019115

NORTHLAKE MINES LIMITED

GEE GROUP OF CLAIMS

105-G-6/7, 61°27'N, 131°00'W

Watson Lake M.D., Y.T.

Report on

AIRBORNE GEOPHYSICAL SURVEYS

April 4-12 & May 8-23, 1966

by

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

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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).

On the Gee Group of claims, 9 small showings were known on the high-lying ridges. In view of the rugged topography of the area, it was decided to use the Geo Cal helicopter-borne electromagnetic prospecting method near some of the showing areas at high altitude, and to conduct a helicopter-borne magnetic-electromagnetic survey by the Lockwood method along the main valleys.

Targets located by these methods early in the 1966 season have subsequently been investigated by geophysical, geochemical and geological methods during the summer of 1966.

The present report deals with the results of the airborne surveys on the Gee Group area. Line-miles flown by the Lockwood method totalled 462.5 miles in this area.

2. PROPERTY

The property consists of the following claims:

	Grant Nos.	Date of record
Gee 1 - 80	90172 - 90250 & Y2004	January 31, 1966
Gee 81 - 88	Y2002, 3 and 5 - 9	January 31, 1966
Gee 89 - 400	Y2010 - Y2321	January 31, 1966
Gee 401 - 530	Y7103 - Y7232	April 20, 1966
FS 1 - 40	Y7854 - 7893	May 9, 1966
Z 1 and 2	Y13085 & Y13086	June 14, 1966
Leo 1 - 6	Y13087 - Y13092	June 14, 1966
Leo 7 - 14	Y13125 - Y13132	July 4, 1966
Leo 15 - 30	Y13093 - Y13108	June 14, 1966
CW 1 - 4	Y13081 - Y13084	June 14, 1966
CW 5 - 23	Y13333 - Y13351	July 25, 1966
PG 1 - 16	Y13352 - Y13367	July 25, 1966

These claims form a contiguous group centered on the high mountains between Grass Lakes and Riviera Lake at approximately 61°27'N and 131°00'W.

The claims lie between elevations of 4300' and 7000' about 20 airmiles South of the Watson Lake - Ross River road (figures 1 and 2). The best access by fixed wing is on the Westerly Grass Lake, which served as a base for the airborne surveys. This lake, at 4300' elevation, lies in a bad weather belt, and during the Lockwood Survey, conducted at the start of break-up, Ross River had to be used as a secondary base due to poor weather conditions, which increased the cost of the survey by about 15%. Starting May 12, 1966, fixed wing aircraft where precluded from landing on the lake by flooding of the ice.

3. HISTORY

There is evidence in the area of activity by the early placer miners, probably around the turn of the century.

The area was initially prospected in 1954 by K.G. Sanders and R. Zielinski for Pelly River Explorations Limited and the Rob, Pit and Gyp claims were staked. The two former groups were optioned by Trans-continental Resources, who carried out a ground magnetometer survey, but allowed the claims to lapse.

From 1955 until the early 1960's, various other mineral discoveries were made to the NW and SE of the present Gee Group. During the same period, the area was mapped on a scale of 1" = 4 miles by J.O. Wheeler, L.H. Green and J.A. Roddick of the G.S.C. and an airborne magnetic survey was flown by Aero Surveys for the same organization.

In January 1966, Messrs. Sanders and Zielinski staked 560 claims in the area, including the Gee 1 - 400. All 560 claims were acquired by Northlake Mines.

The description by the stakers of the 9 showing areas covered by the Gee claims is recorded in the writer's report on the area dated March 18, 1966.

Subsequent to the airborne surveys carried out by Northlake Mines in April and May of 1966, A. MacDonald Consultants Limited of Vancouver conducted an extensive ground exploration program during the summer of 1966 for Northlake Mines Ltd.

The writer has acted as a consulting geologist for both the airborne and ground follow-up programs since mid-February 1966.

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 consideration 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 GEE GROUP

In view of the general high elevations in the area and the limited carrying capacity of the Bell 47G-3 helicopter at these altitudes, flying was purposely confined to the main valleys (figure 4). Flight-line spacing was 660'.

As the formations on the Gee Group have in general relatively flat dips, care was taken to fly several of the valleys adjoining the claims, so as not to miss possible significant extensions of nearby showings into adjacent valleys.

Tapes were examined in the field. As few conductive zones were found and as the magnetic profiles in general were flat and the flight-elevations irregular, it was decided not to obtain a detailed data reduction. A preliminary data reduction of those areas that evidenced significant electromagnetic profiles was carried out by personnel of Exploration Geophysics (Yukon) Limited at Whitehorse (see attached maps).

Very highly conductive zones were located on the Leo claims (Area 11). Medium conductors were located in area 10 near the Lake on the NW portion of the Gee claims, and weak but localized conductors were found on the area of the PG claims at the SW corner of the Gee Group (Area 16), in the valley bottom 1½ miles NE of Grass Lake (Area 14) and in areas 10, 12 and 13. The latter two are covered by the CW claims.

No conductors were found either in the lower part of Area 5 on the slopes to the NW of Grass Lake which is upslope from the galena float at that point, or in Area 15, covering the long conducting zone located by the Geo Cal method.

In both areas, topography and crosswinds combined to force the helicopter to fly at a higher terrain clearance than normal.

In Area 5, where overburden cover increases rapidly when proceeding down the valley, a horizontal loop-frame survey failed to pick up any significant conductors, and the same condition prevailed in Area 15.

Streamsilt and soil sampling failed to locate any significant and continuous anomalies in Area 15, but Area 5 was found to be generally high in lead.

In Area 15, the negative verdict of the Lockwood Survey and of geochemical and ground electromagnetic surveys led to interpret the Geo Cal conductor as reflecting the presence of conductive schists lying under overburden beyond the range of the horizontal loop method.

Area 5 could only be partially flown, and it is felt that the airborne survey did not materially contribute to the assessment of this area, mainly due to its rugged topography.

The subsequent geochemical reconnaissance of all the valleys of the area flown has in general confirmed the results of the Lockwood Survey and the combination of these two methods has resulted in providing a few definite target areas and in eliminating, with good confidence, large areas.

An element of doubt subsists in the centre of the valleys where depth of overburden may preclude the detection of any large base metal occurrence by either or both geochemical reconnaissance and airborne geophysics.

It is believed however, that this may not apply to any more than perhaps 20% of the valley bottoms, and any discovery under those physical handicaps would have to be very substantial to have an economic potential.

When the results of the Lockwood surveys conducted by Northlake Mines Limited over its three main groups, the Gee, El and Hoo, are considered together, it is felt that the survey has focussed the attention on those situations where subsequent geochemical follow-up has proven very worthwhile targets and has significantly contributed to eliminate, with confidence, large sections of ground without any near-surface potential.

The Gee Group area as flown was, in general, at or somewhat beyond the limit of the capacity of the Bell 47G-3 and the quality of the survey in areas with this type of topography would be improved by using a much heavier machine capable of maintaining the proper terrain clearance under all conditions.

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. GEO CAL AIRBORNE METHOD

The Geo Cal method is based on the observation that a helicopter equipped with metal rotor blades generates a primary electromagnetic field of approximately 900 c.p.s. with an effective radius of some 150' when the blades are rotating at their normal speed of 320 R.P.M.

When a helicopter with metal blades flies at an elevation of 50' to 100' above a conducting body of some size, a secondary electromagnetic field is induced, and the resultant field shows a significant distortion.

This resultant field can be analyzed with a search coil with a vertical axis held by an operator in the helicopter.

The audio amplifier attached to the search coil is tuned to a signal of 900 c.p.s. and has a gain switch and a feed back squelcher switch.

The former is regulated to produce a barely audible signal when the coil is held with its axis vertical, and the latter is adjusted so that only the 900 c.p.s. signal goes through the amplifier. When the aircraft flies close to the terrain in the absence of a conducting zone, the field signal will have minimum amplitude. If, under these conditions, a conducting zone is traversed, the signal strength will markedly increase in amplitude. Under favorable conditions, the orientation of the resultant field can be analyzed by having the helicopter hover over the conducting zone.

By landing, the conducting zone so discovered can be traversed on the ground with the same receiver coil, using a power-pack transmitter. A Sharp SE 250 unit was used in the present case.

Since the survey was flown, recordings of signals have been made on magnetic tape. Also, a fixed horizontal coil can be carried under the belly of the helicopter. This is fed direct current by the helicopters electrical system to create a non-pulsating strong magnetic field.

In this field, the alternating EM field created by the rotor will be much stronger than in the natural magnetic field, providing increased depth penetration.

The method is a low cost prospecting tool. As it is sensitive to all types of conductors to the same extent as more sophisticated devices, but less discriminating, it could lead to higher ground follow-up costs in the presence of conductive overburden.

9. RESULTS OF THE GEO CAL SURVEY

The survey was restricted to the rugged areas at high elevations (5000 - 6500') where small showings had previously been found by conventional prospecting methods.

Conductors were located on the following claim areas: (figure 4)

Area	Airborne Anom. on claim #	Ground survey with Sharp SE 250		
		Cross over	Maximum Amplitude	Rating
1	111, 146	Weak	2L, 2R	Insignificant
2	100, 174, 176	no landing possible		unknown
	173-175-186	Good	6L, 8R	Good
	187	Nil	0, 10R	Poor
3	209-210-211	Nil	0, 4R	Insignificant
5	2, 4, 6, 236	no landing possible		unknown
	237, 238	no landing possible		unknown
	240-242	Fair	6L, 10R	Good
6	337	None	0, 8R	Poor
7	322-324	None	0, 2R	Insignificant
8, 9	376-378	Fair	8L, 4R	Fair
15	91, 93	no landing possible		unknown
	151,153,155	no landing possible		Strong HEM only

It is felt that in rugged terrain, the absence of a definite crossover and a weak amplitude suggests topographical effects, or a weak conductor at the limit of depth penetration. The generally schistose rocks of the area may also contribute to weak crossovers.

