

REPORT ON A RECONNAISSANCE HELICOPTER BORNE

V.L.F. ELECTROMAGNETIC AND MAGNETIC SURVEY

ON THE
KOOTENAY RIVER PROJECT
IN THE
GALLOWAY AREA, BRITISH COLUMBIA

FOR OPERATOR AND OWNER

GEOLOGICAL BRANCH STANFIELD
ASSESSMENT REPORT

11,681

Latitude 49° 20'N
Longitude 115° 10'W

PART 2 OF 2

SURVEY DATES: June 26 - 29, 1983

July 27, 1983
Vancouver, B.C.

Apex Airborne Surveys Ltd.
Ronald F. Sheldrake, B.Sc.
Janan T. Sallomy, Ph.D.

TABLE OF CONTENTS

	<u>Page</u>
1. SUMMARY	1 - 1
2. INTRODUCTION	2 - 1
Claims Location and Access Geology	
3. DATA PRESENTATION	3 - 1
4. DISCUSSION OF RESULTS	4 - 1
5. CONCLUSIONS AND RECOMMENDATIONS	5 - 1

BIBLIOGRAPHY

FIGURE 1 CLAIM AND SURVEY LOCATION MAP

TABLE 1 SUMMARY OF VLF ANOMALIES

LIST OF PLATES - IN MAP POCKET

PLATE I VLF ELECTROMAGNETIC PROFILES

APPENDIX I INSTRUMENTATION

APPENDIX II IN FLIGHT RECORD AND FLIGHT PATH RECOVERY

APPENDIX III SURVEY PERSONNEL

CERTIFICATION

STATEMENT OF COSTS

last page

1. SUMMARY

The reconnaissance V.L.F. electromagnetic test survey that was flown over Mr. R.H. Stanfield's holding's was unsuccessful in identifying fault and structural information.

However, an anomalous response was recorded on the Elderberry, Elderberry 3 and Fir 6 claims that warrants investigation as a conductive target. The inferred strike length of this anomaly is over 2 kilometers. Recommendation for follow-up of this anomaly has been made.

2. INTRODUCTION

This report describes the results of a helicopter borne VLF electromagnetic survey that was flown June 26 to June 29, 1983 on behalf of Mr. Ross H. Stanfield.

The survey was flown as part of a continuing exploration program over extensive holdings that extend from the Steeples Mountains in the N.W. to Sheep Mountain in the S.E. The area encompasses the Bull River Mine and ten other mineralized areas.

Previous airborne geophysical work undertaken on the property, in 1981 and 1982, utilized a low frequency (950 to 4050 hz) inphase-out of phase system that is designed to locate concentrations of conductive minerals. Several targets for sulphide mineralization were identified by those surveys. Those surveys however, lacked resolution in the higher resistivity range because of their lower frequencies.

The aim of the present VLF electromagnetic survey where the frequency is in the 20 khz range was to test its sufficiency as a mapping technique in detecting regional fault structures and formational units.

The survey grid comprised of 10 reconnaissance traverses (approximately 35 kilometers in length) and 3 tie lines (approximately 11 kilometers in length). The traverse spacing was 1 kilometer, and a mean terrain clearance of 60 meters was maintained and recorded on the geophysical record by means of a radar altimeter.

The VLF electromagnetometer that was used on this survey was a Totem II-A that is manufactured by Herz Industries of Toronto, Canada. The instrument uses the military VLF radio communication transmitters as a source signal and measures the total field and vertical quadrature components of two stations simultaneously.

On this survey four VLF stations, Hawaii (23.4 khz), Cutler, Maine (17.8 khz), Annapolis, Maryland (21.4 khz) and Seattle, Washington (18.6 khz) were tested. Seattle, Cutler and Annapolis suffered either noisy signals or were off altogether as in the case of Seattle. However, Hawaii gave a consistent signal level throughout and this is the data that has been plotted and is discussed in this report.

CLAIMS

The claims covered or partly covered for assessment purposes by the geophysical survey are as follows:

Balsam 1 - 12
Cedar 1 - 2
Cedar South 1 - 2
Elderberry 1
Elderberry South 1 and 2

See Figure 1 the CLAIM AND SURVEY LOCATION MAP for the disposition and record numbers of these claims.

LOCATION AND ACCESS

The area covered by this survey extends from Sheep Mountain in the southeast to the Bull River in the northwest. The claims are accessible by road from Highway No. 3.

