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REPORT ON
 COMBINED HELICOPTER BORNE
 MAGNETIC, ELECTROMAGNETIC AND VLF
 SURVEY
 LIGHTNING CREEK PROPERTY
 QUESNEL DISTRICT, BRITISH COLUMBIA

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Owner/Operator: LIGHTNING CREEK RESOURCES LTD.

by

AERODAT LIMITED
 GEOLOGICAL BRANCH
 ASSESSMENT REPORT

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16,315

G. Podolsky
 P. Eng.

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LIST of MAPS

(Scale 1:10,000)

MAPS: (As listed under Appendix "B" I. of the Agreement)

- I PHOTOMOSAIC BASE MAP; prepared from an uncontrolled photo laydown, showing registration crosses corresponding to UTM co-ordinates on survey maps.
- II FLIGHT LINE MAP; showing all flight lines and fiducials.
- III AIRBORNE ELECTROMAGNETIC SURVEY INTERPRETATION MAP; showing flight lines, fiducials conductor axes and anomaly peaks along with inphase amplitudes and conductivity thickness ranges for the 4600 Hz coaxial coil system.
- IV TOTAL FIELD MAGNETIC CONTOURS; showing magnetic values contoured at 2 nanoTesla intervals, flight lines, fiducials and anomaly peaks.
- V VERTICAL MAGNETIC GRADIENT CONTOURS; showing magnetic gradient values contoured at intervals of 0.2 nanoTeslas per metre.
- VI APPARENT RESISTIVITY CONTOURS; showing contoured resistivity values, flight lines, fiducials and anomaly peaks.
- VII VLF-EM TOTAL FIELD CONTOURS; showing relative contours of the VLF Total Field response, flight lines, fiducials and anomaly peaks.
- VIII OVERBURDEN THICKNESS CONTOURS; showing relative values of overburden thickness based on a thick plate model calculation.

Note: 'Colour Products' listed under "B" II. are not discussed in this report.

1: INTRODUCTION

This report describes an airborne geophysical survey carried out on behalf of Lightning Creek Resources Ltd. by Aerodat Limited. Equipment operated included a four frequency electromagnetic system, a high sensitivity cesium vapour magnetometer, a two frequency VLF-EM system, a video tracking camera, an altimeter and an electronic positioning system. Electromagnetic, magnetic and altimeter data were recorded both in digital and analog form. Positioning data were stored in digital form and recorded on tape as well as being marked on the flight path mosaic by the operator while in flight.

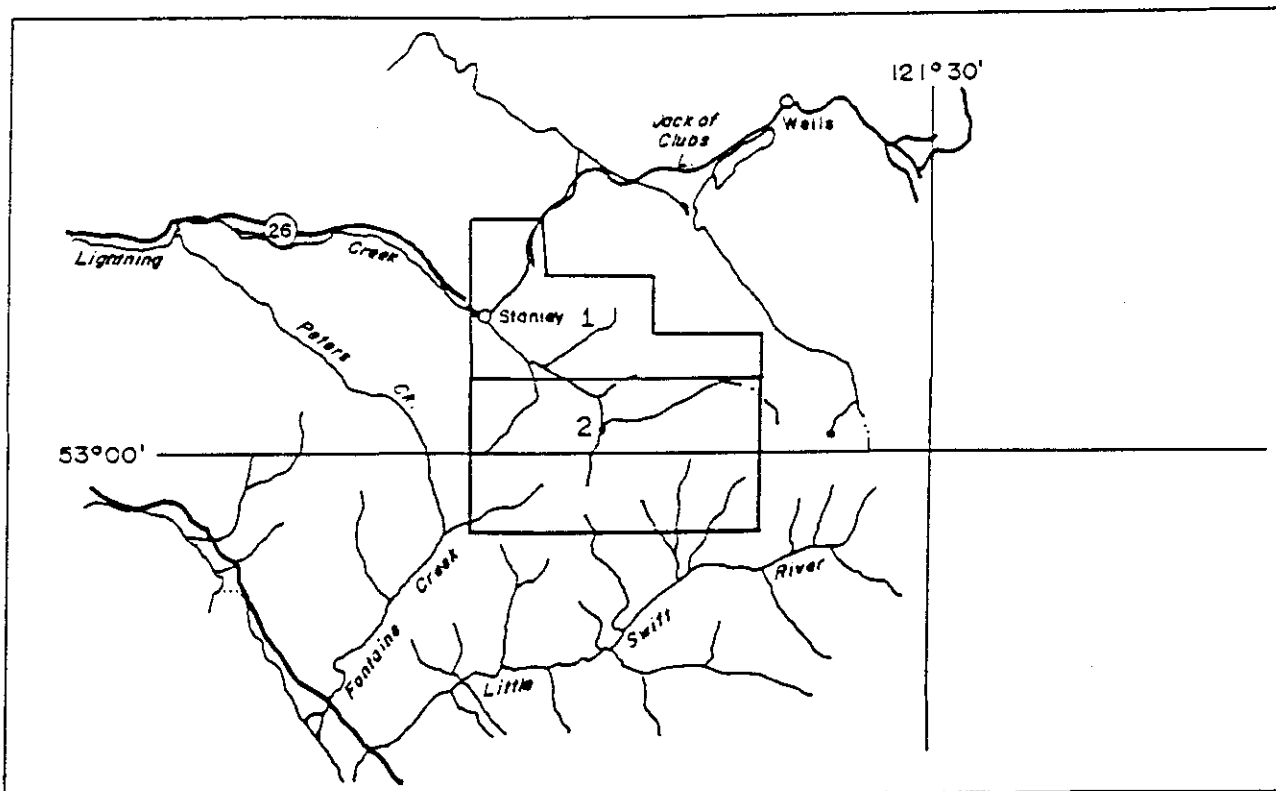
The survey area, comprising a block of ground in the Quesnel Mining District of northern British Columbia and situated about 12 kilometres west southwest of Barkerville, was flown during the period of February 21st to 24th, 1987. Five flights were required to complete the survey with flight lines oriented at Azimuths of 090-270 degrees and flown at a nominal spacing of 150 metres. Coverage and data quality were considered to be well within the specifications described in the contract.

The purpose of the survey was to record airborne geophysical data over and around ground that is of interest to Lightning Creek Resources Ltd.

A total of 535 kilometres of the recorded data were compiled in map form and are presented as part of this report according to specifications outlined by Lightning Creek Resources Ltd.

2: SURVEY AREA LOCATION

The survey area is depicted on the index map shown below. It is centred at Latitude 53 degrees 01 minutes north, Longitude 121 degrees 40 minutes west, approximately 12 kilometres west southwest of Barkerville and 55 kilometres almost due east of Quesnel in the Quesnel Highland area of northern British Columbia (NTS Reference Map Nos. 93 A/13, 93 H/4). The area is accessed from the Quesnel-Wells Highway (# 26) that cuts the north western corner of the area or by helicopter out of Quesnel.



3: AIRCRAFT AND EQUIPMENT

3.1 Aircraft

An Aerospatiale A-Star 350D helicopter, (C-GNSM), owned and operated by Lakeland 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 75 metres.

3.2 Equipment

3.2.1 Electromagnetic System

The electromagnetic system was an Aerodat four frequency system. Two vertical coaxial coil pairs were operated at 955 Hz and 4536 Hz and two horizontal coplanar coil pairs at 4268 Hz and 33.9 kHz. The transmitter-receiver separation was 7 metres. Inphase and quadrature signals were measured simultaneously for the four 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 27 metres below the helicopter. The transmitting stations monitored were NLK, Jim Creek, Washington for the "Ortho" station and NAA, Cutler, Maine for the "Line" station broadcasting at 24.8 and 24.0 kHz respectively.

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 27 metres below the helicopter.

3.2.4 Magnetic Base Station

A Geometrics G803 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 King KRA-10 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 Panasonic video tracking camera was used to record flight path on standard VHS video tape. The camera was operated in continuous mode. Fiducial numbers and time reference marks, for cross-reference to the analog and digital data, were encoded on the tape.

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:

<u>Channel</u>	<u>Input</u>	<u>Scale</u>
ALT	Altimeter (150 m at top of chart)	3 m/mm
CXI1	Low Frequency Inphase	2.5 ppm/mm
CXQ1	Low Frequency Quadrature	2.5 ppm/mm
CXI2	High Frequency Inphase	2.5 ppm/mm
CXQ2	High Frequency Quadrature	2.5 ppm/mm
CPI1	Mid Frequency Inphase	10 ppm/mm

CPQ1	Mid Frequency Quadrature	10 ppm/mm
CPI2	33 kiloHerz Inphase	20 ppm/mm
CPQ2	33 kiloHerz Quadrature	20 ppm/mm
VLT	VLF-EM Total Field, Line	2.5 %/mm
VLQ	VLF-EM Quadrature, Line	2.5 %/mm
VOT	VLF-EM Total Field, Ortho	2.5 %/mm
VOQ	VLF-EM Quadrature, Ortho	2.5 %/mm
MAGF	Magnetometer, fine	1.0 nT/mm
MAGC	Magnetometer, coarse	10 nT/mm
PWRL	Power Line Indicator	

3.2.8 Digital Recorder

A DGR33 data system recorded the survey on magnetic tape. Information recorded was as follows:

<u>Equipment</u>	<u>Recording Interval</u>
EM system	0.1 seconds
VLF-EM	0.5 seconds
Magnetometer	0.25 seconds
Altimeter	0.5 seconds
Power Line Monitor	0.5 seconds

4: DATA PRESENTATION

4.1 Base Map

A photomosaic base at a scale of 1:10,000 was prepared by enlargement of aerial photographs of the survey area.

4.2 Flight Path Map

The flight path was derived from the from an examination of the video tape from the flight path tracking camera system. Points along the flight path that could be identified on the video presentation, were marked on the photomosaic with reference to time. These points were then digitized to produce the 'picked' flight path. It is estimated that positioning is generally accurate to about 30 metres with respect to the topographic detail of the base map. The flight path is drawn with reference fiducials, time marks and navigator's manual fiducials for cross reference to both the analog and digital data and is presented on a Cronaflex overlay of the base map.

4.3 Airborne Electromagnetic Survey Interpretation Map

An interpretation map was prepared showing flight lines, fiducials, peak locations of anomalies and conductivity thickness range along with the Inphase amplitudes. These values were computed from the 4600 Hz coaxial response. Individual conductors, conductive zones and conductive areas have been delineated and numbered on the Interpretation Map. The data are presented on a Cronaflex overlay of the 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 25 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 aeromagnetic data have been presented with flight path and electromagnetic anomaly information on a Cronaflex overlay of the 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 overlay of the 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.

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 overlay of the base map with the flight path and

electromagnetic anomaly information.

4.7 VLF - EM Total Field Contours

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

4.8 Relative Overburden Thickness Contours

The electromagnetic information was processed to yield a map of the relative overburden thickness. This was accomplished by first deriving the apparent resistivity of the ground for a thin sheet model and then, from an assumed constant value of overburden resistivity, computing appropriate overburden thicknesses over the area.

The approach taken in computing apparent resistivity was to assume a suitable model of a conductive layer (i.e., the overburden) 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.

The overburden thickness data were interpolated onto a regular grid at a 25 metres true scale interval using a cubic spline technique.

The calculated overburden thickness data have been presented in contour form along with EM anomalies and flight lines on a Cronaflex overlay of the topographic base map.

5: INTERPRETATION

5.1 GEOLOGY

A small topographic map with drill hole locations and overburden depths along Lightning Creek as well as two churn drill sections, indicate the presence of "heavy" pyrite mineralization within certain of the limestone strata that underlie the survey area. No other geologic data were supplied to Aerodat by Lightning Creek Resources Ltd. and no published data were available to the writer. Also, types of targets sought have not been discussed or identified by Lightning Creek Resources Ltd. although it is generally assumed that the primary interest is in gold mineralization. Barkerville, a historic gold mining camp, lies approximately 14 kilometres east southeast of the survey.

5.2 MAGNETICS

The magnetic data from the high sensitivity cesium magnetometer provided virtually a continuous magnetic reading when recording at two-tenth second intervals. The system is also noise free for all practical purposes.

The sensitivity of 0.1 nT allows for the mapping of very small inflections in the magnetic field, resulting in a contour map that is comparable in quality to ground data. Both the fine and coarse magnetic traces were recorded on the magnetic charts.

The Total Field magnetic map shows a fairly persistent north easterly to north northeasterly magnetic grain throughout the area with one north westerly zone in the south central part of the south sheet. It is felt that the magnetic pattern is an overall reflection of the combined effects of topography

and stratigraphy and, to a lesser extent, structure (i.e., faulting).

Maximum magnetic response is a fairly low 125 nanoTeslas above a 58,000 nT average background level. Overall magnetic relief is only about 210 nT but is quite sharp, suggesting only minor susceptibility contrast in the near surface stratigraphy. No intrusive activity is evident and the faulting indicated on the Interpretation Map (generally north-south to north northwesterly) is only a sampling of the possible cross structures that may be interpreted from the magnetic data. Faulting along the magnetic grain (i.e., "strike" faults) is probably more common but harder to isolate due to topographic effects. The drainage courses themselves are probably an indication of faulting.

5.3 VERTICAL GRADIENT MAGNETICS

The relatively low levels of magnetic relief and the mountainous terrain are not conducive to good quality Vertical Magnetic Gradient data. The present data tend to conform to the Total Field magnetic patterns and provide some support to the structural interpretation but the possible need for terrain corrections make the data of little interpretive value. Further processing of the data is not warranted.

