87-395-15947

REPORT ON COMBINED HELICOPTER BORNE MAGNETIC, ELECTROMAGNETIC AND VLF SURVEY BARKERVILLE PROPERTY, MOUNT NELSON AREA CARIBOO MINING DIVISION, BRITISH COLUMBIA

~~NTS 93G/1W, 1E~~
LAT. 53°05'; LONG. ~~122°15'~~ 121°43'
93H 4E 4/88

for
GALLANT GOLD MINES LIMITED
by
AERODAT LIMITED

June 30, 1987

CLAIMS SURVEYED

CLAIM NAME	RECORD NUMBERS	UNITS	RECORDING DATE
OREGON	7636	12	860505
ORE 1-5	7936-7940	5	860908
BURNS 14-17	7256, 7261, 7255, 7257	4	860112
CHISHOLM 1-4	7260, 7258, 7962, 7264	4	860112
CHISHOLM 6-7FR	7259, 7263	2	860112
GARBO 1, etal	7265	1	860112
WONDER	7266	1	860112
GARBO	7267	1	860112
LOGAN	8164	20	861218
SKY 1-5	8199-8203	5	870108

OWNER: JOHN C. BOT
OPERATOR: GALLANT GOLD MINES LTD.

R.J. de Carle
Consulting Geophysicist

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1. INTRODUCTION

This report describes an airborne geophysical survey carried out on behalf of Gallant Gold Mines Limited by Aerodat Limited. Equipment operated included a three frequency electromagnetic system, a high sensitivity cesium vapour magnetometer, a two frequency VLF-EM system, a film tracking camera, and an altimeter. Electromagnetic, magnetic and altimeter data were recorded both in digital and analog form. Positioning data were recorded on 35mm film as well as being marked on the flight path mosaic by the operator while in flight.

The survey area, comprising a block of ground in the Cariboo Mining District of British Columbia, is located in the Mount Nelson area which is approximately 12 kilometres west of Barkerville. It is also located approximately 70 kilometres northeast of Quesnel, B.C. Two flights, which were flown on January 26, were required to complete the survey with flight lines oriented at an Azimuth of 045-225 degrees and flown at a nominal spacing of 100 metres. Coverage and data quality were considered to be well within the specifications described in the contract.

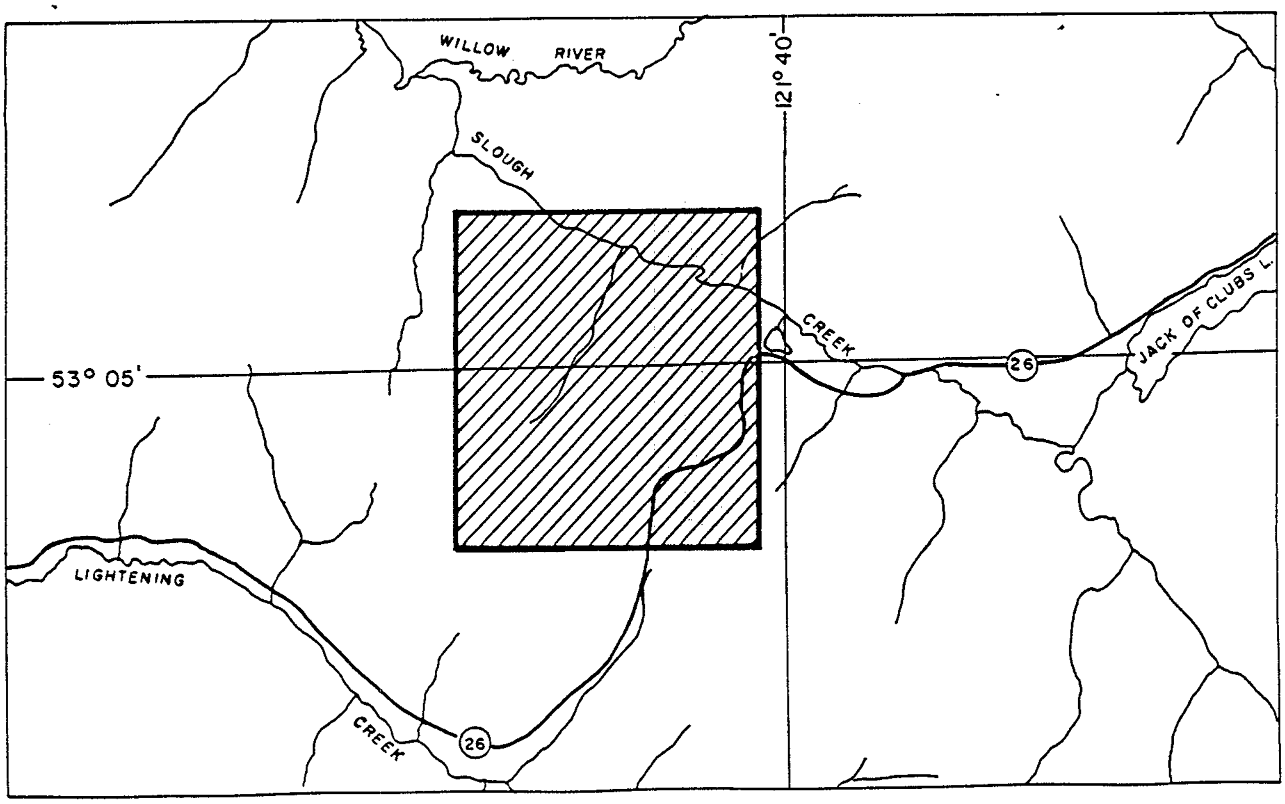
The survey objective is the detection and location of mineralized zones which can be directly or indirectly related to previous metal exploration targets. Of importance, therefore, are poorly mineralized conductors which may represent structural features which can sometimes play an essential role in the eventual location of primary minerals.

A total of 145 kilometres of the recorded data were compiled in map form and are presented as part of this report according to specifications outlined by Gallant Gold Mines Limited.

2. SURVEY AREA LOCATION

The survey area is depicted on the index map shown below. It is centred at Latitude 53 degrees 05 minutes north, Longitude 121 degrees 42 minutes west, approximately 12 kilometres west of Barkerville, British Columbia in the Cariboo Mining District of northern British Columbia (NTS Reference Map No. 93H/4). The area is accessible by Highway 26 which traverses across the southeastern corner of the survey block. From there, poor secondary roads, or rather, trails, branch off from this highway into the survey area. As well, there are some lumber roads at the north end of the area.

The terrain is rough and hilly with a terrain elevation of 3700 feet along Slough Creek to the north and a peak of 5500 feet near Mount Nelson.



3. AIRCRAFT AND EQUIPMENT

3.1 Aircraft

An Aerospatiale A-Star 350D helicopter, (C-GNSM), owned and operated by Maple Leaf Helicopters Limited, was used for the survey. Installation of the geophysical and ancillary equipment was carried out by Aerodat. The survey aircraft was flown at a mean terrain clearance of 60 metres.

3.2 Equipment

3.2.1 Electromagnetic System

The electromagnetic system was an Aerodat 3-frequency system. Two vertical coaxial coil pairs were operated at 935 Hz and 4600 Hz and a horizontal coplanar coil pair at 4175 Hz. The transmitter-receiver separation was 7 metres. Inphase and quadrature signals were measured simultaneously for the 3 frequencies with a time constant of 0.1 seconds. The electromagnetic bird was towed 30 metres below the transmitter.

3.2.2 VLF-EM System

The VLF-EM System was a Herz Totem 2A. This instrument measures the total field and quadrature components of two selected transmitters, preferably oriented at right angles to one another. The sensor was towed in a bird 12 metres below the helicopter. The transmitters monitored were Cutler, Maine broadcasting at 24.0 kHz for the Line station and Jim Creek, Washington broadcasting at 24.8 kHz for the Orthogonal station.

3.2.3 Magnetometer

The magnetometer employed a Scintrex Model VIW-2321 H8 cesium, optically pumped magnetometer sensor. The sensitivity of this instrument was 0.1 nanoTeslas at a 0.2 second sampling rate. The sensor was towed in a bird 12 metres below the helicopter.

3.2.4 Magnetic Base Station

An IFG-2 proton precession magnetometer was operated at the base of operations to record diurnal variations of the earth's magnetic field. The clock of the base station was synchronized with that of the airborne system to facilitate later correlation.

3.2.5 Radar Altimeter

A Hoffman HRA-100 radar altimeter was used to record terrain clearance. The output from the instrument is a linear function of altitude for maximum accuracy.

3.2.6 Tracking Camera

A Geocam tracking camera was used to record flight path on 35 mm film. The camera was operated in frame film mode and the fiducial numbers for cross-reference to the analog and digital data were imprinted on the margin of the film.

3.2.7 Analog Recorder

An RMS dot-matrix recorder was used to display the data during the survey. In addition to manual and time fiducials, the following data were recorded:

Channel	Input	Scale
00	Low Frequency Inphase	2 ppm/mm
01	Low Frequency Quadrature	2 ppm/mm
02	High Frequency Inphase	2 ppm/mm
03	High Frequency Quadrature	2 ppm/mm
04	Mid Frequency Inphase	8 ppm/mm
05	Mid Frequency Quadrature	8 ppm/mm
06	VLF-EM Total Field, Line	2.5%/mm
07	VLF-EM Quadrature, Line	2.5%/mm
08	VLF-EM Total Field, Ortho	2.5%/mm
09	VLF-EM Quadrature, Ortho	2.5%/mm

Channel	Input	Scale
10	Altimeter (150 m at top of chart)	3 m/mm
11	Magnetometer, fine	2.5 nT/mm
12	Magnetometer, coarse	25 nT/mm
13	Magnetometer, noise	0.025 nT/mm

3.2.8 Digital Recorder

A DGR 33 data system recorded the survey on magnetic tape. Information recorded was as follows:

Equipment	Recording Interval
EM system	0.1 seconds
VLF-EM	0.4 seconds
Magnetometer	0.2 seconds
Altimeter	0.4 seconds

4. DATA PRESENTATION

4.1 Base Map

A photomosaic base at a scale of 1:10,000 was prepared from a photo lay down map, supplied by Aerodat, on a screened mylar base.

4.2 Flight Path Map

Recovery of the flight track is carried out by comparing the negative of the 35mm film to the topographic features of the base map. Coincident features are picked and plotted on exact copies of the stable mosaic base map on which the final results are drafted. Points are picked at an average of 1 kilometre.

4.3 Airborne Electromagnetic Survey Interpretation Map

The electromagnetic data were recorded digitally at a sample rate of 10 per second with a time constant of 0.1 seconds. A two stage digital filtering process was carried out to reject major sferic events and to reduce system noise.

Local sferic activity can produce sharp, large amplitude events that cannot be removed by conventional filtering procedures. Smoothing or stacking will reduce their amplitude but leave a broader residual response that can be confused with geological phenomena. To avoid this possibility, a computer algorithm searches out and rejects the major sferic events.

The signal to noise ratio was further enhanced by the application of a low pass digital filter. It has zero phase shift which prevents any lag or peak displacement from occurring, and it suppresses only variations with a wavelength less than about 0.25 seconds. This low effective time constant permits maximum profile shape resolution.

Following the filtering process, a base level correction was made. The correction applied is a linear function of time that ensures the corrected amplitude of the various inphase and quadrature components is zero when no conductive or permeable source is present. The filtered and levelled data were used in the interpretation of the electromagnetics.

An interpretation map was prepared showing peak locations of anomalies and conductivity thickness ranges along with the

Inphase amplitudes (computed from the 4600 Hz coaxial response) and conductor axes. The anomalous responses of the three coil configurations along with the interpreted conductor axes were plotted on a Cronaflex copy of the photo base map.

4.4 Total Field Magnetic Contours

The aeromagnetic data were corrected for diurnal variations by adjustment with the digitally recorded base station magnetic values. No correction for regional variation was applied. The corrected profile data were interpolated onto a regular grid at a 20 metre true scale interval using a cubic spline technique. The grid provided the basis for threading the presented contours at a 2 nanoTesla interval.

The contoured aeromagnetic data have been presented on a Cronaflex copy of the photomosaic base map.

