

# ASSESSMENT REPORTS

MAP No. <sup>105-0-6,7,</sup>  
11,12

TYPE OF WORK:

Summary Report

REPORT FILED UNDER	Northlake Mines Ltd.	
DATE PERFORMED	1966	DATE FILED: Feb 1967
LOCATION - LAT.	61° 27' - 61° 32' N	Grass Lake Area, Yukon
LONG.	131° 00' - 131° 32' W	
CLAIM Nos.	GEE Op EL Op HOO Op	
WORK DONE BY	P.H. Severson	
WORK DONE FOR	Northlake No 1	
REMARKS	A summary of geochem, geology, airborne and ground EM-mag surveys, gravity survey, trenching and drilling. Six priority areas were found and type of follow-up work is discussed.	

NORTHLAKE MINES LIMITED

GEE, EL AND HOO GROUPS

105-G-6, 7, 11, and 12

Watson Lake M.D., Y.T.

SUMMARY REPORT AND RECOMMENDATIONS

JANUARY 31, 1967

by

P.H. SEVENSMA, Ph. D., P. Eng.

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NORTHLAKE MINES LIMITED

GEE, EL AND HOO GROUP'S

105-G-6, 7, 11, and 12

Watson Lake M.D., Y.T.

SUMMARY REPORT AND RECOMMENDATIONS

JANUARY 31, 1967

1. INTRODUCTION

During 1966 Northlake Mines Limited conducted an extensive exploration program in the area lying in general WNW of the Grassy Lakes, Finlayson Map Sheet 105-G in the Yukon Territory. (Figure 1). Details of the program have been reported elsewhere by MacDonald Consultants Limited, property managers, and by the writer, Consulting Geologist.

This report is intended to set out a brief summary and the recommendations for follow-up work.

For details, the reader should refer to the above mentioned reports.

2. PROPERTY

	Initial claims, March 30, 1966	560
Plus	Staked March 30, 1966 - January 30, 1967	<u>294</u>
	Total claims, January 30, 1967	854
Minus	Recommended for abandonment	<u>574</u>
	Recommended for retention	<u>280</u>

3. REGIONAL GEOLOGY

The basic concepts underlying Northlake Mines program are as follows:

- a. The belt of variously-metamorphic rocks originally known as the Yukon schists has been, at least in part, subdivided and correlated by the G.S.C. (map 30 - 1963).
- b. Part of this belt is believed to be of Mississippian age and consists of biotite-chlorite-sericite schists with limey and quartzitic members characterized by ultrabasic intrusives.

- c. This type of formation has produced in excess of \$250 million of gold in the Klondike. More recently, in excess of 60 million tons of massive sulphide bodies averaging about 10% lead and zinc combined with minor copper and close to 1½ oz/t of silver have been outlined in these schists in the Vangorda Creek area. The gross value of these sulphide bodies, which are of long term commercial grade and for a large part minable by open pit, is of the order of \$1.5 billion.
- d. These schists may be called the productive schists and merit extensive exploration, especially in areas where there is evidence of strata-bound sulphide deposition and of favorable structure.
- e. Minor-size copper-zinc-(lead) bearing deposits of this type are known in the Fire Lake - North Lake - Grass Lakes area.
- f. This area is characterized by a pronounced East-West trend across the normal NW-SE structural grain. There is also evidence of pronounced NE and N trending faulting, and of recent domal uplift accompanied by Tertiary basalts.
- g. The area, especially in the lower lying parts, is covered by extensive overburden which does not appear to reach the great thicknesses of several hundred feet more common much further south.
- h. This set of favorable conditions warrants an exploration program by airborne magnetic and electromagnetic methods with a ground follow-up program consisting of electromagnetic and geochemical prospecting.

#### 4. PROGRAM SUMMARY

The program was initiated in early April 1966 by flying the vicinity of nine minor showings lying at high altitude with a reconnaissance-type electromagnetic helicopter-borne device, the Geo Cal method.

In May, the program continued with a helicopter borne magnetic-electromagnetic survey over the less rugged parts of the claims by Lockwood Survey Corporation.

