

Western Mines mill is now averaging 1140 tons daily and recovering three concentrates

George Allen Aerial Photos Ltd.

Western Mines Limited

PROPERTY FILE 92F/12E (071)

VANCOUVER ISLAND MINE REACHES MATURITY

After 3½ years of operation, Western Mines Limited has produced metals valued at approximately \$50 million; has paid off all senior financing involving \$4 million in loans from Canadian banks, \$7 million in income debentures, and \$2.6 million in interest; has built up a healthy working capital; has increased its ore reserves; and is in an enviable position to commence dividend payments. The operating record is all the more remarkable in the light of the numerous obstacles that had to be overcome; a great many more than have usually been presented to comparable projects.

The company's Lynx mine, which has been the source of all output to date, the adjoining Paramount mine which is owned by the subsidiary Myra Falls Mines Ltd., and the Price mine are situated at the southwest end of Buttle Lake in Strathcona Park on Vancouver Island. Because of the site being within a provincial park, conservationists and so-called anti-pollutionists attacked the project, once it was established that a

mine was in the making, with a vehemence entirely unwarranted. Such opposition forced the company to revise plans, to abandon the original concept of a new community at the south end of Buttle Lake, to provide anti-pollution safeguards out of proportion to the scale of operation, to make extraordinary expenditures for road connection, and, possibly most expensive of all, to delay the commencement of production

By **FRED H. STEPHENS**
Associate Editor, *Western Miner*

after obtaining senior financing.

The operating record is impressive. The important contribution to the Island, Provincial, and National economies has become apparent and the wrath of the conservationists has diminished in the absence of any apparent evidence of pollution. The faith of the shareholders, first founded on extravagant projections by brokers and then seriously shaken by the numerous handicaps and delays not anticipated in preliminary plans, has been restored. The company is equitably financed and the operation is conducted by a notably efficient engineering staff.



All open-pit mining is done by contract at Western Mines

HISTORY

Since Western Miner first visited the operation on the eve of production, a considerable part of the following history is taken from information obtained at that time, and this is brought up to date through subsequent events.

Western Mines Limited was incorporated in 1951 to acquire and develop 40 mineral claims comprising what was called the Kootenay Florence mine in the Ainsworth Mining Division of southeastern British Columbia. The timing was unfortunate inasmuch as the highest prices ever paid for lead and zinc were quoted in that year. The inevitable decline in the value of these two principal metals in the Ainsworth area forced a suspension of development but the work was resumed in the mid-fifties by arrangement with The Consolidated Mining and Smelting Company of Canada, Limited. In all, more than \$500,000 was expended in these efforts, through which Cominco secured a substantial stock interest in Western Mines. The results were encouraging but not sufficiently so to warrant production at that time. The claims have been maintained in good standing and will undoubtedly receive further attention.

The Buttle Lake properties, in which Western Mines later became involved, were first staked in 1918 by Cross, Miller, Price, and other associates of Victoria. Some of the key claims were later Crown-granted. A summarization of a report to the Geological Survey of Canada by Dr. H. C. Gunning in 1930 is Canada by Dr. H. C. Gunning in 1930 is interesting in view of subsequent events: "Mineralization already exposed indicates quite clearly that the

principal possibility is of developing a large tonnage of milling grade ore."

The Reynolds Syndicate, comprising H. H. Huestis, P. M. Reynolds, J. A. and W. H. McLallen, and associates, acquired the key claims of the Lynx, Paramount, and Price groups in 1959 and extended the holdings by widespread staking. Western Mines Limited negotiated an option-purchase agreement with the Reynolds Syndicate in 1961 and immediately initiated a vigorous exploration programme under the direction of J. A. C. Ross, consulting engineer, and the supervision of A. O. Hall, another well-known British Columbia engineer. Initial drilling quickly confirmed persistence to depth of high-grade ore exposed in surface showings on the Lynx property and, within a very short time, it was apparent a singularly attractive prospect was under investigation.

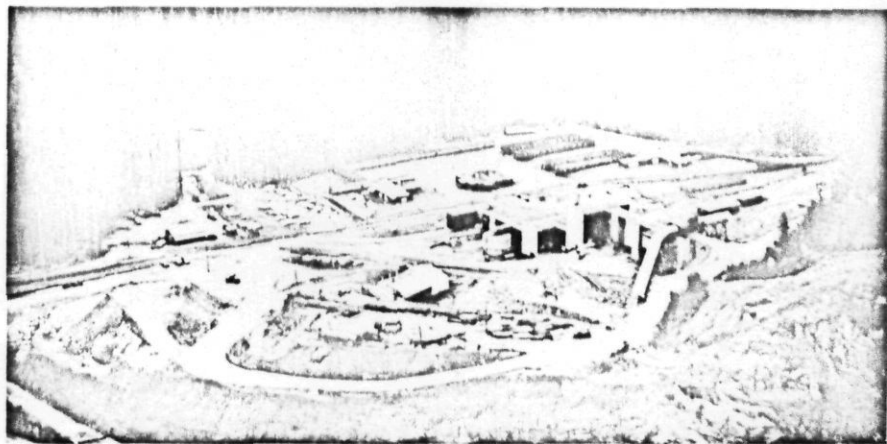
Western Mines established an adit at 1225 feet elevation. This was subsequently called the main-haulage level

and numbered "10". A shaft was sunk to the horizon of a projected "17" level with 150-ft. intervals between stations. Drifting on the 10, 11, 12, and 13 levels was advanced in ore and provided ample evidence of the width and grade of the various shoots, at the same time providing stations for underground drilling. That procedure, warranted at the outset by its exploratory nature, was abandoned in later lateral development. All entries on the 6, 8, 9, 14, and 15 levels have been driven in waste and thus the independent development of stopes and withdrawal of ore therefrom can be effected without interruption through mining or transportation activities in any one section.

Between acquisition of the property in 1961 and July 1965, when Nesbitt, Thomson and Company Limited and Pemberton Securities Ltd. purchased 6% debentures in the amount of \$7 million and the Canadian Imperial Bank of Commerce agreed to advance \$4 million to equip the project with a 750-ton-per-day mill, Western Mines expended more than \$4.5 million. Thus it becomes evident that more than \$15 million was committed when production plans were formulated.

It was in August 1966 that the possibility of developing an open-pit operation was first presented. It was estimated that some 300,000 tons of good-grade ore could be prepared for early delivery to the mill and thus "get the show on the road" and at the same time allow more time for underground development. The welcome discovery, however, required a drastic revision of mining and milling plans. The concentrator site had to be moved to facilitate development of the pit, a factor in the delay of construction and the consequent over-run in plant cost.