The maximum depth of penetration of the Sharp SE 250 is probably of the order of 150'.

It is also believed that the depth penetration of the airborne device may be somewhat greater than assumed, and may be beyond the depth range of any of the usual horizontal loop instruments, like a Ronka, which at 200' coil spacing, does not exceed 70' - 80'.

All conductors have subsequently been followed up in the field, all by visual inspection, some by a Ronka survey and most by either stream silt sampling and/or soil sampling. These results may be tabulated as follows:

Area	Visual examination	Geochem	Ronka survey	Total assessment
1	pyrite	streams: spotty Cu, Pb	not required	not significant
2	pyrrh. showings up to 4' wide	spotty Cu	not required	due to pyrrh. showings
3	no visual explanation	nil	not required	not significant
5	quartz & galena veins only	high Pb soils	nil	high Pb requires further evaluation
6	faulting	nil	not required	not significant
7	faulting & various minor showings	streams: weak	not required	not significant
8, 9	considerable faulting	Soils: + BG. Cu, Lead	not required	nothing of economic interest observed
15	deep overburden	streams: spotty Soils: low	nil	N-S fault or N.S. striking schists beyond Ronka range

In summary, areas 1, 3, 6, 7 and 8 + 9 did not reveal anything of economic potential, and the conductors are most likely related to faults or slightly conductive schists.

Area 2 covers showings of massive pyrrhotite with very minor chalcopyrite which would give conductivity readings as observed. The showings do not show economic promise.

Area 5 shows geochemical and visual evidence of the presence of probably numerous quartz veins with galena. Ground follow-up with a Ronka horizontal loop indicated one weak conductor, but in the Southeast portion of the area, the overburden thickness increases rapidly, probably well beyond the range of the Ronka.

The galena-bearing quartz veins could be part of a halo of a larger galena-bearing body related to the granodiorite-schist contact and additional investigations to check this working hypothesis will be recommended.

In area 15, there is no satisfactory explanation for the conductive zone, which may be due to a N-S fault or a conductive schist formation. As there is no geochemical support other than some spotty highs, further work is not recommended in this area.

The Lockwood survey failed to confirm the presence of this conductor, but crosswinds forced the helicopter to fly higher than required for a thorough exploration, whereas the Geo Cal survey was flown no more than 50' above ground level. This may account for the non-confirmation.

It is concluded that the Geo Cal survey did not miss any major near-surface occurrences of possible economic interest in the areas flown.

10. PERSONNEL AND COSTS OF THE GEO CAL SURVEY

The Geo Cal survey was flown out of a temporary staking camp located at Grass Lake, and part of the cost is based upon a split between staking and surveying. Camp costs have been absorbed by the staking account,

A. Personnel on Geo Cal Survey

Helicopters supplied by Klondike Helicopters Ltd.

Geophysical Helicopter	CF-UAA	Bell 43-G-3 B1
Supporting Helicopter	CF-KEL	Bell 47-G-2

Pilots: P. Langlois
E. Burgess

Engineer: McKay

Geophysical contractor: Geo Cal Ltd., 2658 Nelson Avenue, West Vancouver

Geophysical operator: Ian Poyntz, Geo Cal Ltd.

Consulting Geologist: P.H. Sevensma, Ph. D., P. Eng.

Field personnel: M. Cloutier, Richmond, B.C.

B. Costs of Geo Cal survey

Geo Cal, contractor	$ 1,673.10
Helicopter costs	1,362.00
Helicopter gas	222.75
Fixed wing	200.00
Consulting fees	500.00
* Consulting expenses	739.45
**Camp costs	none charged
Total	$ 4,697.30

* Charged all expenses to Geo Cal survey
** Charged all expenses to Staking

A cost breakdown is attached as page 2 of Appendix A.

11. SUMMARY AND RECOMMENDATIONS

An airborne Geo Cal electromagnetic survey was flown at a cost of $4,697.30 over 8 selected rugged areas of the Gee claims, followed by an airborne Lockwood magnetic-electromagnetic survey, flown mainly along the valleys, at a cost of $17,701.66 in the Gee Area.

Total cost of the two surveys was $22,398.96.

In conjunction with information obtained by the Lockwood Survey on other Northlake Mines Limited ground (El and Hoo Groups), it is felt that the airborne surveys, combined with geochemical follow-up, have:

1. Conclusively indicated a potential copper-belt related to chlorite-sericite-graphite schists intruded by ultrabasics, towards the N and NW.

2. Eliminated large areas without conductors and geochemical highs in the more highly metamorphic schist-gneiss assemblage underlying the Gee claims.

3. Proven the value of the existence of 1" = 4 miles reconnaissance geological maps and both 1" = 4 miles and 1" = 1 mile aeromagnetic maps, the combination of which has permitted to formulate exploration guide lines at an early date.

As a result of these surveys on all Northlake's holdings and their ground follow-up, recommendations are being prepared in a separate report by the writer.

These recommendations, as they pertain to the Gee claim area, may be summarized as follows without any commitment as to their sequence and timing, as they should be viewed with the framework of the overall program.

Abandonment of the following areas is recommended:

Detail areas 1, 3, 4, 6, 7, 8, 9 and 15
NW central area

Retention of the following areas is recommended:

Detail areas 2, 5, 10, 11, 12, 13, 14 and 16

In the overall program, the areas recommended for retention in the Gee area are rated as follows:

Priority 2 - Areas 11, 12 and 13, i.e. the Leo Group and its extension to the West (CW). Strong EM anomaly supported by geochemical copper (lead-zinc) highs near the contact of the conductive and the non-conductive formations.

Priority 4 - Area 5. Shallow Ronka ground EM failed to pinpoint conductors located by airborne methods in an area of quartz veins with galena and a high lead background.

Priority 5 - Areas 10, 14 and 16. Airborne work and ground follow-up have indicated various weak targets requiring additional assessment.

Priority 6 - Area 2. Pyrrhotite showings with minor copper values have been located. A review of this situation may be indicated if other discoveries are made in the area.

A summary of recommended expenditures follows. All proposed geological mapping is of a detailed nature, on a scale of 1" = 400', to produce a map of outcrops, float and overburden as related to topography and soil sampling along 400' or 200' picket-lines.

It is assumed that existing camp-gear is about adequate for these programs.

Priority 2

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		2,500
	Total	$30,000
Contingent core drilling: 2000' @ $25		50,000
	Total	$80,000
Engineering, overhead, contingencies @ 20%		16,000
Total appropriation		$96,000

Priority 4

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

Priority 5

Detailed geological mapping, additional soil sampling, prospecting	$15,000
EM surveying, as indicated	5,000
Engineering, overhead, claim maintenance; 20%	4,000
Total appropriation	$24,000

Priority 6 Nil

Summary

	Fixed cost	Contingent drilling	Engineering, etc.	Total
Priority 2	$30,000	$50,000	$16,000	$96,000
Priority 4	7,500	37,500	9,000	54,000
Priority 5	20,000	-	4,000	24,000
Priority 6	-	-	-	-
Total	$57,500	$87,500	$29,000	$174,000

