2625

GEOPHYSICAL REPORT

BLUBEL 1-16, 120° 149° NE EAST OF OSPREY LAKE

for

ARGEM EXPLORATIONS LTD. (N.P.L.)
North Vancouver, B.C.

by

GEO CAL LIMITED
West Vancouver, B.C.

August 30, 1970

By: C. B. Selmser, M.Sc. P.Eng.

TABLE OF CONTENTS

LIST OF ILLUSTRATIONS (Rear)

APPENDIX

H.E.M. II Flight Log

Electromagnetic Aerial Survey by C. B. Selmser, P. Eng.

GEOPHYSICAL REPORT
BLUBEL GROUP
Osprey Lake, B.C.

LOCATION:

The BLUBEL property claims 1-32 is located just east of Osprey Lake and Empress Creek near the Canadian Pacific branch line between Princeton and Penticton. This is known as the Kettle Valley line. There is also a gravel all weather road which parallels this railroad line. This area is shown on the Bankeir 92H/9 sheet of the National Topographic Series with coordinates 120° 10', 49° 45'. Elevation changes on the claim group are from 3500 feet a.s.l. along Trout Creek to 5500 feet at the height of land on the property.

The main part of this survey is tied to a base line which passes through the highest part of the claim group and the portal of an adit at the northeast side of a height of land on Area "A".

Additional areas were flown over the north bank of Trout Creek near Thirsk and just inside the Osoyoos Division of the Yale District. We are mostly concerned, however, with the area over the claim group as this is the only area charged as assessment work.

ACCESS:

An unimproved road connects the area with Penticton to the west and with Summerland on the east side. The region is also served by the Kettle Valley branchline of the Canadian Pacific Railway. There are some trails in the area leading south and east from Bankeir, which come near to the south end of the claim group.

PROPERTY AND TITLE:

The recorded owner of the claim group is Mr. Donald Edmond Agur, R.R. 1, Summerland, B. C. The BLUBEL group comprises some 32 claims on the south side of Trout Creek.

At present the claim group covered by this survey is under option to Argem Explorations Ltd. of North Vancouver. The president of this company is Mr. C. D. Hoffman of 1035 Kings Georges Way, West Vancouver, B. C.

GEOLOGY:

A detailed geological report is available on this property by Allen Geological Engineering Ltd., 507 - 789 West Pender Street, Vancouver, B. C. This survey was made for Lethbridge Petroleums Ltd., of Summerland, B. C. on July 25, 1968.

The country rock is the Osprey Lake red granodiorite, which is a porphory containing phenocrysts of pink orthoclose. This rock is Lower Cretaceous in age and is related to the Coast Range granodiorite. A younger grey feldspar porphyry called the Otter intrusive is also found invading batholithic intrusive. Some silicious veins cut the altered portions of the granite and are accompanied with molybdenite and pyrite in fracture zones. This fractured and altered rock termed a greissen is named Valhalla quartz monzonite and is frequently known to be a host rock for economic mineralization.

There is a regional fault zone that passes through the property, which closely parallels the base line and trends north 15 degrees east. It would appear that this structure controls the local fracturing in the quartz monzonite, which gives rise to the presence of the molybdenite and the localized pyrite mineralization.

GEOPHYSICAL SURVEY:

This geophysical survey was done using a 47G-3B-1 Bell helicopter. Since the leading edge of the main rotor on this aircraft is covered with steel it may be made to generate a low frequency electromagnetic field. A pick-up coil placed in the front of this aircraft receives this signal. When this signal is amplified with a feed-back filtered amplifier circuit two signals tend to replace the signal. The first is the primary and the second is any resultant signal from a sulphide occurrence or other highly conductive region. The complete description of this principle may be found in the Appendix.

The flight paths flown on each map area are successively 100 feet apart in elevation and approximately 100 to 500 feet apart horizontally. These paths conform to the contour lines on the topographic sheet which was used for navigation by the aircraft pilot. Each line was flown at a constant elevation and the ends or turns were spaced out as fiducials on the magnetic tape recording for the signal. These paths were also timed as shown on the HEM II Flight Log included in the Appendix.

The phasing is measured in degrees of electric angle and is obtained by replaying and editing the tape on a 5 inch oscilloscope in the laboratory. The relative position of these recordings are timed and measured as to distance using the average velocity of the aircraft, which in this case was 60 miles per hour. During flight the operator observes the signal on a portable oscilloscope and listens through headphones for any significant pitch variation. A log is kept of all pertinent navigational points marked on the ground and also observations of flight elevations and speed of the aircraft.

The claim area (area "C" South) was flown with a total mileage of 42 miles computed on an average airspeed of 60 miles per hour. This distance has also been measured as line miles over the ground. The other areas measured gave:

Area "A" - 8.3 miles
Area "B" - 11.9 miles
Area "C" North - 19.0 miles
Area "D" - 9.5 miles

INTERPRETATION OF RESULTS:

The map for Area "C" South (Figure 5) shows three areas near the base line. One is in Claim 1, another in Claim 3 and a third in Claim 6. These have been marked as lowgrade anomalies. Another position is more remotely situated in Claim 33.

The amount of phase change is comparatively small (less than 15 electrical degrees.) This would indicate areas of lowgrade mineralization (predominately pyrite) which cannot be satisfactorily outlined with the airborne electromagnetic method. This is either due to lack of coupling or a low percentage of mineral that is finely disseminated.

Other anomalies of this nature were discovered as follows:

Area "A" Figure 2 500 elevation near baseline
Area "A" Figure 2 N.E. section near baseline
Area "C" Figure 4 Elevation 4500 near baseline
Area "D" Figure 6 Central 5700 elevation

RECOMMENDATION:

It is recommended that a limited amount of induced polarization survey work be carried out near the positions as indicated

above. This survey could be used to delineate boundaries of mineralization and targets for drilling.

PERSONNEL:

Field work was carried out on August 30th, 1970, using the facilities of Alpine Airways at Kelowna, B.C. Mr. Don E. Agur, prospector, accompanied the pilot of the helicopter and Mr. C. B. Selmser, P. Eng., Geophysicist, to the areas flown. A reconnaissance flight was made over the area to orient the flight pattern. The survey was carried out with the pilot flying and the geophysicist observing.

Respectfully submitted,

Calbert B. Selmser

Calbert B. Selmser, P. Eng.

