#### GEOPHYSICAL REPORT

on an

AIRBORNE MAGNETOMETER SURVEY

of the

CONTIGUOUS 48 WINCO CLAIMS

Situated

In the Turnagain River Area

Some 28 Miles Due East of

CRY LAKE, NORTHERN BRITISH COLUMBIA

and centered at

Latitude 58° 46'N Longitude 128° 08'W

on behalf of

WINCO MINING AND EXPLORATION LIMITED

by

GEO-X SURVEYS LTD. Vancouver, B.C.

October 9, 1969

Instrument Operator:

Report by:

Dave Worrall

G.E. White, B.Sc.

D.R. Cochrane, P. Eng.

James Cerne, M.S.





604-685-0312 TELEX 04-50404

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

# 2342 TABLE OF CONTENTS

Summary and Recommendations	1,2
Preface	3
Introduction	4
Location and Access	4
Claims and Ownership	4,5
General Setting	5
Airborne Field Procedure	6,7
Data Processing	7,8,9
Discussion of Results	9,10,11

#### Appendix:

I Certificate

II Personnel and Dates Worked

III Cost Breakdown

IV Instrument Specifications

#### Figures:

#/1.	Location Map	age	4a		
#22.	Claim Map	e e	5a		
#33.	Black Line Mosaic and Flight Line Plan	? Lar	Ro	Act	
#4 4.	Isomagnetic Plan and General Interpretation	R.		21	
#5 5.	Isoresidual Map	e)		7	
# 6.	Topography	71		<i>n</i>	

### SUMMARY AND RECOMMENDATIONS

During the early part of August, 1969 Geo-X Surveys Limited completed 28 line miles of total field aeromagnetic surveying on the Winco Claim Group, situated due east of Cry Lake in Northern British Columbia on behalf of Winco Mining and Exploration Limited.

The survey was completed in an Excalibur 800 fixed wing aircraft with a Varian V4937A proton precession magnetometer (1 gamma); SDV 4991 digital recorder and analog chart recorders. Flight line positioning was facilitated by 35 mm strip photography matched to mosaics prepared from Government airphotos (see accompanying Figure 3). Terrain clearance was recorded in analog mode by a radar-type pulse altimeter.

Data processing was conducted by Geo-X Surveys Ltd. personnel using IBM equipment in Vancouver.

The total field isomagnetic plan (Figure 4, 1"= 1000') was plotted by a computer-plotter unit at a contour interval of 5 gammas.

Computer programmed trend surface residual analysis of the contoured magnetic data was also completed. Figure 5 is the resulting isoresidual magnetic map contoured at a contour interval of 5 gammas.

The total intensity isomagnetic contour plan shows only small variations in magnetic intensity, indicative

of monolithologic geological terrain containing little ferromagnetic material. The general northwest-southeast low shown
on the isoresidual map tends to align with photo-indicated
geological linears. The cause and significance of this trend
is unknown, but may be determined by ground investigation if
at some time the property is geologically inspected.

Respectfully submitted,

Glen N. Geophysio

D.R. Colinary, P. Eng.

James Cerne, M.S.,

Geophysicist

#### PREFACE

Since ferromagnetic susceptibility and natural rock magnetism change measurably from one rock type to another, accurate detailed mapping of the geomagnetic field often provides valuable information about the subsurface geology (even in heavily drift covered areas). Aeromagnetic surveys provide new knowledge of the type, general attitude, configuration and complexity of the geosuperstructure and often identifies local elements which sometimes indicate ore. 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. Considerable speed and accuracy is inherent in this survey method. When it comes to interpretation, however, there are two factors which can exert considerable influence. first is geologic control, which reduces the number of variables that the interpreter must consider. The second is data analysis, which is essentially the use of filtering techniques. Filtering can remove noise, regional variation, and the effects of various physical phenomena (such as the effect of topography, or changing depth of burial). In addition, interpretation techniques (explaining the data) must be flexible enough to be revised in the light of new geological, geochemical or geophysical information.

