PRODUCTION COMMENCES FROM ALWIN'S UNDERGROUND MINING OPERATION

R. V. KIRKHAM

"Highland Valley" is almost a magical name in the annals of mining in British Columbia.

It became so during the days when H.H. "Spud" Huestis left his personal and permanent mark on the area when, with a fortuitous combination of vision and faith, not to mention sheer guts, he was responsible for the development of the now-famous Bethlehem copper mine which sparked the mining boom of the ensuing years.

This era of important new producers has been characterized by bigness.

Not so long ago the Sullivan mine at Kimberley was regarded with awe, and rightly so, because of the immensity of its orebody and its large daily production of up to 12,000 tons of ore.

Nowadays, with the advent of the big open-pit operations, production figures of up to 50,000 tons of ore daily are spoken of in terms that are almost casual.

It is only natural, therefore, when speaking of the Highland Valley, to think of the huge orebodies of Bethlehem, Lornex, Valley Copper, and Highmont with their combined reserves of several billion tons of copper ore.

Big, huge, immense, enormous — whatever the description, it fits.

So it is almost startling to realize, if a reminder is needed, that small mines are still making important contributions to the mineral output of the province. The fact that their development has been minimized by the larger and better publicized mines does not detract from their usefulness to the economy.

Such a producer is that of Alwing Mining Company Ltd. It is a joint venture by D.K. Mining Inc., International Minerals & Chemical Corporation, and Alwin Mining Company Ltd., termed the O.K. Syndicate.

The Alwin property is unique in the fact that, while located in the Highland Valley, it is a good-grade, small-tonnage operation dwarfed, as it were, by its low-grade, high-tonnage neighbours.

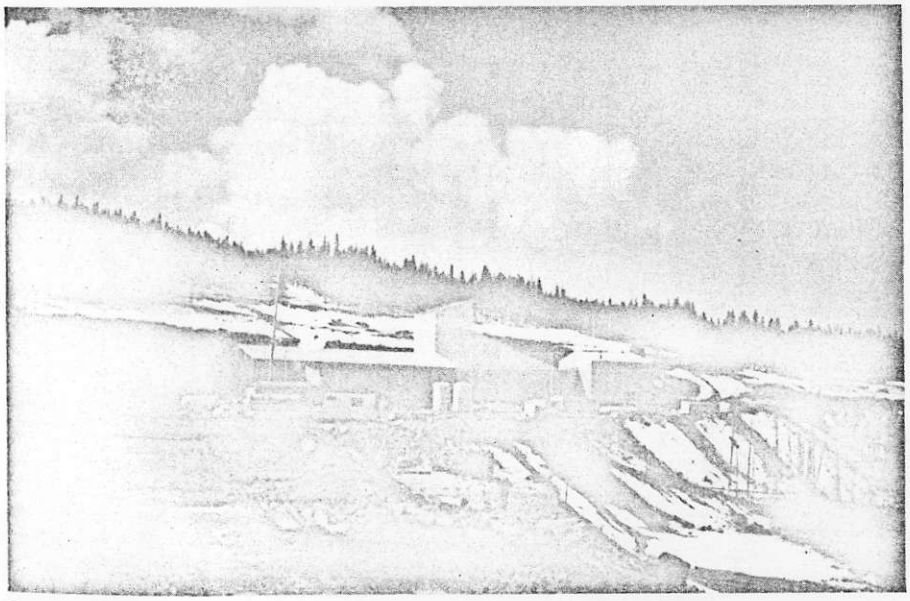
The first operation on the property was the O.K. or Chataway mine which shipped about 2000 tons of ore assaying from 9% to 13% copper and later treated about 10,000 tons of ore assaying about 3.5% copper as long ago as 1916 to 1919.

It lay dormant for many years but a few years ago a magnetometer survey was made and was followed by trenching and drilling with inconclusive results.

After the present group was put together by Alwin Mining Company, an I.P., survey and soil-sampling program were made without locating any areas of economic low-grade copper mineralization. However, a drilling program started from the old workings picked up the high-grade zones which make up the present ore reserves.