5.4 ELECTROMAGNETICS

The electromagnetic data was first checked by a line-by-line examination of the analog records. Record quality was good with some noise noted on the 34 kHz coplanar quadrature trace and minor noise levels on the coaxial traces. This was readily removed by an appropriate smoothing filter. Sferic noise was essentially absent. Geologic noise, in the form of surficial

conductors, is present on the higher frequency responses but does not seem to be a significant problem in the identification of bedrock conductors.

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 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. The 33 kHz data was not used in the selection of bedrock conductors but was relied upon for the identification of surficial zones.

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: A number of conductive zones and areas were detected by the electromagnetic system within the boundaries of the survey area. Taken together, they are indicative of a generally flat dipping conductive sheet that conforms somewhat to the topography and is exposed (?) near or at the summit of the various mountain peaks and ridges and along several of the stream cuts. North east to NNW faulting as well as the possible NE faults along the more common drainage direction, may control the near surface orientation of this horizon. There does not appear to be any correlation between magnetic susceptibility and conductance.

CONDUCTORS I & II - (Lines 10 to 90): Conductors I and II, in the north west corner of the survey area, occur along south westerly trending ridges that extend off the peak of Nelson Mountain. They are characteristic of a multi-banded, nearly flat lying conductive horizon (or horizons) that outcrops along the flanks and near the crest of the ridge. Conductances are low for zone I and moderate to high for zone II. Previous staking indicates that these zones, particularly II, may have been the focus of prior exploration activity.

CONDUCTORS III & V - (Lines 120 to 170 and 250 to 291): Conductor III, along the west boundary of the north sheet, occurs near the base of Nelson Mountain along Davis Creek. It may be controlled by the north-south trending fault zone interpreted from the magnetics but is likely stratigraphically related to Conductor II. Conductance is also in the moderate to high range.

Conductor V is in a similar setting to III but occurs to the south of Lightning Creek, at the base of Grub Mountain along Last Chance Creek. Conductances are in the moderate range. Note that both zones III and V have been staked previously.

CONDUCTOR IV - (Lines 221 to 260): This is classed as a possible bedrock conductor but may actually be cultural in origin as it falls over the eastern outskirts of the village of Stanley. and is along the extension of the power line that follows Provincial Highway # 26 out of Stanley. Ground checks are recommended on this zone.

CONDUCTIVE AREAS VII, VIII, VIIIA, VIIIB - (Lines 141 to 170 and 271 to 400): These conductive areas occur near the summits of Mount Amador (VII) and Mount Pinkerton (VIII) with areas VIIIA and VIIIB along the south west and south east flanks

of Mount Pinkerton. They indicate that the conductive horizons are not necessarily flat lying but undulate somewhat with topography. With the exception of VIIa, each area appears to extend beyond the survey boundaries. Conductances fall into a moderate to high range.

CONDUCTIVE AREA IX - (Lines 350 to 420): Conductive area IX occurs along the base of Houseman Creek near the junction with Lightning and Milk Ranch Pass Creeks. It also falls just north of the intersection of interpreted NNW and NE faults with Houseman Creek probably an extension of the NE fault system. The two churn drill holes along Lightning Creek were sunk just to the south of this conductive area. Conductances are low to the west of the interpreted fault line but moderate to the east of the fault along the east edge (i.e., uphill edge) of the conductive area. Careful mapping along Houseman Creek should disclose the cause of the anomalous response.

CONDUCTIVE ZONES X, Xa - (Lines 560 to 630): This conductive area represents several short zones near the summit of Milk Ranch Mountain both to the west (X and Xa) and east (unmarked) of the interpreted NNE fault system that extends to the south central edges of the survey. Conductances tend to be low except to the east of the fault where they are slightly higher. The latter zone occurs at the upper reaches of a south easterly creek cut that leads into the Little Swift River.

CONDUCTIVE AREA XI - (Lines 460 to 610): Conductive area XI occurs at the intersection of interpreted NNE and N-S faults along the west flank of the eastern ridge off Elk Mountain. Conductances are low and the area is probably a 'leaner' portion of the stratigraphic horizon common (?) to Conductors VIII through X. Conductor XII appears to be an isolated segment

of the same sheet. Its conductance may be enhanced by slight errors in determining inphase base levels.

5.5 APPARENT RESISTIVITY

The Apparent Resistivity map gives what the writer considers to be the best depiction of the distribution of conductive zones and areas throughout the survey, certainly better than the profile maps and far superior to the VLF map. In particular, it indicates that the horizon as represented by Conductive Area XI may continue beyond the east edge of the survey boundary and that zones IV and V may be part of the same zone not necessarily confined to the creek valley.

A compilation of the Apparent Resistivity data with available geology on a topographic base map might indicate additional possible exploration targets within the area.

5.6 VLF - EM TOTAL FIELD

The VLF map shows some correlation with the magnetic trends but topographic effects negate the usefulness of the data. This is generally true for all airborne VLF surveys flown in mountainous terrain.

5.7 CONCLUSIONS

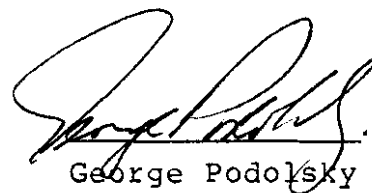
The Apparent Resistivity map, when considered together with the topographic map, leads the writer to conclude that the conductive zones and areas detected in this survey represent an gently undulating conductive stratum (or strata) between roughly the 4600 to 5600 foot elevations. Erosion has exposed these beds around the mountain sides and along the base of several of the creeks. There is no correlation evident between the magnetic and electrical data.

5.8 RECOMMENDATIONS

On the bases of the results of this airborne survey, no further geophysical work can be recommended over the area. The resistivity data, together with any available geology, should be compiled on a topographic map of the area. Careful geologic mapping, particularly along the creek beds, should be sufficient to explain most of the conductive anomalies.

Without some knowledge of the client's mineralization criteria or exploration objectives in this area, recommendations on exploration targets or priorities cannot be made.

J8703.LC



George Podolsky
for

AERODAT LIMITED
August 17, 1987

APPENDIX I

GENERAL INTERPRETIVE CONSIDERATIONS

Electromagnetic

The Aerodat four frequency system utilizes two different transmitter-receiver coil geometries. The traditional coaxial coil configuration is operated at two widely separated frequencies and the lower frequency 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 crossover 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

J8703

FLIGHT	LINE	ANOMALY	CATEGORY	AMPLITUDE (PPM)		CONDUCTOR		BIRD
				INPHASE	QUAD.	CTP	DEPTH	
-----	-----	-----	-----	-----	-----	MHOS	MTRS	MTRS
8	10	A	2	12.8	6.3	2.9	0	781
8	10	B	0	10.7	20.5	0.4	0	539
8	20	A	2	11.7	5.1	3.3	0	708
8	20	B	0	6.7	15.4	0.2	0	553
8	20	C	0	8.3	11.9	0.5	0	608
8	20	D	0	12.8	16.6	0.7	0	658
8	20	E	2	16.6	9.5	2.5	0	680
8	30	A	1	14.7	11.9	1.5	0	633
8	30	B	2	18.3	11.6	2.3	0	605
8	30	C	0	8.9	13.3	0.5	0	582
8	30	D	2	11.2	6.0	2.4	0	667
8	40	A	2	17.1	7.4	3.8	0	646
8	40	B	1	12.0	8.4	1.7	0	643
8	40	C	1	9.0	5.5	1.9	0	610
8	50	A	1	9.7	5.9	1.9	0	621
8	50	B	1	10.8	9.0	1.3	0	617
8	50	C	0	8.1	8.1	0.9	0	661
8	50	D	2	12.7	8.0	2.0	0	681
8	50	E	3	12.8	3.9	5.5	0	680
8	60	A	2	7.4	2.8	3.4	0	715
8	60	B	2	7.7	3.2	3.0	0	904
8	60	C	3	20.3	7.1	5.3	0	627
8	60	D	2	18.2	9.1	3.2	0	671
8	60	E	0	8.4	15.4	0.4	0	521
8	60	F	0	8.2	12.7	0.5	0	594
8	60	G	0	7.4	7.4	0.8	0	583
8	70	A	2	17.4	10.6	2.4	0	652
8	70	B	4	36.5	10.7	8.0	0	613
8	70	C	3	29.2	8.3	7.8	0	705
8	70	D	5	24.4	3.9	16.1	0	639
8	70	E	1	5.3	2.8	1.9	0	857
8	70	F	2	10.8	5.8	2.4	0	646
8	80	A	4	25.8	5.2	12.0	0	617
8	80	B	2	17.1	7.3	3.8	0	684
8	90	A	2	10.2	4.2	3.4	0	618
8	90	B	1	10.9	9.2	1.3	0	654

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.

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FLIGHT	LINE	ANOMALY	CATEGORY	AMPLITUDE (PPM)		CONDUCTOR		BIRD
				INPHASE	QUAD.	CTP MHOS	DEPTH MTRS	HEIGHT MTRS
8	90	C	3	14.9	4.6	5.7	0	668
8	90	D	2	12.0	5.5	3.1	0	667
8	100	A	2	7.7	3.3	2.9	0	853
8	100	B	2	8.1	3.1	3.5	0	634
8	110	A	0	4.7	4.2	0.8	0	612
8	110	B	0	4.2	5.5	0.4	0	570
8	110	C	2	12.5	5.6	3.2	0	758
8	120	A	3	9.4	3.0	4.7	0	783
8	130	A	1	7.2	5.3	1.3	0	664
8	130	B	0	3.4	5.6	0.3	0	584
8	141	A	4	47.0	11.7	10.8	0	594
8	141	B	3	35.7	13.4	5.8	0	593
8	141	C	3	26.6	10.0	5.2	0	617
8	141	D	1	7.5	6.9	1.0	0	768
8	141	E	0	11.2	14.9	0.7	0	647
8	141	F	3	10.9	3.8	4.4	0	871
8	141	G	2	7.7	4.1	2.1	0	632
8	150	A	3	15.4	4.7	5.8	0	674
8	150	B	0	8.6	14.9	0.4	0	581
8	150	C	0	6.0	10.8	0.3	0	670
8	150	D	0	6.7	12.3	0.3	0	602
8	150	E	2	11.8	5.3	3.2	0	686
8	150	F	3	30.2	8.9	7.5	0	617
8	160	A	3	36.9	12.8	6.5	0	567
8	160	B	3	33.4	13.0	5.4	0	577
8	160	C	0	4.7	8.2	0.3	0	662
8	160	D	0	10.2	12.5	0.7	0	633
8	160	E	0	11.7	12.6	0.9	0	647
8	160	F	0	6.0	8.6	0.4	0	713
8	160	G	3	14.5	3.8	7.1	0	638
8	160	H	5	28.6	4.6	16.7	0	599
8	170	A	2	10.8	5.8	2.4	0	614
8	170	B	0	5.2	9.7	0.3	0	705
8	170	C	0	6.1	9.1	0.4	0	715
8	170	D	1	14.0	12.9	1.2	0	625
8	170	E	0	14.5	17.3	0.9	0	585
8	170	F	0	7.6	11.9	0.4	0	575

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FLIGHT	LINE	ANOMALY	CATEGORY	AMPLITUDE (PPM)		CONDUCTOR		BIRD
				INPHASE	QUAD.	CTP MHOS	DEPTH MTRS	HEIGHT MTRS
8	180	A	0	9.7	11.1	0.8	0	575
8	180	B	0	11.3	15.6	0.6	0	611
8	180	C	0	8.4	14.8	0.4	0	610
8	180	D	0	7.7	13.3	0.4	0	628
9	190	A	0	10.2	15.8	0.5	0	595
9	190	B	1	11.7	11.4	1.1	0	648
9	200	A	0	6.8	8.1	0.6	0	683
9	200	B	0	12.6	17.2	0.7	0	570
9	200	C	0	15.8	20.7	0.8	0	575
9	200	D	1	4.8	2.6	1.7	0	823
9	200	E	0	3.5	8.2	0.1	0	532
9	210	A	1	6.2	4.4	1.3	0	605
10	221	A	2	7.6	4.2	2.0	0	715
10	230	A	2	14.4	7.7	2.7	0	620
10	240	A	1	7.9	4.7	1.8	0	754
10	240	B	1	7.9	4.7	1.8	0	754
10	240	C	0	5.2	5.7	0.6	0	687
10	240	D	0	5.2	5.7	0.6	0	687
10	240	E	2	10.2	5.7	2.2	0	595
10	240	F	2	10.2	5.6	2.3	0	595
10	250	A	1	9.9	6.3	1.8	0	673
10	250	B	1	9.9	6.5	1.7	0	671
10	250	C	1	11.2	8.3	1.5	0	624
10	250	D	1	11.2	8.3	1.5	0	624
10	250	E	0	9.4	11.8	0.7	0	588
10	250	F	0	9.4	11.8	0.7	0	588
10	250	G	1	9.4	6.8	1.5	0	684
10	250	H	1	9.4	6.8	1.5	0	684
10	250	J	2	9.5	4.5	2.7	0	723
10	250	K	2	9.5	4.5	2.7	0	723
10	260	A	3	20.2	6.6	5.8	0	621
10	260	B	2	10.3	4.0	3.7	0	662
11	271	A	3	18.7	5.4	6.7	0	842
11	271	B	3	19.5	5.4	7.2	0	622
11	271	C	0	7.1	11.2	0.4	0	614

