



R E P O R T
on the

G E O P H Y S I C A L A N D G E O C H E M I C A L S U R V E Y S

115-E6

O F

R A M A N D B O W C L A I M G R O U P S
Big Creek Area,
Whitehorse Mining Division
Yukon Territory

This report has been examined by the Geological Evaluation Unit and is recommended to the Commissioner to be considered as representing work in the amount of

~~\$4,282~~ 7,051.30

on behalf of

D.B. Craig

G O L D E N G A T E E X P L O R A T I O N S L T D .

Commissioner of Yukon Territory
Section 53 (4), Yukon Quartz Mining Act.

by

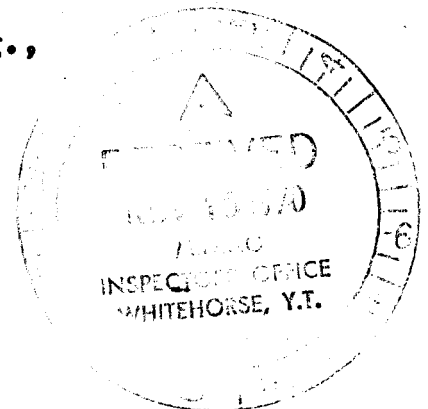
[Signature]

Commissioner of Yukon Territory

P.P. Nielsen, B.Sc., Geophysicist,
International Mondus Corporation Ltd.

and

J.H. Montgomery, Ph.D., P. Eng.,
Consulting Engineer



Long. 137°15'W.
Lat. 62°20'N.

Dates: June - November, 1970

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LIST OF CLAIMS

<u>Claim No.</u>	<u>Grant No.</u>	<u>Date Recorded</u>
Ram 1 - 40	Y40084 - Y40123	Nov. 17th, 1969
Bow 1 - 40	Y40571 - Y40610	Nov. 24th, 1969

oOo

GENERAL INTRODUCTION:

During the months of July and August, 1970, a combined airborne magnetic-radiometric-electromagnetic survey was flown over an area 7 miles by 13.5 miles in the Carmacks - Big Creek area, Yukon Territory, by Geo-X Surveys Ltd., using a fixed wing aircraft. The text of their report is included herein. The data was received by the authors on behalf of Golden Gate Explorations Ltd., resulting in the following interpretation and recommendations.

This study was assisted by personal discussions with geologists familiar with the area; G.S.C. aeromagnetism; Memoir 189 by H.S. Bostock; an air-photo study; and rock and geochemical soil samples collected by J. Boily, a company employee.

Although the interpretation was based on the whole area surveyed, only that portion directly relevant to the property of Golden Gate Explorations Ltd. is herein discussed, as illustrated by the accompanying maps.

LOCATION AND ACCESS:

The Ram and Bow claim groups are located about 36 air miles west-north-west of Carmacks and are accessible by 4-wheel drive truck over a tote road from Carmacks via Crossing and Seymour Creeks. The property of Yukon Revenue borders the claims on the north. The property is centred at 62°20'N. latitude and 137°15'W. longitude.

GEOLOGY:

The general geology of the area consists of Pre-Cambrian metamorphic rocks of sedimentary origin (Yukon Group), invaded in places by syenite, granite-gneiss, diorite gneiss probably of intrusive origin of Mesozoic and tertiary age. The largest intrusive unit is a porphyritic syenite of moderately alkaline composition trending north-west across the lower south-west part of the property. This unit can be quite magnetic and in places changes to coarse alkaline granite, monzonite, hornblendite and quartz monzonite. Granodiorite and granite are present to the south and east in batholithic and stock sizes respectively. Breccia zones containing mineralization in the form of chalcopyrite have been observed on the Yukon Revenue property to the north, and gold bearing magnetite deposits of the contact metamorphic and vein varieties have been known in

the Freegold Mountain area to the east since 1930. Stibnite, sphalerite, arsenopyrite, pyrite, galena and molybdenite have also been observed.

TOPOGRAPHY AND GROUND CONDITIONS:

The survey area is located in the unglaciated Dawson Range consisting of immature creek valleys and smooth-topped ridges which converge and culminate in the form of monadnocks.

The total relief is in excess of 2,500 feet with the mean elevation being about 3,500 feet. Areas of outcrop are primarily confined to ridge tops and creek valleys and total less than 3% of the surveyed area.

Vegetation is typical Yukon sub-alpine consisting of spruce trees below 4,000 feet interspersed with patches of muskeg. Dwarf birch predominates above timber line.

Drainage is to the north-east by way of Bow Creek. Smaller streams of the trellis pattern empty into Bow Creek from the north-west and south-east. A north-easterly trending smooth-topped ridge crosses the north-west corner of the property.

The claims area is generally considered to be unglaciated and therefore overburden thicknesses are slight although bedrock alteration zones can be greater than 10 feet

deep, giving rise to soil and rock geochemical sampling problems. This is evidenced by a very poor "B" soil horizon underlying a volcanic ash layer averaging 5 inches and overlying the residual or "C" horizon caused by weathered, leached bedrock material.

GEOPHYSICAL OBSERVATIONS:

(A) Aeromagnetics:-

The most prominent magnetic feature is the north-west trending belt of highs outlined by the 57700 gamma contour which peaks to in excess of 58200 gammas. Adjacent to this band the magnetic texture is very low and expressionless except for a number of interesting flexures in the contours and a circular high of 58200 gammas in the extreme north-east corner of the map area. The magnetic lows on each side of the northerly bulge in the above north-westerly trending band is of interest although one of these lows is not enclosed due to lack of coverage to the west.

(B) Electromagnetics:-

The stronger more obvious electromagnetic cross-overs are shown on the accompanying Claims, Flight Line Layout

map. No flight lines appear to cross a few of the Ram claims and many claims are barely covered, possibly due to navigational problems as a result of an inaccurate photo mosaic in these regions. The crossovers appear to be somewhat randomly located throughout the survey area, although crossovers do occur in line and on adjacent survey lines on the Ram #8 and #10 claims and just to the north-west of Ram #20. These two features suggest the possibility of conductor axes.

(C) Aeroradiometrics:-

The radiometric map illustrates the distribution of potassium 40 radiation not corrected for differences in terrain clearance and aircraft attitude. Generally the higher isorads are coincident with the mountain ridges and the lows conform to the creek valleys which are more heavily overburdened and a greater distance away from the aircraft-mounted detector. The extreme sensitivity of the instrument to causes other than geologic is evidenced by the high coincidence of linear and enclosed patterns with flight-lines.

GEOPHYSICAL INTERPRETATION:

(A) Aeromagnetics:-

The north-westerly trending band of relatively high magnetic response appears to outline the alkaline syenite rock unit #9 (after Bostock) with the peak highs being caused in part by topographic highs. The low to the north and extreme west (not enclosed) is verified by the G.S.C. aeromagnetic map (#3313G Freegold Mountain) and would appear to delineate an area of more acidic rock types such as monzonite or granite gneiss. Rock samples collected in this area support this point. This low and the one partially straddling Bow Creek in the vicinity of Bow #2 and #4 claims could be part of the magnetic expression of the contact between the syenites to the south and the Yukon Group schists to the north, but might also represent the "low" of an inductive magnetic anomaly of the "thumb-print" variety commonly associated with contact-metamorphic deposits, magnetic dikes, steeply dipping sills (gabbroic), etc.

The circular anomaly in the north-east is coincident with a dome shaped topographic feature thought to be the north-west limit of the granite, granodiorite rock unit #10 (by Bostock) which extends off the map area to Freegold Mountain.

The remaining area is magnetically featureless when

examining the aeromagnetic map by itself. However, upon correlation with air-photos, three lineaments are apparent, all seeming to intersect at the Bow #7 claim -

#1 Lineament This lineament parallels Bow Creek and could be partially due to high terrain clearance, but persists to the west-southwest after Bow Creek swings south. Two Cu-Mo geochemically anomalous areas occur along the flanks of this linear and a reported Mo. anomaly on the adjacent Kook Claims is on strike. This feature is interpreted as a near vertical vault.

#2 Lineament A definite north-east linear extending many miles off the map area passes through or near two other geochemically anomalous areas at Ram #35 and #36 and at the junction of Ram #1, #2, #3 and #4 and continues off to the northeastern extremity of the above interpreted granite stock. This linear is thought to be a fault.

#3 Lineament This lineament is difficult to interpret due to the parallel flight line direction giving rise to coupling problems. Nevertheless the magnetic bulge in the syenite-schist contact and flexures to the north backed up by the isoradiometric "break" suggests a linear feature due to either faulting, shearing, or a system of northerly trending dikes. Rock samples collected in the vicinity of this feature

are aplitic.