4.5 Vertical Magnetic Gradient Contours

The vertical magnetic gradient was calculated from the gridded total field magnetic data. Contoured at a 0.2 nT/m interval, the gradient data were presented on a Cronaflex copy of the photomosaic base map.

4.6 Apparent Resistivity Contours

The electromagnetic information was processed to yield a map of the apparent resistivity of the ground.

The approach taken in computing apparent resistivity was to assume a model of a 200 metre thick conductive layer (i.e., effectively a half space) over a resistive bedrock. The computer then generated, from nomograms for this model, the resistivity that would be consistent with the bird elevation and recorded amplitude for the coaxial frequency pair used. The apparent resistivity profile data were interpolated onto a regular grid at a 25 metres true scale interval using a cubic spline technique.

The contoured apparent resistivity data were presented on a Cronaflex copy of the photomosaic base map with the flight path.

4.7 VLF-EM Total Field Contours

The VLF-EM signals from NAA, Cutler, Maine and NLK, Jim Creek, Washington, broadcasting at 24.0 and 24.8 kHz respectively, were compiled in contour map form and presented on a Cronaflex copy of the photomosaic base map.

5. INTERPRETATION

5.1 Geology

There were no geology maps for the survey area available to the writer so that a geological-geophysical interpretation was not possible. However, a limited amount of interesting background was obtained from a paper by D.A. Barr, of DuPont of Canada Exploration Limited, titled 'Gold in the Canadian Cordillera', and taken from the Adams Club 8th Annual Special Symposium, 1979.

'Most of the lode and placer gold production in the Canadian Cordillera has been derived from mines and placers in the Intermontane and Omineca Belts. Gold has been produced from rocks of Precambrian to Eocene age, the preferred host environment containing Upper Paleozoic to Upper Jurassic eugeosynclinal or arc-type sedimentary and volcanic rocks adjacent to plutonic complexes of varying size and composition. Auriferous quartz lodes occur in fissures and shear zones which are commonly subsidiary to strong fault zones. In common with most vein-type deposits, structural complexities are an essential part of the mine environment.

Two past producers, for their gold content, were the Cariboo Gold Quartz Mine and the Island Mountain Mine. Both of these mines are situated near the town of Wells in the Barkerville area, about 80 kilometres east of Quesnel in east-central British Columbia.

The area first attracted prospecting activity during the Cariboo gold rush in 1860 when rich placer gold was discovered in the district. Gold bearing quartz veins were discovered in the 1870's but initial lode gold production did not commence until 1933 at Cariboo Gold Quartz and 1934 at Island Mountain.

This may not be true within the survey area but the principal rocks in the mine area are sedimentary formations of the Cariboo Group of probable Lower Cambrian age. There are two formations, one being the Snowshoe Formation, which consists of micaceous quartzite, phyllite and a thin limestone and phyllite bed (Baker limestone beds). It conformably overlies the Midas Formation which consists of phyllite, slate, argillite, metasiltstone and thinly bedded limestone. The nearest intrusive rocks are sills and dykes which intrude the Cariboo Group and younger rocks.

There are numerous faults in the mine area and they play an important role in the formation of ore deposits.

The mineralogy of the quartz veins and replacement bodies is similar. Metallic minerals consist of auriferous pyrite and associated free gold with minor galena, sphalerite, cosalite, bismuthinite, scheelite, pyrrhotite, arsenopyrite and chalcopyrite. Commercial veins normally contained 15 to 25 percent of pyrite which assayed 1 to 2 ounces gold per ton or more. Replacement ore normally consisted of massive fine grained pyrite, the finest grained pyrite being the most auriferous, assaying as much as 5 ounces gold per ton. Gangue minerals are quartz, ankerite and muscovite in the veins and ankerite with some quartz in the replacement bodies. Both the Cariboo Gold Quartz Mine and Island Mountain Mine contained replacement ore.

Because of the proximity of the survey area to the Barkerville mining camp, it is possible that some of the aforementioned geological deliberations can be related to the geological prospective within the survey area.

The claim blocks covering the northeast corner of the survey block as well as the area to the west of Highway 26 are related to gold placer workings. The writer does not have any background for either of these areas but it may not be presumptious to conclude that the source for these placer emplacements could be from higher ground close to Mount Nelson.

5.2 Magnetics

The magnetic total field data within the survey area is generally of low intensity with only one area displaying amplitudes which are conducive to mafic intrusives. This area is located in the extreme northeastern corner of the survey area. It is a circular feature and may represent, as mentioned, a mafic plug.

There are three areas towards the southwest corner of the survey block which display relatively high amplitude magnetic features which may correlate with volcanic or metamorphosed equivalents. These are small, isolated features which seem to be anywhere from 300 to 600 metres in width. There are other magnetic features of variable magnetic intensity throughout the remainder of the survey block as well. However, these features are generally of less amplitude than the previously two mentioned areas.

Also, there has been intercepted, a rock unit or units which skirt the northeastern corner and east boundary of the survey block. The writer is unaware of the geology in this particular area, but volcanics are possible.

Structurally, the writer has indicated a few faults which seem to cross cut the geology as opposed to being stratigraphically related. There are definitely other areas of weakness within the survey area but an attempt to delineate them all is beyond the scope of this report. Folding has definitely played a part in the make-up in the geological formations. These areas can be interpreted from the aeromagnetic data, however, they can be readily seen on the calculated vertical magnetic gradient data on Map 5.

5.3 Vertical Magnetic Gradient Contours

This presentation has clearly defined those areas mentioned previously, as well as delineating a somewhat northwest-southeast lithology. There is no doubt that folding does exist, in fact, some rather tight folding.

As mentioned previously in Section 5.2, Magnetics, there is no question of the number of faults within the survey area.

It is this type of data processing which enhances structural features such as faults, certainly much more so than the magnetic total field. As well, it is this structural effect which plays an important role in the formation of ore deposits.

It should also be noted that the zero contour interval coincides directly or very close to geological contacts. It is because of this phenomenon that the calculated vertical gradient map can be compared to a pseudo-geological map.

By using known or accurate geological information and combining this data with the vertical gradient data, one can use the presented map as a pseudo-geological map. Obviously, the more that is known about an area geologically, the closer this type of presentation is to what the rock types are.

5.4 Electromagnetics

The electromagnetic data was first checked by a line-by-line examination of the analog records. Record quality was good with minor noise levels on the low frequency coaxial trace. This was readily removed by an appropriate smoothing filter. Instrument noise was well within specifications. Geologic noise, in the form of surficial conductors, is present on the higher frequency responses and to a minor extent, on both the low frequency inphase and quadrature response.

Anomalies were picked off the analog traces of the low and high frequency coaxial responses and then validated on the coplanar profile data. These selections were then checked with a proprietary computerized selection program which can be adjusted for ambient and instrumental noise. The data were then edited and re-plotted on a copy of the profile map. This procedure ensured that every anomalous response spotted on the analog data was plotted on the final map and allowed for the rejection - or inclusion if warranted - of obvious surficial conductors. Each conductor or group of conductors was evaluated on the bases of magnetic (and lithologic, where applicable) correlations apparent on the analog data and man made or surficial features not obvious on the analog charts.

RESULTS

As a result of this airborne survey being carried out, it is very clear that the entire area, with few exceptions, is overlain by a thin layer of conductive overburden. If one assumes a constant level of conductivity, throughout the survey area, then changes in amplitude, especially with the high frequency quadrature response, can be related to a thickening or thinning of the overburden cover. Two such areas where a thickening of the overburden is anticipated are in areas on the interpretation map designated as Area A and Area B. It should be noted that both of these areas are at the base of Mount Nelson and both areas are involved with creeks, namely, Nelson Creek and Slough Creek respectively.

There are a number of good electrical conductors, that are associated with bedrock sources, which have been intercepted within the survey block. These conductors have been designated on the interpretation map with a number. Not having access to any detailed geological maps, it is impossible for the writer to give any geological-geophysical deliberations on these targets. There are also some weaker conductive trends on the EM map where the writer feels further work is definitely warranted. Again, not having access to any geology maps makes it difficult to render an informative correlation with the geophysical responses.

The only cultural responses that were picked up was from the power line which parallels Highway 26, a highway which traverses across the southeastern corner of the survey block.

Each of the numbered conductors on the interpretation map should be investigated in any future ground exploration programme. These conductors, because of their strengths in conductance and amplitude, are interpreted to be massive to semi-massive sulphides. For the mostpart, these stronger conductors are correlating with magnetic lows, suggesting pyrite and/or graphite as the source. Only a few of the weaker conductors have magnetic correlation and these trends may be related to pyrrhotite.

ZONE 9 is a complicated area electrically, with several conductors indicated. The magnetics, as well, did not assist in delineating conductor axis, nor did the apparent resistivity data presentation. The area seems to be on the apex of a high ridge which may render some geological information because of possible outcrops. The writer has indicated several conductors in this area that is roughly a square kilometre.

Note the relationship between some of the fault zones and the conductors. As mentioned previously in Section 5.1, these structural features may play an important role in the deposition of economic mineralization. It is also clear that auriferous quartz lodes occur in fissures and shear zones which are commonly subsidiary to stronger fault zones. This should be kept in mind when investigating the electrical conductors, both the stronger trends as well as the weaker ones.

5.5 Apparent Resistivity

There is a faint relationship between the total field magnetics and the apparent resistivity data. However, because of the probable folding that has been interpreted in this area, the writer tends to believe the magnetic data regarding strike direction of the stratigraphy.

A generally resistive area exists toward the northeast quarter of the survey block as well as a smaller area toward the southwest quarter. Areas of high resistivity may be related to rock types of the Snowshoe Formation while areas displaying lower resistivity could be related to the Midas Formation. It is the latter group that is thought to contain most of the conductors.

5.6 VLF-EM Total Field

The VLF-EM data shows only faint correlation with the magnetic field data. The general strike direction, with exceptions of course, of the geological stratigraphy is northwest-southeast. The VLF data tends to follow this pattern in some areas only. As well, there is only faint correlation between the VLF data and the EM conductors. Areas such as ZONES 7, 8 and 9 are typical areas where there is a lack of correlation. Other areas, however, such as Zones 1, 3, 4, 5 and 6 have reasonable correlation.

The discrepancies may be related to the VLF transmitting station being used.

5.7 Recommendations

As mentioned previously, gold has been produced from rocks of Precambrian to Eocene age, the preferred host environment containing Upper Paleozoic to Upper Jurassic eugeosynclinal or arc-type sedimentary and volcanic rocks adjacent to plutonic complexes of varying size and composition. Also, auriferous quartz lodes occur in fissures and shear zones which are commonly subsidiary to strong fault zones.

It is on the above premises that a detailed geological survey as well as a geochemical soil sampling programme be carried out in the vicinity of the stronger intensity magnetic features. Particular attention should be paid to conductors that are in close proximity to these magnetic features.

Pyrite seems to be present in most vein type deposits in varying proportions. It is, therefore, expected that some of the weaker E.M. responses should be caused by pyrite as well.

If results from this programme are encouraging, then a follow-up survey in the form of Genie or MaxMin II E.M. survey should be implemented. Keep in mind that weak conductors will produce quadrature responses only but these responses will also be quite important. Since a thin layer of conductive overburden is present, one should be looking for sharper as opposed to broad E.M. responses. The alternative is an induced polarization (IP) survey but the cost factors between the two systems may be a factor.

The recommended areas to initiate this programme are ZONES 8, and 9 and in particular, those weaker conductors which are in close proximity to stronger intensity magnetic features.

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J8660

June 30, 1987

APPENDIX I

GENERAL INTERPRETIVE CONSIDERATIONS

Electromagnetic

The Aerodat three frequency system utilizes two different transmitter-receiver coil geometries. The traditional coaxial coil configuration is operated at two widely separated frequencies and the horizontal coplanar coil pair is operated at a frequency approximately aligned with one of the coaxial frequencies.

The electromagnetic response measured by the helicopter system is a function of the "electrical" and "geometrical" properties of the conductor. The "electrical" property of a conductor is determined largely by its electrical conductivity, magnetic susceptibility and its size and shape; the "geometrical" property of the response is largely a function of the conductor's shape and orientation with respect to the measuring transmitter and receiver.