#### INTRODUCTION

On August 15, 1969, Geo-X Surveys Limited of Vancouver, British Columbia, on behalf of Winco Mining and Exploration

Limited conducted an Airborne Magnetometer Survey over a group of claims in the Turnagain River area east of Cry Lake in the northern area of the Province of British Columbia.

A total of 28 line miles of total intensity airborne magnetometer surveying was conducted. This report describes the instrumentation, field procedure and data processing, and discusses the results obtained.

#### LOCATION AND ACCESS

The group of claims covered by this report is centered at latitude 58° 46'N and longitude 128° 08'W approximately 28 miles east of Cry Lake, British Columbia, and approximately 95 miles South, South-East of Watson Lake, Yukon Territory.

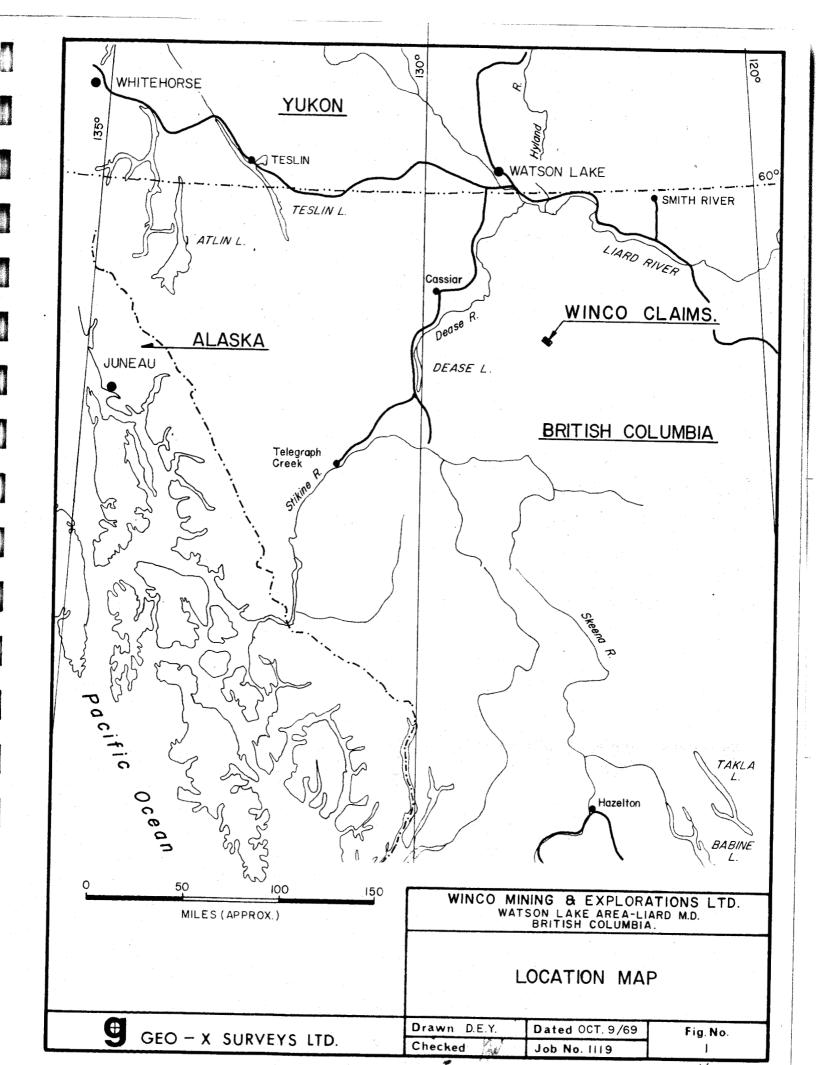
Direct access to the property is by helicopter from Watson Lake, Yukon Territory, where British Columbia Yukon Helicopter Services are located.

#### CLAIMS AND OWNERSHIP

The Winco Claim Group consists of some 48 contiguous mining claims listed as follows:

Claim Names: Winco 1-48 inclusive

Claim Numbers: 32248 - 32295 inclusive



The claims are owned by, and the survey was conducted on behalf of Winco Mining and Exploration Limited, registered office; 1108 - 1111 West Hastings Street, Vancouver, British Columbia.

