

CONFIDENTIAL

July 22nd, 1971.

93B/8

STRIP RATIO, HAUL INFORMATION & PRODUCTION(a) Overburden in Gibraltar East Pit

Contract let to Pooley Bros. for 1.4 million, then expanded to 2 million yards glacial till - very few boulders, but solidly compacted - used tractors and scrapers with reported difficulty. Heavy rains delayed progress. Time of completion about 2½ months - should be finished 1st August 1971 - small part of leach zone exposed now.

Price per yard - Pooley - 39¢
Two others - Kiewit & one more (Dawson?) - 50¢ & 54¢.

(b) Lake water & bottom sludge - Granite Lake Pit

Plans to use dredge - must start 1½ to 2½ years from now.

(c) Gibraltar East Pit

10 million tons of waste rock (including some overburden) to be removed commencing 1 Aug. 71 - finishing 1 Mar. 72. This will be charged to preproduction and will be done by Gibraltar using shovels and trucks.

Essentially, this pit is a "hole" from now on - the waste must be hauled up a 10% grade within the pit and then flat to destination - average distance about one mile.

The ore haul is at plus 7% to the primary crusher about 1500' from the edge of the pit.

(d) Overall predicted strip ratio (from memory)

<u>Year</u>	<u>Pit</u>	<u>RATIO</u>		
		<u>Drill & Blast Waste</u>	<u>Overburden</u>	<u>Total</u>
1	Gib. East	1.00	0.46	1.46
2	"	1.00	0.54	1.54
3	"	1.00	0.58	1.58
4	" & Polly	1.00	0.50	1.50
5	" "	1.00	0.40	1.40
6	" "	1.00	0.40	1.40
7	" "	1.00	0.40	1.40

(e) Production

It is planned to use 6 shovel shifts/day averaging 13,000 tons/shovel shift or more. $6 \times 13,000 = 78,000$ tons/day.

Production has been quoted at 30,000 tons of ore/day, leaving 48,000 tons possible for waste removal. Probable production, however, will be as high as 45,000 tons of ore per day with the balance of 33,000 tons for waste.

37,000 tons of ore and 41,000 tons of waste should be a safe assumption, resulting in a 1.11 to 1 waste to ore strip ratio.

Predicted grade will average 0.44% Cu (0.43% to 0.45%). The molybdenum grade was not discussed but a figure of possibly \$1,000,000 per year addition to the cash flow was discussed.

Note - Using the same computer ore reserve estimating system, it is reported the grade as mined at Marcopper is 5% lower than the estimated grade.

(f) Mill Recovery

Some oxide copper has been reported but no figures were submitted. A 90% recovery should be attained.

(g) Start-up Date

Current mine staff estimates are 1st March 1972. The mining crew, however, must remove 10M tons of waste apparently, in the interim, but production on a partial scale can no doubt start before all this is completed.

(h) Capital Investment

The mine staff think 68M will be required and not the 74M reported

(i) Work is well advanced on the crusher and mill foundations. The open pit repair shop will be finished in about one month. All other buildings are in various stages of construction, with foundations well advanced. No plant machinery on site was observed, although no delivery delays are anticipated.

July 22nd, 1971.

MEMO re GIBRALTAR

(A) ORE ZONES

(1) Name & Location

(a) Gibraltar East

Discovered and drilled by Canex.
Northwest perimeter of central core.
Supply for first 3 years of mining - then supplemented by Granite Lake zones.

(b) Granite Lake

Discovered and drilled by Canex.
Southeast perimeter of central core.
Approx. 1/8 (?) of ore zone under Granite Lake.
Preliminary work to commence 1½ to 2 years from now.

(c) Pollyanna

Drilled mostly by Duval.
Northeast perimeter of central core.

(d) Gibraltar West

Original showings - adit area.
Drilled by initial owners and Cominco.
Southwest perimeter of central core.

(2) General Characteristics

Plunging at 20° to 30° westerly and/or west-southwesterly.
Upper part usually leached and barren - zero to 80' thick, underlain by copper enriched zone - chalcocite and some covellite, underlain again by primary zone - chalcopyrite.
Zones not delimited down plunge, and repetitions possible vertically underneath.

(B) EXPLORATION DRILLING

Almost all holes vertical (say 90% of total) except initial work in Gibraltar West zone. No sludge samples were taken. Ten foot runs were sampled. Location - corners of 400' squares initially (BQ size) - followed by holes at centres of squares (HQ size) for fill-in checking and metallurgy.

In addition, 13 rotary holes, using reverse circulation, 5-7/8" in size, were drilled for additional metallurgical samples. These samples gave copper assays 6% higher on the average than the corresponding diamond drilling.

Visual inspection of assay results of a few percussion holes adjacent to diamond drill holes indicates that averages over 75' to 100' would give comparable results, but individual samples of corresponding locations would not compare.

Virtually all the core samples have by now been used for metallurgical work. It was noted that all intersections, with extremely few exceptions, reported copper even though values were down to 0.03%. High values ranged up to 1.50%, but these are rare. Most values in the selected ore zones lie between 0.25% Cu and 0.75% Cu.

(C) ORE RESERVE CALCULATIONS

Much computer work was completed in about two months' time to establish the following optimum procedure:

Horizontal sections spaced 45' apart have been assumed and plans prepared. Drill hole assay values are averaged between these elevations. Cubes 45' x 45' resting on these horizontal sections are then assumed. For each cube the computer "searches" within a radius of 300' for any intersection averaging more than the assumed 0.25% Cu cut-off value. The assay values of these intersections are then combined according to the following formula to obtain the assay value for each 90' x 90' cube:

$$A = \frac{\frac{A_1}{d_1^5} + \frac{A_2}{d_2^5} + \frac{A_3}{d_3^5}}{\frac{1}{d_1^5} + \frac{1}{d_2^5} + \frac{1}{d_3^5}}$$

Where:- A = block assay value.