Respectfully submitted,

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

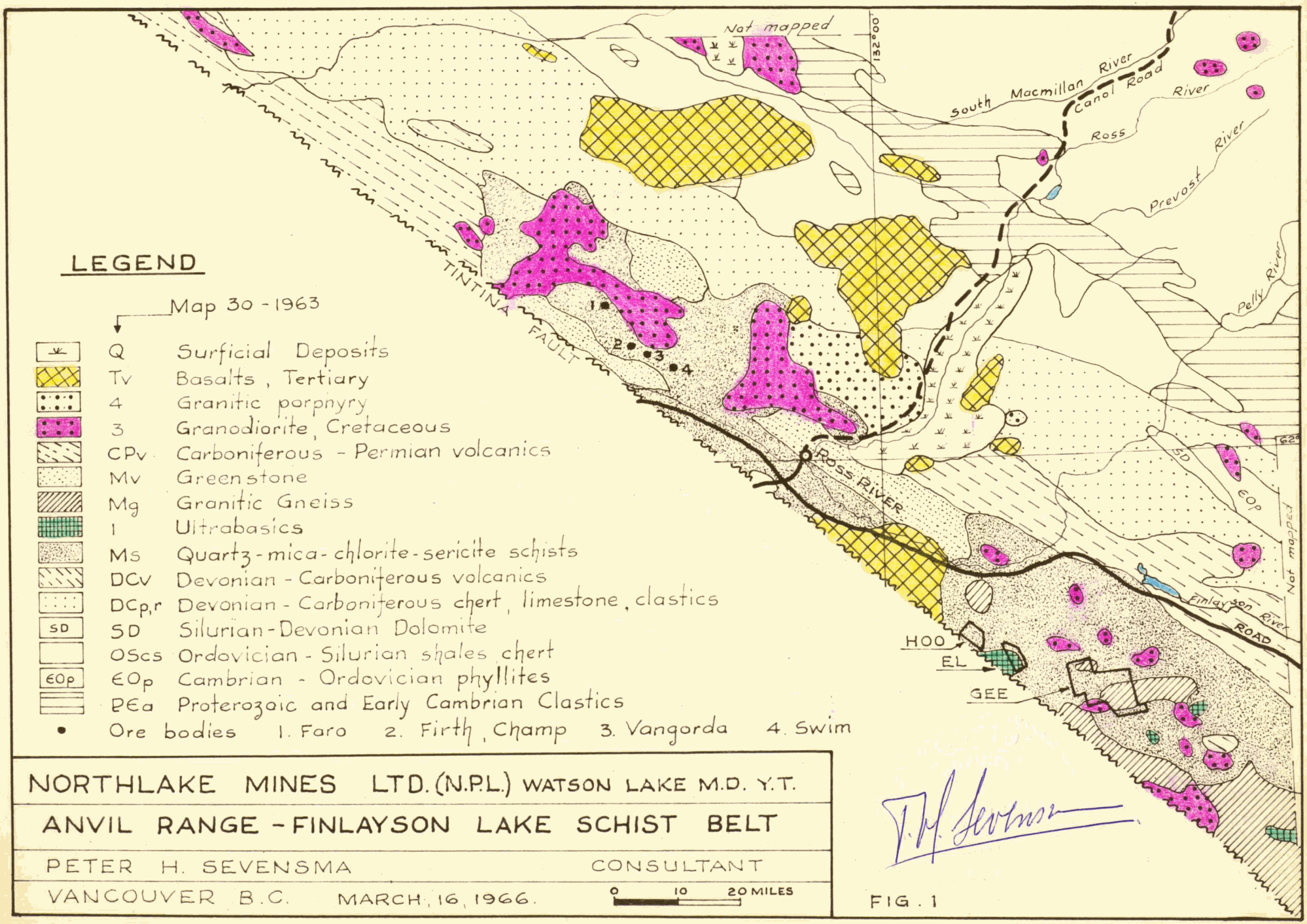
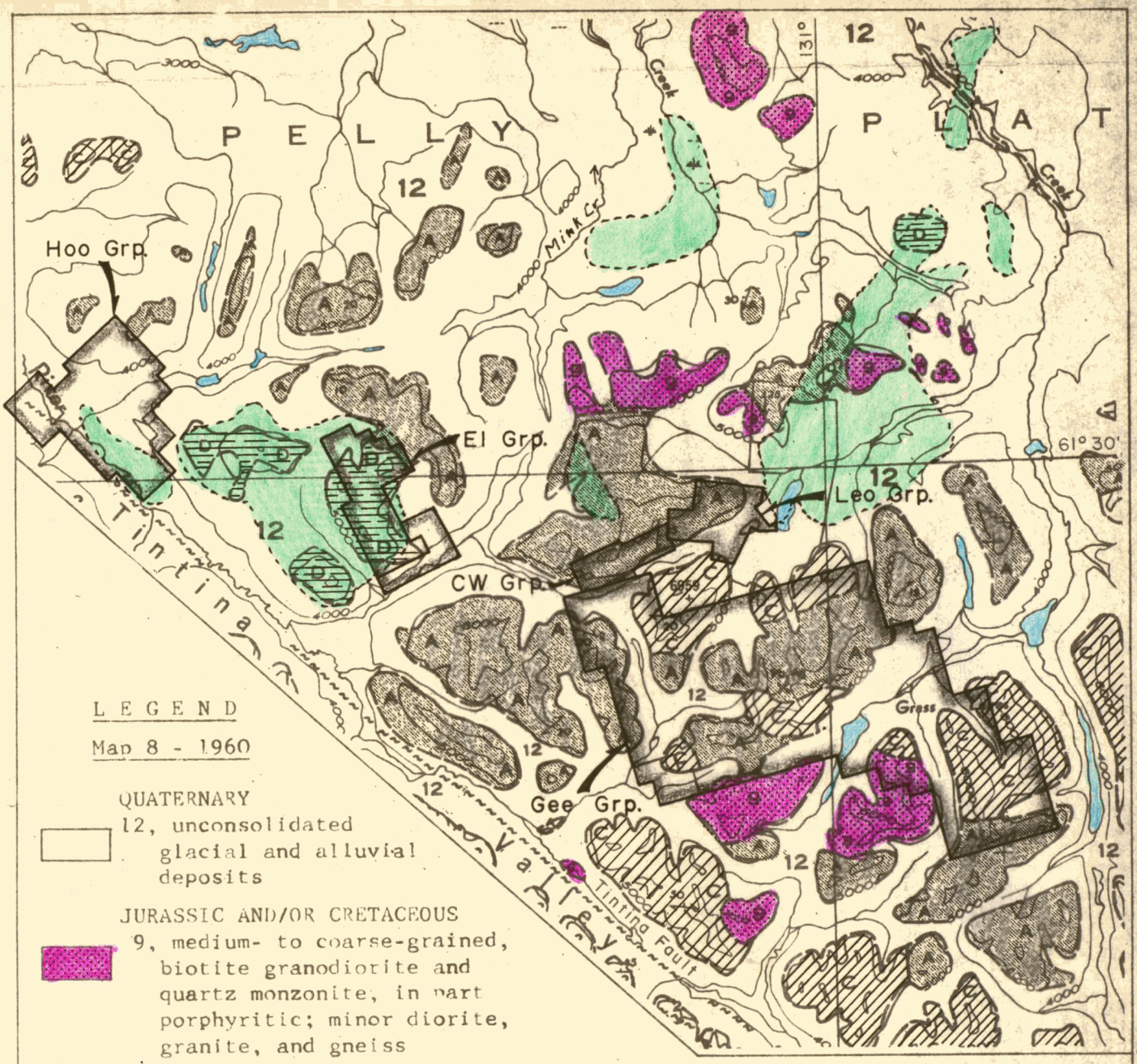

LEGEND
Map 30 - 1963
Q Surficial Deposits
Tv Basalts, Tertiary
4 Granitic porphyry
3 Granodiorite, Cretaceous
CPv Carboniferous - Permian volcanics
Mv Greenstone
Mg Granitic Gneiss
1 Ultrabasics
Ms Quartz-mica-chlorite-sericite schists
DCv Devonian - Carboniferous volcanics
DCp,r Devonian - Carboniferous chert, limestone, clastics
SD Silurian-Devonian Dolomite
OScs Ordovician - Silurian shales chert
€Op Cambrian - Ordovician phyllites
P€a Proterozoic and Early Cambrian Clastics
Ore bodies 1. Faro 2. Firth, Champ 3. Vangorda 4. Swim
Not mapped
132°00'
South Macmillan River
Canol Road
Ross River
Prevost River
Pelly River
TINTINA FAULT
Ross River
Finlayson River
ROAD
HOO
EL
GEE
SD
€Op
Not mapped
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

FIG. 1



LEGEND

Map 8 - 1960

QUATERNARY

12, unconsolidated glacial and alluvial deposits

JURASSIC AND/OR CRETACEOUS

9, medium- to coarse-grained, biotite granodiorite and quartz monzonite, in part porphyritic; minor diorite, granite, and gneiss

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

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

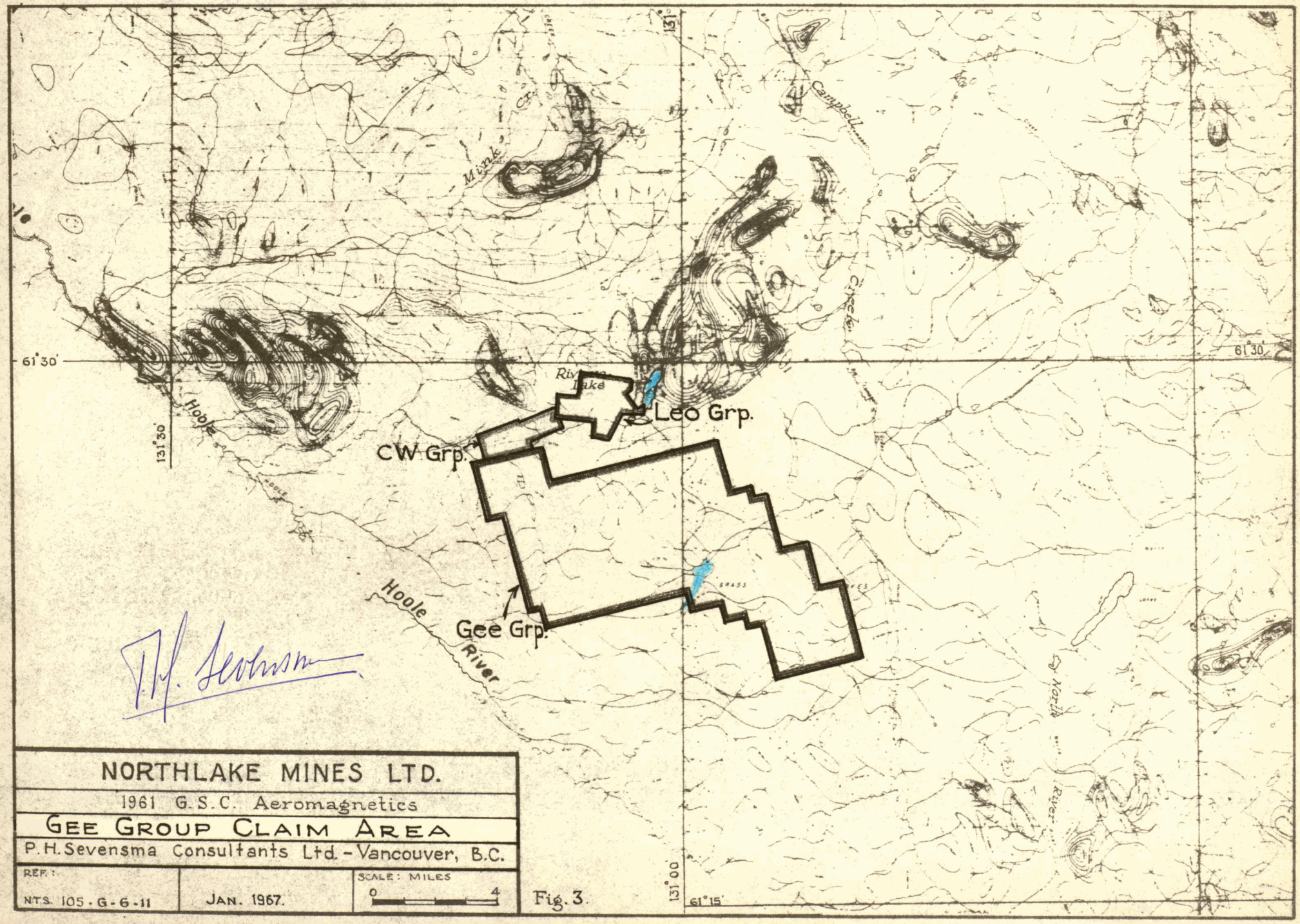
D, Dunite; minor peridotite, pyroxenite, and serpentinized equivalents; gabbro and diorite

