# Annual Report 1993



# PRINCETON MINING CORPORATION





An airborne geophysical survey was completed over 175 square kilometres at the Similco minesite which identified anomalous footprints similar to those displayed by the deposits with known reserves.

## Achievements - 1993

#### **Corporate:**

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- Sold 50% interest in Teranov to Black Hill Minerals Ltd.
- Conversion of \$12 million in debentures to Princeton Mining Shares, eliminating the long-term debt.

#### **Exploration & Development:**

- Initiated an extensive exploration program at Similco to upgrade mineral reserves.
- Optioned the Elenita oxide copper project in Chile, a potential low cost open pit mine.
- Arranged funding to advance the Nancagua gold-silver project in central Chile through a joint venture with Agate Bay Resources.
- Negotiated a \$1.5 million private placement with Teck Corporation and Cominco Resources to fund exploration on the Elenita oxide copper deposit.
- Funded the 1994 drilling program for the Rio Lluta porphyry copper project in Northern Chile through a joint venture with Gold Giant Minerals Inc..

## **Objectives - 1994**

- Discover and develop new reserves at Similco which would result in lower production costs.
- Evaluate all alternatives to reduce Similco costs to the extent that the mine operation can resume at current metal prices.
- Acquire advanced high quality copper or precious metal properties which can be developed as low cost producers.
- Utilize the most efficient and effective technologies to maximize the value of our exploration and operating projects.
- Manage exploration risk through joint ventures on early stage projects.

## Similco Reclamation

Experimental tests with biosolids to enhance revegetation of mined areas produced successful results. The darker green in the centre area reveals the improved growth on the test plot.



The Company is committed to sound environmental management and maintains an active self-monitoring program to ensure compliance with government and corporate objectives.

Reclamation of inactive previously mined areas continued in 1993 with aerial seeding and fertilizing. The Company has been working with the Greater Vancouver Regional District in testing treated biosolids derived from sewage to enhance re-vegetation of mined areas. Results have been positive and this experimental program will continue in 1994.

## **Teranov Mining Corporation**

Teranov had a net operating loss before interest of \$1.6 million in 1993 on total revenues of \$3.8 million. The loss was mainly due to production shortfalls and a deterioration of chrysotile fibre markets.

Modifications to the processing plant were ongoing throughout the year in an effort to improve the quantity and quality of fibre production. These changes resulted in production of 13,493 tonnes over a 6.5 month period.

In December of 1993 Princeton completed a transaction with Black Hill Minerals Ltd., an Australian based holding company, to purchase 50% of Princeton's interest in Teranov. Under the agreement Black Hill committed to advance up to \$1 million to Teranov for working capital and capital improvements as well as provide Princeton 8 million shares of Cliff Resources Corporation, a publicly traded company on the Toronto Stock Exchange. The remaining 50% interest in Teranov is under option to Black Hill until December 1994 at a price of 8 million shares of Cliff Resources Corporation plus \$1 million in cash. Black Hill and its associated companies add engineering expertise in screening of fine particles and fibre enhancement to the Teranov operation. Changes are currently underway to increase production capacity and product quality.

Improvements in product quality are planned to bring Teranov fibre up to world standards. Confirmation of the products acceptance by customers will be sought in 1994.

With the new technology being introduced, 1994 will be a building year in the marketplace and it is anticipated that in 1995 Teranov will have sales for its forecasted production at competitive market prices.

The Alabama-Lost Horse Ridge area is located immediately north of Pit 2 and adjacent to the crusher. Previous exploration in the area consisted of Induced Polarization (IP) surveys and shallow diamond drilling. Results of this work indicated widespread, low to moderate grade copper mineralization within a 2 kilometre long eastwest oriented IP chargeability anomaly. Recent work, consisting of geological mapping, deep penetration - high resolution IP surveys and reinterpretation, indicates that the IP chargeability anomaly extends to the north and west under a relatively thin cover of younger, post-mineralization volcanic rocks, and increases in intensity with depth; thereby greatly increasing the size of the potentially mineralized area. Gold was analysed in 30% of the previous drill holes and copper-gold ratios in these holes indicates that the Alabama area is gold-rich relative to the other Copper Mountain deposits. Precious metals could constitute up to 40% of the value of any deposit delineated in this area.