The airborne programs located a total of 19 areas of interest.

In June, linecutting and ground surveys started. A summary of the overall program in table form is attached. In general, the details of the program were adjusted to conditions. Considerable emphasis was placed

on streamsilt and soil sampling, the former along streams draining the surveyed areas, the latter confined to the vicinity of electrically conducting zones, usually after grids had been cut and the zones located by a ground survey.

One anomaly located by airborne methods on the Hoo Group was pinpointed by Turam and drilled without geochemical work as the depth of overburden was estimated to be in the vicinity of 100'. However, overburden was found to be in the vicinity of 30'; the drilling intersected graphitic schists, chloritic-sericitic schists, and a talc-schist zone and encountered only traces of copper in disseminated pyrrhotite.

After completion of the field program in October, assay returns of the geochemical reconnaissance continued to come in until well into December and assessment of the complete results was not completed until about mid-January 1967.

As a result of this assessment, it has been recommended to abandon 574 claims and to continue work on the remaining 280 claims, representing 11 of the original 19 areas. These have been divided into 6 priorities, defined from 1 to 6 in order of decreasing interest.

## 5. PROGRAM RESULTS

a. The airborne geophysical surveys did not reveal any outstanding conductors near any of the known showings, ruling out the presence of near-surface large sulphide bodies in their vicinity.

b. The Lockwood Survey located a number of interesting electromagnetic anomalies in the vicinity of ultrabasic intrusives, specifically in areas 11, 17, 18 and 19.

c. Streamsilt sampling revealed a definite pattern of increased coppers and occasionally lead and zinc, in the vicinity of the ultrabasics. One outstanding anomaly was found to originate in an area of rust and near a conducting zone of characteristics that may reflect the presence of massive sulphides in area 17.

Zinc anomalies did not show a very significant pattern.

Lead, and to a lesser degree copper, show a definite increase in areas draining the granodiorite intrusives, especially around the intrusive at Grass Lake.

Remarkable are the absence of lead and the relatively low zinc in the high copper anomaly in the streams draining the South part of the E1 Group. In the main streambed, the copper in silts shows a constant increase over a length of about 2½ miles from 240 ppm to 7562 ppm.

d. Soil sampling, conducted over 11 of the 19 areas on grids with both 800' and 400' line spacing, with a 200' or 100' sample spacing, showed in general spotty results. Over area 11 however, a significant copper anomaly was found with peak values of 409 ppm Cu, 100 ppm Pb and 660 ppm Zn. This anomaly occurs on a well drained slope and originates in a strongly conducting zone, apparently from a contact between chlorite schists and graphite schists of very low metamorphic grade and known to contain strata-bound fine grained massive pyrite-pyrrhotite on a nearby property. Both folding and faulting are indicated nearby.

e. Linecutting, picketing and line surveying was done respectively over 10, 15 and 6 areas, as conditions suggested.

f. Reconnaissance geological mapping on a scale of 1" = 1000' was carried out over all the significant claim areas and surroundings, with emphasis on the showing areas, using a 1" = 1000' base map prepared by McElhanney Surveying and Engineering.

g. Ground EM surveys were conducted with a moving source Ronka instrument over 5 areas, and with a constant source Turam instrument over two areas (see table).

These surveys pinpointed several conductors detected by airborne methods.

h. Ground magnetics were not used, as the government aeromagnetic maps and the results of the Lockwood surveys showed high magnetics over ultrabasics and very uniform low magnetics over the more highly metamorphic schists of the Gee area.

Some magnetic surveying is indicated in further proposed work.

i. Gravity. One small gravity survey was run in area 11 near the source of the geochemical anomaly. Results were inconclusive and suggested that a much larger survey should be carried out.

j. Trenching in area 2, where massive pyrrhotite showings with minor chalcopyrite occur, was not successful and failed to find significant extensions to the showings.

k. Core drilling, totalling 1,596' in 4 holes in area 18 on an airborne EM anomaly confirmed by Turam, failed to encounter commercial mineralization.

