

REPORT ON A  
HELICOPTER E.M. AND MAGNETOMETER SURVEY  
KWUN LAKE AND GIBBONS CREEK PROJECTS

NTS 93A16 <sup>3</sup> 6W  
CLAIMS: KWUN 1-4  
LEMI-2

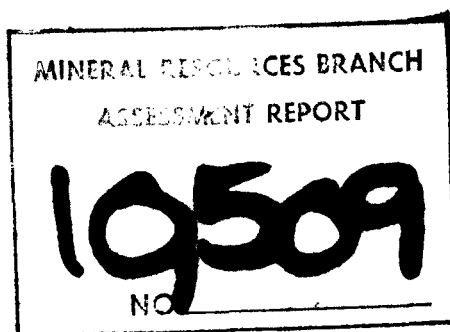
HORSEFLY LAKE, BRITISH COLUMBIA

CARIBOO MINING DIVISION

FOR

ORBEX MINERALS LIMITED  
410 - 675 West Hastings Street  
Vancouver, B.C.  
V6B 1N2

SURVEY DATE: February 27, 1981



May 25, 1981  
Vancouver, B.C.

Apex Airborne Surveys Ltd.  
Ronald F. Sheldrake, B.Sc.

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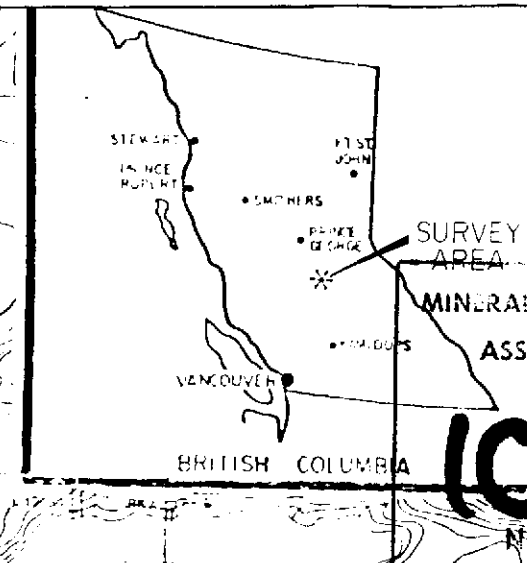
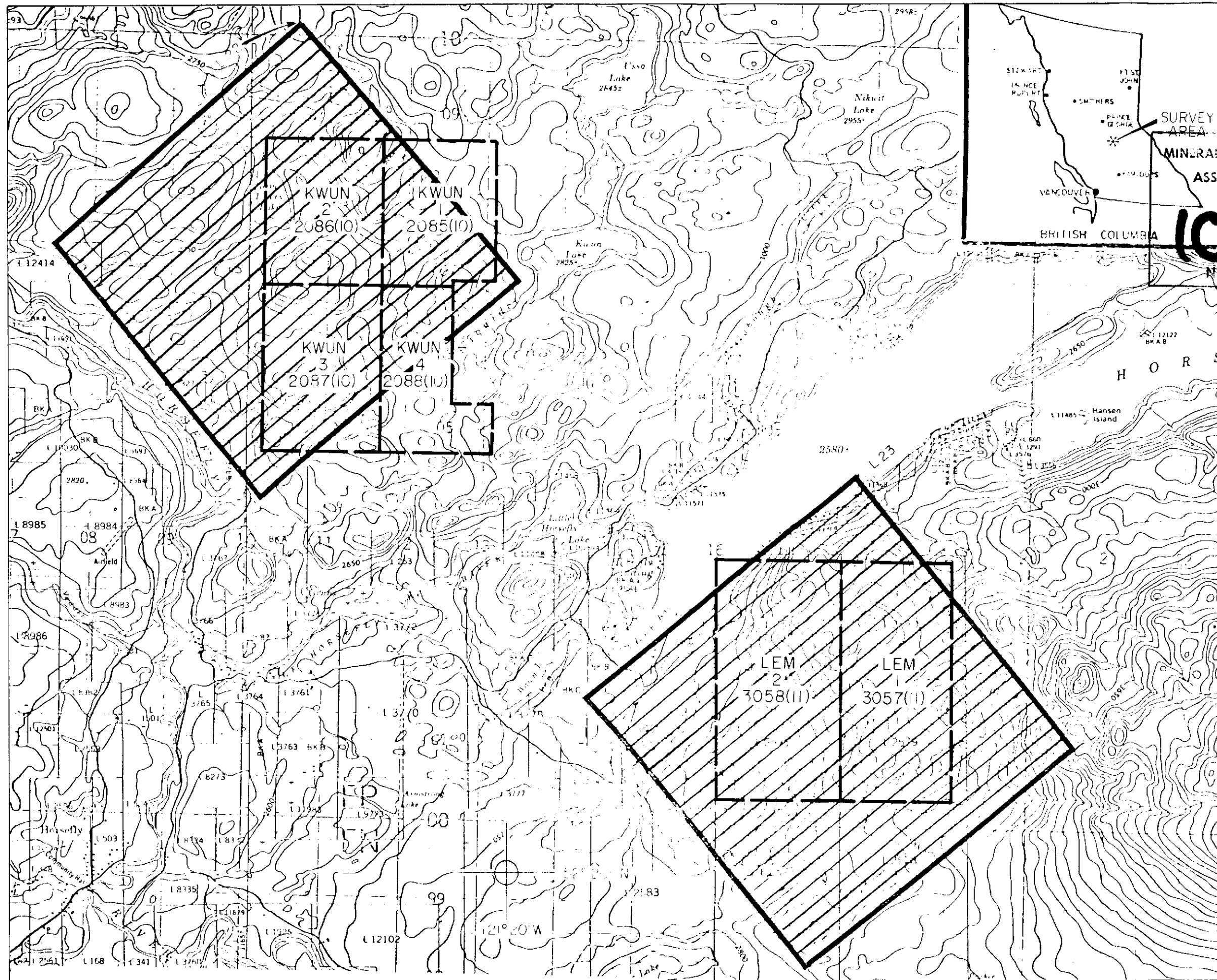
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CERTIFICATION

