

To: M.D. Rowswell  
 From: J.K. Carrington

November 23/75

Proposed Winter Surface Drilling Program and Additional  
 Underground Development - Grum Joint Venture

Introduction

The purposes of the current Grum project exploration and development program are:

- i) to understand the geology of the deposit with particular reference to the ore horizon geology, geometry and continuity.
- ii) to determine a reliable grade and tonnage estimate of the ore zones with particular reference to the grade continuity and fluctuations.
- iii) to obtain an adequate number of representative bulk samples for metallurgical pilot plant studies.
- iv) to ascertain underground mining conditions and their effects on mining methods and costs.

As our understanding of the geology of the deposit grew, and with the completion of the surface diamond drilling program this fall the need for several changes in the underground layout became apparent. To date the following have been implemented or are anticipated:

- i) The  $4N/W$   <sup>$\rightarrow 4N/E$</sup>  ramp has been deleted from the initial program.
- ii) The cross cutting and raising in the ore horizon as originally proposed have been cancelled.
- iii) In place of the  $4N/E+W$  ramp one will be driven along  $6N/E+W$ .

iv) The 2N/W ramp has been replaced by one along 3N/W. In light of the 1975 season's results it is necessary to re-consider the remaining portion of the program.

### Proposed Winter Surface Drilling Program

The surface drilling program being proposed will test essentially high grade zones (+12% Pb+Zn) whose positions are such that underground drilling would be impractical (eg. poor intercept angle) or uneconomic. Much of this material is relatively shallow (less than 125 m below surface). Attached are a drill plan map showing the proposed holes and a detailed list of the holes. The drilling is divided into three categories:

- i) Proposed Drilling - 2250 m - This is required drilling considered necessary to test higher grade zones inaccessible to or uneconomic by underground drilling.
- ii) Proposed Fill-in Drilling - 1120 m - These are deeper holes to test the higher grade zones southwest of the 2N/E and 3N/W ramps. These holes would be drilled only after underground drilling proved to be unsuccessful in outlining these zones.
- iii) Possible Drilling - 1080 m - This drilling is very contingent upon the results of (i) above and the underground drilling program. It tends to confirm more of the geology and low grade zones than high grade zones. As such much or all of this drilling may not be justifiable at this stage and

would not be completed. It is included here primarily to make the overall picture more complete.

The proposed surface and scheduled underground drilling are designed to achieve (i) and (ii) outlined in the Introduction at an acceptable confidence level. The high cost of surface drilling prohibits drilling on the same density as underground drilling. The surface drilling will be done on the previously established section lines (61 m apart) with a hole spacing of 30.5 m (i.e. 30.5 m along the section). Initially, underground drilling will intersect the ore zones on 15 m intercepts. As continuity confidence increases the underground drilling intercepts will be increased.

In studying the proposed program it will be helpful to refer to the drill plan map and the geological sections prepared by T. Takeda of the Vancouver office.

### Proposed Additional Underground Development

Two changes to the underground development layout are contemplated; one relatively minor (in cost), one major:

(i) The 6N/W ramp would terminate at about section L76W and be continued by a ramp along 7N/W from L76W on.

This will require approximately 8 m of additional cross cutting. The purposes for this change are threefold:

1) generally speaking the 7N/W ramp would be in a better footwall position for future mine development work (approximately 5-15 m into the ore zone footwall).

2) our experience to date has indicated that the footwall position is probably more competent and

drier than either the ore zones or the hanging wall rocks.

- 3) better and more efficient underground drilling coverage can be achieved from the 3N/W + 7N/W ramps than if the ramps are closer together (i.e. 3N/W and 6N/W). This can be seen by studying the drill sections.

Between L72W and L76W there appears to be a fault sub parallel to 7N/W - hence the recommendation not to move to 7N/W much before L76W is reached.

There are no drilling (surface or underground) or mining advantages, and some decided economic disadvantages, by ~~going~~ moving to ramp to 8N/W or further north.

