

GRINDING OUT PROFIT

Copper, moly and coal mix well for Lornex

by Marilyn Scales

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Rio Algom's 68% interest in Lornex Mining Corp is a profitable one. During 1985, Lornex had earnings of \$24.1 million. While the high earnings levels of 1979 and 1980 have not been duplicated, they have recovered substantially from the losses and slim profits of 1982-84.

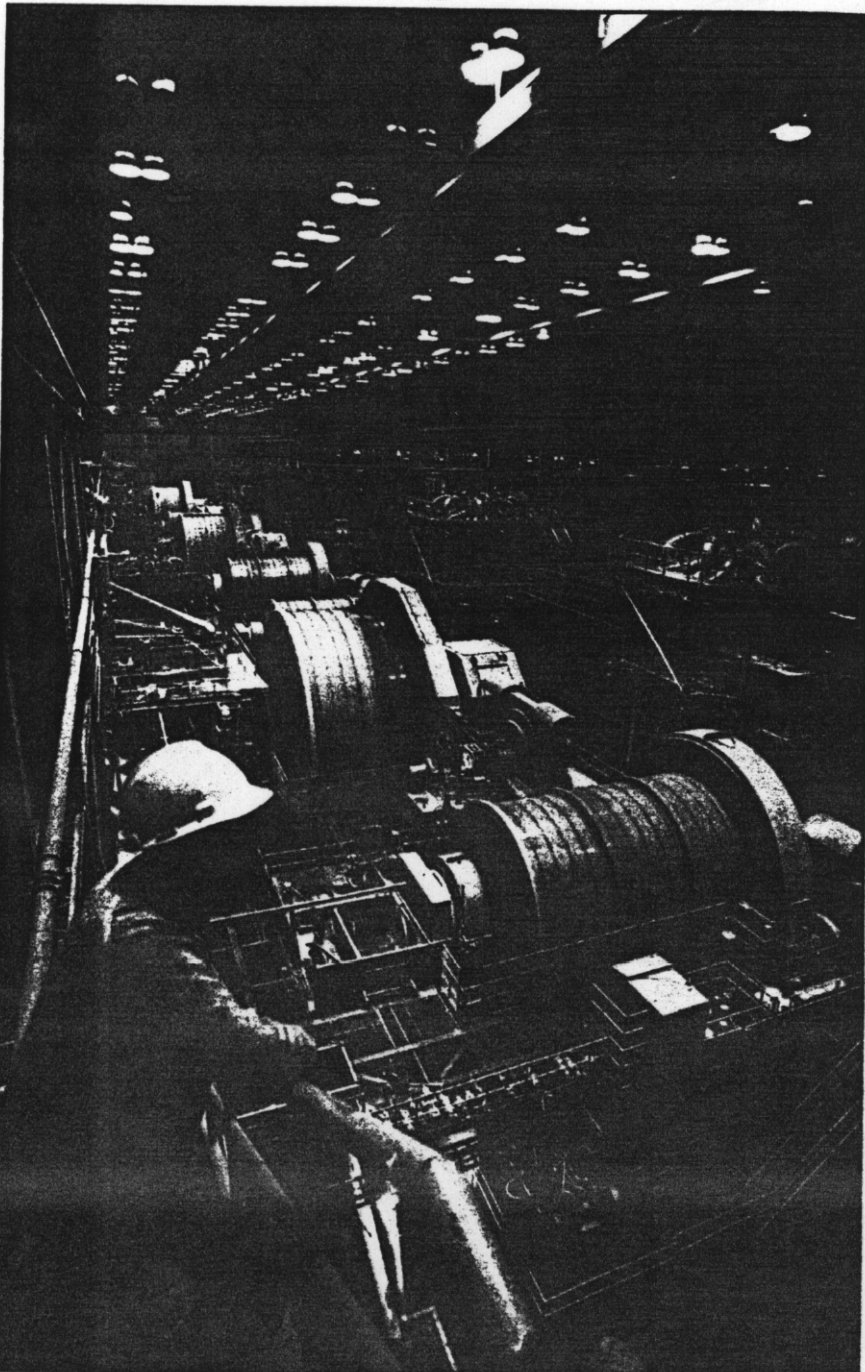
Lornex is well positioned to maintain its fiscal strength. The company has a 45% interest in a giant copper-molybdenum producer in the Highland Valley of British Columbia, has a 39% joint venture interest in a metallurgical coal mine in the northeastern part of the province and maintains a small but active exploration effort.

Lornex opened its exploration office in Vancouver five years ago. With a modest annual budget of \$1 million, the company prefers to conduct investigations on acquired claims rather than grassroots projects. Precious metals and massive sulphide prospects are the principal targets in British Columbia and the western US.

BULLMOOSE COAL MINE

The \$300 million Bullmoose project, located near the new town of Tumbler Ridge BC, began production late in 1983. Lornex holds a 39% joint venture interest in the mine. Fifty-one percent is held by Teck Corp which is the operator, while Nissho-Iwai holds the remaining 10%. The operator reports to a management committee. Lornex's share of metallurgical coal production was 831 000 tonnes up 25% over the previous year. The mine also produces a small amount of thermal coal, 27 000 t of which was credited to Lornex last year.

Sales contracts with a number of Japanese steel mills were obtained in 1981. In early 1982, Lornex bought into the Bullmoose project and construction began that May. Eighteen



Lornex will mill more tons/day of the new softer higher grade ore

PROPERTY FILE

93P016

months later the first clean coal was produced. The Bullmoose project has turned into a highly successful operation.