STATEMENT OF COSTS



SURVEY AND CLAIM  
LOCATION  
MAP

MINERAL RESOURCES BRANCH  
ASSESSMENT REPORT

10,509  
NO.

ORBEX  
MINERALS  
LTD.

1:50,000  
METRES 000 500 1000 METRES  
CONTOUR INTERVAL 100 FEET

KWUN LAKE AND  
GIBBON'S CREEK

CARIBOO MINING DIVISION  
BRITISH COLUMBIA

NTS 93 A/6

FIGURE 1

PRODUCED FROM NATIONAL N.T.S. SERIES



1. SUMMARY

No conductive targets suitable as prospects for massive sulphide mineralization were identified on this survey.

An interpretation of the magnetic data has provided a map that may be used as a guide for locating "contact type" mineralization.

Recommendations for follow-up have been made.

## 2. INTRODUCTION

This report describes the results of a combined helicopter-borne electromagnetic and magnetic survey undertaken on behalf of Orbex Resources Ltd.

The survey traverses totalled 200 linear kilometres and were flown in two separate grids over the KWUN and LEM Claim groups. The traverses were oriented at 045°T at a 200 metre traverse interval.

The survey was flown over the two claim blocks February 27, 1981. The terrain ranged in elevation from 760 metres to 1150 metres.

A terrain clearance of 30 to 40 metres for the electromagnetic sensor was maintained where possible.

The Geonics 33-1 Electromagnetometer is a solid state system especially designed for helicopter transport.

It consists of two coaxial coils, one serving as a transmitter and the other as a receiver, which are mounted 6 metres apart, in a rigid "bird" with their axes horizontal and in the direction of flight. The bird is towed 30 metres below the helicopter by means of a suitable cable which also carried the electrical signals and power to and from the bird.

The system operates at 918 hertz. Changes in the alternating magnetic field at the receiver coil, caused by eddy currents in the subsurface rock, are recorded. These changes are expressed in ratios of the normal undistorted primary field. They are so small as to be expressed in parts per million or p.p.m.

The magnetometer used on this survey was a Geometrics 803. It is a total field nuclear precession instrument which measures the magnetic field strength with a sensitivity of one gamma. The sensor is toroidal and is positioned half way between the helicopter and the E.M. 33-1 bird.

Appendix I gives details of the geophysical equipment used for this survey. Appendix II describes the flight record and flight path recovery process.

CLAIMS

## KWUN LAKE AREA

<u>CLAIM NAME</u>	<u>RECORD NUMBER</u>
KWUN1	2085 (10)
KWUN2	2086 (10)
KWUN3	2087 (10)
KWUN4	2088 (10)

## GIBBONS CREEK AREA

<u>CLAIM NAME</u>	<u>RECORD NUMBER</u>
LEM 1	3057 (11)
LEM 2	3058 (11)

LOCATION AND ACCESS

Both claim groups are easily accessible by gravel road from Williams Lake to the Horsefly Lake area. The claims areas are serviced by logging roads.