#### GENERAL SETTING

The Winco Claim Group lies on the northern slope of an unnamed mountain in the east central area of the Stikine Mountain Range. The Stikine Mountain Range consists of folded sedimentary and volcanic rocks of Paleozoic and Mesozoic age which have been intruded by the Cassiar batholith, a composite batholith of Jurassic or Cretaceous age.

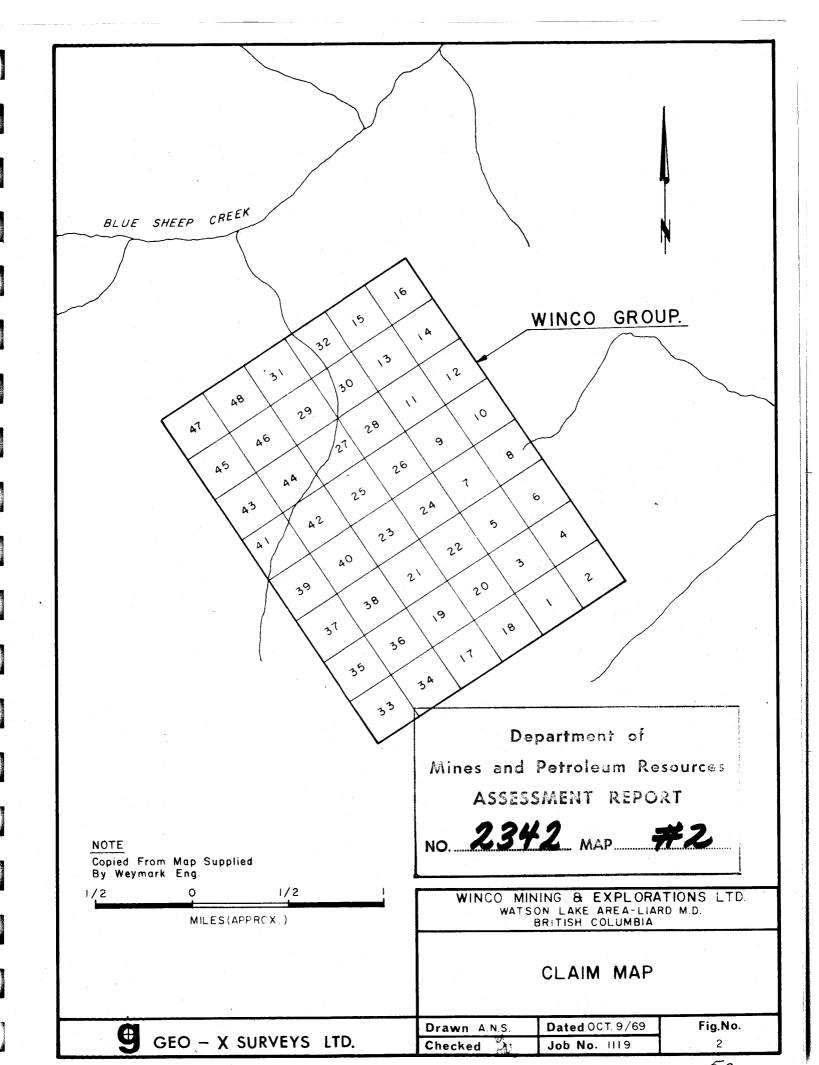
Peaks and ridges especially on the north and northeast slopes are sharply scalloped by cirque glaciers as can be seen in figure 3. Below 6000 feet the ridges and summits are more rounded and gently undulating. The valley bottoms are drift filled and normally maintain elevations between 3,500 and 4,000 feet.

\* Reference: Bulletin No. 28 - Stuart S. Holland

Land forms of British Columbia A physiographic

outline: British Columbia Department of Mines and

Petroleum Resources.