GEOLOGY

*The mineral deposits on the R.H. Stanfield properties are located on the west flank of the Rocky Mountains in the Precambrian Aldridge formation.

Normal faults strike northwesterly and dip southwesterly. Subsidiary faults strike northeasterly and dip northwesterly. Extensive displacement produced by the faulting brings Devonian and Mississippian formations in contact with the Precambrian strata.

Sulphide mineralization, discovered to date, contains lead-silver and copper-silver mineralization in strong fissure veins within Aldridge quartzite and argillite.

* Personal Communication, Mr. Alfred Allen, P.Eng., December 1981

3. DATA PRESENTATION

The TOTAL FIELD and QUADRATURE profiles are presented in a stacked format on PLATE 1, the VLF PROFILES MAP. The data were plotted at a horizontal scale of 1:50,000 and a vertical scale of 1 cm = 20 percent.

The VLF data were corrected for changes in airspeed and levelled before being plotted. A digital filter was used to suppress high frequency noise in the data that is due to sensor vibrations and ambient electrical noise.

Other parameters acquired during the present survey are the total field aeromagnetic and VLF data from Culter, Maine or Annapolis, Maryland transmitter. Aeromagnetic data are not presented because they did not yield any new information on the previous results acquired in 1982 at a 200 m spacing.* Similarly the other VLF data are not displayed because of their inferior response compared to that of the Hawaii transmitter.

The inflight records are secured in a binder and are submitted to the client along with this report.

* "Report on a Helicopterborne Multifrequency Electromagnetic and Magnetic Survey" by Ronald F. Sheldrake, June 22, 1982.

4. DISCUSSION OF RESULTS

The present VLF survey successfully identifies a potential mineralized conductive zone at the eastern part of the area. The observed responses may be taken to indicate metallic sulphides or a narrow graphitic conductor. The indicated strike length is in excess of 2 kilometers. The anomalous zone is in the area of the Elderberry 1, Elderberry 3 and Fir 6 claims. This response is identified with hachures on PLATE I.

Other responses observed in this survey were attributed either to topographic relief variations or the presence of cultural phenomena such as power-lines, roads, pipe-lines, etc.

TABLE I summarizes most of the measured anomalies and their causative phenomena.

Broad anomalies that are typically associated with topographic undulations are not listed in the table. An example of such anomalies is that encountered along Line 08 between fiducials 205 to 220. This response coincides with a topographic relief of about 1,000 feet.

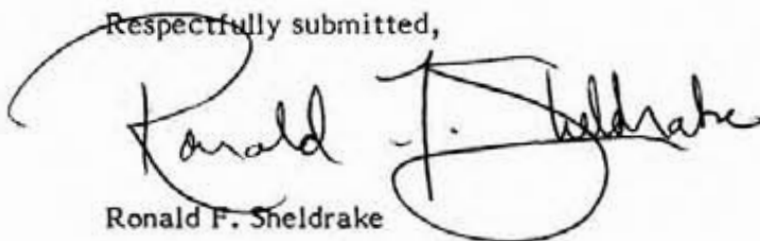
TABLE I
Summary of VLF Anomalies

Line No.	Fid. No.	Channel	Anomaly Percent	Remarks
1	500	VLFT	18	Suspected cultural phenomena
	535	VLFT	20	"
	360	VLFT	24	"
	615		12	"
2	1000	VLFT	10	"
	1026	VLFT	12	"
	1047	VLFT	14	"
3	1773	VLFT	12	"
	1794	VLFT	13	"
	1817	VLFT	14	"
4	2141	VLFT	17	Gas pipe-line (underground)
5	298	VLFT	10	Power transmission line
	533	VLFT	18	Road
6	714	VLFT	8	Power transmission line
8	107	VLFT	24	Possible metallic conductor or graphitic zone.
9	1573	VLFT	8	"
10	1725	VLFT	12	"

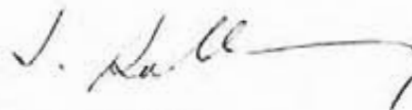
5. CONCLUSIONS AND RECOMMENDATIONS

The test of the VLF technique over Mr. Stanfield's holdings did not provide structural or formational information. Terrain effects that are apparently characteristic of the VLF technique in steep mountains caused the majority of the VLF responses. Anomalous responses recorded on the Elderberry 1, Elderberry 3 and Fir 6 claims may be due to a localized geological conductor and ought to be further examined. If a geologic examination is proved to be positive, a grid of ground VLF-EM traverses ought to be undertaken. The traverses should be parallel to the flightlines and Hawaii (NPM) station should be used as the VLF source.