(B) Electromagnetics:-

The majority of crossovers are probably due to the interpreted contact between the syenites and other rocks conforming to the 57,700 gamma contour. The conductor axes mentioned above are thought to be caused by galena veins in the neighbourhood of known zinc occurrences and other crossovers not explained are likely due to effects such as sudden breaks in topography, water-filled faults, conductive dikes and overburden, lithology changes, poor transmitter direction, and a host of other causes.

(C) Aeroradiometrics:-

No direct interpretation on the potassium 40 map has been attempted although it has been used to confirm or deny the linear interpretation mentioned above and the high K-40 isorads do substantiate to some degree the likelihood of potassium feldspar, biotite rich rocks such as syenite and granite as evidenced by the aeromagnetics, government geology and rock samples collected on the property.

CONCLUSIONS AND RECOMMENDATIONS:

Although the western one-third of the claims are without aeromagnetic coverage, and some areas were not soil sampled, it would appear that a tectonic epicentre could exist at the Bow #7 claim. An area of geochemically anomalous values; favourable rock types; geophysical features such as magnetic lows, flexures, and gradients; E.M. conductors; and widespread mineralization have been observed and interpreted to exist in a fan-shaped area centred approximately at Bow #7 claim and spreading throughout the northern and eastern quadrants. From the information available, it would appear that those claims to the north of a diagonal line bisecting the claims from Ram #20 to Bow #21 are the most interesting in the search for economic mineral deposits. In particular, those areas which are thought to be underlain by tertiary monzonites and granite-gneiss in close proximity to the aplites should be given particular attention. Brecciation is also very important in this area and is a definite guide to mineralization.

No geophysical follow-up is recommended at this time pending the results of a detailed gridded geochemical soil survey and a geological investigation using the same grid as recommended below.

GEOCHEMICAL SOIL SURVEY

INTRODUCTION:

This portion of the report covers the reconnaissance geochemical soil survey carried out on the Ram and Bow mineral claims during the period between June 15th, 1970 and August 1st, 1970.

The geochemical investigation consisted of soil sampling the four claim lines. Rock samples were also collected to assist in a more accurate determination of background and anomalous levels for different rock types on the property.

Two men living in a nearby "fly" camp supported by a 4-wheel drive truck carried out the survey. The soil samples were shipped to Vancouver where they were analyzed and the results were plotted by the authors of this report.

SURVEY TECHNIQUES:

The majority of the soil samples were taken using a soil sampling mattock along the claim lines at 200 foot intervals. All soil samples collected were taken from an average depth of 18 inches under the volcanic ash layer, where present, and in what was thought to be the "B" horizon. In areas of immature soils, the "C" horizon or residual layer was sampled.

Permafrost in the valley bottoms interfered with the sampling, consequently, complete coverage was not possible. 154 samples were collected and dried in Kraft bags, then shipped to Vancouver Geochemical Laboratories for analysis.

METHOD OF ANALYSIS:

The samples were dried in a ventilated oven, screened to 80 mesh, weighed out to 0.5 grams and digested in a sand bath with nitric and perchloric acids. Samples were then diluted, clarified and tested.

Copper and zinc analyses were determined using a Techtron Atomic Absorption Spectrophotometer Model AA4 with their respective hollow cathode lamps. The digested samples were aspirated directly into an air and acetylene flame.

The molybdenum analysis was done by aspirating the digested samples directly into a nitrous oxide acetylene flame.

The Cu., Zn. and Mo. values in parts per million were calculated by comparing to a set of standards.

TREATMENT OF DATA:

The geochemical results in parts per million were plotted along the claim lines. Because of the reconnaissance nature of the survey, the number of various rock types and the amount of permafrost, no frequency distribution studies or contouring of the data was attempted.

GEOCHEMICAL RESULTS:

Copper - An approximate threshold value of 60 ppm. has been assigned for the copper leaving two anomalous areas on the property. Firstly, the area centred at the junction of Ram claims #15, #16, #17 and #18 exhibit coincident Cu. and Zn. anomalous values. This area is known to contain outcroppings of monzonite, quartz monzonite, and granite gneiss. Secondly, is the area along the claim line separating the Bow #1 and #3 claims from the Bow #2 and #4 claims. These high Cu. values are coincident with anomalous Mo. values. This trend could continue to the west. Other single value highs exist at four other locations throughout the area surveyed and six sub-anomalous values of interest were observed centred at the junction of Ram #1, #2, #3 and #4 claims. These values are enclosed by anomalous Zinc values.

Zinc - A threshold of 100 ppm. is assigned to the zinc, although due to its high mobility a value of 200 ppm. or greater would be considered of interest. The anomalous zinc values are primarily confined to the Ram claim group or in areas not underlain by syenite. The main concentration of high zinc values is along the northernmost claim line. One high value of 278 ppm. coincident with a high molybdenum value appears to coincide with an E.M. conductor. Another coincident Mo., Cu., Zn. sample occurs near an interpreted fault on the Ram #35 and #36 claims.

Molybdenum - All values in excess of 5 ppm. are considered anomalous for this element. All but two anomalous Mo. samples occur within or adjacent to the syenite rock unit and most occur coincident with anomalous Copper values. The two most interesting areas are along an interpreted east-north-easterly trending fault. Their locations are at the junction of Bow claims #33, #34, #35 and #36 as well as the Bow claims #1, #2, #3, and #4 area.

GEOCHEMICAL CONCLUSIONS AND RECOMMENDATIONS:

On the basis of interesting coincidental geophysical, geochemical and rock-type information, it appears that there are three specific areas requiring further investigation. These are the Bow #1, #2, #3 and #4 area; the Ram #1, #2, #3 and #4 area; and Ram #13 - #20 inclusive area.

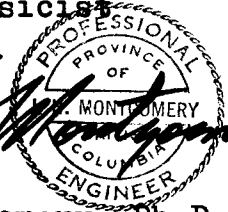
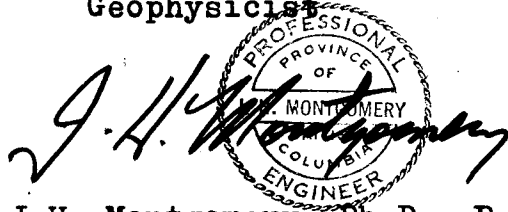
A gridded geochemical soil survey is recommended in these three areas. The grid should consist initially of north-south lines 800 feet apart and sampled for Mo.- Cu.- Zn. at 200 feet intervals. The samples should be analyzed while the survey is in progress to facilitate the locating of intermediate lines over areas of interest and to limit the total amount of sampling.

Geological mapping and prospecting should also be carried out before ground geophysics and/or drilling is considered.

Respectfully submitted,



P.P. Nielsen, B.Sc.
Geophysicist



J.H. Montgomery, Ph.D., P.Eng.

APPENDIX I

SUMMARY OF COSTS:

(A) Geophysical Survey -

Combined airborne survey by Geo-X
Surveys Ltd., 80 claims @ \$15.00
per claim \$ 1,200.00 ✓

(B) Geochemical Survey -

Sample 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48

Salaries - 2 samplers for 48 man/days \$ 1,575.00 ✓
Camp support and equipment \$10/da 500.00
Truck rental: 29 days @ \$25 per day.. 725.00 ✓
Shipping 30.00
Cost of analysis of 154 samples 338.80 ✓
Travel 300.00 ✓
Supervision 200.00 ✓
Gas and Oil 135.00 ✓

(C) Consultants' Fees -

Data retrieval, Whitehorse 200.00 ✓
Accommodation in Whitehorse,
Oct. 16-19, 1970 85.00 ✓
Travel - Vancouver/Whitehorse return 175.00 ✓
Drafting and map preparation 300.00 ✓
(4 man days @ \$75.00/day)
Interpretation and report writing
(2.5 man/days @ \$125.00/day) 412.50 312.50 ✓
Disbursements - typing, printing, etc. 75.00 ✓
Supervision 800.00 706 ✓
(previous report by J.H. Montgomery)

TOTAL = \$ ~~7,051.30~~

6951.30

APPENDIX II

AFFIDAVIT SUPPORTING SUMMARY OF COSTS

I, PHILIP P. NIELSEN, Geophysicist, and President of International Mondus Corporation Ltd. of Vancouver, British Columbia, DO HEREBY STATE that to the best of my knowledge and belief the statement of costs as presented in Appendix I of this report entitled "Report on the Geophysical and Geochemical Surveys of Ram and Bow Claim Groups" is both true and correct.

SWORN BEFORE ME at the City of Vancouver, in the Province of British Columbia, this 12th day of November, A.D. 1970.

