

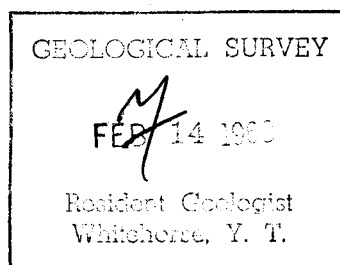
REPORT ON
A COMBINED HELICOPTER-BORNE
ELECTROMAGNETIC AND MAGNETOMETER SURVEY
OF
QUARTZ LAKE, YUKON TERRITORY

FOR

REDFORT SYNDICATE

Supervision of Flying By:

Archer, Cathro and Associates,
Geological Engineers,
Whitehorse, Yukon Territory.



Data Compilation By:

Lockwood Survey Corporation Limited,
Toronto, Ontario.

Interpretation By:

Huntec Limited, Toronto, Ontario

November, 1967

This report has been examined by
the Geological Evaluation Unit.
Approved as to technical worth by:
D. J. Millan
RESIDENT GEOLOGIST

Approved as to cost in the amount
of: \$19,200
H. B. Redden
RESIDENT MINING ENGINEER

Accepted as representation work
under Section 53(4) Yukon Quartz
Mining Act.
James Smith
COMMISSIONER OF YUKON

REDFORT SYNDICATE

SEVEN MAPS ACCOMPANYING

HUNTEC REPORT OF NOVEMBER, 1967

(All in triplicate)

Map No. R-1	Property Plan showing location of Red, Fort and Plus Groups.
Map No. R-2	Aeromagnetic Map - North Section
Map No. R-3	Aeromagnetic Map - South Section
Map No. R-4	Electromagnetic Map - North Section
Map No. R-5	Electromagnetic Map - South Section
Map No. R-6	Interpretation Map - North Section
Map No. R-7	Interpretation Map - South Section

TABLE OF CONTENTS

	<u>Page</u>
1. INTRODUCTION	1-2
2. SURVEY SPECIFICATIONS	3
3. INSTRUMENTATION:	
- Electromagnetometer	4
- Magnetometer	4-5
- Radioaltimeter	5
- Positioning Camera	5
4. COMPILATION AND MAP PREPARATION	6
5. PRESENTATION OF RESULTS:	
- Presentation of Survey Data	7
- Presentation of the Results of the Interpretation	8
6. GENERAL AND LOCAL GEOLOGY	9-10
7. INTERPRETATION:	
- Aeromagnetic Survey	11
- Electromagnetic Survey	12-27
8. SUGGESTIONS FOR FURTHER WORK	28-29
9. REFERENCES	30

1. INTRODUCTION

During the periods April 24 to May 22, and June 14 to July 26, 1966, Lockwood Survey Corporation of Toronto, rented to Messrs. Archer, Cathro and Associates, Consulting Geological Engineers of Whitehorse, Yukon Territory, certain aerial geophysical equipment with operator for the purpose of carrying out aerial geophysical surveys.

On July 24 and July 25, 1966, the system was employed in carrying out an airborne combined electromagnetic and magnetometer survey over an area designated as "Quartz Lake", Yukon Territory for Redfort Syndicate under the supervision of Archer, Cathro and Associates, Consulting Geological Engineers. Upon examination of the electromagnetic data it was concluded that the data in the southern part of the survey area were not adequate for the detailed interpretation. The southern part was re flown by Lockwood Survey Corporation on October 26 and October 29, 1967. Only electromagnetic data were obtained during the second survey.

The location and the boundaries of the surveyed area are shown on the index map included on all accompanying maps. The location of the claims are indicated on Maps R-3 and R-4 submitted separately by Surveymin Limited.

A total of 258 line miles were flown. Approximately 89.8 line miles were flown the second time.

The field work was carried out by the following personnel:

Pilot	- T. Gurr
Aircraft Engineer	- J. Carstensen
Operator/Navigator	- H. Sandau

The second survey was carried out by the following personnel:

Pilot	- R. Consant
Engineer	- E. McKay
Operator/Navigator	- H. J. Sandau

The compilation of the survey data and the preparation of the maps was carried out by Lockwood Survey Corporation Limited of Toronto, in Toronto.

Huntec Limited was retained by Surveymin Limited to interpret the survey data.

2. SURVEY SPECIFICATIONS

The first survey was performed using a Bell 204 helicopter, registration CF-OKY, equipped with magnetometer and the Lockwood helicopter electromagnetic system. A Bell G-3B1 helicopter, registration CF-VUE owned by Trans Northern Turbo Air, Whitehorse, Yukon Territory was used during the second survey.

The flight line interval was 1000 feet and the aircraft operated with mean terrain clearance of 200 feet. The "bird" housing the magnetometer and the electromagnetic transmitting and receiving coils was towed 100 feet below the aircraft.

Positioning of the lines and the geophysical data was done by means of vertical, overlapping 35 mm. photography exposed throughout the survey flight. Numbered fiducials along the flight lines correspond to landmarks on the 35 mm. strips, which relate the data to the terrain covered.

3. INSTRUMENTATION

3.1 Electromagnetometer

The Lockwood helicopter E.M. system was designed by V. Ronka and manufactured by V. Ronka and the Aerotechnical Division of Lockwood Survey Corporation.

The primary field generated at 4000 cycles per second produces secondary electromagnetic responses in conducting bodies at or beneath the earth's surface. The system measures the in-phase and the quadrature component of the secondary field.

The transmitting and receiving coils are co-axial and vertical; the coil separation is 32 feet.

The in-phase and quadrature components are recorded in red and green ink respectively, on a 4.5 inch wide curvilinear chart; full scale deflection represents a secondary field response of .04% of the primary field. The recording chart speed is 3 inches per minute.

3.2 Magnetometer

The airborne magnetometer used was the Gulf Mark III, saturable core, servo-oriented fluxgate magnetometer manufactured by the Gulf Research and Development Corporation, Pittsburg, Pa., U.S.A., recording changes in the earth's total magnetic field

intensity. The changes are recorded on a ten inch wide rectilinear chart; the full scale deflection was 1200 gammas with a step interval of 1000 gammas. The chart speed was three inches per minute.

3.3 Radioaltimeter

A modified APN-1 radioaltimeter was operated during the survey recording the ground clearance of the aircraft on a 4.5 inch wide curvilinear chart. The sensitivity was 0 to 400 feet across the width of the chart. The chart speed was three inches per minute.

3.4 Positioning Camera

The 35 mm. discrete frame camera equipped with an 18 mm. focal length wide-angle camera manufactured by Canadian Applied Research Limited, provided continuous and overlapping photography of the ground covered by the aircraft.

The interval between exposures was 1.5 seconds and each frame is automatically numbered at the moment of exposure. At the time of every tenth exposure a fiducial pulse was recorded on all charts to relate the charts to ground positions.

4. COMPILATION AND MAP PREPARATION

On completion of the flying, the aerial survey data and navigation mosaics were delivered to the client for evaluation. The survey data were delivered to Lockwood Survey Corporation for reduction and compilation.

The flight path recovery was carried out by visual comparison of the 35 mm. film with the navigation mosaics. Base maps were prepared on dimensionally stable cronaflex film by tracing planimetric information and flight paths from the navigation mosaic.

The data compilation was carried out by the following Lockwood Survey Corporation personnel:

- M. Fray, 1466 Danforth Road, Scarborough.
- M. Leppen, 75 Singleton Road, Scarborough.
- J. McKeown, 1325 York Mills Road, Apt. 417, Don Mills.
- J. Rhodes, 30 Bergen Road, Scarborough.
- E. Ross, 41 Forbes Avenue, Scarborough.
- V. Routcliffe, 18 Alsike Road, Agincourt.
- D. Vaughan-Williams, 102 Sheldrake Blvd., Toronto.

5. PRESENTATION OF RESULTS

5.1 Presentation of Survey Data

The results of the combined helicopter-borne electromagnetic magnetic survey are presented on maps at a scale of 1 inch equals 1000 feet.

The magnetometer data are presented in the form of contours of total magnetic intensity referred to an arbitrary datum. The contour interval is twenty gammas.

The E.M. response (in-phase) was transcribed along the flight lines and contoured at intervals of .001% of the primary field. The ratio of in-phase response to quadrature response was shown on the maps at peak values of in-phase response.

Ozalid copies of the magnetic and electromagnetic maps were delivered to Surveymin Limited under separate cover. The drafting of the magnetic and electromagnetic maps was carried out by the following Lockwood Survey Corporation personnel:

G. Atkinson, 194 Rexleigh Drive, Apt. 208, Toronto.

A. Borges, 132 Haileybury Drive, Scarborough.

K. Lindner, Apt. 1625, 70 Cambridge Ave., Toronto.

A. Palmer, 24 Innisdale Drive, Scarborough.

5.2 Presentation of the Results of the Interpretation

The results of the interpretation are presented on the Interpretation Maps at a scale of 1 inch equals 1000 feet.

Ozalid copies of the Interpretation Maps accompany this report.

The drafting was carried out by the following Hunttec and Lockwood personnel:

J. Wilson, 1220 Bayview Avenue, Toronto 17, (Hunttec Limited)

K. Lindner, Apt. 1625, 70 Cambridge Ave., Toronto. (Lockwood Survey Corporation)

6. GENERAL AND LOCAL GEOLOGY

The following remarks are based for the most part on the report of Mr. A. G. Hodgson (1966) on the exploration activities of the Liard River Mining Company in this area. We also refer to a report by Chew-Walker Associates (1966) on structural interpretation from aerial photographs.

The general geological environment is one of fairly flat-lying Paleozoic sediments containing Mesozoic (?) acid intrusions, which appear to consist mainly of granodiorites and granitic rocks. Bedrock in this area consists of limestones (identified as Mississippian), shales and argillites, and quartzites. Dips are generally low and to the northeast. Much of the area is covered with an overburden of alluvial terrace or glacial drift.

