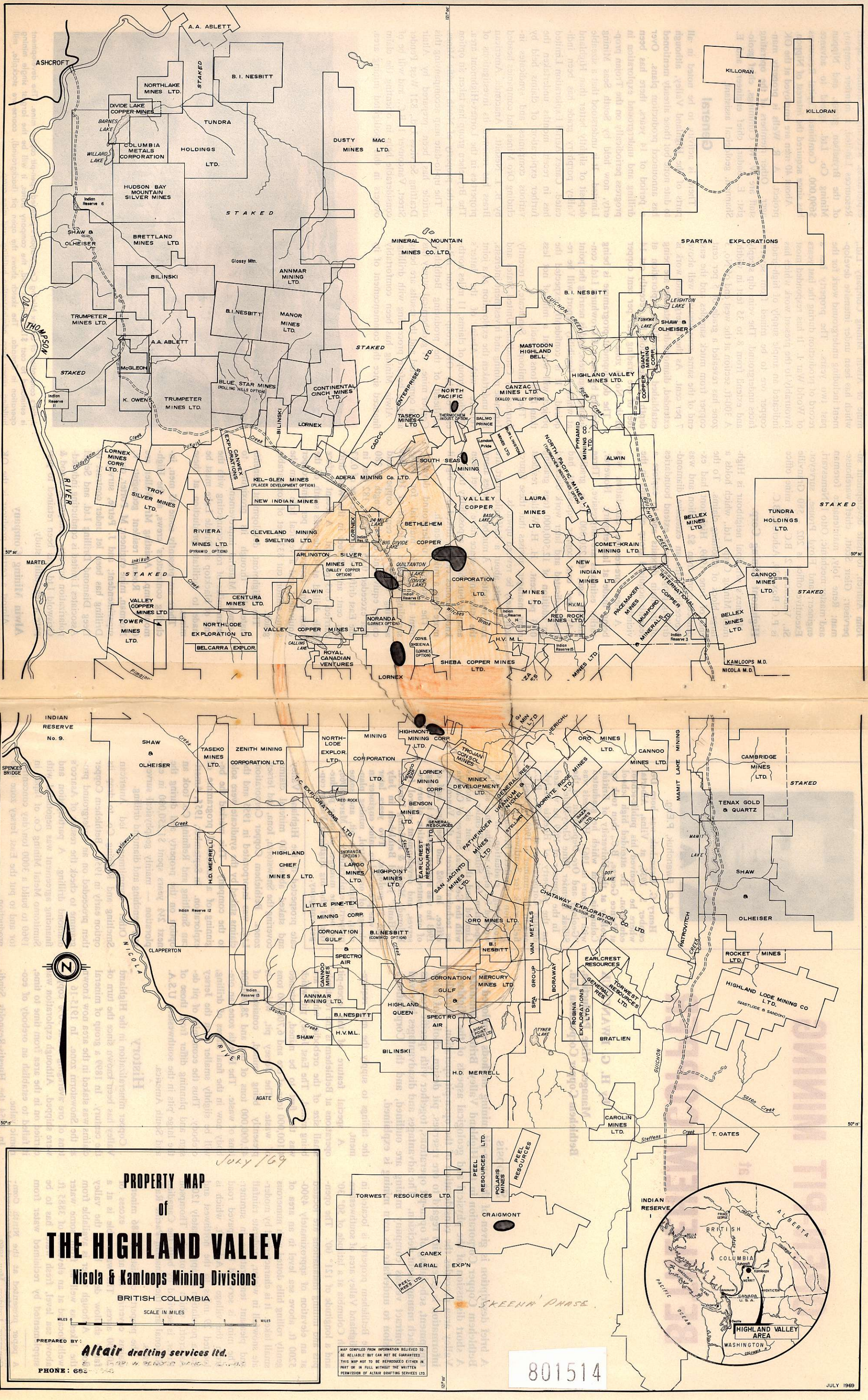
A.A. ABLETT
ASHCROFT
NORTHLAKE MINES LTD.
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DIVIDE LAKE COPPER MINES
BARNES LAKE
TUNDRA HOLDINGS LTD.
WILLARD LAKE
COLUMBIA METALS CORPORATION
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BIG DIVIDE LAKE
COMET-KRAIN MINING LTD.
50° 30'
MARTEL
Inkikuh Creek
STAKED
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QUILTANTON LAKE (DIVIDE LAKE)
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SHEBA COPPER MINES LTD.
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LORNEX
Pimainus Creek
INDIAN RESERVE No. 9.
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ORO MINES LTD.
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GAZA MINES LTD.
Kookwuck Creek
HIGHLAND CHIEF MINES LTD.
H.D. MERRELL
(NORANDA OPTION)
LARGO MINES LTD.
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EARLCREST RESOURCES LTD.
PATHFINDER MINES LTD.
ST ELMO
SAN JACINTO MINES LTD.
MAMIT LAKE
SHAW & OLHEISER
Indian Reserve 12
LITTLE PINE-TEX MINING CORP.
ORO MINES LTD.
CHATAWAY EXPLORATION (KING RESOURCES OPTION) CO LTD
PATROVITCH CREEK
CORONATION GULF & SPECTRO AIR
B.I. NESBITT (COMINCO OPTION)
B.I. NESBITT
VAN METALS
ROCKET MINES LTD.
CLAPPERTON
CANNOO MINES
ANNMAR MINING LTD.
B.I. NESBITT
H.V.M.L.
SHAW
Indian Reserve 13
Stuhun Creek
CORONATION GULF & SPECTRO AIR
HIGHLAND QUEEN
HIGH POINT MINES LTD
MERCURY MINES LTD.
SRA GROUP
BORAWAY
EARLCREST RESOURCES
GENERAL RES.
TORWEST RESOURCES LTD.
ROBINA EXPLORATIONS LTD.
HIGHLAND LODE MINING CO LTD. (VASTLODE & SANDOH)
TYNER LAKE
BRATLIEN
BILINSKI
H.D. MERRELL
GUICHON
Saxon Creek
AGATE
CAROLIN MINES LTD.
Steffens Creek
T. OATES
50° 15'
PEEL RESOURCES LTD.
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PEEL RESOURCES
TORWEST RESOURCES LTD.
CRAIGMONT
CANEX AERIAL EXP'N
PEEL RES. LTD.
SKEENA PHASE
INDIAN RESERVE
PRINCE GEORGE
BELLA COOLA
FRASER R.
ALBERTA
BRITISH COLUMBIA
Ashcroft
Kamloops
MERRIT
PENTICTON
VANCOUVER ISLAND
Vancouver
Victoria
Seattle
CANADA U.S.A.
PACIFIC OCEAN
COLUMBIA R.
WASHINGTON
HIGHLAND VALLEY AREA
PROPERTY MAP
of
THE HIGHLAND VALLEY
Nicola & Kamloops Mining Divisions
BRITISH COLUMBIA
SCALE IN MILES
MILES 0 1 2 3 4 5 6 MILES
PREPARED BY:
Altair drafting services ltd.
PHONE: 685-
MAP COMPILED FROM INFORMATION BELIEVED TO BE RELIABLE BUT CAN NOT BE GUARANTEED THIS MAP NOT TO BE REPRODUCED EITHER IN PART OR IN FULL WITHOUT THE WRITTEN PERMISSION OF ALTAIR DRAFTING SERVICES LTD.
801514
JULY 1969