Electrical Considerations

For a given conductive body the measure of its conductivity or conductance is closely related to the measured phase shift between the received and transmitted electromagnetic field. A small phase shift indicates a relatively high conductance, a large phase shift lower conductance. A small phase shift results in a large inphase to quadrature ratio and a large phase shift a low ratio. This relationship is shown quantitatively for a non-magnetic vertical half-plane model on the accompanying phasor diagram. Other physical models will show the same trend but different quantitative relationships.

The phasor diagram for the vertical half-plane model, as presented, is for the coaxial coil configuration with the amplitudes in parts per million (ppm) of the primary field as measured at the response peak over the conductor. To assist the interpretation of the survey results the computer is used to identify the apparent conductance and depth at selected anomalies. The results of this calculation are presented in table form in Appendix II and the conductance and inphase amplitude are presented in symbolized form on the map presentation.

The conductance and depth values as presented are correct only as far as the model approximates the real geological situation. The actual geological source may be of limited length, have significant dip, may be strongly magnetic, its conductivity and thickness may vary with depth and/or strike and adjacent bodies and overburden may have modified the response. In general the conductance estimate is less affected by these limitations than is the depth estimate, but both should be considered as relative rather than absolute guides to the anomaly's properties.

Conductance in mhos is the reciprocal of resistance in ohms and in the case of narrow slab-like bodies is the product of electrical conductivity and thickness.

Most overburden will have an indicated conductance of less than 2 mhos; however, more conductive clays may have an apparent conductance of say 2 to 4 mhos. Also in the low conductance range will be electrolytic conductors in faults and shears.

The higher ranges of conductance, greater than 4 mhos, indicate that a significant fraction of the electrical conduction is electronic rather than electrolytic in nature. Materials that conduct electronically are limited to certain metallic sulphides and to graphite. High conductance anomalies, roughly 10 mhos or greater, are generally limited to sulphide or graphite bearing rocks.

Sulphide minerals, with the exception of such ore minerals as sphalerite, cinnabar and stibnite, are good conductors; sulphides may occur in a disseminated manner that inhibits electrical conduction through the rock mass. In this case the apparent conductance can seriously underrate the quality of the conductor in geological terms. In a similar sense the relatively non-conducting sulphide minerals noted above may be present in significant consideration in association with minor conductive sulphides, and the electromagnetic response only relate to the minor associated mineralization. Indicated conductance is also of little direct significance for the identification of gold mineralization. Although gold is highly conductive, it would not be expected to exist in sufficient quantity to create a recognizable anomaly, but minor accessory sulphide mineralization could provide a useful indirect indication.

In summary, the estimated conductance of a conductor can provide a relatively positive identification of significant sulphide or graphite mineralization; however, a moderate to low conductance value does not rule out the possibility of significant economic mineralization.

Geometrical Considerations

Geometrical information about the geologic conductor can often be interpreted from the profile shape of the anomaly. The change in shape is primarily related to the change in inductive coupling among the transmitter, the target, and the receiver.

In the case of a thin, steeply dipping, sheet-like conductor, the coaxial coil pair will yield a near symmetric peak over the conductor. On the other hand, the coplanar coil pair will pass through a null couple relationship and yield a minimum over the conductor, flanked by positive side lobes. As the dip of the conductor decreased from vertical, the coaxial anomaly shape changes only slightly, but in the case of the coplanar coil pair the side lobe on the down dip side strengthens relative to that on the up dip side.

As the thickness of the conductor increases, induced current flow across the thickness of the conductor becomes relatively significant and complete null coupling with the coplanar coils is no longer possible. As a result, the apparent minimum of the coplanar response over the conductor diminishes with increasing thickness, and in the limiting case of a fully 3 dimensional body or a horizontal layer or half-space, the minimum disappears completely.

A horizontal conducting layer such as overburden will produce a response in the coaxial and coplanar coils that is a function of altitude (and conductivity if not uniform). The profile shape will be similar in both coil configurations with an amplitude ratio (coplanar:coaxial) of about 4:1*.

In the case of a spherical conductor, the induced currents are confined to the volume of the sphere, but not relatively restricted to any arbitrary plane as in the case of a sheet-like form. The response of the coplanar coil pair directly over the sphere may be up to 8* times greater than that of the coaxial pair.

In summary, a steeply dipping, sheet-like conductor will display a decrease in the coplanar response coincident with the peak of the coaxial response. The relative strength of this coplanar null is related inversely to the thickness of the conductor; a pronounced null indicates a relatively thin conductor. The dip of such a conductor can be inferred from the relative amplitudes of the side-lobes.

Massive conductors that could be approximated by a conducting sphere will display a simple single peak profile form on both coaxial and coplanar coils, with a ratio between the coplanar to coaxial response amplitudes as high as 8*.

Overburden anomalies often produce broad poorly defined anomaly profiles. In most cases, the response of the coplanar coils closely follows that of the coaxial coils with a relative amplitude ratio of 4*.

Occasionally, if the edge of an overburden zone is sharply defined with some significant depth extent, an edge effect will occur in the coaxial coils. In the case of a horizontal conductive ring or ribbon, the coaxial response will consist of two peaks, one over each edge; whereas the coplanar coil will yield a single peak.

* It should be noted at this point that Aerodat's definition of the measured ppm unit is related to the primary field sensed in the receiving coil without normalization to the maximum coupled (coaxial configuration). If such normalization were applied to the Aerodat units, the amplitude of the coplanar coil pair would be halved.

Magnetics

The Total Field Magnetic Map shows contours of the total magnetic field, uncorrected for regional variation. Whether an EM anomaly with a magnetic correlation is more likely to be caused by a sulphide deposit than one without depends on the type of mineralization. An apparent coincidence between an EM and a magnetic anomaly may be caused by a conductor which is also magnetic, or by a conductor which lies in close proximity to a magnetic body. The majority of conductors which are also magnetic are sulphides containing pyrrhotite and/or magnetite. Conductive and magnetic bodies in close association can be, and often are, graphite and magnetite. It is often very difficult to distinguish between these cases. If the conductor is also magnetic, it will usually produce an EM anomaly whose general pattern resembles that of the magnetics. Depending on the magnetic permeability of the conducting body, the amplitude of the inphase EM anomaly will be weakened, and if the conductivity is also weak, the inphase EM anomaly may even be reversed in sign.

VLF Electromagnetics

The VLF-EM method employs the radiation from powerful military radio transmitters as the primary signals. The magnetic field associated with the primary field is elliptically polarized in the vicinity of electrical conductors. The Herz Totem uses three coils in the X, Y, Z configuration to measure the total field and vertical quadrature component of the polarization ellipse.

The relatively high frequency of VLF (15-25) kHz provides high response factors for bodies of low conductance. Relatively "disconnected" sulphide ores have been found to produce measureable VLF signals. For the same reason, poor conductors such as sheared contacts, breccia zones, narrow faults, alteration zones and porous flow tops normally produce VLF anomalies. The method can therefore be used effectively for geological mapping. The only relative disadvantage of the method lies in its sensitivity to conductive overburden. In conductive ground the depth of exploration is severely limited.

The effect of strike direction is important in the sense of the relation of the conductor axis relative to the energizing electromagnetic field. A conductor aligned along a radius drawn from a transmitting station will be in a maximum coupled orientation and thereby produce a stronger response than a similar conductor at a different strike angle. Theoretically, it would be possible for a conductor, oriented tangentially to the transmitter to produce no signal. The most obvious effect of the strike angle consideration is that conductors favourably oriented with respect to the transmitter location and also near perpendicular to the flight direction are most clearly rendered and usually dominate the map presentation.

The total field response is an indicator of the existence and position of a conductivity anomaly. The response will be a maximum over the conductor, without any special filtering, and strongly favour the upper edge of the conductor even in the case of a relatively shallow dip.

The vertical quadrature component over steeply dipping sheet-like conductor will be a cross-over type response with the cross-over closely associated with the upper edge of the conductor.

The response is a cross-over type due to the fact that it is the vertical rather than total field quadrature component that is measured. The response shape is due largely to geometrical rather than conductivity considerations and the distance between the maximum and minimum on either side of the cross-over is related to target depth. For a given target geometry, the larger this distance the greater the depth.

The amplitude of the quadrature response, as opposed to shape is function of target conductance and depth as well as the conductivity of the overburden and host rock. As the primary field travels down to the conductor through conductive material it is both attenuated and phase shifted in a negative sense. The secondary field produced by this altered field at the target also has an associated phase shift. This phase shift is positive and is larger for relatively poor conductors. This secondary field is attenuated and phase shifted in a negative sense during return travel to the surface. The net effect of these 3 phase shifts determine the phase of the secondary field sensed at the receiver.

A relatively poor conductor in resistive ground will yield a net positive phase shift. A relatively good conductor in more conductive ground will yield a net negative phase shift. A combination is possible whereby the net phase shift is zero and the response is purely in-phase with no quadrature component.

A net positive phase shift combined with the geometrical cross-over shape will lead to a positive quadrature response on the side of approach and a negative on the side of departure. A net negative phase shift would produce the reverse. A further sign reversal occurs with a 180 degree change in instrument orientation as occurs on reciprocal line headings. During digital processing of the quadrature data for map presentation this is corrected for by normalizing the sign to one of the flight line headings.

APPENDIX II

ANOMALY LIST

J8660 BARKERVILLE PROJECT

FLIGHT	LINE	ANOMALY	CATEGORY	AMPLITUDE (PPM) INPHASE	QUAD.	CONDUCTOR CTP MHOS	DEPTH MTRS	BIRD HEIGHT MTRS
7	1040	A	2	44.4	32.7	2.5	0	38
7	1050	A	3	83.2	40.2	5.4	0	38
7	1050	B	4	50.3	14.6	9.0	0	44
7	1060	A	4	53.4	15.1	9.4	0	43
7	1060	B	3	60.0	30.0	4.6	0	39
7	1070	A	4	40.0	12.0	8.0	0	47
7	1070	B	4	34.1	8.3	10.1	7	39
7	1080	A	3	21.6	7.7	5.3	4	48
7	1090	A	2	12.5	6.8	2.5	11	47
7	1090	B	1	28.5	24.3	1.8	0	43
7	1100	A	2	32.6	19.3	3.1	0	42
7	1100	B	1	42.1	43.6	1.6	0	40
7	1110	A	2	30.9	18.2	3.0	0	42
7	1110	B	1	30.0	27.5	1.7	0	44
7	1110	C	1	57.8	60.9	1.7	0	29
7	1110	D	2	34.5	22.7	2.7	0	41
7	1110	E	3	52.3	20.2	6.2	8	30
7	1120	A	3	39.2	17.8	4.6	10	30
7	1120	B	2	44.3	24.9	3.6	13	24
7	1120	C	2	25.8	13.9	3.2	13	33
7	1120	D	1	22.2	26.7	1.0	0	45
7	1120	E	2	21.1	14.9	2.1	0	53
7	1130	A	2	33.9	18.5	3.4	0	46
7	1130	B	0	9.2	10.5	0.8	4	46
7	1130	C	2	46.9	28.5	3.3	0	38
7	1130	D	2	30.3	17.3	3.1	8	34
7	1130	E	3	49.2	21.6	5.2	9	29
7	1130	F	3	26.8	11.9	4.2	13	34
7	1140	A	2	24.2	12.4	3.4	1	47
7	1140	B	2	21.7	15.5	2.1	11	34
7	1140	C	2	22.1	14.4	2.4	14	32
7	1140	D	2	27.1	18.4	2.4	4	39
7	1140	E	2	25.4	14.7	2.9	3	42
6	1150	A	3	40.7	14.7	6.3	3	38

Estimated depth may be unreliable because the stronger part of the conductor may be deeper or to one side of the flight line, or because of a shallow dip or overburden effects.