The imminence of an open-pit mining operation also stirred the politicians and conservationists to even greater invective as expressed in some newspapers and in the British Columbia Legislature. Directors concluded further funds should be arranged to effect changes and to assure the project's un-



Concentrator, surface plant, and mine camp of Western Mines

relenting critics that mining could be conducted within a park just as effectively with regard to the environment as anywhere else.

Tentative arrangements were made for the sale of 200,000 shares at \$2 per share to Cominco and Consolidated Canadian Faraday Limited, both important shareholders of Western Shareholders, who attended the following extraordinary meeting with a view to criticizing the low price attached to the sale, were stunned when the chairman announced that the companies had withdrawn their offer until more time could be had to obtain an independent engineering report. That was the low point in the history of Western Mines since its acquisition of the Buttle Lake properties. It is interesting to note that Cominco has since sold its shares to Northgate Exploration Limited and Faraday has also disposed of its holding of Western Mines.

The company's problems were expressed to shareholders December 6, 1966, by Harold M. Wright, then president of the company:

"Primarily a complex project, our developments at Myra Falls have involved many problems. The normal development of a mine project usually includes the preparation of the mine for production and the construction of a concentrator and other immediately-related facilities. In addition, we have been faced with the financing and development of a deepsea dock and shiploading terminal

at Campbell River, a 4500 h.p. high-head hydro-electric power plant in a very difficult setting, negotiations and financing a large portion of a major highway link and the preparation of a site in a completely virgin section of Vancouver Island. Since the road was constructed concurrently with the plant, the transport of equipment and supplies and the transport of men to and from the job on 22 miles of Buttle Lake became extremely complex. Above and beyond these operational problems has been the severe problem of the mine location within a provincial park. This has required extended and time-consuming negotiations with the Government and Government agencies.

"Original plans were for operation by mid-1966. Delays due to heavy snow last winter, several strikes, poor delivery of major items of equipment and protracted negotiations for park-use permits have been frustrating. Further major problems have occurred because of the overall conditions prevailing in British Columbia in 1966. In particular, because of the mine location in a park, there has been a great deal of opposition from segments of the public and the press. This opposition has been biased and emotional and mainly unfair to a new producer in the mining industry proceeding to production. These factors have had a serious effect on our personnel and delayed our progress to a considerable extent. Your Board has examined each of these problems in turn, has seen that a great deal of study went into them and decisions have been made which the Board considers in the best interests, not only of the Company, but of the Strathcona Park and the Province of British Columbia. It has been most unfortunate that in the face of the many natural problems involved in the project, the unnatural problems based on

emotionalism and lack of facts have required heavy costs which were not budgeted for and many hours of time and patience from our senior staff. It is therefore with considerable relief that we are now able to say that our plant is in the tune-up and initial production stage."

GEOLOGY

The geology and ore occurrences have been described by Dr. D. D. Campbell, consulting geologist, and Allan J. Anderson, a former consulting mining engineer to the company, as follows:

"The rocks of the property and in the immediate vicinity are mainly a series of tuffs and agglomerates with some andesite flows and dykes. These volcanics have been fractured by a wide, steeply-dipping shear structure of marked regional extent and continuity. Within the shear there has been considerable folding and alteration so that schistose types of rocks now predominate. All known orebodies are related to this shearing.

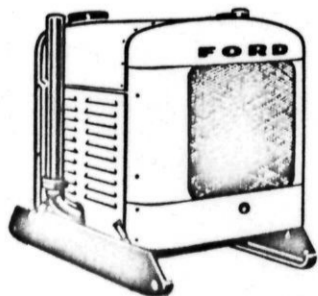
"From the major work on the Lynx and the preliminary work on the Paramount and Price, the indications are that the lenses or pods of ore occur discontinuously in a modified echelon pattern in the Shear zone. The most favoured host rock for ore is light-coloured quartz-sericite schist. The ore occurrences tend to be irregular in detail but in general are sinuous and lensey. Widths of ore vary from two feet to 40 feet with an average width of six to eight feet. The ore is fine-grained massive aggregate of metallic minerals and gangue. It may be homogeneous in character and appearance or show a rude alternate banding of chalcopryrite and sphalerite."

ENGINES



PARTS

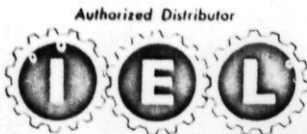
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MINING PRACTICE

All open-pit mining is contracted to Gretsinger & MacDonald Construction Ltd. of Vancouver. This arrangement has proven mutually acceptable. Under engineering direction and supervision of Western Mines, the contractor operates its pit drills on a three-shift basis and the shovels and trucks one shift a day. An average crew of 30 men is employed on this work which produces 60% of the mill feed.

Underground mining is by cut-and-

fill methods with mill tailing providing a fine cemented fill in the stopes. Immediately after the removal of blasted ore, the fill is placed to a height eight feet below the back of the stope. As the underground operation continues to increase percentage-wise, the placement of tailing will increase as will the disposal of tailing in Buttle Lake decrease proportionately.

The general Manager, James B. Magee, estimates that a mile of underground entries is advanced each year.

ORE RESERVES

As of December 31, 1969, ore reserves were estimated at 1,215,750 tons in the Lynx mine grading 0.06 oz. gold and 1.8 oz. silver per ton with 1.9% copper, 0.7% lead, and 8.1% zinc; 34,000 tons in the Myra Falls Mines property assaying 0.06 oz. gold and 3.6 oz. silver per ton with 0.8% copper, 1.7% lead, and 9.2% zinc, not including any of the high-grade ore recently discovered by drilling; and 78,850 tons in stockpiles grading 0.02 oz. gold and 0.9 oz. silver per ton with 1.0% copper, 0.3% lead, and 5.0% zinc. The total is 1,328,600 tons averaging 0.06 oz. gold and 1.8 oz. silver per ton with 1.8%

copper, 0.7% lead, and 7.9% zinc.

As of August 11, 1970, W. G. Jewitt, president, stated that ore reserves are expected to show an increase during the current year. Particularly favourable results have been obtained on the 8-level drive in the Lynx mine which has indicated 240,000 tons of new ore in that area alone.

The pit, hopefully expected to provide 300,000 tons of ore urgently needed at startup, has now contributed some 1,300,000 tons to the concentrator and extractable reserves remain in at least the same quantity as when mining was first commenced.

MYRA FALLS MINES

It has been found that, despite earlier conceptions, the mineralogy and ore deposition of the Lynx and Myra Falls properties differ considerably and, if Myra Falls ore is to be treated in the present concentrator of Western Mines, modification will have to be effected which will necessitate special storage facilities for the new ore in order to keep it separated from that amenable to the present flow sheet.