Respectfully submitted,

A large, stylized handwritten signature in black ink, appearing to read "Ronald F. Sheldrake". The signature is written over the typed name below it.

Ronald F. Sheldrake

A smaller, more fluid handwritten signature in black ink, appearing to read "J. Sallomy".

Janan T. Sallomy

APEX AIRBORNE SURVEYS LTD.

BIBLIOGRAPHY

- Mr. Alfred Allen, P.Eng. - Personal communication, December 1981.
- Ronald F. Sheldrake - Report on a Helicopter Multifrequency
Electromagnetic and Magnetic Survey, June 22, 1982.
- A.B.L. Whittles, Ph.D. - Prospecting with Radio Frequency E.M. - 16 in
Mountainous Regions, B.C. Institute of Technology,
Feb. 1969.

APPENDIX I

INSTRUMENTATION

Electromagnetic Instrument

Type: Helicopter mounted VLF Electromagnetic instrument. Two frequencies are simultaneously recorded. Manufactured by Herz Industries, Toronto.

Coils: 3 - ferrite core; x, y, z orientation.

Noise Level: Less than 1 percent peak to peak, optimum

Magnetometer

Type: Towed sensor type, proton precession model G803 manufactured by Geometrics Corporation, Toronto.

Cycling Time: 1.0 second.

Sensing Head Design: 5 inch diameter toroid.

APPENDIX II

THE "ANALOGUE" CHART AND FLIGHT PATH RECOVERY

The in-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	Altimeter - 10 feet per dot (0 - 1000 feet)
100 - 200	VLF1 total field (Cutler or Annapolis) 1%/dot
100 - 200	VLF2 quadrature (Cutler or Annapolis) 1%/dot
200 - 300	VLF3 total field (Hawaii) 1%/dot
200 - 300	VLF4 quadrature (Hawaii) 1%/dot
300 - 520	magnetometer 2 gammas/dot

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 a photomosaic map.

APPENDIX III

Survey Personnel:

- Field Geophysicist: - Ronald F. Sheldrake
1271 W. 22nd Street
North Vancouver, B.C.
- Field Technician: - Michael Magee
c/o Apex Airborne Surveys Ltd.
- Helicopter Engineer - Herman Lorenz
Highwood Aviation Ltd.
Calgary, Alberta

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 514 - 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 have no interest, direct or indirect, in the properties or claims of Mr. R.H. Stanfield, nor do I expect to receive any.
6. I consent to the use of this report in or in connection with engineering reports or in a Statement of Material Facts.

Ronald F. Sheldrake

A handwritten signature in black ink that reads "Ronald F. Sheldrake". The signature is written in a cursive style with a large, looping initial "R" and "S".

Apex Airborne Surveys Ltd.

July 27, 1983

CERTIFICATION

I, JANAN T. SALLOMY, of the City of Vancouver, Province of British Columbia, hereby certify as follows:

1. I am Chief Geophysicist 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 514 -625 Howe Street, Vancouver, British Columbia.
3. I received my M.Sc. and Ph.D. in Geophysics from the University of Leeds, U.K. in 1968 and 1972, respectively.
4. I have practised my profession since 1972.
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 the properties or claims of Mr. R.H. Stanfield, nor do I expect to receive any.
7. I consent to the use of this report in or in connection with a engineering reports or in a Statement of Material Facts.

Janan T. Sallomy



Apex Airborne Surveys Ltd.

July 27, 1983

July 27, 1983

STATEMENT OF COSTS

Type of Survey: V.L.F. Electromagnetic-Magnetic Helicopter Platform

Date(s) of Fieldwork: June 24 - 29, 1983

Survey Kilometers: 380 Kilometers

Cost per Linear
Kilometer: \$86.73

Additional Charges: None

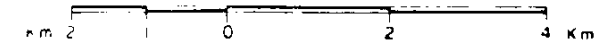
Total Cost of Survey: \$32,960

FIGURE 1

MR. R. H. STANFIELD V.L.F. ELECTROMAGNETIC SURVEY CLAIMS & SURVEY LOCATION MAP KOOTENAY RIVER PROJECT

APEX AIRBORNE SURVEYS LTD.

Scale 1:100,000 approx.



From B.C. Ministry of Mines & Petroleum Resources
Maps 62G, 6E, 6W & 11W
Allen Geological Engineering Ltd.

JULY 1983

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PART 2 OF 2**