#### AIRBORNE FIELD PROCEDURE

The total intensity of the geomagnetic field was measured and recorded along northeast - southwest and northwest - southeast flight lines, directed to maintain an average terrain clearance of 500 feet.

The survey was flown in a fixed wing aircraft, towing an airfoil sensor. A proton magnetometer, digital and chart recorders, camera and altimeter were mounted in the aircraft. The magnetometer and chart recorder continuously measured and recorded the magnetic field intensity. At one second intervals, the field amplitude and fiducial number were recorded on punch tape by the digital recording system. At thirty second intervals, the time and line number were punched on the tape. At two second intervals, a split image camera simultaneously photographed (1) the terrain, and (2) the clock and fiducial display panel. Thus each terrain photograph is bordered by a photograph of the clock and fiducial number.

The terrain clearance was measured with a Bonzar pulse type radar altimeter and recorded in analog mode by a G-2000 chart recorder.

Solar flare warnings and predictions, issued daily at the Space Disturbance Forecast Center in Boulder, Colorado, were used to schedule the flight during a magnetically quiet period.

The punch tape, chart and strip photograph processing is described in the following section. Instrument specifications are in Appendix IV.

#### DATA PROCESSING

The data processing procedure consisted of four steps, discussed under the following headings:

- 1. Flight line X-Y positioning.
- 2. Editing of the paper tape.
- 3. Tabulation of critical fiducial numbers and their X-Y coordinates.
- 4. Contour plotting;

#### 1. FLIGHT LINE X-Y POSITIONING

From the aircraft, while the lines were being flown, the flight lines were roughly positioned on government aerial photographs. In the office, the beginning and end of each flight line was marked on the strip photographs. From the strip photos Geo-X personnel transferred the flight lines on to a mosaic prepared from the government photos. An X-Y co-ordinate system was also superimposed on the flight line mosaic with +y north and +X east (see Figure 3). Thus, every position along a flight line was defined in terms of X (number of feet east of the origin) and Y (number of feet north of the origin), and has a corresponding magnetic value in gammas.

#### 2. EDITING OF THE PAPER TAPE

A listing of the contents of the paper tape was made by IBM of Vancouver. The listing was examined and compared with the analog record as a guard against possible machine or operator error.

#### 3. TABULATION OF CRITICAL FIDUCIAL NUMBERS

The first and last fiducial number on each line were tabulated along with their X-Y coordinates. In addition, points where the flight line changed direction were tabulated along with the appropriate fiducial number. The tabulated information was keypunched onto computer cards and sent with the punch tape to IBM.

#### 4. CONTOUR PLOTTING OF THE ISOMAGNETIC MAP

IBM fed the punch tape to its computer, along with the X-Y coordinates of the start, end and any changes of direction that may have occurred in the flight line. The data sampling interval along the flight lines was roughly 160 feet. The magnetometer readings were evenly spaced along the line segments and contoured by a computer-plotter unit at a contour interval of 05 gammas.

#### Part II - TREND RESIDUAL SURFACE COMPUTATION

The total intensity of the geomagnetic field is the sum of the earth's deep-seated field and the fields produced

by near surface conducting or magnetic bodies (there are other contributions as well, but they need not be considered here). The interpreter of an isomagnetic map can be greatly assisted if the geomagnetic field is separated into its various components and the uninteresting components removed. Many methods of separating the field are in common use today; one of them is trend surface-residual analysis, and this was the method selected. This method assumes that the trend surface represents deep-seated effects, and the residual values are near surface contributions to the magnetic field (hence of possible economic interest).

In this case, since the magnetic terrain contained little relief, the regional trend can be approximated by a gently east to west dipping planar surface. The grid mesh point coordinates for the planar surface where chosen identical with those used for contouring the total field magnetic data. The trend surface grid values were then subtracted from the data grid values with a "Grid to Grid Operations" program. The resulting residual grid was contoured at an interval of 05 gammas by a Cal-Comp plotter. See Figure 5.