In the programme to get into production and reduce the large capital debt, Western Mines has until this year left the Myra Falls Mines property to itself while concentrating every effort on production from the Lynx. With fulfillment within grasp, a serious drilling programme was commenced at Myra Falls early in 1970 and, although the holes were long and widely spaced, the work brought forth remarkable indication of rich ore deposition. Seven holes were driven from the face of the 10-level drift: three drew blanks but four intersected ore. Two intersections cut ore about 300 feet below the level on the same vertical north-south section about 100 feet apart: hole 21 cut a 14-ft. true width assaying 0.29 oz. gold and 35.2 oz. silver with 1.0% copper, 2.9% lead, and 14.2% zinc; and hole 22

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PROJECT MANAGEMENT

The Company undertakes complete responsibility for complex projects, using management and control systems which have been refined over many years of experience.

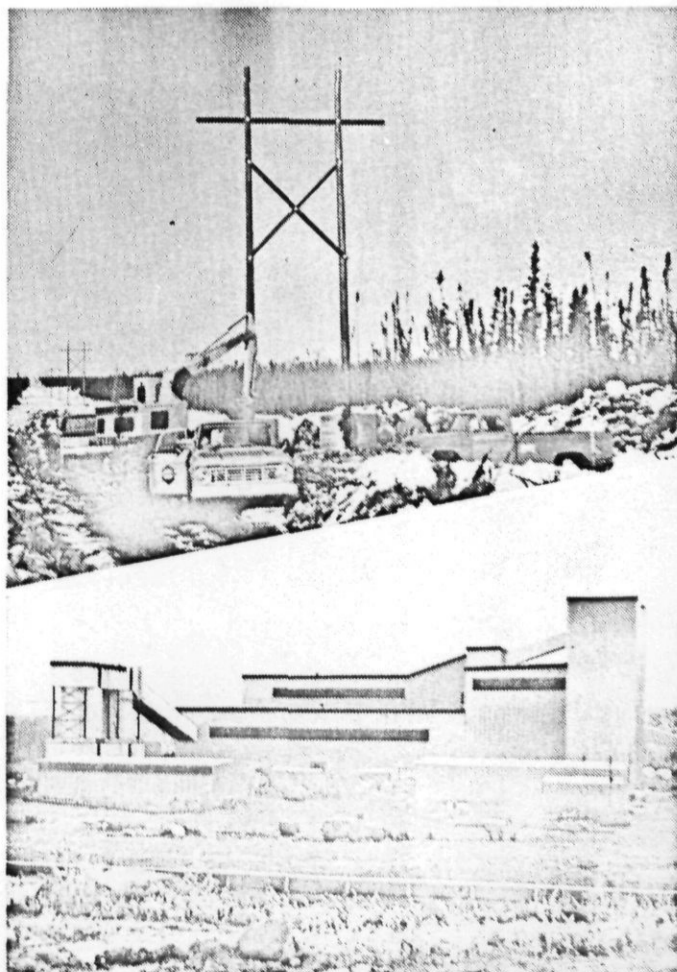
Partial services can also be provided — as for the Fox Mine (illustrated) where our engineers provided project co-ordination and field supervision of civil works.



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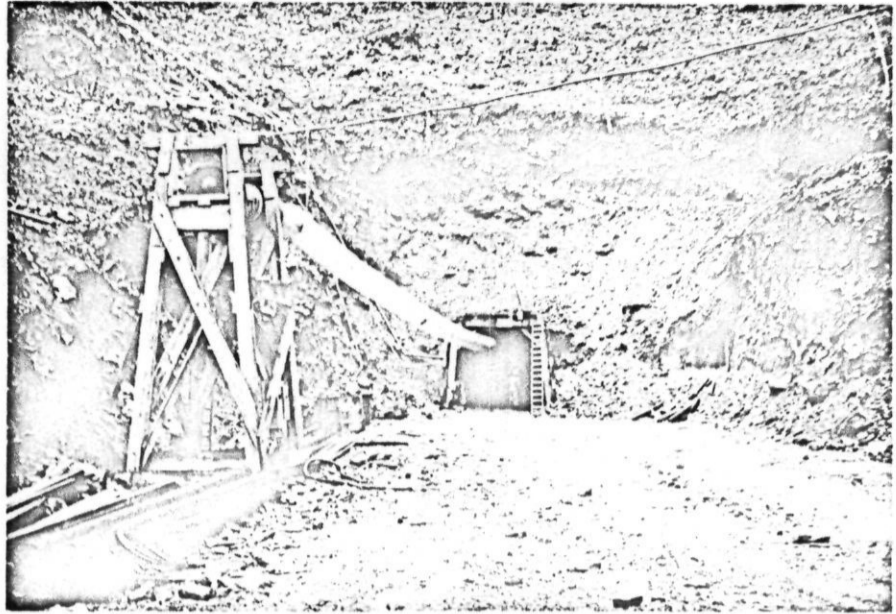
cut a true width of 23 feet averaging 0.33 oz. gold and 41.3 oz. silver with 0.8% copper, 2.9% lead, and 13.2% zinc. Hole 23, one hundred feet to the east, cut a true width of 5 feet assaying 0.04 oz. gold and 82.0 oz. silver per ton with 1.3% copper, 6.7% lead, and 16.4% zinc. The fourth intersection of 5 true feet averaging 0.08 oz. gold and 3.9 oz. silver with 2.8% copper, trace lead, and 4.7% zinc was cut at a higher elevation and to date must be considered as unrelated to the others. W. G. Jewitt, president, has commented that the much higher silver values constitute a notable change from the Lynx ore.

Encouraged by such results, Western Mines proceeded to explore and develop the property of its subsidiary. A portal was cut at elevation 1200 feet to provide a new entry. A 9-ft. by 9-ft. entry for trackless mining and hauling equipment was driven on a slight incline to provide drainage for any surface or near-surface water to flow out of the mine and, at a point 150 feet from the portal, the gradient was changed to minus 15 degrees on a decline. At 350 feet from the portal the new entry encountered a "blind" vein which had not outcropped and which had not been found in diamond drilling at higher elevations. In the decline, the new vein assayed 0.12 oz. gold and 9.91 oz. silver with 1.5% copper, 2.71% lead, and 20.2% zinc across a true width of 10 feet.

Management was not sidetracked by the discovery as so many mining explorations have been in the past. The decline heading is being advanced continuously towards its objective at an estimated 2200 feet in the vicinity of the high-grade drill intersections and is progressing at an average of 700 feet a month. Meanwhile some lateral drilling is being done to learn more of the unexpected "blind" vein. Drifting on that ore occurrence will have to await conclusion of the main purpose of the entry.