T. Hadley Brown

A Notary Public for the Yukon Territory

Philip P. Nielsen
Philip P. Nielsen

APPENDIX III

PERSONNEL:

(A) Geophysical Survey

Instrument Operator
Report Writer

N. Wilson
J. Carne, M.S.

(B) Geochemical Survey

Samplers
Supervisor

J. Boily
G. Wheeler
B. Abraham

(C) Consultants

Geophysicist
Geological Engineer

P.P. Nielsen, B.Sc.
J.H. Montgomery,
Ph.D., P.Eng.

GEOPHYSICAL REPORT

on an

AIRBORNE MAGNETIC, ELECTROMAGNETIC

AND

RADIOMETRIC SURVEY

over the

Carmacks - Big Creek Area

Situated at

Latitude $62^{\circ}20'N$ and Longitude $137^{\circ}15'W$, N.T.S. 115-J-6

In the

Dawson Range, Yukon Territory

by

GEO-X SURVEYS LTD.

Vancouver, B.C.

October 6, 1970

Instrument Operator:

N. Wilson

Report by:

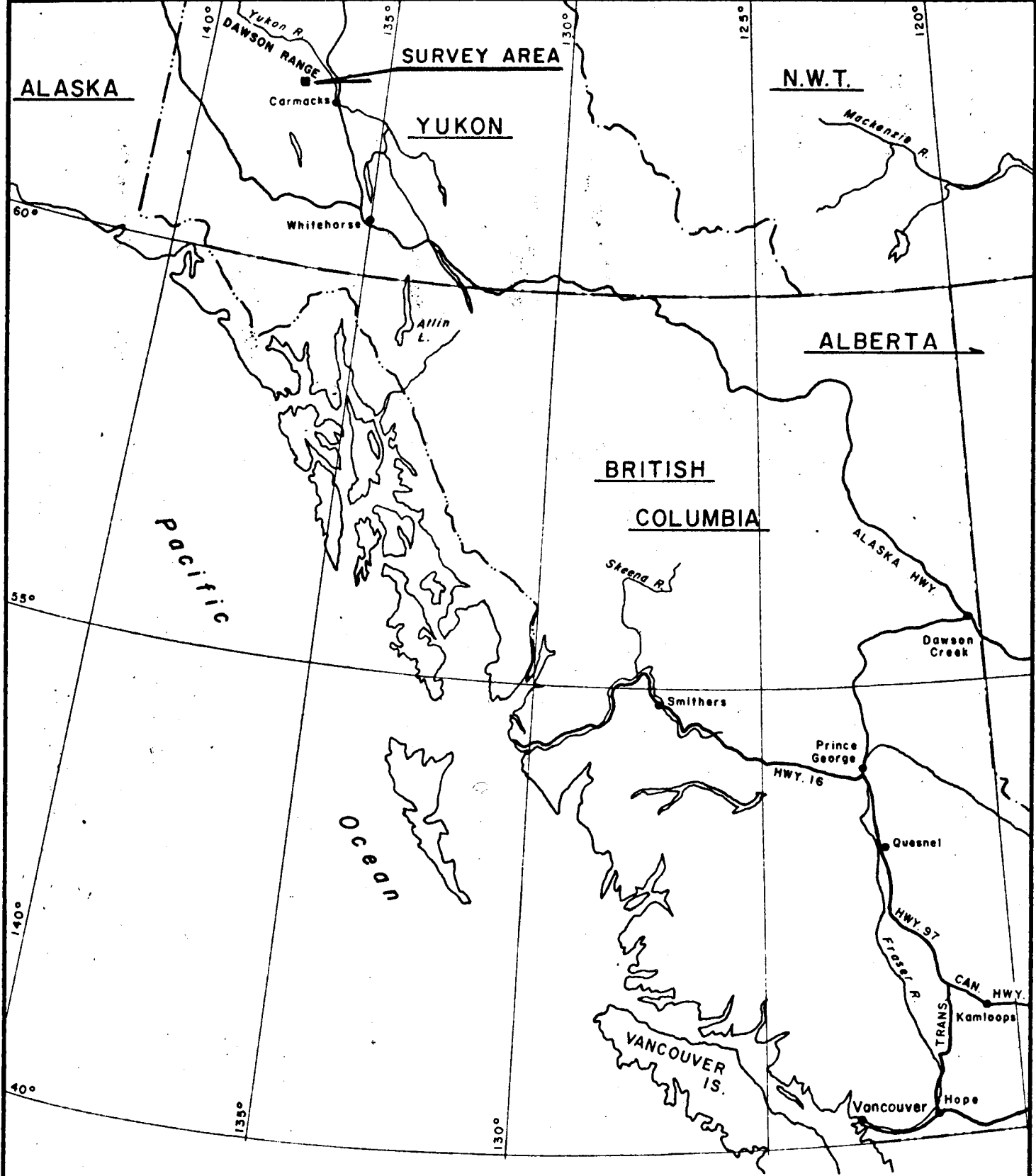
James Cerne, M.S.



604-685-0312

TELEX 04-50404

GEO-X SURVEYS LTD. 627 HORNBY STREET, VANCOUVER 1, B. C.

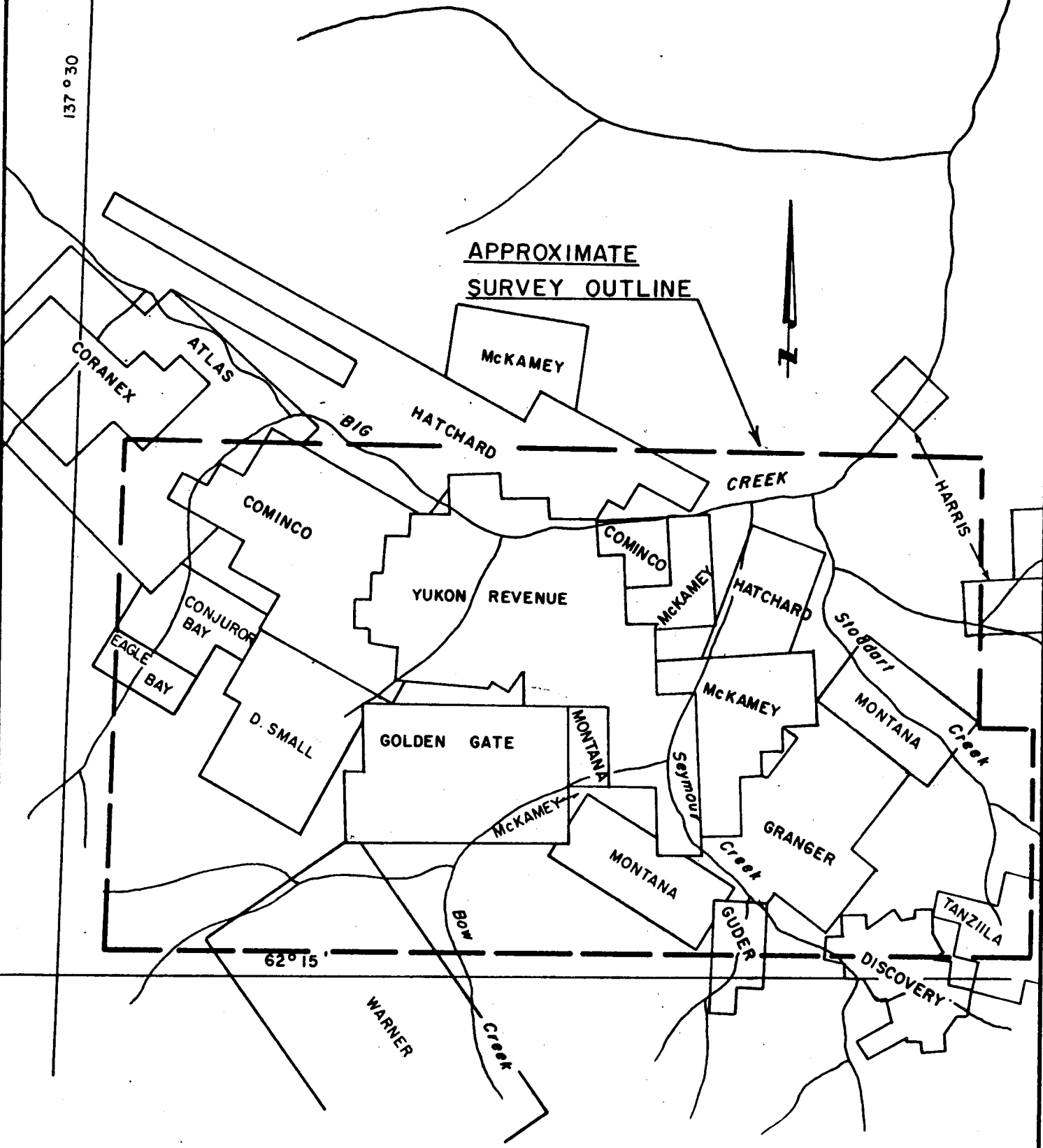


CARMACKS - BIG CREEK AREA
WHITEHORSE M.D.
YUKON TERRITORY

LOCATION MAP

137° 30'

APPROXIMATE
SURVEY OUTLINE



62° 15'



SCALE : MILES

CARMACKS - BIG CREEK AREA
WHITEHORSE M.D.
YUKON TERRITORY

CLAIM MAP



GEO - X SURVEYS LTD.