A diamond drill program commenced on the Alabama-Lost Horse Ridge area in March 1994. The first phase of this program is designed to test the extent of potentially economic mineralization and will involve up to 24,000 feet of diamond drilling. Pending results of Phase 1, Phase 2 of the exploration program will define the morphology and grade of the deposit(s) in



the Alabama Ridge area and will require in excess of 50,000 feet of drilling. Additional drilling will be required in Phase 3 for detailed mine design prior to production from this zone.

The other target areas, shown on the accompanying map, will require further exploration and drill testing. These targets have potential to increase Similco's reserve base.



Deep penetration - high resolution induced polarization survey indicates mineralization extends to depth below prior drilling on Alabama zone. Diamond drilling to depth on Alabama deposit in spring of 1994.

## Similco Mines Ltd.



Exploration is focused on the Alabama-Lost Horse Ridge area where a geophysical anomaly and prior drilling have identified a large target providing the potential of a major new ore deposit.

A renewed exploration program was initiated around the Similco minesite in early 1993. The primary objective of this program is the discovery of a copper deposit containing 50 million tons of mineable ore within a suitable haulage distance from current facilities. There were three key components of the initial exploration program: a helicopter-borne multiparameter geophysical survey covering 175 square kilometres around the minesite, a compilation and re-interpretation of all geological and exploration data collected over the last six decades of mining activity on the site, and detailed studies on the character and controls of mineralization. This latter component of the program was carried out in conjunction with the Mineral Deposit Research Unit of The University of British Columbia.



The Copper Mountain Camp has a long history of mining activity and has produced over 1.7 billion pounds of copper, 9 million ounces of silver and 0.7 million ounces of gold. Over the last 60 years, five deposits have been discovered and mined within the camp (see map). The Contact ore body, first mined by underground methods and then as an open pit, produced in excess of 100 million tons of ore with an average grade of 0.81% copper. An improved understanding of the geology and mineralization controls on the Contact ore body and other ore deposits in the area, gained through data compilation and detailed studies, together with the results of the airborne geophysical survey, has resulted in a number of areas being targeted for more intense exploration. The most promising of these targeted areas is the Alabama-Lost Horse Ridge.



The extensive airborne geophysical survey has identified numerous exploration targets and has assisted in the interpretation of the local geology.

#### **Operations:** (continued)

The installation of an additional primary crusher was completed in September. This crusher is located adjacent to the mill to allow processing of ore from the Ingerbelle low grade stockpile and the Ingerbelle East Pit. This new installation will also eliminate the ore shortage problems that are often encountered in the winter months.

Copper recovery averaged 77.8% for the year, compared with 77.2% in 1992. The high oxide content of the ore from the Virginia Pit adversely affected recoveries.

Similco's copper production was 52 million pounds for the 11 months of operation in 1993 which is equivalent to the production rate of 1992. Copper prices received by Similco averaged U.S. \$0.84 per pound in 1993. The low production in the first half of the year and falling copper prices resulted in an operating loss of \$8.9 million for the year.

#### Similco Production Statistics

	*1993	1992	**1991	1990	1989
Ore Milled (tons x 1000)	7,416	8,132	4,245	7,441	8,312
Waste Mined (tons x 1000)	6,553	8,828	4,541	15,935	15,829
Head Grade ( % Cu)	0.45	0.45	0.48	0.50	0.46
Recovery (% Cu)	77.8	77.2	78.5	75.6	75.9
Copper Produced (lbs x 1000)	51,991	56,667	31,936	56,418	57,420
Gold Produced (ozs)	14,181	16,039	7,617	13,617	17,277
Silver Produced (ozs)	370,129	314,490	183,354	311,660	432,220
No. of Employees (Dec 31)	32	274	289	341	341

\* II months operation \*\* 7.5 months operation



Mining in Pit 3 on the Contact Ore Zone which has produced 100 million tons of ore grading 0.81% Cu by underground and open-pit mining methods.

#### Mine Plan:

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Mineral reserves at Copper Mountain consist of a limited tonnage of low strip ratio reserves and a larger tonnage of high strip ratio reserves. The higher strip ratio reserves require increased copper prices and lead time to develop. Mine plans are currently being completed to schedule the low-strip reserves.