TRANSPORTATION

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Portal of new entry of Myra Falls Mines

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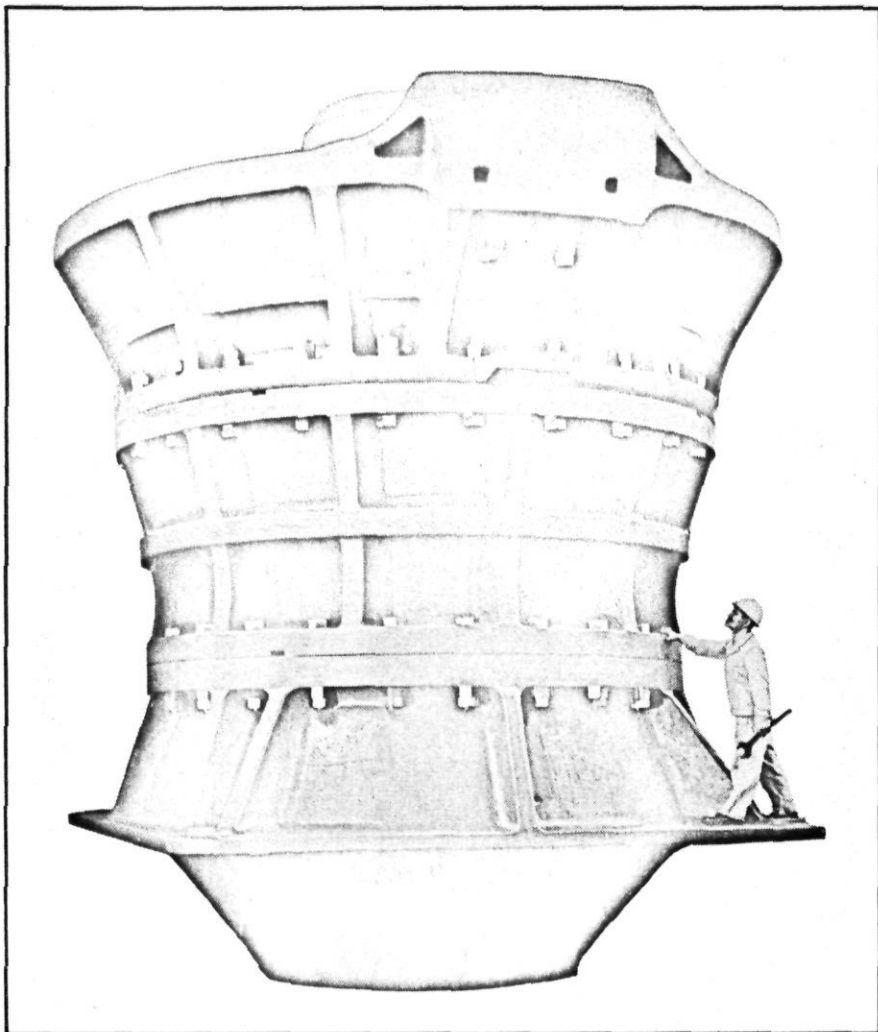
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contracted to B. C. Mack Truck Distributors Ltd. The haul to Campbell River is 56 miles, a distance which includes 33 miles of provincial highways and 23 miles of park road constructed by Western Mines Limited. Before the production decision was taken in 1966, the graveled government road terminated at Strathcona Lodge, or Western Landing as it was known at the time. From that point, Western Mines with its own lake vessels barged all personnel and freight to the mine site at the head of the lake. All mine and mill machinery and equipment were transported to the property in such manner.

The deepsea terminal facility at Campbell River was built at a cost of \$800,000 on waterfront leased for 25 years at an annual rental of \$10,000.

Western Mines has contributed \$2,200,000 toward the construction of the 23-mile length of road extending from Strathcona Lodge (Western Landing) along the east side and around the south end of Buttle Lake to the mine. According to the agreement with the British Columbia Government, the company was also charged with the hard-surfacing and maintenance of the road. Blacktopping was completed in September 1970.

MILLING

The complexity of the ore has required several changes in the flow sheet as experience and environmental control have necessitated a revision of early conceptions. At start-up, three concentrates were manufactured: a copper, a zinc, and a lead-zinc. This was later deemed impractical and was reduced to two: a copper and a zinc concentrate. The company recently engaged a new mill superintendent who has had world-wide experience in the recovery of metals from complex ores. Austin Murphy has made significant progress in the recovery of the minor metals within the bounds of environmental control. He has installed a leach circuit which is now producing a concentrate carrying 0.4 oz. gold and 20 oz. silver per ton with 7% copper in which the company receives payment. 50% lead, and 9% zinc. Total lead recovery is only 44.5% but this is increasing slowly. "It is evident", Murphy told Western Miner, "this percentage can be increased but to do so quickly entails the use of more cyanide and environmental factors limit the use of this re-agent".

Regular copper concentrate averages 0.26 oz. gold and 9.0 oz. silver per ton with 25% copper, 4% lead, and 5% zinc. Zinc concentrate averages 0.01 oz. gold and 3.0 oz. silver per ton with 1% copper, 1% lead, and 55% zinc. Total recovery of copper is in the range of 91.15% and zinc 79.0%.

The accompanying illustration shows

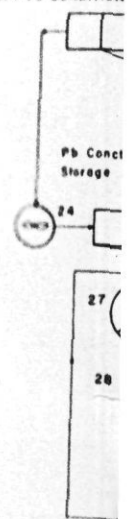
LEG

Crus:

1 COARSE ORE B
2 CRUSHER 4" SPZ
3 PRIMARY CRU
4 JAW CRUSHER
5 JAW FEEDER
6 10'2 MEMCO I
7 MAGNET
8 MILLION DOUBL
9 TERTIARY CRU
10 BOWHEAD CC
11 SECONDARY
12 MONS STANDAI
13 2" FINE ORE B
14 EACH

Concen

15 AMERICAN TUBE
16 RICHARD
17 WATER
18 BALLS CHALMER
19
20 BALLS CHALMER
21
22 CYCLONE CL
23 4 8 SRL PUMI
24 DENVER NO. 2
25 FLOTATION CELLS
26 DENVER NO. 18
27 FLOTATION
28 4 2 SRL PUMI
29 THICKENER
30 DIAPHRAGM P
31 4 2 SRL PUMI
32 SPAN OLIVER-LC
33 SHAM
34 4 2 SRL PUMI
35 4 8 CONDITION
36 DENVER NO.
37 FLOTATION CELL
38 4 2 SRL PUMI
39 SPAN OLIVER
40 TRAYLOR TH
41 DIAPHRAGM PI
42 BALLS CHALMERS
43
44 2 SRL PUMI
45 CYCLONE CLA
46 4 8 CONDITION



47 DENVER NO 24 SUB
48 4 8 CONDITIONER
49 4 2 SRL PUMI
50 DENVER NO 24 S
51 DENVER NO 24 S
52 4 2 SRL PUMI
53 4 8 COPPER STC
54 SPAN OLIVER LONG
55 4 8 CONDITIONER
56 4 2 SRL PUMI
57 DENVER NO 24 BI
58 4 2 SRL PUMI
59 DENVER NO 24 BI
60 SPAN OLIVER LOI
61
62 4 8 ZINC STORA
63 4 2 SRL PUMI
64 SPAN OLIVER LONGI
65 4 2 SRL PUMI