OPEN-PIT MINING

at

BETHLEHEM COPPER

By H. G. EWANCHUK

Manager, Mine Production,
Bethlehem Copper Corporation Ltd.

H. G. Ewanchuk, P.Eng.

Henry G. Ewanchuk was born December 5, 1936, at Vilna, Alberta, where he received his public-school education. He attended high school at Prince George, B.C., then took up geology at the University of British Columbia from which he graduated with honours in 1961. His thesis was "Geology and Ore Deposition of the Silbak Premier Mine Glory-Hole".

In the summer of 1959 he worked on the property of Huestis Molybdenum Corporation at Pacific, B.C., and in the summer of 1960 engaged in field work for Southwest Potash Corporation in northern British Columbia. Following graduation in 1961, he worked for eight months on a salvage operation for Silbak Premier Mines Limited and then spent six months with the Geological Survey of Canada as technical officer in the Vancouver office. In 1962 and the first half of 1963 he was section geologist in charge of ore control, calculation of ore reserves, and development control for Eldorado Mining & Refining Limited.

"Hank" joined Bethlehem in July 1963 as geologist. Two years later he was promoted to mine engineer in charge of ore control, mining planning, design of open pit, and some property exploration. In March 1966, he became manager of mine production of the big Highland Valley copper company.

Synopsis

A brief description is given of the open-pit mining methods employed by Bethlehem Copper Corporation in the Highland Valley, British Columbia. A short discussion of the physical and geological aspects of the Highland Valley area precedes the consideration of the open-pit operation. Detailed information is given with regard to ore reserves, pit design, choice of mine equipment, scheduling of open-pit operations, together with specific reasons for each management decision. The advantages and disadvantages involved in contract versus company mining are outlined, and the Corporation's decision to undertake its own mining is explained.