J8660 BARKERVILLE PROJECT

FLIGHT	LINE	ANOMALY	CATEGORY	AMPLITUDE (PPM) INPHASE	QUAD.	CONDUCTOR CTP MHOS	DEPTH MTRS	BIRD HEIGHT MTRS
6	1150	B	3	41.7	21.2	4.0	0	51
6	1150	C	2	34.9	19.5	3.4	0	41
6	1150	D	2	25.6	17.5	2.3	8	35
6	1150	E	2	30.5	22.4	2.2	2	38
6	1150	F	0	10.6	12.4	0.8	11	36
6	1160	A	0	9.4	11.3	0.7	6	43
6	1160	B	1	11.7	10.7	1.2	18	33
6	1160	C	2	21.5	12.9	2.6	0	58
6	1170	A	2	19.0	10.5	2.8	24	27
6	1170	B	2	19.1	12.7	2.2	14	34
6	1170	C	2	24.5	18.5	2.0	0	44
6	1170	D	0	7.2	15.3	0.3	5	34
6	1170	E	2	20.2	14.0	2.1	8	39
6	1180	A	2	20.7	13.8	2.2	3	43
6	1180	B	0	9.4	15.4	0.5	0	44
6	1180	C	1	25.0	20.2	1.8	3	38
6	1190	A	2	19.7	11.3	2.7	11	38
6	1190	B	2	21.1	15.4	2.0	12	33
6	1190	C	1	16.6	12.3	1.8	17	32
6	1200	A	1	16.4	12.3	1.7	15	34
6	1200	B	2	20.1	11.5	2.7	15	34
6	1210	A	3	25.5	11.7	4.0	11	36
6	1210	B	0	12.9	24.0	0.4	0	36
6	1210	C	1	20.8	16.2	1.8	5	40
6	1220	A	0	10.6	13.7	0.7	11	34
6	1220	B	1	17.5	16.0	1.4	9	36
6	1220	C	1	14.9	13.2	1.3	10	37
6	1220	D	1	14.4	14.6	1.1	3	43
6	1220	E	2	21.1	14.8	2.1	0	52
6	1220	F	2	15.0	9.9	2.0	13	40
6	1220	G	0	14.0	25.6	0.5	11	22
6	1220	H	2	21.8	9.7	3.9	15	35
6	1230	A	3	10.4	3.3	4.9	2	66
6	1230	B	0	12.9	21.2	0.5	0	43
6	1230	C	2	19.8	12.8	2.3	14	34
6	1230	D	1	26.1	21.1	1.9	2	39
6	1230	E	1	21.6	26.5	1.0	5	31

Estimated depth may be unreliable because the stronger part of the conductor may be deeper or to one side of the flight line, or because of a shallow dip or overburden effects.

J8660 BARKERVILLE PROJECT

FLIGHT	LINE	ANOMALY	CATEGORY	AMPLITUDE (PPM) INPHASE	QUAD.	CONDUCTOR CTP MHOS	DEPTH MTRS	BIRD HEIGHT MTRS
6	1230	F	2	21.4	12.6	2.7	9	39
6	1230	G	3	29.2	10.9	5.4	6	40
6	1230	H	2	27.6	13.1	3.9	4	42
6	1230	J	2	24.3	13.5	3.0	0	50
6	1240	A	1	21.3	17.4	1.7	4	39
6	1240	B	1	21.5	17.4	1.7	0	50
6	1240	C	2	21.8	13.0	2.6	8	40
6	1250	A	2	15.8	10.1	2.1	9	43
6	1250	B	1	8.1	5.1	1.7	6	61
6	1250	C	2	20.5	12.0	2.7	0	55
6	1250	D	3	36.0	11.5	7.1	0	52
6	1250	E	3	21.9	8.7	4.6	4	47
6	1250	F	0	15.5	25.1	0.6	0	34
6	1250	G	1	14.3	13.0	1.3	16	32
6	1250	H	1	18.8	16.2	1.5	8	36
6	1260	A	1	26.8	35.3	1.0	0	36
6	1260	B	1	22.0	27.1	1.0	0	38
6	1260	C	3	15.0	5.2	4.9	5	54
6	1260	D	3	20.1	5.3	7.7	1	54
6	1260	E	2	16.9	11.4	2.0	0	51
6	1260	F	1	16.3	14.8	1.3	3	43
6	1260	G	1	16.5	18.5	1.0	0	42
6	1260	H	1	26.4	31.2	1.1	0	36
6	1260	J	1	15.5	16.2	1.1	7	37
6	1260	K	1	12.1	10.7	1.2	12	40
6	1270	A	1	13.6	14.6	1.0	4	41
6	1270	B	1	21.6	26.0	1.0	0	40
6	1270	C	1	31.5	29.9	1.6	0	36
6	1270	D	1	17.0	15.9	1.3	2	43
6	1270	E	2	19.4	10.7	2.8	3	47
6	1270	F	1	17.2	12.2	1.9	2	47
6	1280	A	1	13.0	10.8	1.4	13	39
6	1280	B	3	38.0	13.1	6.6	4	39
6	1280	C	3	29.4	12.0	4.8	3	42
6	1280	D	3	43.9	16.2	6.3	0	48
6	1280	E	3	46.3	19.5	5.4	0	49
6	1280	F	2	28.4	18.1	2.6	0	47
6	1280	G	2	26.2	17.3	2.5	0	48
6	1280	H	0	9.1	11.5	0.7	0	52
6	1280	J	0	11.4	13.5	0.8	13	33

Estimated depth may be unreliable because the stronger part of the conductor may be deeper or to one side of the flight line, or because of a shallow dip or overburden effects.

J8660 BARKERVILLE PROJECT

FLIGHT	LINE	ANOMALY	CATEGORY	AMPLITUDE (PPM) INPHASE	AMPLITUDE (PPM) QUAD.	CONDUCTOR CTP MHOS	CONDUCTOR DEPTH MTRS	BIRD HEIGHT MTRS
6	1290	A	0	7.4	6.9	0.9	8	52
6	1290	B	0	9.9	15.3	0.5	6	36
6	1290	C	3	35.9	14.0	5.5	2	41
6	1290	D	3	41.6	13.6	7.2	4	38
6	1290	E	3	30.1	11.7	5.2	5	41
6	1300	A	2	26.3	12.7	3.7	4	43
6	1300	B	3	28.4	10.0	5.8	0	47
6	1300	C	4	33.0	9.2	8.3	2	44
6	1300	D	3	30.8	12.6	4.9	8	37
6	1300	E	3	33.4	15.3	4.3	0	43
6	1310	A	3	52.0	20.1	6.2	3	35
6	1310	B	3	25.8	7.9	6.8	3	47
6	1310	C	3	35.2	15.2	4.8	2	41
6	1310	D	2	31.2	16.3	3.6	0	44
6	1310	E	1	9.4	7.8	1.2	22	36
6	1320	A	1	9.4	8.0	1.2	12	45
6	1320	B	4	92.8	24.8	11.9	0	32
6	1320	C	4	26.5	6.3	9.7	10	40
6	1320	D	3	48.4	17.2	6.8	2	37
6	1330	A	3	37.1	17.8	4.2	0	41
6	1330	B	3	26.2	8.2	6.7	9	40
6	1330	C	4	35.7	8.4	10.7	0	47
6	1330	D	4	32.5	8.5	9.0	3	43
6	1330	E	4	47.8	11.5	11.3	4	37
6	1330	F	0	2.6	11.5	0.0	0	39
6	1330	G	0	5.3	18.4	0.1	4	27
6	1330	H	1	8.2	7.5	1.0	24	34
6	1340	A	2	31.0	22.6	2.3	5	35
6	1340	B	1	13.6	10.5	1.6	16	36
6	1340	C	0	7.8	21.0	0.2	1	31
6	1340	D	0	12.1	29.7	0.3	1	29
6	1340	E	4	113.8	41.7	8.4	3	25
6	1340	F	3	68.0	33.1	5.0	4	29
6	1340	G	4	87.5	28.1	9.2	2	30
6	1340	H	4	95.9	21.3	15.3	2	30
6	1340	J	4	86.6	22.4	12.2	0	34
6	1340	K	4	77.1	17.9	13.6	1	34
6	1350	A	0	6.6	12.6	0.3	10	33

Estimated depth may be unreliable because the stronger part of the conductor may be deeper or to one side of the flight line, or because of a shallow dip or overburden effects.

J8660 BARKERVILLE PROJECT

FLIGHT	LINE	ANOMALY	CATEGORY	AMPLITUDE (PPM) INPHASE	QUAD.	CONDUCTOR CTP MHOS	DEPTH MTRS	BIRD HEIGHT MTRS
6	1350	B	2	21.9	14.8	2.2	0	51
6	1350	C	4	39.7	11.9	8.0	2	41
6	1350	D	4	49.6	11.1	12.6	0	47
6	1350	E	4	51.1	13.4	10.3	0	44
6	1350	F	4	60.1	14.4	12.2	3	35
6	1350	G	4	75.3	22.5	9.7	0	35
6	1350	H	1	21.3	20.0	1.4	4	37
6	1350	J	2	31.0	17.1	3.3	0	45
6	1350	K	2	33.7	18.8	3.3	2	39
6	1350	M	0	13.2	28.0	0.4	0	33
6	1350	N	0	10.6	28.8	0.2	1	28
6	1350	O	4	62.1	16.4	10.8	0	43
6	1360	A	4	51.5	10.8	13.9	6	34
6	1360	B	0	10.0	20.7	0.3	0	35
6	1360	C	0	11.7	20.2	0.5	3	34
6	1360	D	0	11.8	19.5	0.5	4	34
6	1360	E	4	68.7	18.8	10.6	3	32
6	1360	F	4	81.4	25.8	9.2	0	35
6	1360	G	1	24.2	24.9	1.3	3	35
6	1360	H	3	62.3	28.4	5.3	4	31
6	1360	J	3	63.9	24.5	6.7	2	33
6	1360	K	4	76.1	20.6	11.1	0	37
6	1360	M	4	83.9	18.3	15.1	0	36
6	1360	N	4	78.3	21.3	11.1	0	35
6	1360	O	2	30.3	19.1	2.7	0	45
6	1370	A	0	14.2	23.5	0.5	2	33
6	1370	B	2	23.0	13.3	2.8	0	47
6	1370	C	4	43.3	10.6	10.7	0	44
6	1370	D	4	46.7	11.1	11.4	0	47
6	1370	E	4	42.1	9.0	12.8	0	50
6	1370	F	4	48.2	13.9	8.9	1	39
6	1370	G	4	53.9	15.7	9.1	3	36
6	1370	H	3	37.7	12.8	6.7	8	35
6	1370	J	3	22.0	5.9	7.8	12	41
6	1370	K	1	12.3	8.8	1.7	24	31
6	1370	M	5	29.6	4.5	18.2	8	41
6	1380	A	5	36.0	6.1	16.6	9	37
6	1380	B	3	17.8	7.1	4.3	22	32
6	1380	C	3	21.5	6.3	6.9	7	46
6	1380	D	4	74.7	19.9	11.2	1	33
6	1380	E	4	95.8	24.5	12.7	0	35
6	1380	F	4	100.4	25.3	13.2	0	34

Estimated depth may be unreliable because the stronger part of the conductor may be deeper or to one side of the flight line, or because of a shallow dip or overburden effects.