1. Summary

(i) Two significant discoveries were made. In area 17, as a result of a combination of airborne surveying and reconnaissance geological work, which led to the decision to sample the streamsilts, an outstanding copper anomaly was discovered.

In area 11, as a result of airborne surveying followed by soil sampling in the area of a promising HEM anomaly pinpointed by a Renka survey, a significant Cu - Pb - Zn anomaly was discovered.

(ii) The combination of airborne surveying and streamsilt and soil sampling has permitted the elimination, with a high degree of confidence, of about 2/3 of the staked areas.

(iii) Seven other areas have provided enough encouragement to justify some further investigation. Streamstilt and soil sampling results have been important factors in several of these areas.

6. INDIVIDUAL TARGET AREAS

The remaining target areas have been divided into 6 priorities, which will be discussed separately.

Priority 1 El Group, area 17 (figure 4)

This group consists of 60 claims. Figure 4 shows the relation of the copper streamstilt anomaly to the geology and the airborne EM anomalies.

The lead content of the streamsilts is nil or trace; the zinc content varies between 0 and 117 only, which is normal background.

Viewed in the regional streamstilt pattern, the absence of lead and the normal zinc background in this high copper anomaly may be very significant. Both to the West (Hoo Group) and to the East, minor lead appears about 8 miles away from the El Group and at the same time, zinc starts to pick up. This suggests that the El Group is the copper-bearing centre of a base metal area where lead and zinc are concentrically arranged away from this centre.

To the East, however, the geological environment is different, and the regional sampling to the North and South is insufficient to non-existent. Additional sampling could well show that the geological environment

has a greater bearing on the base metal distribution. Also, this distribution may not be roughly circular, but could have some oblong shape following some as yet unknown structural trend.

Whatever base metal distribution is ultimately found to exist, there is at least a strong regional suggestion that the El Group lies at the core of the regional copper distribution.

Examining the anomaly in detail, it shows a near-textbook distribution with two sources, a weak one in the Creek West of the group, and a strong one in the Creek on the East part of the group, with a weak "halo" effect upstreams in both cases.

As the sample nearest the source in the Easterly creek assays 7562 ppm, which is equal to 0.756%, it is obvious that the best part of this  $1\frac{1}{2}$  mile long copper-bearing zone should lie close to this high anomalous reading.

It is of considerable interest that a line drawn between the two sources is about parallel to the geological structure, which is well defined by the aeromagnetics. The high magnetics reflect the presence of the serpentinized ultrabasic, and one must assume that the surrounding schist formations are more or less parallel to the contact of the ultrabasics, as is usually the case around this type of intrusive.

The conclusion that the odds favor a stratabound high-copper zone very low in zinc and lead is therefore well nigh inescapable. The map shows clearly that this zone produces a marked effect in the streamsilts in locations about  $1\frac{1}{2}$  miles apart,

The airborne electromagnetic pattern is also of considerable interest, as it shows, near the high copper anomaly, a well defined conductor of characteristics that may typically reflect the presence of a sulphide body.

When it is remembered that attention was drawn to the area by the existence of a very rusty pinnacle-like hill during reconnaissance-type geological mapping located in the general area of the HEM anomaly, and that this led to the decision to take stream silt samples in the nearby creek as this pinnacle was not easily accessible, the conclusion is peremptory that a mineralized copper-bearing body lies somewhere in this vicinity.

It is very seldom indeed that so many strong and favorable features point to a target area of as large a size and so well defined as the present one.

The writer has therefore no hesitation in defining the odds of discovering a large-size copper-bearing body in this location as unusually high.

The following program is recommended for an early start in March 1967. A winter road as near as possible to an all-weather location is recommended rather than helicopter-transportation, as it is practically certain that drilling will be justified, and that this can be demonstrated by line-cutting and trenching with a bulldozer while the snow is still on the ground. It is very likely that outcrops with substantial copper will be found in this area.

Snow fell early in October 1966 and in nearby areas there is little frost in the ground. A ripper-equipped bulldozer will permit the taking of soil samples as line-cutting in the area proceeds.

