NORTHLAKE MINES LTD.

HOO GROUP OF CLAIMS

105-G-12, 61°32'N, 131°33'W

Watson Lake M.D., Y.T.

Report on

AIRBORNE GEOPHYSICAL SURVEY

May 8 - 23, 1966

by

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

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ILLUSTRATIONS

1. INTRODUCTION

In early 1966, Northlake Mines acquired several large claim blocks located in the general Grass Lake area, in a belt stretching from the Hoole River in the Tintina Trench, in a Southeasterly direction towards the Grass Lakes (figure 1).

An exploration program on these claims was started by flying a combined magnetic-electromagnetic survey using the helicopter-borne Lockwood Survey Corporation method.

The present report deals with the results of this survey on the Hoo Group, where a total of 106 line miles were flown.

2. PROPERTY

The property consists of the following claims:

Hoo 1 - 100	Grant Nos. 90072 - 90171
Hoo 101 - 123	Grant Nos. Y13368 - Y13390

The group is located on the Hoole River in the Tintina Trench and on the gently rising NE slope of this valley, approximately centered on 61°32'N and 131°33'W, on claim sheet 105-G-12.

The claims lie between elevations of 3700' in the valley and 4900' on the NE hillside, (figures 1, 2 and 3) about 10 airmiles South of the Watson Lake - Ross River road.

The nearest lake suitable for fixed wing lies about 6 airmiles to the East.

The airborne survey was conducted out of a camp on Grass Lakes, but due to poor weather conditions the aircraft had to use Ross River as a secondary base.

3. HISTORY

Nothing is recorded about the early phases of exploration in the area. Old cabins and remnants of early placer workings have been found further East and in all probability, the Hoole River and its tributaries were investigated by the early placer miners around the turn of the century.

The first recorded activity in the Hoole River area known to the writer occurred in 1954, shortly after the discovery of the Vangorda Creek lead-zinc deposit by A. Kulan and associates.

Messrs. K.G. Sanders and R. Zielinski prospected the area of the present Hoo claims for Pelly River Explorations Limited, a Pioneer Gold Mines of B.C. subsidiary, in the summer of 1954 and reported minor galena=sphalerite float in a limestone host in the creek crossing claims Hoo 44, 46 and 63.

They also reported chalcopyrite in quartz in the creek crossing Hoo 76 and 88.

None of thisfloat could be traced to a source.

They staked the area in January 1966, as part of several groups of claims subsequently acquired by Northlake Mines Limited.

4. REGIONAL GEOLOGY

During the last ten years, the Geological Survey of Canada has been very active in reconnaissance mapping on a scale of 1" = 4 miles of large areas in the Yukon. In addition, large areas have been flown aeromagnetically.

As a result of the correlation of the 1" = 4 mile mapping, new concepts on the age of various rock belts have emerged. The newer concepts have been published in 1964 on a map of the Yukon and the N.W.T. on a scale of 1: 3,000,000, map 30-1963, which has served the writer as a base for figure 1.

The area under consideiation forms part of the Anvil Range - Finlayson Lake belt, a belt of metamorphic rocks characterized by extensive mica schist formations and varying amounts of ultrabasic bodies. In the Finlayson Lake area there are also a number of masses of gneiss of unknown origin.

Broadly speaking, the schistose formations, probably of Mississippian age, form a definite belt, although the relationships between the more intensively metamorphosed gneissic rocks and the much lesser metamorphosed schists is not clear. In addition, the degree of metamorphism decreases very gradually from South to North throughout the area pictured on figure 1.

A persistent characteristic of the belt is the presence of the ultrabasics, and 1966 fieldwork has indicated to the writer that these rocks are often associated with very low-grade meta-chlorite schists, slates and even argillites, frequently accompanied by significant amounts of graphitic schists, which occasionally form zones of true graphite slates.

As the change from the more highly metamorphic schist-gneiss assemblages to the less metamorphic slates and argillites is often very sudden but hidden by overburden, it is probable that significant tectonic features have so far remained undetected.

In addition, in the general area of the Northlake holdings, there appears to exist a significant change in tectonic style between the very flat lying schist-gneiss areas and the more steeply dipping slate-ultrabasic assemblages.

Notwithstanding these perhaps very significant differences, the overall characteristics of the schist-ultrabsic association is similar throughout large areas of the central Yukon.

The study and correlation of these belts has led to the concept that the Anvil Range - Finlayson belt is nothing else but the offset by the Tintina Fault of the Klondike schists with a right-lateral movement of about 250 miles (G.S.C. paper 65-2, page 57).

There is therefore a good reason to consider these schists an economically very productive unit, as the Klondike has produced some 250 million dollars of gold, and in the Anvil Range, massive sulphide bodies outlined sofar total at least something of the order of 60 million tons containing better than 10% zinc and lead combined with a gross total value of some 1.5 to 2 billion dollars in base metals and silver.

Significant ore-deposits are usually associated with major structural disturbances, and in the area under consideration the regional geology (figure 1) suggests a large regional E-W striking fold within the normal NW-SE trend of the formations.

Also, geologically and topographically, the area has the characteristics of a recently uplifted dome, and the trend of the valleys suggests pronounced fracturing and faulting along N-S and NE-SW cross-trends; both these features are present in many ore-bearing districts. And as a number of small showings are known in the Fire Lake-Northlake-Grass Lake area, some of them of the strata-bound type, this district is considered an excellent target area for exploration for massive sulphide deposits with base metal values.

These various factors have led to the choice of a combined magnetic-electromagnetic airborne survey as a method well suited to an area with extensive but relatively thin overburden covering structures and lithologies favorable for the occurrence of massive sulphide bodies.

5. LOCKWOOD AIRBORNE METHOD

This method will detect formations that are electrically conductive, and subsequent work can then be concentrated over and near these zones, by using geochemical and geophysical reconnaissance methods.

This method of initial reconnaissance is particularly suited to areas without a well defined drainage pattern along which streamsilt sampling could provide complete initial reconnaissance. It is also the best tool for areas with relatively extensive overburden and few outcrops.

The Lockwood method uses a single frequency of 4000 cps to generate a primary electromagnetic field. The transmitter loop is carried in a fibreglass bird and is oriented with the loop axis parallel to the direction of flight. A receiving loop is located 30' away in the other end of the bird; the loops are coaxial.

The bird is suspended at the end of a 70' cable and is towed by a helicopter at an elevation of 100' above the ground.

A magnetometer of the Gulf Mark III type, also located in the bird, measures the total intensity of the magnetic field.

Recorders and a positioning camera are carried on the helicopter and are handled by an operator who indicates to the pilot the planned course plotted on 1" = 1320' airphotographs and who marks fiducial points on the recorder's strips.

In general, the flight lines are laid out at right angles to the strike of the formations and at distances varying from 600' to 1500' apart.

If a conductive body in the ground is crossed by the helicopter carrying this equipment, the primary electromagnetic field creates eddy currents in this conductor which cause the generation of a secondary electromagnetic field. This secondary field is generally of the same frequency as the primary field but out-of-phase with it; it is detected by the receiver loop in the bird.

As a variation in the distance between the transmitter and the receiver coils will create a strong in-phase response, both coils are in a fixed position in the relatively rigid bird. This will eliminate false responses. Increasing out-of-phase responses will be obtained over bodies of low to medium conductivity; as the conductivity increases beyond the medium range, this out-of-phase response falls off again.

