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# ARCHER, CATHRO

& ASSOCIATES (1981) LIMITED

CONSULTING GEOLOGICAL ENGINEERS

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June 29, 1988

Mr. Gregg Jilson,  
Curragh Resources,  
117 Industrial Road,  
Whitehorse, Yukon

Dear Greg:

Please find enclosed some information on our firm's Williams Creek copper deposit as discussed with you on the phone. Although it's not mentioned in our proposal, I believe it might be possible to in-situ leach this deposit using large diameter surface holes, similar to procedures used in uranium mining in Florida.

Yours truly,

ARCHER, CATHRO & ASSOCIATES (1981) LIMITED



A.R. Archer

/mjm  
Encl.

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## CONSULTING GEOLOGICAL ENGINEERS

1016-510 WEST HASTINGS STREET  
VANCOUVER, B. C. V6B 1L8

(604) 688-2568

To Whom It May Concern:

Re: Williams Creek Copper Prospect, Yukon

The Williams Creek deposit consists of a steep (70°) dipping tabular zone of copper mineralization some 2200 feet in length and 90 feet in width that extends to over 1600 feet below surface. The upper 800 feet of the deposit is about 90% oxidized with most of the copper contained in malachite and azurite. The total drill-indicated reserve in the oxide zone, based on holes at 400 foot centres, is 12.2 million tons grading 1.13% copper. This reserve can be subdivided into three categories:

1. a near surface cap of low grade material;
2. a low grade hanging wall portion; and,
3. a higher grade footwall portion.

The core of the higher grade footwall reserve (Blocks 10, 11 and 12 on Figure W25) contains 3.165 million tons grading 2.1% copper in a block 1100 feet long, 600 feet deep and 68 feet wide. This block contains 133 million pounds of copper or some 48% of the total reserve in the oxide zone.

I believe this smaller reserve block can be developed for underground "in-situ" leaching at a cost of less than \$8 million, including underground access, construction of underground treatment facilities (to allow a year round operation) and drilling 3 inch diameter surface holes at 20 foot centres for introduction of sulfuric acid (and possibly for blasting to increase permeability). Sulfuric acid could be produced cheaply from either the pyrite-pyrrhotite rich tailings at Faro or from massive pyrite which is available in other even closer open-pit deposits.

I estimate the total cost of the operation to be less than \$0.60 per pound of copper, including all material consumed, shipping and smelter costs, and direct operating costs. Assuming an average metal price of \$1/lb copper and 40% recovery, the project would return \$21 million for a capital investment of less than \$8 million. Profits might be increased substantially by:

- (a) increasing the recovery;
- (b) expanding the operation to treat the remaining 9 million tons; and,
- (c) the use of electrowinning (rather than precipitation with iron) to produce cathode copper. Although power consumption for electrowinning is high at 0.8 to 1.4 kw hr/lb copper, this technique would eliminate smelter and scrap iron costs, plus some shipping costs, for a total saving of about \$0.40 to \$0.45/lb and would regenerate most of the sulfuric acid.

I believe that the ground conditions at Williams Creek are ideal for in-situ leaching and that high recoveries will be possible without having to fragment the rock. The cost of drill testing the high grade portion of the oxide zone at 200 foot centres, conducting permeability and porosity studies, and completion of a preliminary feasibility study is estimated at 1.5 million and is included in the overall capital cost estimate of \$8 million.

Yours truly,

ARCHER, CATHRO & ASSOCIATES (1981) LIMITED

/mc  
Encl.

A.R. Archer