In 1968 an underground program was started to check the results of the surface program. This consisted of an adit about 300 feet below the highest outcrop with a crosscut through the ore and limited drifting and raising on the ore. Simultaneous diamond drilling underground extended the ore zones to depth. On surface, anomalous areas as indicated by soil sampling were trenched and diamond-drilling without finding any additional ore outside the mine area.

A decision was made last year to go ahead with production at the rate of 500 tons a day. A construction camp was established and with work continuing throughout the winter (the worst for many years in the Highland Valley) the run-in period was reached in March. At the time of Western Miner's visit to the property in early April the mill was handily putting through 600 tons of ore daily.



Concentrator of the O. K. Syndicate at the Alwin underground-mining operation in the Highland Valley.

CONSTRUCTION

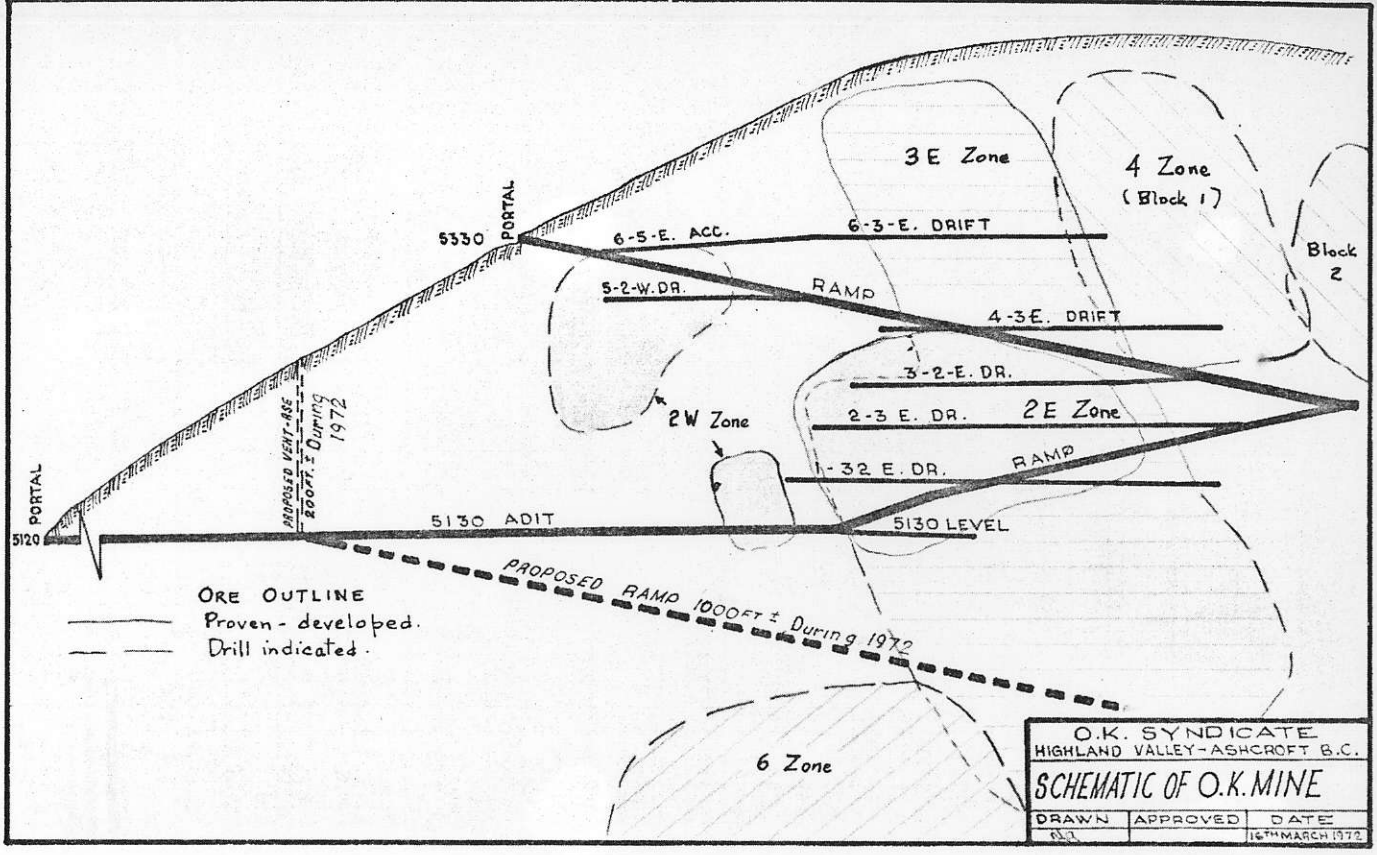
While the current operators brought new life to an old property, the decision to proceed with production meant a new lease on life for an existing mill.

