~~C O N F I D E N T I A L~~

# AN EVALUATION

# OF THE

# NEW IMPERIAL MINES LTD.,

# WHITEHORSE, Y.T.

by

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RESOURCE MANAGEMENT DIVISION

DEPARTMENT OF NORTHERN AFFAIRS

AND

NATIONAL RESOURCES

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## INTRODUCTION

New Imperial Mines Ltd. has announced its intention to place its copper property at Whitehorse into production by March 1967. The Company has requested financial assistance from the Department of Northern Affairs and National Resources for the construction of an access road from Mile 910 on the Alaska Highway to the mine property, a distance of approximately two miles. The estimated cost of this road is $65,000.00.

It is the purpose of this report to evaluate the economics of the proposed New Imperial Mines Ltd. mining operation with a view to determining whether or not federal government financial assistance for the construction of this road is warranted. Information used in this evaluation was obtained from the following sources:

1. A feasibility study of the New Imperial Mines Ltd. project prepared by Wright Engineers Limited, J.A.C. Ross and Associates Ltd., and Dr. A.C. Skerl, P.Eng.
2. Discussions between officials of New Imperial Mines Ltd. and representatives of the Department of Northern Affairs and National Resources.

## SUMMARY

An evaluation of the New Imperial Mines Ltd. mining operation at Whitehorse, Y.T. reveals that at the rate of production contemplated by the Company, the rate of return to the Company on its capital investment will be at an acceptable level provided that copper prices

do not drop below the average E.&M.J. price for foreign refinery copper for the year 1965.

## COMPANY, LOCATION AND ACCESS (See Maps 1 & 2)

New Imperial Mines Ltd. is an Alberta Company with a capitalization of 5,500,000 shares, no par value, of which 5,349,091 have been issued. Head office of the Company is at Suite 1022, 85 Richmond Street, West, Toronto. The mining property consists of six ore bodies which are situated in a 16-mile long zone which is roughly parallel to and about 1-3/4 miles to the west of the Alaska Highway, near Whitehorse, Yukon Territory. The mill site is near the centre of the zone and is 5-1/2 miles due south of Whitehorse. The Yukon and White Pass Railway from Skagway, Alaska to Whitehorse passes within 2 miles of the property at the settlement of MacRae. The Company holds 286 staked mineral claims, one Crown granted claim and has options on 88 staked claims and 21 Crown granted claims.

## HISTORY

The important showings along the Whitehorse Copper Belt were all staked in 1898 and 1899. In 1909, a branch of the White Pass and Yukon Railway was built through the property and shipments of crude ore were made to the smelter at Anyox, B.C. up until the

end of World War I. Some drilling was done between 1926 and 1929, and in 1947 and 1948 Noranda Mines Limited did extensive geological and geophysical work and diamond drilling. In 1955, Imperial Mines and Metals acquired by staking, purchase and option, numerous claims along the Copper Belt. Some diamond drilling was done and in 1963 this Company was reorganized as New Imperial Mines Ltd. The newly-formed Company immediately began an extensive exploration and development program which resulted in a decision to bring a copper mine into production.

## GEOLOGY AND ORE RESERVES

A map of the Geological Survey of Canada shows predominant granitic intrusions with an elongated zone of limestone in the area of the Whitehorse Copper Belt. These granitic intrusions have been responsible for the replacement of the limestone by skarn. Magnetite is common throughout the skarn and in one place, at the old Pueblo mine, hematite is the principal mineral. All the deposits that have been drilled to date are associated with faults and also with acid dykes.

Bornite, chalcopyrite, malachite, azurite, cuprite, malaconite, chrysocolla, and native copper are found associated with the skarn minerals at intervals throughout the contact zone. The rare copper mineral, valleriite, was recognized in the drill cores at the Little Chief deposit. Molybdenite is found in commercial quantities in one ore body and minor amounts of gold and silver

occur in all deposits.