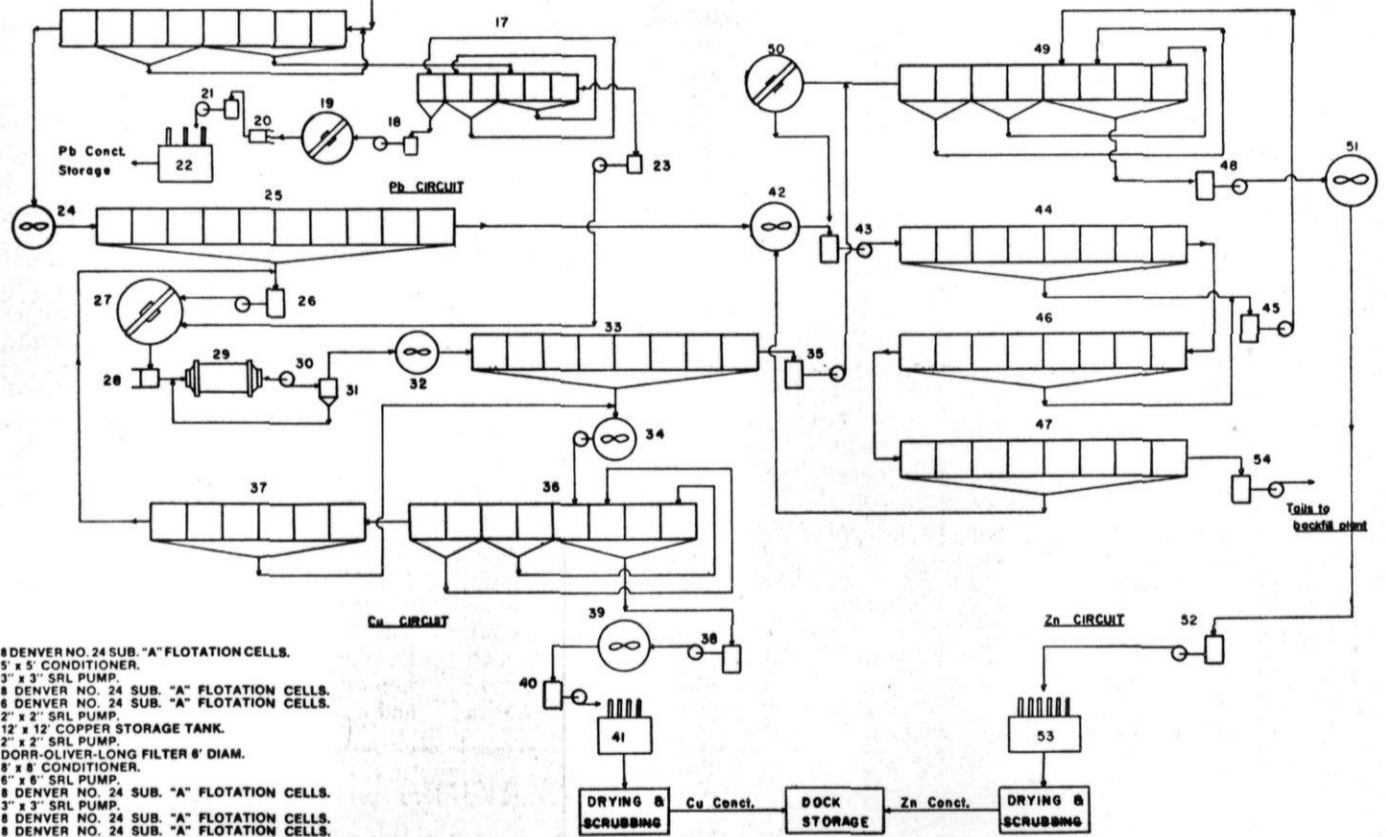
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- 13 ALLIS-CHALMERS BALL MILL 9' x 9'
- 14 20" CYCLONE CLASSIFIER
- 15 6" x 6" SRL PUMP
- 16 8 DENVER NO. 24 SUB. "A" FLOTATION CELLS
- 17 6 DENVER NO. 18 SPECIALS SUB. "A" FLOTATION CELL
- 18 2' x 2" SRL PUMP
- 19 24" THICKENER
- 20 4" DIAPHRAGM PUMP
- 21 2' x 2" SRL PUMP
- 22 DORR-OLIVER-LONG FILTER 4' DIAM.
- 23 3' x 3" SRL PUMP
- 24 5' x 5' CONDITIONER
- 25 10 DENVER NO. 24 SUB. "A" FLOTATION CELLS
- 26 3' x 3" SRL PUMP
- 27 40" DORR-OLIVER-LONG DOUBLE TRAY THICKENER
- 28 6" DIAPHRAGM PUMP
- 29 ALLIS-CHALMERS BALL MILL 7' x 7'
- 30 2" SRL PUMP
- 31 18" CYCLONE CLASSIFIER
- 32 5' x 5' CONDITIONER



- 33 8 DENVER NO. 24 SUB. "A" FLOTATION CELLS.
- 34 5' x 5' CONDITIONER.
- 35 3' x 3" SRL PUMP.
- 36 8 DENVER NO. 24 SUB. "A" FLOTATION CELLS.
- 37 6 DENVER NO. 24 SUB. "A" FLOTATION CELLS.
- 38 2' x 2" SRL PUMP.
- 39 12' x 12' COPPER STORAGE TANK.
- 40 2' x 2" SRL PUMP.
- 41 DORR-OLIVER-LONG FILTER 6' DIAM.
- 42 5' x 5' CONDITIONER.
- 43 6" x 6" SRL PUMP.
- 44 8 DENVER NO. 24 SUB. "A" FLOTATION CELLS.
- 45 3' x 3" SRL PUMP.
- 46 8 DENVER NO. 24 SUB. "A" FLOTATION CELLS.
- 47 8 DENVER NO. 24 SUB. "A" FLOTATION CELLS.
- 48 3' x 3" SRL PUMP.
- 49 8 DENVER NO. 24 SUB. "A" FLOTATION CELLS.
- 50 24" DORR-OLIVER-LONG SINGLE TRAY THICKENER.
- 51 12' x 18" ZINC STORAGE TANK.
- 52 2' x 2" SRL PUMP.
- 53 DORR-OLIVER-LONG FILTER 6' DIAM.
- 54 6" x 6" SRL PUMP.

