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DATE: \_\_\_\_\_

FROM: Gregg Tilson

TO: Jose Preciado

Number of Pages \_\_\_\_\_ including Cover Page.

Circulation and/or Comments:

I now recall why I haven't sent these to you already - The disk with the text crashed some time ago and most of the AFE text was lost. As a result those are not absolutely the latest but then they were not approved anyway!, so who cares.

*Cherry*  
*Byg*

If all pages were not received, please contact \_\_\_\_\_  
at (403) 668-3578.

APPLICATION FOR FINANCIAL EXPENDITURE (WHITEHORSE OFFICE)

EXPENDITURE:

CAPITAL:

OPERATING:

PROJECT TITLE : Faro Pit Fill-in Drilling  
 PROJECT SPONSOR : G. Jilson AFE# : \_\_\_\_\_  
 AMOUNT BUDGETED : 85,000 DEPT : Technical Services  
 AMOUNT REQUESTED: 257,000 DATE : June 29/87 Geology

**SUMMARY** Fill-in drilling carried out in the 1986 has helped produce a geologic model of the Faro deposit AY phase volume that gives a greater degree of confidence to bench reserve prediction. In the BY and CY phases more data is required in order to produce predictions as reliable as those now available for the AY phase. Seventeen drill holes totalling 2500 m. (8200 feet) are required to complete the drill pattern. Five of these holes are in the southwest part of the BY phase and should be drilled at the earliest possible time. The remainder are less urgent but should be drilled as soon as possible because of the turn-around time involved in getting results from drill data. The estimated cost of this work is \$287,000: of this total amount \$66,500 is required urgently to carry out the drilling needed for the early BY phast.

AQUISITION PURCHASE  LEASE  CR BUILT   
COST ESTIMATE QUOTATION  ESTIMATED COST:  
 CR FORECAST  CONTINGENCY : 287,000  
 TOTAL : 287,000

Est. Life \_\_\_\_\_ NPV \_\_\_\_\_ IRR \_\_\_\_\_ Payback \_\_\_\_\_  
 Startup date \_\_\_\_\_ Closeout Date \_\_\_\_\_

	1987					1988	
	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.
Expenditure Flow (\$000):							
Cash Flow (\$000):							

<u>REVIEWED BY (Position Title)</u>	<u>SIGNATURE</u>	<u>DATE</u>
Vice President, Transportation and Engineering	_____	_____
Executive Assistant to the Chairman	_____	_____
Vice President, Controller	_____	_____

AUTHORIZED BY:  
 Chairman and Chief Executive Officer \_\_\_\_\_  
 Cost Eng. \_\_\_\_\_  
 Accountant \_\_\_\_\_

## Introduction

As part of the program of regular development drilling of ore in advance of production more drilling will be needed in the Faro deposit. This AFE presents all remaining drilling required to confirm ore reserves and a few holes to test the southwest ultimate pit limit for push back possibilities. The only additional drilling required at Faro would be to test the southwest tail underground potential and various as yet undefined exploration possibilities around the pit. The southwest tail underground drilling is presented in a companion AFE.

## The Problem

The problem is accurate prediction of ore reserves to allow efficient mine planning and marketing. The final drill spacing in the Faro deposit approximates a 141 foot square pattern, this pattern is adequate to define the geology in most areas. There are a few remaining parts of the deposit where additional holes are needed to complete this pattern. The second part of the problem is to get results from the drilling in a time frame that makes the data useful for mine planning.

In addition to this general need for more detail there is a more urgent requirement for information in the early production portion of the BY phase. This production comes from the part of the phase which is probably the highest grade part but has the greatest uncertainty in geology due to wide drillhole spacing. There is barely sufficient time to make a full model of this area before it is scheduled to be mined but the visual results of fill-in drilling would indicate clearly if the model geology is supported and a re-design of stripping priorities is warranted.

Towards the southeast part of the deposit, near the JB phase it is possible that there will be holes that are in the wrong place as was experienced in the JB phase. More holes will help minimize the effect of this problem.