In-phase responses are increasingly stronger as the conductivity rises from poor to very high.

The strength of the response is measured in parts per million. For the above-cited reasons, the ratio of the in-phase to the out-of-phase responses is less than one for bodies of poor to medium conductivity and increases rapidly as the conductivity varies from medium to high.

The response is also a function of the size of the conducting body and of the distance from the bird to it.

The maximum distance at which a highly conductive body of large size will give a response is still somewhat unknown, but appears to be about 300' between the bird and the top of the conducting body.

Various geological bodies are electrical conductors and geological conductors are manifold and of greatly varying size, shape and conductivity, the latter often being a function of the internal texture of the conductor.

Some examples of conducting bodies are:

Massive pyrrhotite
Massive pyrite
Disseminated pyrrhotite and/or pyrite
Graphitic schists
Talc schists, especially when wet
Chlorite (serpentine) schists
Wet overburden in swamp
Lake-bottom deposits
Wet shears

Due to their schistose nature, graphitic schists may be excellent conductors if the individual graphite flakes form a conductive layer.

Massive sulphide bodies with 10 - 20% interstitial quartz may be excellent conductors if the main sulphide is pyrrhotite and if the individual grains of sulphide have large contact areas.

Their conductivity drops off rapidly if the main sulphide is pyrite and if the individual iron sulphide grains are isolated by interstitial non-conductors like silica or sphalerite.

For these reasons, a combined magnetic - electromagnetic airborne survey is essentially a geological mapping tool, especially so as the amount of magnetite in rock is even more of a geological variable than conductivity.

The reliability of the method is principally a function of the elevation above ground that can be maintained. Correlation of responses on adjacent lines flown at different elevations, due to weather or topographical conditions, may not be satisfactory. This happens if the survey if flown with too light a helicopter.

Providing the bird is flown at a steady elevation above the ground, interpretation of airborne data is largely a function of the geological conditions.

Different geological environments will lead to different appraisals of quantitatively very similar airborne geophysical responses.

In general, experience has shown that long conductors (several thousand feet or several miles) with relatively low ratios of 1 or less are likely to be of a formational nature, like graphitic schists. Smaller conductors of better than 1, or preferably 2, ratios may represent near-surface sulphide occurrences.

In certain areas, coincidence of magnetic and electromagnetic highs is critical because of an association of sulphides and magnetite. Most magnetic highs are however a reflection of increased magnetite content of the underlying rock formations, and high magnetic readings may have no more than a very indirect relationship to unusual sulphide concentrations in any given area.

Other geological factors complicating a qualitative interpretation are, for example, the frequent association of graphite and sulphide bodies or the presence of sulphide deposits the mass of which is buried beyond the range of the electromagnetic field but that do have a small near-surface expression.

An airborne geophysical survey should therefore be considered as a mapping tool enabling the exploration effort to be directed towards limited portions of the area flown and further ground work in restricted areas should use methods like geological mapping, geochemical reconnaissance, ground EM and gravity to assess conductors or magnetic highs detected by airborne methods.

6. SURVEY OF THE HOO GROUP

Outside of relative poor weather conditions with low cloud and snow, the Hoo survey did not encounter any serious obstacles.

As it had not been possible to delimit accurately and at a reasonable cost the exact property boundaries previous to the survey, care was taken to extend the lines well beyond the estimated property boundary and beyond the distance required for a good turn around.

Subsequently, the SE boundary of the property was found to lie 3000' beyond the limits of the survey, leaving unsurveyed about 8 claims overlying the ultrabasic. Flight line spacing on the Hoo Group averaged 660'.

In view of the significance of the magnetics in the area as established by the G.S.C. aeromagnetic survey, a complete data reduction was requested from Lockwood Survey Corporation (figures 5 and 6).

Four interesting conductive zones were found (figure 6). Two of these lie beyond the claim boundaries, in the NE part of the area. Subsequent field investigations did not provide any interesting features and no further follow-up work was recommended.

In the most Westerly claims, a restricted conductive zone of medium strength (50 ppm) and ratios of 1.5/0.5, 5.5/1.5 and 3.3/0.8 was located. This conductor was located on the ground using a Turam instrument, as the overburden was estimated to be of the order of 100'. The zone was subsequently drilled, but no economic mineralization was encountered. This area is identified as Area 18 in the overall Northlake Mines program.

In the field, two separate conductive areas were identified and drilling was completed on the most Northerly one. Overburden was found to be only about 30'.

Both graphitic schists and a significant talc zone were intersected in the drilling in Area 18. The best part of the conductivity appears related to the talc zone rather than to the graphitic schists, as an outcrop of the latter was found outside the conducting zone.

In the Southeasterly portion of the claims, a rather extensive conductive zone is located on the NE flank of the aeromagnetic anomaly. This zone, known as Area 19 in the overall program, has been investigated by a Ronka horizontal loop electromagnetic ground survey and by soil sampling. Both investigations were conducted along picket-lines spaced at 800'. Further follow-up work is recommended.

In the general geological context of the area, the 1966 program has demonstrated that the best target zones occur in the schist areas within about one to two miles from the ultrabasics. Both area 18 and 19 justify therefore further investigation.

7. PERSONNEL AND COSTS OF LOCKWOOD SURVEY

The Lockwood Survey was flown under supervision of P.H. Sevensma Consultants Ltd. out of a camp on Grassy Lake, between May 8th and 23rd, 1966.

Due to meltwater on the ice starting May 12th, 1966 and poor weather conditions, Ross River had to be used as a secondary base, and additional helicopter support was required.

A. Personnel on Lockwood Survey

Helicopters were supplied by Klondike Helicopters Ltd.

Geophysical Helicopter:	Bell 47G-3, CF-NJW
Supporting Helicopters:	Hiller UH-12E, CF-MLL
	Bell 43G-3, CF-UAJ
Pilots:	G.F. Kerr
	R. Peters
	J. Dirkie
Engineer:	R. Smegalski
Geophysical Operator:	H. Sandau of Lockwood Survey Corp., Toronto
Field Supervisor:	P.H. Sevensma, P. Eng., Vancouver, B.C.
Auxiliary Personnel:	M. Cloutier, Richmond, B.C.
	J.L. Stout, Mayo, Y.T.
	N. Menegos, Whitehorse, Y.T.
	S. Lothrop, Vancouver, B.C.
	M. Shorty, Ross River, Y.T.

B. Costs of Lockwood Survey

Costs were as follows:

Group	Line Miles	Instrument Rental	Field Expenses	Data Reduction	Total
Gee	462.5	$7,956.34	$9,745.32	$ -	$17,701.66
Hoo	106	1,823.50	2,233.51	1,607.99	5,664.50
El	82	1,410.64	1,727.81	1,243.53	4,381.98
TOTAL	650.5	11,190.48	13,706.64	2,851.02	27.748.14
Cost per line mile		$17.203	$21.071	($15.00)	$42.657

Field costs include labour, fixed wing aircraft, helicopter, sundry expenses and consulting fees.

A cost breakdown is attached as Appendix A.