#### DISCUSSION OF RESULTS

A total intensity isomagnetic contour plan and general interpretation map is presented as figure 4. To obtain the actual terrestrial total field magnetic value add

50,000 gammas to the isomagnetic contour values. The isoresidual magnetic contour plan is illustrated as figure 5. The distortation normally associated with photomosaics is readily apparent in Figure 3 because of the topographic relief. Since the flight line tracking is controlled by the mosaic this distortation is inevitably imparted in Figures 4 and 5. Therefore, figures 3,4, and 5 are at an approximate scale of 1"= 1000 feet.

N.T.S. map number 104P. As is illustrated in figure 6, the property is generally on the summit of a ridge represented approximately by the 5,500 contour. However, as shown in figure 3, there are several ridges which inhibit airborne surveying by helicopter or fixed wing. Thus an irregular survey pattern is inevitable and resulted from trying to maintain a constant terrain clearance. Magnetic susceptibility contrast of the bedrock in the area surveyed is very low, as can be seen by the small range in total intensity on the isomagnetic contour plan. This would indicate that the survey area is underlain by a lithologic unit or units characterized by low ferromagnetic susceptibility material.

The magnetic intensity varied from a low of 58615 gammas in the northwestern section of the claim group to a high of 58655 gammas in the southwestern section. An isoresidual magnetic map, from which an assumed regional trend has been removed, was constructed to try to aid interpretation,

(see figure 5). This map shows a northwest - southeast directed low which generally tends to align more with the photo-indicated linears than do the total intensity contour patterns. Its cause is unknown.

The significance of the low trend indicated on the isoresidual map may be determined by a geologist, should the property be mapped geologically, in his geological consideration of the claim group.

Respectfully submitted,

Glen E. White, Geophysicist

Geophysicist

James Cerne, M.S. Geophysicist

Superv

 $\overline{D.R.}$ 

P. Eng.

#### <u>C E R T I F I C A T I O N</u>

TO WHOM IT MAY CONCERN:

I, GLEN ELMO WHITE, of the City of Vancouver in the Province of British Columbia, hereby certify:

- 1. That I am a Geophysicist and reside at 112 - 641 Gilbert Road, Richmond, British Columbia.
- 2. That I studied Geophysics and Geology and graduated from the University of British Columbia with the degree of Bachelor of Science.
- 3. That I have been engaged in Mining Exploration for eight years.
- 4. That I do not have, nor do I expect to receive, either directly or indirectly, any interest in the property, or in the securities of WINCO MINING AND EXPLORATION LTD.
- That this report is based on information derived from an 5. Airborne Magnetometer Survey carried out by GEO-X SURVEYS LTD.

Dated this 9th day of October 1969 .

Ge ophysicist

#### PERSONNEL

NAME:

COCHRANE, Donald Robert

EDUCATION:

B.A.Sc. - University of Toronto M.Sc. (Eng.) - Queen's University

PROFESSIONAL

ASSOCIATIONS:

Professional Engineer, (P. Eng.), registered in British Columbia,

Ontario, Saskatchewan.

M.C.I.M.M., M.E.I.C., M.G.A.C.,

M.M.A.C.

EXPERIENCE:

Engaged in the Profession since 1962 while employed with Noranda Exploration Co. Ltd., Quebec Cartier Mines Ltd., Meridian Exploration Syndicate.

Experience in West Indies, Central and

South America, U.S.A. and Canada.

#### PERSONNEL

Name:

WHITE, Glen E.

Education:

B.Sc. Geophysics - Geology University of British Columbia.

Professional Associations:

Associate member of Society of Exploration Geophysicists.

Experience:

Pre-Graduate experience in Geology-Geochemistry-Geophysics with Anaconda American Brass.

Since Graduation in 1966 in Geophysics - Geology, has obtained experience in Mining Geophysics with Sulmac Explorations Ltd.

Airborne Geophysics with Spartan Air Services consulting on second derivative.

Micro-Gravity project with Velocity Surveys Ltd.

Recently acted as mining Geophysicist and technical Sales Manager in the Pacific north-west for W.P. McGill and Associates.