### 3. DATA PRESENTATION

#### 3.1 Electromagnetics (Plate I)

The Electromagnetic Survey Profiles Map shows the profiles of inphase and quadrature E.M. responses along the flight lines. The E.M. profiles are transcribed and plotted from the digital chart recorded in flight, after assigning a suitable base level value.

#### 3.2 Magnetics (Plate II)

The Total Field Magnetic Map shows contours of the total magnetic field uncorrected for regional variation. The maps are plotted from the digital chart recorded in flight, and contoured at an interval of 25 gammas. The 100 gamma and 100 gama contours are "weighted" for clarity.

### 3.3 Interpretation Map (Plate III)

The Interpretation Map provides a summary of the interpreted information. Formational responses, rock types, contact zones and photo-lineaments are displayed as well as target conductors that may be suitable for massive sulphide exploration.

#### 4. INTERPRETATION

Both Magnetic and Electromagnetic Maps can be interpreted to reveal areas underlain by different rock types and lineaments which could indicate contact or fault zones. Magnetic Maps can reveal the location of orebodies which contain higher percentages of magnetite or pyrrhotite than the surrounding rocks.

Conductivity thickness is the "parameter-pair" measured with the electromagnetometer. Materials which conduct electronically, metallic sulphides and graphite, have higher conductivity-thickness values than electrolytic conductors such as clays (in overburden) and ion-rich sloughs or creeks, however, there is considerable overlap.

In general, the electromagnetic responses encountered by an electromagnetic survey are of four main types.

1. Bedrock conductors: including formational graphitic responses and massive sulphide targets.
2. Surficial conductors: overburden and lake responses.



3. A combination of 1 and 2: when a conductive material overlays a bedrock conductor the response due to the bedrock is superimposed on the response of the overburden or lake response. Depending upon the conductivity contrasts, and the thickness of the overburden, some bedrock conductors can be recognized through the surficial layer.
  
4. "Negative" magnetic effects: When conductors are also magnetic, the electromagnetic responses can become distorted. The distortion tends to decrease the inphase response, often reversing the sign of the E.M. anomaly. Apparent depths and conductivity-thickness products, in this case, are generally not representative.

5. DISCUSSION OF RESULTS

Although there were many overburden and magnetic permeability responses, no conductance anomalies were recorded by the electromagnetic survey that were identifiable as prospects for massive sulphide mineralization.

The magnetic results, however, were useful in delimiting structural and contact features and may provide a guide to further exploration in the area.

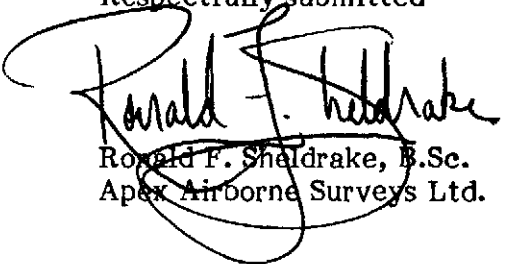
See PLATE III for a summary of the interpreted data.

6. CONCLUSIONS AND RECOMMENDATIONS

The geophysical survey was not successful in identifying any E.M. targets, but did provide a useful guide to the "magnetic formations" in the area.

It is recommended that a geochemistry survey be undertaken in areas of the interpreted contacts with intrusive rocks. As a second phase, areas of positive geochemistry results should be followed up with induced polarization surveys. Drill targets ought to be identifiable from that data.

Respectfully submitted



Ronald F. Sheldrake, B.Sc.  
Apex Airborne Surveys Ltd.

BIBLIOGRAPHY

Geonics Limited (Toronto) "Technical Note TN-4  
Interpretation Aids for E.M. 33 Helicopter  
Electromagnetic System"

APPENDIX I

## APPENDIX I

### INSTRUMENTATION

#### Electromagnetic Instrument

- Type: Helicopter mounted in-phase - quadrature instrument manufactured by Geonics Limited, Toronto, Ontario.
- Coils: The transmitting and receiving coils are co-axial 6 metres apart in a towed bird 30 metres below the helicopter. The coil axis is in the direction of travel.
- Frequency: 918 Hz
- Noise Level: Approximately 1/4 ppm (0.6 second time constant).

#### Magnetometer

- Type: Proton precession model G803 manufactured by Geometrics Corporation, Toronto.
- Cycling Time: 1.0 second.
- Sending Head Design: 5 inch diameter Toroid.