Structural controls are provided by a system of NNE trending faults with numerous smaller subsidiary fractures. There is a second fault system whose trend lies more or less at right angles to the first, but it appears to be structurally less important. The major feature belonging to the first system is the Black Fault, which has been defined by surface drilling for a distance of more than two miles and which appears to be a low-angle thrust striking about twenty degrees east of north and dipping $20^{\circ} \pm$ to the east. Movement along this fault is interpreted to be right-hand from the aerial photographs (Walker, 1966); and this would conform qualitatively with the suggestion that some of the

Smaller nearby faults might be secondary or subsidiary fractures. According to the theory of dislocations in elastic solids, features such as the South Fault, the MacMillan orebody fault and the three small NS faults on the left bank of Pink Creek opposite the MacMillan orebody, would all strike roughly in the direction of the maximum shearing stress brought about by right lateral movement along the Black Fault system. However, it should be remarked in this connection that shearing forces sufficient to cause these ruptures are unlikely to have developed from motion on the Black Fault if it maintains its low angle of dip for very far underground.

7. INTERPRETATION

7.1 Aeromagnetic Survey

The aeromagnetic survey showed no anomalies. There is a rather ill-defined NW-SE trend in the contour lines on Aeromagnetic Map Sheet No. 1 which follows the general geological strike direction in this area, but it is of such low amplitude that it conveys no useful information. Nothing worth remarking upon appears on Aeromagnetic Map Sheet No. 2.

While the aeromagnetic survey results are negative, we can at least infer from this a minimum depth to significant magnetic mineralization. For if we take the contour intervals (20 gammas) as being the amplitude of the weakest anomaly that would be recognizable on the contour maps, and if we assume that the volume magnetization of subsurface rocks must be 10^{-2} c.g.s. units or greater in order to qualify as "interesting" (this figure roughly corresponds to 5% by volume of magnetite), then the depth to such material must be seven or more times the maximum linear dimension of the zone of deposition in order that its anomaly fall below the 20 gamma threshold. This would put it well outside the range of practical interest.

7.2 Electromagnetic Survey

7.2.1 General Discussion

The contour lines appearing on Electromagnetic Map Sheets 1 and 2 were obtained from the flight records by connecting all of the electromagnetic "lows" by straight lines and plotting the residuals from the in-phase signal trace. This is rather an arbitrary procedure and leads to distortions in some cases. Accordingly, we have re-examined the flight records and have prepared an alternative interpretation of the records, which we show as contour lines of equal residual in-phase response. Due to the complexity of anomalies 10, 11 and 12 the residual in-phase contouring is not shown. Basically, the differences are due to our adopting the practice of removing the background affects by the use of smooth curves rather than of straight line segments. Various considerations, among which the altimeter record is important could lead to alternative choices of datum. Choice of datum and correction for height \times variation both affect the shape of an anomaly, apart from its amplitude. The peak of the revised anomaly may then be in a different position from the apparent peak in the primary records. As an example, it is interesting to note that anomalies 11 and 12 on the Interpretation Map, Sheet 2 both show a simple linear strike trend, which is not obvious on the Electromagnetic Map.

This is not by design: the flight records were dealt with one by one before plotting on the Interpretation Map.

An airborne electromagnetic survey over rugged ground may produce a good many anomalies which are not necessarily significant from the view point of mining exploration.

Special treatment is required before the more promising anomalies can be separated from those of little or no interest.

A critical point is the actual height of observation when anomaly is recorded. In the case of a sulphide body, this height of observation is the sum of depth of burial of the body and above ground height of the sensing equipment. But anomalies also arise from conductive overburden or specific rock formations; and for these cases the significant height is from ground surface to sensing equipment. A continued circle of ground clearance is therefore a necessity (and provided as a matter of course) for the interpretation of recorded anomalies.

All airborne E.M. systems are sensitive to such height variations. The helicopter system, purely because it is flown very close to the ground, appears to be extra sensitive; but the effect of height variations can be dealt with analytically. It is not practical to correct for ground clearance in the routine process of reducing and mapping all survey data.

Hence, the primary mapping may be directly interpretable where the country is topographically smooth, but it may need further reduction where the country is rugged. This further reduction is normally confined to anomalies of some perspective interest rather than to an entire survey area.

With the two-component E.M. system, the in-phase to quadrature ratio is a reasonably good measure of the electrical properties of a target, and it is only slightly sensitive to height variations. It is used directly for sorting anomalies into classes that represent major, minor or quite insignificant conductors. The weaker classes are often rejected if they happen to correspond with swamps, muskeg, alluvial basins, or such areas where conductive overburden is the most likely cause of the anomaly and there is no reason to suspect the presence of sulphides as well. The height correction can be a further reason for rejecting anomalies of this sort. If the primary records show an anomaly of high amplitude but weak in other characteristics it is sometimes found that the high amplitude is due purely to below normal ground clearance; and the corrected anomaly may be weak in all respects.

In studying the anomaly patterns with the view to grading their quality, the following principles were used:

- 1) The shape and extent of the anomaly pattern were used as the basis for selecting the appropriate interpretation model.
- 2) The intensity and width of the in-phase anomaly were used to determine the depth.
- 3) The ratio of maximum in-phase to quadrature component was used to determine the response parameter of the model.
- 4) The response parameter was used to determine the conductivity of the model from a knowledge of the frequency and dimensions of the prospecting system.

This is a standard approach to the interpretation of electromagnetic anomalies. In certain cases, e.g. where the cause of the anomaly is quite obvious, we do not carry out full procedure but merely mention our reasons for making the identification.

7.2.2 Sheet by Sheet Description of the Interpretation

a. Sheet No. 1

First of all, we refer to the original contour map prepared by Lockwood Survey Corporation.

The great majority of anomalies appearing on this sheet are broad and smooth, with relatively large quadrature components. These are thought to be due either to surface or near-surface groundwater or swamps, or to surficial alluvial deposits.

The chain of large anomalies running NE from Camp Lake in Quartz Lake is unquestionably due to the lakes themselves and to their drainage systems. The average conductivity indicated by the ratios of in-phase to quadrature amplitudes along this trend, based on the half-space model, is about 4×10^{-3} mhos/meter, which is fairly typical of fresh water in a sedimentary environment. Several other rather broad anomalies marked with the letter S on the map are thought to be due to swamps or to groundwater. The surface conductivity for these anomalies, using the conducting horizontal sheet model, is generally about 1 mho, which indicates that the water is fairly conductive. Assuming reasonable depths (say about 10 meters), this value could quite easily be accounted for by the presence of alkalis or clay particles.

A number of other anomalies follows the drainage systems quite closely, and are thought to be due to alluvial or clay deposits. These are marked on the map sheet with the letter G. Along Quartz Creek and Pink Creek particularly, these anomalies are characterized by quite low quadrature components, yielding a surface conductivity that is surprisingly large (5-10 mhos). Nevertheless, the coincidence of these trends with the drainage patterns, and their generally broad character, leads us to assume that they are due to

conductive surface deposits.

There are two classes of anomalies on this sheet that do not fit easily into any of the categories described above. One of these has its members marked on Lockwood Survey Corporation's map sheet with the Roman letters A, B, C and D. The members of the other group are not easily picked out on the Lockwood sheet, and show up more clearly on the Interpretation Map Sheets, which give our own residual contours taken from the flight records after removing the effects of overburden. Because our re-interpretation of the records affected only a limited portion of the total map area, we have re-contoured only that section and we refer back to the original map sheets for information lying outside of this smaller region.

Anomalies A, B, C,D (Electromagnetic Map Sheet No. 1)

These four well-defined anomalies have in common the following features: 1) a high intensity, 2) low phase angle, 3) a generally elongated shape. All except Anomaly B appear to be associated with known or interpreted faulting. None has any associated magnetic effects. Using a conducting half-plane as the interpretational model, these anomalies all yield a depth of 100 - 150 feet below the bird (corresponding

to an overburden thickness of 0 - 50 feet), and a surface conductivity (i. e., a conductivity times thickness product) of 5 - 10 mhos.

In our opinion, these anomalies are far too large to be caused by metallic mineralization, and are more likely to be due to well-connected sheets of graphite. Surface conductivities of 5 - 10 mhos are not uncommonly encountered in graphite deposits.

Anomalies 1, 2, 3, etc. (Interpretation Map)

These anomalies are quite different in character from the first group. They are all small both in amplitude and in extent, and the phase angles are quite variable. All of them occur where there are known fractures. We shall look at them in detail.

Anomaly 1

This one coincides exactly with the MacMillan orebody and is undoubtedly due to the sulphide mineralization.

The ratio of in-phase to quadrature response for this anomaly is slightly larger than two, which - for an anomaly having such a low intensity - is a high value.

Unfortunately, the amplitude of this anomaly is so small, being less than 30 parts per million of the primary field,

that a detailed analysis in terms of conductivity, size and depth is not practicable. We would assert, however, that on the basis of amplitude and phase angle alone, the MacMillan orebody seems to be rather small in size, but quite highly conductive, and therefore probably massive. While many holes have been drilled in the vicinity of the MacMillan orebody, we find that it is quite impossible, with the data we have before us, to make any meaningful estimates of the bulk conductivities of the minerals that are present. We cannot say, on the basis of core assays, what the average conductivities of the mineralized zones should be. To calculate these, we would need to know what minerals were encountered and in what volumes. Even then the estimates could very easily be in error by an order of magnitude. To determine the volumes and depths of the zones of mineralization from the airborne electromagnetic anomalies themselves, we would have to be able to separate the effects of volume from those of conductivity. The airborne method lacks the resolving power to do this for targets are small as those encountered in this area, and that is why we made our recommendation to use ground methods to resolve these ambiguities.

Anomalies 7, 8 and 9

These anomalies we would put in the same category as Anomaly 1. They indicate a strong likelihood of mineralization, and because of their low phase angles, the mineralization is probably fairly massive. They are all - like Anomaly 1 - associated with minor faults and therefore they occur in geological environment that are favourable to mineralization. Anomaly 2 is probably too small to be of interest, and therefore we focus our attention upon Numbers 7 and 8. Both of these features occur on the South Fault, which appears to be related to other secondary faults in the area, including the fault which has controlled the deposition of the MacMillan ore. Both of these anomalies are more intense than that which occurs over the MacMillan body, indicating that larger volumes of conductive material are present in each case; but neither anomaly is large enough for meaningful interpretations to be made of size, depth and conductivity. Qualitative indications are that Anomalies 7 and 8 are associated with fairly rich zones of non-magnetic conductor which are of limited size, but which are substantially greater in volume than the MacMillan orebody.