## The Solution

It is clear that more drilling and better geologic control make for better reserve predictions. The degree to which the predictions of grade distribution are improved is shown on figure 1. The spatial reliability of the newer models is also substantially improved. In the AY phase, the bench variance for the newest model compared to the FI model (the one used for mine planning) is reduced from  $\pm 30\%$  to  $\pm 20\%$ . The goal of  $\pm 5\%$  was not achieved but a sizeable improvement in reliability was gained as a result of the 1986 drilling.

The drill programme needed to firm up the remaining reserves for the Faro deposit is outlined below and shown on figure two. This drilling will have to be done as soon as possible in order to allow sufficient time to put the results into a form suitable for mine planning. This time is about four months after the completion of drilling for new modeling projects such as carried out for Faro recently; incorporation of new drilling into already modeled parts of the deposit can be done much more quickly depending on the extent of revision needed.

The drilling is prioritized from highest to lowest as follows:

- Category A    Fill-in early BZ Phase production, urgent priority, should be drilled as soon as possible  
5 holes totalling 580 metres (1900 feet)
- Category B    Fill-in drilling in the CZ Phase, should be drilled no later than 1<sup>st</sup> qtr. 1988  
12 holes totalling 1920 metres (6300 feet)
- Category C    Pit limit holes along the southwest edge of pit, not urgent, should be drilled before abandonment  
7 holes totalling 860 metres (2800 feet)

This AFE requests funds to drill the 17 holes totalling 2500 metres (8200 feet) in categories A and B above. These hole locations are shown on figure 2. All these holes are considered essential. Before drilling the three holes in category A that are closest to the AY phase excavation, all surface geological information will be evaluated to insure that the holes are needed (see figure 2). The most effective utilization of the drillhole data would be achieved if all holes are drilled in one program starting as soon as funds are available. This approach will also give the lowest unit drilling cost.

#### Benefit

The main benefit to be gained from this drill programme is the reduction of surprises such as those encountered in the early days of production in the JB phase. Accurate reserves allow more realistic budgeting of costs and output. The category A holes will tell in advance if BY phase stripping in the pit now is directed at reserves that we can be confident are present; if not then there is time to redesign the stripping to release more reliable ore. The CY phase holes will help resolve questions about the reliability of the survey control for drill hole collars.

#### Effect of non-execution

If the drilling described herein is not carried out then the mine plan for the remainder of the Faro deposit will have to follow a model that has proven itself to be less than satisfactory in the southeast part of the deposit. This could mean that there will be a return to the situation of predicting head grades that are too high and mill feed tonnages that are too low; thus grossly misrepresenting the economics of the deposit. Without these drillholes the new model (FB701A) can and will be extended to the remainder of the Faro deposit; this will help resolve some of the problems with the FI model but the reserves will be no more reliable than the base data from which they are derived and these data are suspect based on what has been learned in the JB phase.

#### Costs

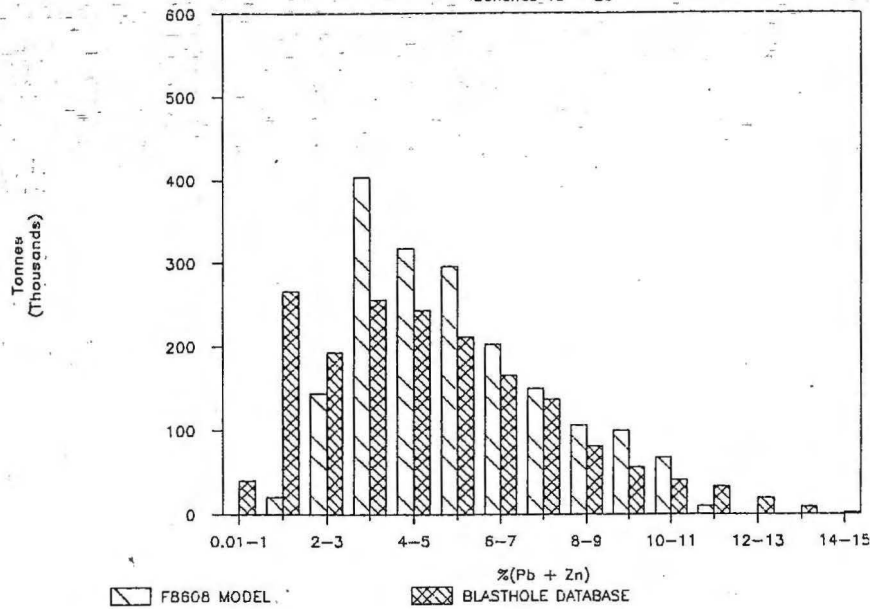
The following is an estimate by Curragh staff based on 1986 experience drilling at the Faro pit. A footage cost of \$28.00/ft. is used and is inclusive of all contractor charges. Allowance for a core rack has been made since the existing racks are full.