Outline of aeromagnetic anomalies estimated to reflect ultrabasic intrusives.

T. 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.

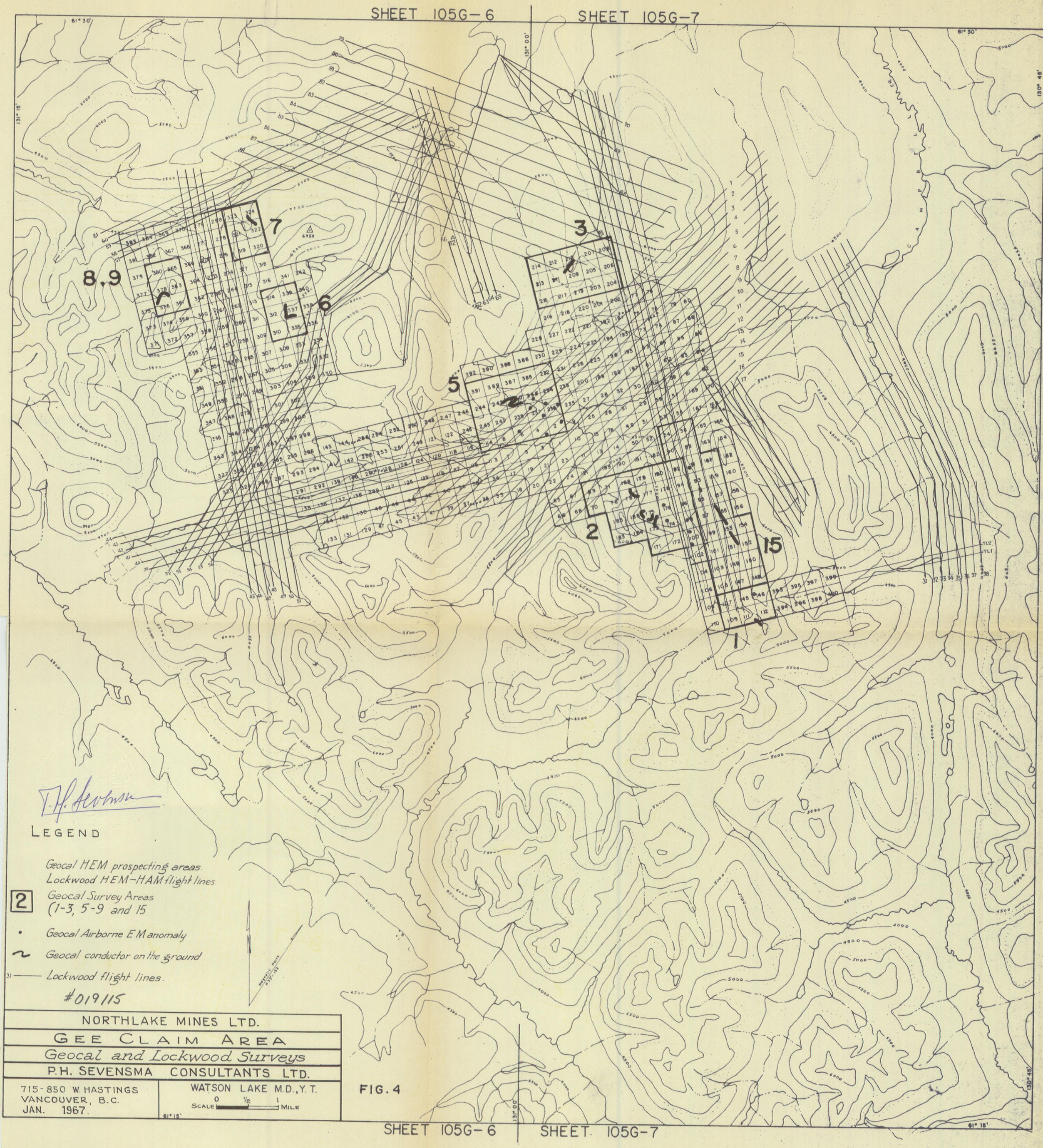
1961 G.S.C. Aeromagnetics

GEE GROUP CLAIM AREA

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

REF.:		SCALE: MILES
NTS. 105-G-6-11	JAN. 1967.	0 — 4

Fig. 3.


SHEET 105G-6
SHEET 105G-7
61° 30'
131° 00'
131° 15'
130° 45'
61° 15'
8,9
7
6
5
3
2
15
1
LEGEND
Geocal HEM prospecting areas.
Lockwood HEM-HAM flight lines.
2 Geocal Survey Areas (1-3, 5-9 and 15
Geocal Airborne EM anomaly
Geocal conductor on the ground
31 Lockwood flight lines.
#019115
NORTHLAKE MINES LTD.
GEE CLAIM AREA
Geocal and Lockwood Surveys
P.H. SEVENSMA CONSULTANTS LTD.
715-850 W. HASTINGS
VANCOUVER, B.C.
JAN. 1967.
WATSON LAKE M.D., Y.T.
SCALE 0 ½ 1 MILE
FIG. 4
SHEET 105G-6
SHEET 105G-7