Drawn RK

Dated Oct. 6/70

Fig. No.

Checked C

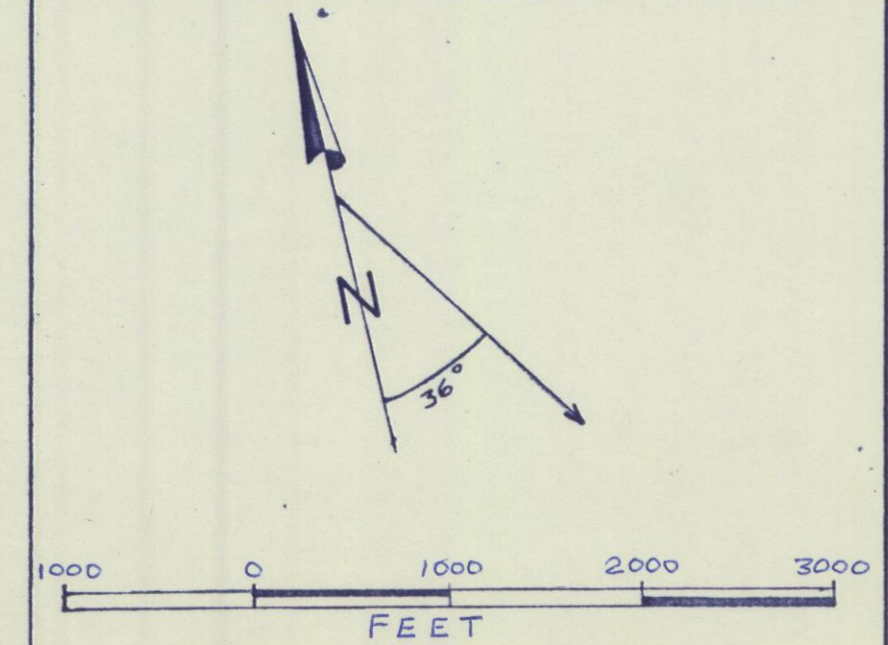
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2

CARMACKS-BIG CREEK AREA
WHITEHORSE MD.
YUKON TERRITORY

GEOCHEMICAL
SOIL SURVEY

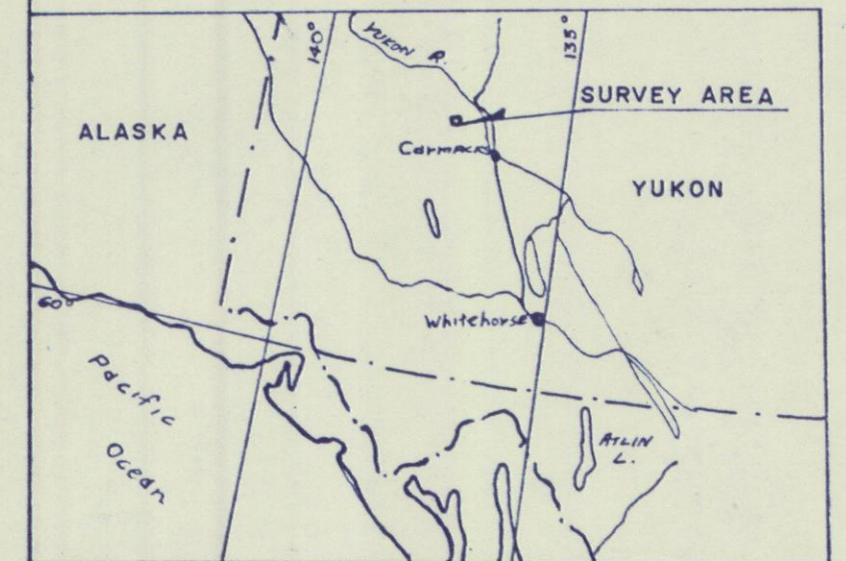
DRAWN BY: P.P.M. SCALE: 1"=1000'
DATE: NOV 14, 1970. FIG. NO.: 6



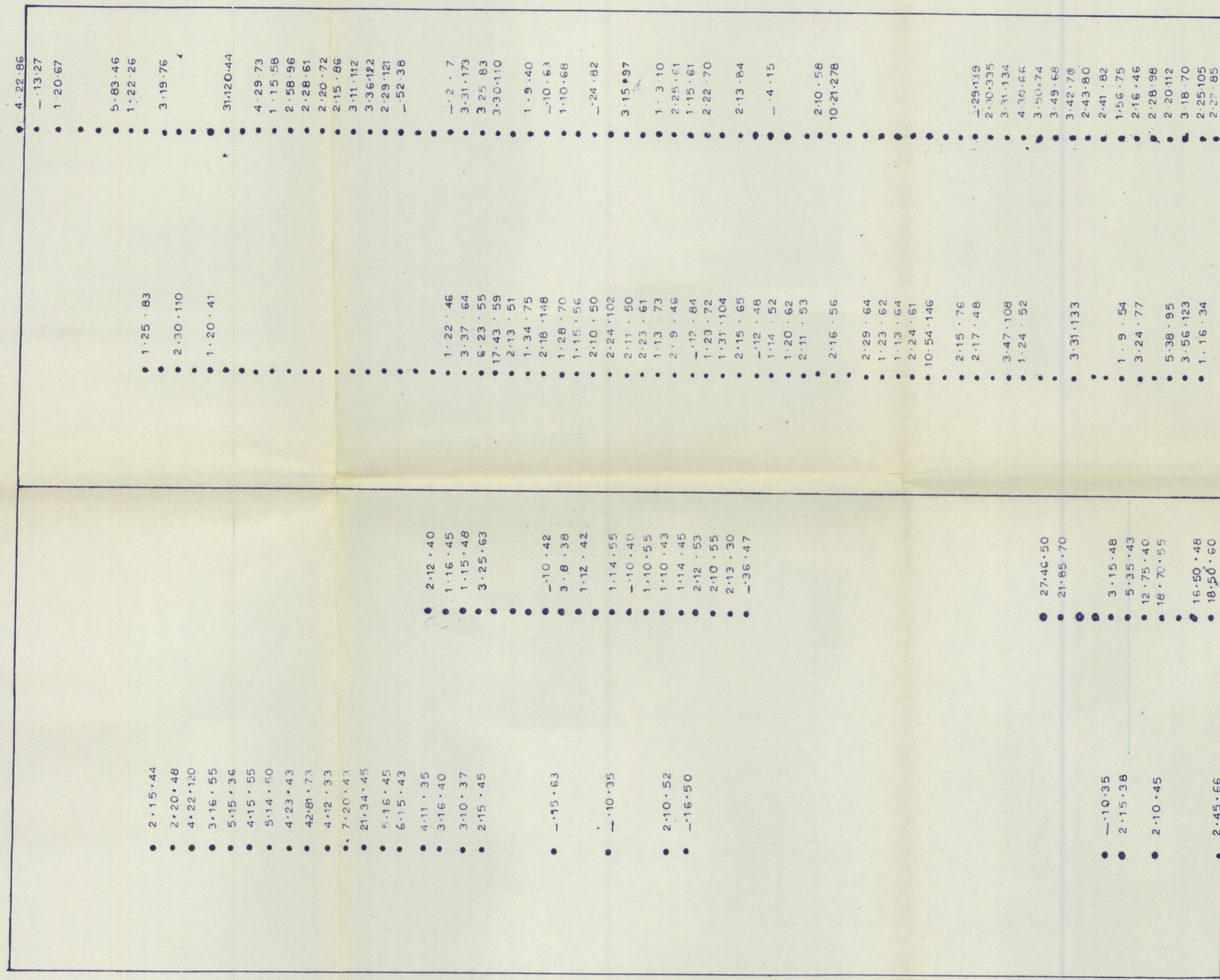
GOLDEN GATE
EXPLORATION LTD.