Presently employed as Airborne and Mining Geophysicist with Geo-X Surveys Ltd.

Active experience in all Geologic provinces of Canada has been obtained.

#### PERSONNEL

NAME:

CERNE, James

EDUCATION:

B.S. Geology (June 1967)

Case Institute of Technology - Cleveland,

Ohio.

M.S. Geophysics (August 1968)
California Institute of Technology Pasadena, California.

**EXPERIENCE:** 

July 1965 - June 1967 - Metallurgy Dept., Case Institute of Technology - Student Asst.

June - September 1967 - N.A.S.A. Manned Spacecraft CNT. Lunar and Earth Sciences Div., Geophysics Group, Houston, Texas.

September 1967 - August 1968 - California Institute of Technology, Seismological Laboratory, Graduate Research Asst.

September 1968 - present. Employed by Geo-X Surveys Ltd. as Geophysicist.

#### PERSONNEL

NAME:

WERNER, David Thomas

EDUCATION:

La Salle College, Philadelphia, Pa.

Night school courses - Pennsylvania

Military College, University of Mississippi

Extension, Baylor University.

MILITARY SCHOOLS:

Aviation/Cadet Pilot Training - Laughlin

A.F.B., Texas.

Squadron Officers School, Maxwell A.F.B.,

Alabama.

Instructor Pilot Instrument School,

Randolph A.F.B., Texas.

**EXPERIENCE:** 

October, 1955 to February, 1969 Employed by the U.S. Air Force, as a
Captain. Flying experience - 6,250
hours total. Duties included Fighter
pilot, Assistant Operations Commander,
Administrative Officer for Group Commander,

Transport pilot, Instructor pilot and Officer-in-charge -- Base Instrument

School.

Approximately 1,000 hours flying low level missions 500 feet or less. 860 hours flying in Viet Nam using 1,250,000

charts (High and low level).

July 1, 1969 - present - Employed by

Geo-X Surveys Ltd. as a pilot.

#### PERSONNEL

NAME:

WORRALL, David Spencer

EDUCATION:

B.A.

B.Litt. - University of New England,

Armidale, N.S.W.

**PROFESSIONAL** 

ASSOCATIONS: N.S.W. Geography Teachers' Association

Australian Geographic Society

**EXPERIENCE:** 

Teaching Geography N.S.W. Education

Department - ten years.

Land-use and Population Studies (Part Time) for U.N.E. - 1965 - 1969.

Employed by Geo-X Surveys Ltd. - present

#### PERSONNEL

NAME:

RODDY, Robert B.

EDUCATION:

Senior Matriculation - Alberta

Military Courses Attained:

1942 - Air Observer; 1948 - Photographic Technician; 1949 - Air Camera Operator; 1956 - Photographic Supervisor; 1956 - Camera Recorder Repair; 1957 - Junior Officer; 1957 - Public Relations Officer; 1959 - Flying Officer's Qualifying Exams; 1960 - Technical Photographic Officer; 1963 - Technical Officer's Radiological Defence; 1964 - Technical Officer's Logistics; 1966 - Royal Canadian Air Force Staff School; 1967 - Program Evaluation and Review Techniques.

#### **EXPERIENCE:**

- 1964 68: Manager-Photographic Logistics Cell at Material Command Headquarters -Canadian Armed Forces, Ottawa.
- 1959 64: Staff Officer-Photography at Training Command Headquarters, Royal Canadian Air Force, Winnipeg.
- 1957 59: Public Relations Staff Officerat Training Command Headquarters, Royal Canadian Air Force, Trenton.
- 1947 57: Supervisor-Photographic Services Unit at various R.C.A.F. stations throughout Canada and England.

#### PERSONNEL

NAME:

DOBSON, Lionel John

EDUCATION:

June 1966 - Grade 12; Brentwood College, Mill Bay, B.C.

May 1968 - 1st year University; University of Victoria, Victoria, B.C.

December 1968 - Private Pilot licence - Victoria Flying Club.

**EXPERIENCE:** 

September 1968 - April 1969 - Mapping Assistant.