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FLIGHT	LINE	ANOMALY	CATEGORY	AMPLITUDE (PPM)		CONDUCTOR		BIRD
				INPHASE	QUAD.	CTP MHOS	DEPTH MTRS	HEIGHT MTRS
11	271	D	0	5.2	11.2	0.2	0	645
11	271	E	1	15.3	12.9	1.4	0	643
11	271	F	0	7.4	11.6	0.4	0	572
11	281	A	2	27.7	13.6	3.7	0	626
11	281	B	0	10.2	10.9	0.9	0	662
11	281	C	0	11.0	11.6	0.9	0	636
11	281	D	3	12.6	3.4	6.5	0	789
11	281	E	2	7.6	3.1	3.1	0	674
11	291	A	2	8.9	3.6	3.3	0	667
11	291	B	0	5.2	7.7	0.4	0	661
11	291	C	0	9.9	12.9	0.7	0	623
11	291	D	2	20.9	11.4	2.9	0	624
11	291	E	3	23.0	8.3	5.3	0	632
11	291	F	3	37.0	11.5	7.5	0	680
11	291	G	3	31.1	12.6	5.0	0	660
11	291	H	3	28.0	11.2	4.9	0	665
11	291	J	3	36.1	13.5	5.8	0	667
11	300	A	3	28.6	12.7	4.3	0	658
11	300	B	4	28.8	5.2	14.3	0	592
11	300	C	3	19.5	5.8	6.5	0	642
11	300	D	0	10.9	11.4	0.9	0	626
11	300	E	1	13.3	13.3	1.1	0	624
11	300	F	0	6.7	7.3	0.7	0	643
11	300	G	2	8.6	3.9	2.8	0	760
11	310	A	0	2.8	7.9	0.1	0	608
11	310	B	0	6.2	7.3	0.6	0	673
11	310	C	3	23.3	9.2	4.7	0	511
11	310	D	3	23.3	7.7	6.0	0	550
11	310	E	4	41.2	11.9	8.5	0	593
11	310	F	4	70.9	14.8	15.3	0	596
11	310	G	5	71.4	13.2	18.0	0	604
11	310	H	4	39.9	10.9	9.1	0	626
11	321	A	0	6.1	9.2	0.4	0	589
11	321	B	0	6.0	8.7	0.4	0	600
11	321	C	0	6.8	12.0	0.3	0	566
11	321	D	0	6.6	12.1	0.3	0	607
11	321	E	0	6.8	9.9	0.5	0	672
11	321	F	2	16.6	11.1	2.1	0	617
11	321	G	2	16.4	8.0	3.1	0	598
11	321	H	2	16.2	6.7	3.9	0	583

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FLIGHT	LINE	ANOMALY	CATEGORY	AMPLITUDE (PPM)		CONDUCTOR		BIRD
				INPHASE	QUAD.	CTP DEPTH	HEIGHT	
-----	-----	-----	-----	-----	-----	MHOS MTRS	MTRS	-----
11	321	J	2	17.7	10.2	2.6	0	644
11	321	K	2	28.5	13.6	3.9	0	626
11	321	M	3	39.6	17.0	5.0	0	615
11	321	N	3	42.3	16.7	5.7	0	644
11	321	O	3	27.2	12.2	4.2	0	703
11	321	P	2	22.4	14.8	2.3	0	647
11	321	Q	3	28.2	10.6	5.3	0	611
11	321	R	2	32.5	16.4	3.8	0	626
11	330	A	3	26.4	8.7	6.2	0	709
11	330	B	1	10.9	10.3	1.1	0	597
11	330	C	3	20.9	6.9	5.8	0	722
11	330	D	3	14.7	5.9	4.0	0	681
11	330	E	0	10.2	11.6	0.8	0	611
11	331	A	2	9.6	5.7	2.0	0	726
11	331	B	3	26.4	9.1	5.9	0	699
11	331	C	4	43.4	8.7	14.0	0	624
11	331	D	4	40.2	8.4	13.0	0	653
11	331	E	3	21.7	7.7	5.3	0	753
11	340	A	2	16.4	8.7	2.8	0	637
11	340	B	2	13.4	7.4	2.5	0	710
11	340	C	1	12.0	9.3	1.5	0	626
11	340	D	2	11.4	5.3	3.0	0	653
11	340	E	0	9.3	9.9	0.9	0	649
11	350	A	0	6.7	8.1	0.6	0	583
11	350	B	2	14.5	5.9	3.9	0	625
11	350	C	3	19.9	7.8	4.5	0	597
11	350	D	3	20.4	6.0	6.7	0	599
11	350	E	3	19.3	5.1	7.6	0	701
11	360	A	2	16.7	7.4	3.6	0	637
11	360	B	2	17.4	7.6	3.7	0	693
11	360	C	4	25.2	6.3	8.9	0	613
11	360	D	4	23.7	5.4	9.9	0	673
11	360	E	3	13.6	5.3	4.0	0	671
11	360	F	1	8.6	7.8	1.0	0	678
11	360	G	3	15.6	4.8	5.8	0	639
11	360	H	0	7.0	6.6	0.9	0	599
11	360	J	1	6.9	6.0	1.0	0	745
11	370	A	0	9.4	10.8	0.8	0	643
11	370	B	0	9.8	11.5	0.8	0	514

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J8703

FLIGHT	LINE	ANOMALY	CATEGORY	AMPLITUDE (PPM)		CONDUCTOR		BIRD
				INPHASE	QUAD.	CTP MHOS	DEPTH MTRS	HEIGHT MTRS
11	370	C	0	10.0	12.0	0.7	0	563
11	370	D	3	14.6	3.6	7.7	0	639
11	370	E	2	14.2	7.2	2.8	0	670
11	370	F	3	21.2	7.2	5.6	0	662
11	370	G	4	24.3	6.1	8.8	0	639
11	380	A	3	29.9	9.1	7.2	0	681
11	380	B	3	31.0	10.5	6.3	0	601
11	380	C	3	23.2	10.3	4.0	0	610
11	380	D	2	13.4	7.9	2.3	0	623
11	380	E	2	10.7	5.5	2.5	0	577
11	380	F	1	11.9	10.3	1.3	0	587
11	390	A	0	7.2	12.1	0.4	0	591
11	390	B	0	5.4	11.5	0.2	0	534
11	390	C	0	7.2	7.7	0.8	0	727
11	390	D	1	12.8	11.4	1.3	0	581
11	390	E	1	16.1	12.6	1.6	0	532
11	390	F	1	14.9	11.8	1.6	0	716
11	390	G	1	13.6	9.5	1.8	0	614
11	390	H	2	16.0	8.6	2.7	0	645
11	390	J	3	24.0	7.5	6.5	0	582
11	390	K	3	21.3	5.8	7.5	0	591
11	390	M	3	21.4	6.0	7.3	0	662
11	390	N	4	31.6	7.8	9.7	0	661
11	390	O	3	29.7	9.4	6.8	0	643
11	400	A	3	13.7	4.9	4.5	0	693
11	400	B	3	15.6	5.8	4.5	0	682
11	400	C	0	7.7	8.0	0.8	0	665
11	400	D	0	7.0	9.0	0.6	0	595
11	400	E	0	7.2	9.4	0.6	0	602
11	400	F	2	16.4	10.1	2.3	0	621
11	400	G	1	7.1	5.8	1.1	0	771
11	410	A	0	10.5	11.4	0.9	0	559
11	410	B	0	7.9	7.7	0.9	0	581
11	410	C	1	7.5	6.2	1.1	0	725
11	410	D	0	8.3	9.5	0.7	0	631
11	420	A	0	8.3	9.8	0.7	0	680
11	420	B	1	6.4	3.7	1.8	0	620
11	430	A	0	8.2	8.0	0.9	0	634
11	440	A	0	5.4	9.8	0.3	0	654

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J8703

FLIGHT	LINE	ANOMALY	CATEGORY	AMPLITUDE (PPM)		CONDUCTOR		BIRD
				INPHASE	QUAD.	CTP MHOS	DEPTH MTRS	HEIGHT MTRS
11	450	A	0	9.1	9.1	0.9	0	614
11	450	B	0	8.1	10.8	0.6	0	570
11	460	A	1	16.3	14.9	1.3	0	614
11	460	B	1	14.7	16.4	1.0	0	592
11	460	C	0	6.7	9.6	0.5	0	598
12	470	A	0	8.2	15.4	0.3	0	578
12	470	B	1	11.7	11.1	1.1	0	631
12	470	C	0	6.7	10.4	0.4	0	655
12	470	D	0	9.7	14.9	0.5	0	582
12	470	E	1	14.7	14.3	1.2	0	641
12	470	F	2	17.6	12.0	2.0	0	635
12	470	G	1	15.2	13.7	1.3	0	619
12	480	A	1	13.4	14.0	1.0	0	643
12	480	B	1	13.6	9.8	1.7	0	672
12	480	C	1	13.2	14.1	1.0	0	634
12	480	D	1	12.1	12.8	1.0	0	578
12	480	E	2	13.8	9.0	2.0	0	582
12	480	F	0	5.3	9.7	0.3	0	573
12	491	A	0	6.9	9.7	0.5	0	715
12	491	B	1	8.1	7.5	1.0	0	657
12	491	C	2	11.6	6.6	2.3	0	590
12	491	D	1	14.4	10.4	1.8	0	606
12	500	A	5	17.4	2.0	22.9	0	785
12	500	B	0	11.3	13.8	0.8	0	598
12	500	C	0	12.3	16.0	0.7	0	600
12	500	D	0	12.8	16.2	0.8	0	587
12	500	E	1	15.5	12.9	1.5	0	614
12	500	F	2	11.1	4.9	3.2	0	608
12	500	G	0	6.9	9.9	0.5	0	625
12	500	H	1	9.3	6.5	1.6	0	713
12	500	J	1	9.1	6.9	1.4	0	671
12	510	A	1	7.6	4.6	1.8	0	643
12	510	B	0	8.2	12.6	0.5	0	603
12	510	C	0	7.3	8.2	0.7	0	621
12	510	D	2	18.7	11.2	2.5	0	605
12	510	E	5	25.6	3.8	18.1	0	671
12	520	A	1	8.4	6.4	1.3	0	709

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J8703

FLIGHT	LINE	ANOMALY	CATEGORY	AMPLITUDE (PPM)		CONDUCTOR		BIRD
				INPHASE	QUAD.	CTP MHOS	DEPTH MTRS	HEIGHT MTRS
12	520	B	2	9.4	4.1	3.0	0	795
12	520	C	0	4.3	8.6	0.2	0	612
12	530	A	0	8.1	10.4	0.6	0	623
12	530	B	2	12.2	7.5	2.1	0	705
12	530	C	1	13.5	10.5	1.5	0	645
12	540	A	2	14.7	9.1	2.2	0	679
12	540	B	2	13.7	6.1	3.4	0	686
12	540	C	1	10.2	7.2	1.6	0	680
12	540	D	0	8.9	9.4	0.8	0	636
12	540	E	0	8.5	10.6	0.6	0	670
12	540	F	1	12.1	12.5	1.0	0	603
12	540	G	0	6.7	10.6	0.4	0	595
12	540	H	0	7.7	9.7	0.6	0	604
12	550	A	0	5.6	6.8	0.6	0	551
12	550	B	0	4.7	7.7	0.3	0	643
12	550	C	0	7.6	12.0	0.4	0	609
12	550	D	2	20.7	13.0	2.4	0	572
12	550	E	2	17.9	12.2	2.1	0	597
12	550	F	1	12.9	10.6	1.4	0	669
12	550	G	2	11.1	5.2	2.9	0	663
12	550	H	2	14.1	6.0	3.6	0	652
12	550	J	2	11.6	5.7	2.8	0	716
12	550	K	2	12.1	7.0	2.2	0	636
12	550	M	1	13.5	9.1	1.9	0	646
12	550	N	1	11.0	10.3	1.1	0	635
12	560	A	2	7.6	3.9	2.2	0	701
12	560	B	2	9.4	5.3	2.1	0	682
12	560	C	1	10.3	6.5	1.9	0	711
12	560	D	1	8.0	6.1	1.3	0	704
12	570	A	0	8.5	8.7	0.9	0	563
12	570	B	0	4.7	7.1	0.4	0	574
12	570	C	1	12.0	11.1	1.2	0	620
12	570	D	0	7.9	8.0	0.9	0	626
12	570	E	2	10.2	5.1	2.6	0	670
12	570	F	2	11.6	5.7	2.8	0	614
12	570	G	2	14.6	7.8	2.7	0	627
12	570	H	2	18.9	10.7	2.7	0	600
12	570	J	0	6.3	8.1	0.5	0	635
12	580	A	1	11.7	7.7	1.8	0	623

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.