BIBLIOGRAPHY

Report - "The Blubel and Pine Groups Osprey Lake, B.C." by Alfred R. Allen, P. Eng. July 25, 1968

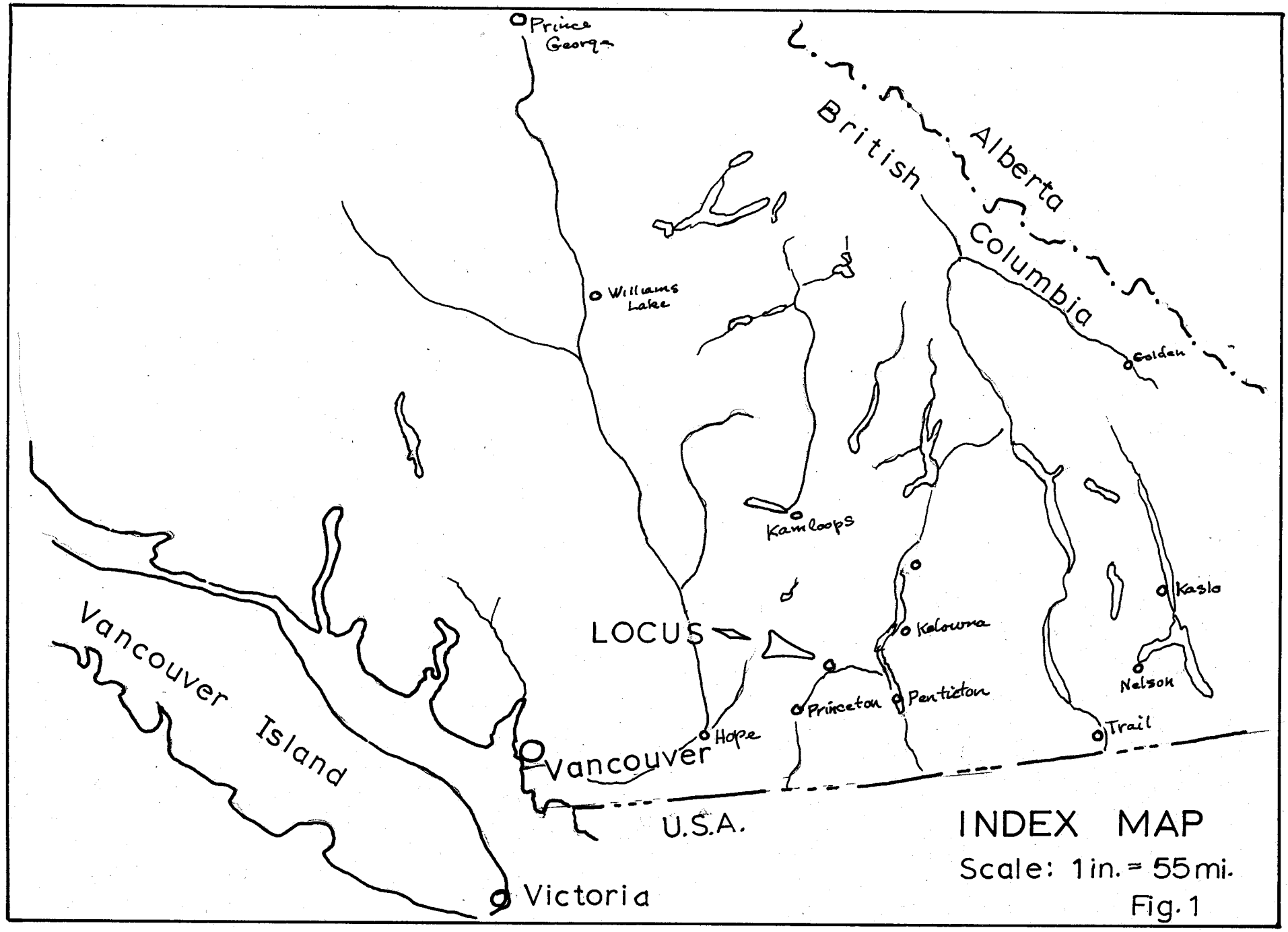
Geological Survey Memoir 243 "Geology and Mineral Deposits of the Princeton Map.- Area B.C. by H.M.A. Rice 1947

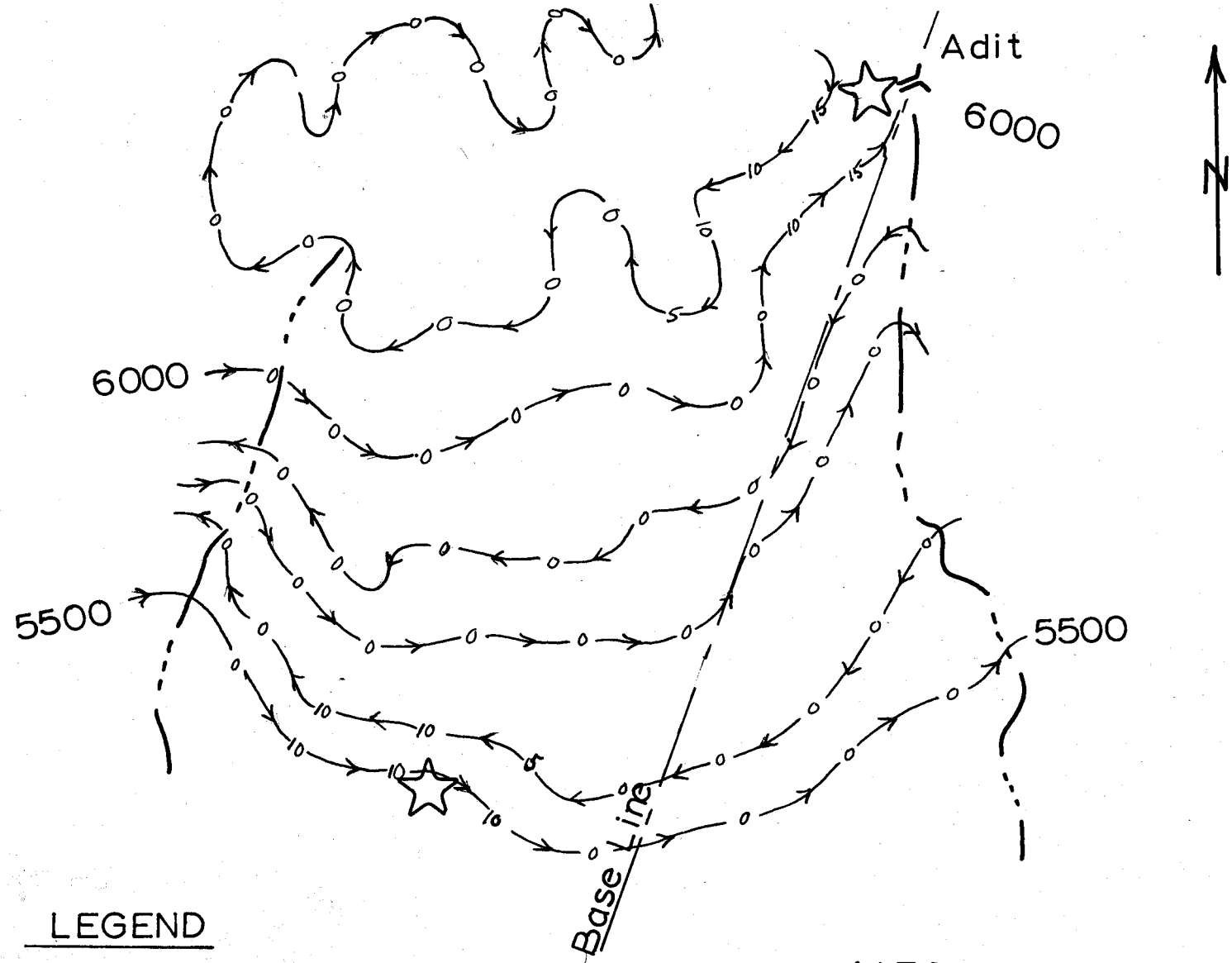
CERTIFICATE OF QUALIFICATIONS

I, Calbert Byron Selmser of 2658 Nelson Avenue, West Vancouver, B.C. do hereby certify that:

1. I am a practising geologist and geophysicist in British Columbia
2. I am a graduate of McGill University, having been granted the degree of M.Sc., and have spent a year in graduate studies at Toronto University in the Physics Department
3. That I have taught geology at Mount Royal Junior College for 2 years and geophysics at Cambrian College for 1 year
4. That I have had over 23 years' experience in mining and petroleum exploration and am a member of the Association of Professional Engineers of British Columbia
5. That I have no interest in the securities of Argem Explorations Ltd., nor in the property discussed in this report.

C. B. Selmser


Prince George
Williams Lake
Alberta
British Columbia
Golden
Kamloops
Kaslo
Kelowna
LOCUS
Nelson
Princeton
Penticton
Trail
Hope
Vancouver
Vancouver Island
U.S.A.
Victoria
INDEX MAP
Scale: 1 in. = 55 mi.
Fig. 1



LEGEND

Flight path

10 Phase change

Low grade anomaly

Elev. int. 100 ft.

AIRBORNE E.M. MAP

ARGEM EXPLORATIONS LTD. (N.P.L.)

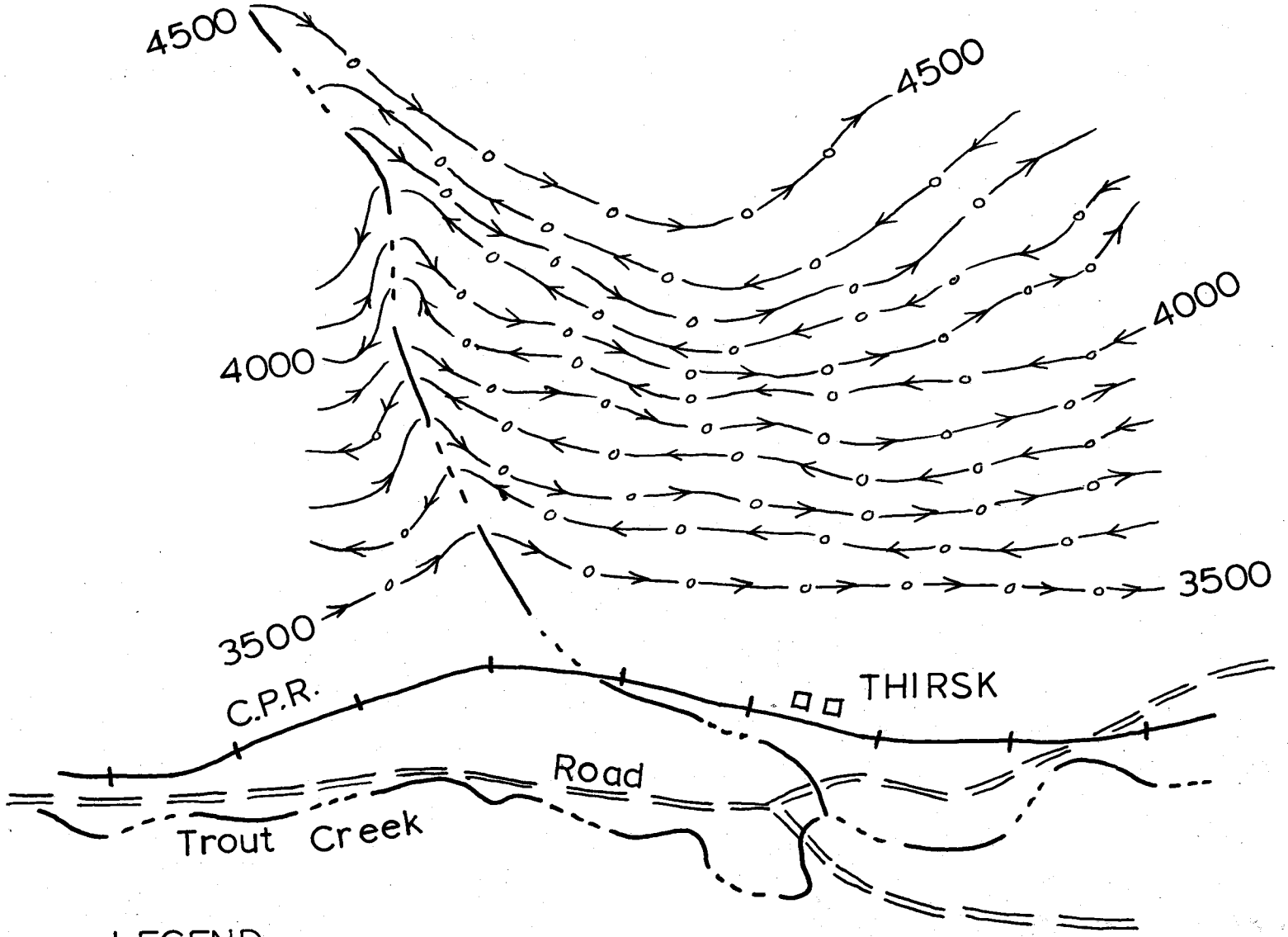
AREA "A"

Osprey Lake, B.C.

Scale: 1 in 1000 ft. Sept., 1970

GEO CAL LIMITED
2658 NELSON AVE.
WEST VANCOUVER, B. C.
C. B. Delmer

Fig. 2



LEGEND

Flight path

Phase change

Low grade anomaly

Elev. int. 100 ft.

AIRBORNE E.M. MAP

ARGEM EXPLORATIONS LTD. (N.P.L.)