WESTERN MINES LTD. MYRA FALLS, B.C.	
SCHEMATIC DIAGRAM Crushing Plant & Concentrator	
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DRAWN BY: <i>A.R.</i>	
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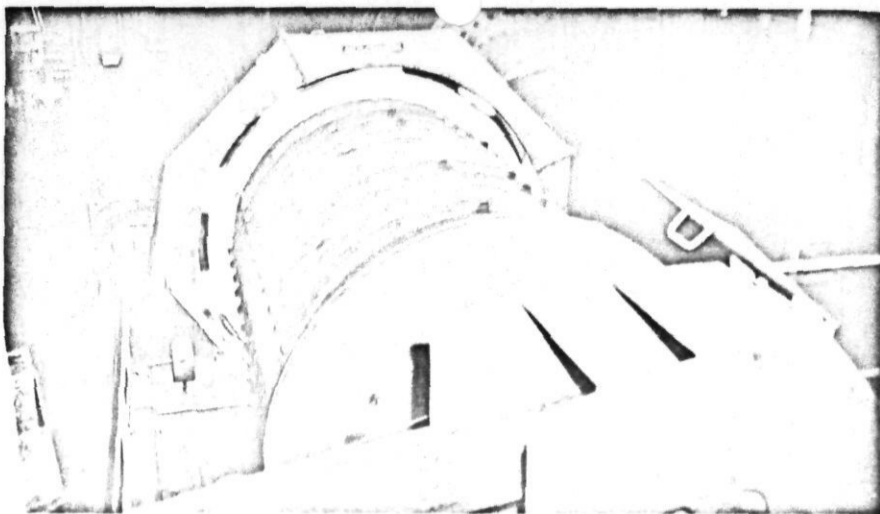
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A part of the grinding bay at Western Mines

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PERSONNEL

At the Western Mines operation some 260 men are presently employed. Of these, 87 are underground at the Lynx, 15 at the Myra Falls Mines property, 33 in the concentrator and on surface, and 55 men are employed by the contractors, Gretsinger & MacDonald in the pit, and Canus Services Ltd. in the catering service.

James B. Magee, a highly-regarded veteran of many challenging mining operations, is general manager. Gunnar Dziny is general superintendent; Austin Murphy, mill superintendent; Ed. Sader, mine superintendent; Eric Yeoman, plant superintendent; Bruce Spencer, chief geologist; and Norman T. McGeachy, chief accountant.

The Board of Directors includes the names of prominent figures in the mining industry and certainly confirms the strong Canadian tenor of the company. It includes: D. B. Armstrong, R. T. Hager, E. C. Hammond, J. A. McLallen, P. M. Reynolds, J. E. R. Wood, and H. M. Wright, all of Vancouver; W. G. Jewitt of Victoria, B. C.; J. B. Magee of Campbell River, B.C.; and M. K. Pickard and O. A. Seeber of Toronto.

W. G. Jewitt, who retired recently from one of the top offices of Cominco and who established a record for exploration in the Northwest Territories

both as an engineer and as a bush pilot 35 years ago, is president of Western Mines Limited. Roger T. Hager is vice-president, and the capable and cooperative Frank A. Robertson, C.A., is secretary-treasurer. Executive office of the company is 870 - 505 Burrard St., Vancouver, and mine office address is Box 8000, Campbell River, B. C.

CONCLUSION

The Western Mines experience is a classic example of a success story in the face of adversity. Hampered by unreasonable protest from conservationists and ecological patrolmen as well as politicians and the press, the directors did hold to their purpose (the mine was too good to forfeit) and accepted restrictions never envisioned by a fully-legal exercise as conceived by the original prospectors and those explorers and developers who had the faith to put their money on the line. In the face of such adversity and, in the beginning with inadequate funds, they have earned the satisfaction of establishing a proven mine with a most attractive future; one which may even justify the brokers' projections of five years ago. Western Mines no longer needs funds, unless it is for the development of the Myra Falls property. However, it is the opinion of the author that the cash flow will take care of this situation while at the same time providing for the initiation of dividend payments to patient and now-reassured shareholders.



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Northgate Exploration for one is entitled to credit. Led by the intrepid Pat Hughes, who established a toehold in Canada during the Beaverlodge uranium boom in the early fifties and then returned to his native Ireland to find one of the most fabulously rich mines in European history and entirely change the economy of that country (which grants 20 years income-tax exemption to new mines), this Canadian company holds 22.4% of the issued stock of Western Mines. Incidentally, Northgate is the first junior Canadian stock to make it all the way from Toronto "over-the-counter" to the big board of the New York Stock Exchange. We are fortunate that Pat started in Canada and has had such great faith in this country; yet we are disturbed that he is now concentrating his exploration activity in Australia, an incident no doubt related to the White Paper on Taxation.



James B. Magee
General Manager

Western Mines is manifestly a Canadian company. Approximately 95% of its issued shares are held by Canadians and more than 50% by residents of British Columbia. Through the exchanges of interest there have been

some changes in the board of directors. Northgate, however, has not demanded representation commensurate with its position nor has it interfered with the direction of Western Mines.

The company is here to stay. By all the standards of the industry, the operation should become increasingly profitable. If the Myra Falls property develops into an entirely new mine with anything approaching the assay values indicated to date, Western Mines could succeed beyond the dreams of its founders.

It is fitting to inform the conservationists who avowedly advocate greater recreational facilities that the 23-mile paved road built by Western Mines provides the only public entry to Strathcona Park. It would also be appropriate for these people to read the work of "Old Badger" which commences on page 10 of this issue of Western Miner.

PLACER DEVELOPMENT ANNOUNCEMENTS



A. E. Gazzard



J. D. Little



C. L. Pillar

Mr. T. H. McClelland, President and Chief Executive Officer, Placer Development Limited, announces three major appointments:

Mr. Albert E. Gazzard becomes Senior Vice-President of the Company. Mr. Gazzard joined the Placer group in 1939 and was General Manager of Bulolo Gold Dredging Limited at the time of that Company's merger with Placer in 1966. In 1960 he became a Director of Placer and was later appointed Vice-President with residence in Sydney, Australia. In 1969 he was appointed Executive Vice-President and moved to head office in Vancouver. Mr. Gazzard will continue to be responsible for the Australian and New Guinea operations and activities of the Placer group.

Mr. J. Douglas Little, who becomes Executive Vice-President, is a graduate of the University of British

Columbia (B.A. Sc. Mining Engineering) and has been associated with Placer since 1951. Mr. Little was latterly Vice-President/Operations and in that capacity was responsible for the operations of the Placer group.

Mr. Charles L. Pillar has been appointed Vice-President/Operations, having held the position of Assistant Vice-President/Operations since 1966. Mr. Pillar, a graduate of the Colorado School of Mines, joined Placer in 1965. In his new role, he will be responsible for the mining operations of those companies in the Placer group.