May 1969 - June 1969 - Survey Assistant.

The above positions - Employed by B.C.

Government, Victoria.

June 1969 - present - Employed by Geo-X Surveys Ltd. as Air Crew Navigator and Photo Co-ordinator.

#### PERSONNEL

Name: KEY, Robert A.

Education: Grade XII Diploma.

1 year Petroleum Geology at the Institute

of Technology and Arts in Calgary.

Experience: 2 years in Steam Heating Design Drafting.

12 years with Mobil Oil Canada Limited,

Senior Draftsman.

#### PERSONNEL

Name: YIP, David Edward

Education: Grade 12 - Majors: Science, Mathematics,

Social Studies and

Industrial Arts.

Lake Cowichan Secondary School

1 year - Vancouver Vocational Institute -

Drafting Training.

Experience: Presently employed by Geo-X Surveys Ltd.

since November 27, 1967 as Draftsman.

#### PERSONNEL

NAME:

SCHAMPIER, Anthony Nicholas

EDUCATION:

July, 1966 - Graduated from Newent

Grammar School in England.

July, 1968 - Graduated from Richmond Highschool in Richmond, B.C. on the Industrial programme - Drafting,

Mechanics, Construction, English and

Mathematics.

July 18, 1969 - Graduated from V.V.I. after taking a twelve month drafting

course.

**EXPERIENCE:** 

Presently employed with Geo-X Surveys

as a Draftsman.

#### PERSONNEL AND DATES WORKED

The following Geo-X Surveys Ltd. personnel were employed on the Winco Mining and Exploration Ltd. airborne magnetometer survey project.

#### A. FIELD WORK

D.	Werner		Pilot	August	15,	1969
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#### B. DATA PROCESSING AND REPORT PREPARATION

	D.R.	Cochrane	October	11,	1969
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#### C. DRAFTING AND REPRODUCTION

R.	Key		Julv	8.	Aug.	5.	. 8
· 17 •	vea		July	ο,	Aug.	၁,	۲

Mould

#### COST BREAKDOWN

	The fo	ollowing is a cost breakdown for an Airborne
Magnetomet	er Su	rvey conducted over the Winco
		Claim Groups by Geo-X Surveys
Ltd. throu	gh an	Agreement withWinco Mining and Explorations
Limited		_dated_October 15 1969.
(	Geo-X	Surveys provided the following for an all
inclusive p	price.	
	(a)	Air Photo Mosaic
	(b)	Aeromagnetic Survey Coverage
	(c)	Base Map Preparation
	(d)	Preliminary Data Preparation
	(e)	Computer Data Processing
	(f)	Report Preparation
	_28_	line miles at \$ 142.85 per line mile
		ALL INCLUSIVE TOTAL PRICE \$4,000.00
		S.L. Sandner, President.

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## ADDENDUM TO REPORT ON BEHALF OF WINCO MINING AND EXPLORATIONS LIMITED

## APPENDIX III COST BREAKDOWN

The following is a cost breakdown for an Airborne Magnetometer Survey conducted over the Winco Claim Groups by Geo-X Surveys Ltd. through an Agreement with Winco Mining and Explorations Limited dated August 5, 1969.

Geo-X Surveys provided the following for an all inclusive price.

- (a) Air Photo Mosaic
- (b) Aeromagnetic Survey Coverage
- (c) Base Map Preparation
- (d) Preliminary Data Preparation
- (e) Computer Data Processing
- (f) Report Preparation

28 line miles at \$171.43 per line mile

ALL INCLUSIVE TOTAL PRICE

\$4,800.00

S. L. Sandner, President

Morel

## SPECIFICATIONS OF THE V-4937A MAGNETOMETER SYSTEM

#### Performance

Range: 20,000 to 100,000 gamma (worldwide) Sensitivity:  $\pm 1/2$  and  $\pm 1$  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 -  $15 \times 10 \times 10$  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)

"O" 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.

#### 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.

#### 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"  $\times$  0.738" square picture with 0.200"  $\times$  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.