LEGEND

● 27.46.103
STN. MO. CU. ZN.
VALUES IN PPM.



INDEX MAP



RAM
CLAIMS

BOW
CLAIMS

- 4-22-86
- 13-27
- 1-20-67
- 5-83-46
- 1-22-26
- 3-19-76
- 31-20-44
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- 2-29-121
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- 2-18-148
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- 1-23-72
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- 1-14-52
- 1-20-62
- 2-11-53
- 2-16-56
- 2-29-64
- 1-23-62
- 1-13-64
- 2-24-61
- 10-54-146
- 2-15-76
- 2-17-48
- 3-47-108
- 1-24-52
- 3-31-133
- 1-9-54
- 3-24-77
- 5-38-95
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- 27-46-50
- 21-85-70
- 3-15-48
- 5-35-43
- 12-75-40
- 18-70-55
- 16-50-48
- 18-50-60
- 18-40-40
- 52-90-40
- 2-15-44
- 2-20-48
- 4-22-120
- 3-16-55
- 5-15-36
- 4-15-55
- 5-14-50
- 4-23-43
- 42-81-73
- 4-12-33
- 7-20-43
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- 2-15-45
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4. Isomagnetic Contour Map
5. Potassium 40 Contour Map
6. Photo Mosaic

PREFACE

Magnetic susceptibility may change perceptibly from one lithologic unit to another; thus accurate detailed mapping of the geomagnetic field often provides valuable information about subsurface geology, even in heavily drift covered areas. Aeromagnetic surveying can aid in the delineation of buried contacts and disruptions, or the location of areas of possible plutonic differentiation. Often local magnetic patterns associated with known ore bodies can be identified, and the existence of similar variations in magnetic intensity elsewhere may lead to the discovery of new ore bodies.

Radioactivity may likewise vary from one rock type to another and can be used as a geological mapping tool. Both the total gamma ray count and the K-40 are used as indirect geologic aids. The measurement of K-40 is particularly useful in that potassium -40 is in greater abundance in acidic intrusives, and related rocks and frequently (associated with K-feldspars) in areas of certain varieties of hydrothermal alteration. However, the usefulness of this method is somewhat limited because of the variation in overburden thickness and extent, and variation in terrain clearance.

INTRODUCTION

During the months of July and August, 1970, Geo-X Surveys Ltd. flew a total of 42 flight lines of total field magnetics and a total of 104 flight lines of aereoelectromagnetic and aeroradiometric surveying on an area approximately 7 miles by 13.5 miles in the Carmacks - Big Creek Area, Yukon Territory.

The survey was flown in an Excalibur 800 fixed wing aircraft with a Varian V4937A proton precession magnetometer (± 1 gamma), Exploranium DiGRS 2000 differential spectrometer; McPhar (K.E.M.) electromagnetometer, magnetic tape and chart recorders, altimeter, tracking camera and Doppler navigation system.

This report describes the instrumentation, field procedure and data processing.

INTRODUCTION TO AEROMAGNETOMETRY

The earth has a magnetic field which is basically that of a magnetic dipole. There are, however, major and minor divergences from the basic dipolar field. Major divergences are interpretable as indications of structure within the geoid proper and are of mostly academic interest. Minor differences are of more interest to the mineral prospector since they may be attributable to local variations in either the ferromagnetic susceptibility or the natural rock magnetism, or both. Since ferromagnetic susceptibility and natural rock magnetism change measurably from one rock type to another, accurate detailed mapping of the local geomagnetic field often provides valuable information about the subsurface geology (even in heavily drift-covered areas). Aeromagnetic surveys can provide information about the type, general attitude, configuration and complexity of the geo-superstructure. Local elements associated with known ore bodies can often be identified, and the existence of similar local elements elsewhere may lead to the discovery of new ore bodies. Aeromagnetic prospecting can be applied to the delineation of buried contacts and disruptions, or the location of areas of possible plutonic differentiation and its varied products.

INTRODUCTION TO AERORADIOMETRY

Basic Concepts

Radioactivity is the spontaneous disintegration of the nucleus of one or more atoms and the emission of energy and sub-nuclear particles. Gamma radiation is a product of the process in which a nucleus in the excited state makes a transition to a lower (and more stable) energy state. The energy difference is emitted as a photon or gamma ray. The gamma spectra of nuclei consists of sharp lines characteristic of each individual radioelement. Natural terrestrial radiation is made up of contributions from about 50 naturally occurring radio-isotopes unevenly distributed in rocks and soils. Much terrestrial radiation is supplied by three isotopes. These are potassium -40 (K^{40}), thorium -232 (TH^{232}), and uranium -238 (U^{238}). These radio elements are normally the only ones in sufficient abundance to produce the intensity of gamma flux that might be detected some distance above the ground. Since a particular emission energy is characteristic of a particular radio element, measurement within a narrow energy band can serve to discriminate between these three main sources of gamma radiation.

RADIOMETRIC DETECTION SYSTEM

When a gamma ray strikes certain natural or synthetic crystals, (normally a thallium activated sodium iodide crystal) a scintillation (a minute flash of light) is produced. The scintillation is converted to electrical energy and is amplified in the photomultiplier tube coupled to the crystal. The intensity of the scintillation is directly proportional to the energy of the incident gamma ray. Thus the photomultiplier output may be calibrated to read the gamma ray energy directly. Discriminatory electronic circuitry is used to record 'counts' only if the gamma energy falls within certain ranges ("windows"). The Exploranium DiGRS-2000 has four such windows, the mean energy and window width of each being independently variable. The response of a detector is a complex function of the crystal efficiency and several circuit parameters.

Three crystals, each coupled to 3 photomultipliers are employed to record flux from the spectrums of the three most abundant radio elements (K^{40} , Th^{232} , U^{238}) and the total gamma ray count. The three crystals have an "effective aperture" of approximately 800 feet when flown at 300 feet terrain clearance at 110 m.p.h. (Effective aperture defines the major diameter of the elliptical area sampled by the detection system during one sampling period.)

INTRODUCTION TO ELECTROMAGNETOMETRY

The V.L.F. electromagnetometer is a high frequency electromagnetometer receiver which uses the horizontal electromagnetic field transmitted by a series of V.L.F. submarine communication stations for the primary field. The station used for this survey was Jim Creek, Washington, U.S.A., transmitting at a frequency of 18.6 Kilohertz. The V.L.F. electromagnetometer output consists of a dip angle signal and a field amplitude signal. These measurements are obtained from a comparison of the signal amplitude of two perpendicular coils tuned to the V.L.F. radio station at Jim Creek, Washington. In the absence of conductors, the V.L.F. signal is horizontal and constant. The presence of conductors (such as mineralized zones, bridges, power lines, conductive overburden, etc.) causes the dip angle and the field amplitude to change. The amount of change depends on the conducting body's size, conductivity, and distance from the receiver, as well as local topography and local conductivity contrasts.

As the receiver crosses a conducting body, the dip angle decreases in magnitude. If local conditions are favourable (i.e. low background conductivity), the dip angle trace should cross the zero line. However, if background conductivity is high, the dip angle trace may not cross the zero level. The field amplitude trace should show a

positive increase in the presence of conductors. Using these considerations, the EM profiles were analyzed for dip angle crossovers. The more interesting EM profile crossovers were located on the flight lines.

LOCATION

The survey area covered by this report is centered at latitude 62°20'N and longitude 137°15'W (NTS 115-J-6) in the Carmacks - Big Creek Area, Dawson Range, Yukon Territory.

GENERAL SETTING

The area surveyed is located in the Dawson Range. The topography is unglaciated and consists of deep, narrow valleys separated by long, smooth-topped ridges. These ridges converge and culminate in monadnocks that consist of dome-like eminences or groups of relatively smooth-sloped mountains including the Dawson Range.

The generalized geology of the Dawson Range consists of Pre-Cambrian metamorphic rocks of sedimentary and igneous rocks (largely granite and granodiorite), probably of Cretaceous or Jurassic Age, apparently contemporaneous with the Coast Range Intrusives.

(H.S. Bostock. Physiography of the Canadian Cordillera with special reference to the area north of the fifty-fifth parallel. G.S.C. Memoirs 247.)

AIRBORNE FIELD PROCEDURE

The total intensity of the geomagnetic field on 42 flight lines and the dip angle and field strength of a VLF radio signal, and gamma radiation from bismuth 214, thallium 208, potassium 40, and all radioactive sources was measured and recorded along 104 flight lines, at an average terrain clearance of 500 feet. The survey was flown in a fixed wing aircraft, towing an airfoil magnetometer sensor.