J8703

FLIGHT	LINE	ANOMALY	CATEGORY	AMPLITUDE (PPM)		CONDUCTOR		BIRD
				INPHASE	QUAD.	CTP MHOS	DEPTH MTRS	HEIGHT MTRS
12	580	B	1	8.1	4.9	1.8	0	654
12	580	C	1	9.1	8.7	1.0	0	676
12	580	D	1	13.3	10.6	1.5	0	627
12	580	E	1	13.9	10.5	1.6	0	628
12	580	F	0	8.1	8.3	0.8	0	669
12	580	G	0	7.8	10.0	0.6	0	600
12	580	H	1	7.6	6.7	1.0	0	610
12	580	J	0	8.1	8.2	0.9	0	589
12	590	A	0	8.8	10.4	0.7	0	585
12	590	B	0	5.5	6.4	0.6	0	571
12	590	C	2	27.5	21.3	2.0	0	581
12	590	D	2	29.1	17.8	2.8	0	599
12	590	E	3	21.3	7.9	5.0	0	619
12	590	F	3	24.4	10.9	4.0	0	580
12	590	G	1	12.4	9.7	1.5	0	601
12	590	H	1	17.2	13.7	1.6	0	626
12	590	J	0	6.9	9.3	0.5	0	578
12	600	A	0	6.5	6.2	0.9	0	634
12	600	B	0	6.1	6.5	0.7	0	714
12	600	C	3	12.5	4.8	4.0	0	661
12	600	D	2	12.5	6.5	2.6	0	621
12	600	E	2	11.5	5.0	3.3	0	649
12	600	F	2	8.8	3.8	3.0	0	798
12	600	G	0	8.2	9.7	0.7	0	585
12	610	A	2	10.1	5.1	2.5	0	667
12	610	B	0	7.6	9.6	0.6	0	687
12	610	C	0	8.0	11.6	0.5	0	615
12	610	D	0	7.3	10.4	0.5	0	629
12	620	A	4	7.8	1.5	8.9	0	781
12	620	B	0	6.5	6.0	0.9	0	701
12	620	C	1	8.4	7.8	1.0	0	666
12	620	D	1	8.4	7.1	1.1	0	664
12	620	E	1	8.1	6.8	1.1	0	681
12	630	A	1	12.3	11.1	1.2	0	576
12	630	B	1	12.3	11.0	1.2	0	596
12	630	C	2	20.9	13.0	2.5	0	547
12	630	D	2	14.2	9.2	2.0	0	660
12	640	A	2	9.7	4.4	2.9	0	686
12	640	B	2	7.0	2.8	3.1	0	888

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.

J8703

FLIGHT	LINE	ANOMALY	CATEGORY	AMPLITUDE (PPM)		CONDUCTOR		BIRD
				INPHASE	QUAD.	CTP MHOS	DEPTH MTRS	HEIGHT MTRS
12	640	C	0	5.0	7.3	0.4	0	598
12	640	D	0	5.2	6.8	0.5	0	615
12	650	A	0	8.2	12.9	0.4	0	534

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, GEORGE PODOLSKY, certify that: -

1. I am registered as a Professional Engineer in the Province of Ontario and work as a Professional Geophysicist.
2. I reside at 172 Dunwoody Drive in the town of Oakville, Halton County, Ontario.
3. I hold a B. Sc. in Engineering Physics from Queen's University, having graduated in 1954.
4. I have been continuously engaged in both professional and managerial roles in the minerals industry in Canada and abroad for the past thirty two years.
5. I have been an active member of the Society of Exploration Geophysicists since 1960 and hold memberships on other professional societies involved in the minerals extraction and exploration industry.
6. The accompanying report was prepared from information published by government agencies, materials supplied by Lightning Creek Resources Ltd., and from a review of proprietary geophysical data compiled by Aerodat Ltd. in the course of producing this airborne survey. I have not visited the property.
7. I have no interest, direct or indirect, in the property described nor do I hold securities in Lightning Creek Resources Ltd.
8. I hereby consent to the use of this report in a Statement of Material Facts of the Company and for the preparation of a prospectus for submission to the British Columbia Securities Commission and/or other regulatory authorities.

Signed,

Oakville, Ontario

August 17, 1987



George Podolsky
George Podolsky, P. Eng.

GEOPOD ASSOCIATES INC.

any other causes which are beyond Aerodat's reasonable control.

- (d) Notwithstanding anything to the contrary herein expressly contained or implied Aerodat shall indemnify and save harmless Lightning from and against all losses, cost, damages and demands of any nature whatsoever which may be suffered by or brought against Lightning arising out of and attributable in any manner to any or all operations conducted by Aerodat pursuant to this Agreement.
- (e) It is agreed and understood that Aerodat is, while acting under this Agreement, an independent contractor and not acting as an agent or servant of Lightning, and any persons engaged by Aerodat to conduct operations pursuant to the Agreement shall be the employees of Aerodat and not of Lightning.
- (f) Aerodat carries comprehensive general liability insurance including non-owned automobile liability insurance of \$2,000,000 for bodily injury and property damage, and non-owned aircraft liability insurance with combined limit of liability of \$2,000,000 bodily injury and property damage, any one occurrence.
- (g) All information relating to the survey shall belong exclusively to Lightning and its assigns and Aerodat shall keep such information strictly confidential.

8. CHARGES:

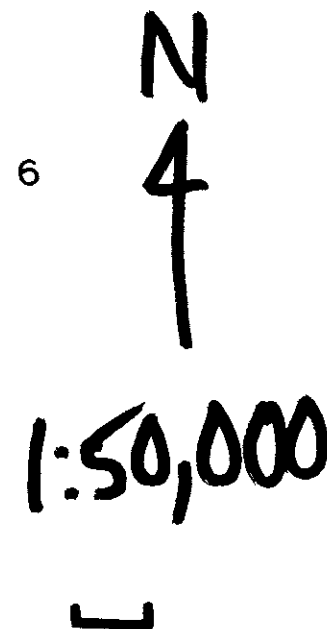
- a) Mobilization/Demobilization \$ 3,000.00
- b) Survey charges described above including mobilization/- demobilization, all helicopter charges and data presentation for approximately

400 kilometres @ \$75.00/line km. \$ 30,000.00

TOTAL \$ 33,000.00

Jc Feeze

(FOR PLACER SEE P 93A/13E)



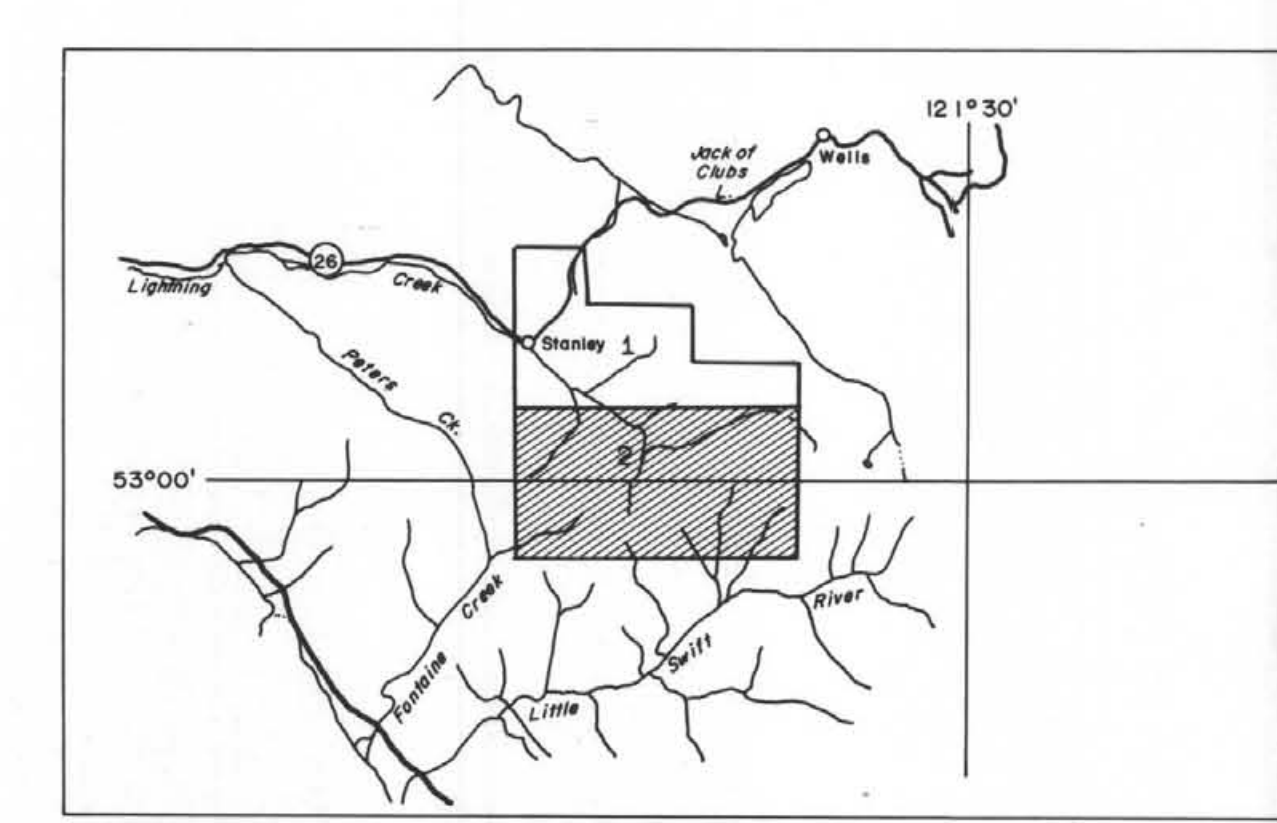
GEOLOGICAL BRANCH ASSESSMENT REPORT

16,315

A hand-drawn map of the T.R. 4951 area. The map shows a winding road or path. On the left side, there is a label 'Portin 6201' with a small sketch of a building. On the right side, there is a label 'TUNA 6200' with a small sketch of a building. The map is drawn on a grid background.



VLF-EM TOTAL FIELD CONTOURS
 VLF STATION: NAA (Cutler, Maine) 24.0 kHz
 MEAN VLF-EM SENSOR ELEVATION: 48 metres
 CONTOUR INTERVAL:
 50%
 10%
 2%
16,315



LIGHTNING CREEK RESOURCES LTD.	
VLF-EM TOTAL FIELD CONTOURS	
QUESNEL (15) BRITISH COLUMBIA	
SCALE 1/10,000 0 300 600 900 1200 0 100 200 300 400 500 1 Kilometre	
AERODAT LIMITED	DATE: February 1987
	N.T.S. No: 93 A/13, 93H/4
	MAP No: 7



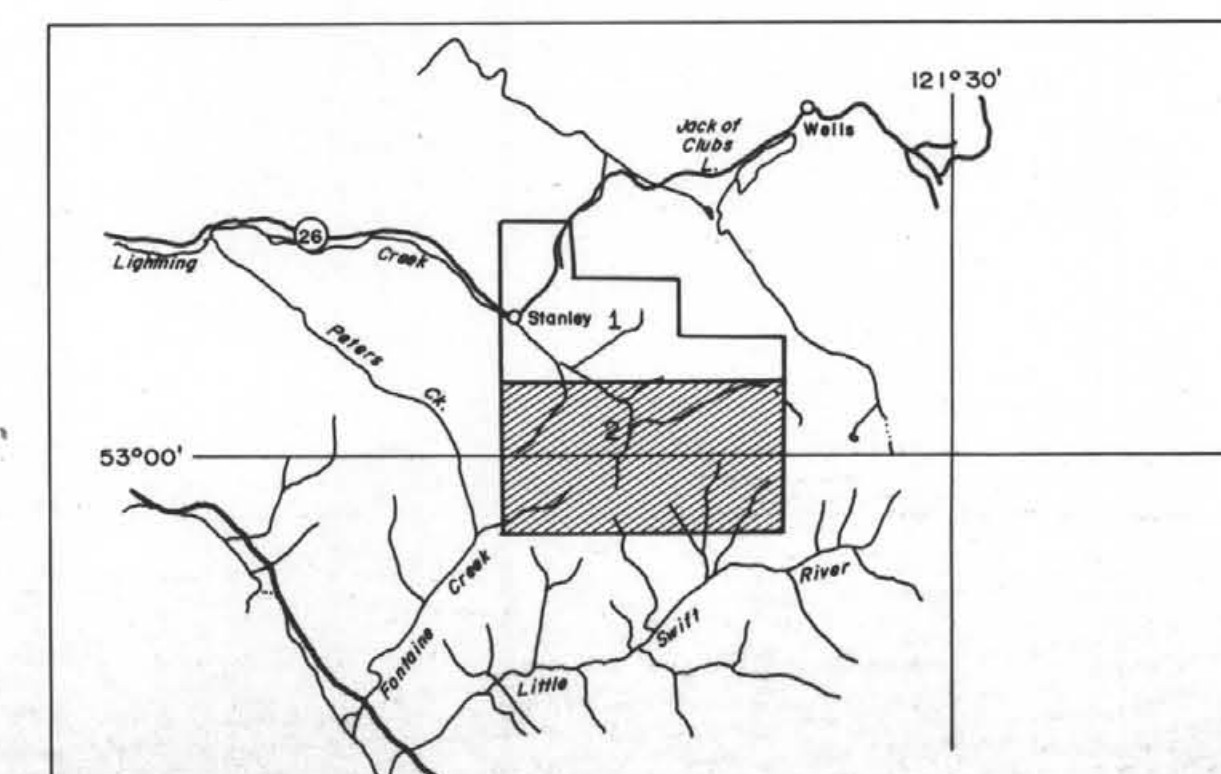
APPARENT RESISTIVITY CONTOURS

Calculated assuming 200 m conductive layer
(using 4000 Hz coaxial data)

— 10⁴ OHM-M
— 10³ OHM-M
— 10² OHM-M

N = 123.9
GEOLOGICAL BRANCH
ASSESSMENT REPORT

16,315



LIGHTNING CREEK RESOURCES LTD.