The plant building and equipment were purchased from Western Nuclear Limited at Hansen Lake, Saskatchewan, near Flin Flon, Manitoba. About 160,000 tons of ore had been processed by this plant before being shut down at its original site.

The entire plant was purchased in situ, dismantled by the O.K. Syndicate and trucked to Vancouver.

H.A. Simons (International) Ltd., consulting engineers, were given the task of engineering the re-location of the plant and modifying it to process the Alwin ore. Because the plant was originally located on a perfectly flat site adjacent to Hansen Lake and had to be re-erected on a steeply-sloping hillside in the Highland Valley, modifications included all new foundations, a new coarse-ore bin, and a re-design of the lower floor along with the re-location of some of the equipment. The re-location of the plant was designed to provide optimum economy in construction and full utilization of the excavation for the re-design of the lower floor.

Mine offices were created by utilizing the existing office and engineering trailers used by Alwin during the exploration program. The staff house is the original two-trailer installation at Hansen Lake which was moved across the country and re-located in the Highland



Valley on the plant site adjacent to the main office. Some of the personnel are housed in trailer units and the eating and dry facilities are also trailers. The on-site housing is a temporary situation as the company intends to use the surrounding municipalities as a source for labor and housing.

The Alwin-O.K. Syndicate project was managed by D. W. Pringle and Associates Ltd. with J. S. Robertson directing and superintending construction. General contractor was Klassen Construction Ltd. and electrical and building contracts were let to Gould Electric Ltd. and Permasteel Engineering Ltd. respectively.

GENERAL GEOLOGY

The Alwin property is underlain almost entirely by Bethsaida granodiorite, the central and youngest phase of the Guichon batholith. The gradational contact with the older Bethlehem phase passes through the west end of the property and all of the properties producing or preparing for production, are located in or near the Bethlehem phase. The batholith, which is dated as Lower Jurassic or about 200 million years old, extends about forty miles from near Ashcroft to Merritt. The final phase of the batholith was the brecciation, prophyry dyke emplacement and mineralization which formed the ore bodies.

A light gray Tertiary andesite forms a volcanic neck or plug lying mainly under a pond at the west end of the ore structure, and a trough up to 1200 feet deep lying along the north boundary.

Structure

All the major deposits of the Highland Valley are associated with major structures striking northerly — faults, breccia zones and prophyry dykes. However, the Alwin zones are controlled by two fracture sets striking 80° or 110° (azimuth) in a belt running easterly from the volcanic plug toward the old Bethsaida showings on the Valley Copper property. A set of post-ore faults strikes north-easterly, with horizontal displacement up to 15 feet, and a greater vertical component.

Alteration

The most pervasive alteration is associated with post-ore faults, and varies from chalky kaolinization of feldspars to green "talcose" sericitization of feldspars and biotite. The margins of ore zones sometimes have several inches of reddish alteration, due to K-spar on hematite. Red earthy hematite and chloritized biotite are locally common.

