and ball mills



Goldstream. Larox pressure filters are used in the concentrator to provide concentrate cake with about 8% moisture, eliminating the need for a kiln dryer



manager for the development phase. Other staff: chief geologist, Norm Berg; mine superintendent, Bob Hinkkuri; chief engineer, Bruce Humphrey; mill superintendent, Stu McTavish; office manager, Paul Smith; plant superintendent, Bob Sweet.

Union. The International Union of Operating Engineers, Local 115, represents about 100 unionized employees.

Ownership. Goldstream Mining Division, Maclaren Forest Products Inc, is

a subsidiary of James Maclaren Industries Inc, which is a wholly-owned subsidiary of Noranda Mines Limited. The original owners, Frank King and Gordon and Bruce Bried, retain an interest in the property.

Access. The mine is located off a new highway that links the Mica and Revelstoke Dams (parts of the old road will be submerged when the present water level rises behind the Revelstoke Dam). Many of the mine employees commute from Revelstoke, and no

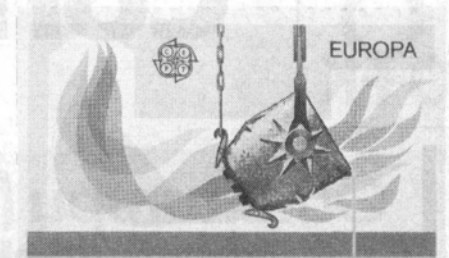
serious problems occurred in the 1982-3 winter, though slides are not unexpected in bad weather.

There is also a good modern camp on site.



Goldstream. Waiting to blast at the pit

Photo credits. Deborah MacNeill; Martti Huttenen (Tamrock); Western Miner

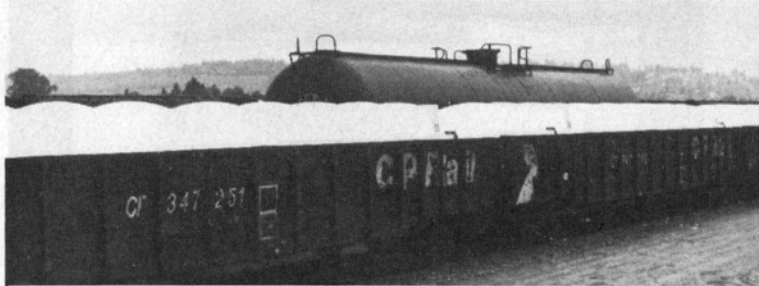


SUOMI FINLAND 1,30

The European Conference of Postal and Telecommunications Administrations, CEPT, has arranged for the issue of a series of stamps depicting notable human achievements. This Finnish stamp depicts Outokumpu Oy's flash smelting method.

The method was developed in 1949 for the smelting of sulphidic concentrates and is used today in 31 copper and nickel smelters all over the world. The method is known for its ecological advantages and low energy consumption. It has been continuously developed by Outokumpu Oy and can now also be used for smelting sulphidic lead concentrates.