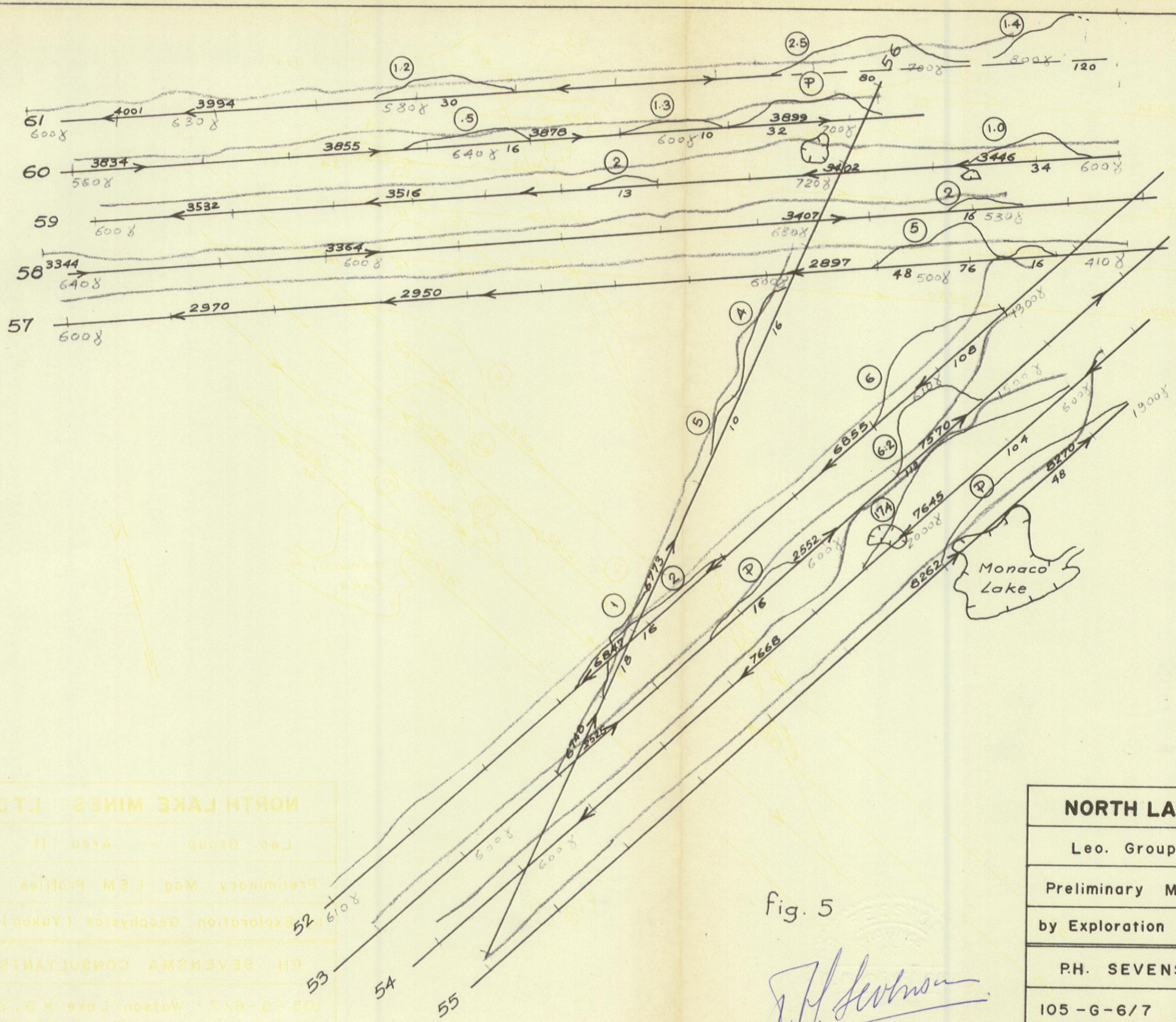


Fig. 5

P.H. Sevensma

NORTH LAKE MINES LTD.	
Leo. Group – Area II	
Preliminary Mag. + EM Profiles	
by Exploration Geophysics (Yukon) Ltd.	
P.H. SEVENSMA CONSULTANTS LTD.	
105-G-6/7 Watson Lake M.D., Y.T.	
June 1966	0 — 1320'

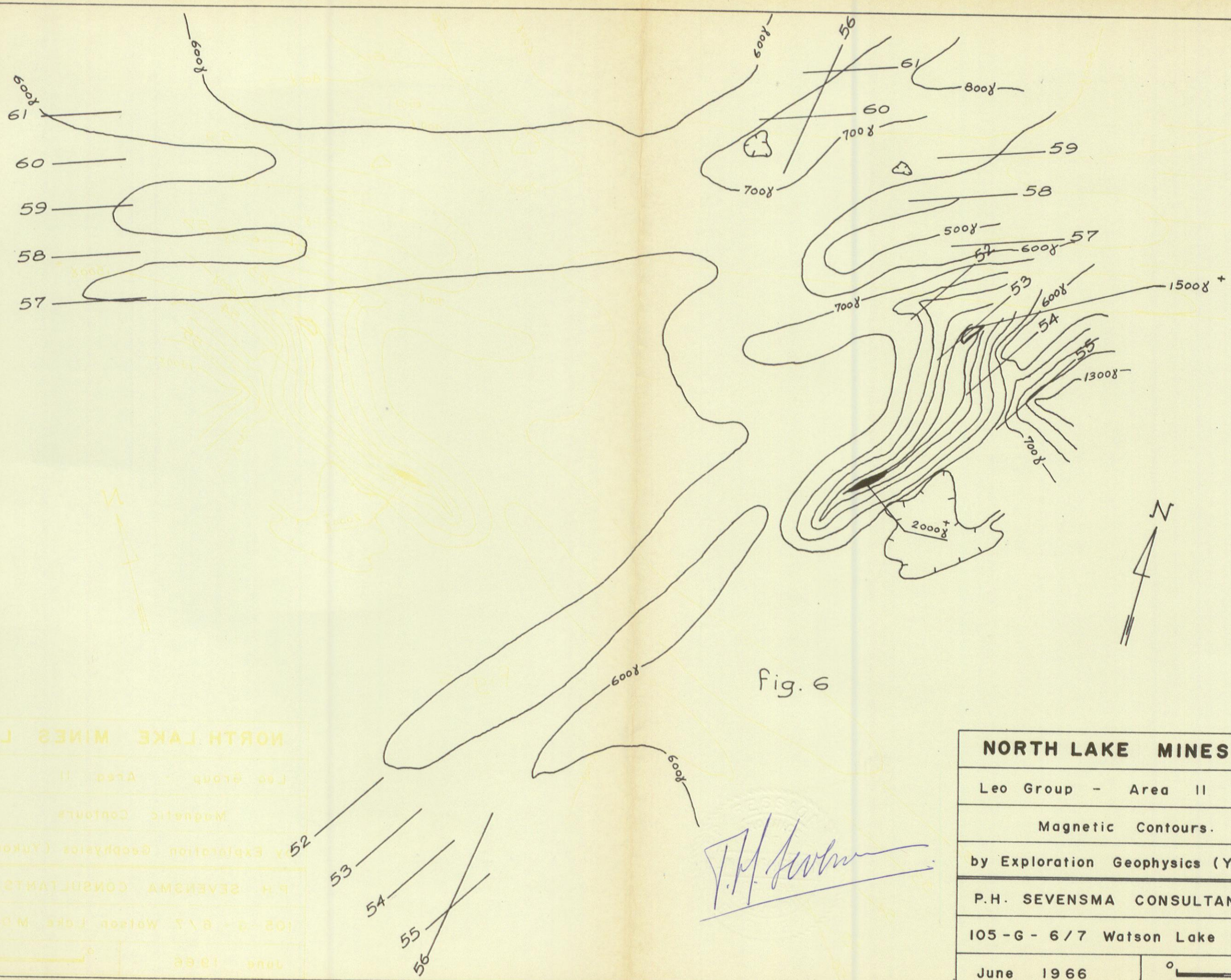
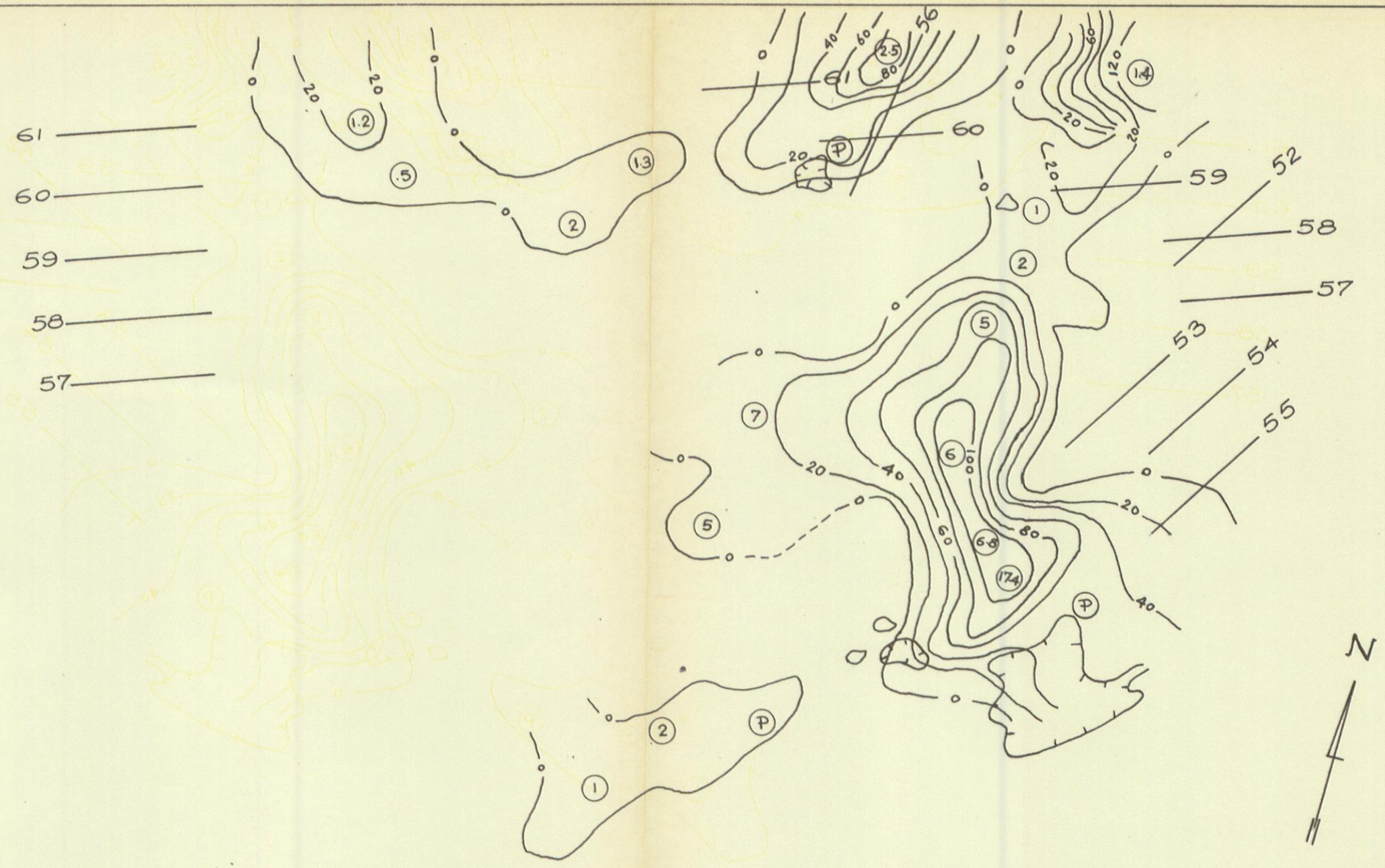


Fig. 6

NORTH LAKE MINES LTD.	
Leo Group - Area II	
Magnetic Contours.	
by Exploration Geophysics (Yukon) Ltd.	
P.H. SEVENSMA CONSULTANTS LTD.	
105-G-6/7 Watson Lake M.D., Y.T.	
June 1966	0 — 1320'