Mineralization

The ore zones consist mainly of sericite, quartz and minor chlorite in vein-like zones with sharp contacts, dipping steeply south. Lengths of zones vary up to 300 feet and widths to 30 feet, averaging 10 feet. Where mineralization occurs along intersecting fractures, the combined widths may increase to over 40 feet.

The ore minerals are chalcopyrite, with lesser bornite and chalcocite. Specular hematite is common in marginal ore (1% Cu. or less), and molybdenite is found as slickensides on minor fractures, not associated with the ore zones. Pyrite occurs in the post-ore fault mineralization, in quartz stringers with chalcopyrite and, rarely, galena and sphalerite.

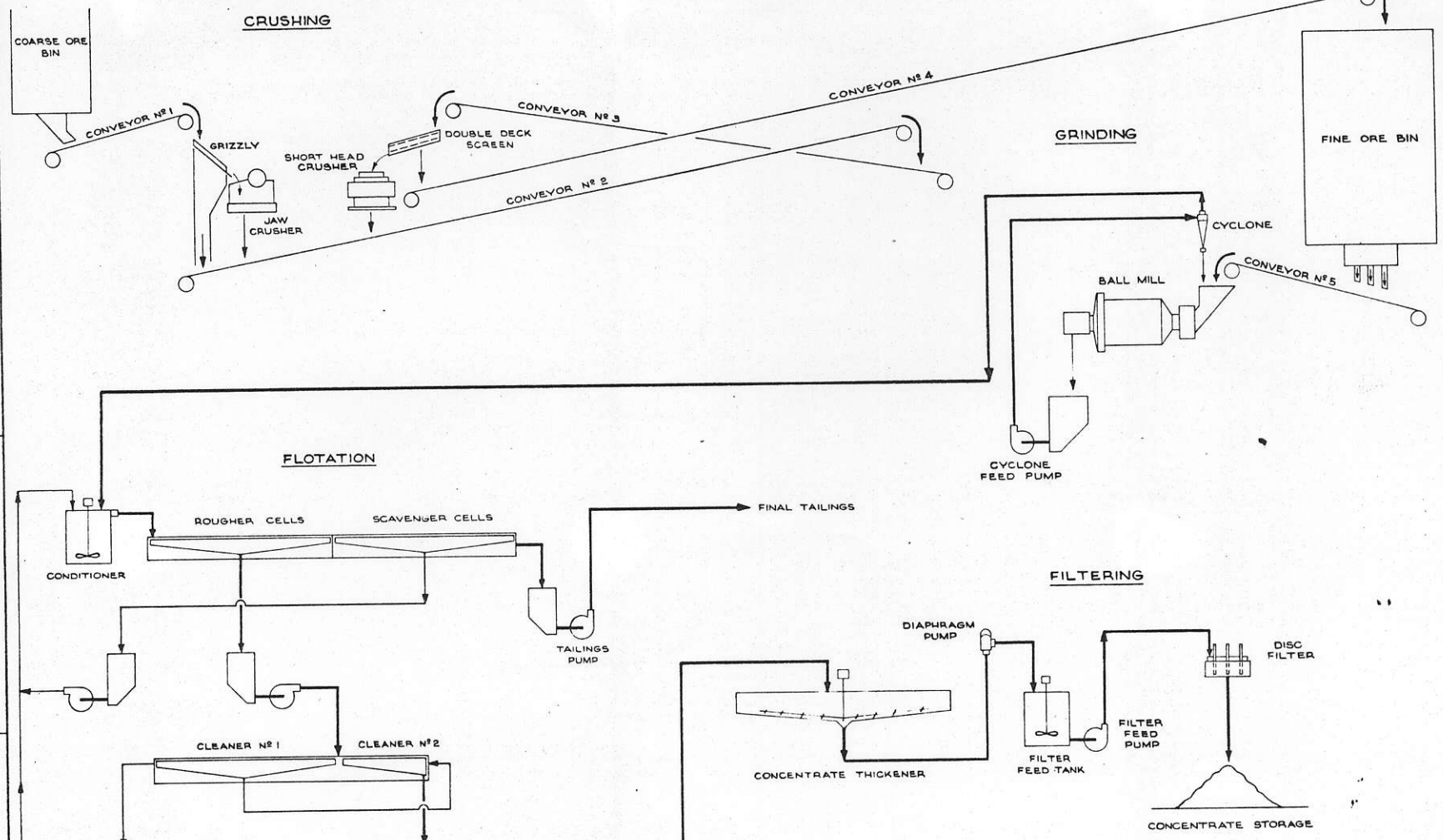
ORE RESERVES

Ore reserves are presently calculated for six zones, in an area 500 feet wide by 1,500 feet long, and to a maximum depth of 800 feet below surface. Geological reserves as estimated for the feasibility report are 1,153,260 tons at 2.31% copper after dilution. This includes drill-indicated ore as well as proven ore. Pre-production development has increased the reserves, since the work has been concentrated on stope preparation in known zones.

Outside the immediate mine area, similar zones have been found about 600 feet northeast, and 700 feet west of the workings. No change in geological structure has been seen in the deeper drill holes, and therefore possibilities for more ore are considered to be good.

I MINE DEVELOPMENT

The mine is a completely trackless operation and is currently developed by a haulage adit at the 5130 ft. elevation and a service-access ramp collared at the 5343 ft. elevation. This ramp descends at -15% for 1460 ft. to a connection with the 5130 level haulage. Ramp exits at various elevations provide access to the drilling and extraction horizons of the first lifts in 2E and 3E



PURCHASE ORDER		
DWG. ISSUED TO VENDOR	NUMBER	DESCRIPTION

REQ'D FOR CONSTR.	ASSOCIATED DRAWINGS

02	MAY 1972	REISSUED	DG
ISSUE NO.	G.M.Y.	ISSUE	DR. CH. APP.
