

862478



February 25, 1992

MEMORANDUM

TO: Mine Manager
FROM: Engineering Supervisor
SUBJECT: MT. POLLEY EVALUATION

INTRODUCTION

Imperial Metals has placed the Mt. Polley Property for sale. The property is located 56 km northeast of Williams Lake. Indicated mining reserves are estimated at 49 million tonnes grading 0.383% copper and 0.556 g/t gold. A feasibility study for the property was completed by Wright Engineers in 1990 with a capital cost of \$131.4 million. This memorandum reviews economics of the property by utilizing Equity equipment to reduce capital costs. The approach is to look as optimistically as possible at the property and if the economics appear reasonable to review the property more critically.

FINDINGS

1. Without including acquisition costs, developing the property under the parameters used would provide a net present value of \$1.4 million at a 10% discount rate; IRR would be nearly 11%; payback would take nearly four years.
2. Copper leaching potential from oxide ore or low grade to obtain additional cash flow does not appear economic due to the high natural buffering capacity of the rock.

PARAMETERS

1. Operating costs and metal production were obtained from the Wright Engineers feasibility study at a 13,700 tpd milling rate.
2. Wright's capital costs were reduced to \$70 million by utilizing Equity equipment and eliminating working capital and contingency components. This approach would reduce capital cost to the likely lowest possible amount.

3. Concentrate revenue and disposal costs are based on proposed increases to Equity's present concentrate transportation and processing costs. These may be high but are much closer to current contracts than those contained in Wright's feasibility.
4. Metal prices are PDI projections.

Copper U.S. \$1.10/lb.
Gold U.S. \$400/oz.
Exchange CAN. \$1 = U.S. \$0.86
5. Cost of capital is assumed at 10% P.A. Other financing (possible gold loan) might reduce this cost.
6. The property is subject to a 22% net profits royalty after costs plus interest. Opening pools are \$9.2 million.
7. Ongoing capital costs are reduced to \$11 million from Wright's estimate of \$15.5 million.
8. Cost to purchase Imperial Metals interest or effect some type of joint venture are not included in the analysis.

DISCUSSION

1. Wright Engineers Feasibility

The Wright study visualized a 5 million tonne per year operation with a 10 - 14 year mine life. Oxide and sulphide were to be blended with an average 27% oxide content in the feed.

Capital cost was estimated at \$131.4 mill. with \$18.1 mill. in working capital and contingency.

Operating cost was estimated at:

Mining	\$2.50/t milled
Milling	3.46
Gen. & Admin.	<u>.60</u>
Total	\$6.52/t milled

Mining was in three zones - Central, North, West and totalled 48.4 mill. t of ore and 85.9 mill. t of waste for a stripping ratio of 1.76:1. 27.2 mill. t of low grade between 0.25% and 0.39% Cu equivalent at a grade of 0.22% Cu

and 0.24 Au/t is included with the waste. The pit was scheduled to operate for the first five years on a 12 hour shift/day and seven days/week and thereafter at two 12 hour shifts/day.

Metal recoveries were estimated at 76.6% copper and 79.2% gold.

Annual concentrate production was estimated at 50-60,000 t/year with average copper content of 25% and gold at 30 to 75 g/t. Transportation charge was estimated at \$73/WMT with a moisture content of 8%. Treatment charge was U.S. \$70/DMT and refining charge at U.S. \$0.09/lb. copper and \$7/oz. gold.

Metal prices were gold \$425/oz., copper \$0.95/lb. and exchange \$0.80 US/CAN.

No allowance was made for financing.

Results were a 12.3% rate of return, 3.6 years to payback and a net present value of \$7.6 mill. at a 10% discount rate.

2. Present Study

A number of parameters in the present study differ from Wrights feasibility, however, metal production was assumed to be the same.

Capital cost was reduced from \$131.4 mill. to \$70.0 mill. by utilizing Equity equipment and removing some working capital and contingency amounts. It is doubtful that capital costs could be reduced below the \$70 million level.