- (ii) Should geological complexities so indicate, one or more cross cuts may be necessary connecting the 3N/W and 7N/W ramps. Each cross cut would entail approximately 105 m of additional mining. The location of the first cross cut would possibly be along L80W. Such a heading would provide a more positive base for a detailed study of a particular section. The justification of any additional cross cutting would be contingent upon the results of the underground program.

## Estimated Costs

Based on the 1975 surface drill costs and allowing for an increase in these costs due to inflation, winter drilling conditions, short holes and more frequent moves, an estimated surface drilling cost for this program is \$51.25/m.

An estimate of the direct (only) underground development costs are \$1,365/m for single entry headings and \$1,065/m for multiple entry headings. These estimates include the contract mining price, rockbolts, straps, force account work directly attributable to ground support or water control, the underground retrain to surface and the surface rehaul to the ore/sulphide storage area. They do not include on-site indirect costs such as monthly lump sum charges (plant & camp operation), mine air heating, winter road cleaning, staff salaries etc. Details on these estimates are attached.

### Cost Summary (direct costs only)

(a) <u>Surface Drilling</u> : 3,500 m * @ \$51.25/m	\$ 179,400
(b) <u>U/G Development</u> : L76W X Cut (6N/W to 7N/W)	
8 m @ \$1,065/m **	8,500
L80W X Cut (3N/W to 7N/W)	
105 m @ \$1,065/m **	118,800
	\$ 299,700
(c) <u>Plus 10%</u> (Mobilization for (a); ulg drill stations, contingency, etc.)	30,300
<u>Total</u>	\$ 330,000

\* This total is based upon 100% item (i); 75% item (ii)

and 35% item (iii) on pg 2.

\*\* For this cross cutting the multiple heading price is assumed to apply.

The total of \$330,000 should be considered more as an order of magnitude rather than an absolute amount. It will obviously depend upon the amount of work done and the time required to complete it. (i.e. the indirect mining costs vary with time).

### Recommendations

- 1) Serious consideration should be given to conducting a surface drill program during the early part of 1976 to determine the geology, continuity and geometry of the higher grade ore zones ( $+12\% \text{ Pb} + \text{Zn}$ ) inaccessible from or uneconomical to test from the underground workings. This program would involve some 3,500 m of drilling at a total estimated cost of \$200,000.
- 2) It is recommended that the 6N/W ramp be moved to the 7N/W section line at about section L76W to provide a better development base for future mining, probably better ground and water conditions by being in the footwall rocks rather than the hangingwall or ore zones themselves, and to provide a more efficient underground drill coverage between the ramps. The additional cross cutting amounts to 8 m at an estimated direct cost (only) of \$9,500.
- 3) Should the indications from the on-going underground program justify it, it is recommended that funds be available to drive at least one additional cross cut between the 3N/W and 7N/W ramps. This would involve approximately 105 m of additional driving at an estimated cost of \$120,500.

4) The quantities of additional work outlined in (1), (2) and (3) above depend upon the results of the on-going program. If no serious problems arise, conceivably the aims the program outlined in this proposal could be achieved, say, with 2,600 m of drilling and by carrying out item (2) above for a total approximate cost of \$ 156,000.

John K. Carrington

Proposed Winter Surface Drilling Program

<u>SECTION</u>		<u>PROPOSED DRILLING</u>	<u>FILL-IN DRILLING</u>	<u>POSSIBLE DRILLING</u>
L64W	alg	3N - 80m <sup>(1)</sup>		
		✓ 7N - 140		
		✓ 9N - 120		
L66W	alg <sup>2</sup>	✓ 3N - 100 <sup>(1)</sup>		
		✓ 7N - 160		
		✓ 9N - 140		
L68W	alg	3N - 120 <sup>(1)</sup>	IN - 250m alg	✓ 7N - 180m
		✓ 5N - 70 <sup>(1)</sup>		✓ 9N - 160
L70W	alg	7N - 135 <sup>(1)</sup>	BL - 250x	
		9N - 90 →	9N 90	
L72W		7N - 180 <sup>(2)</sup>		
L74W		7N - 140		
		9N - 90 <sup>(1)</sup>		
L76W		8N - 135 possible	IN - 260	possible 12N - 50 <sup>(1)</sup>
		✓ 10N - 90 <sup>(1)</sup>		
		✓ 11N - 80 <sup>(1)</sup>		
L78W	alg & 5N	✓ 9N - 130		
		✓ 11N - 110 <sup>(1)</sup>	12N - 75m	
L80W		✓ 9N - 140 <sup>(3)</sup>	IN - 360x	✓ <sup>(3)</sup> 11N - 110
				✓ <sup>(3)</sup> 12N - 100
L82W				✓ possible <sup>(3)</sup> 11N - 120
				possible <sup>(3)</sup> 9N - 175
L84W				possible <sup>(3)</sup> 9N - 185
				✓ <sup>(3)</sup> 10N - 120
<u>TOTALS</u>		<u>2,250m</u>	<u>1,120m</u>	11N <sup>100</sup> <u>1,080m</u>