Tote road: 25 miles @ \$800	\$ 20,000
Linecutting: 20 miles @ \$100	2,000
Geological mapping: 4 man-months @ \$1,500	6,000
Soil Sampling: 1000 samples @ \$3.00	3,000
Electromagnetic surveying: 15 line miles @ \$100	1,500
Gravity survey: 10 line miles @ \$150	1,500
Transportation: Bombardier, truck	<u>6,000</u>
	Total \$ 40,000
Contingent core drilling: 3000' @ \$20	<u>60,000</u>
	Total \$100,000
Engineering, overhead, contingencies: 20%	<u>20,000</u>
Total appropriation	<u><u>\$120,000</u></u>

Drilling on this property can hardly be considered as contingent, and as the drill should be moved in before break-up, i.e. before May 1st, the full appropriation of \$120,000 is recommended for this project.

Priority 2 Leo Group, area II (figure 5)

A strong HEM was located in this area. After linecutting, a Ronka survey pinpointed this anomaly and subsequent soil sampling showed a significant copper-lead-zinc anomaly with peaks of 409 ppm Cu, 100 ppm Pb and 660 ppm Zn in an environment similar to the one prevailing on the El Group. Drilling of one hole on nearby ground is known to have located fine-grained massive pyrite-pyrrhotite in a narrow argillite bed very near the contact of thin-bedded and laminated chloritic argillites with graphite slates.

The source of the copper-lead-zinc anomaly in the soil, which has its peak on a well drained slope with little vegetation at an elevation of about 4800', is located near what appears to be the same contact, at the edge of a strongly conducting zone, and, as on the El Group, only a short distance away from an ultrabasic.

It is thought that the base-metal anomaly may not reflect an outcrop of commercial grade copper, but rather indicates the presence of a formation with unusually high copper and probably lead and zinc. As massive sulphide of typical stratabound texture is present nearby and as an apparently similar zone on the El does carry high copper, it is postulated that a specific assemblage may occur throughout the area, i.e. that a favorable "horizon" with massive sulphide deposits occurs.

The Leo Group warrants therefore a high rating, and further exploration as early in the season as possible.

If this general working hypothesis is confirmed by success, or even partial success, on either or both the El and Leo Group, the key to further successful exploration in the area may well have been found.

The following program is therefore recommended for an early start, preferably with a gravity survey in March 1967. It is anticipated that a winter road can be built quite easily, if this appears desirable, from the El road. This road could follow the lower part of talus slopes with Southerly exposures for a good portion of the way, thus preparing the building of an all-weather road.

In the area of the geochemical anomaly, there does not appear to be significant perma frost and bulldozer trenching is therefore strongly recommended.

A small initial gravity survey in 1966 has indicated that the gravity profile rises with the hillside and that a significant gravity anomaly could be present.

Tote road: 10 miles @ \$1,000	\$10,000
Geological mapping: 2 man-months @ \$1,500	3,000
Linecutting: 10 miles @ \$150	1,500
Soil Sampling: 350 samples @ \$4.00	1,500
EM surveying: 10 line miles @ \$100	1,000
Gravity surveying: 15 line miles @ \$200	3,000
Transportation: Bombardier, truck	4,000
Bulldozer trenching: 100 hours @ \$35	3,500
Aircraft	<u>2,500</u>

Total \$30,000

continued ...

Contingent core drilling: 2000' @ \$25		<u>50,000</u>
	Total	\$80,000
Engineering, overhead, contingencies @ 20%		<u>16,000</u>
Total appropriation		<u><u>\$96,000</u></u>

Priority 3 Hoo Group, areas 18 and 19 (figure 6)

These target areas are in an environment similar to the El and Leo groups, i.e. in the general contact area of schistose rocks with the ultrabasics.

One conductor remains to be tested in area 18; good conductors with low soil sampling results and indicated faults are present in area 19.

The possible potential of these areas would be enhanced by economic discoveries on either the El or Leo Groups, and they would become much more accessible.

Only a minor program is therefore proposed for either 1967 or 1968, the timing depending upon the progress of the El and Leo programs.

