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District Geolo	ogist, Kamloops Off Confidential: 90.02.13
ASSESSMENT REI	PORT 18440 MINING DIVISION: Lillooet
PROPERTY: LOCATION:	Summit LAT 50 52 30 LONG 122 31 30 UTM 10 5635813 533421 NTS 092J15E
CAMP:	034 Bridge River Camp
KEYWORDS:	Fringe Benefit,Summit,Shadow of Doubt,Glamorous Gold Gold Summit Mines Brewer, L.C. 1988, 25 Pages Gold,Silver,Antimony Triassic,Fergusson Group,Volcanic,Sedimentary,Intrusive,Ultramafic Alteration,Faults,Quartz,Calcite,Sulphides
EMAE MAGA	Map(s) - 1; Scale(s) - 1:10 000
RELATED REPORTS: MINFILE:	17958 092JNE035

LOG NO:	0224	RD. P
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GEOPHYSICAL REPORT

ON

AIRBORNE MAGNETIC AND VLF-EM SURVEYS

OVER THE

FRINGE BENEFIT, SUMMIT 1-4, SHADOW OF DOUBT AND GLAMOROUS GOLD CLAIMS

MARSHALL CREEK AREA

LILLOOET MINING DIVISION

BRITISH COLUMBIA



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DATED

: 45 kilometers northwest of Lillooet, B.C. on Marshall Creek, on the north shore of Carpenter Lake.

: GOLD SUMMIT RESOURCES LTD. #100-455 Granville Street Vancouver, B.C. V6C 1T1

: COLUMBIA AIRBORNE GEOPHYSICAL SERVICES (1984) LTD. #611-470 Granville Street Vancouver, B.C. V6C 1V5

: LLOYD C. BREWER COLUMBIA AIRBORNE GEOPHYSICAL SERVICES (1984) LTD.

AUGUST 15, 1988

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Property Location Map Claim Map 
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 Map 1 /

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 Map 2 /

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Airborne Magnetic & VLF-EM

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Map 3 🖌

#### SUMMARY

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Airborne magnetic and VLF-EM surveys were carried out over the Summit Gold Property and adjoining claims owned by Gold Summit Resources Ltd. of Vancouver B.C., during the months of December 1987 and January 1988. The claims are located on the ridge between Marshall Creek and Carpenter Lake, some 40 kilometers northwest of the town of Lillooet. Access is gained by road from Goldbridge some 18 kilometers to the west properties. The terrain consists of mainly steep and rugged slopes forested with moderately dense coniferous trees at lower elevations to alpine vegetation above 2,000 meters elevation. The purpose to the surveys was to aid in the mapping of geology as well as to locate probable areas for extensions of gold bearing quartz filled faults and shears.

The property occurs within Bridge River series sediments and volcanics, and is intruded by granodiorites of the Coast Plutonic Complex. The structures within these groups strike northerly through the property.

In the area, occurs gold, silver and copper mineralization usually hosted in fault controlled quartz and calcite viens within the Bridge River Series.

The airborne surveys were flown at about 50 meter terrain clearance on contour lines with line separation averaging 200 meters. The instruments used were a Sabre Electronics proton precession magnetometer and a Sabre Electronics VLF-EM receiver. The magnetic data were digitized from strip charts and hand contoured. The contours were drawn on a survey plan on which the VLF-EM anomalies were plotted as well.

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## CONCLUSIONS

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The magnetic survey revealed the presence of a previously unmapped (basic) plug or neck within the center of the Summit #2 claim. The rest of the survey area is fairly quiet, indicating it is mainly underlain by undivided sediments and volcanics of the Bridge River Group. There are indications of the presence of ultramafics on the northeastern area of the claims. Mineralization in the Marshall Creek area is often related to structural controls such as faults and shears. As a result, magnetic lows, which can reflect these structures, indicate important areas for further exploration.

The VLF-EM survey revealed 26 multi-line conductors as well as several single line conductors; the majority of these conductors are reflecting shears, faults and contact zones, which are important in the placement of gold bearing quartz veins.