		CERTIFIED FOR CONSTRUCTION	SCALE
H.A.S. DEPT. MGR.		H.A.S. PROJ. ENG.	

O.K. SYNDICATE

H. A. SIMONS (INTERNATIONAL) LIMITED
CONSULTING ENGINEERS
VANCOUVER, B.C. CANADA

AREA: CRUSHING PLANT & CONCENTRATOR

SUBJECT: FLOWSHEET FOR 600 TONS/DAY

DRAWING NO.	H.A.S. DRAWING NO.	REV.
	D1947-3-460	02

ore zones now in production. Definition and mining preparation of the 4E zone is also accessed from this decline.

This year, the decline will be extended an additional 1000 ft. to prepare the second lift of 3 zone and 4 zone to enable exploration drilling well beneath existing ore reserves.

II PRODUCTION

To date, 135,000 tons are prepared and producing in two parallel zones. These stopes are both longhole configurations utilizing near vertical holes fanned or ringed up and down from the sublevels. These stopes vary in width from 8 ft. to 43 ft.

In addition to longhole mining. some subsequent narrow zones will be extracted with shrinkage methods and there may be occasions when as much as 30% of production will be from shrinkage stopes.

Drilling and Blasting

Bar-and-arm setups are utilized for all longhole drilling. Current ring patterns call for a 4-ft. burden and 6-ft. toe spacing using split-ring configurations in wider sections so that alternate setups have only about one half the footage of standard rings or fans. Average performance using a 2-in.-diameter hole and Gardner-Denver DH99 machines is 282 ft. per man-shift.

Both cartridge and ANFO explosives are used, and all blasts are fired electrically from a 220 volt source. Collar lengths vary from hole to hole but are designed to achieve as near parallel explosive columns as possible between adjacent holes. A detonating chord is used in all holes loaded with standard 1½-in. by 16-in. cartridge explosives.

Although a relatively small tonnage has been blasted to date, it is indicated that some variation in mining methods will have to be introduced in order to obtain the maximum grade at minimum cost.