J8660 BARKERVILLE PROJECT

FLIGHT	LINE	ANOMALY	CATEGORY	AMPLITUDE (PPM) INPHASE	QUAD.	CONDUCTOR CTP MHOS	DEPTH MTRS	BIRD HEIGHT MTRS
6	1380	G	4	78.6	21.0	11.4	0	38
6	1380	H	2	24.5	16.2	2.4	2	42
6	1390	A	2	12.8	6.4	2.8	0	76
6	1390	B	2	46.4	31.6	2.9	1	34
6	1390	C	3	45.6	16.5	6.5	0	42
6	1390	D	2	25.7	17.5	2.3	0	46
6	1390	E	2	15.2	7.4	3.1	17	39
6	1390	F	4	16.5	3.3	10.6	22	38
6	1390	G	2	10.6	6.1	2.2	29	33
6	1390	H	1	10.6	8.8	1.3	21	34
6	1400	A	1	8.0	4.6	1.9	27	41
6	1400	B	2	10.0	5.9	2.0	22	40
6	1400	C	4	16.9	2.8	13.8	20	40
6	1400	D	2	32.3	21.7	2.6	4	36
6	1400	E	2	28.0	13.6	3.8	10	36
6	1400	F	3	16.1	5.2	5.5	1	57
6	1410	A	3	27.7	8.0	7.6	9	40
6	1410	B	2	16.4	6.8	3.9	0	68
6	1410	C	1	26.0	24.4	1.5	0	47
6	1410	D	2	27.8	15.0	3.3	2	43
6	1410	E	4	21.3	4.2	11.7	23	32
6	1420	A	2	13.9	6.2	3.4	18	41
6	1420	B	4	16.6	3.5	9.9	23	36
6	1420	C	1	14.9	11.8	1.6	5	45
6	1420	D	1	27.7	24.9	1.7	0	43
6	1420	E	3	20.6	8.4	4.3	8	44
6	1420	F	3	37.4	11.9	7.3	7	37
6	1430	A	4	28.9	8.0	8.1	0	50
6	1430	B	3	45.0	17.1	6.1	0	40
6	1430	C	1	75.2	79.8	1.9	0	29
6	1430	D	1	10.8	9.2	1.2	0	75
6	1430	E	3	19.6	6.5	5.6	14	41
6	1430	F	2	15.6	7.6	3.1	14	41
6	1440	A	2	13.5	8.0	2.3	0	68
6	1440	B	2	22.2	11.8	3.1	0	51
6	1440	C	3	27.4	10.4	5.2	2	46
6	1440	D	3	36.5	12.2	6.8	0	58
6	1440	E	4	28.9	8.1	8.0	0	67
6	1450	A	3	13.1	4.2	5.2	0	72

Estimated depth may be unreliable because the stronger part of the conductor may be deeper or to one side of the flight line, or because of a shallow dip or overburden effects.

J8660 BARKERVILLE PROJECT

FLIGHT	LINE	ANOMALY	CATEGORY	AMPLITUDE (PPM) INPHASE	QUAD.	CONDUCTOR CTP MHOS	DEPTH MTRS	BIRD HEIGHT MTRS
6	1450	B	3	27.1	10.6	5.0	0	51
6	1450	C	4	26.2	7.1	8.1	0	62
6	1450	D	2	16.7	8.5	3.0	0	59
6	1450	E	2	16.3	9.5	2.5	0	55
6	1450	F	0	6.8	9.8	0.5	8	41
6	1450	G	0	7.4	10.1	0.5	4	46
6	1460	A	2	18.0	12.7	2.0	0	57
6	1460	B	2	19.3	10.0	3.1	0	57
6	1460	C	2	17.2	7.9	3.5	0	60
6	1460	D	2	17.2	9.1	2.9	0	54
6	1460	E	2	16.7	9.6	2.5	0	58
6	1460	F	2	16.4	7.1	3.7	0	68
6	1460	G	3	35.1	11.5	6.9	1	43
6	1460	H	3	10.9	4.0	4.1	0	76
6	1470	A	3	13.6	4.9	4.5	0	72
6	1470	B	4	52.2	16.4	8.2	5	33
6	1470	C	3	22.7	8.8	4.8	0	51
6	1470	D	3	24.2	9.2	5.0	0	55
6	1470	E	2	16.4	8.3	3.0	4	51
6	1481	A	2	9.2	5.3	2.0	8	56
6	1490	A	1	6.7	4.6	1.4	26	43
6	1500	A	0	5.4	5.9	0.6	16	46
6	1520	A	0	10.7	20.3	0.4	8	28
6	1520	B	0	11.6	22.1	0.4	1	34
6	1520	C	1	6.9	6.2	1.0	12	50
6	1520	D	0	10.2	13.4	0.7	7	38
6	1530	A	0	16.2	20.0	0.9	0	46
6	1530	B	1	12.6	10.0	1.5	17	35

Estimated depth may be unreliable because the stronger part of the conductor may be deeper or to one side of the flight line, or because of a shallow dip or overburden effects.

APPENDIX III

CERTIFICATE OF QUALIFICATIONS

I, ROBERT J. DE CARLE, certify that: -

1. I hold a B. A. Sc. in Applied Geophysics with a minor in geology from Michigan Technological University, having graduated in 1970.

2. I reside at 28 Westview Crescent in the town of Palgrave, Ontario.

3. I have been continuously engaged in both professional and managerial roles in the minerals industry in Canada and abroad for the past eighteen years.

4. I have been an active member of the Society of Exploration Geophysicists since 1967 and hold memberships on other professional societies involved in the minerals extraction and exploration industry.

5. The accompanying report was prepared from information published by government agencies, materials supplied by Gallant Gold Mines Limited and from a review of the proprietary airborne geophysical survey flown by Aerodat Limited for Gallant Gold Mines Limited. I have not personally visited the property.

6. I have no interest, direct or indirect, in the property described nor do I hold securities in Gallant Gold Mines Limited.

Signed,

R. J. de Carle

Palgrave, Ontario

June 30, 1987

Robert J. de Carle

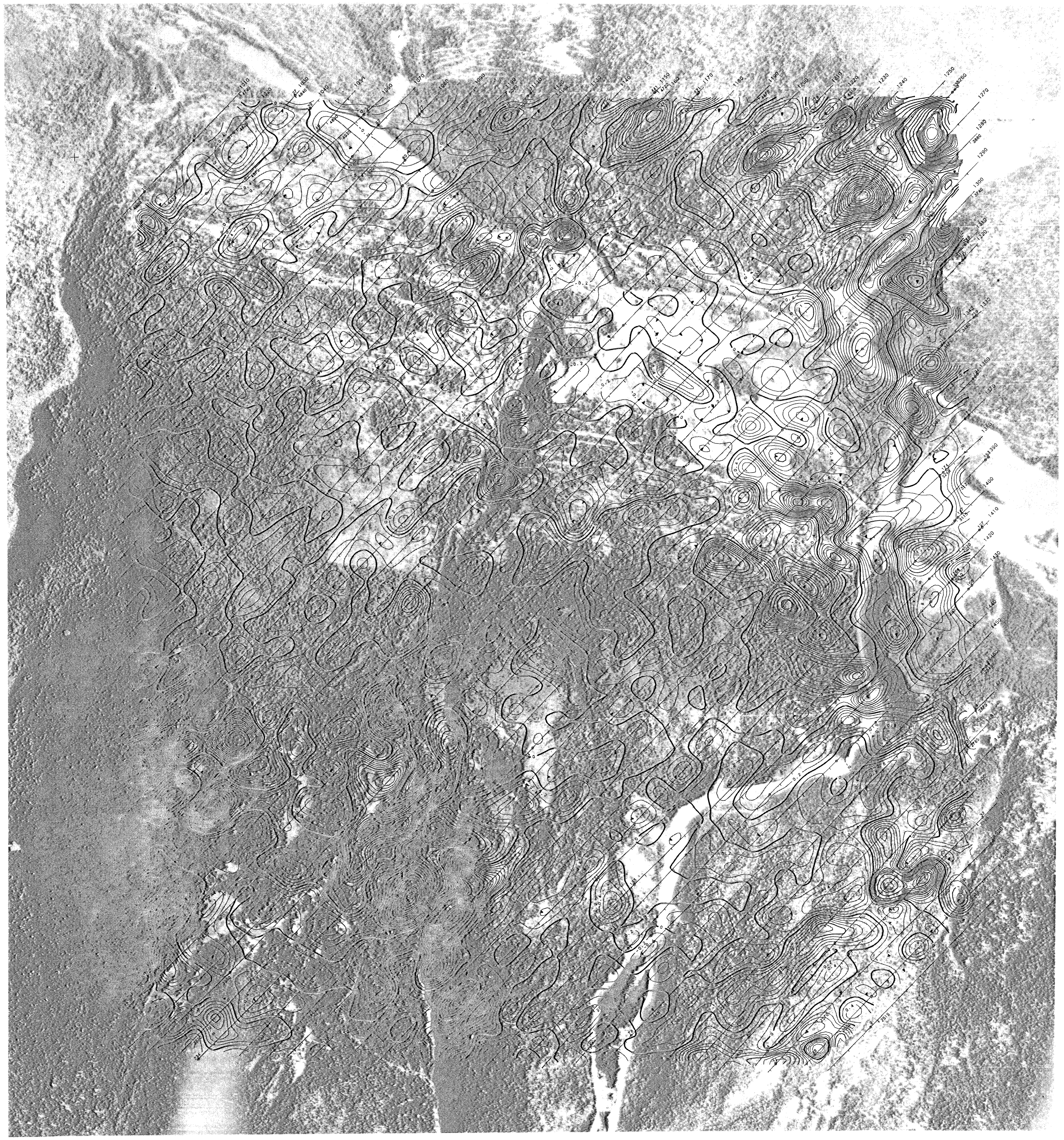
Consulting Geophysicist

COST STATEMENT

BARKERVILLE AREA CLAIMS
26 January 1987

AIRBORNE GEOPHYSICAL SURVEY

Aerodat Limited - 145 Line Km @ $75.00	$10,875.00
Mark Management - Planning, Supervision	1,627.05
TOTAL COST	$12,502.05



Vertical Gradient

Vertical magnetic gradient calculated from the total field magnetic intensity

Contours in nT/m

Cesium high sensitivity magnetometer
Sensor elevation 45m

5 nT / metre ....
1 nT / metre ....
.2 nT / metre ....

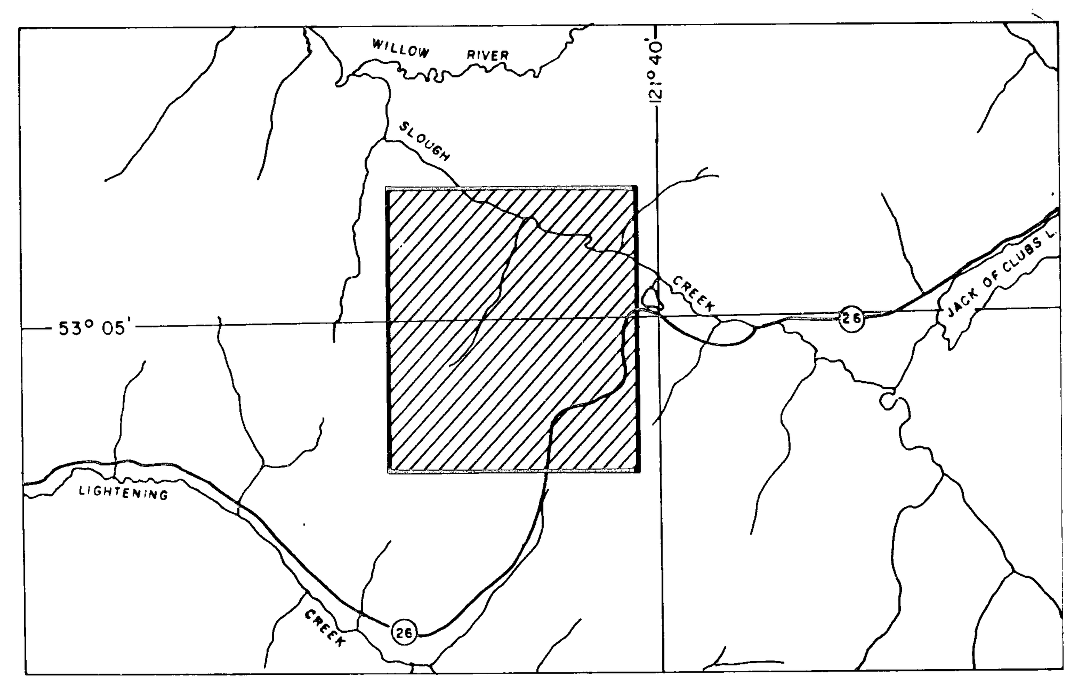
Flight Path

Flight path derived from 35 mm tracking film.

Average terrain clearance 60m
Line spacing = 100m

GEOLOGICAL BRANCH
ASSESSMENT REPORT

15,947



GALLANT GOLD MINES LIMITED

CALCULATED VERTICAL MAGNETIC GRADIENT

5

BARKERVILLE AREA

BRITISH COLUMBIA

AERODAT LIMITED

DATE: JANUARY, 1987

NTS No: 93H/4

MAP No: 5 J8660

Magnetics

Cesium high sensitivity magnetometer
Sensor elevation 45m

Total Field Magnetic Intensity
Contours in nT

50 nT ....
10 nT ....
2 nT ....