AREA "B"

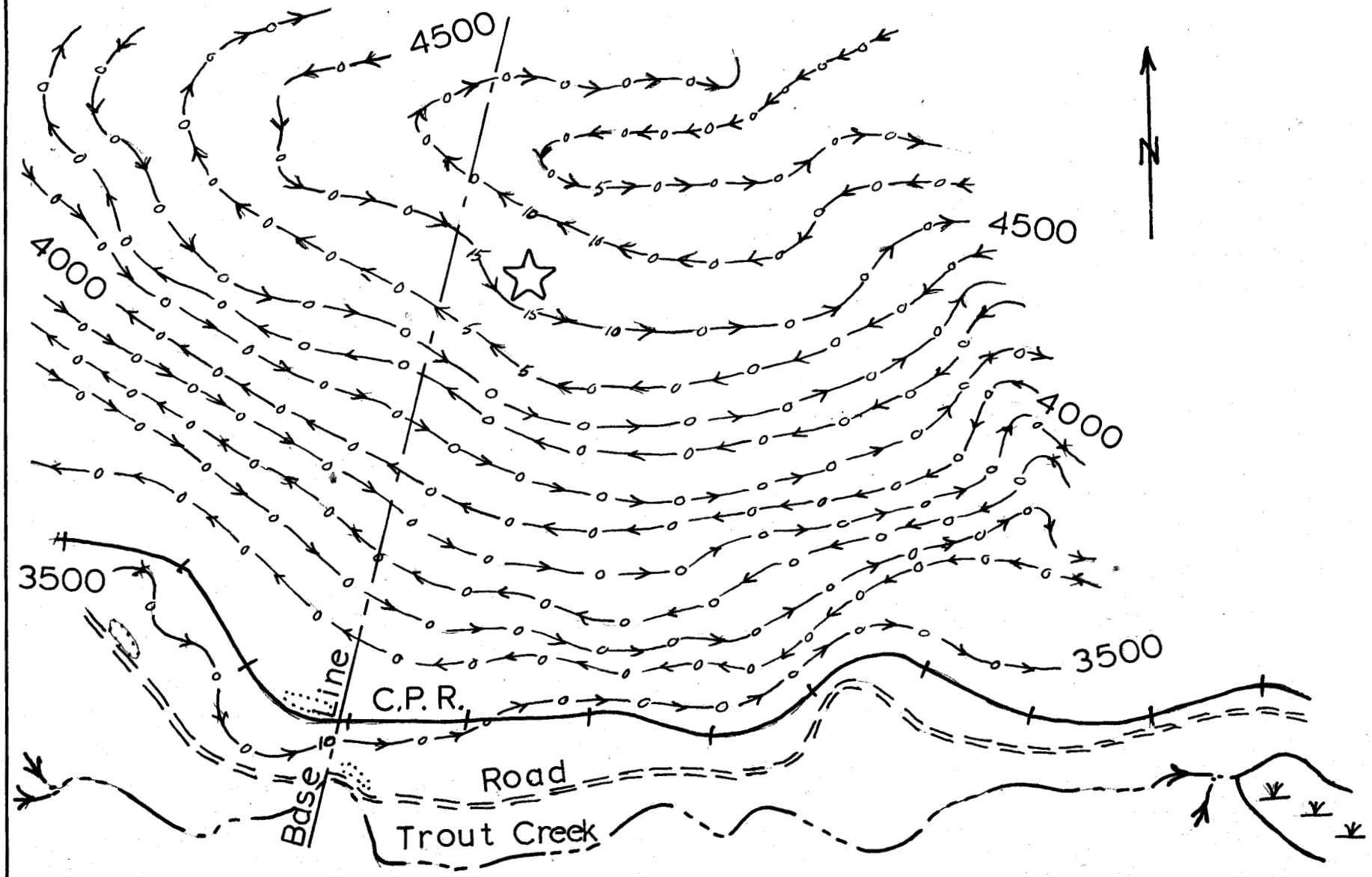
Osprey Lake, B.C.

Scale: 1 in. = 1000 ft.

Sept., 1970

C. B. Delmer

Fig. 3



LEGEND

Flight path

Phase change

Low grade anomaly

Elev. int. 100 ft.

C. B. Delmar

AIRBORNE E.M. MAP

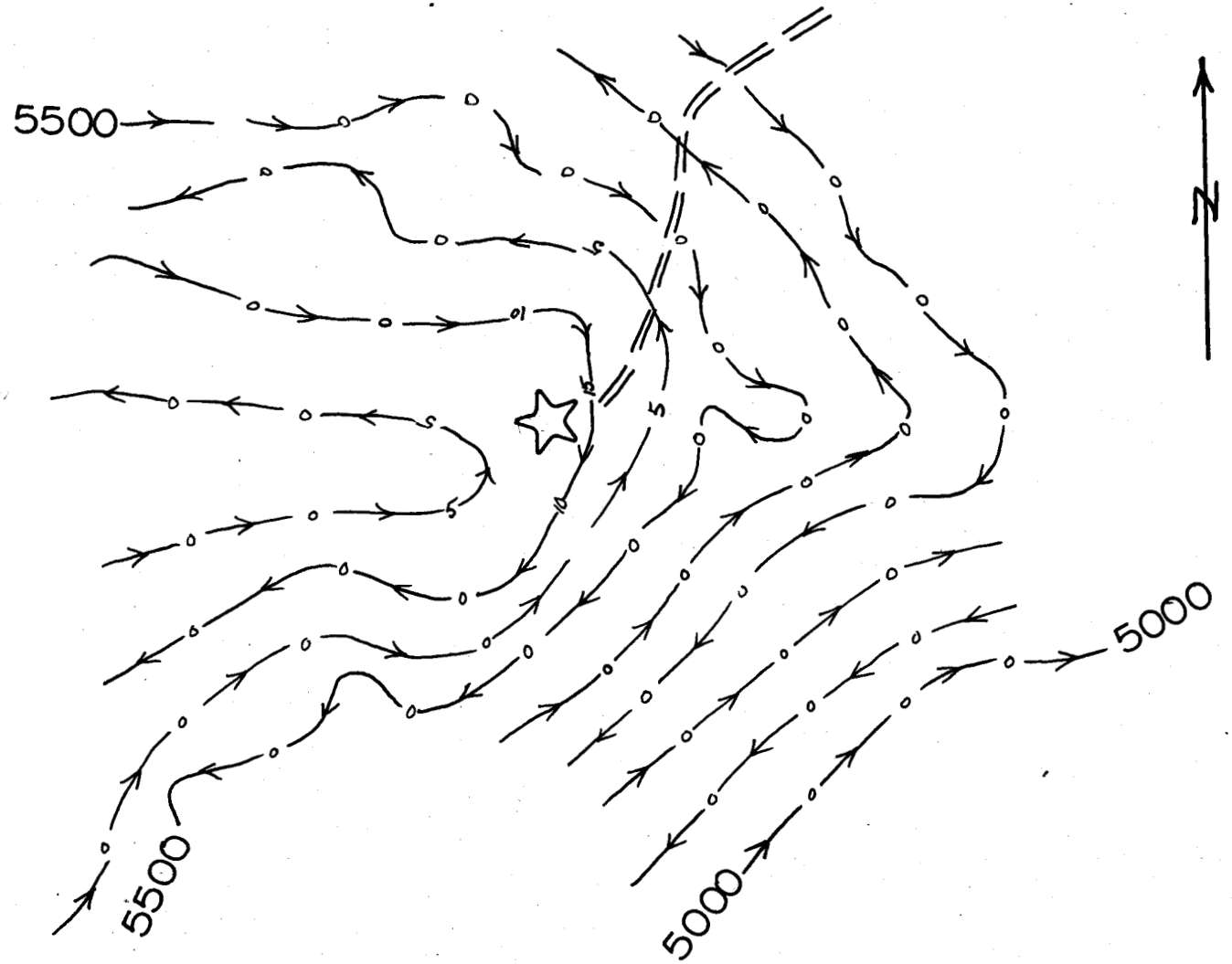
ARGEM EXPLORATIONS LTD. (N.P.L.)