Draw and Haulage

Each stope has a draw level incorporating an undercut drill drift, an extraction drift, and drawpoints at 30-ft. centres. As the stopes are opened, some mucking will be from the undercut drift to relieve the brow and to permit stope blasts while there is a good broken-ore inventory still in the stopes. Two-cu. yd. Scooptrams are used for all production requirements. These machines also load the 13-ton haulage trucks which take mine production outside to either the coarse-ore bin or to waste. The one-way haulage distance from the present loading station to the bin is 2460 ft. Of this distance, 1600 ft. favours the load and 860 ft. has an average 6% adverse grade. Present average performance using one truck on a three-shift schedule is slightly more than 700 tons per day.

III VENTILATION

The mine ventilation system is an interim arrangement consisting of two 48-in.-diameter, 75-hp fans operating in parallel. Together they produce a mine exhaust of 75,000 cfm. through flexible pipe supplied by A.B.C. Manufacturers. Preparation of the permanent arrangement to achieve a mine-air flow of 150,000 cfm has started. This system involves a fresh-air raise adjacent to the 5130 level with a surface fan and 200,000-BTU mine-air heating plant.

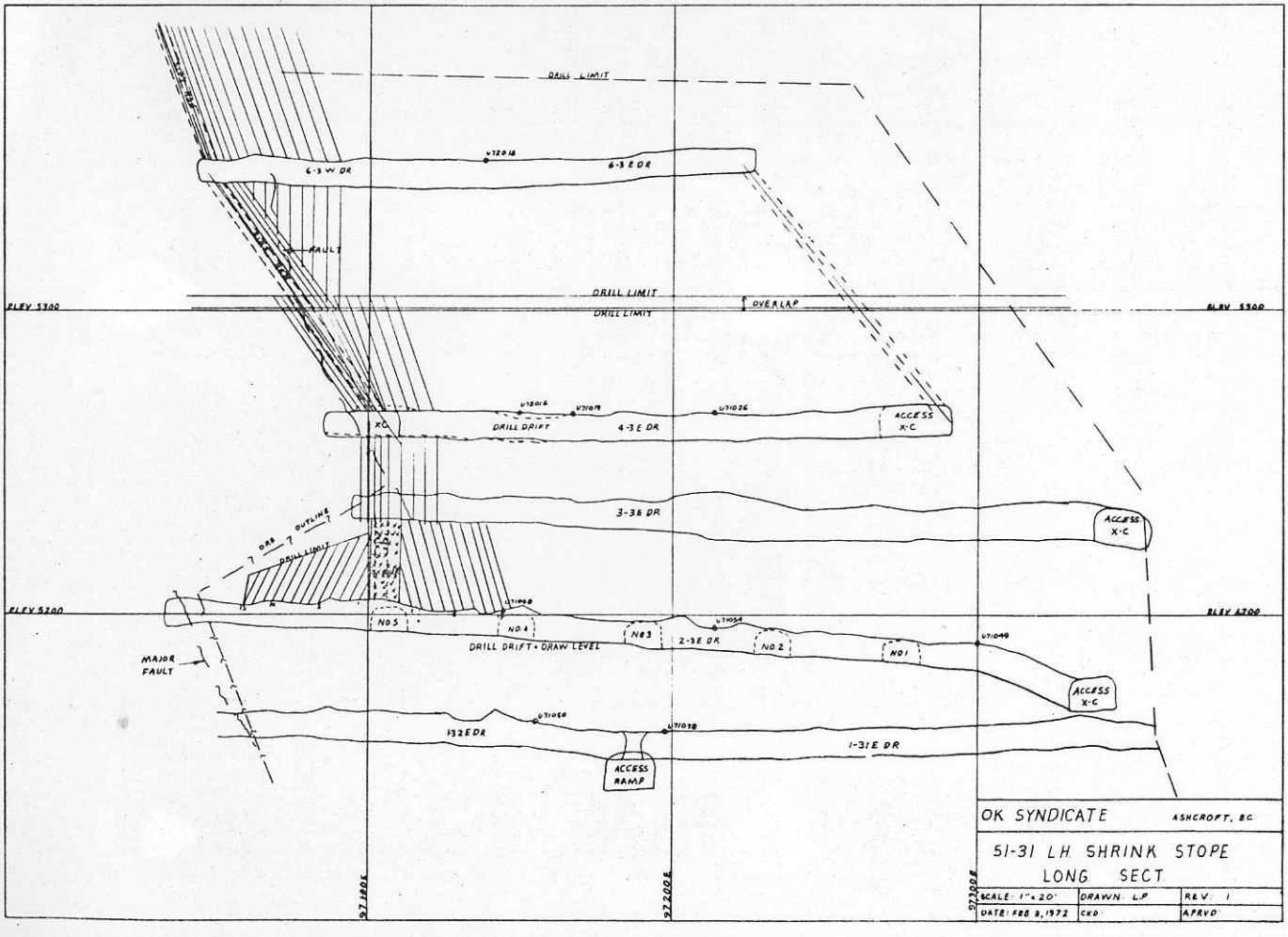
IV EQUIPMENT AND INSTALLATIONS

Major equipment required to operate the mine is not extensive, and the inventory includes these units:

3 - 2-cu. yd. Scooptrams
2 - 13-ton dump trucks
1 - grader
2 - service vehicles
3 - 850-cfm compressors

All equipment is erviced in outside facilities. A shop compressor building is currently under construction which will considerably improve the very basic facilities now used.

The only underground installation presently required is a 450 KVA load centre which drops the mine power feeder voltage from 2300 volts to 600



Harold E. Jacques D. W. Pringle J. A. C. Ross

volts, and provides for secondary distribution.

MILLING

The milling process is relatively straightforward at Alwin requiring only one circuit to yield the copper concentrate which also contains minor values in gold and silver.

The accompanying flow sheet will provide our readers with the basic information on the progress of the ore into the mill and through the various crushing, grinding, flotation, thickening and filtering sections to form the final concentrate.