-See following page for explanatory notes.

## Explanatory Notes

- (1) These holes primarily intersect near surface sub outcrop zones (i.e. zones which sub outcrop under the overburden) which would lie in the crown pillar of an underground operation. Alternatively, it may be ~~possible~~ feasible to open pit these areas. The main purpose of such holes is to check grade continuity as most will not add significantly to tonnage estimates.
- (2) Depending on the stop location of the 72 X Cut, this hole may be drilled from underground.
- (3) These holes will primarily add to the geology picture rather than significantly to the high grade tonnage estimate.

## Cost Estimates

### (i) Surface Drilling Costs

It is estimated that the 1976 surface winter drilling price will be in the order of 14% more expensive than the 1975 summer price. This increase can be broken into two categories; ~8% for inflation, wages etc. and ~6% due to more frequent moves, short holes, winter conditions etc. The average depth of the "Proposed Drilling" holes (item 15 pg. 3) is 115 m. of which about 40 m. are in overburden.

$$\text{Estimated O/B price: } \$14.00 + 14\% = \$15.96 / \text{ft.}$$

$$\text{Estimated Coring price: } \$13.54 + 14\% = 15.44 / \text{ft.}$$

$$\text{Estimated 1976 Price: } \frac{40}{115} \times \$15.96 = 5.55 / \text{ft. for O/B.}$$

$$\frac{75}{115} \times 15.44 = \frac{10.07}{15.62} / \text{ft. " coring}$$

$$\underline{\underline{\text{Estimated Overall (O/B + Coring) Price, 1976, } \$51.25 / \text{m}}}$$

Note that this price is an estimate only. I have not contacted any drilling contractors re this work.

### (ii) Underground Development Prices

An attempt has been made to determine the direct underground development costs. The three main components of this cost are the contracted mining price, ground & water control, and muck rehandling. The approach for the ground support cost was to take the total amount applicable from mid-June to the end of October, correct the prices to reflect the current escalated costs & divide by the appropriate

development footage. This is summarized as follows:

Period	Advance	Rockbolts *	Straps/Screens *	Force Acc't. Ground Control
June 16 - Oct 31	939.4m.	\$ 90098	27756	\$ 174,018 **
<u>Cost:</u>		<u>\$ 95.91/m</u>	<u>\$ 29.55/m</u>	<u>\$ 200.11</u> <u><del>185.24</del>/m</u>

\* Cost for period in question adjusted to reflect current prices.

\*\* Period Oct. 16-31 not included. Adjusted advance 869.6m.

### UG Retram Rate

The contract u/g retram rate is \$ 1877.23/day.  
 Price / metre = \$ 242.22 - Single Face Advance, 7.75m/day.  
 = 144.40 - Multiple Face Advance, 13.0 "

### Surface Rehaul Rate

The contract surface rehaul rate for ore/sulphides to the storage lagoon is \$ 1.15 / ton