Temporary salaries	5,500	
Drilling	229,600	\$28.00 per foot
Light vehicle lease	2,000	
Travel	1,500	
Room and board	3,200	80 man days
Gasoline	1,000	
Diesel	8,700	
Core rack	15,000	
Assaying	20,500	
Total	\$287,000	\$35.00 per foot

Using the above footage costs the category A drilling would cost \$66,500 and the category B drilling an additional \$220,500.

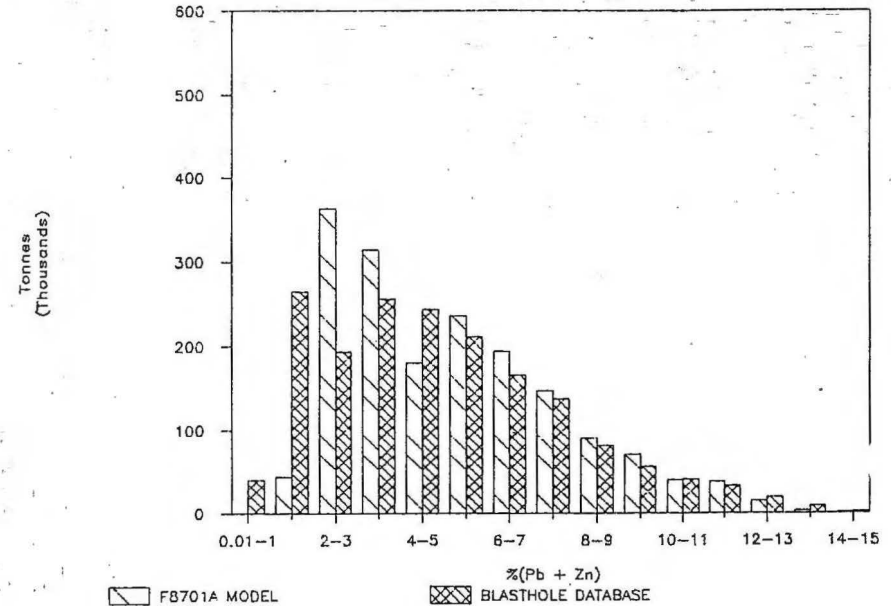
### F8608 MODEL GRADE DISTRIBUTION - AY

Benches 19 - 26



### F8701A MODEL GRADE DISTRIBUTION - AY

Benches 19 - 26



### FI MODEL GRADE DISTRIBUTION - AY

Benches 19 - 26

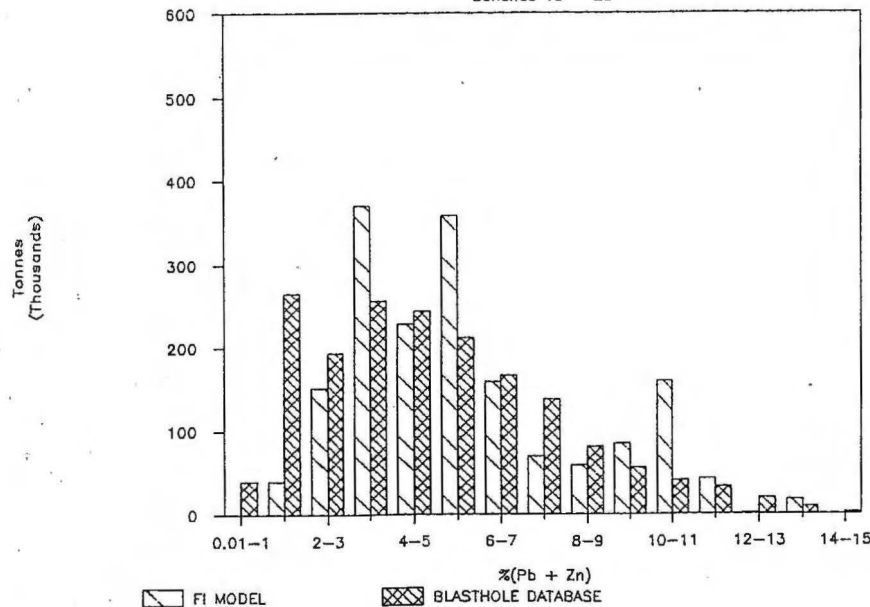


Figure 1.

Grade distribution histograms for all the sulphides mined in the AY phase, Faro pit to date. The tonnage blocked out by blastholes in each category is compared to three different computer models made over the last three years. The most recent model (F8701A) shows improved simulation of the grade distribution especially above the ore-waste outoff grade. This model shows excellent spatial correlation with high grade blocked out by blastholes on each bench. With the appropriate dilution factors the newest model also shows the best bench by bench comparison to the blasthole reserves. These improvements are the result of improved geologic control which is due to increased drillhole density. Despite these improvements the goal of predictability of bench reserves to the 95% confidence level was not reached and probably is beyond the realm of economic feasibility. Note that the blasthole quantities used here are the preliminary results using an average tonnage factor of 3 tonnes/cu.yd.



## Introduction

In order to meet stipulated concentrate outputs during the years 1990 to 1993 open pit ore feed to the mill must be supplemented from another source. Since all possible open pit sources have been tapped, the only ~~source~~<sup>supply</sup> of additional feed is an underground operation in the part of the Faro deposit that lies southwest of and downdip from the open pit (figure 1). Very preliminary calculations show that there is possibly two million tonnes of mineable high grade ore in that area.

The southwest tail ore consists of a sheet of massive sulphides overlain and underlain by A type sulphide bearing quartzites. There are two separate zones connected by an area where the sulphide horizon is thin (figure 1). The east zone appears to be a relatively planar, tabular body from 10 to 40 feet thick dipping 25° toward the southwest. From the available data the thickness of the east zone does not vary dramatically from hole to hole thus it is felt that this zone will be structurally simple and have relatively good continuity. Geologic reserves for the east zone are two million tonnes averaging 5.1% lead, 7.7% zinc and 73 grams per tonne silver. The west zone is thinner and from the available data it appears likely that the zone will be quite variable in thickness and grade as well as complicated by significant faults. Geologic reserves for the west zone are 580,000 tonnes averaging 4.7% lead, 7.5% zinc and 50 grams per tonne silver.