AREA "C" NORTH

Osprey Lake, B.C.

Scale : 1 in. = 1000 ft. Sept., 1970

Fig. 4



LEGEND

Flight path

5 Phase change

Low grade anomaly

Elev. int. 100 ft.

AIRBORNE E.M. MAP

ARGEM EXPLORATIONS LTD. (N.P.L.)

Area "D"

Osprey Lake, B.C.

Scale: 1 in. = 1000 ft. Sept., 1970

Fig. 6

APPENDIX I

HEM II Flight Log

Area "A"

Elevation	Time	Mileage
6100	2 min. 30 sec.	2.5 miles
6000	1 " 6 "	1.1 "
5900	1 " 6 "	1.1 "
5800	1 " 6 "	1.1 "
5600	1. " 6 "	1.1 "
5500	1 " 18 "	1.3 "
		8.3 miles

Area "B"

4500	54 sec.	0.9 miles
4400	1 min. 0 "	1.0 "
4300	1 " 0 "	1.0 "
4200	1 " 6 "	1.1 "
4100	1 " 6 "	1.1 "
4000	1 " 18 "	1.3 "
3900	1 " 0 "	1.0 "
3800	1 " 18 "	1.3 "
3700	1 " 6 "	1.1 "
3600	1 " 0 "	1.0 "
3500	1 " 0 "	1.0 "
		11.9 miles

Area "C" North

4700	1 min. 0 sec.	1.0 miles
4600	1 " 12 "	1.2 "
4500	1 " 12 "	1.2 "
4400	1 " 30 "	1.5 "
4300	1 " 36 "	1.6 "
4200	1 " 42 "	1.7 "

Area "C" Cont'd

Elevation	Time	Mileage
4100	1 min. 30 sec.	1.5 miles
4000	1 " 30 "	1.5 "
3900	1 " 30 "	1.5 "
3800	1 " 30 "	1.5 "
3700	1 " 30 "	1.5 "
3600	1 " 30 "	1.5 "
3500	1 " 30 "	1.5 "
		19 miles

Area "C" South

5500	0 min. 36 sec.	0.6 miles
5400	0 " 54 "	0.9 "
5300	0 " 54 "	0.9 "
5200	1 " 24 "	1.4 "
5100	4 " 30 "	4.5 "
5000	4 " 36 "	4.6 "
4900	2 " 36 "	2.6 "
4800	2 " 12 "	2.2 "
5100) h) i 5150) l) l 5200)) t 5250) o) p 5300)	3 " 24 "	3.4 "
	2 " 0 "	2.0 "
	1 " 30 "	1.5 "
	1 " 18 "	1.3 "
	0 " 42 "	0.7 "
4700	1 " 24 "	1.4 "
4600	1 " 48 "	1.8 "
4500	2 " 0 "	2.0 "
4400	1 " 42 "	1.7 "
4300	1 " 24 "	1.4 "
4200	1 " 12 "	1.2 "

Area "C" South Cont'd.

Elevation	Time	Mileage
4100	1 min. 6 sec.	1.1 miles
4000	1 " 0 "	1.0 "
3900	1 " 0 "	1.0 "
3800	0 " 54 "	0.9 "
3700	0 " 54 "	0.9 "
3600	0 " 48 "	0.8 "
3500	0 " 42 "	0.7 "
		42.0 miles

Area "D"

5800	1 " 0 "	1.0 "
5700	1 " 18 "	1.3 "
5600	1 " 36 "	1.6 "
5500	1 " 48 "	1.8 "
5400	1 " 6 "	1.1 "
5300	1 " 6 "	1.1 "
5200	0 " 30 "	0.5 "
5100	0 " 30 "	0.5 "
5000	0 " 42 "	0.7 "
		9.5 miles

New Primary Field

Electromagnetic Aerial Survey

By C. B. SELMSER, P.Eng.

REPRINTED FROM WESTERN MINER

APRIL, 1966

JULY, 1966

New Primary Field

By C. B. SELMSER, P.Eng.

Electromagnetic Aerial Survey

PART I

THE author while making installation tests on a 47G-3B-1 Bell helicopter discovered an interesting primary field developed by the rotors on this aircraft. It was found that this field is adequate for searching near the surface of the ground with an operator using an electromagnetic search coil.

This primary field has an effective size to reach at least 150 feet below the elevation of the search coil. It also has an approximate frequency of 1000 cycles per second, which provides maximum penetration into overburden and rock material to a depth of about 100 feet.

Search is made in mountain country by flying lines along contour levels and on more level terrain with a parallel configuration. With the aircraft at a 50- to 75-foot elevation above the terrain the path covered is about 100 feet wide.

Practical Theory

A careful examination of figures 1 and 2 will show that because of the shape of the rotor blades on the aircraft, two distinctive fields are generated when the rotor is turning. These fields are generated from eddy currents in the rotors as they turn rapidly across the earth's magnetic field, which in northern latitudes is nearly vertical to the earth's surface.

An elementary study of physics tells us that a conductor cutting across a magnetic field will generate electric current. If this current is not drawn off then eddy currents will form and a secondary field which has a frequency depending on the speed of the rotors will be developed.

Since the two blades are turning and will reach opposite sides of the shaft, the currents and thus the field will be changing direction with every revolution of a blade. The blades rotate at a speed of 320 rpm and since there are two blades the primary rotor field has a frequency of approximately 10 cycles per second (100 and 1000 cycle multiples).

The blades which are made of aluminum alloy are long and thin. This shape promotes a rotor field, which is normal to the flat surface of the blade. As the blade turns, the field which is effectively about 150 feet in radius, forms a conicle shape. A second field is built up transverse to the rotor field. This field as it turns with the blades forms a sphere shaped configuration.

When the rotor field comes in contact with a tabular orebody it sets up a secondary field from the conducting orebody. This field then joins the transverse field to give a resultant

Patent applied for.