The proton magnetometer, gamma ray spectrometer, and electromagnetometer (EM) unit were mounted in the aircraft, along with magnetic tape and chart recorders, altimeter, tracking camera, and Doppler navigation system. The magnetometer and spectrometer readings were recorded at one second intervals on the magnetic tape, along with the time, fiducial number and line number. Simultaneously, tracking camera photographs were taken, and each photograph was bordered by the fiducial number. The EM values were recorded continuously by the chart recorders.

MAP COMPILATION

The tracking camera film was developed and identifiable points on each flight line plotted on a mosaic of the survey area. A coordinate grid was superimposed on the flight lines, and the coordinates of each flight line or flight line section was digitized.

The magnetometer and spectrometer values were evenly distributed along the straight line segments. The magnetometer values were machine plotted and hand contoured. The smoothed potassium 40 values above 10 counts per second threshold were machine plotted and hand contoured. The major EM dip angle crossovers were picked and their location marked on the flight lines. The resultant 3 maps and analog EM records accompany this report.

Further data processing available for the magnetic and spectrometer data consists of:

- 1) removal of regional and/or residual;
- 2) second derivative filtering.

Computer data processing of the E.M. data would require digitizing the E.M. analog records. With data in digital form, the method of filtering reported by Fraser (Geophysics, Dec. 1969) can be applied, and the transformed data made into a contour map.

DISCUSSION OF AIRBORNE DATA

This section is intended as an aid to geologic interpretation of the airborne geophysical survey data.

In general, geophysical features which can originate from, or are associated with mineralization are used to localize favourable sites for more intensified exploration. The presence of certain minerals (e.g. magnetite, potassium feldspar) and geologic features (e.g. faulting) are detectable from geophysical observations. Faulting is sometimes expressed in a magnetic map as a steep gradient or magnetic low, and will usually give a strong VLF EM crossover. Thus, correlation between the EM crossovers and favourable magnetic features can be used in the search for fault zones. Interruptions of K₄₀ trends may also be indicative of faulting. EM crossovers, when accompanied by increased field strength, are good indicators of conductors (such as mineralized zones). Magnetic highs can be caused by increased concentrations of magnetic minerals. Potassium 40 high can be caused by rocks having higher concentrations of potassium feldspar and altered potassium feldspar.

However, there are effects which tend to mask the geophysical response of the source rock. The K₄₀ signal is very sensitive to terrain clearance differences. Both EM and K₄₀ signals are attenuated by the presence of

overburden. In general, the geophysical data from a survey of this type can only be evaluated after a detailed examination and comparison of the geophysical data, terrain clearance charts, air photographs and government photograph mosaic. For instance, the 59,300 gamma anomaly on the magnetic map may be due to an occurrence of concentrated magnetic minerals. However, relative to the other magnetic peaks, it may be partially influenced by terrain clearance. Thus, the 58,700 gamma anomaly adjacent to it may prove to have an equal concentration of magnetic minerals. The potassium 40 and magnetic lows which generally follow the drainage pattern may be an expression of faulted material, low in potassium feldspar, but may also be influenced by the presence of alluvium and higher terrain clearance. A check of the strip photographs and terrain clearance charts for these sections of the flight lines would be helpful. EM crossovers associated with the stream valleys, are probably influenced by both terrain clearance differences, soil and possible lithology changes. Generally E-W directed crossover patterns in the central portion of the map may mark lithology changes and faulting.

APPENDIX

INSTRUMENT SPECIFICATIONS

Aircraft

Type and Model: Excalibur 800
(Beechcraft Twin Bonanza modified by
Swearingen Aircraft, San Antonio,
Texas)

Power: Two 400 H.P. Lycoming 10-720-AIA
engines.

Gross Weight: 7900 pounds

Empty Weight: 5300 pounds

Useful Load: 2600 pounds

Fuel Capacity: 230 gallons (U.S.)

Performance at
7900 lbs. Gross: Climb - 1535 feet per minute (at sea level)
Cruise - 230 miles per hour.
Range - 1200 miles.

APPENDIXSPECIFICATION OF THE EXPLORANIUM DIGRS - 2000 SPECTROMETER

Crystals Three 6" x 4" NaI (TI) each coupled to three photomultiplier tubes.

Spectrum Stabilization Pulse height at output of detector maintained constant by spectrum stabilization using Cesium 137 as reference. Cesium 137 has an ultra-stable single gamma emission at .662 MeV, and half life of 32 years.

Channels Four. Each independently adjustable for E (peak energy level of channel-count) and ΔE (range of energy level counted)

Approximate values used:

	<u>E</u>	<u>ΔE</u>
Potassium 40	1.47 Mev	150 Kev
Bismuth 214	1.76 Mev	180 Kev
Thallium 208	2.62 Mev	270 Kev
Total count	2.05 Mev	1.2 Kev

Differential Linearity 1%

Resolution Better than 8.3% at .662 MeV & 1000 V

Mechanical Configuration - Designed to conform to TID - 20893

Recommended U.S.A. electrical and mechanical standard for nuclear instruments and power supplies.

Temperature Stability - Approximately .1% per °C

All pulse and analog processing circuiting is temperature compensated. Integrated circuits used throughout.

APPENDIX

SPECIFICATIONS OF THE V-4937A MAGNETOMETER SYSTEM

Performance

Range: 20,000 to 100,000 gamma (worldwide)
Sensitivity: $\pm 1/2$ and ± 1 gamma in any field.
Sampling
Rate: manual and "clock" operation permits any timing sequence.

Power Requirements

22-30 V, 6 amps for magnetometer, 60 watts for analog recorder and 100 watt maximum for digital recorder.

Physical Specifications

Console: size - 19 x 17 x 24 inches; Weight 68 lbs.
Analog
Recorder: dual channel - 15 x 10 x 10 inches, 30 lbs.
Scanner-
coupler: fucical counter, ident. control, 24 hr. clock, 40 lbs.
Recorder: size - 14 x 11 x 28 inches; Weight 41 lbs.

Data Output

Digital
Recording: BCD 1-2-4-8 (four line output)
"0" state - 18 to -30v through 100K ohms
1 state -1 to +3v through 100k ohms
Print
Command: Positive going 12 to 25v pulse; 15M second.
Auxiliary
Channels: A & B for radio altimeter and navigation equipment.
Analog
Recording: Galvanometric -1 mA full scale into 1500 ohms
Potentiometric: 100mV full scale. Minimum load resistance 20K
Full scale resolution of the least most significant digits of the total geomagnetic field
0-99, 0-999 at 1 gamma sensitivity; 0-49, 0-499 at 1/2 gamma sensitivity.

APPENDIX

SPECIFICATIONS OF THE McPHAR KEM (Kilocycle Electromagnetic) SYSTEM

Operation

The KEM operates as a receiver off of a horizontal primary electromagnetic field transmitted by a worldwide network of VLF radio stations operating in the 15 to 30 Kilohertz frequency range. The KEM system continuously measures the angle of the resultant field caused by a conductor, and variations in relative amplitude.

- (a) System noise approximately 0.5 microvolts rms.
- (b) Field strength measurement range ± 7.5 db
- (c) Tilt angle measurement range ± 30 degrees
- (d) Display; Field Strength and Field angle meters and analogue traces on Hewlett Packard analogue recorder.
- (e) Power Requirements 28 volts dc 0.2 amps
- (f) Receiver Console: Dimensions 14-1/2" X 9-1/6" X 7"
Weight 12 lbs.
- (g) Sensor Unit Dimensions 10 1/2" X 5 1/2" X 5"
Weight 1.25 lbs.

Performance

The VLF electromagnetic systems are high frequency systems with respect to frequencies used by most electromagnetic methods. (15-30 Kilohertz verses 1 Kilohertz). Thus any airborne VLF system in addition to detecting massive sulphides will be sensitive to changes in surface conductivities, topography, aircraft movement and heading.

APPENDIX

Instrument Specifications

Camera

Type: Neyhard Automax 35 m.m. pulse camera

Model: G-2 with auxiliary data box

Pulse Rate: Up to 10 frames per second

Film Format: 0.738" x 0.738" square picture with
0.200" x 0.738" data area.

Magazine: Mitchell 400 foot 35 m.m.