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Both the VLF-EM and magnetic surveys revealed lineations within the survey area that are likely caused by fault, shear and/or contact zones. These can be important indicators of sulphide and native gold mineralization especially where the lineations cross.

#### RECOMMENDATIONS

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The airborne geophysics has revealed some target areas throughout the property such as magnetic lows and the VLF-EM highs. It is recommended to check these out by prospecting, geological mapping and possible soil sampling. Soil geochemistry lines should be run in the areas of interest, such as across the VLF-EM conductors that occur near the magnetic lows.

It is not expected, however, that all gold-sulphide mineralization in the area will be reflected by the airborne magnetic and VLF-EM surveys. It is simply a start as far as defining target areas.

However, if one wants to cover the property effectively, the following program is recommended:

Careful geological mapping and prospecting should be carried out by a geologist and prospector familiar with gold mineralization. One large benefit of this well be a better interpretation of any geophysics that are carried out. Special attention should be paid to the VLF-EM conductors that are occuring on and around the magnetic high occuring in the Summit #2 claim.

Soil samples should be carried out on a reconnaissance basis over any area of interest. They should be run on topographical contours across the strike of the zone being investigated whenever possible.

Cat trenching should be carried out prior to diamond drilling.

#### GEOPHYSICAL REPORT

ON

AIRBORNE MAGNETIC AND VLF-EM SURVEYS

OVER THE

FRINGE BENEFIT, SUMMIT1-4, SHADOW OF DOUBT, GLAMOROUS GOLD AND CG CLAIMS

MARSHALL CREEK AREA

LILLOOET MINING DIVISION

BRITISH COLUMBIA

## INTRODUCTION

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This report discusses the survey procedure, compilation of data and the interpretation of low-level airborne magnetic and VLF-EM surveys carried out over the FRINGE BENEFIT, SUMMIT 1-4, SHADOW OF DOUBT, GLAMOROUS GOLD AND CG claims in the Marshall Creek area in December 1987 and January 1988. The surveys were carried out by Lloyd C. Brewer, instrument operator and project manager, and John Kime, navigator, both of whom are of Columbia Airborne Geophysical Services (1984) Ltd. A total of 166.7 line kilometers of airborne surveys were flown over the property and surrounding area.

The object of the surveys was to aid in the geological mapping of lithology and structure for the purpose of exploration of the type of gold mineralization as is found in the Gold Bridge and Bralorne area. Magnetic surveys have especially been proven to be a good geological mapping tool.

## PROPERTY AND OWNERSHIP

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The property consists of seven contiguous claims and 3 crown grants totaling 100 units as shown on Map 2 and as described below:

- 2 -

Claim Name #	Units	Record #	Expiry Date
FRINGE BENEFIT	20	3665	March 16, 1989
SUMMIT 1	15	3510	Aug. 11, 1988.
SUMMIT 2	12	3534	Aug. 13, 1988
SUMMIT 3	12	3640	Jan. 07, 1989.
SUMMIT 4	9	3741	June 18, 1988
SHADOW OF A DOUBT	9	3674	Apr. 21,1989
GLAMOROUS GOLD	20	3659	Feb. 12,1987
CROWN GRANTS	3	Lot #'s 3660 - 3662	2

The expiry dates shown do not take into account the surveys under discussion as being accepted for assessment credits.

The six claims and 3 crown grants are owned by Gold Summit Resources Ltd. of Vancouver, British Columbia.

## LOCATION AND ACCESS

The property is located on Marshall Ridge and covers the entire area between Carpenter Lake and Marshall Creek.

The geographical coordinates are 50°54'N latitude and 122°30'W longitude.

Access can be gained by the Lillooet/Gold Bridge road which runs on the north side of Carpenter Lake. The distance from Gold Bridge to the property is about 18 km. ſ

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The property lies between Carpenter Lake and Marshall Creek on Marshall Ridge in the Coastal Mountain Range. The terrain is, in general, steep and mountainous.

Elevations vary from 750 meters a.s.l. at the western edge of the property to 1,600 meters a.s.l. in the middle of Shadow of Doubt claim.

The main water source on the property is both Carpenter Lake, which is included in the southern end of the property, and Marshall Creek which runs through the northern claims along the bottom of the property.