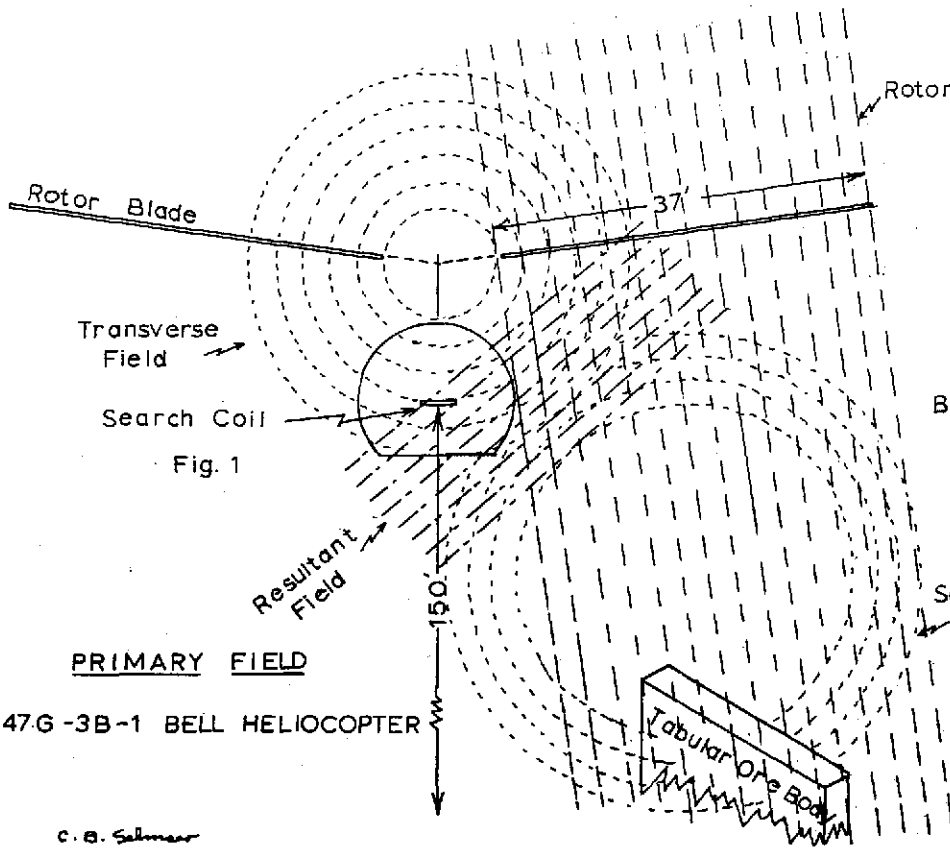


Fig. 1

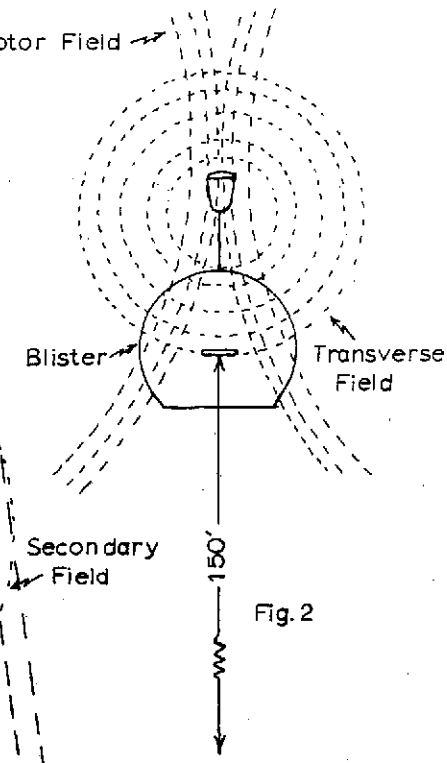


Fig. 2

field direction that is quite different from the original and now no longer perpendicular to the axis of the search coil. Thus out of phase harmonic multiple signals are picked up in place of the secondary field.

The Detector Coil

The operator sits in the seat beside the pilot and holds a search coil with its axis vertical. Attached to the tuned coil is an audio amplifier. This is in turn attached to a pair of headphones, which the operator wears over his ears.

The audio amplifier, which is tuned to a signal of 1000 cps has a gain switch and a feedback squelcher switch. The gain switch is regulated so that the signal is just audible when the coil is held with its axis vertical. The squelcher circuit is adjusted so that only the 1000 cps signal goes through the amplifier.

When the aircraft is flown close to the surface of the ground without a conductor present the field signal will have minimum amplitude. When a conductor is present in the rotor field the signal strength will suddenly increase in amplitude warning the operator that he is crossing a conductor. The aircraft then hovers over the spot until the observer has investigated the change in signal reception.

Tests Made in the Field

1. Tests were made for extraneous fields inside and outside of the aircraft.
2. Tests were made of the rotor and transverse fields inside and outside the bubble.
3. The aircraft was flown at various elevations over the observer so that he could measure the amplitude of the rotor field at the various levels.
4. A known external field was mounted below the rotor using a motor generator set for power. Tests were made both on the ground and in the aircraft, and while the aircraft was airborne. This enabled the author to study the relative strength of the magnetic field.
5. Tests flown over Keno Hill orebodies gave positive verification with orientation changes of 10 degrees.

Conclusion

The primary field generated by the 47G-3B-1 Bell aircraft may be used for reconnaissance electromagnetic surveys. The search is not as deep as some ground methods, but is deep enough for bodies exposed in outcrops or under light overburden. The method is as effective for finding conductors as the self potential method, but with greater speed and mobility.

It is obvious that since the method can be used in an aircraft such as this it is very adaptable to surveys over all kinds of terrain. The survey requires no line cutting and coverage may be done rapidly and with as much detail as required.

Cost Relative to Ground Methods

The survey which is continuous in nature may be flown at a cost of $12.50 per mile. Surveys on the ground could cost as much as $100.00 per mile in very rough and inaccessible locations.

The cost of the aircraft, which in most cases amounts to $3.00 per mile is much less than that for line cutting. Line cutting and marking costs usually amount to $40.00 per mile.

The total cost of the survey then is $15.50 per mile. This means that the claim is totally covered with continuous reading on lines 100 feet apart. The equivalent cost on the ground would be $250.00 with readings 100 feet apart and lines having a 200-foot separation.

Electromagnetic Aerial Survey PART II

SINCE the writing of the last article on this subject, the principal of this airborne EM method has been tested on many ore occurrences in northern British Columbia and the Yukon Territory. Also the technical aspects of the method have been overhauled and conclusions have been made to make this method much more effective than was first thought possible.

Recordings have been made on magnetic tape, which have been played back on the oscillograph to study the wave form of the signals. Records were made over both very mountainous and less rugged terrain to discover what effect odd angular reflections would have on the signal. Many recordings were made over known ore occurrences and anomalies found elsewhere were assessed by surveys on the ground.

The receiver has also been tested for the tuning qualities of the circuits and the ability of the circuits to filter out the correct signal strength and quality for the purpose of the survey. A portable collapsible coil has been added to strengthen the earth's magnetic field to many times its natural value. This increases the signal strength of the various multiple harmonic signals produced by the rotor. By adding automatic frequency filter systems any desired frequency can be locked in and used to vary the depth of penetration of the audio wave energy.