APPARENT RESISTIVITY CONTOURS

QUESNEL
BRITISH COLUMBIA

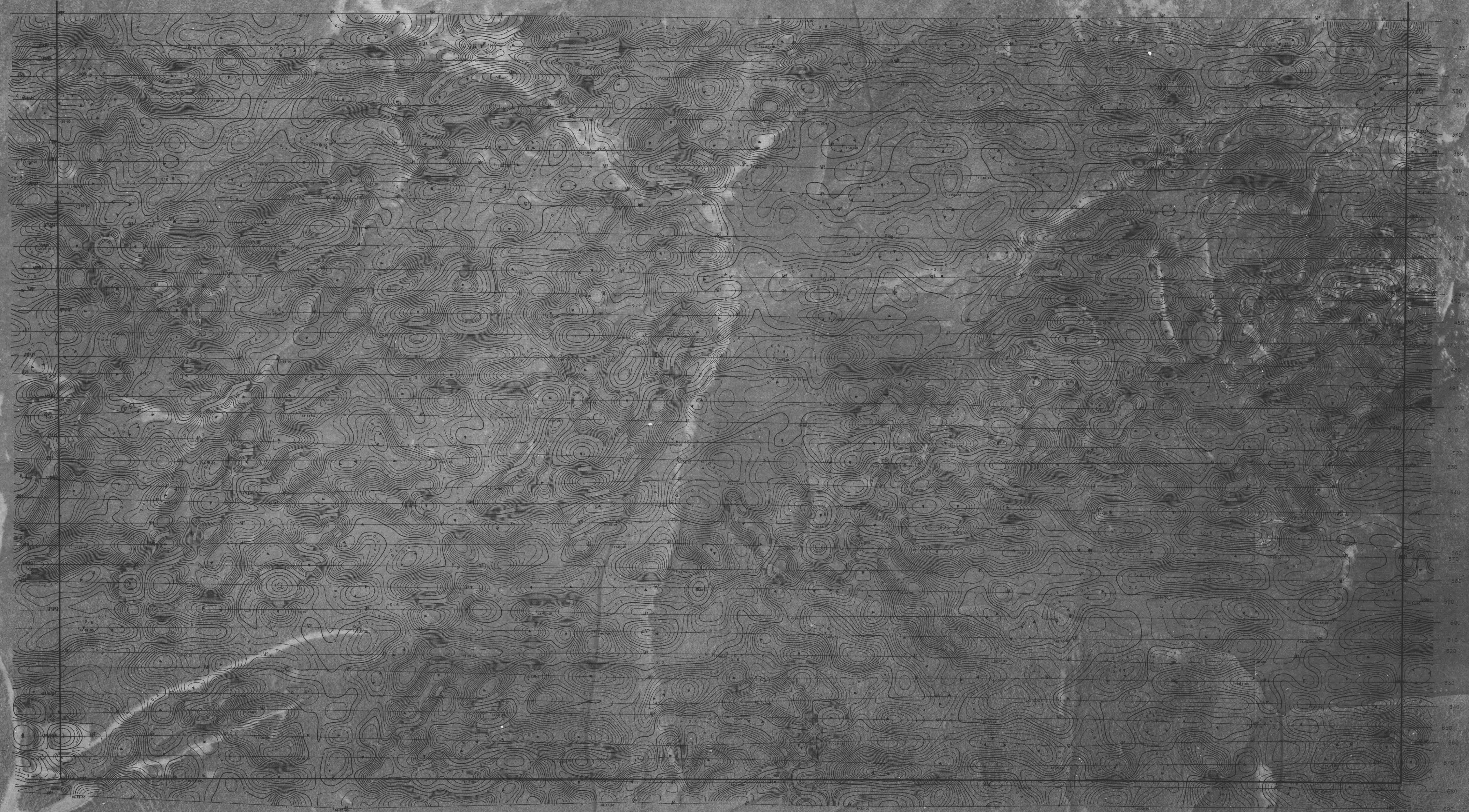
(14)

SCALE 1/10,000
0 300 600 900 1200
0 100 200 300 400 500 600 700 800 900 1000 1100 1200
1/2 mile
1 kilometre

AERODAT LIMITED

DATE: February 1987
N.T.S. No: 93A/13, 93H/4
MAP No: 6

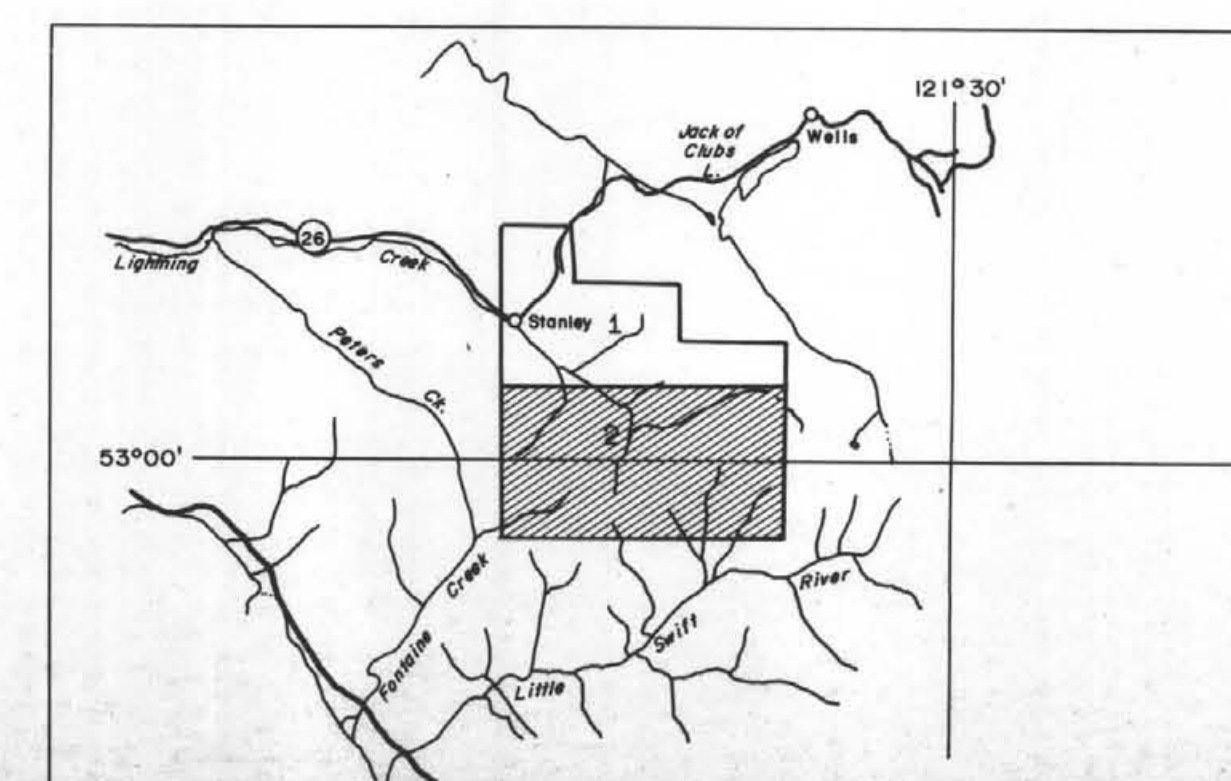
J 8703



VERTICAL MAGNETIC GRADIENT
(CALCULATED FROM TOTAL MAGNETIC FIELD)
CONTOUR INTERVAL:
5 gammas / metre
1 gamma / metre

GEOLOGICAL BRANCH
ASSESSMENT REPORT

16,315



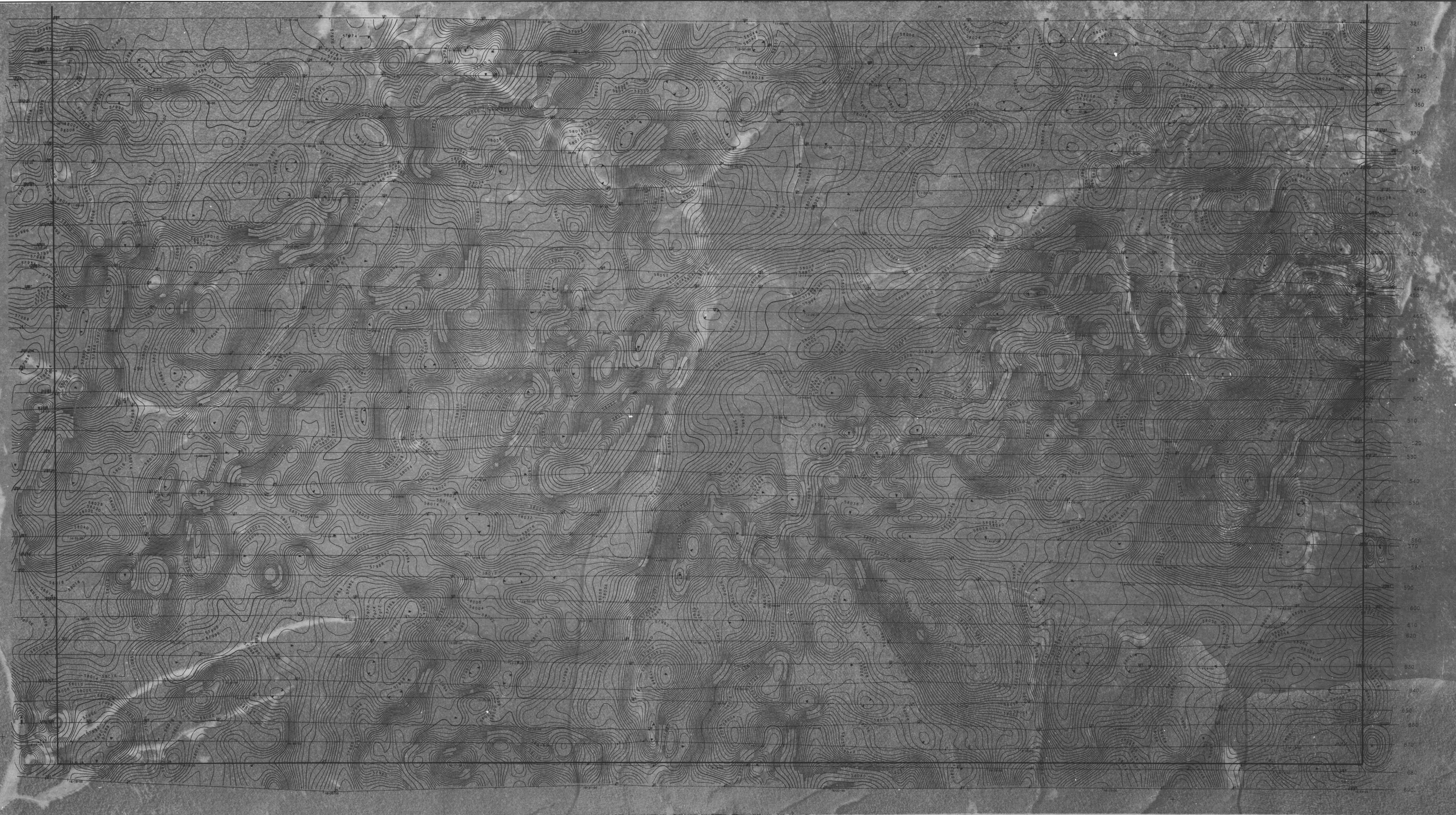
LIGHTNING CREEK RESOURCES LTD.