The forest cover consists primarily of fir and spruce trees, moderate in density and with an undergrowth light to moderate.

#### HISTORY OF PREVIOUS WORK

The earliest work on the property was done in the 1930's when adits were driven into mineralized zones. One of these adits is the LMT or Lower Mountain Tunnel. Mineralization present includes: pyrite, arsenopyrite, pyhrotite, sphalerite, galena, minor bornite, stibnite and quartz.

More recent work includes geochemical surveys and sampling and mapping of old workings in 1981. Further geophysical work was performed in 1982.

#### GEOLOGY

The area is underlain by the Fergusson Group of Triassic age or older. The Group consists of greenstone, basalt, chert, argillite, phyllite, and minor limestone. This package of rocks has been intruded in places by serpentinized ultrabasic rocks. The Fergusson Group rocks are highly contorted and altered and are cut by strong faults, some of which are filled with quartz-calcite viens carrying sulphide mineralization with varying gold and silver values.

### INSTRUMENTATION AND THEORY

## a) Magnetic Survey

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APPROVAL AND A

The magnetic data are detected using a nuclear free precession proton magnetometer, manufactured by Sabre Electronic Instruments Ltd. of Burnaby, B.C. The magnetometer measures the total count of the earths magnetic field intensity with a sensitivity of one gamma. The data are recorded on magnetic tape and 12 cm analog strip chart.

The magnetic patterns obtained from a regional airborne survey are directly related to the distribution of magnetite in the survey area. However, the geology cannot be deduced from isomagnetic maps by simply assuming that all magnetic highs are underlain by gabbro or ultramafic rocks, and that all magnetic lows are caused by limestone or chert. The problem with such a simplistic approach is that magnetite is not uniformly distributed in any type of rock. Other problems arise from the fact that most geologic terrains have rocks of high susceptibility superimposed on less 'magnetic' rocks, and vice versa. Cultural features such as powerlines, pipelines and railways also complicate matters. So many variable can be involved that it may be impossible to make a strictly accurate analysis of the geology of an area from the magnetic data alone. It is preferable to use other information such as geological, photogeological and electromagnetic in combination with magnetic data to obtain a more accurate analysis.

## b) VLF-EM Survey

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A two-frequency omni-directional receiver unit, manufactured by Sabre Electronic Instruments Ltd, of Burnaby, B.C., was used for the VLF-EM survey. The transmitters used are NLK Arlington (Seattle), Washington, operating on 24.8 KHz, and Annapolis, Maryland, transmitting at 21.4 KHz. These signals are used due to their ideal orientation with respect to northwest and eastwest geological structures, and their good signal strengths. The measurement taken during the survey is the variation in the horizontal component of signal strength.

- 5 -

The VLF (Very Low Fequency) method uses powerful radio transmitters set up in various parts of the world for military communications. These powerful transmitters can induce electric currents in conductive bodies thousands of kilometers away from the radio source. The induced currents set up secondary magnetic fields which can be detected at surface through deviations in the normal VLF field. The VLF method is inexpensive and can be a useful initial tool for mapping structure and prospecting. Successful use of the VLF requires that the strike of the conductor be in the direction of the transmitting station so that the lines of magnetic field from the transmitter cut the conductor. Thus, conductors with northeast to southeast strikes will respond to Annapolis transmissions, while conductors striking north to west will respond to both stations, giving coincident field strength peaks.

The theory of VLF-EM interpretation is quite simple. Conductors are located at field strength maxima. In the Gold Bridge area, on may assume that a Seattle field strength peak represents a conductor with a generally north trend, and a Annapolis peak will be a conductor with an east-west trend. This of course, only applies to conductors with clearly linear trends and cannot be assumed for single line anomalies. It is impossible to determine the quality of conductors with any reliability, using field strength data alone. The question of linearity is in doubt if the conductor does not appear to cross the adjacent flight lines. The relatively high frequency results in a multitude of anomalies from unwanted sources such as swamps, creeks and cultural debris. However, the same characteristic also results in the detection of poor conductors such as faults, shear zones, and rock contacts, making the VLF-EM a powerful mapping tool.