Lenses: (a) 17 m.m. F/14 Super-Takumar Fish-eye
(b) 35 m.m. F/2.0 Super Takumar

Data Box: (a) 24 hour Accutron Clock
(b) Frame counter
(c) Available for optional feature

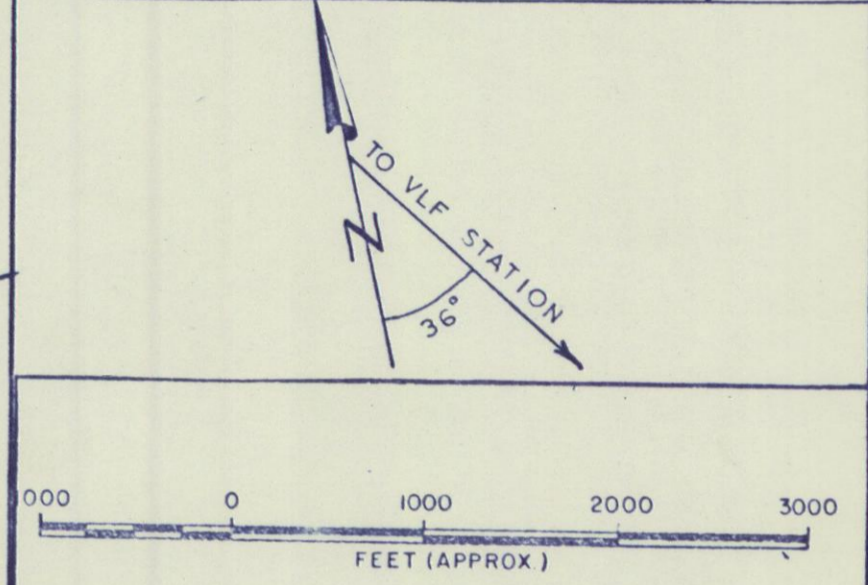
Dimensions
(less magazine): 8 3/8" high, 4 1/2" deep, 6 1/4" wide.

Weight
(less lens and
magazine): 12 lbs.

CARMACKS - BIG CREEK AREA
 WHITEHORSE M.D.
 YUKON TERRITORY

CLAIMS,
 FLIGHT LINE LAYOUT
 & E.M. CROSSOVERS

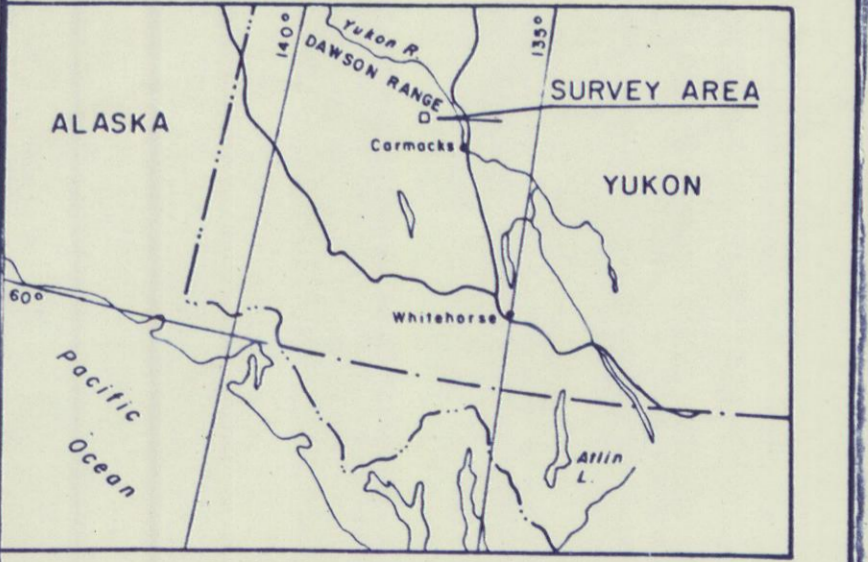
DRAWN	T.M. & P.P.N.	JOB NO.	FIG. NO.
DATED	OCT. 6, 1970	1150	3
CHECKED	<i>[Signature]</i>		



G GEO - X SURVEYS LTD.

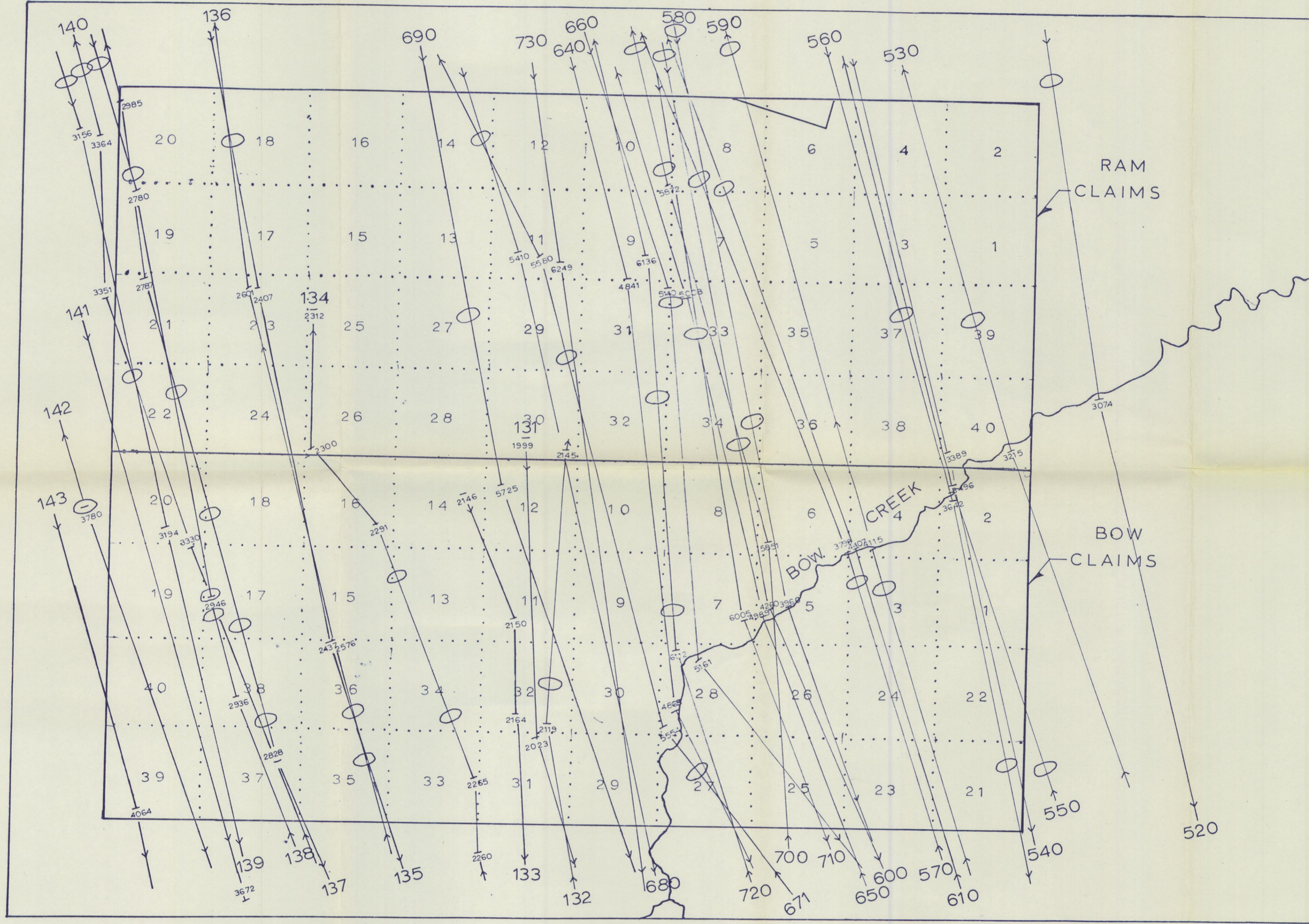
SURVEY SPECIFICATIONS
 LINE SPACING - 660'
 FLIGHT DIRECTION - N.S.
 MEAN TERRAIN CLEARANCE - 500'