COMPUTED VERTICAL MAGNETIC
GRADIENT CONTOURS

QUESNEL
BRITISH COLUMBIA

13

SCALE 1/10,000
0 320 640 960 1280 1600 1920 2240 2560 2880 3200 3520 3840 4160 4480 4800 5120 5440 5760 6080 6400 6720 7040 7360 7680 8000 8320 8640 8960 9280 9600 9920 10240 10560 10880 11200 11520 11840 12160 12480 12800 13120 13440 13760 14080 14400 14720 15040 15360 15680 16000 16320 16640 16960 17280 17600 17920 18240 18560 18880 19200 19520 19840 20160 20480 20800 21120 21440 21760 22080 22400 22720 23040 23360 23680 24000 24320 24640 24960 25280 25600 25920 26240 26560 26880 27200 27520 27840 28160 28480 28800 29120 29440 29760 30080 30400 30720 31040 31360 31680 32000 32320 32640 32960 33280 33600 33920 34240 34560 34880 35200 35520 35840 36160 36480 36800 37120 37440 37760 38080 38400 38720 39040 39360 39680 40000 40320 40640 40960 41280 41600 41920 42240 42560 42880 43200 43520 43840 44160 44480 44800 45120 45440 45760 46080 46400 46720 47040 47360 47680 48000 48320 48640 48960 49280 49600 49920 50240 50560 50880 51200 51520 51840 52160 52480 52800 53120 53440 53760 54080 54400 54720 55040 55360 55680 56000 56320 56640 56960 57280 57600 57920 58240 58560 58880 59200 59520 59840 60160 60480 60800 61120 61440 61760 62080 62400 62720 63040 63360 63680 64000 64320 64640 64960 65280 65600 65920 66240 66560 66880 67200 67520 67840 68160 68480 68800 69120 69440 69760 70080 70400 70720 71040 71360 71680 72000 72320 72640 72960 73280 73600 73920 74240 74560 74880 75200 75520 75840 76160 76480 76800 77120 77440 77760 78080 78400 78720 79040 79360 79680 80000 80320 80640 80960 81280 81600 81920 82240 82560 82880 83200 83520 83840 84160 84480 84800 85120 85440 85760 86080 86400 86720 87040 87360 87680 88000 88320 88640 88960 89280 89600 89920 90240 90560 90880 91200 91520 91840 92160 92480 92800 93120 93440 93760 94080 94400 94720 95040 95360 95680 96000 96320 96640 96960 97280 97600 97920 98240 98560 98880 99200 99520 99840 100160 100480 100800 101120 101440 101760 102080 102400 102720 103040 103360 103680 104000 104320 104640 104960 105280 105600 105920 106240 106560 106880 107200 107520 107840 108160 108480 108800 109120 109440 109760 110080 110400 110720 111040 111360 111680 112000 112320 112640 112960 113280 113600 113920 114240 114560 114880 115200 115520 115840 116160 116480 116800 117120 117440 117760 118080 118400 118720 119040 119360 119680 120000 120320 120640 120960 121280 121600 121920 122240 122560 122880 123200 123520 123840 124160 124480 124800 125120 125440 125760 126080 126400 126720 127040 127360 127680 128000 128320 128640 128960 129280 129600 129920 130240 130560 130880 131200 131520 131840 132160 132480 132800 133120 133440 133760 134080 134400 134720 135040 135360 135680 136000 136320 136640 136960 137280 137600 137920 138240 138560 138880 139200 139520 139840 140160 140480 140800 141120 141440 141760 142080 142400 142720 143040 143360 143680 144000 144320 144640 144960 145280 145600 145920 146240 146560 146880 147200 147520 147840 148160 148480 148800 149120 149440 149760 150080 150400 150720 151040 151360 151680 152000 152320 152640 152960 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199040 199360 199680 200000 200320 200640 200960 201280 201600 201920 202240 202560 202880 203200 203520 203840 204160 204480 204800 205120 205440 205760 206080 206400 206720 207040 207360 207680 208000 208320 208640 208960 209280 209600 209920 210240 210560 210880 211200 211520 211840 212160 212480 212800 213120 213440 213760 214080 214400 214720 215040 215360 215680 216000 216320 216640 216960 217280 217600 217920 218240 218560 218880 219200 219520 219840 220160 220480 220800 221120 221440 221760 222080 222400 222720 223040 223360 223680 224000 224320 224640 224960 225280 225600 225920 226240 226560 226880 227200 227520 227840 228160 228480 228800 229120 229440 229760 230080 230400 230720 231040 231360 231680 232000 232320 232640 232960 233280 233600 233920 234240 234560 234880 235200 235520 235840 236160 236480 236800 237120 237440 237760 238080 238400 238720 239040 239360 239680 240000 240320 240640 240960 241280 241600 241920 242240 242560 242880 243200 243520 243840 244160 244480 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290560 290880 291200 291520 291840 292160 292480 292800 293120 293440 293760 294080 294400 294720 295040 295360 295680 296000 296320 296640 296960 297280 297600 297920 298240 298560 298880 299200 299520 299840 300160 300480 300800 301120 301440 301760 302080 302400 302720 303040 303360 303680 304000 304320 304640 304960 305280 305600 305920 306240 306560 306880 307200 307520 307840 308160 308480 308800 309120 309440 309760 310080 310400 310720 311040 311360 311680 312000 312320 312640 312960 313280 313600 313920 314240 314560 314880 315200 315520 315840 316160 316480 316800 317120 317440 317760 318080 318400 318720 319040 319360 319680 320000 320320 320640 320960 321280 321600 321920 322240 322560 322880 323200 323520 323840 324160 324480 324800 325120 325440 325760 326080 326400 326720 327040 327360 327680 328000 328320 328640 328960 329280 329600 329920 330240 330560 330880 331200 331520 331840 332160 332480 332800 333120 333440 333760 334080 334400 334720 335040 335360 335680 336000 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427840 428160 428480 428800 429120 429440 429760 430080 430400 430720 431040 431360 431680 432000 432320 432640 432960 433280 433600 433920 434240 434560 434880 435200 435520 435840 436160 436480 436800 437120 437440 437760 438080 438400 438720 439040 439360 439680 440000 440320 440640 440960 441280 441600 441920 442240 442560 442880 443200 443520 443840 444160 444480 444800 445120 445440 445760 446080 446400 446720 447040 447360 447680 448000 448320 448640 448960 449280 449600 449920 450240 450560 450880 451200 451520 451840 452160 452480 452800 453120 453440 453760 454080 454400 454720 455040 455360 455680 456000 456320 456640 456960 457280 457600 457920 458240 458560 458880 459200 459520 459840 460160 460480 460800 461120 461440 461760 462080 462400 462720 463040 463360 463680 464000 464320 464640 464960 465280 465600 465920 466240 466560 466880 467200 467520 467840 468160 468480 468800 469120 469440 469760 470080 470400 470720 471040 471360 471680 472000 472320 472640 472960 473280 473600 473920 474240 474560 474880 475200 475520 475840 476160 476480 476800 477120 477440 477760 478080 478400 478720 479040 479360 479680 480000 480320 480640 480960 481280 481600 481920 482240 482560 482880 483200 483520 483840 484160 484480 484800 485120 485440 485760 486080 486400 486720 487040 487360 487680 488000 488320 488640 488960 489280 489600 489920 490240 490560 490880 491200 491520 491840 492160 492480 492800 493120 493440 493760 494080 494400 494720 495040 495360 495680 496000 496320 496640 496960 497280 497600 497920 498240 498560 498880 499200 499520 499840 500160 500480 500800 501120 501440 501760 502080 502400 502720 503040 503360 503680 504000 504320 504640 504960 505280 505600 505920 506240 506560 506880 507200 507520 507840 508160 508480 508800 509120 509440 509760 510080 510400 510720 511040 511360 511680 512000 512320 512640 512960 513280 513600 513920 514240 514560 514880 515200 515520 515840 516160 516480 516800 517120 517440 517760 518080 518400 518720 519040 519360 519680 520000 520320 520640 520960 521280 521600 521920 522240 522560 522880 523200 523520 523840 524160 524480 524800 525120 525440 525760 526080 526400 526720 527040 527360 527680 528000 528320 528640 528960 529280 529600 529920 530240 530560 530880 531200 531520 531840 532160 532480 532800 533120 533440 533760 534080 534400 534720 535040 535360 535680 536000 536320 536640 536960 537280 537600 537920 538240 538560 538880 539200 539520 539840 540160 540480 540800 541120 541440 541760 542080 542400 542720 543040 543360 543680 544000 544320 544640 544960 545280 545600 545920 546240 546560 546880 547200 547520 547840 548160 548480 548800 549120 549440 549760 550080 550400 550720 551040 551360 551680 552000 552320 552640 552960 553280 553600

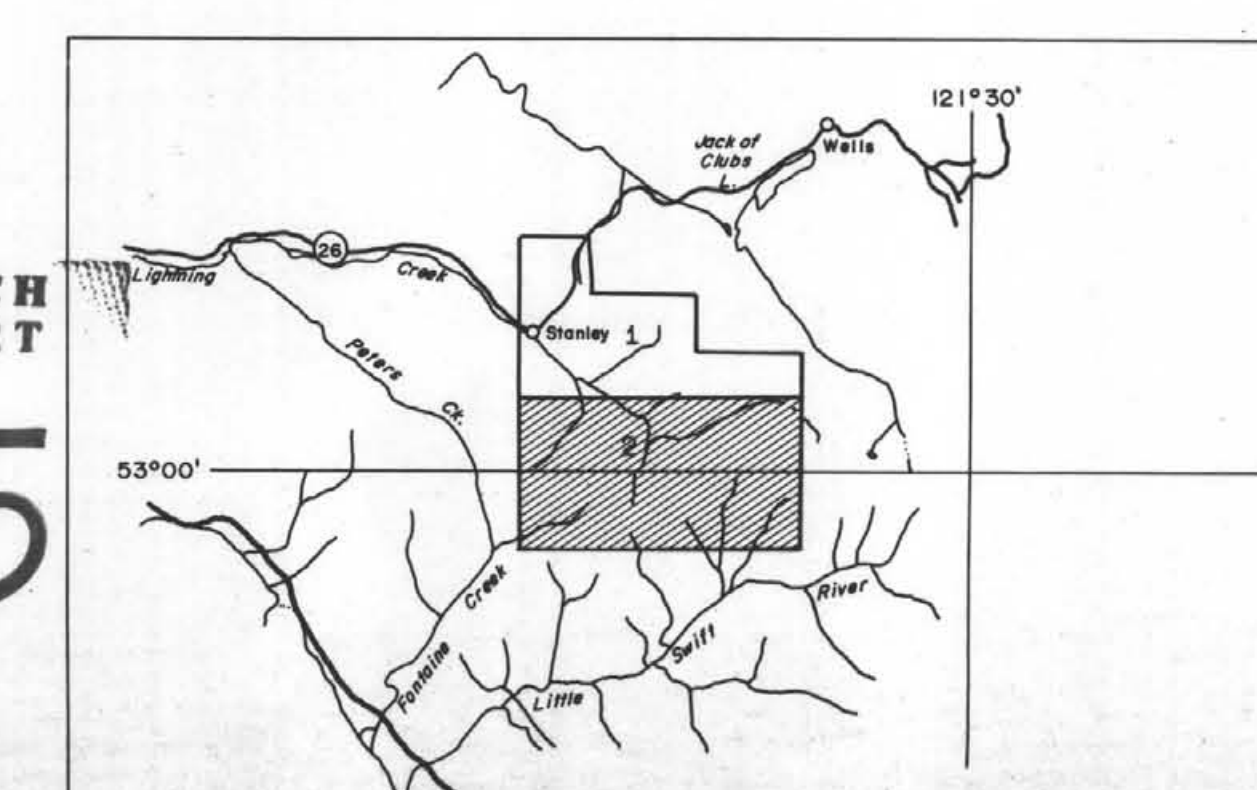


GEOLOGICAL BRANCH
TOTAL FIELD MAGNETIC CONTOUR ASSESSMENT REPORT

MEAN MAGNETOMETER
 SENSOR ELEVATION: 48 metres
 CONTOUR INTERVAL: 2 gammas

100 gammas.....
 10 gammas.....
 2 gammas.....

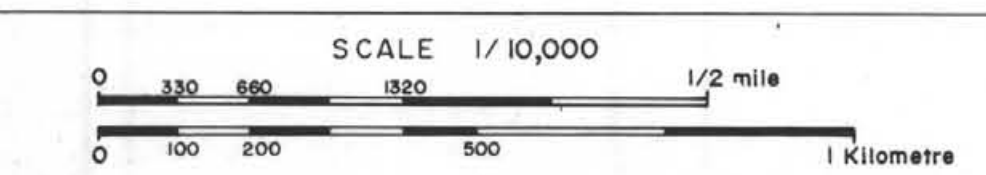
16,315



LIGHTNING CREEK RESOURCES LTD.