A₁ = assay value of drill hole No. 1.

A₂ = " " " " " No. 2, etc.

d₁ = horizontal distance between block and drill hole No. 1.

d₂ = " " " " " " " " No. 2.

Note - The 5th power was chosen as suitable for the Gibraltar type orebody. d₁, d₂ etc. must be less than 300'.

Open pits were then designed for 45' benches by (a) using suitable combinations, (b) rounding out perimeter lines, (c) assuming a 45° slope for the pit walls, (d) inserting 80' wide roads, and (e) re-computation of the final design.

Molybdenum assays were not used in these pit designs. Precious metal content is low and considered to be insignificant.

By raising the cut-off value in increments of 0.05% Cu (i.e. 0.30%, 0.35%, etc.) smaller higher-grade pits within the overall pits were then designed to outline initial mining plans.

(D) EQUIPMENT

(1) Mine

<u>Number</u>	<u>Description</u>
13	#M-85 Lectra-Haul Trucks - with 100 ton boxes.
3	#2100 P. & H. electric shovels - 14 yd. buckets.
3	#D-8 Caterpillar tractors.
2	#14E " graders
2	Rotary drills - Bucyrus Erie - 9-7/8" diameter holes.

(2) Concentrator

<u>Number</u>	<u>Description</u>
<u>Crushing</u>	
(a) 1	54" x 74" primary hydroset gyratory - 500 H.P. motor.
(b) 2	7' Hydracone (or standard) secondary.
<u>Grinding</u>	
(a) 3	13'6" x 20' rod mills.
(b) 3	" " ball mills.
(c) 3	9' x 12' regrind mills.
<u>Flotation</u>	
(a) 3 banks each - 8 #600 roughers (Denver?) 8 #600 scavengers.	
(b) 16	#300 first cleaners.
(c) 8	#30 second "
(d) 8	#30 third "
(e)	Molybdenum flotation section extra to above.
<u>Thickening</u>	
(a) 2	80' diameter - installed outside.
Building - size 234' x 322' - not including crushing section.	

(E) MANPOWER

(1) Construction

	<u>Men</u>
July 1971 - (a) Open pit - Pooley - overburden - strip 2M yds. - about 2½ mos.	60
(b) Concentrator & plant	<u>625</u>
Total	685

(2) Operating (estimate)

(a) Mine

Probably work 7 days/week on a basis similar to Endako - i.e. each man works a schedule of 7-2 : 7-2 : 7-3, or an average of 42 hrs./week.

<u>Category</u>	<u>Men/shift</u>	<u>Total (4 Shifts)</u>	
Truckdrivers	10		
Shovel runners	2		
Shovel oilers	1		
Blasthole drillers	2		
Drill helpers	2		
Tractor & grader	3		
Blasters	2		
Airtrac driller	1		
Labourers	2		
Shift boss	<u>1</u>		
	26	104	
Pit foreman		<u>1</u>	
Total			105

(b) Concentrator

Primary	1		
Secondary crusher	2		
Grinding operator	1		
Flotation operator	2		
Thickening & filtering	1		
Drying & concentrate loading	1		
Tailings	2		
Labourers & general	3		
Shift boss	<u>1</u>	56	
	14		
Supervision, metallurgical, sample preparation, etc.		<u>4</u>	
Total			60

(c) <u>Assay Office</u>			
Atomic absorption method			6
(d) <u>Engineering</u>			
Including pit layout, geology, new construction, (outside exploration?), computer work, etc.			18
(e) <u>Maintenance</u>			
Including mine, concentrator, tailings dam & lines, water supply, plant mobile equipment, camp & plant general - Supervision - 12			
Crew	<u>108</u>		
Total			120
(f) <u>Office</u>			
Including accounting, bookkeeping, warehousing, purchasing & stenographical			18
(g) <u>Camp General</u>			
Including single men's quarters, yard maintenance, road maintenance - approx. 8 miles (?) from plant area to sawmill			21
(h) <u>Management</u>			
General manager & assistant (none now)			<u>2</u>
		Total	350

mine = 30
mill = 15
mine = 30
20 75
rem = 45
120

45
18
21
2
66

(F) PERSONNEL

- | | |
|------------------|------------------------------------|
| J.M. (Mac) Gibbs | General Manager |
| Al Stevenson | Mine Superintendent |
| Jim O'Rourke | Mill Superintendent |
| Keith Croteau | Plant Superintendent (Maintenance) |
| Bill Trythall | Chief Engineer |
| Bob Young | Chief Geologist |
| Jerry Bell | Industrial Relations |

Telephone Numbers

- | | |
|------------------------------|----------|
| Gibraltar Mines - Operations | 297-6212 |
| Construction | 297-6211 |
| Commonwealth Construction | 297-6515 |

(G) MISCELLANEOUS

Water Supply

Three wells adjacent to the Fraser River (elevation 1600' approx.) will supply water through a 20" diameter pipeline, 7 miles long, to the concentrator (elevation 3500'). This pumping system will start up shortly to fill the tailings pond and provide reclaimed water later.

Tailings

Concentrator to pond - 36" diameter - 15,000' northerly.
Reclaim line - 36" diameter.

Power

Electrical power is supplied by B.C. Hydro, and natural gas for heating will be supplied by Inland Natural Gas through a pipeline.

Housing

20 key-employee staff houses are to be constructed at Williams Lake. Travel time is 30 to 40 minutes one way.
Single man accommodation and cookhouse facilities will be provided at the plant.