From the 150-ton coarse-ore bin the ore is carried on No. 1 conveyor to a grizzly. The undersize drops to No. 2 conveyor which carries the material to No. 3 conveyor to a 4-ft. by 10-ft. Dillon double-deck screen which is used to close the crushing circuit. Half-inch undersize passes through the screen to No. 4 conveyor directly to a 1200-ton fine-ore bin. Oversize from the 2½-in. grizzly passes through the 20-in. by 36-in. jaw crusher with the product joining the undersize on No. 2 conveyor to the screened close-circuit.

All conveyors were supplied by Link-Belt Div. of F.M.C. Corporation.

An air-operated adjustable bin gate controls the feed from the fine-ore bin discharging on No. 5 conveyor where it is weighed and fed into the 7-ft.6-in. by 10-ft. ball mill. The mill discharge passes through a 6-mesh screen to the sump of a 5-in. by 4-in. SRL pump whence it is pumped to a Linatex 15-in. cyclone for distribution to the flotation cells. Cyclone underflow returns to the mill for further grinding.

Cyclone product goes through two 7-cell rougher-flotation machines to the scavenger cells and is then pumped to the cleaner cells. Cell overflow goes to the thickener tank and thickener overflow water returns to the grinding circuit.

The cleaned bulk concentrate is pumped to a 28-ft. dia by 10-ft. spiral-rake thickener. Thickener overflow goes to the tailing pond with underflow being conveyed by a 2-in. diaphragm pump to the filter-feed tank then to a three-disc, 6-ft.-dia. filter. Filtrate is returned to the thickener. Concentrate is stored on the lower floor of the mill building. At the beginning of April no shipments had been made but a contract had been let to Cam Cement of Ashcroft for trucking the product to CN railhead at Ashcroft for eventual shipment to buyers in West Germany.

Shortly after startup the mill was operating well beyond expectation with the remarkable recovery of 98% of the metal in the ore. Presently, with millheads running 1.75% Cu, the concentrate production rate is about 25 tons each day with a grade of 34% Cu. With minor modification a grade between 36% and 38% will be achieved in the near future.