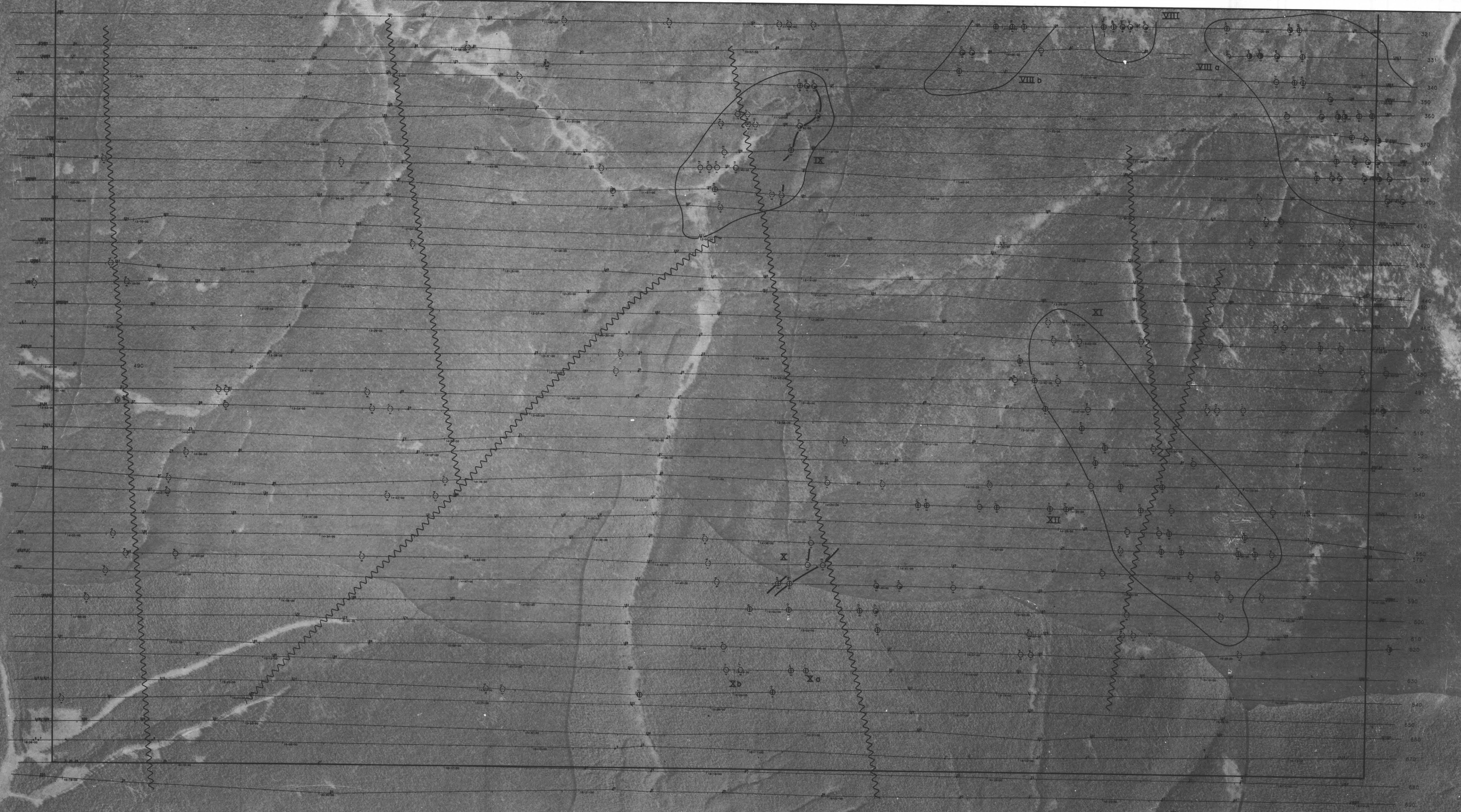
TOTAL FIELD MAGNETIC CONTOURS

QUESNEL
 BRITISH COLUMBIA



AERODAT LIMITED

DATE: February 1987
 N.T.S. No: 93A/13, 93H/4
 MAP No: 4



GEOLOGICAL BRANCH
ASSESSMENT REPORT

16,315

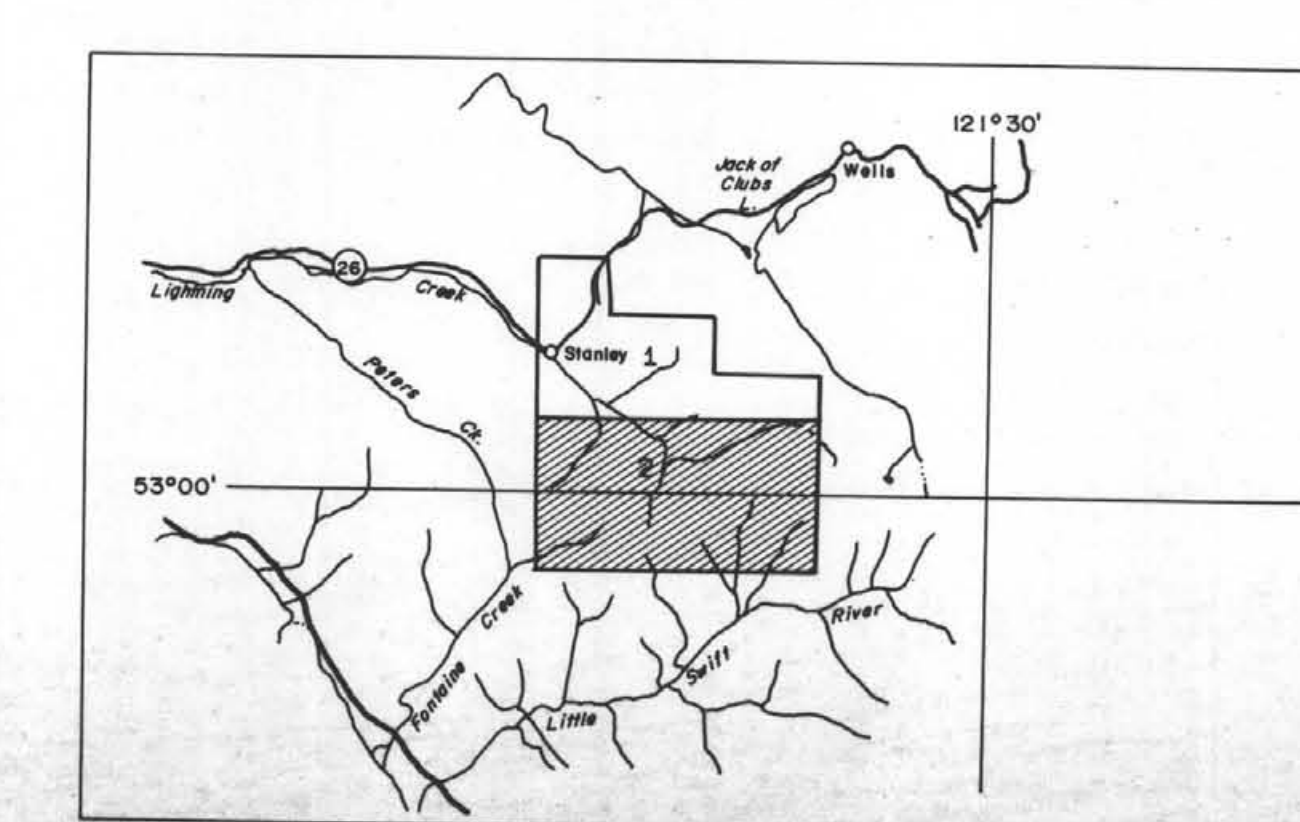
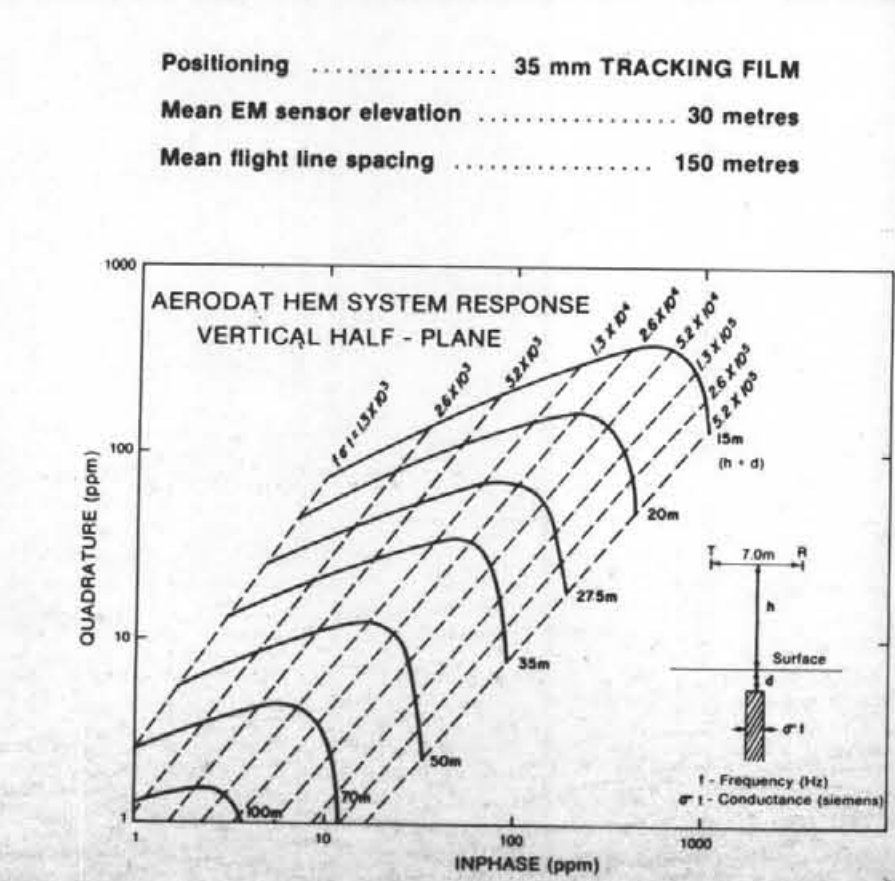
INTERPRETATION LEGEND

- EM Anomaly A: in-phase amplitude 7 ppm
- Conductive Zone
- Possible bedrock conductor axis
- Fault

EM RESPONSE

Conductivity thickness in mhos

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



LIGHTNING CREEK RESOURCES LTD.

**ELECTROMAGNETIC SURVEY
INTERPRETATION**

QUESNEL

BRITISH COLUMBIA

SCALE 1/10,000

0 200 400 600 800 1000

0 100 200 300 400 500

1/2 mile

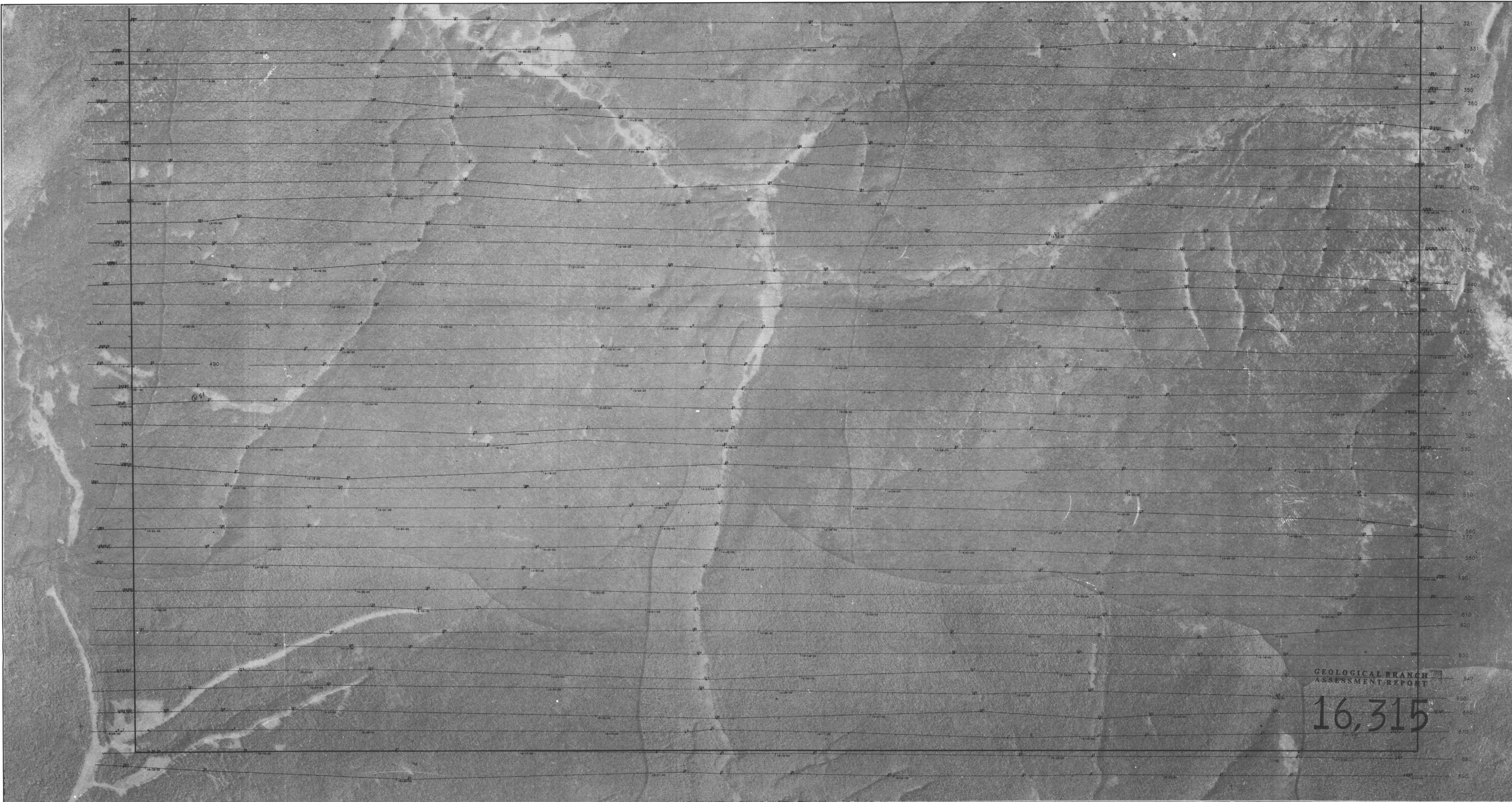
1 Kilometre

DATE: February 1987

N.T.S. No: 93A/13, 93H/4

MAP No: 3

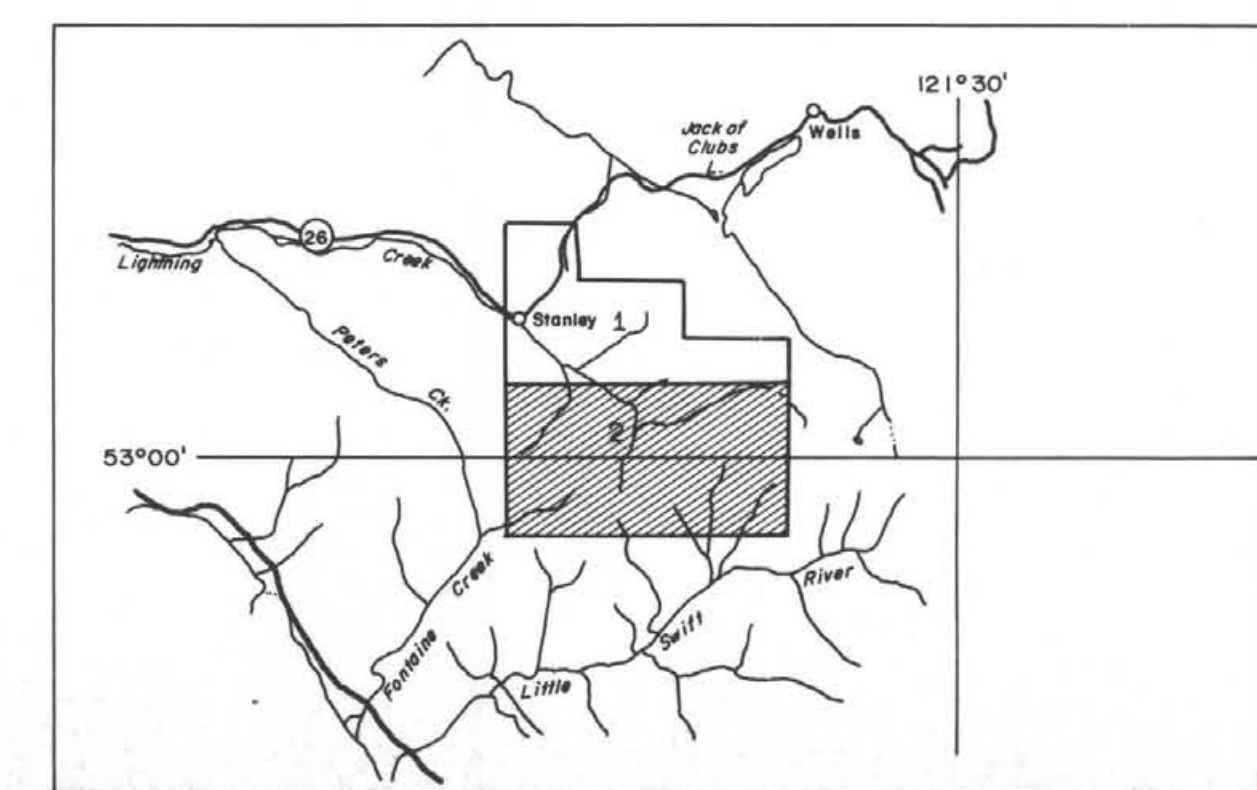
J8703



GEOLOGICAL BRANCH
ASSESSMENT REPORT

16,315

Positioning 35 mm TRACKING FILM
Mean flight line spacing 150 metres



LIGHTNING CREEK RESOURCES LTD.