The newly installed primary crusher allows crushing and treatment of ore from the 10.3 million ton Ingerbelle low grade stockpile and from the Ingerbelle East deposit. Production tests of the Ingerbelle stockpile material completed in late October 1993 resulted in high mill throughput rates with acceptable recoveries. Although the Ingerbelle stockpile copper grade is relatively low, the recoverable gold content is approximately twice as high as that recovered from ore of Pits 1, 2 and 3. The Ingerbelle East deposit which is located adjacent to the old Ingerbelle Pit has been added to the mineral inventory because of the installation of the additional primary crusher. This added deposit has geological reserves of 21 million tons grading 0.35% copper. Fill-in drilling is required to upgrade this reserve to the mineable category.

Mineral Reserves									
	Ore	Cut-Off	Grade	Waste	Total	Strip			
	Tons	%Cu	%Cu	Tons	Tons	Ratio			
Low Strip Reserves									
Pit 3	261	0.30	0.455	106	367	0.41			
Virginia Pit	1,439	0.21	0.420	1,969	3,408	1.37			
Stockpiles & Salvage	10,366	-	0.267	0	10,366	0.00			
Total	12,066		0.289	2,075	14,141	0.17			
Other									
Pit 2	39,000	0.20	0.330	69,420	108,420	1.78			
Pit 3 Phase 2	10,534	0.23	0.462	20,140	30,674	1.91			
Pit 3 Phase 3	41,888	0.23	0.479	117,315	159,203	2.80			
Total	91,422		0.413	206,875	298,297	2.26			
Combined Total	103,488		0.399	208,950	312,438	2.02			

## Similco Mines Ltd.





Similco's processing facilities exceeded the targeted treatment rate of 25,000 tons per day of ore in the second half of the year. Operations were suspended on November 30, 1993 due to low copper prices. The mine is currently being maintained on a standby basis with staff personnel. Management is evaluating alternate operating plans which could enable the mine to reopen at current metal prices.

A drilling program was initiated on a priority target in close proximity to the Copper Mountain primary crusher. This target, the Alabama Zone, has had prior shallow drilling which has identified an inferred

reserve of about 10 million tons of ore grade material. A deep penetration induced polarization survey has identified a large anomaly adjacent to and below the prior drilling. The 1994 program is designed to identify the extent and grade of this potentially economic mineralized zone.

## **Copper Markets:**

In early 1993 the copper market continued relatively firm despite high inventories and slow world economic conditions. Unfortunately the deteriorating fundamentals combined with concern about the reliability of "Chinese buying" triggered a price collapse in April. Although there was a modest recovery during the summer, the market again collapsed in September and continued the downward trend through October and November to the U.S. \$0.72 per pound range. For the year, copper prices averaged \$0.812 per pound; down from the 1992 average of \$1.037.

While metal supplies were in surplus in 1993, copper concentrates were in a deficit position and spot prices for treatment charges have fallen markedly. The shortage of concentrates is now beginning to affect the ability of smelters to operate at full capacity and this will gradually overcome the supply/demand imbalance.

### **Operations:**

Mill feed in 1993 was mined primarily from Pit 3 and the Virginia Pit, supplemented with a minor amount of ore from the Ingerbelle stockpile. In total, 7.4 million tons of ore and 6.6 million tons of waste was mined. The mill head grade averaged 0.45% copper for the year.

Mill throughput in 1993 was comparable to that of 1992, but below the planned increased rate, due to a grinding ball problem, lightning strike in June and the suspension of operations on November 30th. Mill operating time averaged 85.7%; down from the 1992 average of 91.5%. A lightning strike in early June disabled one ball mill motor, one synchronous condenser, and two S.A.G. mill motors. The plant operated at reduced capacity until July 12th when the final motor repairs were completed. As a result, mill operating time in June and July was reduced to 64.9% and 78.2% respectively.

During the first five months of 1993 premature breakage of the 5 inch diameter S.A.G. mill balls had a significant adverse affect on costs and throughput. Substantial improvements in throughput and unit costs were achieved after changing the ball supplier in May.