The ore bodies usually consist of skarn with a sufficient concentration of copper minerals to make them of ore grade. The copper values average from 1% to 2%. Gold and silver values average 0.05 ozs. of gold and 0.50 ozs. of silver per ton. Molybdenite is found only in the Cowley Park ore body and averages 0.08% $MoS_2$ per ton.

The following tabulation shows the total ore reserves of each ore body and the mineable ore reserves. The latter figure was determined after making an allowance for dilution and after deducting reserves of ore in the Little Chief deposit which cannot be mined by open pit methods.

| | TOTAL ORE RESERVES | | | | MINEABLE ORE RESERVES | | | |
|---|---|---|---|---|---|---|---|---|
| ORE BODY | TONS | Cu % | AuAg,$ | $MoS_2$ % | TONS | Cu % | AuAg$ | $MoS_2$ % |
| Little Chief | 1,910,000 | 1.33 | 1.05 | | 1,518,610 | 1.21 | 1.07 | |
| Arctic Chief | 400,000 | 1.32 | 1.10 | | 420,750 | 1.27 | 1.67 | |
| War Eagle-Main | 900,000 | 1.40 | 0.75 | | 926,530 | 1.24 | 0.73 | |
| War Eagle-South | 330,000 | 1.00 | 0.50 | | 215,330 | 0.96 | | |
| Cowley Park | 1,370,000 | 0.88 | 0.25 | 0.080 | 1,265,050 | 0.86 | 0.20 | 0.091 |
| Keewenaw | 380,000 | 1.10 | 1.05 | | 485,180 | 1.05 | 0.96 | |
| Best Chance | 200,000 | 1.09 | 0.25 | | 191,280 | 0.98 | 0.26 | |
| | 5,490,000 | 1.20 | $0.78 | $0.22 | 5,022730 | 1.10 | $0.85 | $0.20 |

The author examined the plans, sections, and diamond drill core assays for the six ore bodies. Sample calculations were made on some sections and it appears as though the Company has been fairly conservative in its ore reserve calculations. The complete core of one hole was checked visually with the diamond drill logs for that hole. The assay certificates were also compared with the diamond drill logs and found to be accurate. Time did not permit a complete recalculation of all ore reserves or an examination of all drill core. The possibility of finding additional ore reserves appears to be good.

## MINING

With the exception of the lower portion of the Little Chief ore body, all of the ore bodies can be mined by open pit methods. Stripping ratios vary from 1.479 cubic yards of waste to 1 ton of ore for the War Eagle deposit to 0.431 cubic yards of waste to 1 ton of ore for the Arctic Chief deposit. The rock is competent and fairly low mining costs can be expected. It is possible that there may be sufficient ore below the proposed bottom of the Little Chief pit to consider an underground operation.

## FINANCING

The Company has a letter of intent from the Sumitomo Metal Mining Company of Japan whereby the latter Company will provide financial assistance and marketing assistance to bring the New Imperial mine into production. It is estimated that Sumitomo will provide funds as needed up to a maximum of $4,700,000 with interest

at 6%. After this sum has been advanced, additional funds required will be obtained from bank borrowing at 6% interest. It is expected that a maximum of $2,230,000 will be raised from this source. New Imperial shareholders last year authorized the issue of 2,000,000 additional treasury shares but it is expected that only $500,000 will be raised from issues of these shares. In summary, capital requirements will be met by:

| | | |
|---|---|---|
| Sumitomo loan | = | $ 4,700,000 |
| Bank Loan | = | 2,230,000 |
| Sale of shares | = | 500,000 |
| Total | | $ 7,430,000 |

## MARKET ANALYSIS

The copper market at the present time is unusually strong. An unprecented demand for copper plus strikes in the United States, Chile and Africa, the main copper producing countries, created price pressures in 1964. Additional pressures were created in 1965 by a strike at the Mount Isa mine in Australia and by demands from Chilean and African governments to increase the price of copper. Production simply could not keep up with the booming economy. The E. & M.J. prices for foreign refinery copper have increased from an average of 35.604 cents per lb. in 1964 to 41.344 cents in mid-April 1966. London Metal Exchange quotations for copper were approximately 95 cents per lb. in mid-April 1966. It appears, therefore, that prices of copper will continue at a fairly high

level for some time to come. On the negative side, however, the present trend of rapidly increasing copper prices will lead to intensive research into the use of substitutes for copper.