The importance of detailed mapping taking into account the topography, and soil sampling in judiciously selected locations in area 18, should be stressed.

The recommended expenditure is as follows:

Geological mapping: 2 man-months @ \$1,500		\$ 3,000
Soil Sampling: 350 samples @ \$3.00		1,000
Transportation: helicopter, 15 hours		2,000
Camp preparation		<u>1,000</u>
	Total	\$ 7,000
Contingent linecutting, geophysics, 15 line miles @ \$200		3,000
Contingent drilling: 1600' @ \$25		<u>40,000</u>
	Total	\$50,000
Engineering, overhead, contingencies: 15%		<u>7,500</u>
Total appropriation		<u><u>\$57,500</u></u>

Priority 4 Gee Group, area 5

Soil sampling at 100' spacing on lines 400' apart gave generally spotty trends of high lead and zinc and some spotty high copper values over the West third of the grid. Peak values are:

Pb 840 ppm                      Zn 500 ppm                      Cu 210 ppm

A number of galena bearing quartz veins occur in the area.

Further study is required, particularly to determine whether the high lead is due to minute galena particles or is really adsorbed geochemical secondary lead.

This block of ground appears to lie between two contacts. The Ronka survey found only one weak in-phase reaction near the creek; this could be due to short-cable effect but is located near a galena showing and the peak copper value in the soils.

The property requires detailed mapping and exact assessment of topographical conditions near the high lead areas.

The quartz veins and high lead soils could represent a halo around a much larger galena-bearing body buried beyond a depth of 100' and the proposed detailed geological investigation should determine whether a deep-penetration EM like Turam, or an IF survey is justified.

The proposed expenditure is as follows:

Geological mapping: 1 man-month @ \$1,500		\$ 1,500
Deep EM or IF survey: 15 line miles @ \$300		4,500
Aircraft transportation		<u>1,500</u>
	Total	\$ 7,500
Contingent core drilling: 1500' @ \$25		<u>37,500</u>
	Total	\$45,000
Engineering, overhead, contingencies; 20%		<u>9,000</u>
Total appropriation		<u><u>\$54,000</u></u>

Priority 5 Gee Group, areas 10, 14 and 16

In each case, further assessment is warranted, but the suggestion is not to spend any funds until the El and Leo areas have been more closely assessed.

In each areas, favorable indications are conducting zones, which in 10 and 16 are supported by spotty geochemical highs; in 14, the zone occurs under apparently deep (100' or plus) overburden.

Further investigation involves detailed mapping in area 10, prospecting near area 16 and possible Turam surveying over area 14.

Turam surveying could be done any time an instrument is used on any of the other projects.

Recommended expenditures are as follows:

Detailed geological mapping, additional soil sampling, prospecting	\$ 15,000
EM surveying, as indicated	5,000
Engineering, overhead, claim maintenance: 20%	<u>4,000</u>
Total appropriation	\$ <u>24,000</u>

Priority 6 Gee Group, area 2

No expenditures recommended at present.

Prospecting

An appropriation should be available to continue areal stream-silt sampling and follow-up soil sampling, as various localized areas appear of interest even now. Success on the El and/or Leo would (i) enhance the attractiveness of certain situations, (ii) provide good geological guide lines for further areal exploration and (iii) create a staking rush.

It would be desirable for Northlake Mines to be in a position to capitalize immediately on any success obtained on the present holdings.

Using the bulldozer for soil sampling while putting in a winter road and lines would be advantageous and fulfill the requirements of further areal exploration at very little additional cost.

It is recommended that \$30,000 be set aside for aerial reconnaissance and property acquisition, covering the following:

Helicopter, one month	\$10,000
3000 soil samples	10,000
Property acquisition	<u>10,000</u>
Total	\$30,000

7. SUMMARY AND RECOMMENDATIONS

The 1966 Northlake Mines Limited exploration program in the Grass Lakes area has resulted in the discovery of several very attractive exploration targets.

On the El Group, streamsilt sampling, airborne EM and favorable geological environment suggest the presence of a copper-bearing zone of significant size and possibly of major importance.