LEGEND

51 ———— Flightlines

(2) Ratio in-phase to out-of-phase

20 Contours in ppm. of primary field.

fig 7

NORTH LAKE MINES LTD.	
Leo Group – Area II	
E M. Contours.	
by Exploration Geophysics (Yukon)Ltd	
P.H. SEVENSMA CONSULTANTS LTD.	
105 - G - 6/7 Watson Lake MD, Y.T.	
June 1966	0 — 1320'

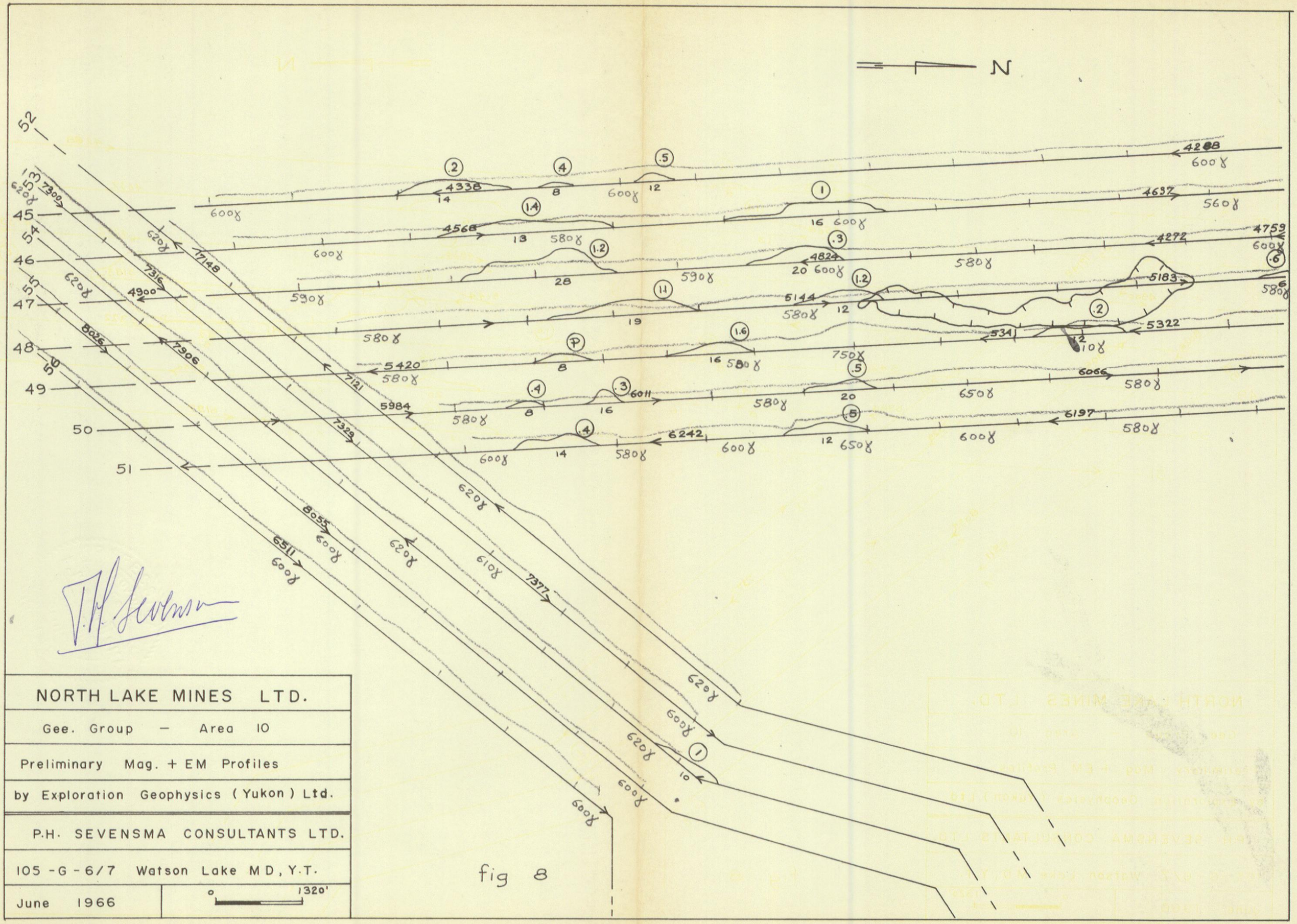
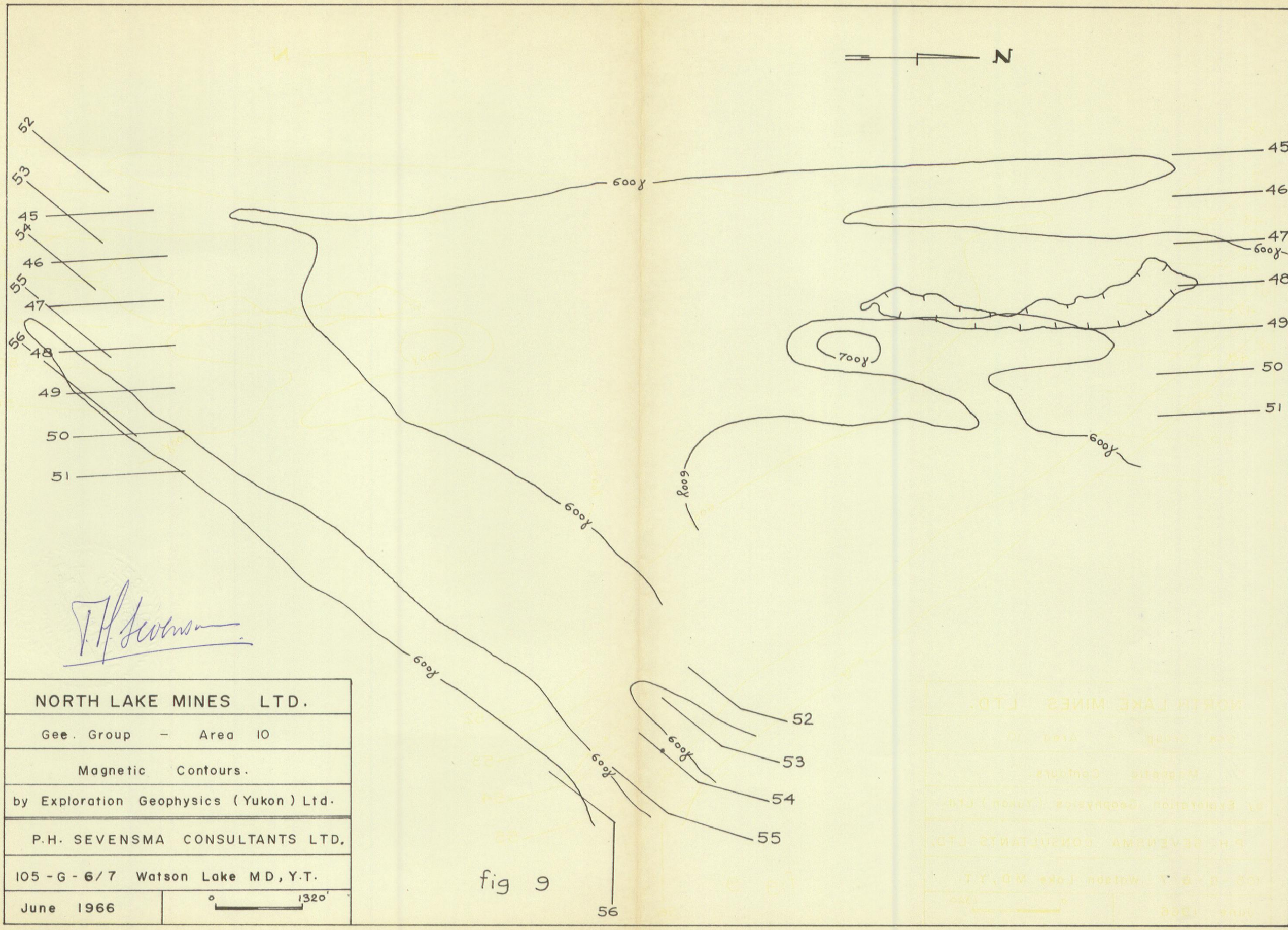


fig 8

NORTH LAKE MINES LTD.
Gee. Group — Area 10
Preliminary Mag. + EM Profiles
by Exploration Geophysics (Yukon) Ltd.
P.H. SEVENSMA CONSULTANTS LTD.
105-G-6/7 Watson Lake MD, Y.T.
June 1966 — 0 1320'