8. SUMMARY AND RECOMMENDATIONS

An airborne magnetic-electromagnetic survey of the Hoo Group, flown at a total cost of $5,664.50, has revealed the presence of several interesting conducting zones, two of which are quite extensive and located in the schists close to their contact with the ultrabasics.

Initial drilling on one of these has not encountered economic mineralization, but several targets of interest remain and justify further investigation.

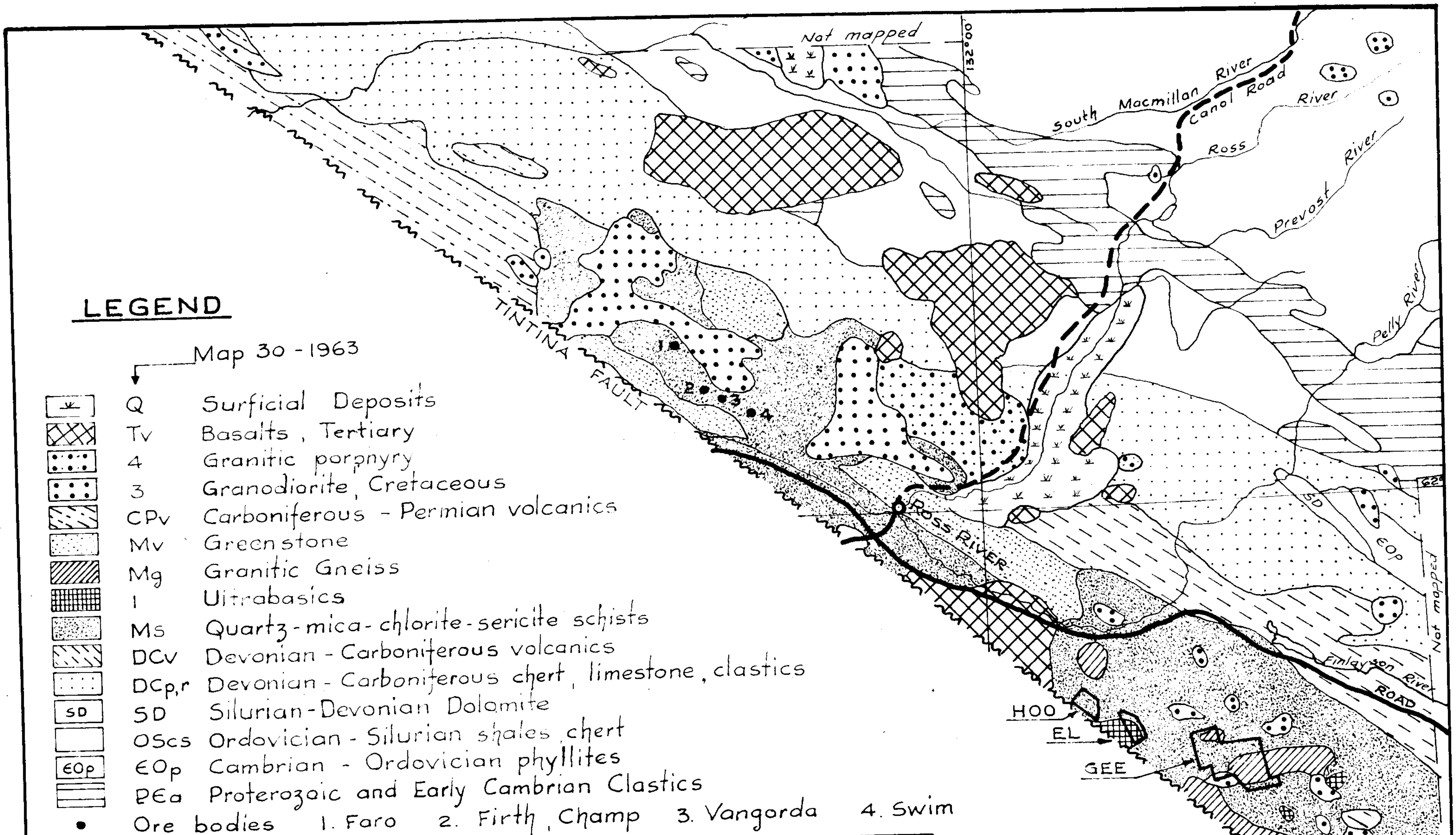
The summary of recommendations which follows must be considered within the framework of the overall program of Northlake Mines; it's priority is rated as 3. These recommendations do not take into account the sequence and timing within the broader program.

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		1,000
	Total	$ 7,000
Contingent linecutting, geophysics, 15 line miles @ $200		3,000
Contingent drilling, 1600' @ $25		40,000
	Total	$50,000
Engineering, overhead, contingencies, 15%		7,500
	Total	$57,500

Respectfully submitted,

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

January 26, 1967



NORTHLAKE MINES LTD. (N.P.L.) WATSON LAKE M.D. Y.T.