On the Leo Group, a very good target is reflected by high Cu - Pb - Zn soil samples near a contact zone between chloritic argillites and

graphitic slates known to contain bedded iron-sulphides nearby. Geological conditions are comparable to those on the El Group.

On the Hoo Group, conductive zones in a geological environment similar to the one on the El and Leo are worthwhile targets requiring further assessment.

In area 5 on the Gee Group, a high lead environment suggests the possibility of a significant buried galena deposit.

Several other targets require further work for a final assessment, but are less promising than the first group.

Large areas with an estimated very low potential are recommended for abandonment.

Recommended expenditures may be summarized as follows:

<u>Group</u>	<u>Area</u>	<u>Priority</u>	<u>Firm</u>	<u>Contingent</u>	<u>Engineering</u>	<u>Total</u>
El	17	1	\$40,000	\$60,000	\$20,000	\$120,000
Leo	11	2	30,000	50,000	16,000	96,000
Hoo	18, 19	3	7,000	43,000	7,500	57,000
Gee	5	4	7,500	37,500	9,000	54,000
Gee	10, 14, 16	5	20,000	-	4,000	24,000
Gee	2	6	-	-	-	-
<u>Areal Prospecting</u>			30,000			30,000
<b>TOTAL</b>			<u>\$134,500</u>	<u>\$190,500</u>	<u>\$56,500</u>	<u>\$381,500</u>

Out of this amount, the following appropriation is recommended for an early start of the program in 1967.

Firm

El, Area 17	\$120,000	Includes drilling
Leo, Area 11	36,000	Drilling is contingent
Priorities 3, 4, 5	24,000	50% of initial work
Areal Prospecting	30,000	Spend at a rate related to success on El, Leo
<u>Cost of 1967 Program</u>	<u>\$210,000</u>	<u>Firm commitment</u>
<u>Probable 1967-1968</u>	<u>\$171,500</u>	<u>Contingent expenditures</u>
<b>Total Program</b>	<u><u>\$381,500</u></u>	