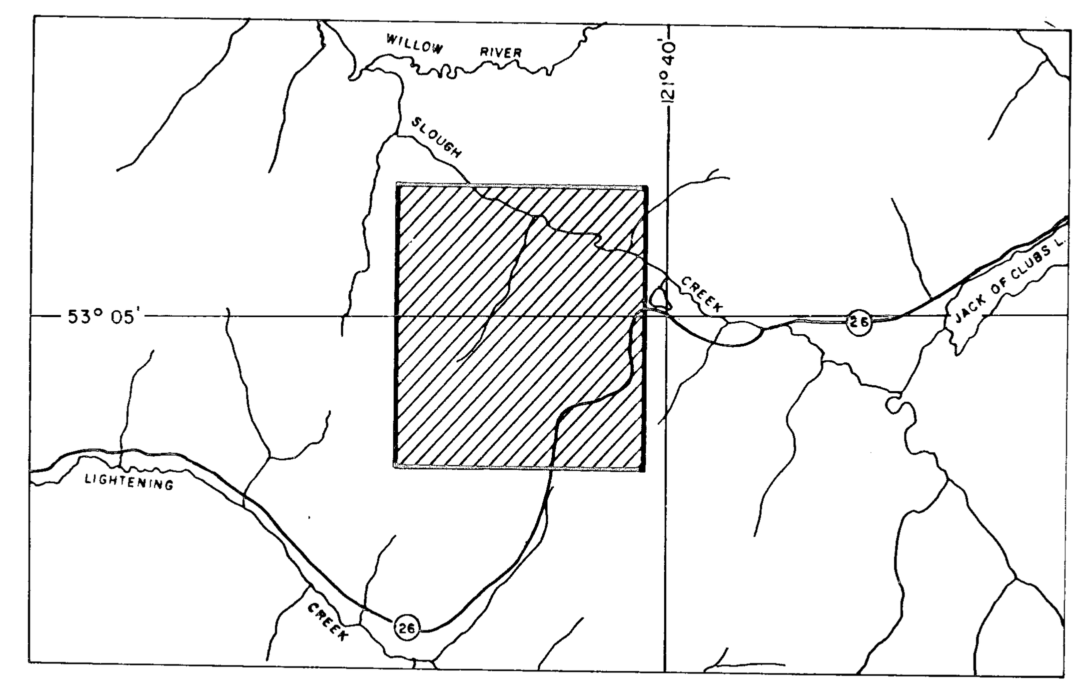
Flight Path

Flight path derived from 35 mm
tracking film.

Average terrain clearance 60m
Line spacing = 100m

GEOLOGICAL BRANCH
ASSESSMENT REPORT

15,947



GALLANT GOLD MINES LIMITED

TOTAL FIELD MAGNETIC CONTOURS

BARKERVILLE AREA

4

BRITISH COLUMBIA

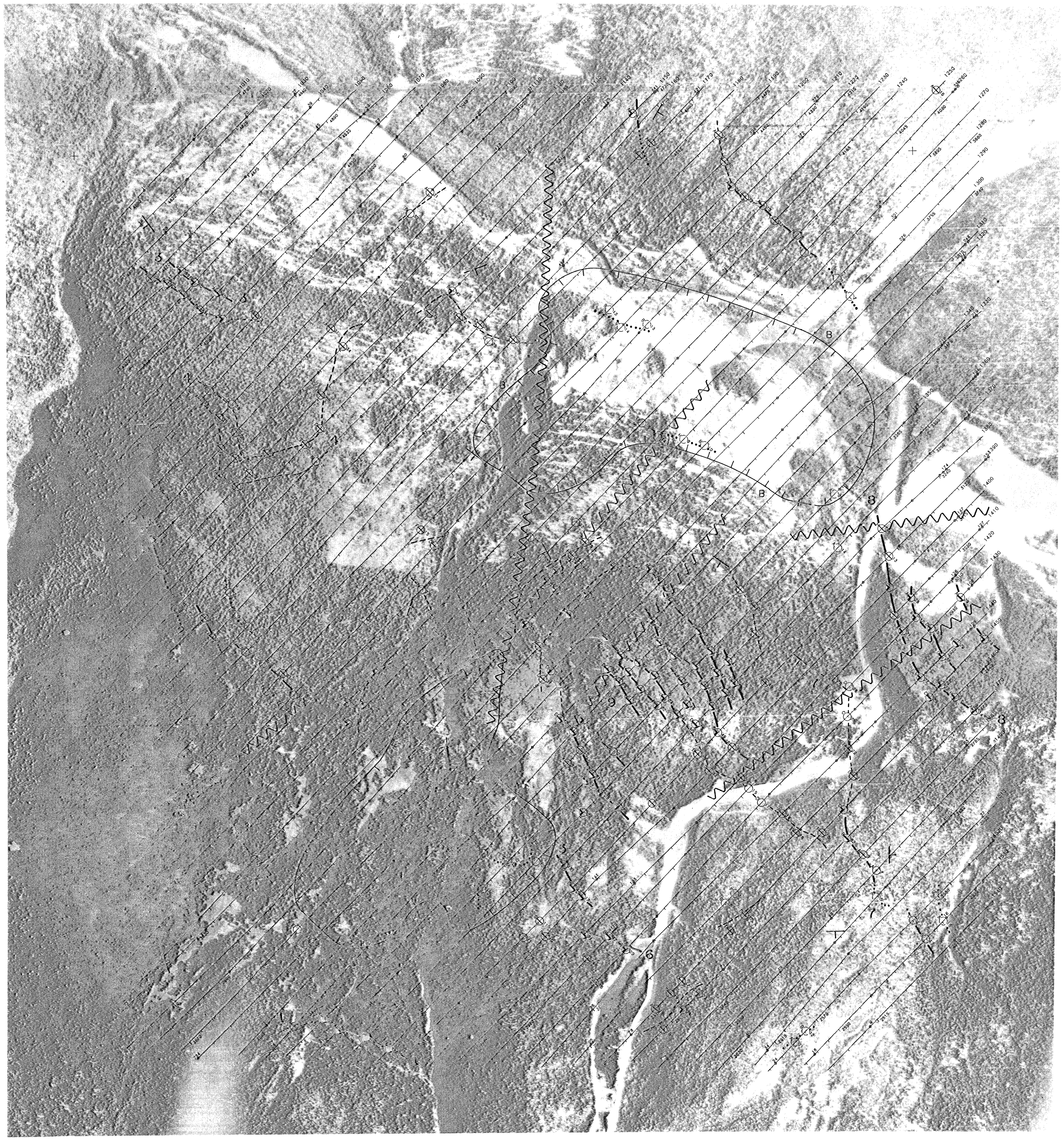
SCALE 1:10,000

0 330 660 1320 2640 feet

0 100 200 500 1 kilometre

AERODAT LIMITED

DATE:	JANUARY, 1987
NTS No:	93H/4
MAP No:	4 J8660



N

EM Anomalies

Conductivity Thickness (mhos)

- 0 - 1
- 1 - 2
- 2 - 4
- 4 - 8
- 8 - 15
- 15 - 30
- > 30

A 7 EM Anomaly A, 4600 Hz inphase amplitude 7 ppm. Conductivity thickness 1-2 mhos (see code).

Interpreted bedrock conductor axis

Probable bedrock conductor axis

Possible bedrock conductor axis

2 Area of interest "2"

Interpreted fault

Vertical dip

Direction of dip

A Surficical conductivity

Flight Path

Flight path derived from 35 mm tracking film.

Average terrain clearance 60m
Line spacing = 100m

GEOLOGICAL BRANCH
ASSESSMENT REPORT

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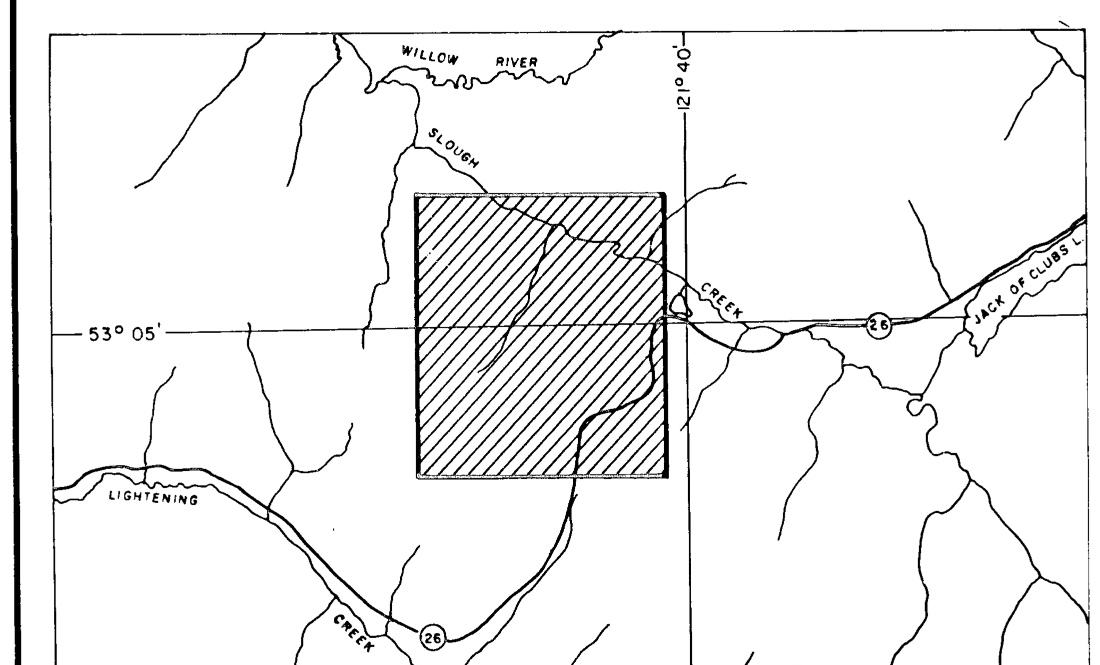


GALLANT GOLD MINES LIMITED

INTERPRETATION

3

BARKERVILLE AREA

BRITISH COLUMBIA

SCALE 1:10,000

0 330 660 1320 2640 feet

0 100 200 500 1 kilometre

AERODAT LIMITED

DATE:	JANUARY, 1987
NTS No:	93H/4
MAP No:	3 J8660

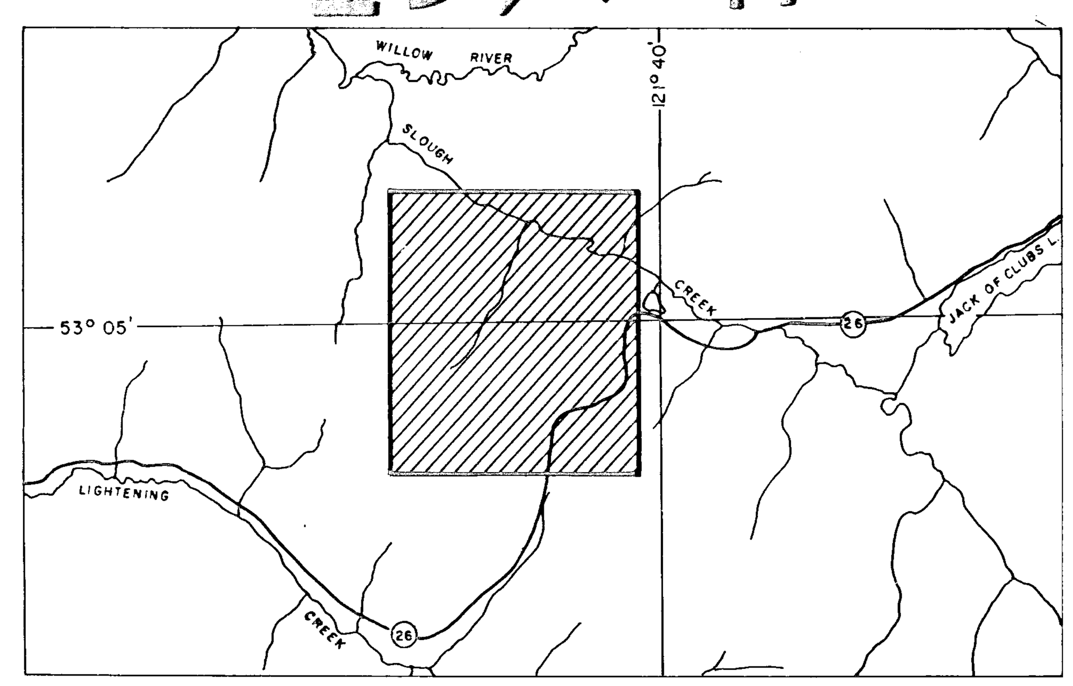
Flight Path

Flight path derived from 35 mm tracking film.