Flight Lines
 324 - Fiducial Numbers
 300 - Line Number
 90 - Line Number



INDEX MAP
 SCALE: 1" = 120 MILES

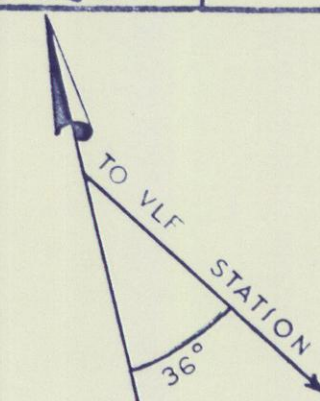
○ TRUE E.M. CROSSOVERS




CARMACKS — BIG CREEK AREA
WHITEHORSE MD
YUKON TERRITORY

TOTAL
ISOMAGNETIC PLAN
CONTOUR INT. : 50 GAMMAS

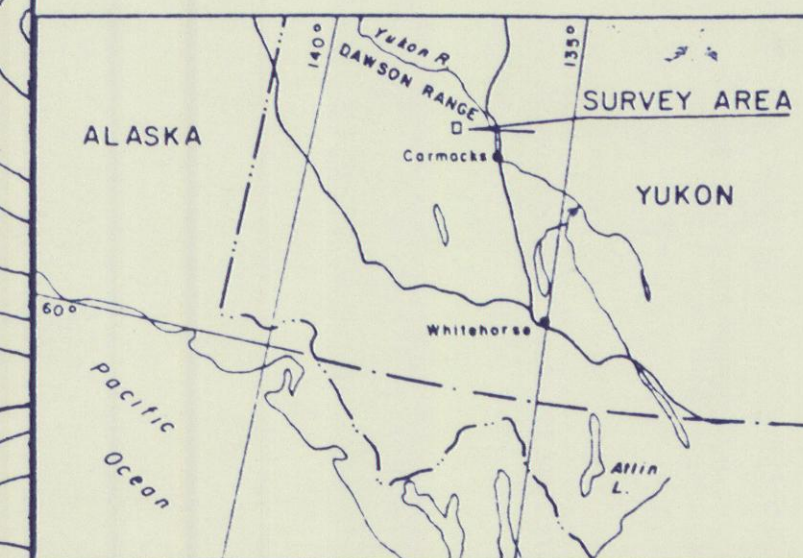
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DATED	OCT 6, 1970	1150	4
CHECKED	<i>James G. ...</i>		



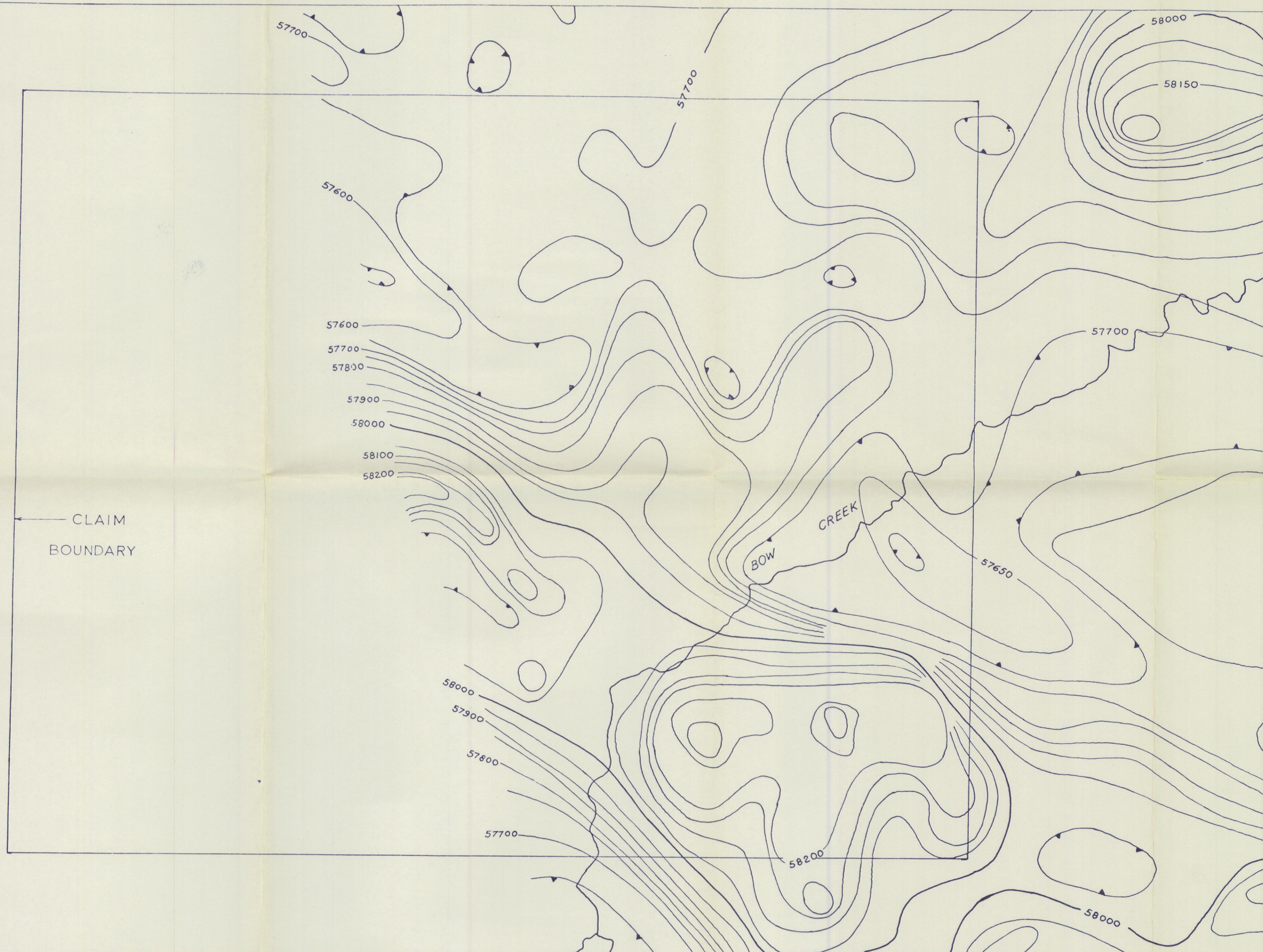
 **GEO - X SURVEYS LTD.**

SURVEY SPECIFICATIONS

LINE SPACING — 660'
FLIGHT DIRECTION — N S
MEAN TERRAIN CLEARANCE — 500'

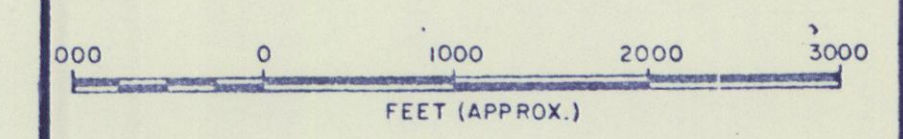
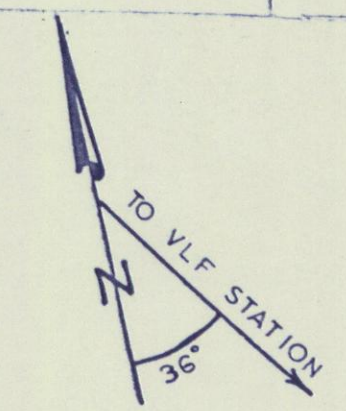



INDEX MAP
SCALE 1" = 120 MILES



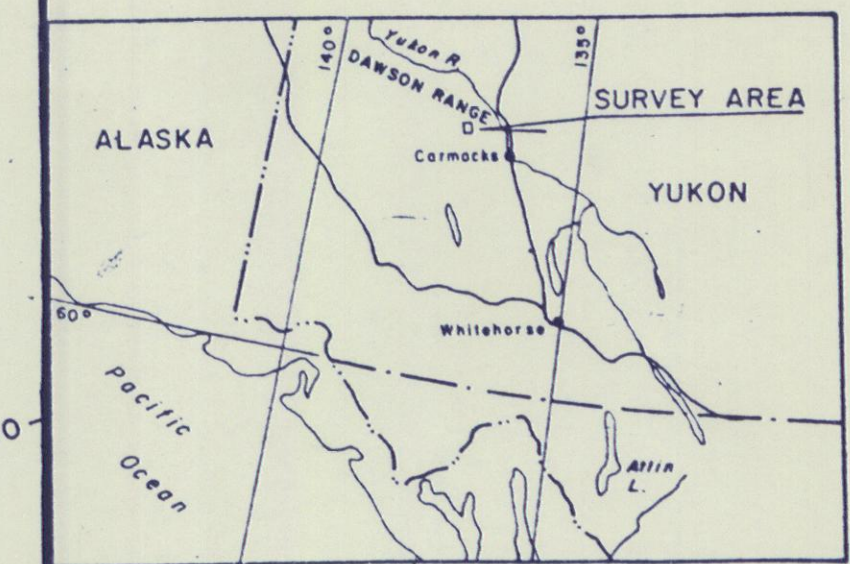
POTASSIUM 40
CONTOUR INT. : 5 C.P.S.

DRAWN	T.M.	JOB NO	FIG NO
DATED	OCT 6, 1970	1150	5
CHECKED	<i>James [unclear]</i>		



 GEO - X SURVEYS LTD.

SURVEY SPECIFICATIONS
LINE SPACING — 660'
FLIGHT DIRECTION — N.S.
MEAN TERRAIN CLEARANCE — 500'



INDEX MAP
SCALE : 1" = 120 MILES