Off property costs were increased to reflect higher smelter charges as experienced by changes to Equity's current contract.

Cost of capital was added at a rate of 10% PA with debt repayment at 100% of cash flow.

Tax rate was assumed to be 43% after deduction of depreciation. A 2% minimum tax was also assumed.

PDI forecast metal prices of U.S. \$1.10/lb. Cu, \$400/oz. Au and exchange rate \$0.86 U.S./CAN. were used.

No provision was made for either acquiring Imperial Metals interest or some form of joint venture. Any sharing of revenue in this area would decrease the projects value even further.

Results of the analysis gave a rate of return of nearly 11%, a net present value of \$1.446 million at a 10% discount rate and nearly four years to payback. See Appendix 1.

3. Oxide Blending

The 48.8 mill. t of ore are reported to be 26.9% oxide. The Wright study provided for uniform blending of oxide with sulphide. In practice it would likely be very difficult to maintain a consistent blend. metal recoveries would likely suffer with erratic levels of oxide ore.

While not covered in this memorandum, a better approach might be to increase mining rates during the first five years, process a maximum amount of sulphide ore initially, stockpile oxide and process it towards the end. While this approach increases initial operating costs, testwork indicates high recoveries for sulphide material and could possibly provide higher initial cash flow and an earlier payback with less risk. Particularly since Wrights schedule only utilized mining equipment 50% of the time for the first five years of operation. Some reduction in capital cost during mine life may also be possible with reduced equipment requirements after year five. While this approach may be better, the property is still unlikely to be attractive enough for acquisition.

4. Capital Cost

A review of capital costs indicates a number of reductions from the Wright study may be possible. These reductions would appear to be a maximum and some doubt exists whether they would be fully realized in practise. Possible reductions are shown in the following table.

	<u>Wright's Feasibility (millions)</u>	<u>Possible Revisions (millions)</u>
Pre-Prod. Mining	21.3	6.2
Site Prep.	1.5	1.5
Mill	46.6	10.0
Other Buildings	3.7	3.7
Tailings & Reclaim.	8.0	4.0
Services	3.3	3.3
Power	6.3	6.3
Off-Site Facilities	1.3	1.3
Indirects	21.4	21.4
Working Capital & Contingency	<u>18.0</u>	<u>12.3</u>
TOTAL	131.4	70.0

5. Mill Throughput

Mt. Polley ore has a similar work index to Equity ore. Therefore major changes may be required to Equity's mill components to achieve a 5,000,000 t/year throughput. Either mill throughput could be lower with Equity's components or higher capital would be required to achieve a higher throughput. In either case economics will likely be adversely affected.

6. Leaching Potential

Buffering capacity of Mt. Polley rock is high. Composite samples representative of average ore gave a net neutralization potential of 29.9 kg of CaCO₃ equivalent at pH 7.0 and 99.4 kg of CaCO₃ equivalent at pH 2.0.

Testwork on material at 50% oxide and 79.5% oxide required approx. 30 kg of acid per t of ore. 10.2 to 12.9 kg of acid were required per kg of copper leached. At \$120/ton for H₂SO₄ acid, cost ranged from \$0.60 - \$0.76 per lb. of copper leached. Gibraltar acid costs are \$0.125 per lb. of copper produced within an overall cost of \$0.537 per lb. of copper. Assuming balance of costs would be similar, then leaching Mt. Polley ore would cost between \$1.01 and \$1.17. Leaching low grade would likely be more expensive as the buffering capacity of the rock would still be high, but the amount of copper available to be leached would be lower.

Gold leaching potential also appears to be unattractive. Gold content at 0.556 g/t is roughly half the grade of the lowest leach operations in the United States.

SUMMARY

Economics of the Mt. Polley property were reviewed by applying lower capital costs through use of Equity mining equipment and mill components. More recent concentrate terms were also included. A 10% cost of capital was used, but no provision was made for property acquisition or some type of joint venture.