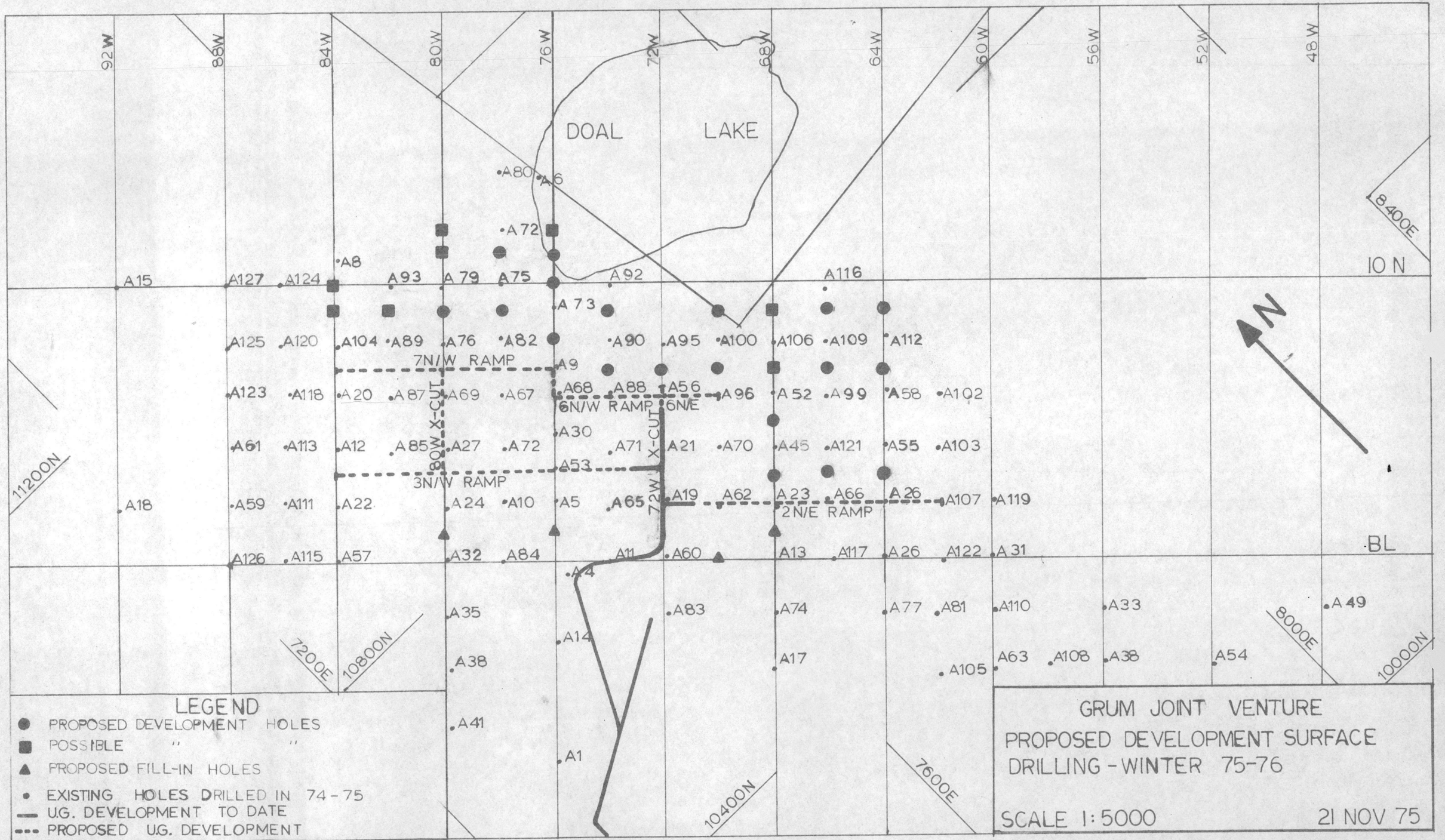
$$\text{Price/metre} = \frac{1 \times 4.27 \times 4.27 \times 1.15}{9 \times .028316} = \$ 82.28$$

### Development Cost Summary

	Single Heading	Multiple Heading
Contract Mining	\$ 714.04 /m	570.24
Rockbolts	95.91	95.91
Straps/Screen	29.55	29.55
Force Acc't - Grd. Support	200.11	140.00 *
UG Retram	242.22	144.40
Surface Rehaul	82.28	82.28
	<u>\$ 1364.11 /m</u>	<u>1,062.38</u>
<u>Use</u>	<u>\$ 1365 /metre</u>	<u>1,065 /ton</u>

- \* This amount has been prorated from the Single Heading category by ~~at~~ a factor approximately equal to the ratio of Single Heading Advance / Multiple Heading Advance ( $\frac{7.75 \text{ m}}{13.0 \text{ m}}$ ) and rounded upwards to account for ~~at~~ inaccuracies in such an estimate.