ANVIL RANGE - FINLAYSON LAKE SCHIST BELT

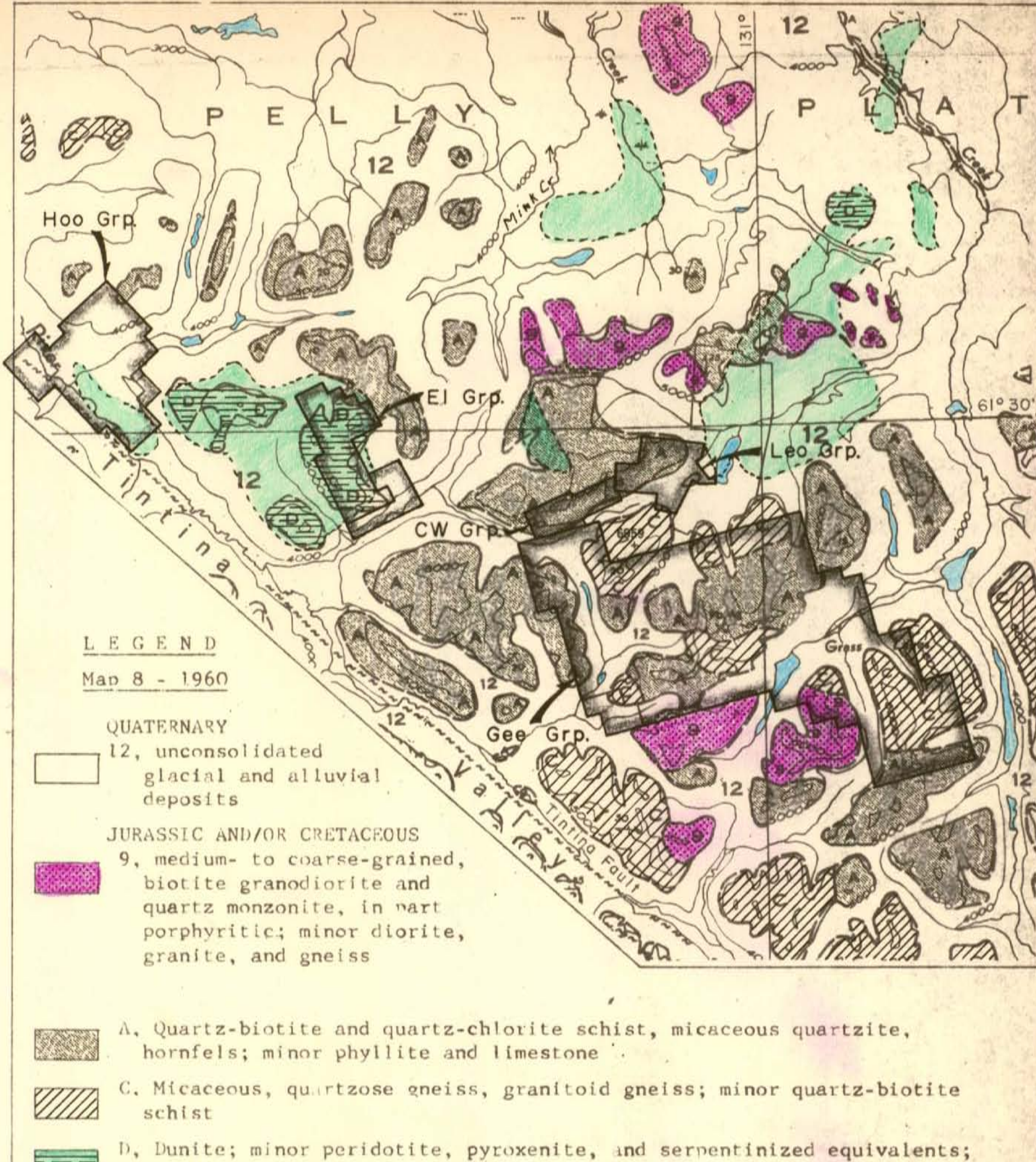
PETER H. SEVENSMA CONSULTANT

VANCOUVER B.C. MARCH, 16, 1966.

0 10 20 MILES

P.H. Sevensma

FIG. 1



A, Quartz-biotite and quartz-chlorite schist, micaceous quartzite, hornfels; minor phyllite and limestone

C, Micaceous, quartzose gneiss, granitoid gneiss; minor quartz-biotite schist

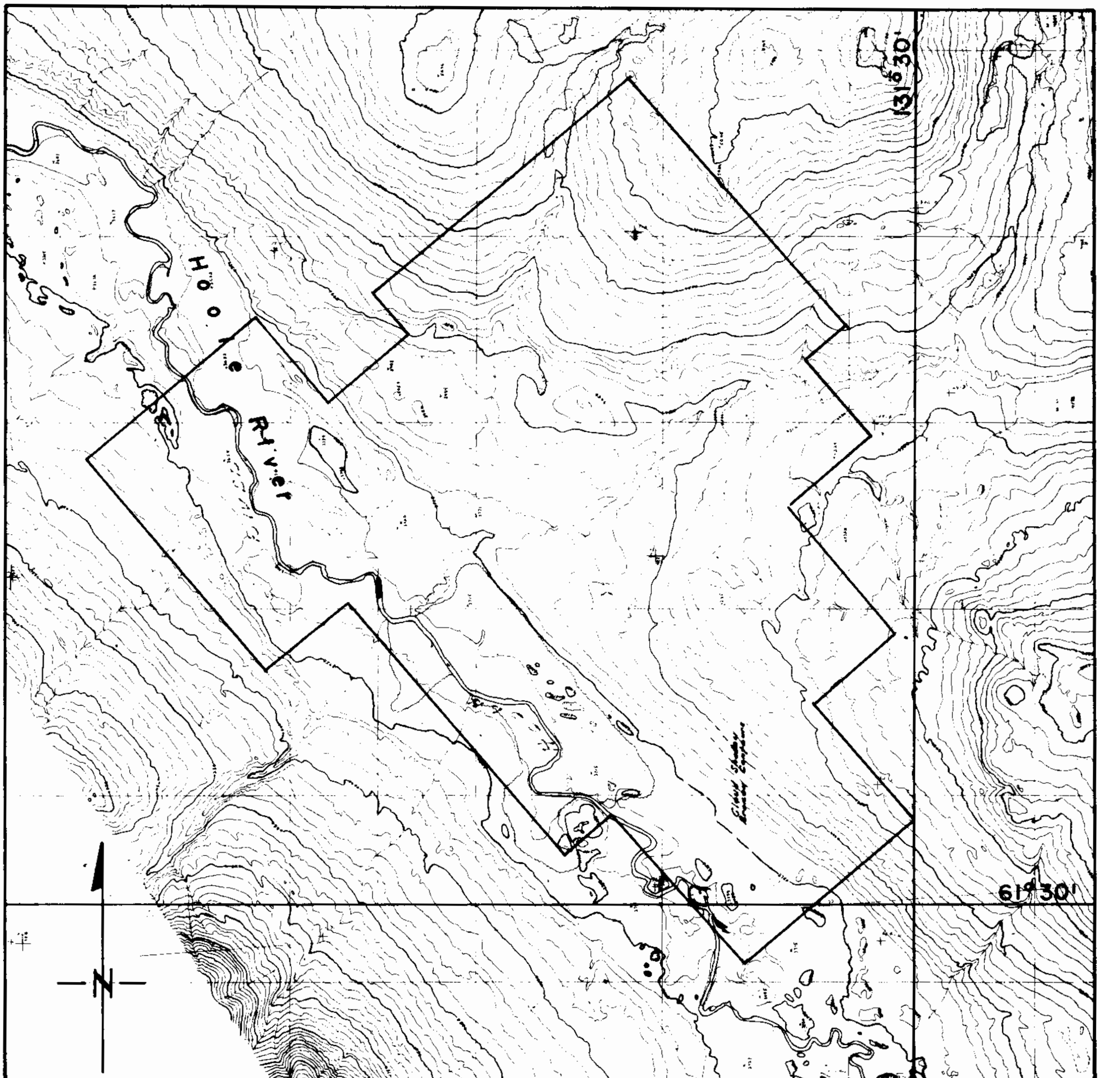
D, Dunite; minor peridotite, pyroxenite, and serpentinized equivalents; gabbro and diorite

Outline of aeromagnetic anomalies estimated to reflect ultrabasic intrusives.

P.H. Sevensma

NORTHLAKE MINES LTD.	
GEOLOGY AND LOCATION PLAN	
Watson Lake M.D.	105 G
P.H. Sevensma Consultants Ltd. - Vancouver, B.C.	
December 1966	scale 0 – 4 mi.