N
52
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45
54
46
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49
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51
600γ
700γ
600γ
600γ
600γ
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600γ
45
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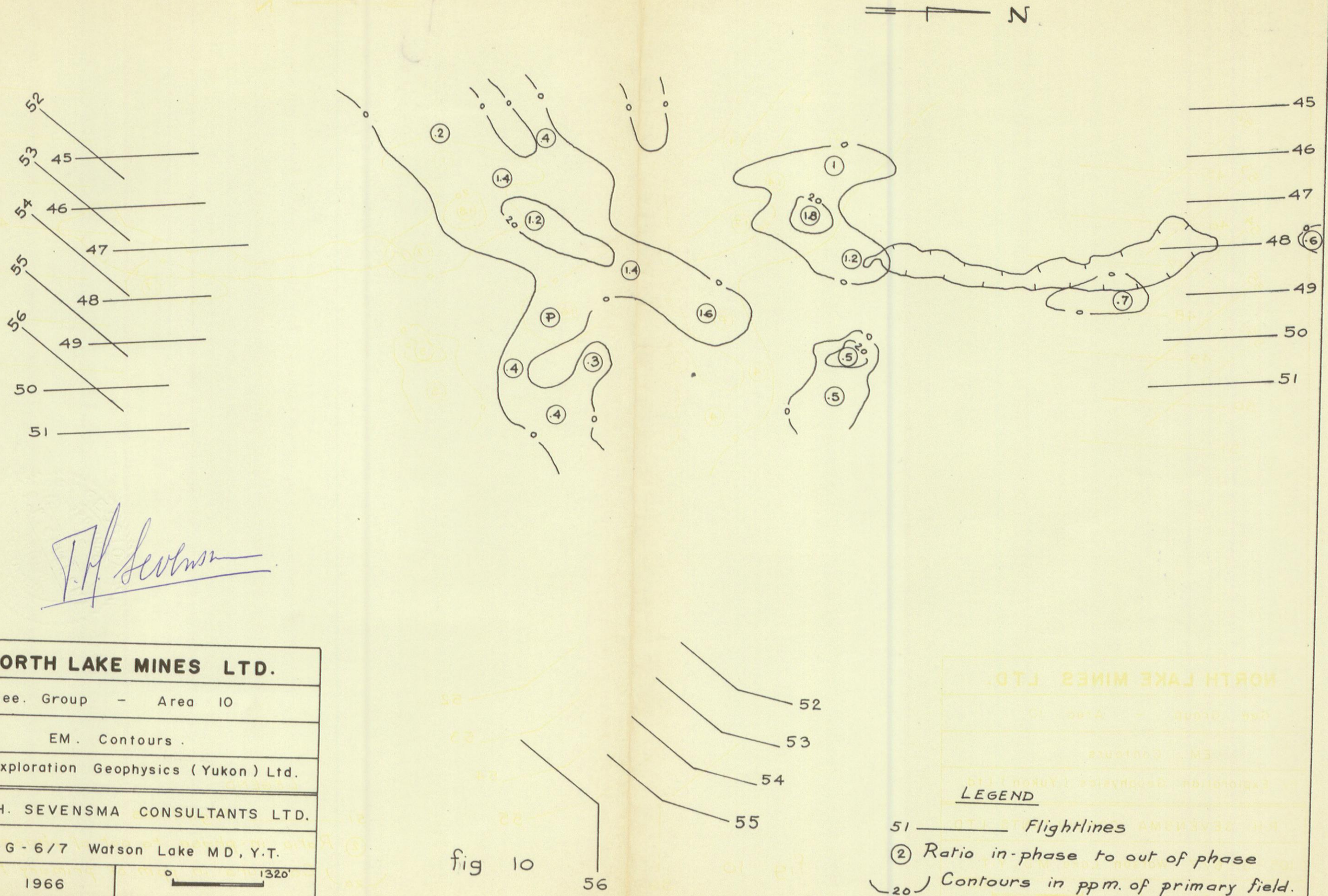
51
52
53
54
55
56
NORTH LAKE MINES LTD.
Gee. Group - Area 10
Magnetic Contours.
by Exploration Geophysics (Yukon) Ltd.
P.H. SEVENSMA CONSULTANTS LTD.
105-G-6/7 Watson Lake MD, Y.T.
June 1966
0
1320'

fig 9



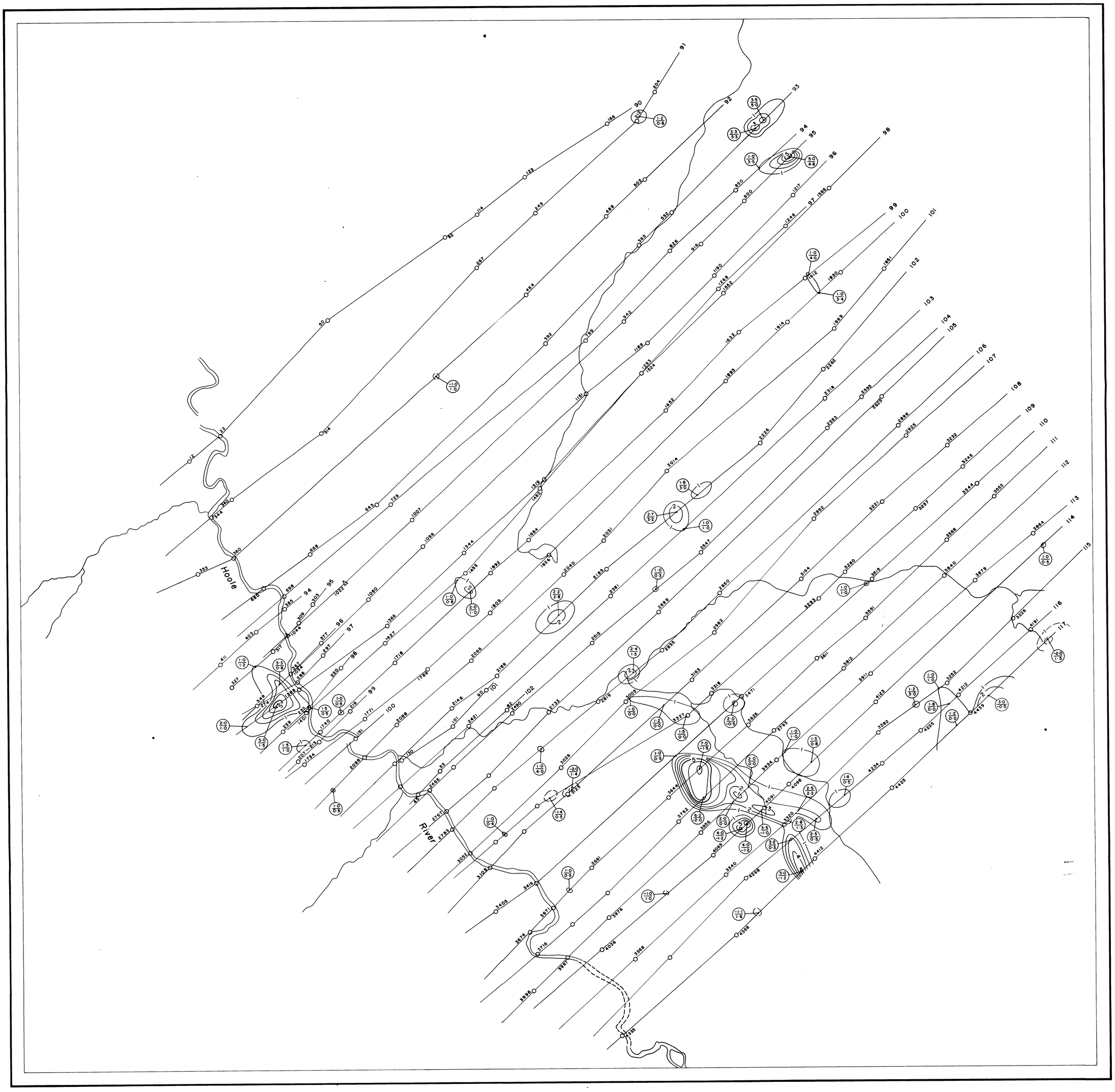
P.H. Sevensma

NORTH LAKE MINES LTD.	
Gee. Group - Area 10	
EM. Contours.	
by Exploration Geophysics (Yukon) Ltd.	
P.H. SEVENSMA CONSULTANTS LTD.	
105-G-6/7 Watson Lake MD, Y.T.	
June 1966	0 — 1320'

fig 10

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 ..... O 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 $\frac{\text{in phase component}}{\text{quadrature component}}$
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 0 1000 2000 3000 4000 5000
FEET FEET

1 Inch to 1320 Feet

ELECTROMAGNETIC MAP

inches
0 1 2
0 1 2 3 4 5
centimetres

YUKON GEOLOGICAL SURVEY

This reference scale bar has been added to the original image. It will scale at the same rate as the image, therefore it can be used as a reference for the original size.

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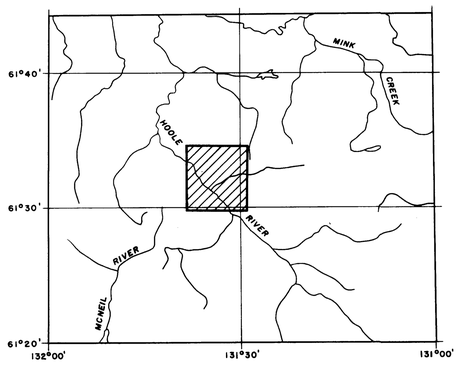
LOCKWOOD SURVEY CORPORATION LIMITED