For the purposes of this analysis, it has been assumed that the Sumitomo Company will purchase copper concentrates from New Imperial Mines Limited at prices based on the E. & M.J. price for foreign refinery copper less one-half cent per pound. A deduction of 1% will be made from the grade of the copper concentrates being shipped and smelter charges and ocean freight amounting to $22.50 per metric ton will also be deducted.

## ASSUMPTIONS

For the purposes of this evaluation, a number of assumptions are made.

1. It is assumed that the ore reserves of 5,022,730 tons will be mined for a period of 7 years at a uniform rate of 717,500 tons per year.
2. Operating costs per ton of ore mined are assumed to be as follows:

| | |
|---|---|
| Mining | $1.50 |
| Milling | 1.32 |
| Freight (to tidewater) | .33 |
| Administrative & Services | .58 |
| Exploration | .15 |
| Sub-total | $3.88 |

| | | |
|---|---|---|
| | Sub-total (cont'd) | $ 3.88 |
| Development | | .21 |
| Inventory Write off | | .06 |
| Administrative | | .43 |
| Interest | | .17 |
| | Total | $ 4.75 |

Gross annual operating costs = 4.75 x 717,500=$3,408,800

3. Capital investment (excluding pre-production costs) is as follows:

| | | |
|---|---|---|
| Year 1966 | = | $6,697,000 |
| 1968 | = | 22,000 |
| 1969 | = | 101,000 |
| 1970 | = | 483,000 |
| Total | | $7,303,000 |

4. Capital Cost Allwance is assumed to be 30% of capital investment. Write-offs will begin in 1970, the fourth year of production.

5. Pre-production investment is as follows:

| | | |
|---|---|---|
| Up to and including year 1966 | = | $ 557,000 |
| 1968 | = | 180,000 |
| 1969 | = | 590,000 |
| 1970 | = | 593,000 |
| Total | | $1,920,000 |

6. Pre-production write-offs are at the rate of 100% per year up to the maximum of income commencing in 1970.

## EVALUATION

Three alternative prices for copper are considered in the evaluation of the New Imperial Mine.

ALTERNATIVE A

Assume a price for copper of 32.459 cents Cdn. per lb. This is an arithmetical average of E. & M.J. prices for foreign refinery copper for the 10 year period from 1956 to 1965, inclusive. The revenue from the sale of copper concentrates to Japan, f.o.b. Skagway, Alaska can be calculated as follows:

Assume concentrate grade = 35% Cu.

Grade ore = 1.10% Cu.

Assume mill recovery = 85%

Then recoverable grade = 0.935% Cu.

Ratio of concentration = $\frac{35}{0.935}$ = 37.43 to 1

Payment for concentrates = $2204.6 \times \frac{(35-1)}{100} \times \frac{(32.459 - 0.5)}{100}$ = $239.55

Smelter treatment and ocean freight = 22.50

Value per long ton conc. = $217.05

Value per ton conc. = $196.91

Value per ton ore = $\frac{\$196.91}{37.43}$ = $5.26

Value of associated minerals (gold, silver and molybdenum) = $1.13

Total value of ore = $6.39 per ton

Gross annual income = 717,500 x 6.39 = $4,584,825

Based on the foregoing assumptions the cash flow for the proposed mining operation is found to have a negative value which indicates that the future earnings of the mine will not return the initial capital investment (see Figure 1).