FIG. 2



NORTHLAKE MINES LTD. - HOO GROUP

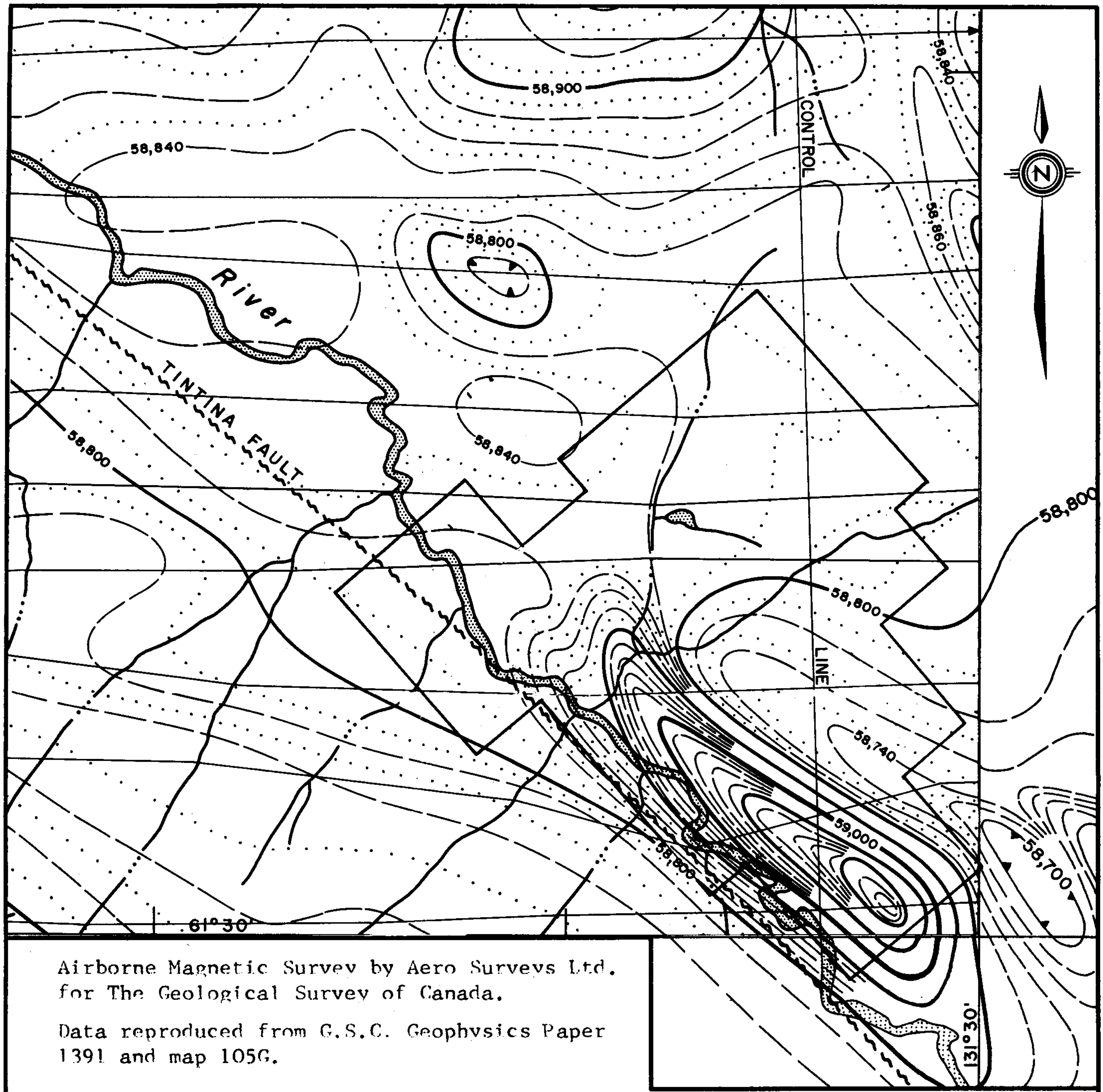
TOPOGRAPHY AND CLAIM LOCATION MAP

Watson Lake M.D. 105 G-12

P.H. Sevensma Consultants Ltd. - Vancouver, B.C.

December 1966 FIG. 3 Miles SCALE 0 1 2

P.H. Sevensma



Airborne Magnetic Survey by Aero Surveys Ltd. for The Geological Survey of Canada.

Data reproduced from G.S.C. Geophysics Paper 1391 and map 105G.

FIG. 4

NORTHLAKE MINES LTD.	
HOO GROUP — AEROMAGNETICS	
Watson Lake M.D.	105 G-12
P.H. Sevensma Consultants - Vancouver, B.C.	
December 1966	SCALE: MILES 0 1 2