Average terrain clearance 60m
Line spacing = 100m

GEOLOGICAL BRANCH
ASSESSMENT REPORT

15,947



GALLANT GOLD MINES LIMITED

FLIGHT PATH

(2)

BARKERVILLE AREA

BRITISH COLUMBIA

SCALE 1:10,000

0 330 660 1320 2640 feet

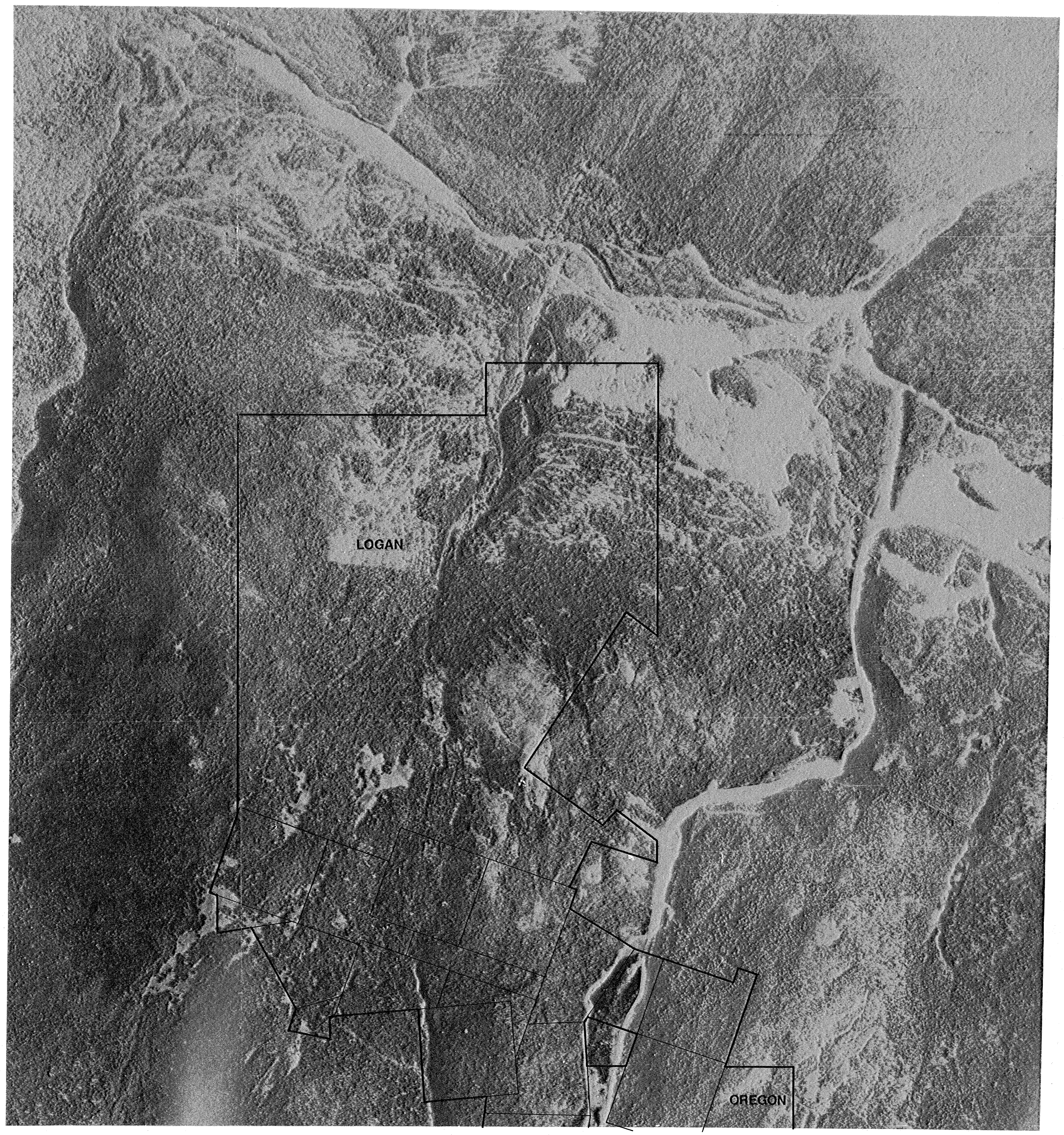
0 100 200 500 1 kilometre

AERODAT LIMITED

DATE: JANUARY, 1987

NTS No: 93H/4

MAP No: 2 J8660



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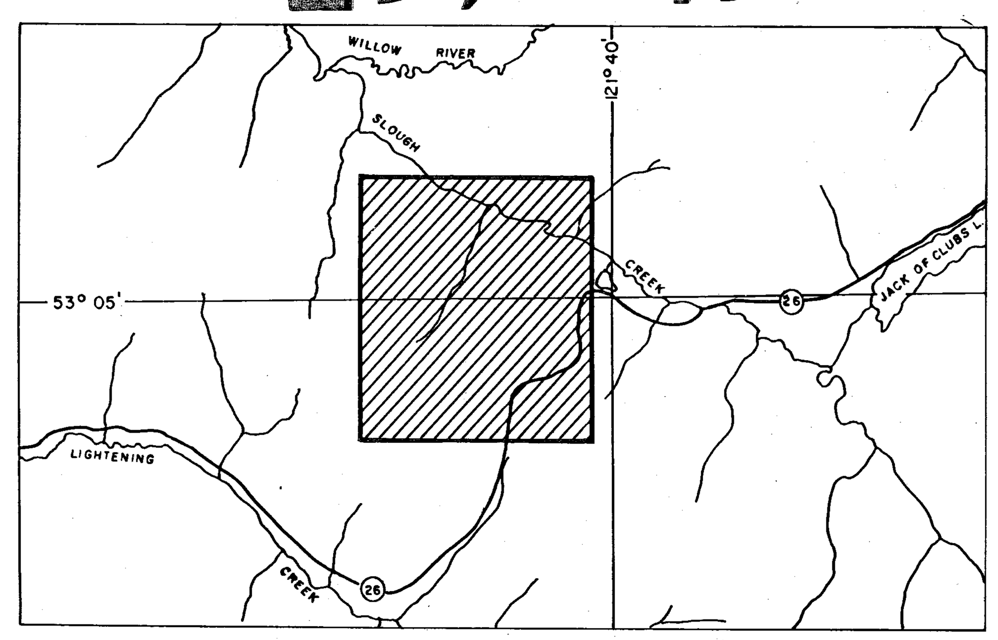
GEOLOGICAL BRANCH
ASSESSMENT REPORT

15,947



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BASE MAP

BARKERVILLE AREA

BRITISH COLUMBIA

1

SCALE 1:10,000

0 330 660 1320 2640 feet

0 100 200 500 1 kilometre

AERODAT LIMITED

DATE: JANUARY, 1987

NTS No: 93H/4

MAP No: 1 J8660

VLF-EM

VLF-EM Total Field Intensity
in percent
Station: NSS (Annapolis, Md.)
21.4 kHz

Sensor elevation 45m

CONTOUR INTERVAL:
50%
10%
2%

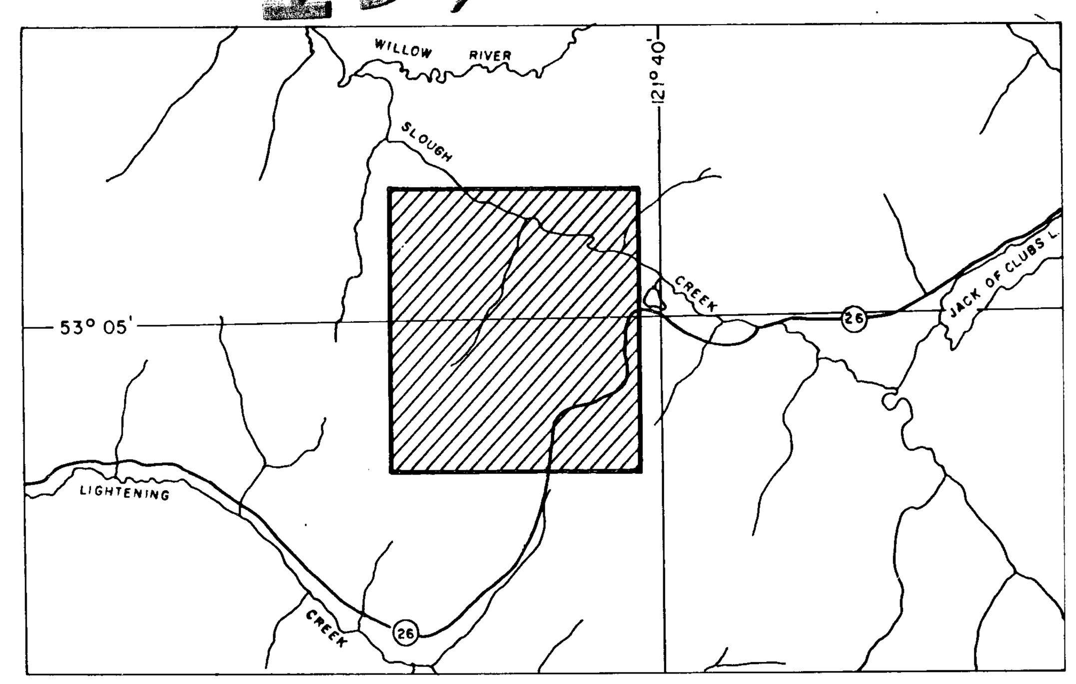
Flight Path

Flight path derived from 35 mm tracking film.

Average terrain clearance 60m
Line spacing = 100m

GEOLOGICAL BRANCH
ASSESSMENT REPORT

15,947



GALLANT GOLD MINES LIMITED

VLF-EM TOTAL FIELD CONTOURS

7

BARKERVILLE AREA

BRITISH COLUMBIA

SCALE 1:10,000
0 330 660 1320 2640 feet
0 100 200 500 1 kilometre

AERODAT LIMITED

DATE:	JANUARY, 1987
NTS No:	93H/4
MAP No:	7 J8660

N

Apparent Resistivity

Contouring in logarithmic intervals

Calculated from 4175 Hz coplanar response using a 200 m model
Sensor elevation 30m

$10^{N.0}$ OHM-M   N = 1,2,3, ... 9
$10^{N.M}$ OHM-M   M = 1,2,3, ...9

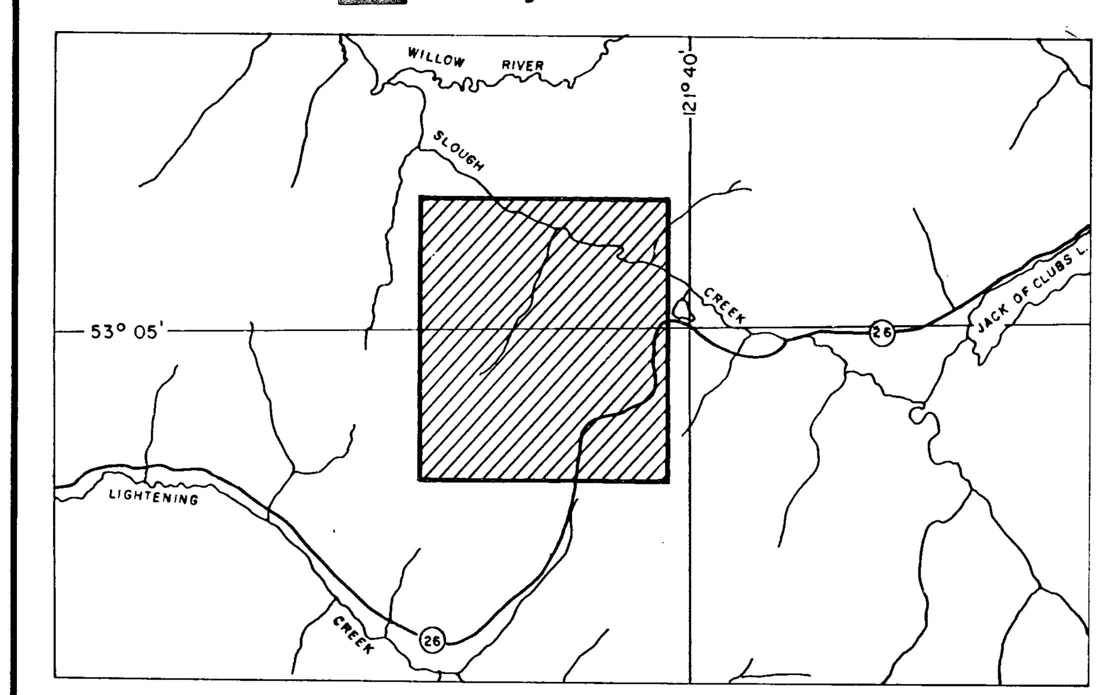
Flight Path

Flight path derived from 35 mm tracking film.