ALTERNATIVE B

Assume a price for copper of 38.274 cents Cdn. per lb. This is the average E. & M.J. price for foreign refinery copper for the year 1965. The revenue from the sale of concentrates to Japan at this price is calculated as follows:

| | |
|---|---|
| Payment for concentrates = $2204.6 \times \frac{(35-1)}{100} \times \frac{(38.274-0.5)}{100}$ | = $ 283.14 |
| Smelter treatment and ocean freight | = 22.50 |
| Value per long ton conc. | = $ 260.64 |
| Value per ton conc. | = $ 236.45 |
| Value per ton ore $= \frac{236.45}{37.43}$ | = $ 6.32 |
| Value of associated minerals (gold, silver and molybdenum) | = $ 1.13 |
| Total value of ore | = $ 7.45 per ton |
| Gross annual income = $717,500 \times 7.45$ | = $5,345,375 |

Based on the foregoing assumptions, the cash flow for the proposed mining operation is calculated and discounted at several rates of interest. The rate of return to the Company on its initial investment is approximately 11.5% (see Figure 1)

ALTERNATIVE C

Assume a price for copper of 44.445 cents Cdn. This is the E. & M.J. price for foreign refinery copper for the week ending April 8, 1966. The revenue from the sale of concentrates to Japan at this price is calculated as follows:

| | |
|---|---|
| Payment for concentrates = $2204.6 \times \frac{(35-1)}{100} \times \frac{(44.445 - 0.5)}{100}$ | = $ 329.40 |
| Smelter treatment and ocean freight | = 22.50 |
| Value per long ton conc. | = $ 306.90 |
| Value per ton conc. | = $ 278.42 |
| Value per ton ore = $\frac{278.42}{37.43}$ | = $ 7.44 |
| Value of associated minerals (gold, silver and molybdenum) | = $ 1.13 |
| Total value of ore | = $ 8.57 per ton |
| Gross annual income = 717,500 x $8.57 | = $ 6,148,975 |

Based on the foregoing assumptions, the cash flow for the proposed mining operation is calculated and discounted at several rates of interest. The rate of return to the Company on its initial investment is approximately 24.5%. (see Figure 1)

BENEFITS TO THE CROWN

The following table lists the estimated revenue which will accrue to the Crown from Yukon royalties and federal corporate income taxes payable by New Imperial Mines Ltd. throughout its life. Also shown is the present value, discounted at 6%, of this revenue as of the year 1966.

| | Alternative A | Alternative B | Alternative C |
|---|---|---|---|
| Corporate Income Taxes | $ 0 | $ 352,000 | $1,257,000 |
| Yukon Royalty | $ 35,000 | 196,000 | 414,000 |
| Present Value Income Taxes | $ 0 | 243,800 | 895,100 |
| Present Value Royalty | $ 25,600 | 160,700 | 346,300 |

## CONCLUSIONS

This analysis of the New Imperial Mines Ltd. project brings out the following points:

1. At the proposed rate of production and assuming that present prices for copper continue, the mining operation will yield a good return on its initial capital investment.
2. If prices of copper drop to the average of the 10-year period ending on December 31st, 1965, the earnings will not be sufficient to pay for the capital invested in the project.
3. With present world wide copper shortages, pressures for increased copper prices by the governments of some copper producing countries, and labour unrest throughout the copper industry, there is a good possibility that prices will continue to remain fairly high for some time.
4. Considerable revenue will accrue to the federal government from corporate income taxes and quartz royalties. Additional revenue which has not been calculated will accrue from federal sales taxes and Yukon Territorial taxes and licenses.