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The interpretive technique requires information from the magnetic surveys, air photo analyses, and ground traverses to aid in discrimination between important and unwanted anomalies. Even armed with this information, the interpreter can easily be misled.

## SURVEY PROCEDURES

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A two meter bird was fitted with a magnetometer coil and 2 omni-directional EM receivers and towed beneath the helicopter on a 10 meter cable. The terrain clearance for the bird was 50 meters.

The surveys were contour flown at a line spacing varying from 100 to 200 meters. Navigation was visual, using 1:50,000 scale maps blown up to 1:10,000.

The aircraft used to conduct this survey was a Bell Jet Ranger, owned and operated by Bob Holt. Airspeed was a constant 60 kph so that the creek valleys and canyons were pentrated thoroughly. The slow airspeed provided safely, detailed coverage of boxed-in areas, and consistency of data retrieval, which was critical in rugged terrain.

The number of km flown covering the areas, as shown on Map 3, is 166.7.

I have over 7 years experience in conducting aerial magnetic and electromagnetic surveys from fixed and rotary wing aircraft, under all types of terrain conditions.

## DATA REDUCTION AND COMPILATION

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The observant magnetic total field was recorded on analogue strip charts. These were played back together with audio recordings containing fiducial markers, and the fiducial markers were transferred to the strip charts. The fiducial markers were identified with topographic features along the flight lines.

The magnetic data were taken from the strip charts and plotted. It was then contoured at a 100 gamma interval onto Map 3 at a scale of 1;10,000 (1 cm = 100 M).

The VLF-EM anomalies were taken from the strip charts and plotted on Map 3 with the magnetic contours. For each anomaly, a heavy line along the flight line was drawn showing its half-width. An 'S' or an 'A' designated the anomaly as being from the Seattle transmitter or the Annapolis transmitter.

A question mark on the anomaly indicates that it could be caused by terrain. The survey area was somewhat rugged causing numerous VLF-EM responses most of what was sorted out as being caused by terrain. However, some were difficult to sort out and they were plotted with a question mark.

Strong anomalies were plotted with exclamation marks, and anomalies without any marks indicated average responses. Other symbols are explained on the sheets.

## DISCUSSION OF RESULTS

## a) <u>Magnetics</u>

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The magnetic field over the Summit property is fairly active, varying from less than 800 gammas to over 2,700 gammas to give a range of 1,900 gammas. There is a definite pattern in the magnetics that correlates closely with geology as mapped by several G.S.C. geologists.

The G.S.C. open file, map 482, shows the property as underlain by undivided sediments and volcanics of the Bridge River Group. These units are reflected by the broad magnetic, quiet area, with values ranging from 1,200 to 1,300 gammas.

The most prominent feature of the magnetic survey is an intense magnetic high occuring in correlation with a topographic high within the eastern portion of the Summit #2 claim. The intensity is about 1,300 gammas above background. In all likely-hood, this high is reflecting an unmapped basic to ultra-basic plug, possibly Rexmont porphyry or dacite porphyry. This body could be the causitive source for mineralization occuring in close proximity to the area.

On the northeastern area of the survey is an area of fairly active magnetic change. The magnetic amplitude changes for less than 800 gammas to over 2,000 gammas. The extreme lows are located in the Hog Creek drainages. These are most likely reflecting faults or shears. The highs (1,500+) are most likely reflecting ultramafic bodies that are known to occur in the area. The less intense highs (1,300+) could also be caused by ultramafics that are below the surface.

Magnetic lows often occur along creek valleys, and/or areas of low topography. The reasons for this are as follows:

- 1. Valleys almost always contain deeper overburden which means the detecting element is further from the bedrock causing the magnetic field.
- 2. If the survey is flown across the valley or gully, then the detecting element is also further from the bedrock.
- 3. Gullies and valleys are often caused by faults or shear zones which are often reflecting magnetic lows.

## b) VLF-EM

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The major cause of VLF-EM anomalies, as a rule, are geological structure such as fault, shear and breccia zones. It is therefor logical to interpret VLF-EM anomalies to likely be caused by these structural zones. Of course, sulphides may also be a causitive source. But in the writer's experience, when VLF-EM anomalies correlate with sulphide mineralization, the anomalies are usually reflecting the structure associated with the mineralization rather than the mineralization itself.