The Bullmoose pit is located on a sidehill above the plant site. Five seams are being mined. They are within an open, upright syncline plunging gently to the north, with limbs dipping about 6°. The seams vary in thickness from 1.5 to 5 metres; the aggregate thickness is about 12 m.

After the drilling and blasting, four electric shovels load waste into the fleet of trucks. Coal is not drilled and blasted, but is dug by two hydraulic excavators. The stripping ratio is approximately 4.5 bank m³/t of raw coal. An in-pit breaker reduces the coal to -38 mm before it is conveyed to the raw coal silo at the preparation plant.

The wash plant uses conventional heavy media techniques to produce coking coal with an ash content of 9.25%. Clean coal is dried to 8% moisture in a dryer fired with thermal coal from the mine. Clean coal is stored in a silo at the mine and then trucked 35 km in 40 t payloads to the railhead for shipment to the Ridley Island terminal in Prince Rupert.

The coal is sold under the terms of a 15½-year contract to a group of Japanese steel mills. The contracted tonnage is 1.7 million t/y. The base price was fixed at \$75.50/t in April 1, 1980 dollars FOBT Ridley Island BC. A portion of that amount is subject to an escalation formula based on a mixture of cost indices. For two years, from April 1984 to May 1986, the contract was amended to increase the total tonnage to 2 million t/y with a price reduction of \$10/t.

HIGHLAND VALLEY COPPER

Credit for the discovery of the Lornex porphyry copper deposit in the Highland Valley of British Columbia goes to Egil Lornzsen in the early 1960s. To develop the property, the backing of a major mining company was needed. Enter Rio Algom, which studied the deposit for four years and in 1968 gave the green light to proceed with development. In the spring of 1972, the mine was ready, construction complete and the first ore fed to the 43 500 t/d concentrator. The Lornex concentrator has since undergone a \$160 million expansion, completed in

1981. The capacity was raised to 72 500 t/d and a molybdenum leach plant added. In 1985 it treated a record 29.2 million t of ore at an average rate of 80 000 t/d. That level of production should be maintained this year.

In July 1986, Lornex and Cominco Ltd combined their copper-molybdenum production facilities into a new venture, Highland Valley Copper (HVC). Assets of HVC include the Lornex pit and concentrator, Cominco's Valley deposit and the old Bethlehem mill. Cominco holds 55% of HVC, and Lornex 45%; the partners share management responsibilities. Eventually the Lornex pit will be closed and the Valley pit mined at the rate of 120 000 t/d. Three-quarters of the ore will be milled at the Lornex concentrator and the other quarter at the Bethlehem mill.

Eventually the "C" crusher at the Lornex mine will be moved to the Valley mine, which will then have two identical portable in-pit crusher systems. The crushers are Allis-Chalmers 1524 mm by 2260 mm units, producing a -250 mm product. Both will be production units (rather than keeping one on standby) and together will run at 12 000 t/h.

Lornex is in the final stages of testing a computerized shovel payload system with encouraging results. The Bucyrus-Erie SLM² system dynamically measures the weight of material in each shovel bucket, and accumulates the data to indicate the payload placed in each haulage truck. Hardware and software improvements are still being made, and the system will be expanded when the time is ripe.

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LORNEX MILL

Lornex copper concentrate production for 1986 will amount to approximately 330 000 t grading 32.0% Cu. Eight thousand tonnes of MoS₂ concentrate, grading 54.5% Mo, will also be produced. Estimated recovery rates for this year are good, being 89% for copper and 76% for molybdenum.

When the Lornex mill is operating solely on ore from the Valley mine, it will produce about the same tonnage of copper concentrate, but the concentrate grade will be higher, at about 44% Cu, because of the higher bornite content of the ore. Moly concentrates will be the same quality but only about one-third of the tonnage because of the lower moly heads.

There are three grinding lines at the Lornex mill. The identical "A" and "B" lines are the original ones. Each has a 7.95 m primary semi-autogenous (SAG) mill. The "C" line was added during the expansion five years ago. It has a Dominion Engineering 10.4 m primary SAG mill with variable speed control. Each of the three grinding lines has two secondary ball mills.

After grinding, the slurry passes through a bulk sulphide flotation circuit, which includes roughing, scavenging, precleaning in flotation columns and two stages of conventional cleaning. Then in the moly separation circuit, differential flotation produces separate moly and copper concentrates. The moly concentrate is cleaned in flotation columns.

The use of column flotation cells in the copper pre-cleaner and moly cleaner flotation circuits has met with considerable success. In the moly separation circuit, the flotation columns reduce the circulating load, increase the grade of the moly concentrate, and save power. They also exhibit good response to operational changes. Finally, the moly concentrate is upgraded by ferric chloride leaching. Both kinds of concentrates are filtered and dried in preparation for shipment.

The Lornex concentrator design can efficiently process most porphyry Cu/Mo ores of various copper grades. Therefore, no major circuit revisions are required to treat Valley ore.

As in most orebodies, the hardness of the Valley ore varies, but to a considerably lesser extent than it does in the Lornex orebody. The variable speed feature of the "C" SAG mill has been successfully employed in accommodating the sudden fluxuations in the hardness of Lornex ore, and will be more than adequate to handle the Valley ore.

Operation of the Lornex mill is extremely efficient. Central process control is provided by a Taylor Mod III system. Two Outokumpu Courier analyzers have also been added recently. They yield six-minute assay scans on all critical streams including heads, concentrates, tails, intermediate and molybdenum circuit streams.

As Highland Valley Copper consolidates its operations, the Lornex concentrator will continue to play an important role in producing low cost copper and molybdenum.