Note that these costs reflect only the direct charges. As the additional underground development will be concurrent with other development, the Multiple Heading rate has been applied for costing purposes ( $\$1,065/\text{m}$ ).



019303

AUG 13 1975

MEMORANDUM

*Authorized by phone*

*August 14/75*

*[Signature]*

To: Kerr-AEX Management Committee

Re: Recommended Additional Drilling on Swim Claims  
by A.E. Aho - August 11, 1975

(Please refer to mag, turam, gravity and  
geochem maps and other data)

Gentlemen:

Drilling of three holes to date on the Swim claims was emphasized on strategically situated gravity features well supported by other data without yielding any favourable results, the gravity features probably being caused by bedrock highs as well as differing rock units. The fourth hole, based on gravity, nearby massive pyrite-pyrrhotite float and bleached rocks and magnetic and electromagnetic anomalies may encounter massive sulfides but geochemistry suggests that they may be capped by bedrock or simply contain little zinc and lead. This hole will complete the minimum 3,000 feet of drilling authorized for the Swim claims.

It is strongly recommended that an attractive new priority target based mainly on magnetics and Turam northwest along strike from the Swim deposit be drilled and that an additional minimum of 1,500 feet of drilling be approved for this purpose.

Contingent upon additional gravity presently being done on anomaly "A" a further 1,000 feet may be warranted. Other targets are contingent on further study at a later phase of work.

(A) FIRST PRIORITY TARGET (Viktor Anomaly) 90W on baseline and 112W 11S or 4S

Magnetics

The recently completed magnetic survey has defined a 300-gamma magnetic high on the boundary of the excluded claims around line 88W on the baseline with a

corresponding 200-gamma magnetic low to the northwest, suggesting a tabular NNW-plunging or dipping magnetic zone in the order of 1,500 - 2,000 feet wide and 3,000 - 4,000 feet long, of which most of the magnetic high lies on excluded claims. The Swim deposit, on strike, is magnetic and the above anomaly is of the magnitude and intensity that might be expected from a sulphide deposit.

From 74W to 120W (4,800') repeated magnetic highs and lows are suggestive of further continuity or magnetic horizons repeated by folding or faulting.

A possible vein zone, trace of a rock unit, or fault parallel to survey lines 92W and 96W is suggested by magnetics and by a line of lead geochemistry crossing the entire claim group, but Turam continues southeast to line 86.

#### Turam

The entire area of magnetic anomalies shows much conductivity suggestive of a considerable graphitic section which dies out into the hillside around line 86 and its trace swings southwest, suggestive of an easterly dip like the Swim deposit.

Turam response in the central part of the magnetic area to 112W is apparently less either because the loop was laid through here, because of greater overburden depth, or perhaps because of sulfides or a "bleached" envelope less conductive than graphite.

#### Gravity

The Bouguer map shows nothing of interest except a small high with steepest gradient around 112W 10S, on the south flank of a magnetic and Turam high and on strike of Turam response on line 108.

The residual map shows only a very slight "ridge" between the Swim deposit and the above small high, all toward the south flank of the main magnetic anomalies. This could conceivably represent the near-surface trend of the Swim mineralization.

Since the Swim Lake area in general has great variations in thickness of overburden, making gravity largely ineffective, gravity might well be masked by overburden "dumped" in the magnetic anomaly area by confluence of glaciation down Swim Lakes and Blind Creek. Moreover, the target may be too deep to give much gravity indication.

### Geochemistry

Except for some high lead and zinc around the main magnetic high, the area appears to be masked by overburden or rock and much of the geochemistry could be attributable to the Swim deposit above.