Results of the analysis indicate participation in the Mt. Polley project by Equity is not attractive. Net present value at a 10% discount rate was \$1.446 million, IRR was nearly 11% and payback required nearly four years.

Leaching also appears unlikely for copper due to the high natural buffering capacity and unlikely for gold due to the low grade.

The high work index would require additional mill components to reach 5,000,000 t/year throughput.

Blending sulphide and oxide ore to provide a reasonable blend will likely be very difficult to achieve in practise. Therefore, metal recoveries may be lower than projected in the Wright feasibility study.



R. Baase
Engineering Supervisor

RB/gp

APPENDIX 1 – Project Economics (000's)

YEAR	0	1	2	3	4	5	6	7	8	9	10
Copper (lb)		28,015	29,887	27,772	26,500	26,731	26,199	35,960	31,241	39,658	29,335
Gold (oz)		107.8	98.2	89.8	62.7	65.6	63.3	55.2	50.8	58.6	31.8
Payable Cu x 0.923		25,858	27,586	25,634	24,460	24,673	24,182	33,191	28,835	36,604	27,076
Payable Au x 0.96		103.5	94.3	86.2	60.2	63.0	60.8	53.0	48.8	56.3	30.5
Rev. Cu US\$'s @ 1.10/lb-0.13		25,082	26,758	24,865	23,726	23,938	23,456	32,195	27,970	35,506	26,264
Rev. Au US\$'s @ 400/oz-5		40,882	37,248	34,049	23,779	24,885	24,016	20,935	19,276	22,238	12,047
Treatment Charge US \$130		6,882	7,342	6,822	6,510	6,567	6,436	8,834	7,674	9,742	7,206
Transport. Charge US \$79.22		4,194	4,474	4,157	3,967	4,002	3,922	5,383	4,677	5,937	4,391
NSR		63,670	60,540	55,605	42,952	44,369	43,052	45,139	40,478	48,795	30,988
Property Op. Cost		31,841	28,810	28,897	28,370	33,958	34,876	35,663	37,612	38,746	20,898
Interest (@ 10% PA)		7,000	4,667	2,215	633						
Cash Before Tax		24,829	27,063	24,493	13,949	10,411	8,176	9,476	2,866	10,049	10,090
Undep. Capital		71,000	48,171	22,108	17,476	13,233	11,263	8,884	6,219	4,353	3,047
Dep. (100%) 45,000		24,829	20,171								
Dep. (30%) 25,000			6,892	6,632	5,243	3,970	3,379	2,665	1,866	1,306	914
Taxable Income		0	0	17,861	8,706	6,441	4,797	6,811	1,000	8,743	9,176
Tax @ 43% (min. 2%)		497	541	7,680	3,744	2,770	2,063	2,929	430	3,759	3,946
Cash After Tax		24,332	26,522	16,813	10,205	3,671	6,113	6,547	2,436	6,290	6,144
Capital		1,000	2,000	1,000	2,000	1,000	2,000	1,000			
Debt Repayment		23,332	24,522	15,813	6,333						
Loan Balance	70,000	46,668	22,146	6,333							
Net Profit					1,872	2,671	4,113	5,547	2,436	6,290	6,144
*Royalty								1,101	536	1,384	1,352
Cash Flow					1,872	2,671	4,113	4,446	1,900	4,906	4,792
Cum. Cash Flow					1,872	4,543	8,656	13,102	15,002	19,908	24,700
Cash Flow Before Debt Repay and After Royalty	(70,000)	23,332	24,522	15,813	8,205	2,671	4,113	4,547	2,436	6,290	6,144
Disc. Factor @ 10%		0.9091	0.8264	0.7513	0.6830	0.6209	0.5645	0.5132	0.4665	0.4241	0.3855
Present Value	(70,000)	21,211	20,265	11,880	5,604	1,658	2,322	2,334	1,136	2,668	2,368
Net Present Value @ 10% Disc.		1,446									
IRR		Nearly 11%									
Years to Payback		Nearly Four Years									

*9.2 million is accumulated prior to 1992 that will likely delay royalty payment to year 7.