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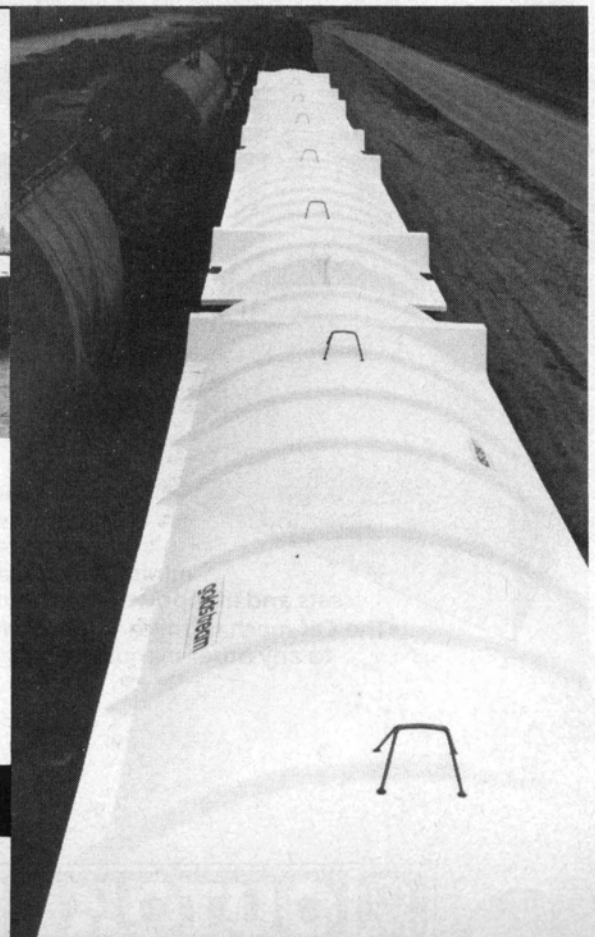
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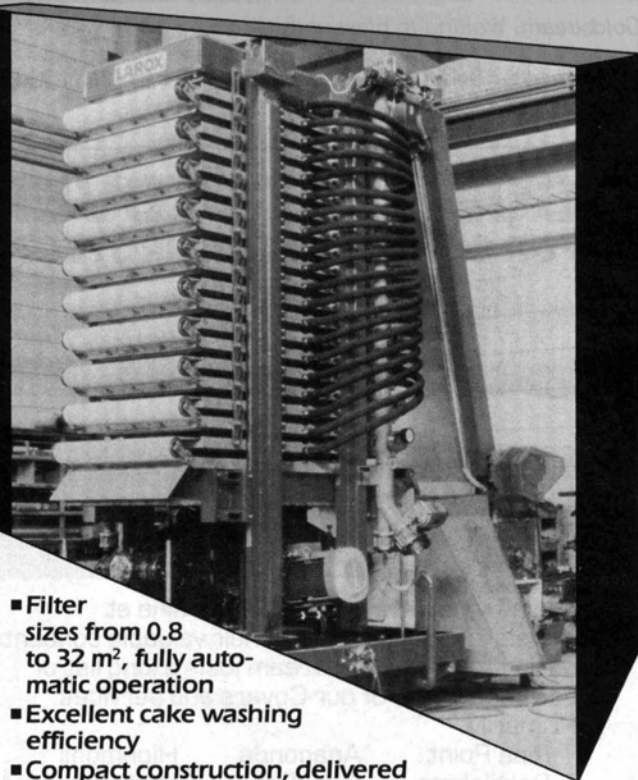
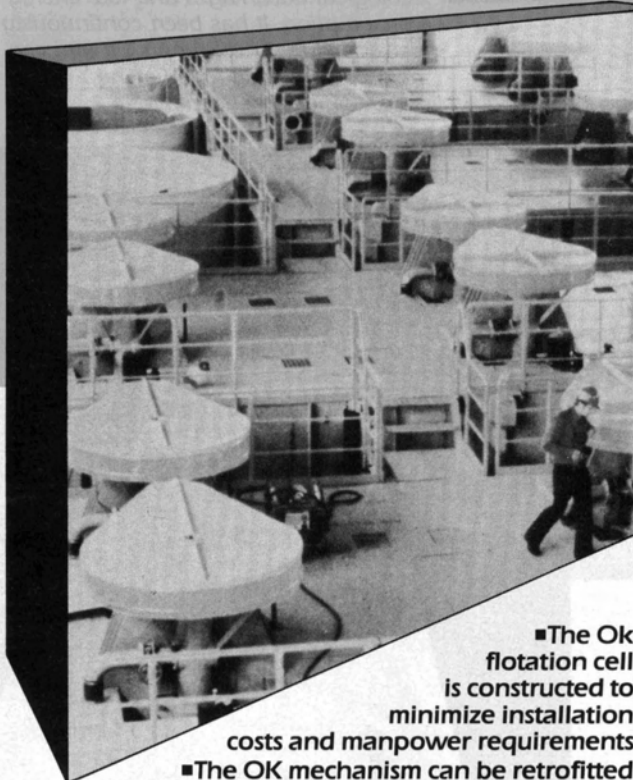


Outokumpu (OK) Flotation Machines

- Outokumpu pioneered large flotation machines and is the acknowledged leader in efficient cell design
- OK flotation machines are in use worldwide – from concentrators in the tropics to the world's most northerly mines
- Applications range from high tonnage, coarse grind flotation (e.g. mill discharge at 70% solids, to extremely fine grind complex ores)
- OK flotation machines are in use in the following industries: base metals, ferrous metals, industrial minerals, tar sands, sewage treatment and gas dispersion

Larox (PF) Automatic Pressure Filter

- High capacity, typical mineral industry capacity range from 100 to 700 kg/m²h
- Larox Filters are used in the following industries: mineral, chemical, foodstuff and waste treatment
- In many applications 2-3 conventional process steps can be replaced by the Larox Automatic Pressure Filter



- The OK flotation cell is constructed to minimize installation costs and manpower requirements
- The OK mechanism can be retrofitted to any other manufacturer's tank

- Filter sizes from 0.8 to 32 m², fully automatic operation
- Excellent cake washing efficiency
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