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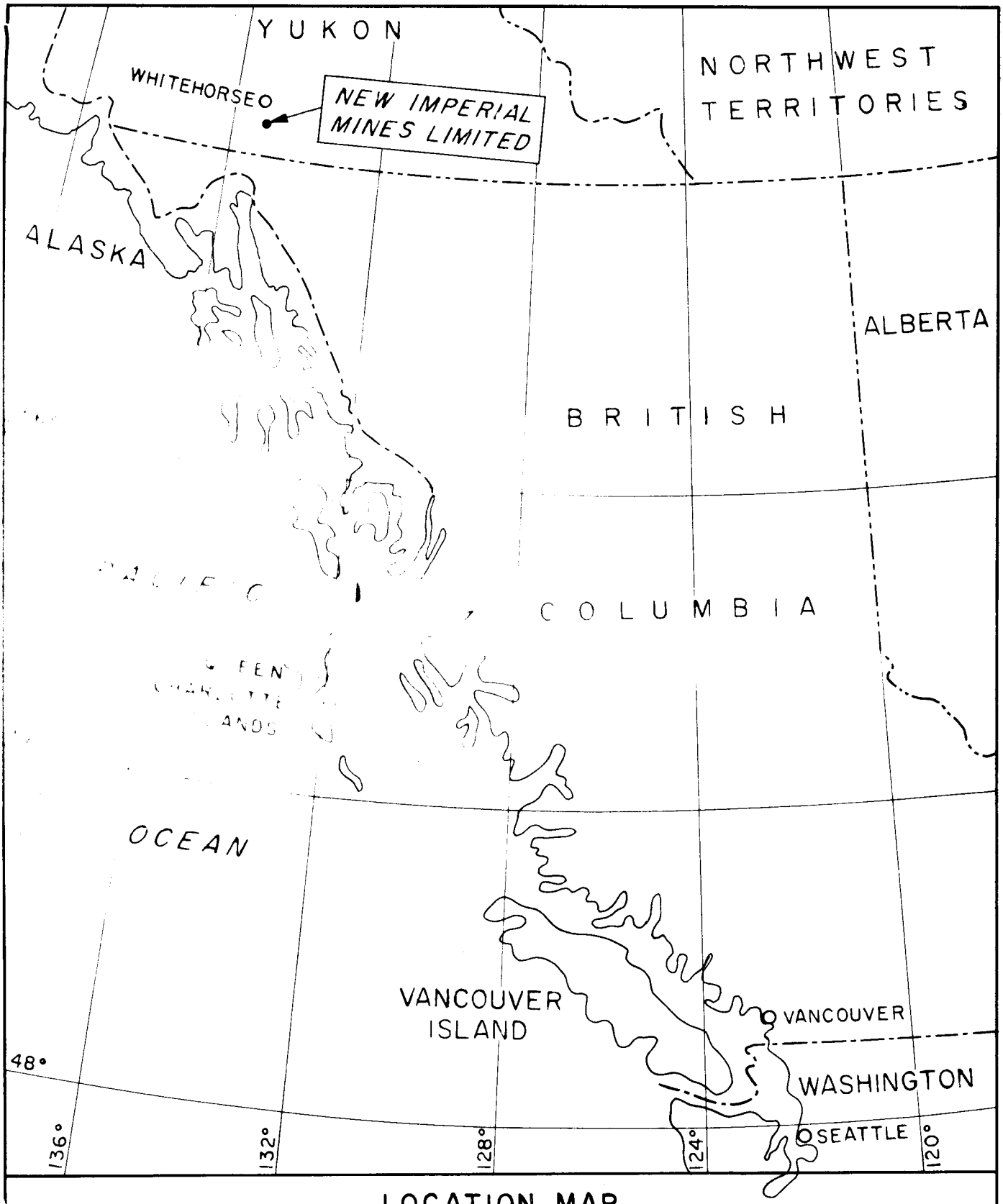
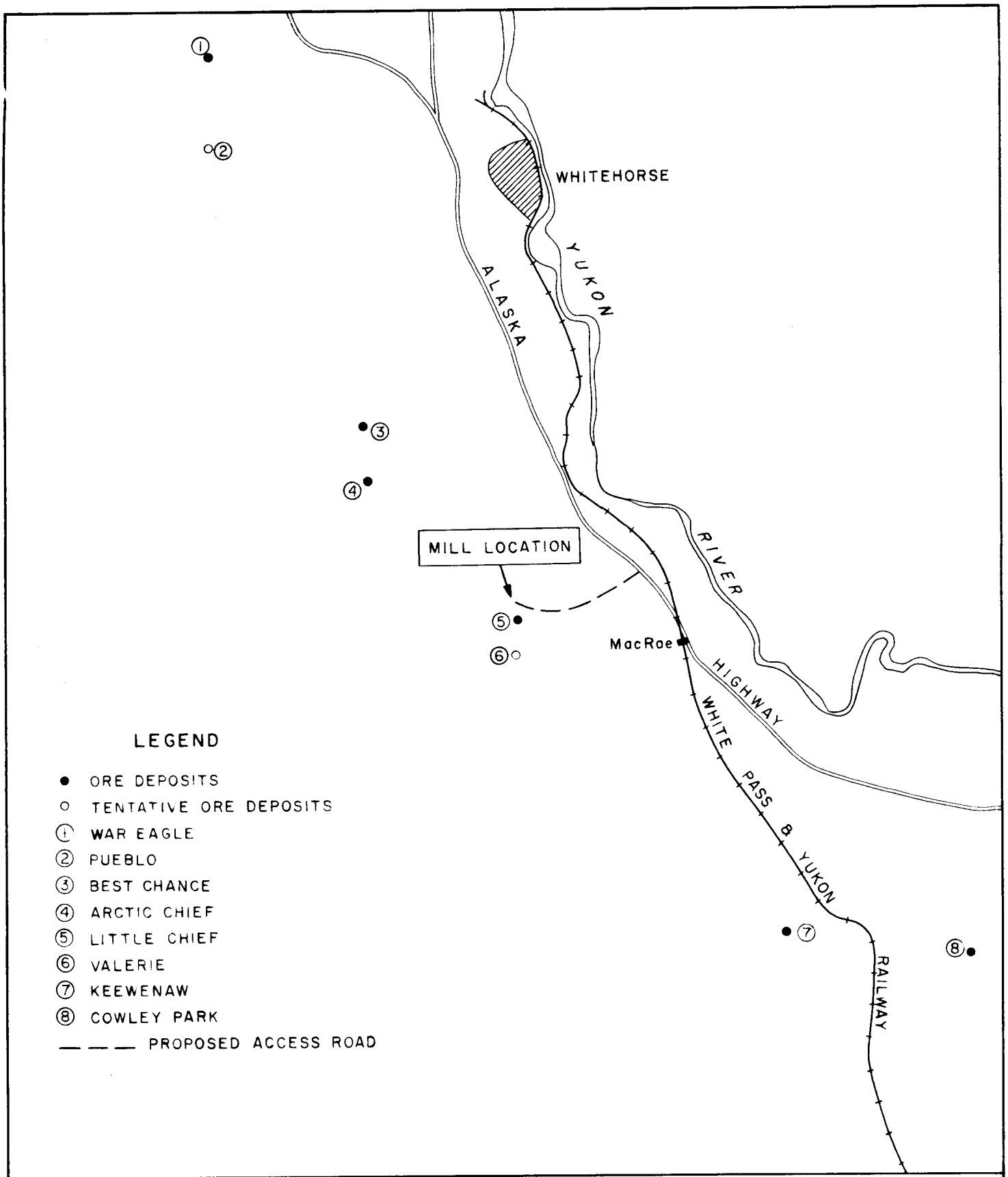