APPENDIX I (cont'd)

Ancillary Equipment:

UDAS Digital Acquisition System with recorder.

Geocam 35 mm Flight Path Camera

Bonzer Radio Altimeter

Geometrics G806 Magnetic Base Station and recorder.

Helicopter:

Gazelle Helicopter supplied by Highwood Airservices Ltd.  
Calgary, Alberta.

APPENDIX II



## APPENDIX II

### THE "ANALOGUE" CHART AND FLIGHT PATH RECOVERY

The flight tape is a roll of chart paper which moves through the digital printer at a speed of 5.48 cm per minute.

The digital printer chart facilitates the use of a full alpha-numeric system. All "header" sensitivity and fiducial information is printed automatically.

The chart is 520 dots wide as follows:

#### DOTS:

- 0 - 100 magnetometer fine - 2 gammas per dot.
- 100 - 180 magnetometer coarse - 25 gammas per dot.
- 180 - 320 quadrature 0.6 sec T.C. 1/4 ppm per dot.
- 320 - 460 in phase 0.6 sec T.C. 1/4 ppm per dot.
- 460 - 470 powerline monitor
- 460 - 470 spherics monitor
- 480 - 520 altimeter 10 feet per dot (0 - 400 feet).

The helicopter flight path is recovered from 35 mm film, which is exposed at 2.0 second intervals during the flight traverses. After processing and anotating, recognizable fiducials are pin-pointed on the photomosaic map.

APPENDIX III

FLIGHT LOG

Project \_\_\_\_\_

Flight No. 10

Area Gibbons

Date February 27, 1981

LN	Start FID	End FID	TIME	PRODUCTION		COMMENTS
				End FID	Start FID	
CAL	0	21	11:38			
23	22	26				
23	27	109	11:45			
22	110	197				
21	198	284				
20	285	372				
19	373	467				
18	468	562				
17	563	654	12:04			
16	655	757				
15	758	848				
14	849	932				
13	933	1017				
12	1018	1097				
11	1098	1184				
10	1185	1266				
9	1267	1352				
8	1352	1435				
7	1436	1527				
6	1528	1607	12:39			
5	1608	1692				
4	1693	1770				
3	1771	1852				
2	1853	1925				
1	1926	2013				
TIE	2014	2096				
TIE/2	2097	2183	13:01			
TIE/4	2184	2184				Scrub
CAL	2185	2250				



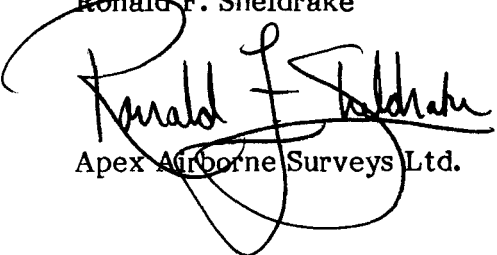
CERTIFICATION

I, RONALD F. SHELDRAKE, of the City of Vancouver, Province of British Columbia, hereby certify as follows:

1. I am President of **Apex Airborne Surveys Ltd.** a company incorporated under the laws of the Province of British Columbia.
2. The Vancouver Office of **Apex Airborne Surveys Ltd.** is located at Suite 512 -625 Howe Street, Vancouver, British Columbia.
3. I received my B.Sc., in Geophysics from the University of British Columbia in May 1974.
4. I have practised my profession since that date.
5. I did not examine the claims area, but I am not aware of any claim conflict and believe that the data presented herein is reliable.
6. I have no interest, direct or indirect, in **ORBEX RESOURCES LTD.** or its affiliates, nor do I expect to receive any.
7. I consent to the use of this report in or in connection with a Prospectus or in a Statement of Material Facts.

