

MEMORANDUM

000789

TO: M. O. Hampton ✦
FROM: D. S. Jennings
DATE: March 3, 1972
SUBJECT: DEVELOPMENT DRILLING PROGRAMS

This memorandum supercedes that of December 28, 1971 on the same subject. The latter communication and accompanying map should be destroyed as it is incorrect as noted in a memorandum dated January 24, 1972.

The attached map (Figure I) summarizes all exploration and definition drill holes in the vicinity of the Faro orebodies. Presently known limits of economic and marginally economic mineralization are shown by the revised orebody "shadows." These "shadows" are drawn on presently available drill hole data and disregard possible extensions of mineralization. Thus, all sulfide mineralization within the "shadows" is either presently economic or marginal while sulfide mineralization outside the "shadows" is uneconomic and likely to remain so. Details of the calculations, based on 1971 operating statistics, leading to these conclusions are summarized in Appendix I. While the gross economics of Zone 3 probably remain unchanged, Figure I suggests the economic portion of the sulfide mass lies to the southwest of its original surface "shadows." This feature may necessitate revision of the ultimate pit plan in this area.

An additional 4.80×10^5 tons of economic sulfides averaging 10.6% combined were encountered along the southwestern margin of Zone 3 (Figure I) during the 1970 and 1971 development programs. A resume of this calculation is included as Appendix 2.

Development drilling for the foreseeable future is included in Figure I. This drilling can be divided into two broad categories: 1) 1972 development work, and 2) post-1972 development work. Proposed drilling within each category will be briefly reviewed.

The 1972 program should be concentrated in four areas outlined on Figure I. These areas are ranked as to priority with the area in red highest, followed by that in blue, followed by that in yellow, followed by that in black. Each of these areas will be discussed in turn.

Red:

The two high priority holes in the southern half of this area are proposed to test extensions of Zone 1 to aid in development of the ultimate pit in this area. Since the west wall of the current pit will be extended to the west in 1973, development work in this area is required to fix the limits of the ultimate pit. Four contingency holes are proposed to further test economic intersections (if any). Additional contingency holes can be spotted as conditions dictate.

The four high priority holes in the northern half of this area are planned to evaluate the thickness and grade of Zone 1 for ore control purposes. Holes 02, 05 and 06 are discussed by Pettigrew in his memorandum of February 21, 1972.

Blue:

Two high priority and four contingency holes are proposed to test the economic potential and geologic structure of the area surrounding DDH 71-210 and FRH-2. Limited economic mineralization is still possible in this area based on current drill hole spacing. In addition, the area affords 1973 dumpsite potential which would result in considerable haulage cost savings if proven void of economic mineralization.

Yellow:

Two high priority and two contingency holes are proposed to evaluate the extent of mineralization in an area presently indicated as uneconomic. Results from these holes should aid considerably in pit planning.

Black:

Drilling in this area is designed to test the westerly extent of Zones 2 and 3 relative to the presently active waste dump. The six priority and three contingency holes proposed for this area can be considered as straight development since northeasterly migration of the dump is not planned at this time. In all likelihood, the proposed holes will define the economic limit of Zone 3 since grades and tonnages have deteriorated in this area.

A total footage of 7500 feet is proposed for the 1972 high priority holes shown on Figure I. This figure represents the minimum footage required to test the four areas for sulfide extensions since some contingency drilling will probably be required.

Post 1972 development drilling is not subdivided into distinct areas. Work in this category is to be completed as operational needs dictate.



D. S. Jennings
Research Geologist

DSJ/mm

cc. R. L. Haffner
N. G. Cornish
J. W. Mossop
J. R. McLachlan
P. M. Pettigrew
U. X. Jansons

Attach.

APPENDIX I

Economic Evaluation of Sulfides Adjacent to an Existing Open Pit

The economic potential of sulfides intersected in drill core adjacent to the Anvil pit can be evaluated by solution of a simple equation of the form:

$$x + y + \left(0.20 \right) \left(\Sigma (x + y) \right) = Z$$

where:

- x = direct mining cost of waste
- y = comprehensive concentrate production cost
- Z = metal value of sulfide intercept

The third term on the left hand side of the equation accounts for a "profit margin" of 20%.