Since both of these anomalies appear to have been very extensively drilled, their cause should be apparent from the diamond drilling sections. As we have not seen any of these sections, we are unable to make any further comment about them. The assay figures given on the Surveymin Property Plan do not enable us to make a quantitative interpretation.

Anomalies 2, 3, 4, 5 and 6

All of the anomalies of this group are characterized by relatively large quadrature components, which in fact by itself makes them appear less interesting than those in the first grouping. Anomalies 3 and 4 are so weak that, taking into account their large phase angles, they can very probably be eliminated from further consideration.

Anomalies 2, 5 and 6 are somewhat more interesting on account of their positions relative to known or interpreted faults. The large phase angle of these three anomalies puts them into a distinctly lower category than 7 and 8; however, if further work is to be done in the area it might be feasible to investigate them along with the others on account of their proximity. They should be regarded, however, as objects of secondary interest; for their phase relationships are not incompatible with water- and clay-filled fractures.

b. Sheet No. 2

Many of the recorded anomalies can be ruled out as topographic effects, to be discussed later. There remain three anomalies, or groups of anomalies, that seem genuinely interesting, and which may represent sulphide concentrations. These are outlined on the Interpretation Map with reference No.'s 10, 11 and 12.

The most impressive case is No. 11. Its contours on the Electromagnetic Map indicate a compound anomaly, or the effect of two or more neighbouring conductors. Analytical reduction of the survey data - chiefly a correction for the effect of ground clearance - leads to a reasonably clear separation between the principle parts of the compound anomaly.

The southerly part seems to be a narrow but firm zone of north northeasterly strike direction, appropriate to a dyke-like body of steep dip. A strike length of at least 1000 feet is suggested by the relatively strong E.M. values on Lines 3, 4 and 5B. East and west of this section are weaker E.M. indications conforming with the same strike axis. The high E.M. values on Lines 3, 4 and 5B are quite constant, 12 to 15 units

for the in-phase response and 2.5 to 4 units for the quadrature response. These indicate a conductivity-thickness factor lying between 10 and 20 mhos; in other words, if the actual target is 1 meter thick, its average specific conductivity lies between 10 and 20 mhos per meter. If this conductivity is due to sulphides alone, the case certainly deserves further investigation.

The site of this anomaly appears to be favourable in relation to the structural geology appearing on Map No. R-2 by Surveymin Limited. A fault of north-northeasterly strike direction is shown along the gully to the north of the principle anomaly. Minor overburden is suggested by the facts that the anomaly is in relatively high ground and in line with a spur of outcrop.

The northerly part of Anomaly 11 is strong but much less interesting. Although it cannot be fully corrected for high variations, it appears to indicate a broad zone of conductivity coinciding with a distinct gully. The photo-mosaic shows a meandering stream in the gulley. A large volume of alluvium is therefore likely and this could well account for the indicated conductivity.

Anomaly 12 is quite like the interesting part of Anomaly 11, though distinctly weaker. The same north, northeasterly strike direction is apparent, though indicated strike length is much less. Some E.M. peaks occur only on Lines 4, 5B and 5A. The highest values give a conductivity-thickness factor of about 5 mhos or a bit less. A major gulley and fault system of a northerly trend marks the easterly cut-off of Anomalies 11 and 12. Anomaly 12 has a weak westerly extension as far as Line 3, but not farther. It is in rough alignment with the spur of outcrop to the west.

Anomaly 10 is not so readily interpretable. It consists of a number of interesting E.M. peaks, but they are mainly confined to a single flight line, and that is the most westerly line of the new survey. Other information, however, suggests that a conductive zone of northerly strike direction is geologically plausible in this vicinity, and its effects might well be confined to a single flight line. These other informations are: (a) the earlier E.M. survey, which shows a clear northerly trend in the vicinity Anomaly 10, (b) the photo-mosaic, which shows a distinct range of hills in rough alignment with Anomaly 10,

though chiefly to the south, in an area not covered by either E.M. survey, (c) the Surveymin structural map, which shows that faults of northerly strike direction are common in the area at large.

For the E.M. peaks in Anomaly 10, the in-phase values (after reduction) range from 6 to 10 units, and the corresponding quadrature values range between 3 and 4 units. The conductivity-thickness factor determinable from these values lies consistently between 5 and 10 mhos.

The peaks are essentially from Line 1 though a few are used of the same class are noted on Line 2.

The southerly part of Anomaly 10 is obscured by the strong (overburden ?) effects in the northerly part of Anomaly 11. The more clearly indicated part of Anomaly 10 has an apparent strike length of 5000 feet or more. It is outside of the Redfort Group, but it is worth consideration as a prospecting zone if the ground is obtainable.

Lesser anomalies, none of them impressive, occur generally throughout the area of the Electromagnetic Map Sheet No. 2. At first inspection they appear uninteresting because of their shape or their in-phase to quadrature ratio. An examination of altimeter record shows

that a good many of them are mapable only because of less-than-normal ground clearance; and the correction for height makes their amplitudes insignificant (they would be below noise level at standard flying height). In two or three cases the revised amplitude remains moderate rather than insignificant, but in close correlation with areas mapped as swamp or probable alluvial basins. These remarks apply chiefly to the westerly and northerly parts of Map Sheet No. 2.

In the southerly and easterly parts of Map Sheet No. 2, there are good reasons for revising the in-phase datum from that used for the Electromagnetic Map. The mapped in-phase values are suspiciously high in comparison with quadrature values. The altimeter records show generally rugged terrain, with local stretches where E.M. response from anything at ground level ought to be nil or nearly so. These justify a revision of datum, which leads to a great reduction in residual amplitudes. The results lead to a general picture of moderate conductivity in gullies, but not in the higher ground between them - a quite plausible presentation of overburden effects. The revision of datum does not imply anything excessive in instrument drift or instability. Some drift is often obvious in the E.M.

records, and can be ascribed to the stresses of flying or to temperature changes. Both the stresses temperature changes are apt to be more violent where the aircraft is negotiating rough country and attempting to maintain uniform clearance.

8. SUGGESTIONS FOR FURTHER WORK

If further exploration studies are to be carried out in this area, we would recommend that ground geophysical survey be undertaken in the vicinity of the South Fault and its southward extension with a view to determine what constitutes the conductor of Anomalies 7, 8, 11 and 12, and having the investigation Anomalies 2, 5 and 6 as a secondary objective.

As the first stage of the ground investigation we would propose the use of the ground electromagnetic method or the induced polarization method to determine the volume and average conductivity of the conductive materials. The latter method should be used if the mineralization is believed to be disseminated. The ground investigation should locate the targets with sufficient accuracy for drilling or other tests. Ground traverses should be directed at right angles to apparent strike direction of each target and there should be enough of these traverses to define parts of the anomalies that lie between flight lines. Property boundaries may have a bearing on the amount of survey feasible, but apart from this each anomaly should be traced to its cut-off. A traverse spacing of 200 feet and station interval of 100 feet are recommended for systematic ground work; intermediate readings may be found advisable for clarifying detail.

If ground is available to cover Anomaly 10, investigation might begin with a comparatively coarse E.M. or other electrical survey to determine the axis and strike continuity of the conductor, which are not perfectly clear in the airborne data. The apparent zone is 1 mile or so in total length, and ground work might indicate particularly favourable sections for more

intense examination.

If after performing these surveys a reasonable doubt remains that the anomalies may be due to graphite, then the gravity meter should be used to resolve this question before an extensive exploratory drilling programme is undertaken.

Respectfully submitted,

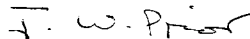
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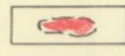

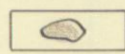
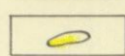
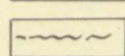
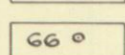