May 25, 1981

Ronald F. Sheldrake

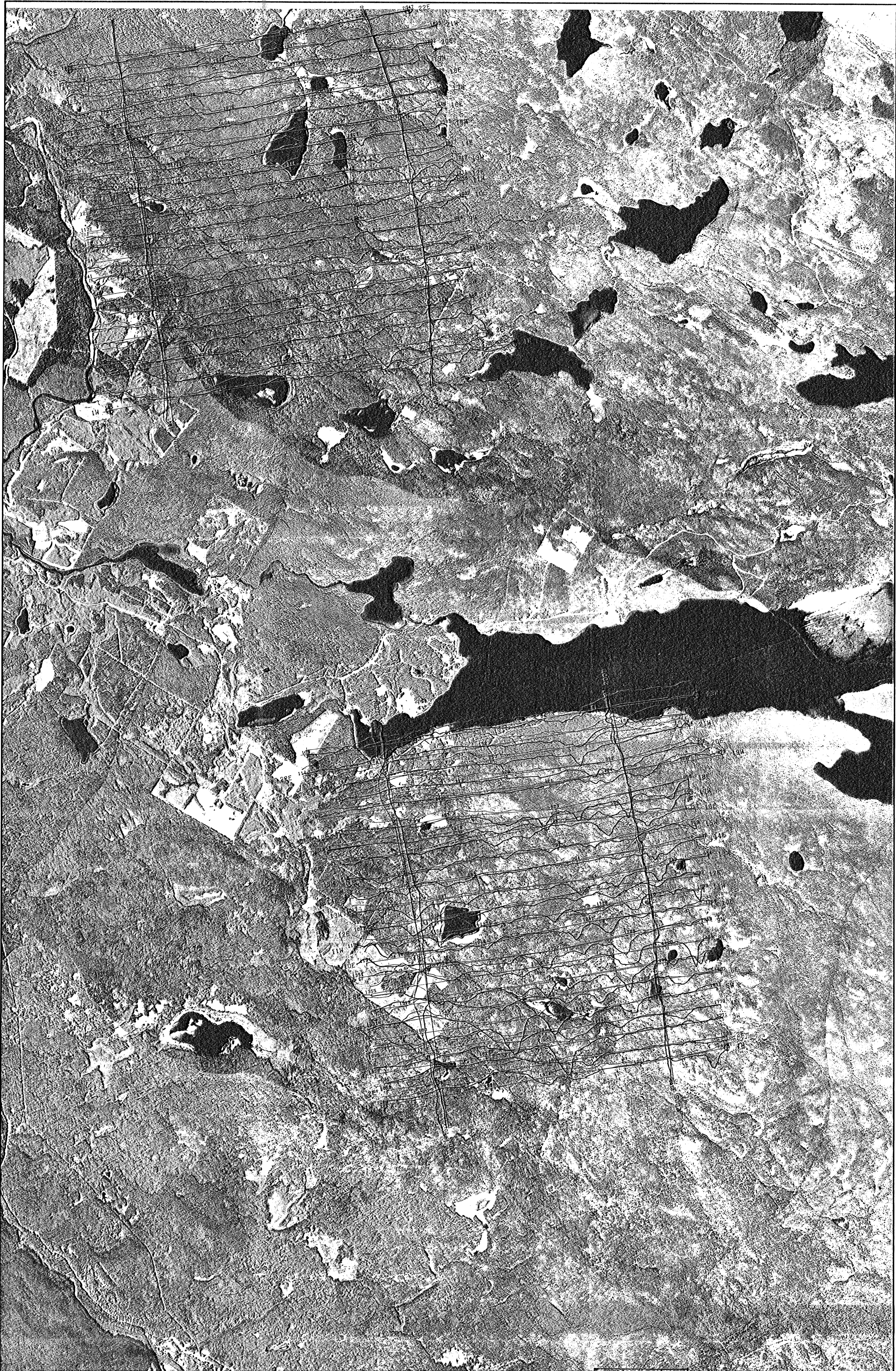
  
Apex Airborne Surveys Ltd.

May 25, 1981

STATEMENT OF COSTS

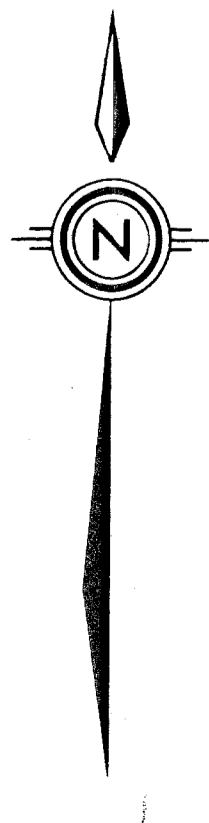
Type of Survey:	Helicopter Electromagnetic and Magnetic
Date(s) of Fieldwork:	February 27, 1981 - 1 day
Survey Kilometres:	200 kilometres
Cost per linear Kilometre:	\$60
Additional Charges:	
Total cost of Survey:	(200 km x 60) = \$12,000