The drill pattern in this area is very wide and there is consequently considerable uncertainty in the reserves especially in the west zone. A variance of  $\pm 50\%$  in the reserves is quite possible. If the extreme unfavorable variance were to be realized then the viability of underground development in this area might be threatened. If the plan is still viable but the west zone is not supported by fill-in drilling then the development of the remainder of the ore zone might be considerably different. Fill-in drilling is required to firm up these reserves before a decision to proceed with underground development is made.

## The Problem

The problem is ~~whether~~<sup>if</sup> the expected reserves actually exist. The final drill spacing in open pit portion of the Faro deposit approximates a 141 foot square pattern. This pattern is adequate to define the geology in most areas and reserves considered proven can be calculated from a geologic model derived from this density of information. In the southwest tail area the drill spacing is about three times greater than this spacing. Experience in the open pit area is that if a drill spacing is closed down by a factor of two to the final spacing, the global reserves do not change significantly but the local reserves do change. There is no data to show the comparison between a spacing as great as that in the southwest tail and the reserves generated from the final spacing especially for a tonnage as small as the total southwest tail underground area. It is known that the polygon method used to calculate the southwest tail reserves does tend to overestimate the reserves compared to inverse square distance block model estimates. This would suggest that the reserves are already optimistic; if there is any lack of continuity between drill hole intersections then large reductions in tonnage could occur. It is not unrealistic to anticipate that the final reserves could be as much as 50% lower than the

AS an economic <sup>body</sup> ~~deposit~~

preliminary reserves and that the west zone may not exist at all. This degree of uncertainty in the reserves makes it impossible to carry out a realistic analysis of the economics of mining and a comparison with possible open pit expansions. Considering the cost of underground development this level of risk is unacceptable.