The operator now records all surveys made on magnetic tape so that they can be later reviewed by the geophysicist. This not only provides a cross-check on the survey method, but enables the geophysicist to more intelligently interpret the anomalies and advise the operator on further ground surveys used to check out these anomalies.

Signal Characteristics

In the photographs taken of the replay of magnetic tapes on the oscillograph the modulated signal is compared with a 1000 cycle per second signal, which has been driven through the receiver. In the three comparisons please note the harmonics of the signals in examples 1, 2 and 3, while in photograph 4 there are no harmonics, but just the pure modulated signal. Photograph 2 shows merely the in-phase and out of phase relationship of a basic signal.

Photograph 1 shows many out of phase harmonics of the signal, which give a very rough sound to the signal in the earphones. This is the signal heard when the aircraft passes over terrain which contains no conducting bodies.

In photograph 3, the aircraft is just entering the influence of a conductive body, and is not yet in close range. Some of the harmonics which are closely in phase with the signal are still present.

In photograph 4 the aircraft is flying

directly over a conducting ore body and all out of phase harmonics of the signal have disappeared. This condition gives a very clear tone in the earphones, which is quite distinguishable from the usual harmonic ridden signal.

The modulated signal shown in the illustrations have an approximate frequency of 875 cycles per second. The actual signal from the rotors will be less, but must be greater than 600 cycles, which is the lower limitation of the oscillograph setting.

Theory on the Rotor Signal

In the previous article it was explained that a preliminary sine wave signal from the rotor would be oscillating at 10 cycles per second, which of course is below the audio range. Now in addition to the earth's magnetic flux the rotor is turning through a 10 cycle per second pulsating field, which is tuned to the pulsations in the rotor from the eddy currents. This is the same condition that exists in a Goldschmidt alternator, which is used to produce high frequency wave energy. In this case a frequency multiplication is made when the blades of the rotor turn at a synchronous speed to produce a 100 cycle per second signal. This signal is in the audio range, but has not a frequency great enough for the best signal ranging in this type of survey. If the receiver used is tuned to resonate at some higher frequency such as 1000 cycles per second, which may be generated by the rotor in a higher frequency environment, then a more correct frequency value may be used in the survey.

The only additional factor, which must be considered is the increase of the signal strength to an amount, which will allow ample penetration into the overburden and rock layers where conductors will be discovered. This also must be done without adding any great weight factor to the aircraft. This goal has been achieved by using a flexible coil of over 100 turns and introducing direct current into it from the aircraft's service system. The area of this coil is adjusted so that it fits between the landing gear struts of the aircraft. This coil then is capable of providing a preliminary direct field of approximately 20 gauss, which is 40 times the magnetic field strength of the earth's vertical component.

Possible Penetration

Since the original penetration was considered to be 150 feet below the elevation of the search coil when the receiver was tuned to a working frequency of 100 cycles per second, it follows that with the increase of the working frequency and the field strength a much greater penetration will be achieved. The isotropic condition of the transmitted signal will also overcome conditions of misorientation weaknesses in detection, which effect other methods of EM detection.

The anisotropic response to the presence of a conductor in the rotor field span is subject to the return of out of phase signals from the conducting body itself. These are notably weak in other methods of EM detection where a signal of low energy is evolved from the transmitting coil. By using the alternator principal of the rotor field in a high primary field strength, several watts of power may be generated.

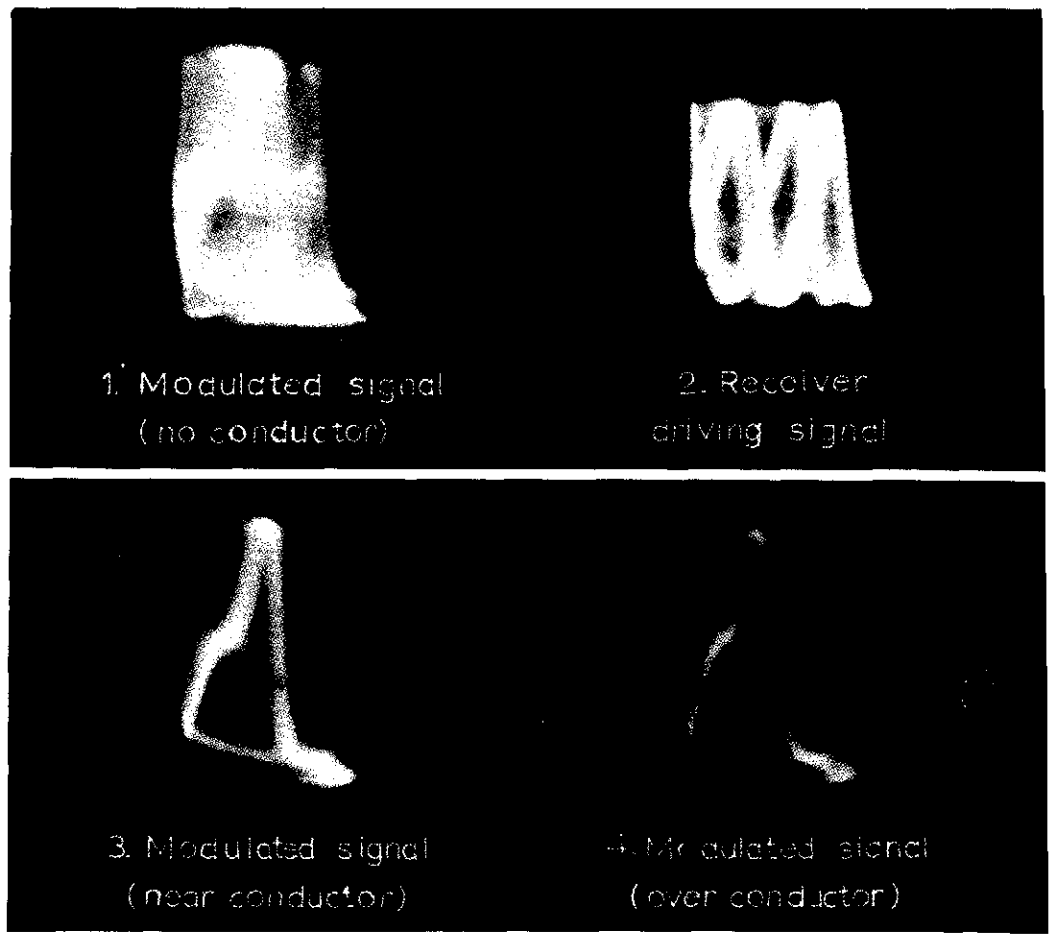
It is quite possible that penetrations into the bedrock and overburden would now be over 1000 feet from an aircraft with the flexibility of a helicopter. This can also be done without a weight factor greater than ferrying a passenger and his baggage. With the characteristics of the 47G-3B-1 Bell helicopter or the Hiller very rough mountainous terrain may be surveyed quickly, economically and safely.