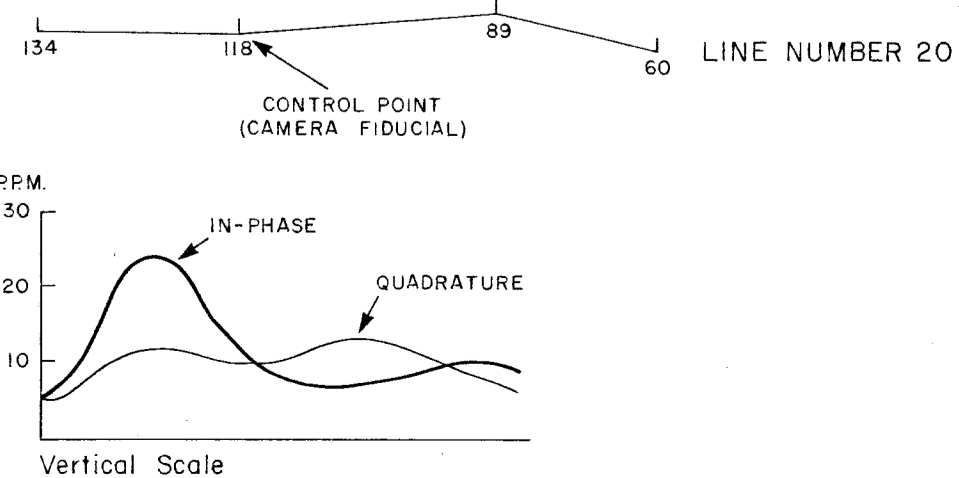


**NOTES**

- INSTRUMENTATION: GEONICS 33-1
- COIL SEPARATION: 6 METRES - COAXIAL
- FREQUENCY: 918 HRTZ
- NOISE LEVEL: LESS THAN 1/2 PPM
- SENSOR TERRAINE CLEARANCE: 35 METRES
- HORIZONTAL CONTROL: 35 mm. FILM  
FLIGHT PATH RECOVERY FROM PHOTO MOSAICS
- VERTICAL CONTROL: RADAR ALTIMETER



**LEGEND**



MINERAL RESOURCES BRANCH  
ASSESSMENT REPORT  
**10,509**  
NO.