### The Solution

The solution to this problem is to drill more holes in advance of underground development to test the continuity of ore and the reliability of the current reserve estimates. The proposed program is outlined on figure two. In the east zone it is proposed to drill off three sections spaced 280 feet apart with holes about 141 feet apart along the section. This will bring the spacing to a point where one can be relatively comfortable with the global reserve estimate. This is estimated to require 12 holes totaling 8900 feet (2715 metres).

In the west zone six holes totaling 2900 feet (885 metres) are proposed as a minimum with a <sup>for an</sup> contingency for another 1900 feet (580 metres) of additional holes and allowance for angle holes that might be needed to drill within the pit.

This drilling is designed only to firm up the reserves; in addition at least four holes each about 1000 feet deep should be put down to the southwest to explore for extensions to the zones. At least one of these holes should be on section 129 where a small extension of the east zone seems likely (figure two). Funding for this exploratory drilling is not requested in this AFE as it is lower priority than, and dependent on, establishing the viability of the present plan.

### Benefit

The benefit to be gained from this drill programme is the reduction of the risk that after spending over a million dollars simply gaining access, it is discovered that the expected reserves are not present and worse, that the reserves do not warrant further development. More reliable reserves allow better evaluation of capital costs per tonne and feasible levels of output as well as permitting a realistic comparison of underground mining and expansion of the open pit.

This area could be drilled from underground however to evaluate the same area would require between a third and a half the footage at a slightly higher unit cost in addition to the cost of gaining underground access. If the drilling does prove up enough reserves to make underground development viable then it would be cheaper to drill the holes underground; should the results be negative then surface drilling is considerably cheaper.

### Effect of non-execution

The effect of non-execution will be to proceed with development in the face of considerable risk. The extreme case would be to suffer the costs of underground development only to discover that the ore is not as continuous as expected. Should this occur to the extent that mining is not practical or that there are not sufficient reserves to warrant production then Cuffagh will have lost a very expensive bet. If the current reserves are followed at face value then there is the possibility that un-warranted expenditures could be carried out on the

west zone even if the east zone fully supported by fill-in drilling.

Costs

The following is an estimate by Curragh staff based on 1986 experience drilling at the Faro pit. A footage cost of \$29.00/ft. is used and is inclusive of all contractor charges.