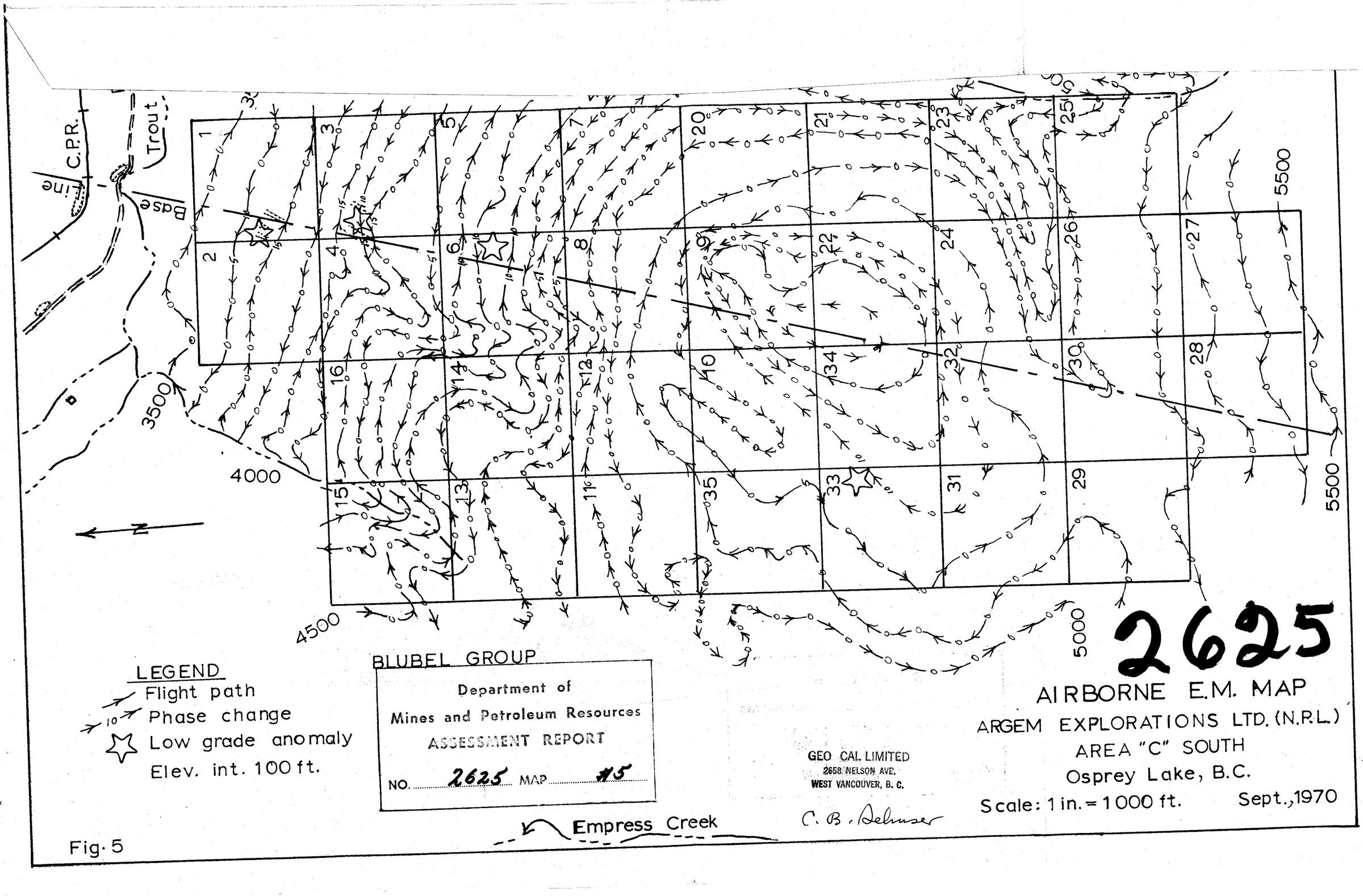
Ore Bearing Provinces Flown Over to Date

1. Mayo District, Yukon Territory
2. Vangorda District, Yukon Territory
3. Ross River District, Yukon Territory
4. Watson Lake District, Yukon Territory
5. Taku District, British Columbia.

The areas flown over involve several thousand miles of line. In every case the anomalies have been assessed and found to be caused only by conducting ore bodies in the bedrock. This has been done during the past six months by one operator who having avoided using time for installation of instruments has used this time in checking results on the ground. He has been closely supervised by several other engineers besides the author who are generously enthusiastic about this method of survey.

PATENT APPLIED FOR





LEGEND

Flight path

10 Phase change

Low grade anomaly

Elev. int. 100 ft.

BLUBEL GROUP

Department of
Mines and Petroleum Resources
ASSESSMENT REPORT

NO. 2625 MAP #5

Empress Creek

GEO CAL LIMITED
2658 NELSON AVE.
WEST VANCOUVER, B. C.

C. B. Delhaise

2625

AIRBORNE E.M. MAP

ARGEM EXPLORATIONS LTD. (N.P.L.)

AREA "C" SOUTH

Osprey Lake, B.C.

Scale: 1 in. = 1000 ft. Sept., 1970

Fig. 5

DOMINION OF CANADA:
PROVINCE OF BRITISH COLUMBIA.
TO WIT:

In the Matter of

ARGEM EXPLORATIONS LTD. (NPL)
1950 Lonsdale Avenue,
North Vancouver, B. C.

I, Calbert B. Selmser,

of 2658 Nelson Avenue, West Vancouver,

in the Province of British Columbia, do solemnly declare that

The following expenditures were made in regard to the BLUBEL CLAIMS No. 1 - 16 inclusive, Record Numbers 18687 to 18702 at Osprey Lake in Similkameen M. D. with one day's work on August 30, 1970 for an Airborne E.M. Survey:

Helicopter and Pilot @ $165.00 per hr.	$ 400.00
Geophysicist's salary @ $150.00 per day	150.00
42 line miles editing and interpretation @ $15.00 per mile	620.00
Mapping (3 days) @ $100.00 per day	300.00
Report and interpretation (2 days) @ $100 per day	200.00
TOTAL	$1670.00

with documents evidencing the expenditures incurred in making this survey

And I make this solemn declaration conscientiously believing it to be true, and knowing that it is of the same force and effect as if made under oath and by virtue of the "Canada Evidence Act."

Declared before me at the City of Vancouver, in the Province of British Columbia, this 8 day of October 1970, A.D.

Calbert B. Selmser

Joan Turner

A Commissioner for taking Affidavits within British Columbia or
A Notary Public in and for the Province of British Columbia.

Sub-mining Recorder