All three have been actively associated with other companies in the Placer group such as Canadian Exploration Limited, Endako Mines Ltd. (N.P.L.) and Craigmont Mines Limited.

PLACER
DEVELOPMENT
LIMITED 

The expansion of Westmin Resources

by Jean Sorensen
B.C. Correspondent

92F/12E (022F 071,072)

A \$250 million expansion at Westmin Resources Ltd.'s Myra Falls property on Vancouver Island has given the operation a new lease on life. Barely five years ago, reserves at the mine had fallen below one million tons, enough to keep the mill fed for only about 40 months. But today with the sinking of a 750 m shaft to develop the new H-W orebody and the construction of a new 3,000 ton per day mill, not only has mine life increased by about sevenfold, but production has tripled and mining costs are expected to come in lower. All in all, the future of the mine looks very good indeed.

This expansion — the culmination of some five years effort after the H-W orebody was discovered — was celebrated at the official opening of the new mine-mill complex this past September. And there was much to celebrate. Besides the shaft sinking and mill construction, the expansion program involved many other auxiliary facilities, such as water and tailings treatment sites, a new dam and hydro power plant and expanded loading facilities at tidewater.

"We have automated the mine to the degree we can operate with a minimum of manpower while not really getting to the point where we are overly concerned with computers," says Westmin project manager Peter Stokes, in charge of the H-W mine addition. Automation has included such features as a programmable logic controller (PCL) system. There are three; one in the mine, the mill, and the crusher. The PCL in the mill serves as a master unit, monitoring the others.

The entire expansion project was

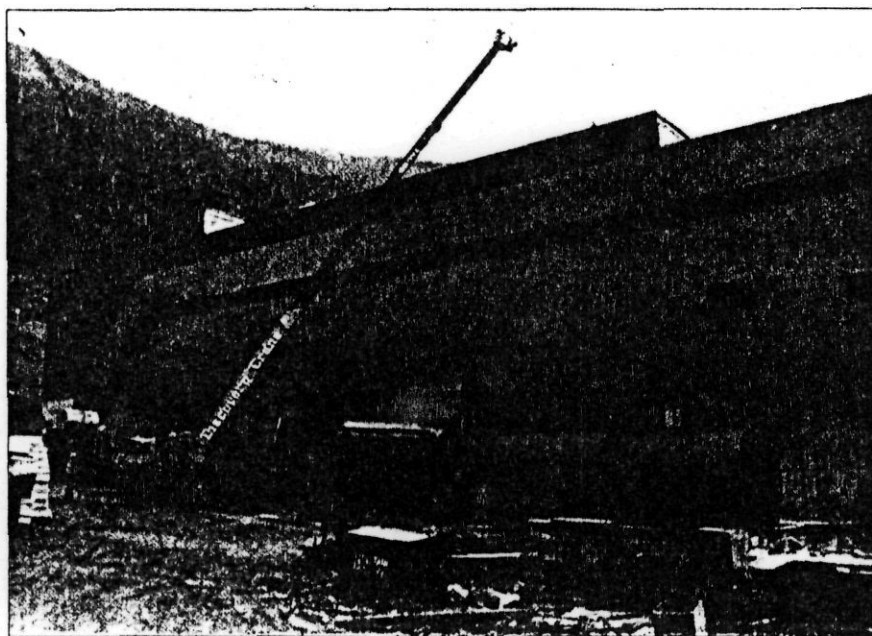
handled inhouse by Westmin under the direction of project manager, Stokes. Because the project was multi-phased, Stokes explains "we felt we could better control engineering, costs, and construction."

Several phases of the mine development presented construction challenges. For one, the mine is located in Strathcona Provincial Park and so environmental considerations had to be tightly monitored. For another, the site is in Myra Valley, a narrow hanging cut. "It was quite difficult to place all those facilities in the area because of limited room. A large excavation had to be made for the head frame, and clearing had to take place for the tailing deposition," says Stokes, adding that this made the project about 10% more costly.

The H-W mine deposit, named for

Harold Wright of Wright Engineering Ltd. who served as the first chairman of Western Mines, the forerunner of Westmin's Vancouver Island property, is considered the most significant new massive sulphide discovery since the mid-1960s Texasgulf (now Kidd Creek) find in the Timmins area of northern Ontario. Ore reserves are defined at over 15 million metric tons, averaging .07 oz gold per ton, 1.1 oz. silver, 2.2% copper, 0.3% lead, and 5.3% zinc. The ore-body is still open on three sides (west, east, and north), indicating that the mill feed could possibly be continued for several

Construction nearing completion of the new 3,000 ton per day mill at Westmin Resources.



decades. The H-W mine is estimated to have a life of approximately 20 years. And definition drilling on the three open sides is indicating an increased grade to what was obtained during exploration drilling.

At the site, the property consists of two older deposits, the Myra which is reaching exhaustion and the Lynx with a four to six year life expectancy. And as Stokes explains: "because the Myra was reaching depletion, exploration for replacement tonnage was carried on. The H-W was discovered in 1979. The new ore reserve was large enough to warrant a tripling of production from these three mines." (*See November 1984 CMJ for geological and exploration side of the Westmin story.*) Stokes adds that the new expansion will push daily output to 3,780 tonnes. (The mines operate two shifts on a five-day-week while the mill operates three shifts on a seven-day-week.) The mill now handles 2,700 tonnes of ore a day with annual production at 1,080,000 tonnes. That's an impressive increase from the past mill rate of 875 tonnes a day.

The H-W shaft

The H-W shaft, constructed by MacIsaac Mining and Tunnelling in Sudbury, extends to shaft bottom, Level 27 or 712 m and measures 1.32 by 6.39 m. The shaft bottom houses a small clear water and slime pumping station. Ore spillage is picked up and returned to an area above Level 26 and dumped into a waste pass and hoisted to the surface. Level 26 is the loading level where bottom-dumping Dorr-Oliver Canada skips with a 11-tonne capacity receive ore from loading pockets.

The fully automated Asea hoist with its 3.78 m diameter drum raises the ore to the surface at the rate of 25.4 skips per hour. The automatic controls eliminate the need for a hoistman.

The mining horizon is located between Levels 21 and 23. Level 23 extends 600 to 750 m into the orebody. "The orebody is probably 1,500 metres long," estimates Stokes, adding that it ranges in width up to 30 metres enabling the use of more efficient trackless mining methods.

Mining equipment

The mining equipment includes: 3.8 m³, 2.7 m³ and 1.6 m³ Wagner scooptrams; two and three boom Tamrock jumbo drills; Tamrock solo booms for long-hole drilling; Atlas Copco uppers drill wagon; scissor lift

and service equipment by Getman; and 135 t Goodman trolley locos used with 12 m³ capacity Dorr-Oliver Granby cars.