LOCATION MAP

# NEW IMPERIAL MINES LIMITED

WHITEHORSE, YUKON

Scale 1" = 120 miles




# LOCATION MAP
# NEW IMPERIAL MINES LIMITED
## WHITEHORSE, YUKON
Scale 1" = 1 mile

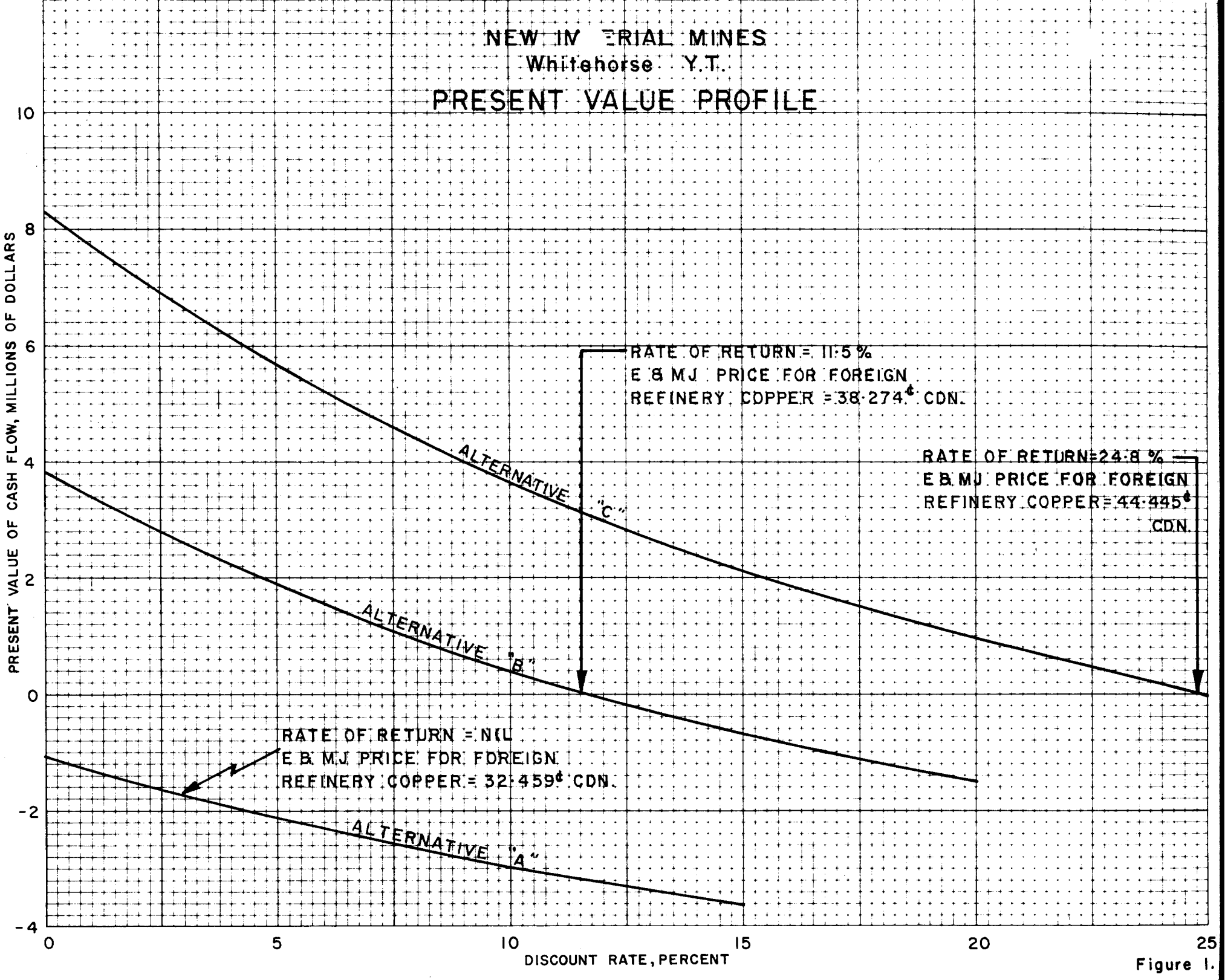

NEW IMPERIAL MINES
Whitehorse Y.T.
PRESENT VALUE PROFILE
PRESENT VALUE OF CASH FLOW, MILLIONS OF DOLLARS
10
8
6
4
2
0
-2
-4
0
5
10
15
20
25
DISCOUNT RATE, PERCENT
RATE OF RETURN = 11.5 %
E & MJ PRICE FOR FOREIGN
REFINERY COPPER = 38.274¢ CDN.
RATE OF RETURN = 24.8 %
E & MJ PRICE FOR FOREIGN
REFINERY COPPER = 44.445¢
CDN.
ALTERNATIVE "C"
ALTERNATIVE "B"
RATE OF RETURN = NIL
E & MJ PRICE FOR FOREIGN
REFINERY COPPER = 32.459¢ CDN.
ALTERNATIVE "A"

Figure 1.