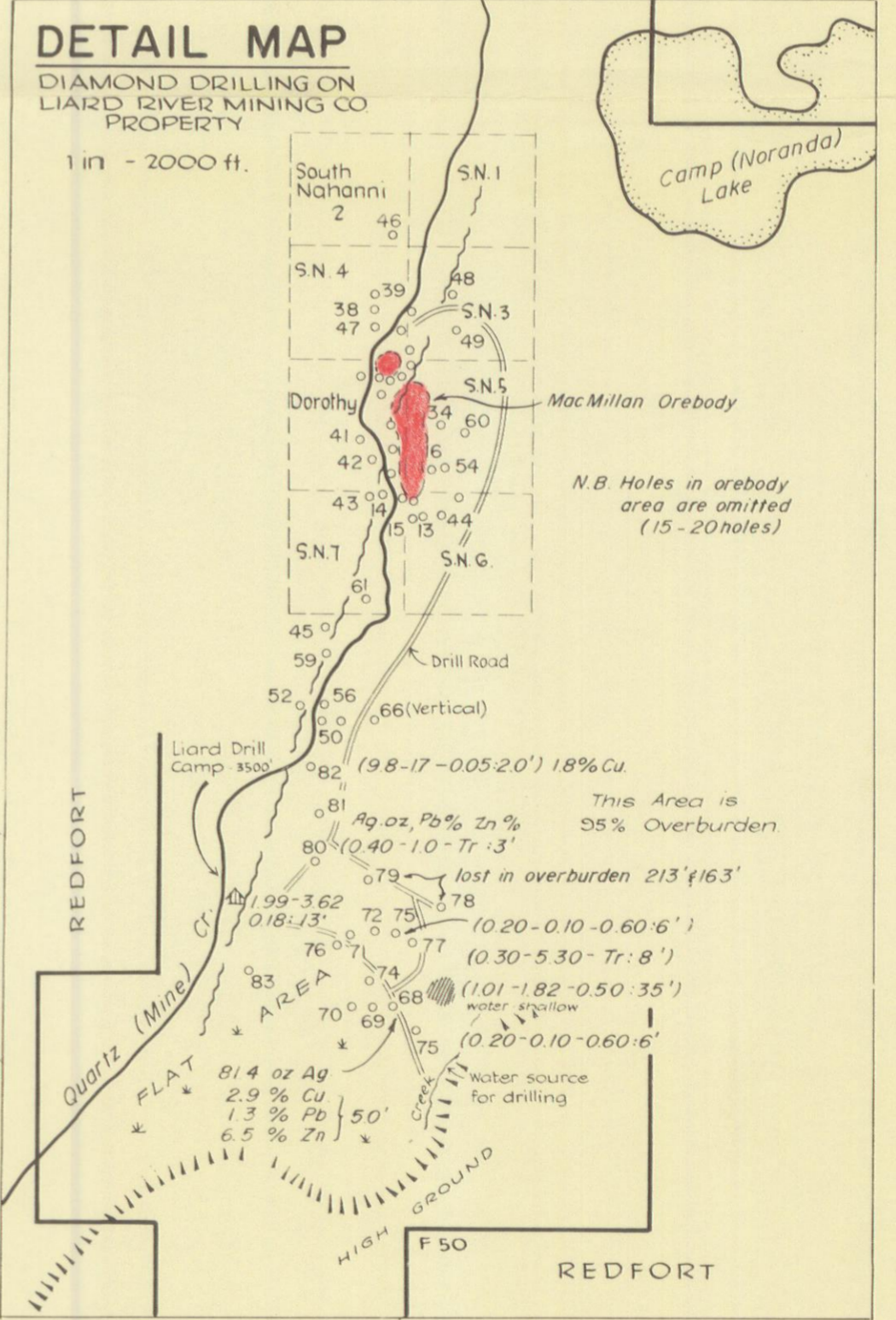
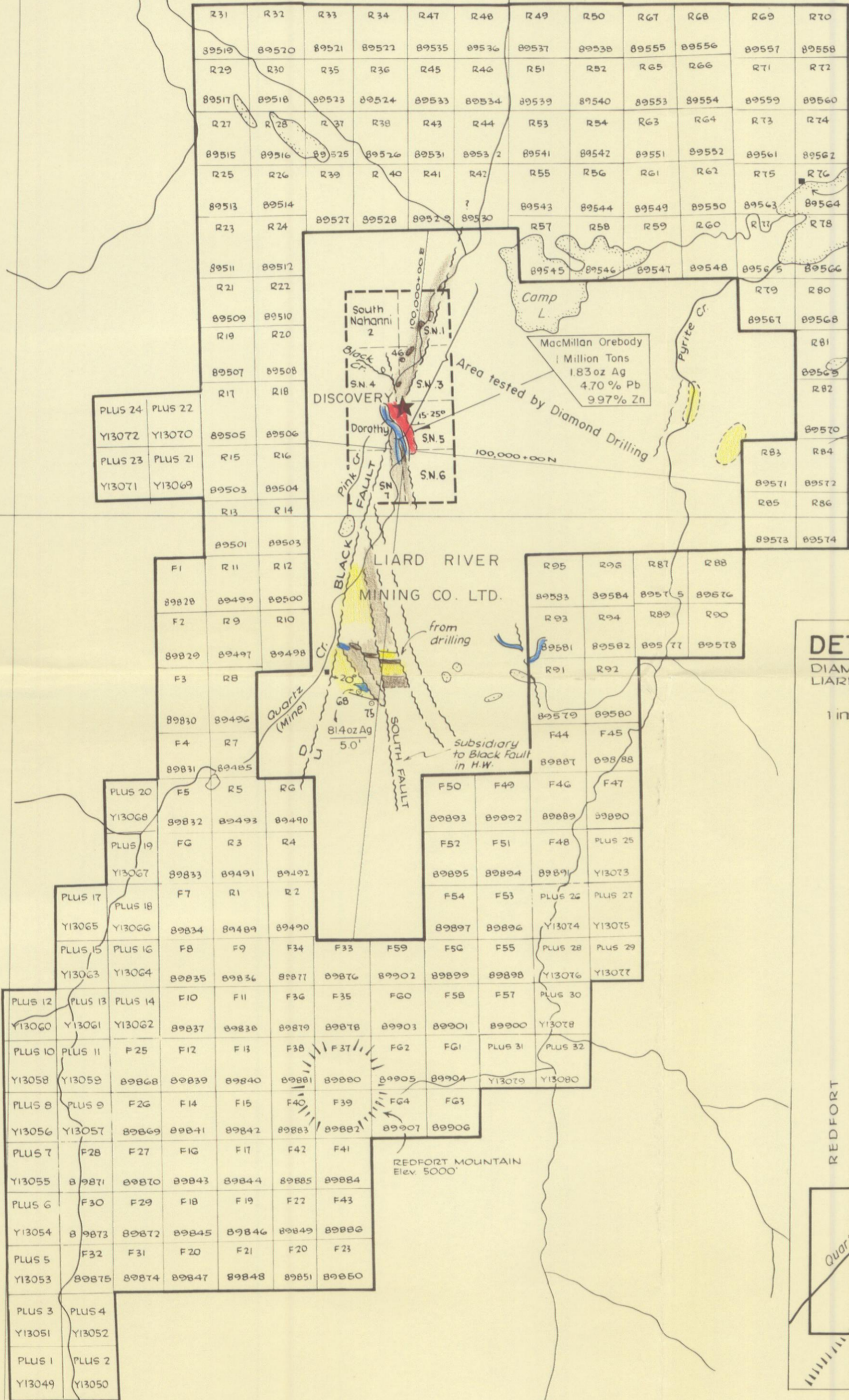
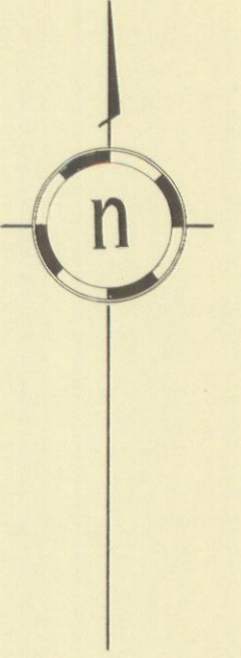
FP
F. S. Grant, Ph. D.,
Technical Director.

9. REFERENCES

- Grant, F.S. and West, G.F. (1965)
Interpretation Theory in Applied Geophysics,
International Series in the Earth Sciences.
McGraw Hill Book Company, New York, St. Louis,
San Francisco, Toronto, London, Sidney.
- Hayduk, R. (1966) Geologic Plan, Red, Fort and Plus Groups,
Redfort Syndicate by Surveymin Limited, Toronto.
- Hodgson, A.G. (1966) Notes on Liard Mining Co. and Application of
Exploration Results to Red and Fort of Redfort
Syndicate, Hyland Plateau, Yukon Territory.
- Walker, W. (1966) Structural Geology Quartz Lake Area Hyland Plateau,
Yukon Territory for Surveymin Consultants Limited
by Chew-Walker Associates, Willowdale, Ontario.

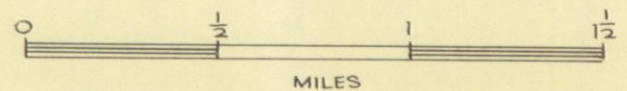
LEGEND

-  MacMillan orebody
 -  Limestone
 -  Argillite - shale
 -  Quartzite
 -  Fault
 -  Drill hole
- PALAEOZOIC



REDFORT SYNDICATE
YUKON TERRITORY

PROPERTY PLAN
RED, FORT AND PLUS GROUPS



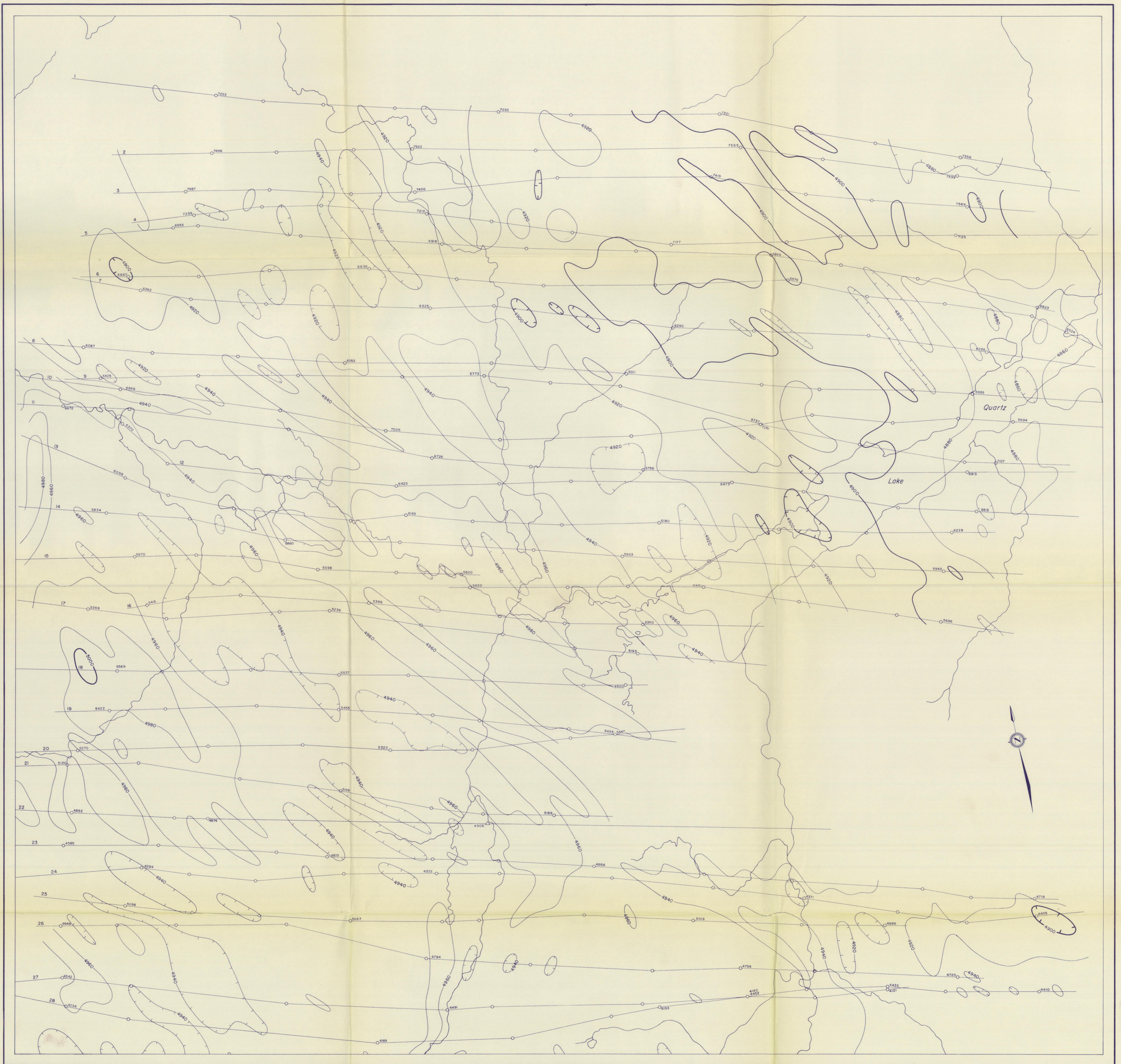
SURVEYMIN
LIMITED
CONSULTANTS
217 BAY ST., TORONTO