There is some variation in intensity from one VLF-EM anomaly to the next. This is not only due to the conductivity of a causative source, but also the direction it strikes relative to the direction of the transmitter. In other words, those conductors lying close to the same direction as the direction of the transmitter can be picked up easier than those that are lying at a greater angle. Depending upon its conductivity, a conductor may not be picked up at all if it is at too great an angle. A number of VLF-EM anomalies (or conductors) occur throughout the survey area. There are a total of 26 main conductive zones with numerous single line anomalies. Of the 26 main conductive zones, only 17 have been described in full detail. The zones are labeled on Figure 3 using lower case letters a to q respectively.

Some of the conductors, such as f and h are drawn with dashed lines. This ocurs simply because the conductor was not picked up on all flight lines. In other words, whereever there is a space within the line marking the axis of a conductor is where a flight line did not respond to the conductor.

As mentioned above, any VLF-EM conductor is indicative of geological structure. However, the longer conductors are much more indicative. These include conductors a,d,f,g,h,l and p, where lengths vary from 1,300 meters to 6,100 meters. As previously mentioned, any parts of these anomalies could be reflecting mineralization that is associated with geological structure.

Conductor a is the longest conductor within the survey area. It has a northwesterly strike length of over 6,100 meters. This anomaly is most likely reflecting the Marshall Creek fault which is a major fault in the area.

Conductor b occurs in the western edge of the survey area. It has a northeasterly strike length of approximately 1,400 meters. This conductor's axis is offset near the center by what appears to be a northwest/southeast trending slip fault. This fault is slao reflected in conductor d to the west and by a long single line conductor to the east. Conductor b is of fairly high exploration potential as ther may be cause for sequences mineralization emplacement especially in the zone of fault/shear intersection.

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Conductor c has a 200 meter northeasterly trending strike length. It's causitive source is most likely a fault/shear zone associated with a fairly large, perpendicular trending fault.

Conductor d occurs in the most western edge of the survey area. It has a somewhat boomerang shape and strikes northwest to west for a length of some 1,300 meters. This conductor is most likely reflecting either mineralization associated with the slip fault or the slip fault itself.

Conductor e is one of several conductive zones originating at or near the edge of the intense magnetic high occuring within the Summit #2 claim. The conductors e,g,h,l and o are high order anomalies as they are most likely reflecting structure that could be emplaced with mineralized fluids mobilized by the intrusive causing the magnetic high. All of the conductors warrant extensive follow-up.

Conductor f has a divided northeast strike length of over 1900 meters. It appears to be reflecting a northeasterly trending fault/shear zone which runs out of Hog Creek as reflected by conductor p across Marshall Creek through a saddle on the main ridge of the Summit claims. Projections from this fault to the southwest line ip with the strike of Bobb Creek, across Carpenter Lake.

Conductor g has a strike length of 1,200 meters. It is one of the higher order anomalies as discussed above. It's causative source is most likely a fault/shear zone that warrants further exploration.

Conductor h is one of the longest anomalies within the survey area. It is open at both ends and extends over 4,500 meters. The strength of this conductor varies somewhat along it's length. The strongest area occurs to the west of the main magnetic high on the survey. Most other sections of anomalies are classified as moderate in strength.

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Conductor i has a northsouth strike length of over 900 meters. It is a strong anomaly occuring along the boundary of the Summit #4 and the Shadow of Doubt claims. It appears to be structuraly related as it's axis lines up with the general strike of Tommy Creek across Carpenter Lake.

Conductor j parrelels conducter i and is also of strong amplitude. It's length is a little over 900 meters.

Conductor k occurs immediately to the east of conductor i and j. It shares a common north-south strike and has an open axis the length of 1,000 meters.

Conductor 1 consists of two parts which bisect the main magnetic high within the survey. It strikes north northeast and has an axis length of over 2,200 meters. This anomaly is of strong amplitude and is of significant exploration interest as:

1. It bisects a large magnetic high

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- 2. Mineralization in the area is known to be fault/fissure controlled
- 3. It appears to be reflecting a large structure that comes from Hog Creek valley.