NORTHLAKE MINES LIMITED
AIRBORNE GEOPHYSICAL SURVEY

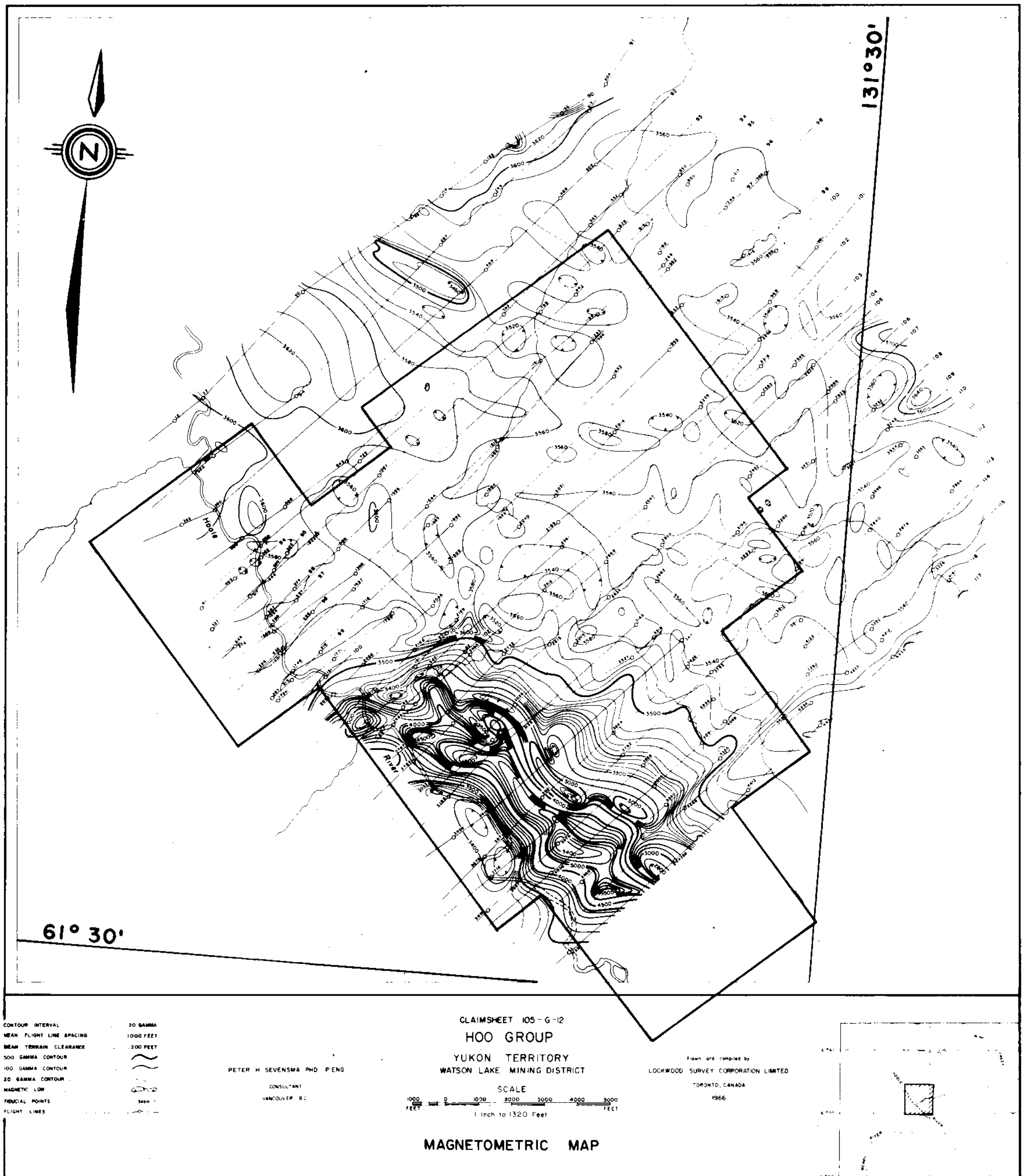
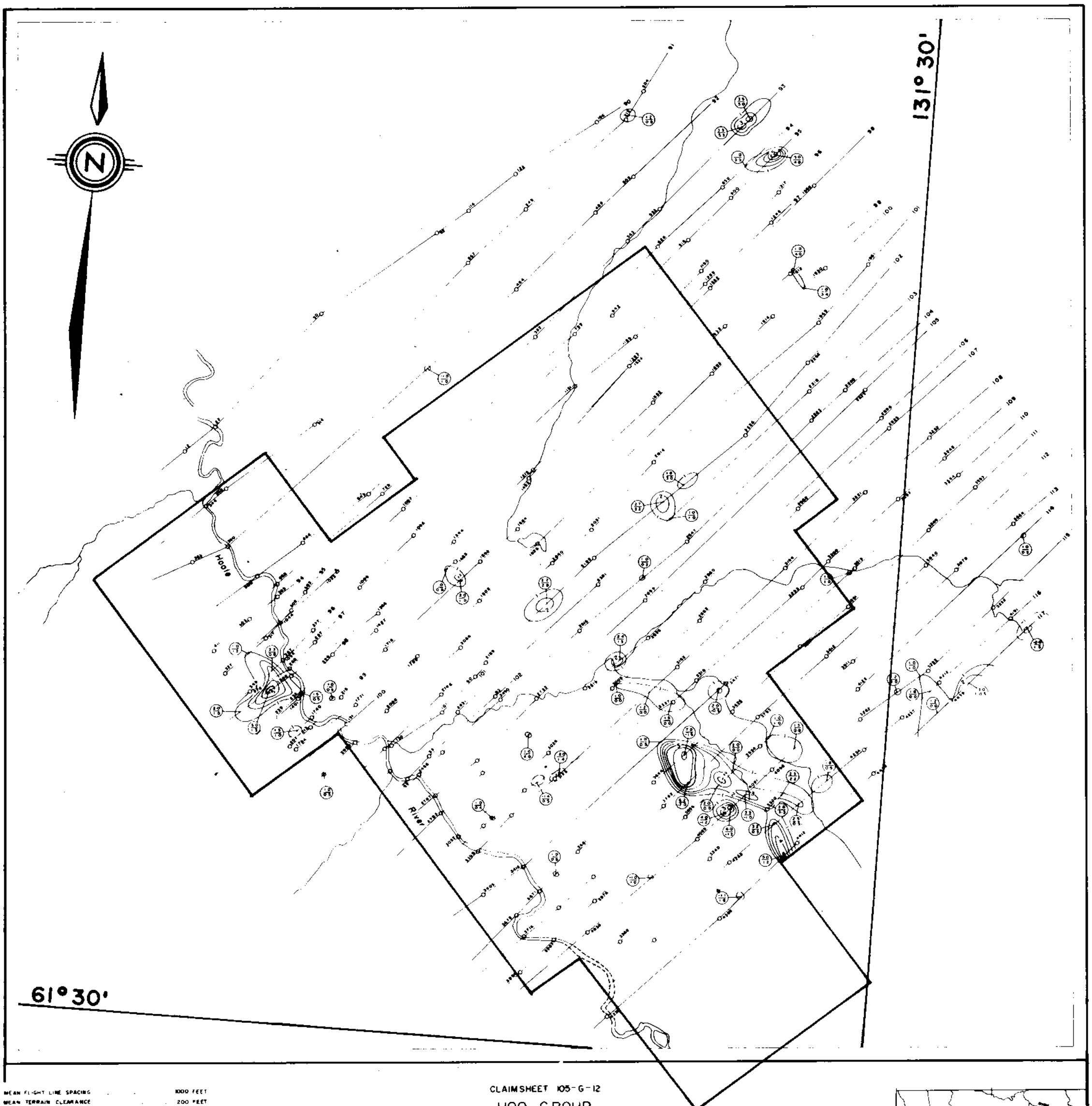


FIG. 5

NORTHLAKE MINES LIMITED

AIRBORNE GEOPHYSICAL SURVEY



MEAN FLIGHT LINE SPACING	1000 FEET
MEAN TERRAIN CLEARANCE	200 FEET
ELECTROMAGNETIC CONTOURS 5, 10, 15 etc / 1, 2, 3, 4 etc	
FIDUCIAL POINTS	
FLIGHT LINES	

The contours represent amplitude of in phase response of the resultant field expressed in parts per million of the primary. The figures represent amplitude in phase component / quadrature component. The frequency of the primary current is 4000 cycles per second.