N.B. RED GROUP claims 1 - 96 (incl.)
FORT GROUP claims 1 - 64 (incl.)
PLUS GROUP claims 1 - 32 (incl.)

MAP# 95-D-12
95-D-5 Doc# 060678

23 Revised Nov 1966

REDFORD SYNDICATE
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 
 FLIGHT LINES 

QUARTZ LAKE AREA
YUKON TERRITORY

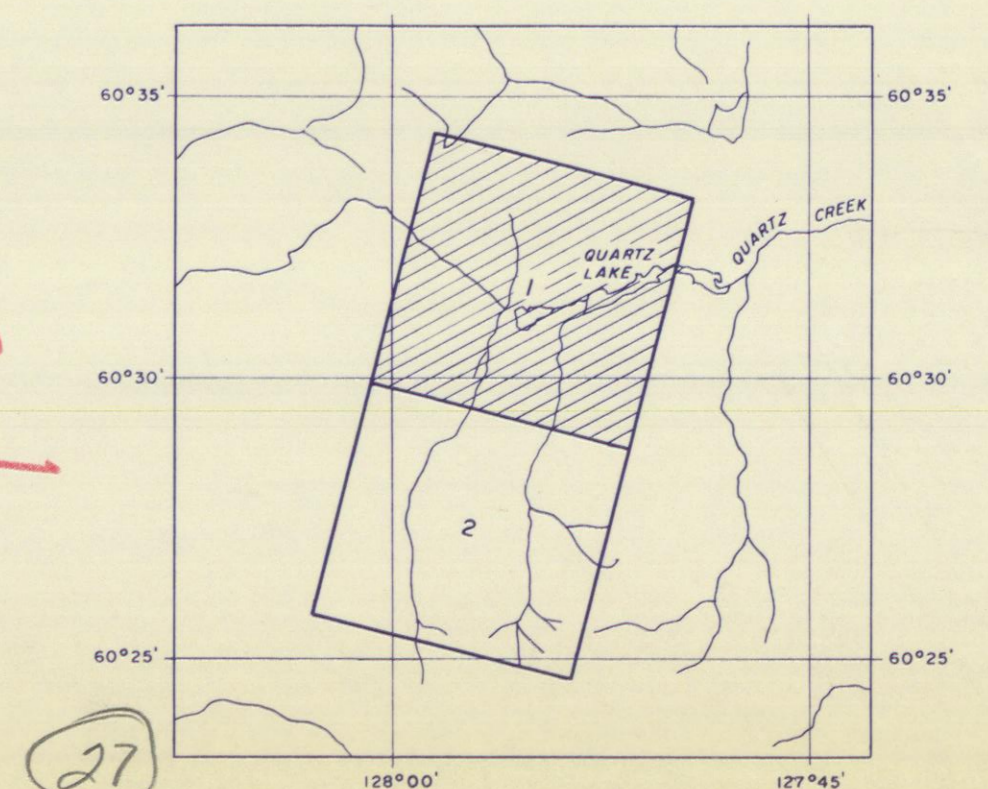
SCALE
 1000 0 1000 2000 3000 4000
 FEET
 1 Inch to 1000 Feet
 (Approx.)

AEROMAGNETIC MAP

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

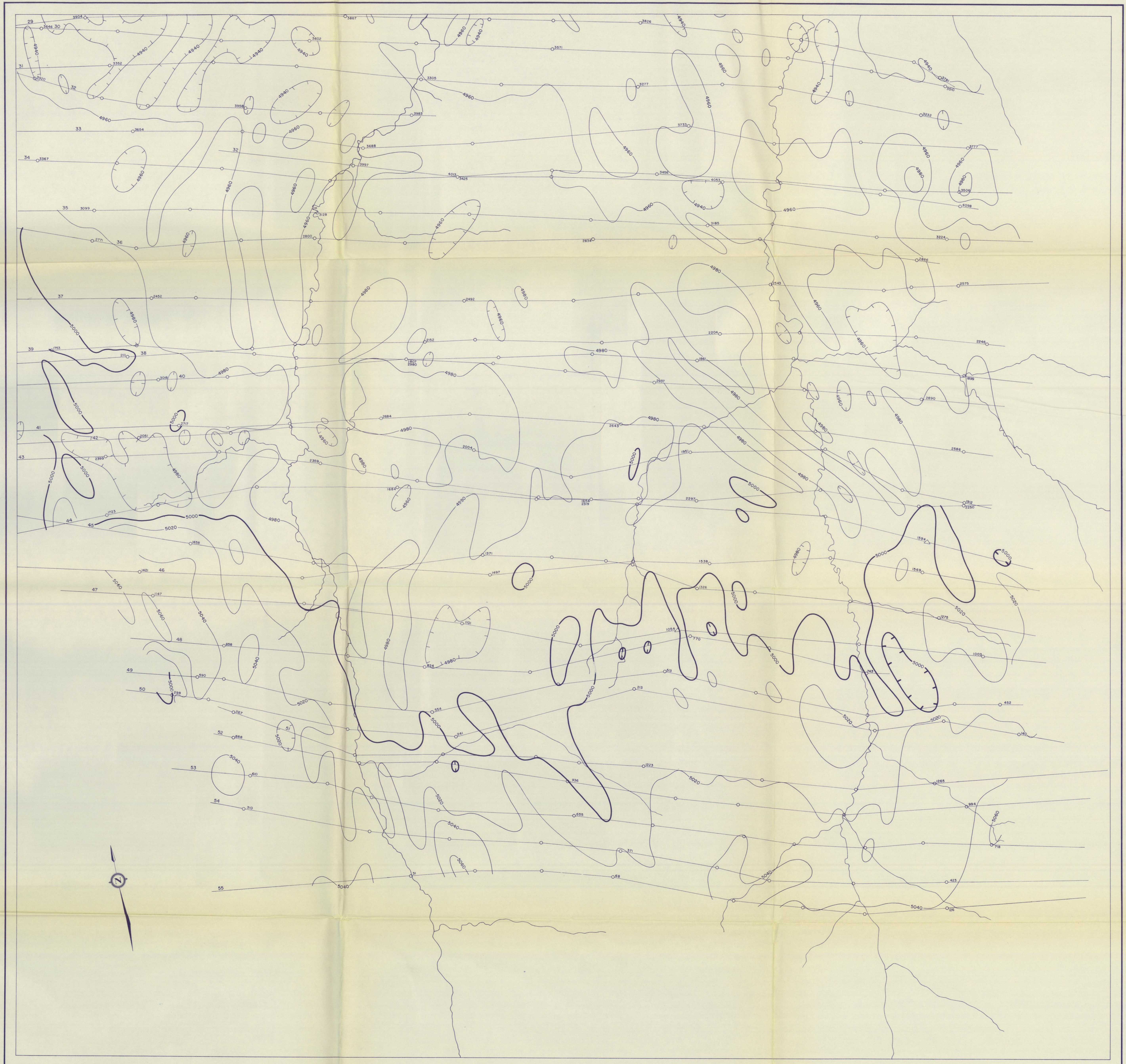
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MAP# 95-D-12
 95-D-5 Doc# 060678



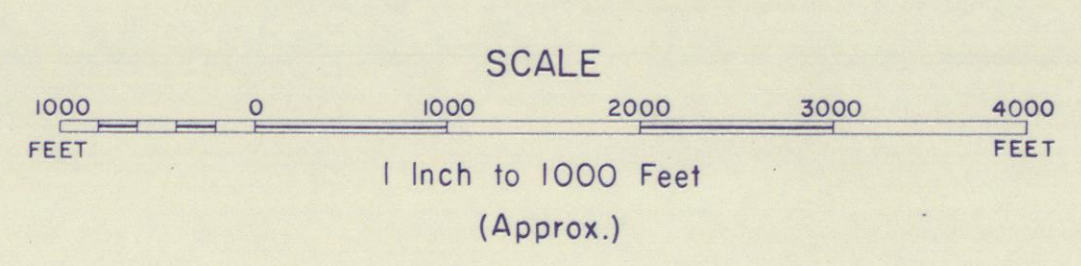
27

REDFORD SYNDICATE
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
- FLIGHT LINES