TORONTO, CANADA

1966



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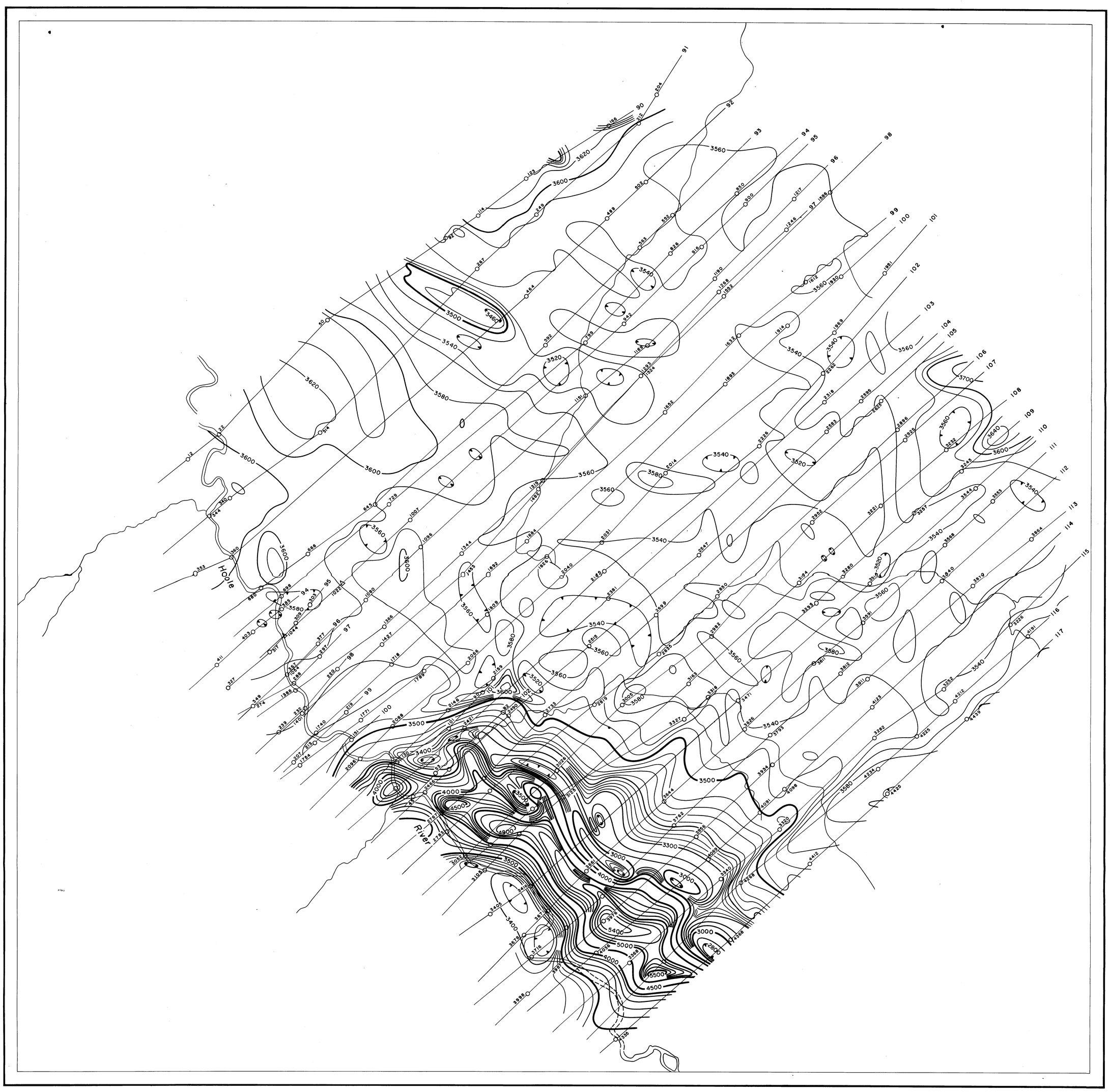
NORTHLAKE MINES LIMITED

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

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

MAGNETOMETRIC MAP

inches 0 1 2

0 1 2 3 4 5 centimetres

YUKON GEOLOGICAL SURVEY

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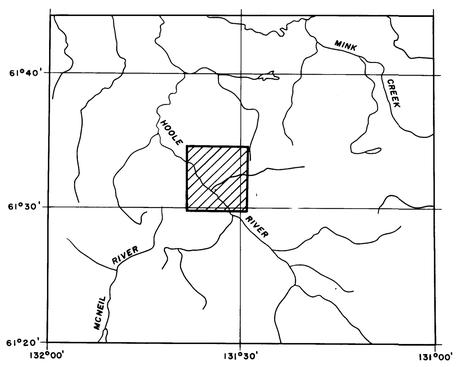
1966



019 115

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

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

inches 0 1 2
0 1 2 3 4 5 centimetres

YUKON GEOLOGICAL SURVEY

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CLAIMSHEET 105-G-6 & 11

EL GROUP

YUKON TERRITORY
WATSON LAKE MINING DISTRICT

SCALE

1000 FEET 0 1000 2000 3000 4000 5000 FEET

1 Inch to 1320 Feet

MAGNETOMETRIC MAP

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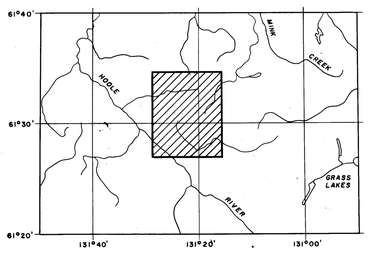
TORONTO, CANADA
1966



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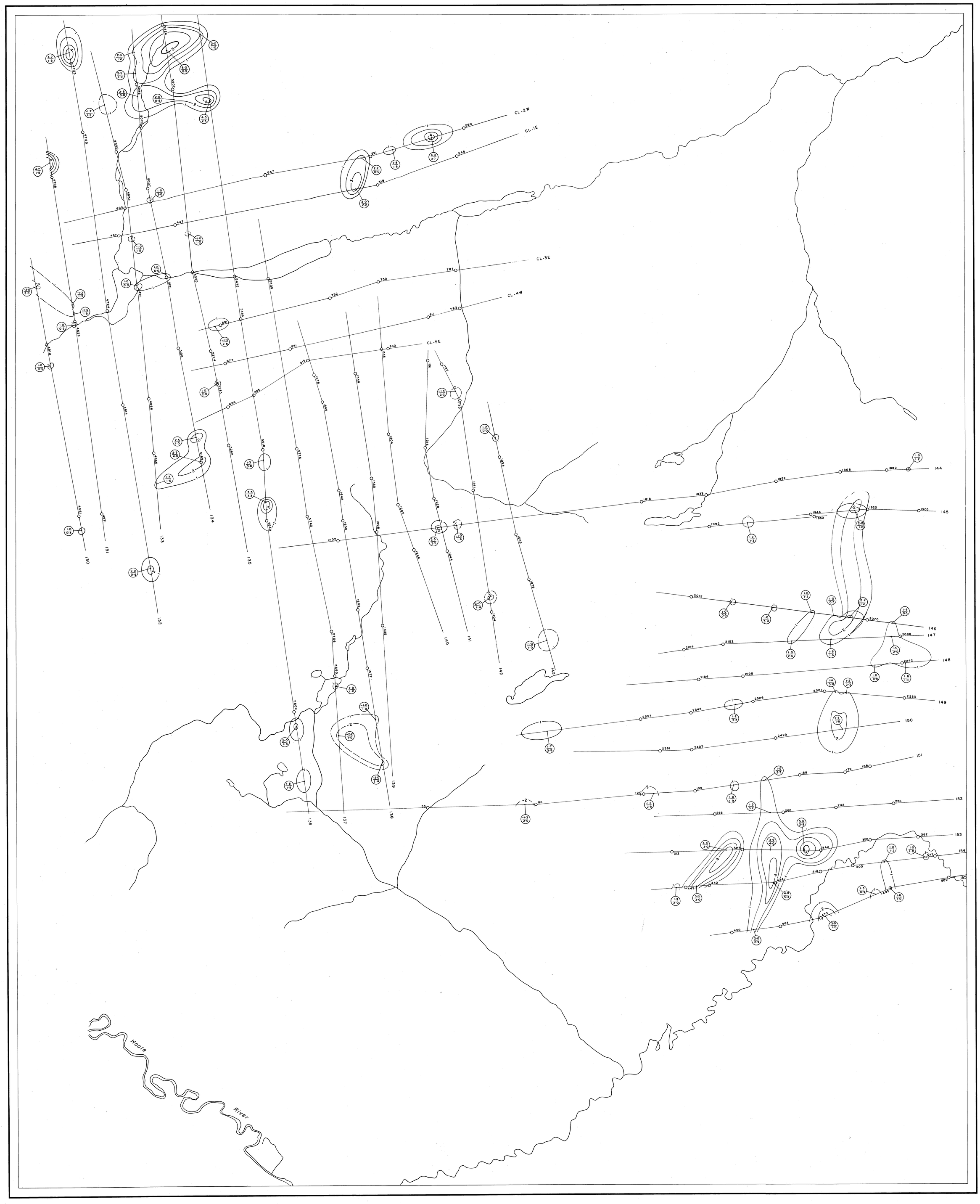
NORTHLAKE MINING LIMITED

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

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PETER H. SEVENSMA PHD. P.ENG.

CONSULTANT

VANCOUVER B.C.

inches 0 1 2
centimetres 0 1 2 3 4 5

YUKON GEOLOGICAL SURVEY

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CLAIMSHEET 105- G-6 & 11

EL GROUP

YUKON TERRITORY

WATSON LAKE MINING DISTRICT

SCALE

1000 FEET 0 1000 2000 3000 4000 5000 FEET

1 Inch to 1320 Feet

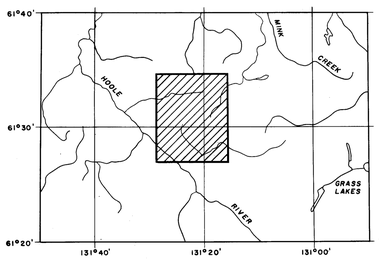
ELECTROMAGNETIC MAP

Flown and compiled by

LOCKWOOD SURVEY CORPORATION LIMITED

TORONTO, CANADA

1966



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