PLATE I

**ELECTROMAGNETIC  
PROFILES MAP**

**KWUN LAKE AND GIBBONS CREEK PROJECT**

CARIBOO MINING DIVISION  
BRITISH COLUMBIA

**ORBEX MINERALS LTD.**

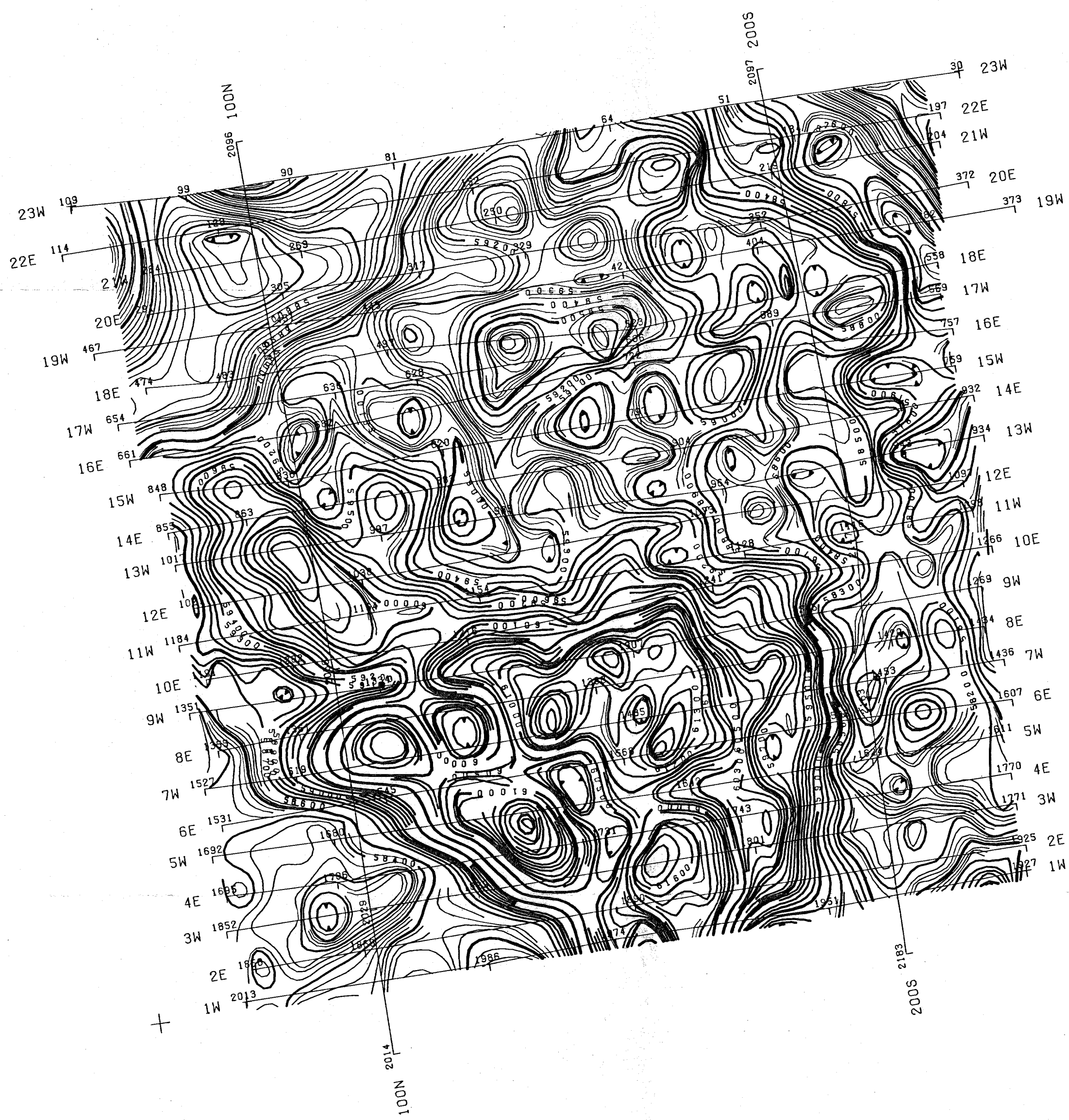
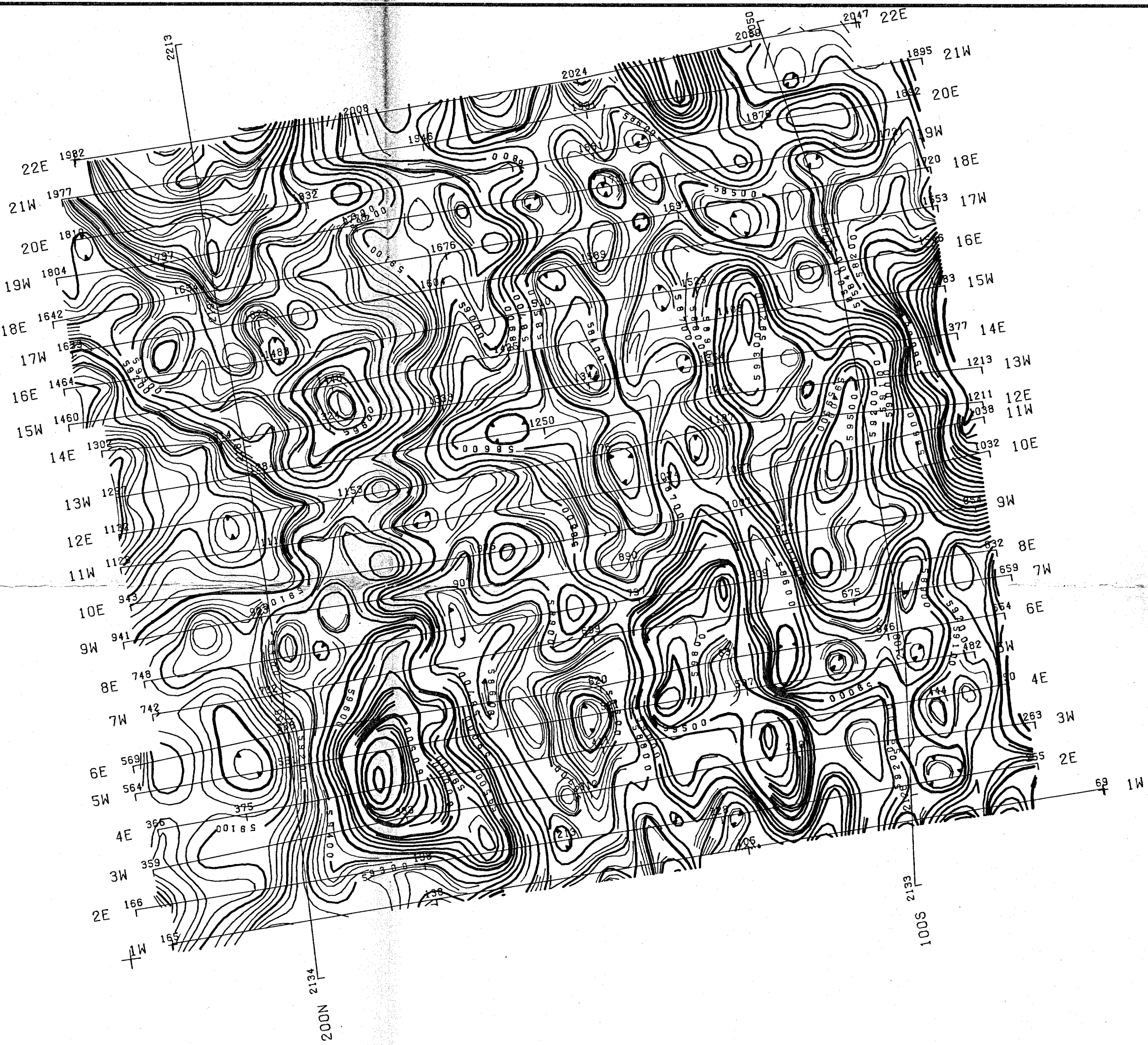
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N.T.S. 93A/6 - HORSEFLY