PETER H SEVENSMA PHD P ENG
CONSULTANT
VANCOUVER B C

CLAIMSHEET 105-G-12

HOO GROUP

YUKON TERRITORY
WATSON LAKE MINING DISTRICT

SCALE
1000 FEET — 0 — 1000 — 2000 — 3000 — 4000 — 5000 FEET
1 inch to 1320 Feet

ELECTROMAGNETIC MAP

Flown and compiled by
LOCKWOOD SURVEY CORPORATION LIMITED
TORONTO CANADA
1966

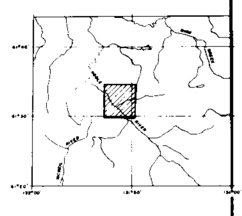
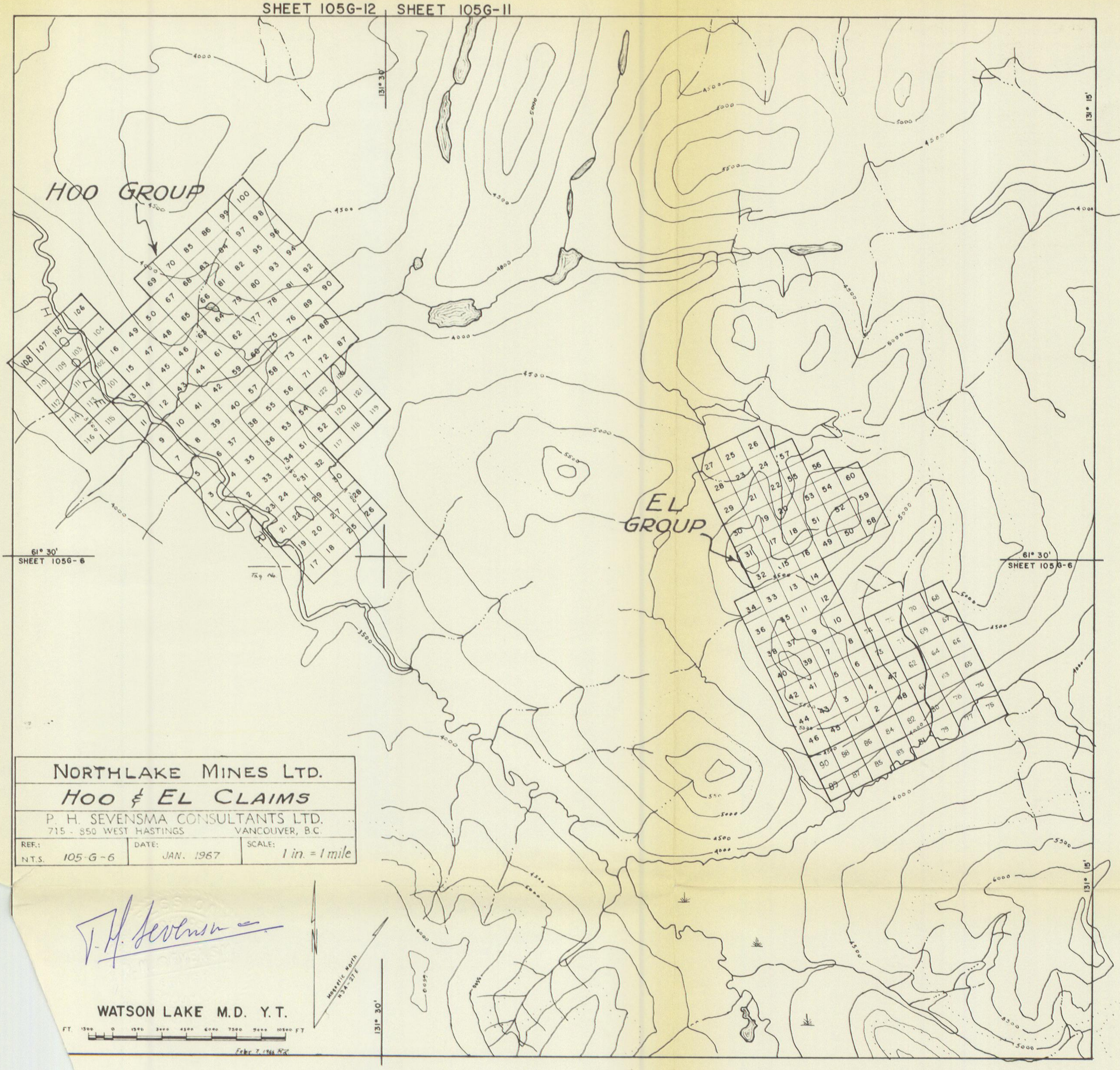
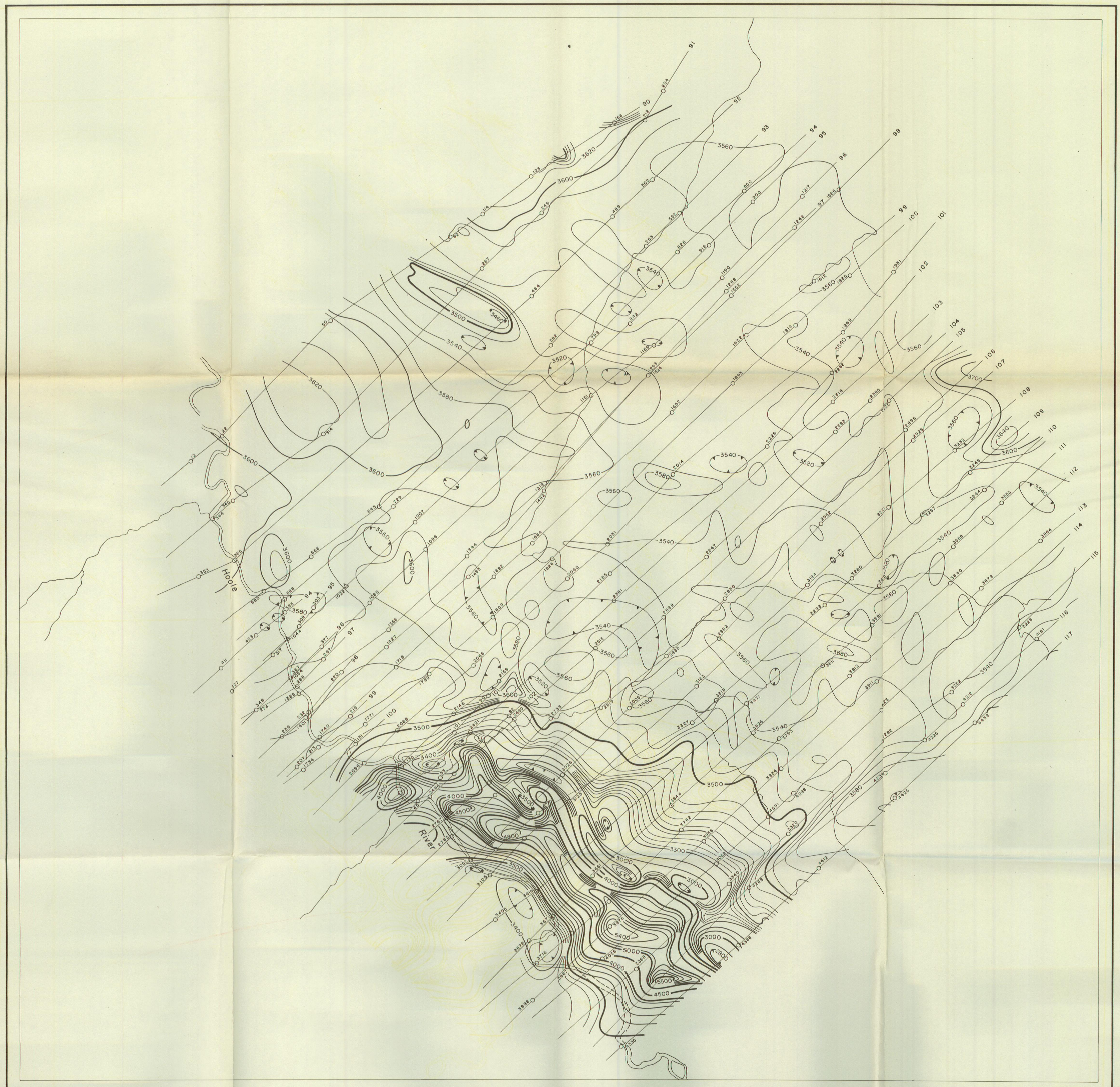


FIG. 6


SHEET 105G-12
SHEET 105G-11
131° 30'
131° 15'
HOO GROUP
EL GROUP
61° 30'
SHEET 105G-6
61° 30'
SHEET 105G-6
NORTHLAKE MINES LTD.
HOO & EL CLAIMS
P. H. SEVENSMA CONSULTANTS LTD.
715 - 850 WEST HASTINGS
VANCOUVER, B.C.
REF.:
N.T.S. 105-G-6
DATE:
JAN. 1967
SCALE:
1 in. = 1 mile
WATSON LAKE M.D. Y.T.
Magnetic North
131° 30'
131° 15'

NORTHLAKE MINES LIMITED
AIRBORNE GEOPHYSICAL SURVEY



CONTOUR INTERVAL .... 20 GAMMA
MEAN FLIGHT LINE SPACING .... 1000 FEET
MEAN TERRAIN CLEARANCE .... 200 FEET
500 GAMMA CONTOUR
100 GAMMA CONTOUR
20 GAMMA CONTOUR
MAGNETIC LOW
FIDUCIAL POINTS 3690
FLIGHT LINES