WATER SUPPLY AND TAILING DISPOSAL

To provide the fresh-water requirements for the operation, Alwin obtained a permit to store a total of five feet of water on top of the existing Island Lake, now re-named Big O.K. Lake. This was accomplished by an earth-fill dam and spillway designed by C.B.A. Engineering Ltd.

The amount of fresh water required for the system is minimal as the plant lies in a small basin with the Little O.K. Lake at its centre. This lake forms the tailing pond which is a total impoundment system and allows no overflow or on the downstream side in the early stages is returned to the pond.

Water from the tailing pond is reclaimed and returned to the mill-water system.

POWER

Power supply for the operation comes from diesel generators which are installed as a total energy plant. The generators provide all electricity requirements of the mine, and mill and waste heat is converted into steam to heat the concentrator building. The plant consists of four Caterpillar units, two D398, 500-KVA units and two D379, 350-KVA capacity.

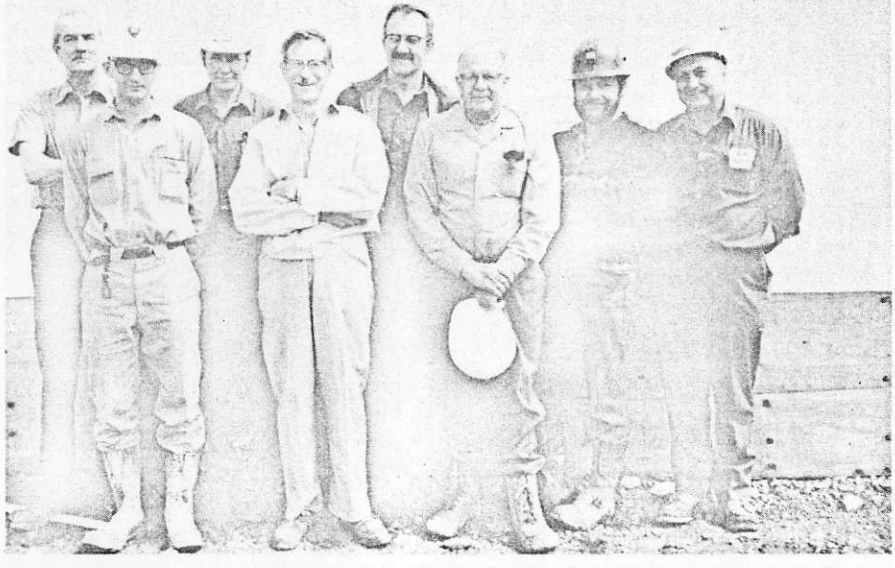
The generating plant is installed on the lower floor of the concentrator building and is completely sealed off by concrete walls and roof.

STAFF

Some 66 men are employed at this operation. F. G. Cooke is mine manager; Art Ditto, mine superintendent; R. G. Blundell, mill superintendent; W. W. Cummings, geologist; J. Alexander, assayer; Ian Murray, mine engineer; H. Wilhem, mill foreman; P. A. Davies, accountant; and R. F. Lovell, purchasing agent and warehouseman.

O.K. Syndicate is the operating entity of Alwin Mining Company Ltd. and all operations are under the direction of Donald W. Pringle, B.A.Sc., P.Eng., in his capacity as general manager of the O.K. Syndicate.

President of Alwin Mining Company Ltd. is Harold E. Jacques, who as a prospector staked the mineral claims now forming the company's property in the Highland Valley. Donald W. Pringle, P.Eng., is executive vice-president and director and John A. C. Ross, P.Eng., is consulting engineer and director. Other directors include Morris M. Menzies, P.Eng., geological engineer, Barry D. Speton, LL.B., and Douglas N. Cameron, retired mine superintendent.



Some of the operating staff of the O.K. Syndicate May 9, 1972. From left: P. A. Davies, Ian Murray, H. Wilhem, F. G. Cooke, W. W. Cummings, R. G. Blundell, J. Alexander, and R. F. Lovell.