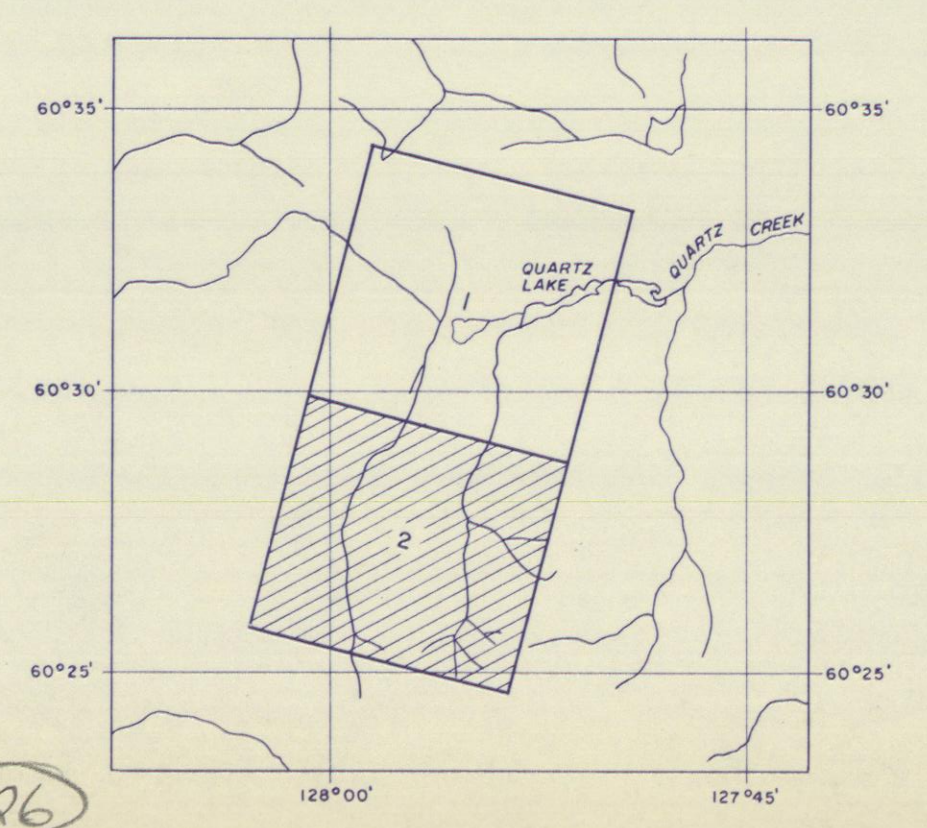
QUARTZ LAKE AREA
YUKON TERRITORY



AEROMAGNETIC MAP

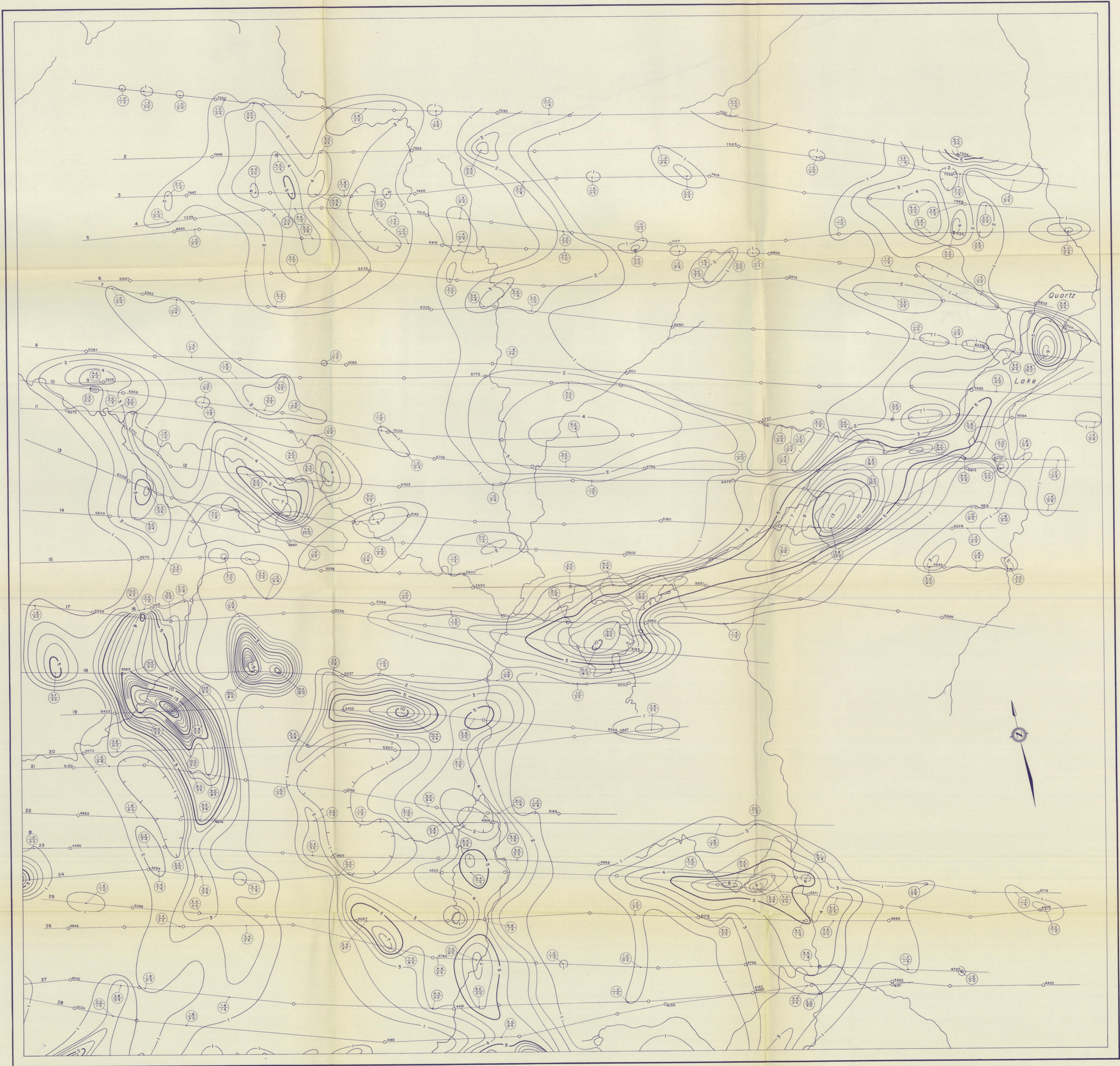
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TORONTO, CANADA
1966

Map No. R-3



95-D-12
Map# 95-D-5 Doc# 060678 (26)

REDFORD SYNDICATE
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.
 NEGATIVE CONTOURS -5, -10 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 $\frac{a}{b}$ represent amplitude in phase component quadrature component
 The frequency of the primary current is 4000 cycles per second.

QUARTZ LAKE AREA
YUKON TERRITORY

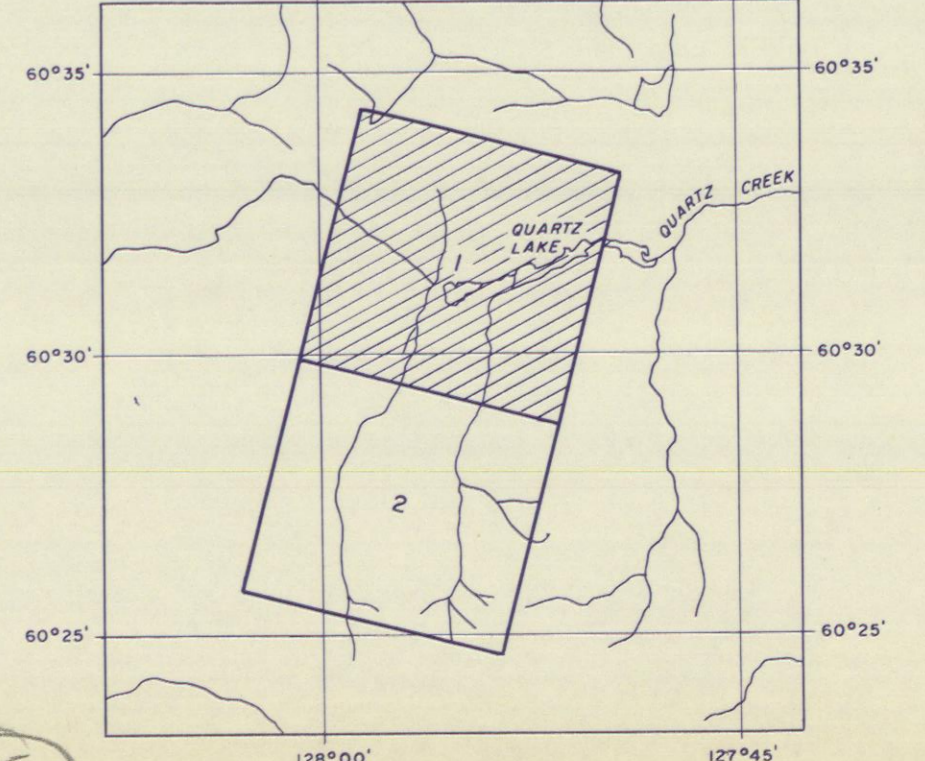
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FEET
1 Inch to 1000 Feet
(Approx.)