Level 24 is the haulage level where the ore is collected and dumped into the 1,000 t coarse ore storage bin. This ore is fed into the underground crusher, installed on the 25th level. The crusher, manufactured by Kemco in Japan, is driven by a 200 hp motor and has a capacity of 540 tph. The crushed ore gravitates to the fine ore storage located between Levels 25 and 26. From there it goes to the load pocket and ore hoist.

While numbers are still being crunched, Westmin expects that the cost of mining will be less than \$50 per ton compared to the \$60 cost incurred at the older properties. One advantage the deposit offers is the composition of the ore. "It's a very strong orebody," says Stokes adding that the time and dollars spent in bracing are reduced. The strength is due to a large amount of pyrite and a minimum of fractures in the deposit.

Level 23 also provides for the installation of a joint lunchroom and manager's office for the 12 to 14 men employed per shift on that level. Level 22 is used as a shaft station while the mine's service level is located on Level 21. Definition drilling is confined to Level 20 and 21.

Underground development work was done by Rocbore (1980) Ltd., a subsidiary of J.S. Redpath Ltd. of Ontario. The company completed the work in mid-November.

Ventilation

In the mine, the fresh-air raises, adjacent to the head frame, are 3.75 m in diameter, extending to Level 24 and interconnecting on all working levels through a ventilation network. Two 8,600 m³ per minute axial flow fans are located on the two 3.75 m return air raises, both located adjacent to the backfill plant.

Water in the mine is obtained from dams on Level 13 — a common drift between the Myra Mine and the new H-W area. It's pumped to the shaft and gravity-fed to underground workings. On Level 25, there's the clean water pumping station with sumps holding over 1,000 t each. Level 25 also has a Zimpro slime pump which pumps 227 litres per minute at 13,300 kPa maximum rating; it's driven by a 100 hp motor. It can pump up to 30% solids. Stokes says it is the first time the pump has been used at that depth. The company decided to try the pump,

which has worked well with no difficulties since installation three months ago, because it proved more cost efficient than other models on the market.

The mine's backfill system uses the Marconaflo method, a slurry retrieval system from the backfill tanks on the surface. An important point of the system, says Stokes, is that it is incorporated with a surface retrieval system of about 25,000 tonne capacity utilizing a Dyna-jet slurry retrieval system which works on the same principle as the Marconaflo system.

The 75 m head frame, was designed by Wright Engineers and accommodates the necessary facilities for a twin-skip dumping system, cage and counterweight facilities.

Once ore reaches the surface, it is dumped into a 100 t bin, before being loaded on the crusher feed conveyor system. Consisting of a 0.2 km long belt and a second 1.2 km the conveyors are 90 cm wide. Ore arrives at secondary and tertiary crushing where it is reduced to pass 1.8 cm before going into the grinding circuit.

Milling circuit

The \$57 million mill and surface facilities were designed by Wright Engineers. Two 3,500 t capacity fine ore storage bins hold the ore before it moves on to the milling circuit; which consists of two 2.4 m diameter by 3.6 m long rod mills, two 3.45 m diameter by 4.5 m long ball mills, and two 2.1 m diameter by 3.6 m long regrind mills. Ground ore at 70% minus 200 mesh is pumped to the conditioning tanks before reaching two banks of 300 cu. ft flotation cells. The regrind ball mills separately grind the copper and the zinc middlings to 85% minus 325 mesh.

In the circuit, potassium amyl xanthate is used as a collector, with zinc sulphate and sodium sulphite used to depress zinc, and cyanide used to depress copper in another circuit. Lead is later removed from the copper concentrate. Gold is present in three concentrates. Throughout the circuits, automatic samples are taken and analysed; and the flotation chemicals adjusted to compensate for any changes in the level of mineralization. The mill is designed with two Larox pressure filters, rather than conventional filters for dewatering the concentrate. One handles zinc while the other dries the copper. The filters can handle 1.8 t per cycle with each cycle taking approximately six minutes.

The tailings from the mill are sent to the mine's tailing ponds built at a cost of \$20 million by Farmer Construction of Victoria. The tailing area is expected to serve the mill for an estimated 25 years. (For a complete description of the treatment plan see the Nov. 1984 issue of *CMJ*).

Storage and dock

From the mine site, the concentrate is hauled via B-train truck, 88 km to Tye Spit, near Campbell River to the company's new \$5.5 million storage and dock facility. Trucks are off-loaded at a two-bay conveyor dump which brings material into the main storage shed. At current metal prices, each truckload of copper concentrate is valued at approximately \$20,000 (U.S.). The storage facility, built by UMA-Spantec, has the capacity for 17,000 t of zinc concentrate on one side, and 17,000 t of copper concentrate on the other. A front-end loader dumps the zinc or copper concentrate on the inplant conveyor, which links to the ship-loader at dock side.

The \$750,000 million ship-loader, designed by Wright Engineers and built by Surrey Iron Works Ltd., is

capable of loading 500 to 600 tph. The dock was constructed by Quadra Construction Co. Ltd. and has the capability of accommodating vessels of up to a 30,000 to 35,000 deadweight tonnage. Lead concentrate and 30% of the zinc product is barged to Mitchell Island, in the Fraser River outside Vancouver, and transferred to rail for shipment to Cominco in Trail. Copper and the remaining zinc are shipped to Pacific Rim countries, mainly Japan for refining.

Increased automation at the mine site has caused Westmin to require more power; it looked at the options such as using diesel generation but the costs were prohibitive compared to hydro. (Even hooking into B.C. Hydro's distant power grid was costly by comparison.) Instead, Westmin built its own hydro power generating station. To demonstrate the cost saving, Stokes says the use of diesel would have cost 15 cents per kWh compared to hydro from Westmin's plant which is half a cent per kWh.

The penstock from the powerhouse to the dam extends four kilometres and measures 95 cm at the bottom and 120

cm at the top end, which links to a 0.8 kilometre tunnel measuring 2.7 by 2.7 metres terminating at the dam's intake works. The dam and spillway are located at Jim Mitchell Lake in the Therwood Valley area, the watershed adjacent to Tennant Lake where the mine's existing three megawatt system is located. The new system, by comparison, is capable of producing 8.5 megawatts of power.

The dam designer was Crippen Consultants in North Vancouver, while Wright Engineers did the powerhouse design. Contractors were Interpro Contractors Ltd., who constructed the civil works for the powerhouse, while Pool Construction Ltd., did the mechanical and electrical installation in the powerhouse and Goodbrand Construction Ltd. of Aldergrove, did the contracting for the dam, spillway and intake system. The hydro package cost \$24 million.

One advantage of the system is the ability to stabilize costs in the long term, and, not have to budget for increased diesel or hydro costs. "We have full control over inflationary costs," says Stokes.