The Bethlehem property is located in the Highland Valley area of southwestern British Columbia at a latitude of 50° 30′ and a longitude of 121° 00′. The open-pits and milling installations are located at an elevation of approximately 4900-5200 ft. above sea level in an area of gently rolling hills dotted with numerous small lakes. It is characterized by moderate snowfall in winter, moderate rainfall and pleasant temperatures in summer. The mine is serviced by a paved road from the village of Ashcroft, which is located 29 miles to the northwest and has a population of approximately 1200. Ashcroft, which is on the Thompson River, is serviced by both the Canadian National and the Canadian Pacific Railways.

The property consists of 486 mineral claims covering an area in excess of 20,000 acres. The water-table is at a fairly shallow depth below the valley floor. Although water is available from the lakes as well as from some water wells located at an elevation of 3885 ft. above sea level, fresh water has to be supplemented by reclaimed water from the tailings to supply the mill requirement.

A special feature of the open-pit operations at Bethlehem is the relatively small size of the orebodies which are being mined. The East Jersey pit, which was the first to be mined, contained 4,100,000 tons of ore and 6,700,000 tons of waste. The Jersey pit, which is presently being mined, consisted of 42,000,000 tons of ore and 28,000,000 tons of waste. The Huestis zone, an orebody now in the final stages of drilling, will be slightly smaller than the Jersey orebody. Thus the economics of pit design and planning differ from those of the large pits in the southwestern U.S.A. and South America.

History

Copper mineralization in the Highland Valley has been known since the turn of the century. In 1899 a group of mineral claims was staked in the area now known as the Snowstorm zone. In 1915-16 90 tons of ore averaging about 30% copper were shipped. Although exploration was carried on in the area from time to time, it failed to establish an orebody of economic value.

In 1954 the Huestis-Reynolds Syndicate prospected in the Highland Valley and staked about 100 mineral claims covering the Snowstorm, Iona, and Jersey zones. Bethlehem Copper Corporation, Ltd., was incorporated in 1955 and the claims staked by the syndicate were sold to the company. This marked the beginning of a successful programme of exploration. In September, 1955, American Smelting and Refining Co. took an option on the property and during the next 2½ years spent $1,250,000 in exploration — mainly geophysical surveying, trenching and diamond drilling.

Other commitments led American Smelting and Refining Co. to drop its option early in 1958. Bethlehem Copper then proceeded on an underground programme to check the results of Asarco's diamond drilling. A participation and financing agreement was negotiated with Sumitomo Metal Mining Co. of Japan in 1960 to build a 3000 ton/day concentrator and to put the East Jersey zone into production.

A paper presented at the Ninth Commonwealth Mining and Metallurgical Congress, London, May 1969.

John Aldrich, townsite development supervisor; Glen Scott, chief warehouseman; Rene Joly, maintenance foreman and master mechanic; Otto I. Nemesvari, engineer; and Floyd Prouse, surveyor. Executive office is 202 - 580 Granville St., Vancouver 2, B.C. and mine office is P.O. Box 430, Ashcroft, B.C.

Highmont Mining Corp.

Lornex's principal neighbour is Highmont Mining Corp. Ltd., which holds a large block of adjoining claims. To the end of June 1969, Highmont had expended more than $2 million and was proceeding with an extensive diamond-drilling programme to extend boundaries of its main deposits and to explore a recently-acquired group of claims in the vicinity.

A new ore-reserve calculation was being made at last enquiry. However, earlier estimates are impressive. Three months ago, 61,220,000 tons grading 0.437 per cent copper equivalent had been indicated and later work disclosed an addition of 12,500,000 tons grading 0.53 per cent. H. H. Waller, resident mine manager, advises that these figures will likely be revised upwards.

Two pits about a half-mile apart are now indicated. A number of holes along the intervening space have not yet been assayed but there is a possibility the two known zones can be linked in a big pit more than a mile in length.

The extensive underground development to provide material for bulk-sampling revealed a length of 167 feet assaying 0.723 per cent copper and copper equivalent; another length of 280 feet exceeded 0.45 per cent; 182 feet in the East drift returned an average of 0.57 per cent; and 52 feet in the West drift carried 0.63 per cent. A recent surface hole drilled at 45 degrees south of the main zone assayed 0.6 per cent copper equivalent and a vertical hole from the same station cut 833 feet of comparable grade.

The Highmont development benefits materially through its proximity to Lornex. Material improvement of the seven miles of road connecting with the end of blacktop at Divide Lake must be made to facilitate production at these mines.

There are presently some 45 men, including contractors' crews, at the Highmont camp. Assisting Mr. Waller are G. Van Rosen, resident geologist; V. Norman, mine engineer; M. Porter, camp superintendent; and J. Petrie, surveyor. Drilling has been let under contract to Deeg Diamond Drilling Ltd. and Seigel Associates Limited is conducting induced-polarization surveys. Chapman, Wood & Griswold Ltd. has been retained to prepare a feasibility study.