Values for x and y are determined from Table A1. Data for this table are compiled from actual 1971 operating costs averaged over the entire year. Waste and sulfide intercepts are plotted against x and y in Figures A1 and A2. Values of Z are based on the following factors: 1) length of sulfide intercept 2) actual 1971 mill recovery rate (75%), and 3) actual 1971 combined metal price/lb. (\$0.14/lb.). Figure A3 relates sulfide intercept length to grade and metal value (Z) for these conditions.

To illustrate the mechanics of drill hole evaluation, consider DDH-71-3. It is assumed that sulfide and waste intercepts in this and all other vertical holes apply to a rock column of 1 square yard cross sectional area. In addition, it is assumed that the sulfide mass is continuous and nearly subhorizontal between drill holes. Note that consideration of a vertical rock column in evaluating drill hole sulfides marginal to a pit is realistic because stripping the existing 45° slope back to expose each increment of ore is equivalent to removing a vertical column above each increment. For DDH-71-3 (Figure I):

TABLE A1

Relative Costs per Cu. Yd. Ore and Waste based on Total 1971 Costs

Production (000 cu. yds.)

Waste	6167	88%
Ore to Mill	<u>840</u>	12%
Total	<u>7007</u>	

Cost of Waste Mined:

		<u>Cost per Cu. Yd.</u>	
		(6167)	
88% of mine costs	2956	0.480	
88% of mech. costs	2161	0.350	
88% of electrical (88% x 115)	101	0.016	
88% of elect. mine power	<u>39</u>	<u>0.006</u>	
Total Cost Waste Mined	<u>5257</u>	\$0.852 =	x

Cost of Ore Mined

		<u>(840)</u>	
12% of mine costs	403	0.480	
12% of mech. costs	295	0.352	
Electrical costs (incl. power)	1112	1.324	
Mill department	5635	6.708	
Coal mine	293	0.349	
Transportation to tidewater	8342	9.931	
Skagway terminal co.	1411	1.680	
Conversion: ocean freight	2402	2.860	
treatment chges.	17813	21.206	
other	194	0.230	
General and administration	2678	3.188	
Depreciation	2483	(2.956)	
Amortization	1518	1.807	
Interest (total)	5528	6.580	
Development deferred	(999)	(1.189)	
Yukon Mining Royalty	506	0.602	
	<u>49614</u>	<u>\$56.108 =</u>	<u>y</u>

Total Cost

54,871

$$x = \frac{160'}{3} = 53 \text{ cy.} = \$43 \quad (\text{Figure A1})$$

$$y = \$935 \quad (\text{Figure A2})$$

$$\Sigma(x + y) = \overline{\$978}$$

$$\Sigma(x + y) - (0.117)(\Sigma(x + y)) = \$861$$

$$\bar{z} = \$537$$

Note that the initial inclusion of a 20% "profit margin" was necessary in preliminary drill hole evaluation to define a single area in Zone 3 capable of supporting mining.

All drill holes in Faro Zones 2 and 3 were evaluated in the manner outlined above. Thus, drill holes outside of the orebody "shadows" in Figure I are presently uneconomic regardless of interest or stripping considerations and will likely remain uneconomic if total mining costs and metal values increase proportionally with time. Drill holes within the orebody shadows can be broken down into two categories: a) economic and b) marginal. Economic holes (shown in small, solid squares in Figure I) will generate current interest + 20% or a total return of $\bar{7}$ 31.7%. Marginal holes can be subdivided into those that generate more than current interest i.e. $\bar{7}$ 11.7% < 31.7% return (small, open squares with dual concentric circles) and those that generate less than current interest i.e. $\bar{7}$ 0 < 11.7% return (small, open squares with single circle). Results of the evaluations are given in Figure I.

APPENDIX 2

An "order of magnitude" estimate of tonnages added to Zone 3 by the 1970 and 1971 development programs is given below:

<u>DDH</u>	<u>SULFIDE INTERCEPT</u>	<u>GRADE*</u>	<u>PRODUCT</u>
70-12	45'	12.7%	571.5
71-5	40'	8.3%	332.0
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TOTAL	85'		903.5

$$\text{Average Thickness} = 85/2 = 42.5'$$

$$\text{Average grade} = 903.5/85 = 10.6\%$$

$$\text{Volume} = 566' \times 283' \times 42.5' = 188.7y \times 94.3y \times 14.1y = 150,901 \text{ cy.}$$

$$3.18 \text{ tons/cy.} \times 150,901 \text{ cy.} = 479,865 \text{ tons} = 4.80 \times 10^5 \text{ tons}$$

* Weighted average over intercept