Temporary salaries	11,200		
Drilling( 14,000 feet)	406,000	\$29.00 per foot	93 days
Light vehicle lease	3,000		
Travel	1,500		
Room and board	6,000	120 man days	
Gasoline	2,500		
Diesel	12,600		
Assaying	25,000	500 samples	\$50.00 each
freight	1,000		
computer suppl.	1,200		
core rack	17,000	(serves underground as well)	
draft & duplic.	1,000		
misc. supplies	2,000		
	~~~~~		
Total	\$490,000	\$35.00 per foot	

The cost of a core rack is included in the estimate since the existing racks at Faro are full. Staff salaries are not included.

CURRAGH RESOURCES INC.

FARD SOUTHWEST TAIL UNDERGROUND

TABLE I. SUMMARY OF GEOLOGIC RESERVES

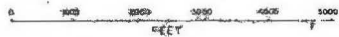
	TONNES	LEAD (%)	LEAD (%)	LEAD PLUS ZINC	SILVER (g/t)	PERCENT OF TOTAL RESERVE
WEST ZONE ~~~~~						
A TYPE	42,801	1.97	3.20	5.17	8.5	7.4%
BG TYPE	520,083	4.92	7.82	12.74	53.1	90.2%
H TYPE	13,417	4.68	7.61	12.29	54.6	2.3%
TOTAL	576,301	4.70	7.47	12.17	49.8	
EAST ZONE ~~~~~						
A TYPE	15,215	2.03	5.78	7.81	28.9	0.7%
BG TYPE	1,787,645	5.10	7.51	12.61	71.6	87.1%
H TYPE	250,619	5.28	9.39	14.67	85.0	12.2%
TOTAL	2,053,479	5.10	7.73	12.83	72.9	
BOTH ZONES ~~~~~						
A TYPE	58,016	1.99	3.88	5.86	13.9	2.2%
BG TYPE	2,307,728	5.06	7.58	12.64	67.4	87.8%
H TYPE	264,036	5.25	9.30	14.55	83.5	10.0%
TOTAL	2,629,780	5.01	7.67	12.68	67.8	

# CURRAGH RESOURCES FARO MINE SITE

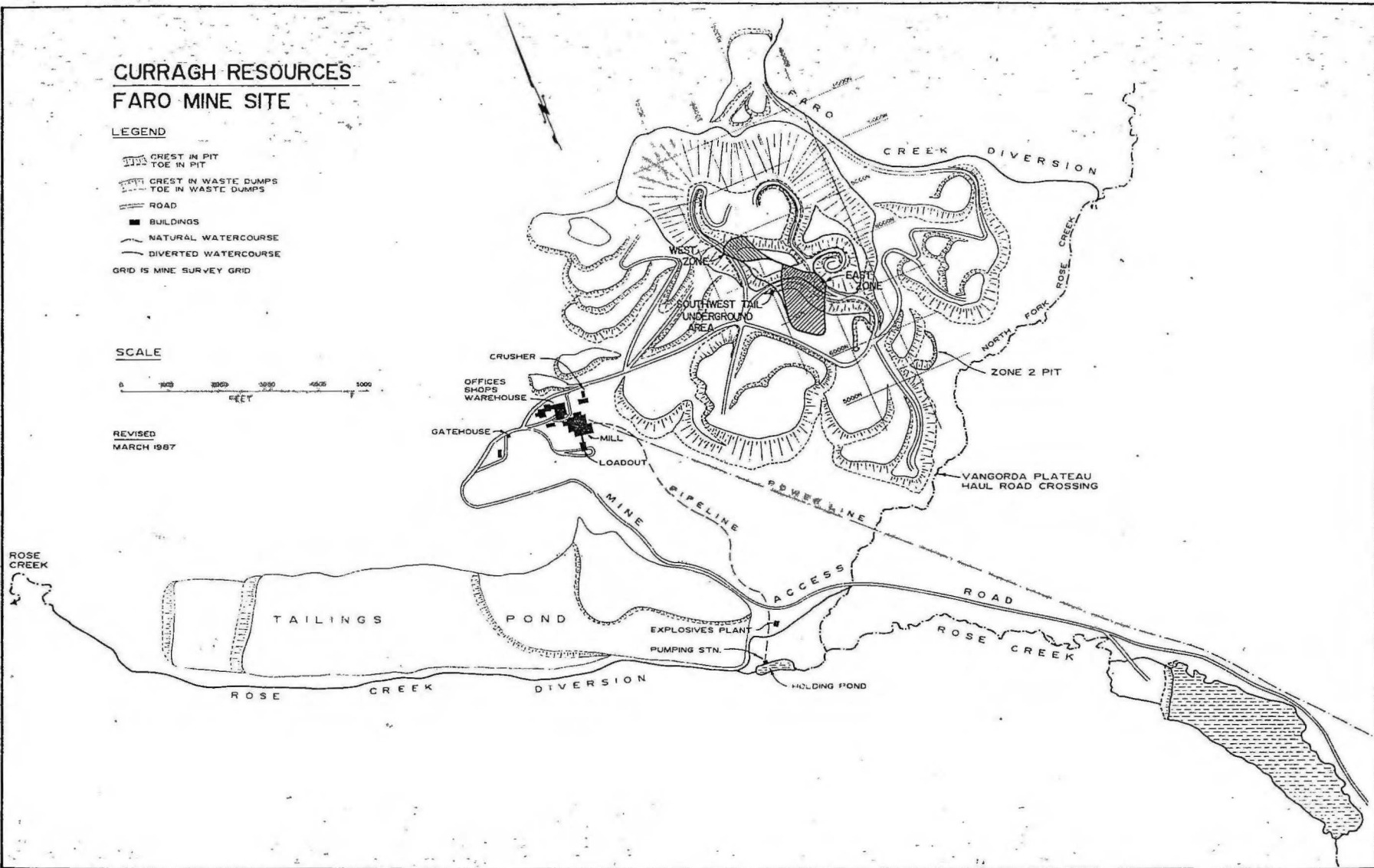
## LEGEND

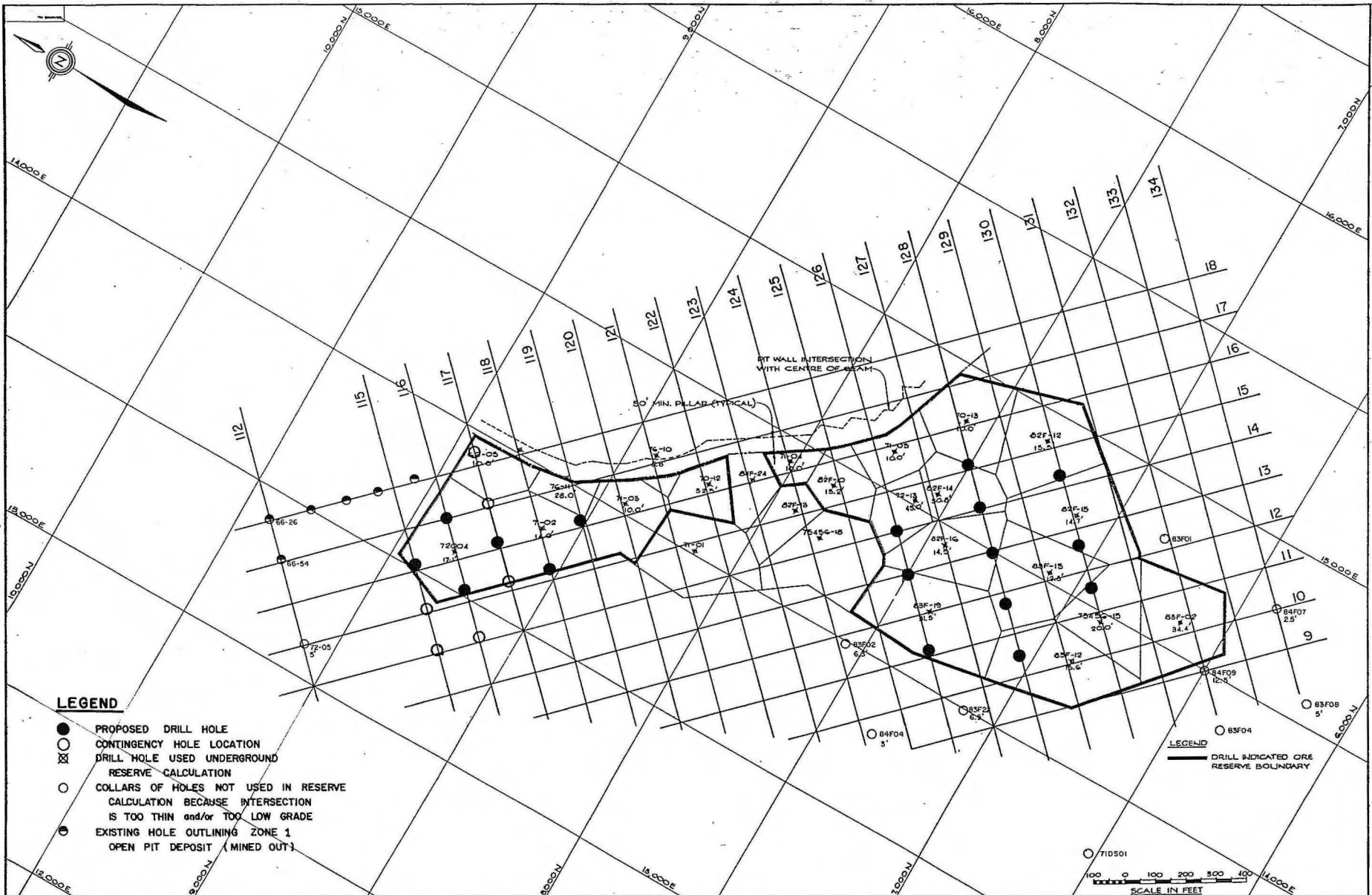
- CREST IN PIT
- TOE IN PIT
- CREST IN WASTE DUMPS
- TOE IN WASTE DUMPS