ELECTROMAGNETIC MAP

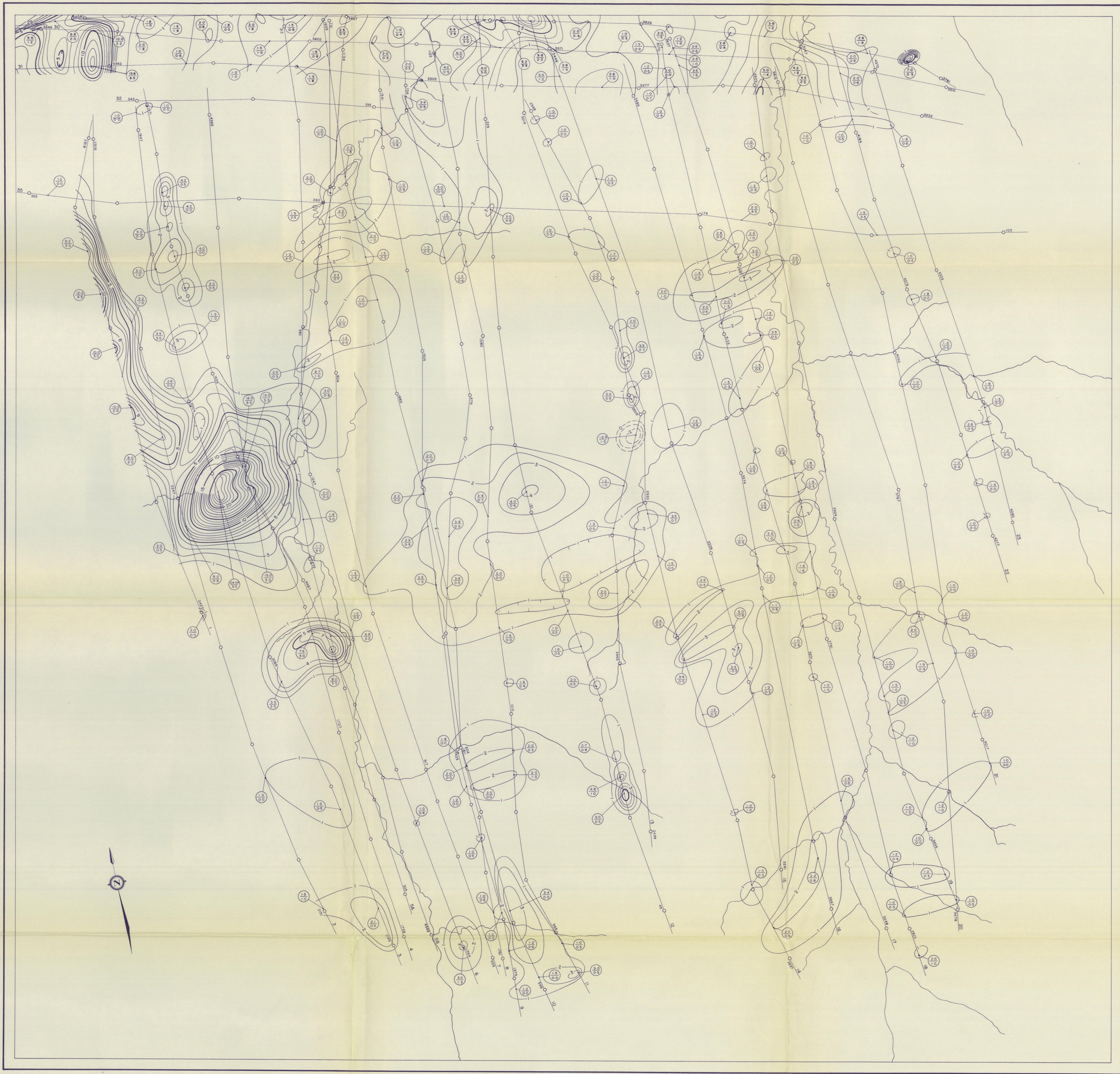
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TORONTO, CANADA
1966

Map No R-4

MAP# 95-D-12
95-D-5 Doc# 060678 (25)



REDFORD SYNDICATE
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.
 NEGATIVE CONTOURS -5, -10 etc.
 -1, -2, -3, -4 etc.
 FIDUCIAL POINTS 3590
 FLIGHT LINES 3590

The contours represent amplitude of in phase response of the resultant field expressed in 10 parts per million of the primary.
 The figures $\frac{1.1}{0.7}$ represent amplitude in phase component / quadrature component
 The frequency of the primary current is 4000 cycles per second.

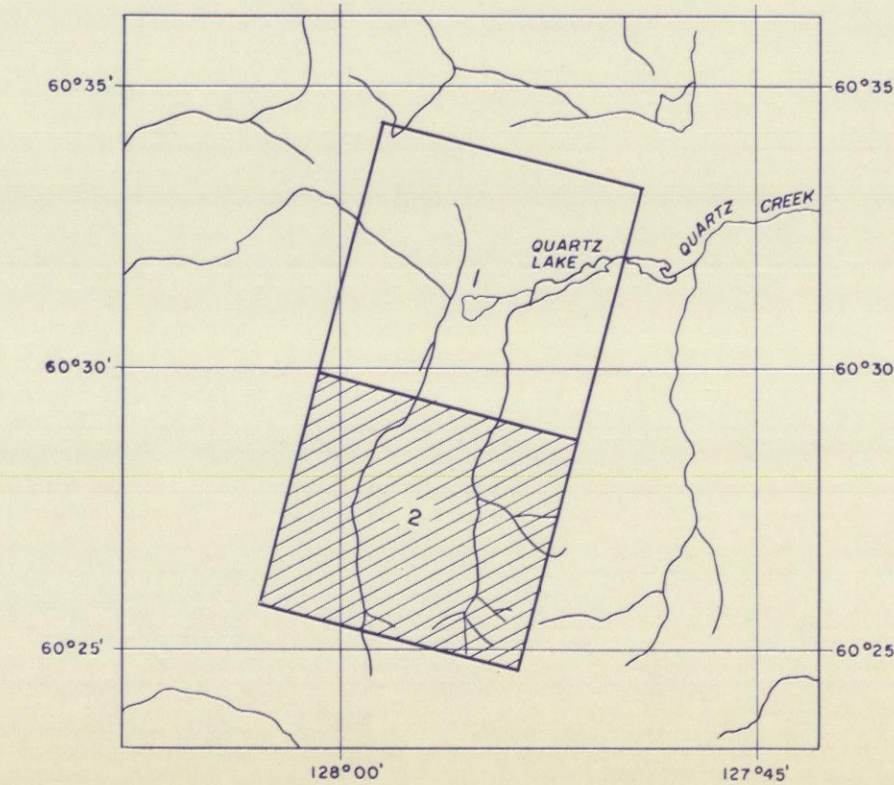
QUARTZ LAKE AREA
YUKON TERRITORY

SCALE
 1000 0 1000 2000 3000 4000
 FEET
 1 Inch to 1000 Feet
 (Approx.)

ELECTROMAGNETIC MAP

Flown and Compiled by
 LOCKWOOD SURVEY CORPORATION LIMITED
 TORONTO, CANADA
 1967

Map No. R-5

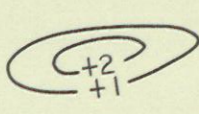


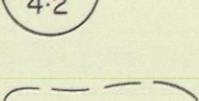
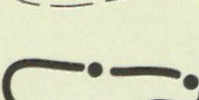

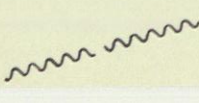


MAP# 95-D-12
 95-D-5 Doc# 060678 (24)

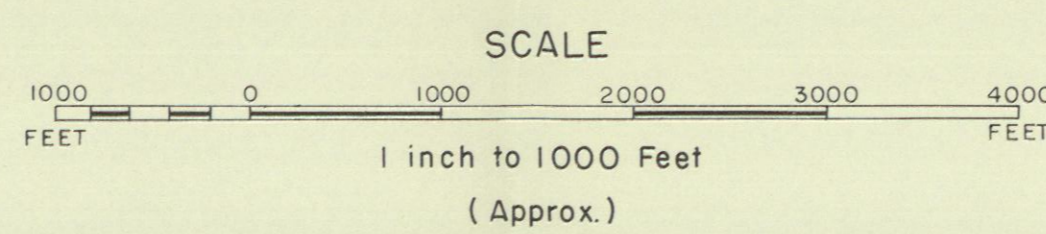
REDFORT SYNDICATE
AIRBORNE GEOPHYSICAL SURVEY



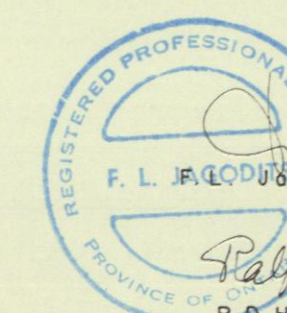
PH 617-5/67

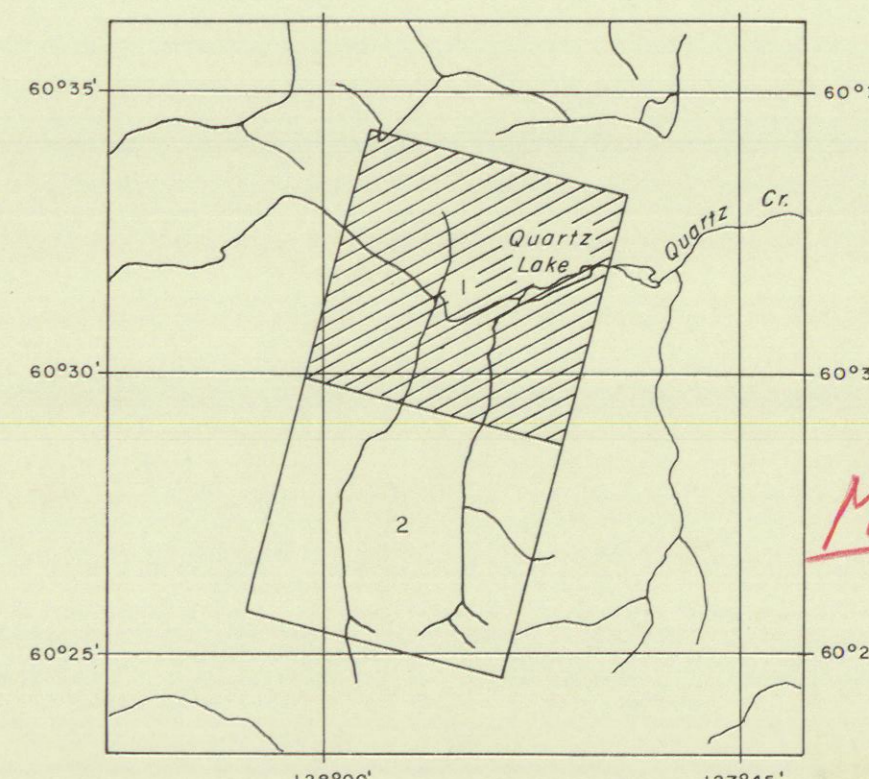
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-  AXIS OF RESIDUAL IN-PHASE ANOMALY AND LOCATION OF RATIO DETERMINATION.
-  INDEFINITE AXIS OF RESIDUAL IN-PHASE ANOMALY AND LOCATION OF RATIO DETERMINATION.
-  RESIDUAL AMPLITUDE OF IN-PHASE RESPONSE.
RESIDUAL AMPLITUDE OF QUADRATURE RESPONSE.
-  50 P.P.M. CONTOUR LINE OF ANOMALIES A, B, C, & D (FROM ELECTROMAGNETIC MAP NO. 1).
-  E.M. ANOMALIES ASCRIBED TO CONDUCTING ALLUVIUM.
-  INTERPRETED (?) FAULTS, ACCORDING TO SURVEYMIN. LTD. REPORT (1966).
- MAPPED (?) FAULTS (?), ACCORDING TO SURVEYMIN. LTD. REPORT (1966).