Conductor m is a moderate strength anomaly with a north-south strike length of 800 meters. It is of some interest as it is occuring in an area of moderate magnetic activity and the southern end of this anomaly overlaps the western end of conductor n. This feature is possibly reflecting the intersection of two fault/shear zones.

Conductor n, as mentioned above, is an anomaly of some exploration potential. it is moderate strength with a northeast strike length of 1,100 meters. At the eastern extremity of this conductor it runs into the Marshall Creek fault. Conductor o is located on the northwest corner of the Glamorous Gold claim. On the western end of the conductor, is the main magnetic high, and on the eastern end of this condictor occurs the Marshall Creek fault(conductor a). Again, this could be reflecting a mineralized shear/fault zone.

Conductor p occurs in the Hog Creek Drainage and strikes into conductor f. It is most likely reflecting a fault related to conductor a.

Conductor q occurs in the northeastern corner of the Summit #1 claim. It has a northeast by east strike of over 600 meters. Its causative source is unknown.

There are some single line anomalies any of which could be reflecting bedrock conductors associated with mineralization. For each anomaly, the strike of the causitive source is unknown.

c) Lineations

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Lineal trends considered to be indicative of geological structure have been drawn on Figure 3, taking into account:

- a) Magnetic lows which are often caused by the magnetite within the rocks being altered by geological structure processes.
- b) VLF-EM anomalies which more often than not are reflecting structure.
- c) Topographic depressions such as creek valleys which are usually caused by structure.

Several lineations that are indicative of faults and contacts have been mapped across the property striking primarily northwesterly and also northerly. some or parts of the lineations in other areas have been known to correlate directly with lithologic contacts and shear zones. The lineations cross each other on the property in different areas. Structure is often important for the emplacement of mineralizing fluid especially where lineations intersect. Thus, these areas may have greater exploration interest.

Respectfully submitted,

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LLOYD C. BREWER PRESIDENT

COLUMBIA AIRBORNE GEOPHYSICAL SERVICES (1984) LTD.

AUGUST 15, 1988

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### CERTIFICATION

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No. of Concession, Name

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I, Lloyd C. Brewer, of the city of Vancouver, in the Province of British Columbia, Canada, do hereby certify:

That I am owner and president of Columbia Airborne Geophysical Services (1984) Ltd., with offices located at #611-470 Granville Street, Vancouver, B.C.

I further certify:

- 1. I am president of Columbia Airborne Geophysical Services (1984) Ltd., and have been employed full time in the mineral exploration industry for the past 7 years, both in Canada, U.S.A. and Mexico.
- 2. I was project manager and instrument operator for the Levon Group property aerial survey program, which covered over 1800 line kilometers.
- 3. This report was compiled from data obtained from the airborne survey carried out by Columbia Airborne Geophysical Services (1984) Ltd., under my direct supervision, during December 1987 and January 1988.