Alwin Mining Company

Almost a certain producer is the OK mine of Alwin Mining Company Ltd., which has been under intensive development including underground work for the past two years. The property has a record of production during the last years of World War I. It has responded most favourably to the present work which has indicated an ample supply of high-grade copper ore to be mined from several faces underground. The veins dip steeply and extend from 8 to 35 feet in width. A 300-ft. section at the west end of No. 3 zone has revealed a grade of 5 per cent copper from muck samples and the east end of the same zone assayed well above 7 per cent. As the underground work is extended, diamond-drill stations are being established to facilitate exploration at depth. A deep hole has recently cut 14 feet of ore grading 6.27 per cent copper in the No. 6 zone.

The development programme is being directed by Bacon & Crowhurst Ltd., consulting engineers, and is nearing the point at which a feasibility report will be required. It is confidently expected the project will warrant a mill of not less than 1000 tons capacity.

The Siniloops Syndicate, recently formed by Canadian, United States and Japanese mining and investment interests, has undertaken the exploration as a joint venture with Alwin of the latter's Guichon group of claims, 11 miles northeast of the OK group and four miles northeast of the producing Bethlehem Copper mine. A geochemical survey has been completed and the results are being assessed before proceeding with drilling.

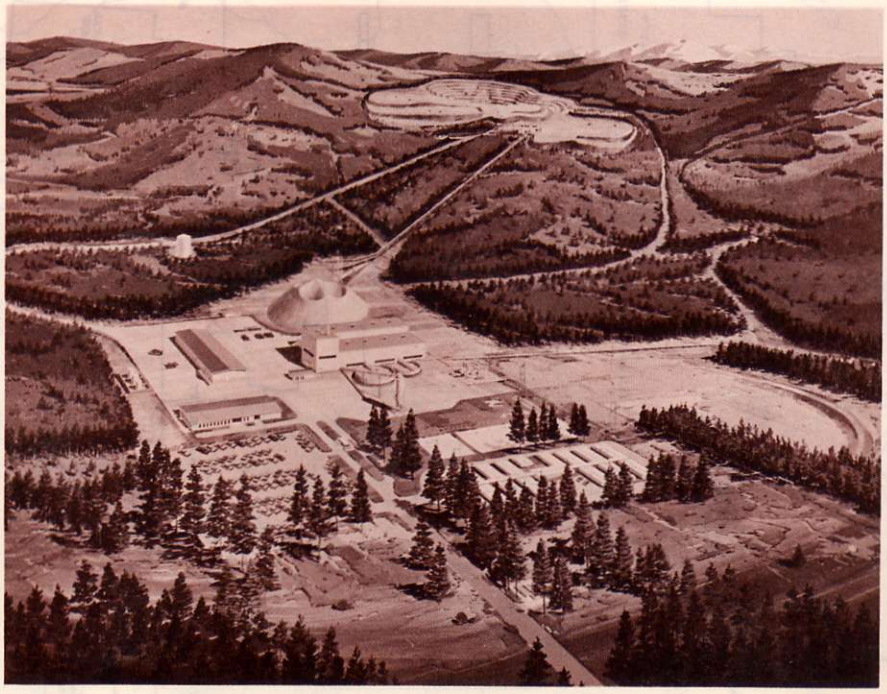
Alwin Mining has been comfortably financed since the commencement of its exploration. Recently, Combined Capital Resources Limited, a member company of the Brynelsen group, and Nippon Mining Co. Ltd. agreed to advance $690,000. Combined Capital Resources has since acquired the interest of Nippon.

About 40 men are employed at the OK project. A. R. Wells is property manager. Other members of the operating staff are W. W. Cummings, chief geologist; E. Sadar, chief engineer; and E. Shannon, geological assistant.

General

There is activity to be noted in all parts of the Highland Valley, although to date none but those already mentioned has announced production plans. Over a period of 14 years, there has been drilling and underground exploration in progress periodically on the Trojan property, now held by South Seas Mining Limited. It is understood that a sizeable deposit of slightly better than Highland Valley porphyry grade has been indicated. Canex Aerial Exploration Limited has in recent months undertaken the further exploration of claims held by various companies and syndicates including Oro Mines and companies headed by B. I. Nesbitt. Anaconda American Brass has renewed its investigations of properties in the Lornex-Highmont area. The Brynelsen group has taken an option on the property of North Pacific Mines.

The up-to-date map accompanying this article has been prepared by Altair Drafting Services Ltd., 821 West Pender Street, Vancouver 1, B.C., and will be of considerable help in orienting the claim owners in this spotlighted mining area.



Artist's conception of Lornex Mining Corporation's planned open-pit copper mine. The development is estimated to cost $120 million and, the company states, it will be the largest single mining operation in Canada. The sketch shows the open pit (background), coarse-ore stockpile, mill building, repair shop, administration building, and mine camp.