Average terrain clearance 60m
Line spacing = 100m

GEOLOGICAL BRANCH ASSESSMENT REPORT

15,947



GALLANT GOLD MINES LIMITED

APPARENT RESISTIVITY CONTOURS

6

BARKERVILLE AREA

BRITISH COLUMBIA

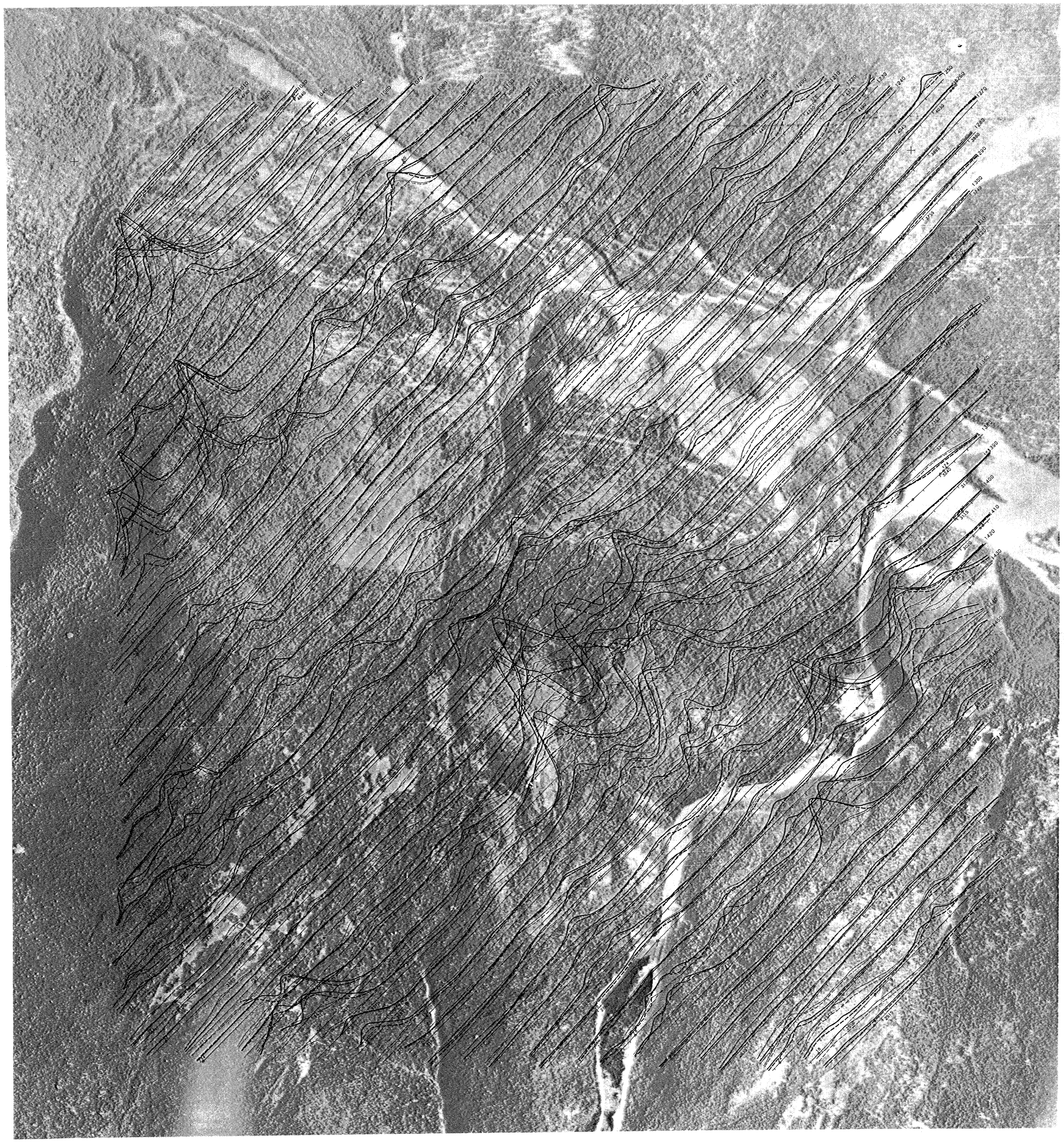
SCALE 1:10,000

0 330 660 1320 2640 feet

0 100 200 500 1 kilometre

AERODAT LIMITED

DATE:	JANUARY, 1987
NTS No:	93H/4
MAP No:	6 J8660



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EM Profiles

Coaxial 2 ppm/mm
4600 Hz inphase
4600 Hz quadrature
Coplanar 8 ppm/mm
4175 Hz inphase
4175 Hz quadrature
Sensor elevation..........30m
Coil separation............7m

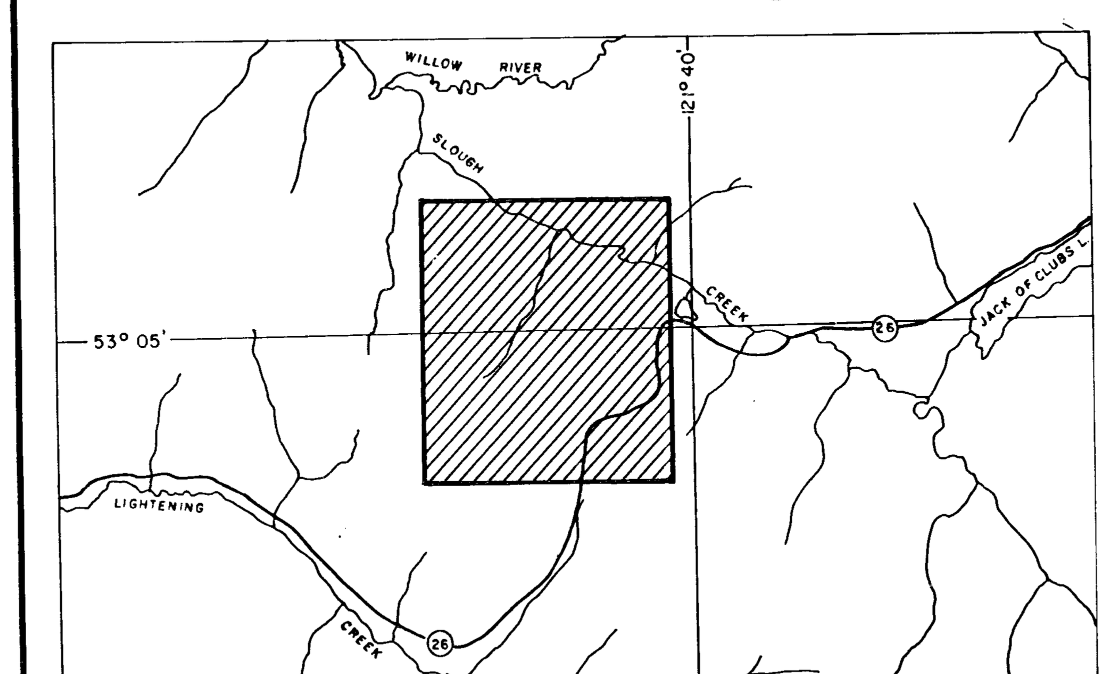
Flight Path

Flight path derived from 35 mm tracking film.

Average terrain clearance 60m
Line spacing = 100m

GEOLOGICAL BRANCH ASSESSMENT REPORT

15,947



GALLANT GOLD MINES LIMITED

ELECTROMAGNETIC PROFILES

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BARKERVILLE AREA

BRITISH COLUMBIA

SCALE 1:10,000

0 330 660 1320 2640 feet

0 100 200 500 1 kilometre

AERODAT LIMITED

DATE:	JANUARY, 1987
NTS No:	93H/4
MAP No:	8a J8660

N

EM Profiles

935 Hz coaxial coils
Sensor elevation 30m

inphase 2ppm/mm
quadrature 2ppm/mm

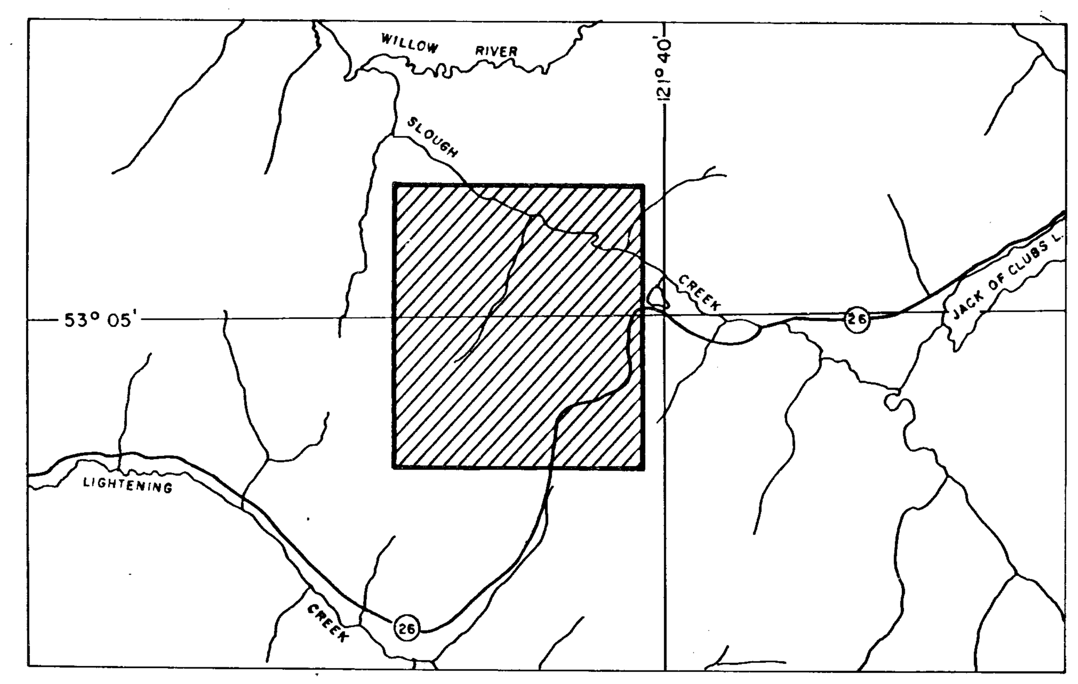
Flight Path

Flight path derived from 35 mm tracking film.

Average terrain clearance 60m
Line spacing = 100m

GEOLOGICAL BRANCH ASSESSMENT REPORT

15,947



GALLANT GOLD MINES LIMITED

ELECTROMAGNETIC PROFILES

BARKERVILLE AREA

(9)

BRITISH COLUMBIA

SCALE 1:10,000

0 330 660 1320 2640 feet

0 100 200 500 1 kilometre

AERODAT LIMITED

DATE: JANUARY, 1987

NTS No: 93H/4

MAP No: 8b J8660