CLAIMSHEET 105 - G -12

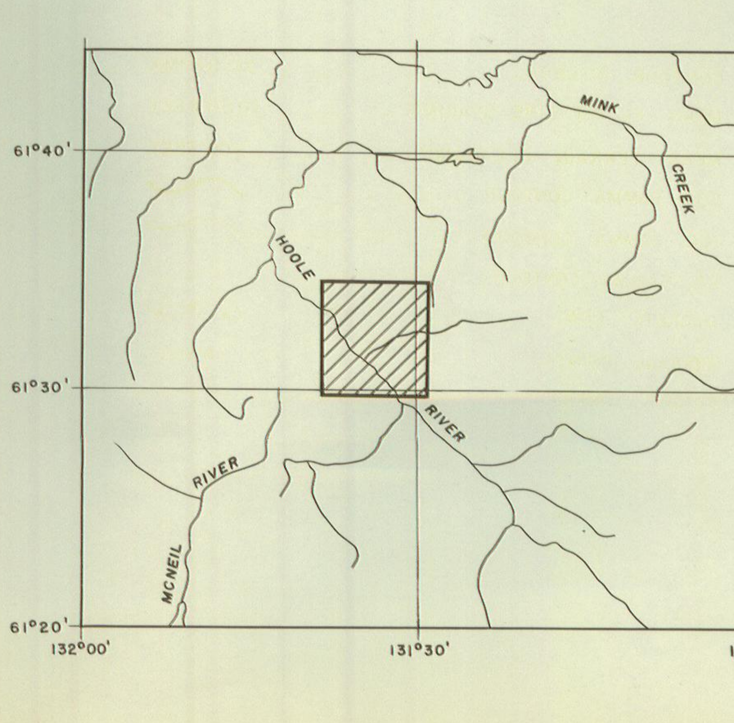
HOO GROUP

YUKON TERRITORY
WATSON LAKE MINING DISTRICT

PETER H. SEVENSMA PHD. P.ENG.
CONSULTANT
VANCOUVER B.C.

SCALE
1000 FEET 0 1000 2000 3000 4000 5000 FEET
1 Inch to 1320 Feet

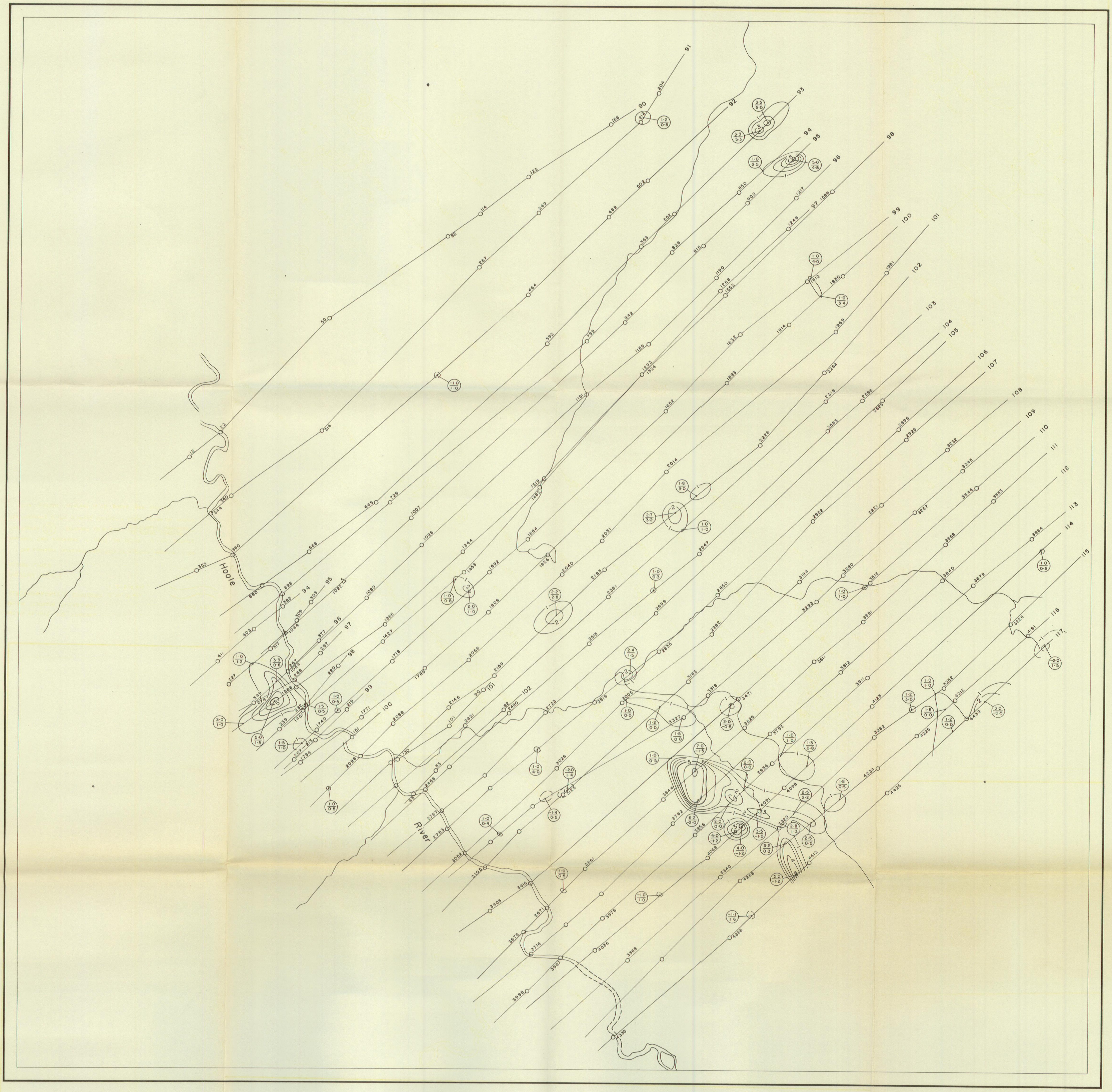
Flown and compiled by
LOCKWOOD SURVEY CORPORATION LIMITED
TORONTO, CANADA
1966



MAGNETOMETRIC MAP

NORTHLAKE MINES LIMITED

AIRBORNE GEOPHYSICAL SURVEY



MEAN FLIGHT LINE SPACING .... 1000 FEET
MEAN TERRAIN CLEARANCE .... 200 FEET
ELECTROMAGNETIC CONTOURS 5, 10, 15 etc.
1, 2, 3, 4 etc.
FIDUCIAL POINTS 3690
FLIGHT LINES

The contours represent amplitude of in phase response of the resultant field expressed in parts per million of the primary. The figures (2.3/0.2) represent amplitude in phase component / quadrature component. The frequency of the primary current is 4000 cycles per second.

The contour interval is 10 parts per million.

PETER H. SEVENSMA PHD. P.ENG.

CONSULTANT.

VANCOUVER B.C.

CLAIMSHEET 105-G-12

HOO GROUP

YUKON TERRITORY

WATSON LAKE MINING DISTRICT

SCALE

1000 FEET 0 1000 2000 3000 4000 5000 FEET

1 Inch to 1320 Feet

ELECTROMAGNETIC MAP

Flown and compiled by

LOCKWOOD SURVEY CORPORATION LIMITED

TORONTO, CANADA

1966