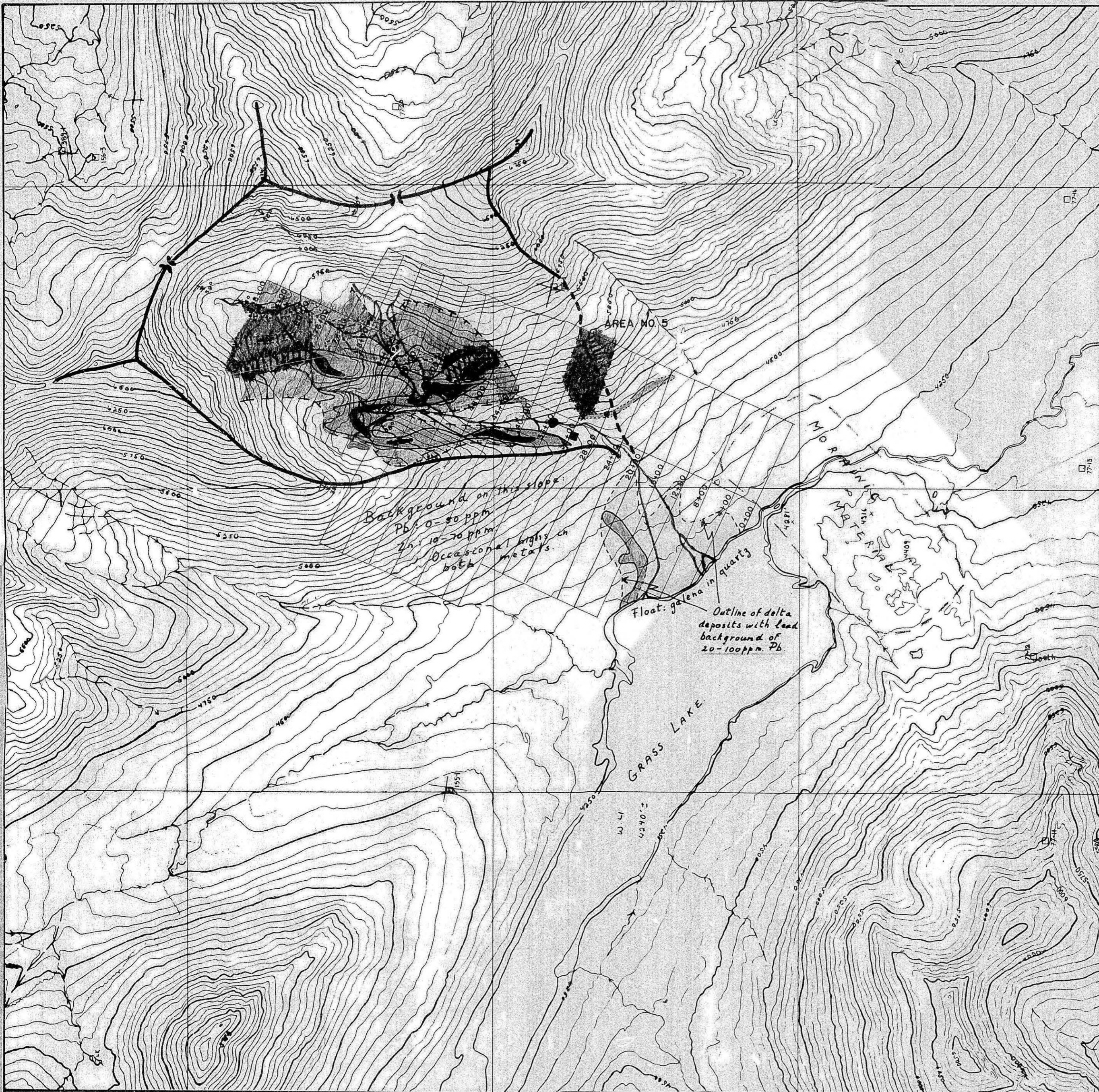
If a situation with a definite economic promise is encountered on the El or Leo, an extensive road-building and drilling program would follow involving perhaps anywhere from 10,000' to 20,000' of drilling. It's cost would lie between \$300,000 and \$500,000.

Respectfully submitted,

A handwritten signature in dark ink, appearing to read 'F.H. Sevensma', written over a horizontal line.

F.H. Sevensma, Ph. D., P. Eng.

Personnel and costs are being reported separately by A. MacDonald Consultants Ltd.



**LEGEND**

- 100' Sample spacing
- ~ Creeks and gullies
- Showing galena in quartz
- Weak Ranka conductor
- > 401 ppm Pb
- ◐ 201 - 400 ppm Pb
- ◑ 80 - 200 ppm Pb
- ◒ 2 or more > 80 ppm on line
- ◓ 1 assay > 80 ppm on line
- ◔ Zn mostly > 201 ppm
- ◕ Zn mostly 100 - 200 ppm