To accompany a report by Ronald F. Sheldrake dated May 25, 1981

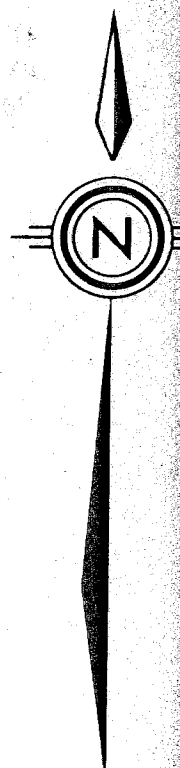
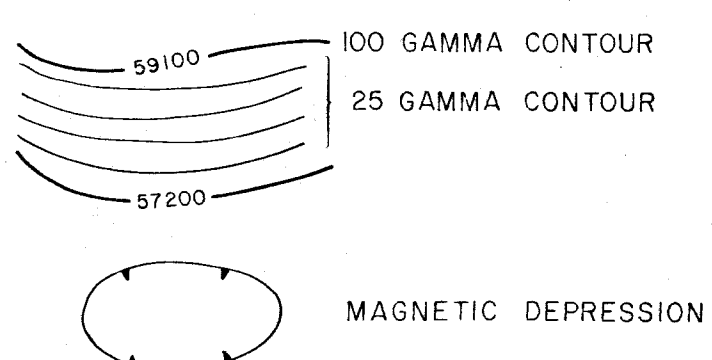




**NOTES:**

- VERTICAL CONTROL - RADAR ALTIMETER  
(mean sensor height 50 metres)
- HORIZONTAL CONTROL - 35 mm FILM,  
RECOVERY ON PHOTO MOSAICS
- REGIONAL TOTAL FIELD VALUE:  
58,000 GAMMAS
- MAGNETIC DECLINATION: 25°E
- MAGNETIC INCLINATION: 72°
- CONTOURS UNCORRECTED FOR  
REGIONAL GRADIENT

**LEGEND**



MINER RESOURCES BRANCH  
ALTIMETER REPORT  
**10,509**

PLATE II  
**TOTAL FIELD MAGNETIC MAP**  
KWUN LAKE AND GIBBONS CREEK  
PROJECT  
CARIBOO MINING DIVISION  
BRITISH COLUMBIA  
**ORBEX MINERALS LTD.**

SCALE 1:20,000  
500 0 500 1000 1500 Metres

N.T.S. 93A/6 - HORSEFLY

To accompany a report by Ronald F. Sheldrake dated May 25, 1981





MINERAL RESOURCES BRANCH  
ASSESSMENT REPORT  
**10,509**  
NO.

PLATE III

INTERPRETATION MAP  
KWUN LAKE AND GIBBONS CREEK  
PROJECT  
CARIBOO MINING DIVISION  
BRITISH COLUMBIA  
ORBEX MINERALS LTD.

SCALE 1:20,000  
500 0 500 1000 1500 Metres

N.T.S. 93 A/6 - HORSEFLY  
To accompany a report by Ronald F. Sheldrake dated May 25, 1981

- LEGEND**
- CONTACT
  - ~~~~~ FAULT ZONE
  - I INTRUSIVE ROCKS ?
  - S SEDIMENTARY ROCKS ?