At the proposed drill hole location (90W B.L.) a northwesterly district plunge of 10 - 15° would project the top of the Swim deposit to 0 - 300 feet depth and the lower limb to 300 - 700 feet depth, if not affected by faulting.

It is strongly recommended that this Viktor anomaly area be tested by diamond drilling:

- 90W on baseline to say 1,000 feet for mineralization and geology. If successful consider hole or holes to NW and also for Kerr to consider holes to SE.
- 112W, 11S or 4S to at least 500 feet to test gravity or magnetic anomaly depending on results of above hole.

### (B) SECOND PRIORITY TARGETS

#### Gravity Anomaly "A" 96W 41N

This is part of a large gravity high, with a local coincident Turam conductor, slight associated (50 gamma) magnetics, numerous nearby outcrops of grey phyllite, and some associated lead geochemistry. This could be a bedrock high but has a steep gravity drop-off to the northeast in an area of continued rock outcrops. If confirmed for drilling by gravity fill-in presently under way, a 1,000-foot hole is recommended for testing and for geology.

54W 20N

This is a coincident slight magnetic high (40 gammas), Turam conductor, faint gravity nose on residual map (nothing much on Bouguer) and associated zinc and lead geochemical anomaly in the valley bottom. It may also be associated with a probable E-W fault (displacing Swim deposit on NW?) sub-parallel to the Blind Creek fault (see mag map). This may warrant drilling at a later stage.

116W 45S

This is a gravity high with nearby magnetic high and some geochem at the NW corner of the claims. This should be studied in the field as a possible target depending on current and proposed drilling.

(C) THIRD PRIORITY TARGETS

6W 45N to 18W 32N

This is a magnetic high (100 gammas) with faint continuation into a magnetic low area around DDH A40, associated Turam conductor, slight nearby lead geochem, minor gravity high but mostly gravity lows probably due to overburden depth. This might reflect one of the "Blind Creek" system of faults (cutting off Swim deposit to SE?), or it may be a possible drill target at some later stage.

4E 15N

This is a magnetic anomaly with faint Turam gravity low, in the vicinity of 1973 DDH A-1, which was lost in overburden. This may reflect Swim Lake type mineralization at depth; judgement to be dependent on further drilling at Swim Lake by Cyprus Anvil.

CONCLUSION

The Viktor anomaly appears to be an outstanding target for a possible sizeable orebody, with other targets presently being of lesser priority.

The geology can be expected to be complex.

RECOMMENDATIONS

It is strongly recommended that a minimum additional 1,500 feet of drilling be approved to test the Viktor target area (as outlined in the text) immediately after termination of the fourth 1975 drill hole regardless of its results.

A further 1,000 feet of contingent drilling may be justified later this season on gravity anomaly A.

Respectfully Submitted,

Yours very truly,

A handwritten signature in cursive script, appearing to read "Aaro E. Aho".

Dr. Aaro E. Aho

AEA:jdw

c.c. Mr. M.D. Rowswell  
Mr. I.D. Bayer  
Mr. G.M. Hogg  
Mr. W.M. Sirola  
Mr. H.S. Cornwell

KERR ADDISON MINES LIMITED  
P.O. BOX 91  
COMMERCE COURT WEST  
TORONTO, ONTARIO  
M5L 1C7

E.C.S.  
~~COPY~~

Y-9  
6A

August 14, 1975

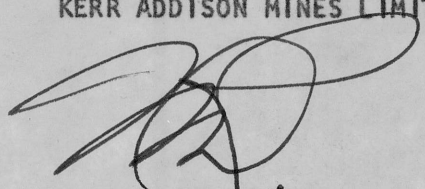
Dr. A. E. Aho  
President  
AEX Syndicate  
8th Floor  
900 West Hastings Street  
VANCOUVER, B.C.

Dear Aro:

Please be advised that we have reviewed your memorandum of August 11 recommending an additional 1,000 feet of diamond drilling and a contingent additional 500 feet of diamond drilling, and that we are in favour of and agreement with proceeding on this according to your direction.

Yours very truly,

KERR ADDISON MINES LIMITED



M. D. Rowswell  
Executive Vice-President

MDR:js