QUARTZ LAKE AREA
YUKON TERRITORY



INTERPRETATION MAP

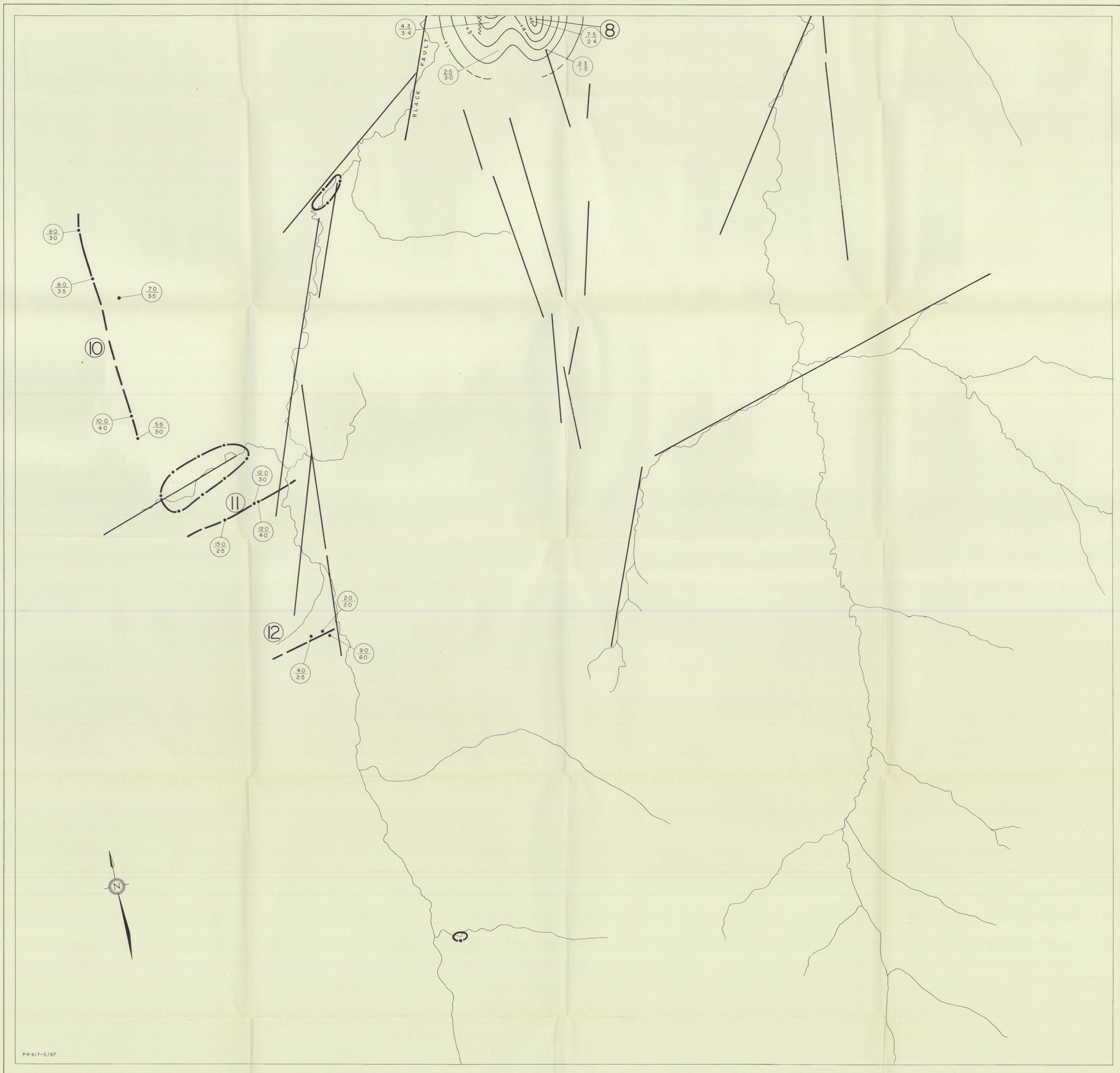
To accompany report by

F. L. Hutchison, B.Sc., P.Eng., Geophysicist
R. D. Hutchison, B.A.Sc., P.Eng., Geophysicist
T. W. Priest
P. P. F. S. Grant, Ph.D., Geophysicist
HUNTEC LIMITED, Toronto, Canada - November 1967



MAP No. R-6

MAP# 95-D-12
95-D-5 Doc# 060678 (82)

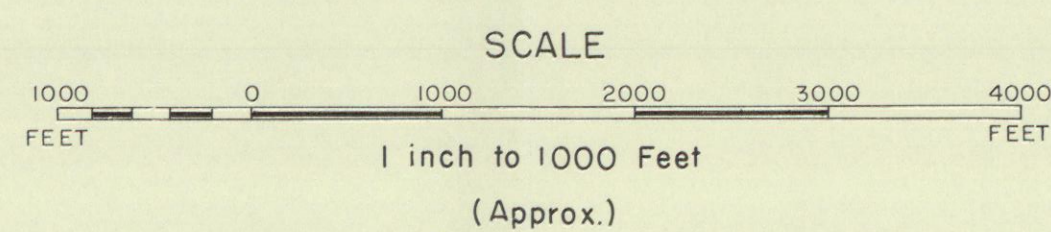
REDFORT SYNDICATE
AIRBORNE GEOPHYSICAL SURVEY



PH 617-5/67

- RESIDUAL IN-PHASE ANOMALY, CONTOUR INTERVAL: 10 PARTS PER MILLION OF PRIMARY FIELD.
- AXIS OF RESIDUAL IN-PHASE ANOMALY AND LOCATION OF RATIO DETERMINATION.
- INDEFINITE AXIS OF RESIDUAL IN-PHASE ANOMALY AND LOCATION OF RATIO DETERMINATION.
- RESIDUAL AMPLITUDE OF IN-PHASE RESPONSE.
RESIDUAL AMPLITUDE OF QUADRATURE RESPONSE.
- 50 P.P.M. CONTOUR LINE OF ANOMALIES A, B, C, & D (FROM ELECTROMAGNETIC MAP NO. 1).
- E.M. ANOMALIES ASCRIBED TO CONDUCTING ALLUVIUM.
- INTERPRETED (?) FAULTS, ACCORDING TO SURVEYMIN. LTD. REPORT (1966).
- MAPPED (?) FAULTS (?), ACCORDING TO SURVEYMIN. LTD. REPORT (1966).

QUARTZ LAKE AREA
YUKON TERRITORY

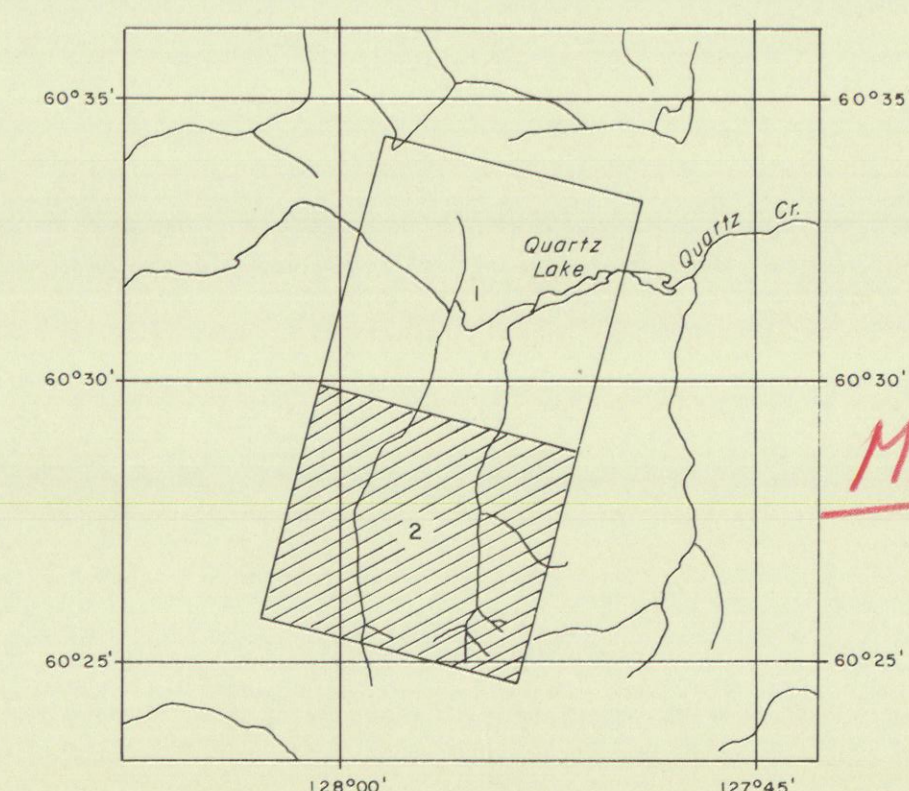


INTERPRETATION MAP

To accompany report by

 F. L. F. Hodgins, Dipl. Eng., P. Eng., Geophysicist

 R. D. Hutchison, B.A.Sc., P. Eng., Geophysicist
 F. S. Grant, Ph.D., Geophysicist
 HUNTEC LIMITED, Toronto, Canada - November 1967



Map No. R-7

MAP# 95-D-12
45-D-5 Doc# 060678 (21)