LLOYD C. BREWER PRESIDENT

JUNE 30, 1988

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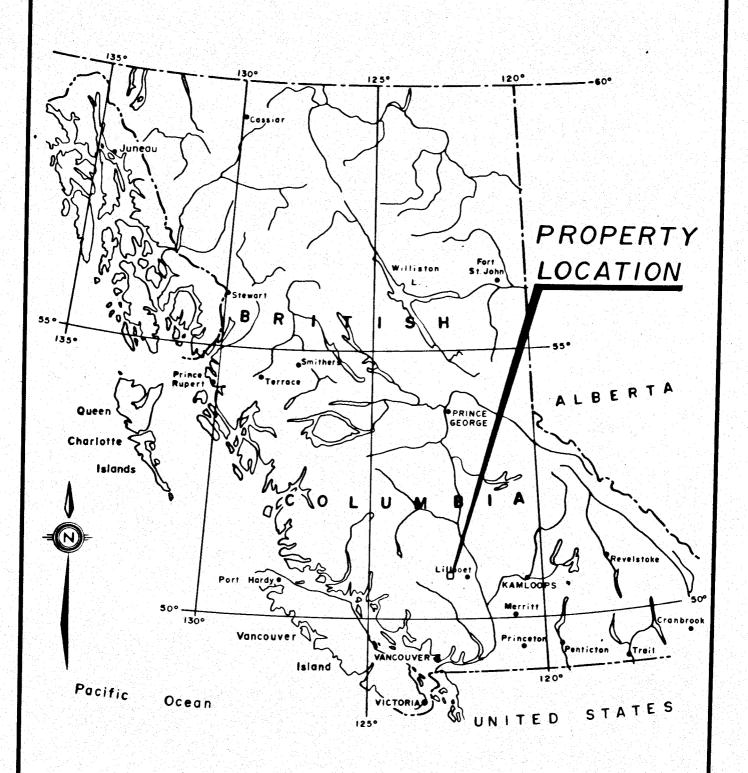
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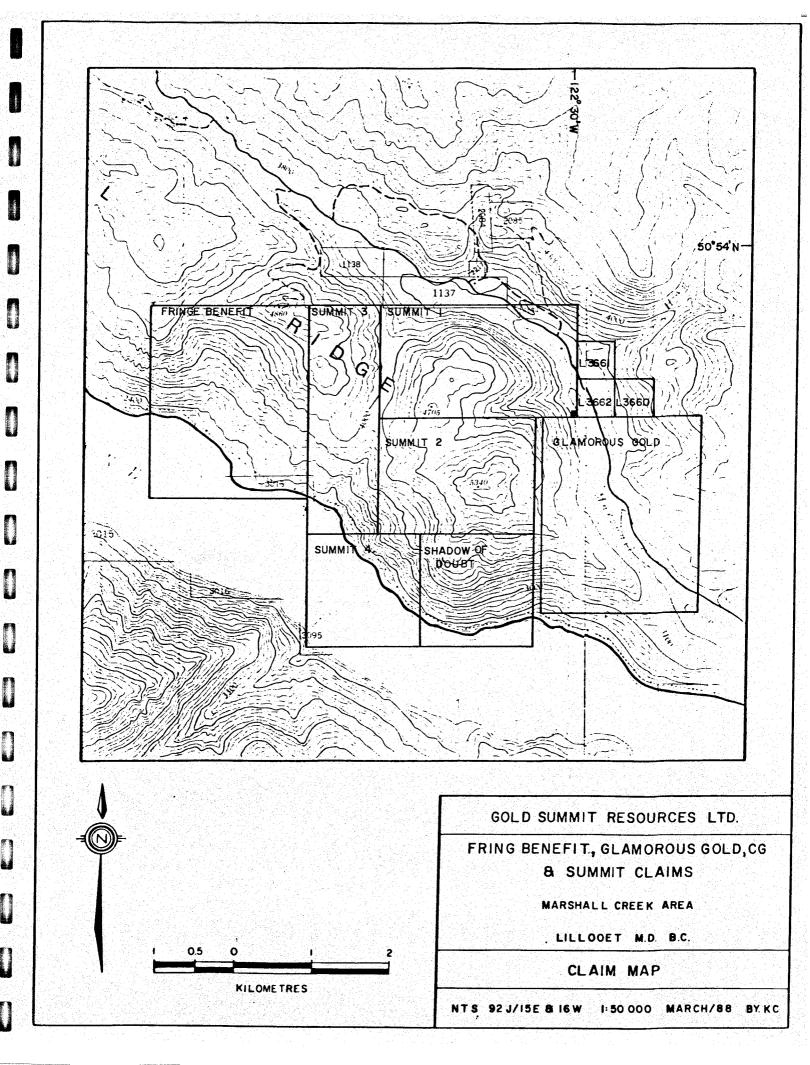
I, Lloyd C. Brewer, president of Columbia Airborne Geophysical Services (1984) Ltd. certify that the airborne magnetic and VLF-EM surveys were flown in December 1987 and January 1988, and that they were flown at a cost of \$100.00/km, the total number of km being 166.7 to give a total cost of \$16,670.00.

LLOYD C. BREWER PRESIDENT COLUMBIA AIRBORNE GEOPHYSICAL SERVICES (1984) LTD.

AUGUST 15, 1988



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