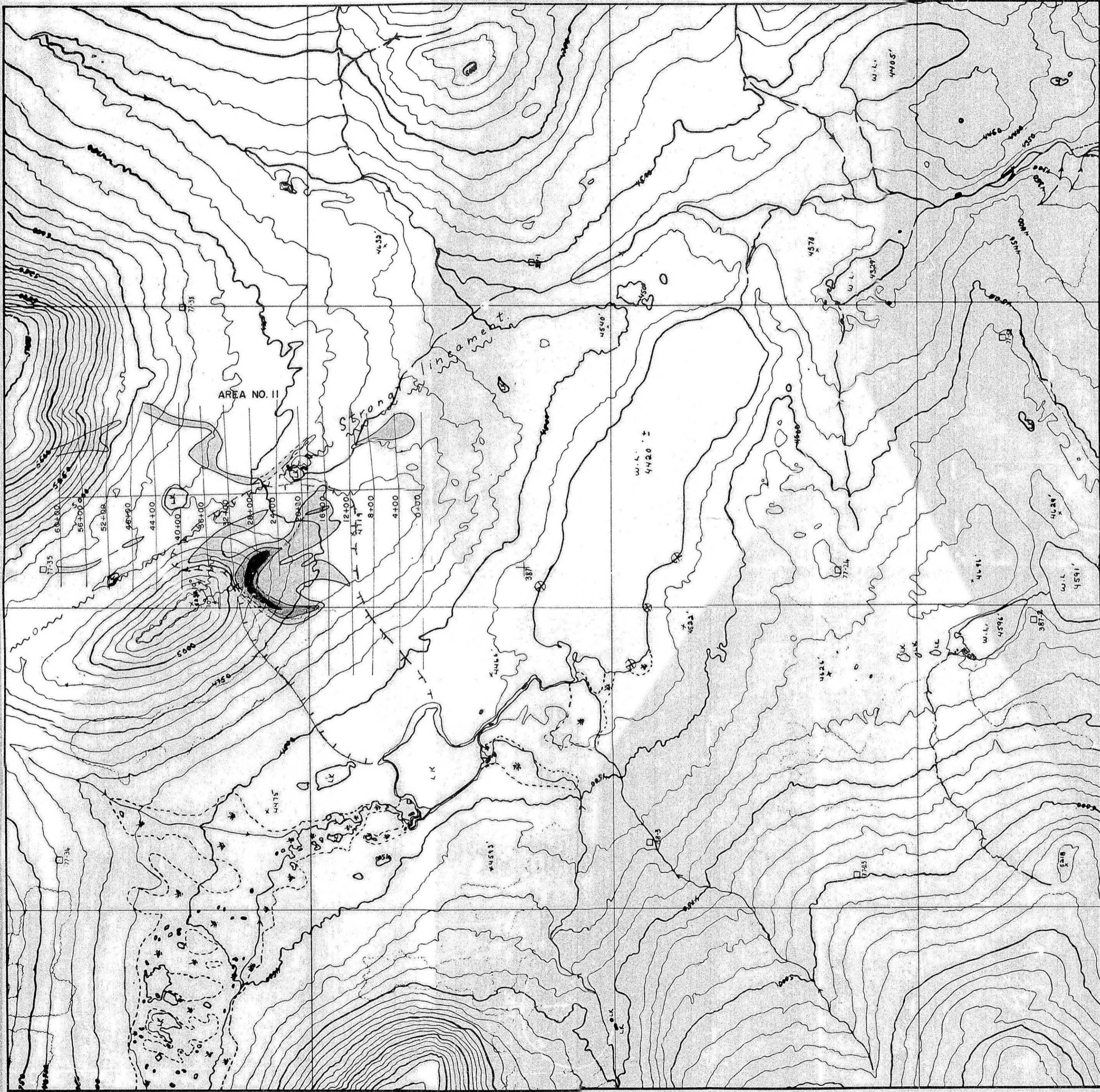
*Note: The Geo. Cal Sharpe 250 conductor lies between the two main forks of the creek, approximately from line 56 to 76 W, values are 6L to 12 R.*

*P.H. Sevensma*

Topography: Mc. Elhanney Surv. and Eng.

**NORTHLAKE MINES LTD.**  
**P.H. Sevensma Consultants Ltd.**  
 Vancouver, B.C. — Whitehorse, Y.T.  
 Interpretation of Soil Sampling

Scale:	1" = 1000'	<b>Area 5</b> <b>Gee Group</b>
Drawn:	Fig. 7	
Date:	Jan. 1967	



**LEGEND**

- 200' Sample spacing
- (---) Outline of near-surface conducting zone, Ronka.
- > 400 ppm. Cu.
- ◐ 201 - 400 ppm. Cu.
- ◑ 101 - 200 ppm. Cu.
- ◒ 50 - 100 ppm. Cu.

*T.H. Sevensma*

Topography: Mc. Elhanney Surv. and Eng.

**NORHLAKE MINES LTD.**  
**P.H. Sevensma Consultants Ltd.**  
 Vancouver B.C. — Whitehorse Y.T.

Interpretation of Soil Sampling	
Scale:	1" = 1000'
Drawn:	Fig. 5
Date:	Jan. 1967
<b>Area II</b>	
<b>Leo Group</b>	