- ROAD
- BUILDINGS
- NATURAL WATERCOURSE
- DIVERTED WATERCOURSE
- GRID IS MINE SURVEY GRID

## SCALE



REVISED  
MARCH 1987





**LEGEND**

- PROPOSED DRILL HOLE
- CONTINGENCY HOLE LOCATION
- ⊗ DRILL HOLE USED UNDERGROUND RESERVE CALCULATION
- COLLARS OF HOLES NOT USED IN RESERVE CALCULATION BECAUSE INTERSECTION IS TOO THIN and/or TOO LOW GRADE
- ⊙ EXISTING HOLE OUTLINING ZONE 1 OPEN PIT DEPOSIT (MINED OUT)

**LEGEND**

- 83F04
- DRILL INDICATED ORE RESERVE BOUNDARY

NO.	DATE	DESCRIPTION	BY	REVISIONS

SHEET NO. _____ REFERENCE DRAWING _____	CLIENT: CURRAGH RESOURCES PROJECT NO. 5509 LOCATION: FARO, YUKON	TITLE: FARO AREA DEPOSITS UNDERGROUND MINE DRILL INDICATED ORE RESERVES	DATE: FEB. 07 DRAWN BY: J.A.H. CHECKED BY: J.H.C.	SCALE: 1"=100' PROJECT NO. 5509 SHEET NO. 13 DRAWING NUMBER: FIG. G-2-1 REV. A
--------------------------------------------	------------------------------------------------------------------------	-------------------------------------------------------------------------------	---------------------------------------------------------	--------------------------------------------------------------------------------------------



CURRAGH - FARO

lineup

Moore  
Barronman  
Toyo.  
Cloutier  
Sally  
L. Beitz  
K Johnson.

1. PORTAL LOCATION
2. VENT RAISE LOCATION (2 raises)
3. GROUND CONDITIONS - drill cores
  - check faults
  - pit walls
  - water
4. STOCKPILES - ore, waste - locations, distances
5. ORE THICKNESS - ore plans, sections, HW, FW
6. FRESH WATER SUPPLY - distance, height
7. MINE WATER DISCHARGE - distance, height
8. ELECTRIC POWER - voltage, distribution
9. DRY - location (including office)
10. SHOP - location, size
11. ACCOMMODATION - in Faro (TV, meals, rec room, phone, etc.)
12. FUEL TANKS
13. EXPLOSIVES MAGAZINES - location
14. PHONE & FAX
15. SUPPLIES BY CURRAGH *fuel - explosives*
16. AIR HEATING - system - propane?
17. TEMPERATURES - *graph for year. for sizing air heater.*
18. NAMES, CONTACTS
19. PERMITS - who, what *owner/operator*
20. LABOUR RATES IN EFFECT
21. FREIGHT SYSTEM FOR CURRAGH - can we join? *Neil Carmichael*

*First Aid / Ambulance*

*How to treat decline exploration or mining/chem? (taxation)*

*Surface plans*

*Blasting in open pit vs UG times etc.*

exploration Drifts 150' apart. - would be part of mine  
development cost anyway



contract DD to drill up and down plus  
"fms" as required - in finished drifts  
need good geologist to map them and  
log core sort out structure early 88 → completion  
late Sept 88



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DATE: 19 Aug 1987

FROM: Gregg Tilson

TO: Jack Bowers

Number of Pages 2 including Cover Page.

Circulation and/or Comments:

Could you have a look at the adit portal  
and ventraise site on this plan to see when  
the areas could be available and if the  
site will be out of the area of active  
mining between Oct 1988 and mid 1993

P.S. please pass on to Tom C.  
when he returns.

If all pages were not received, please contact \_\_\_\_\_  
at (403) 668-3578.