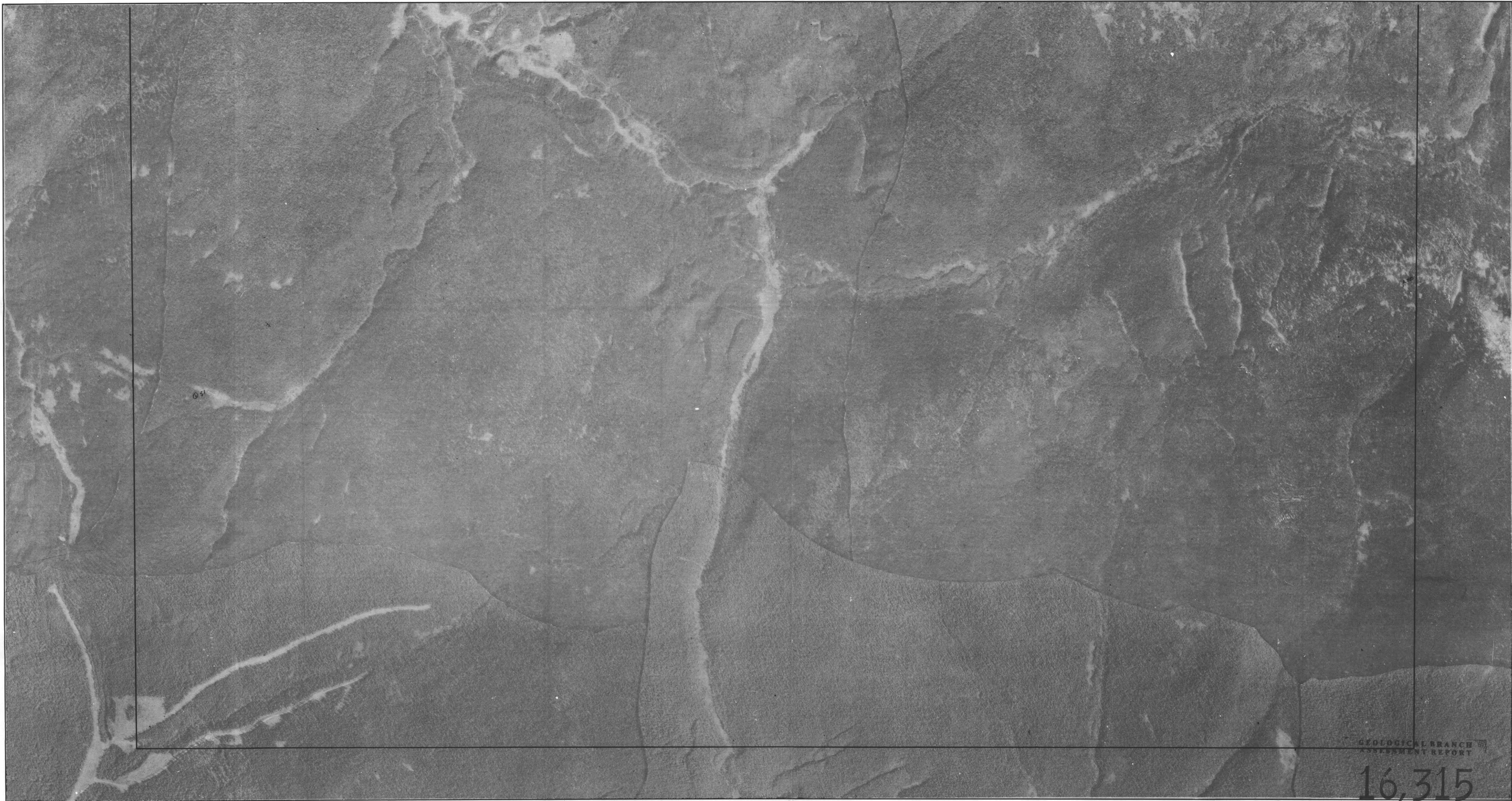
ELECTROMAGNETIC SURVEY
FLIGHT PATH

QUESNEL
BRITISH COLUMBIA

SCALE 1/10,000
0 300 600 900 1200
0 100 200 300 400 500 600 700 800 900 1000 1100 1200
Kilometres

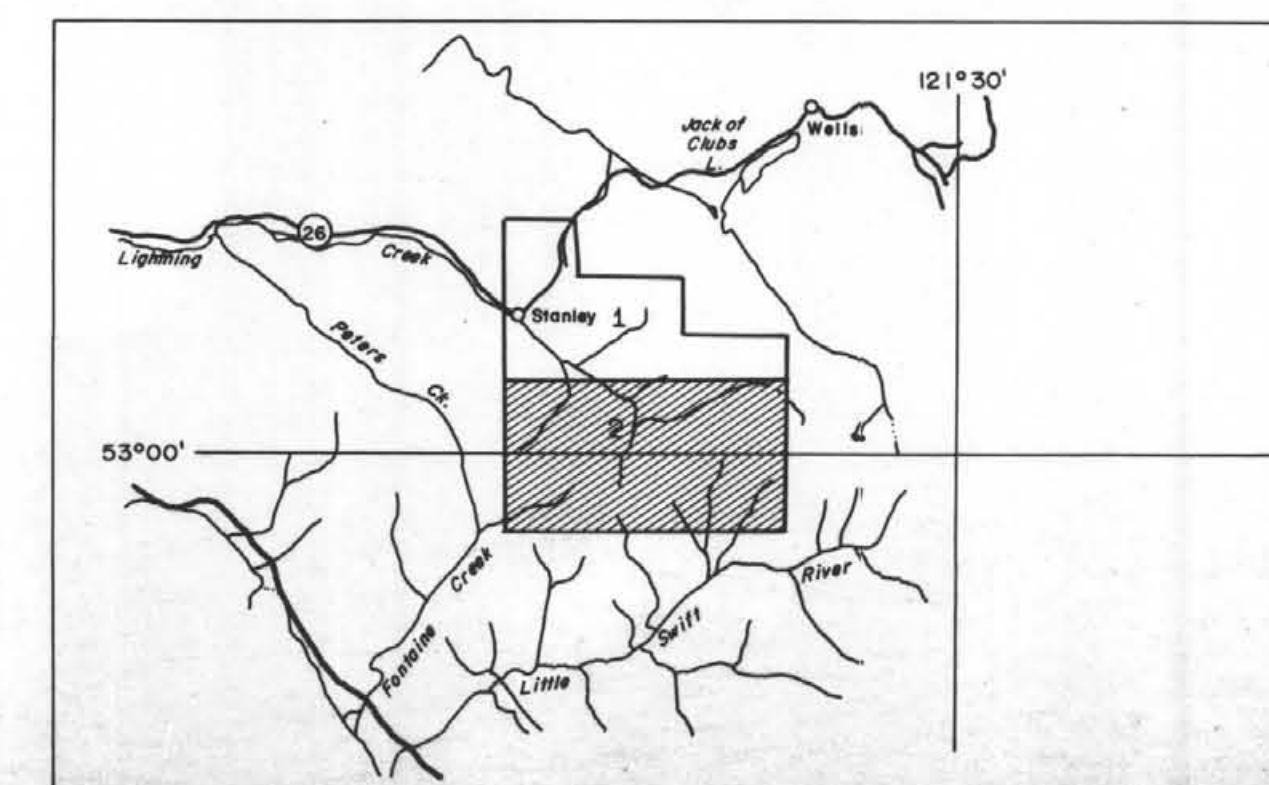
AERODAT LIMITED

DATE: February 1987
N.T.S. No: 93A/13, 93H/4
MAP No: 2



GEOLOGICAL BRANCH
ASSESSMENT REPORT

16,315



LIGHTNING CREEK RESOURCES LTD.

BASE MAP

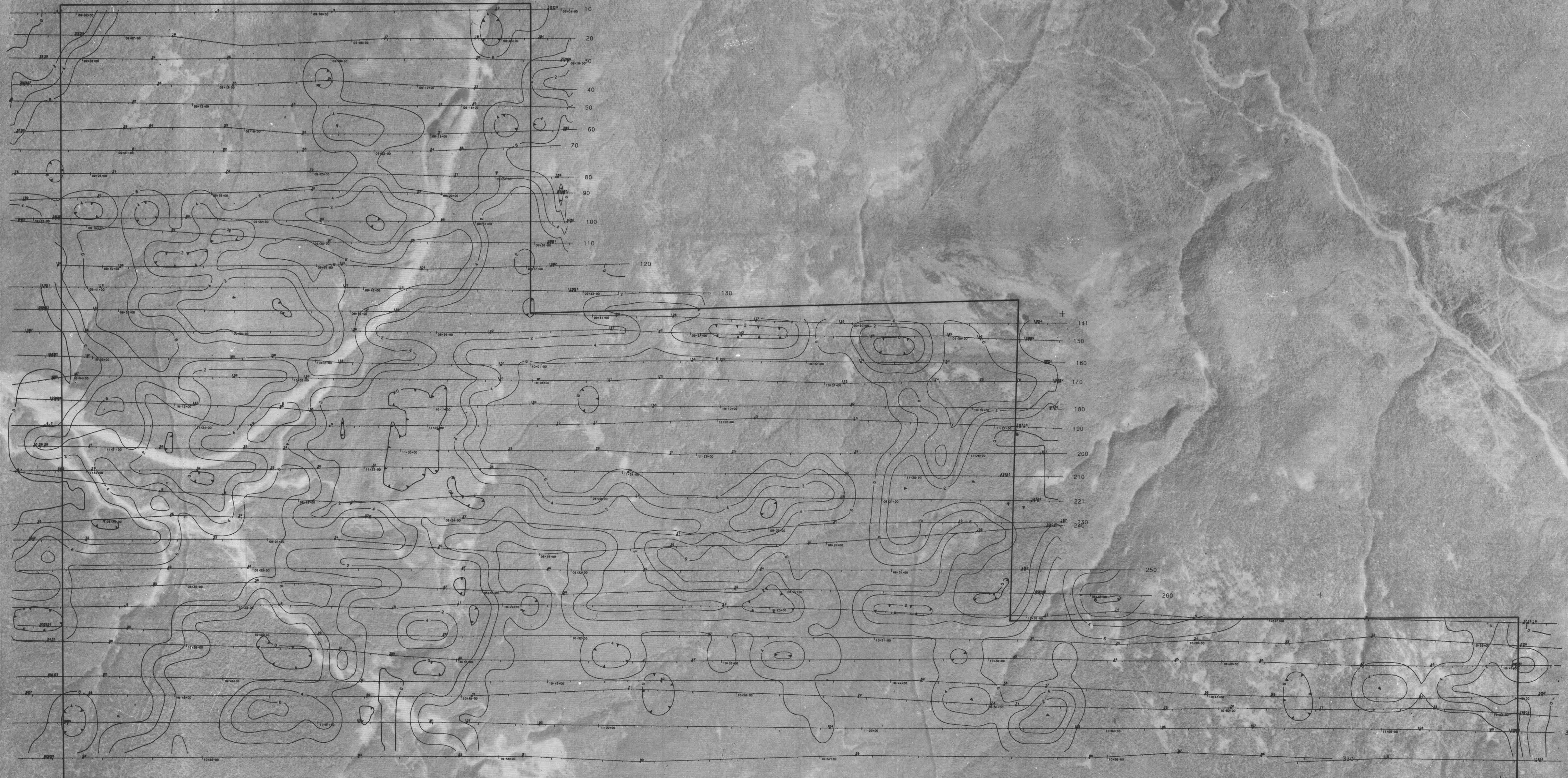
QUESNEL
BRITISH COLUMBIA

SCALE 1/10,000
0 320 640 960 1280
0 100 200 300 400 500 600 700 800 900 1000 1100 1200 1300 1400 1500 1600 1700 1800 1900 2000
1/2 mile
1 Kilometre

AERODAT LIMITED

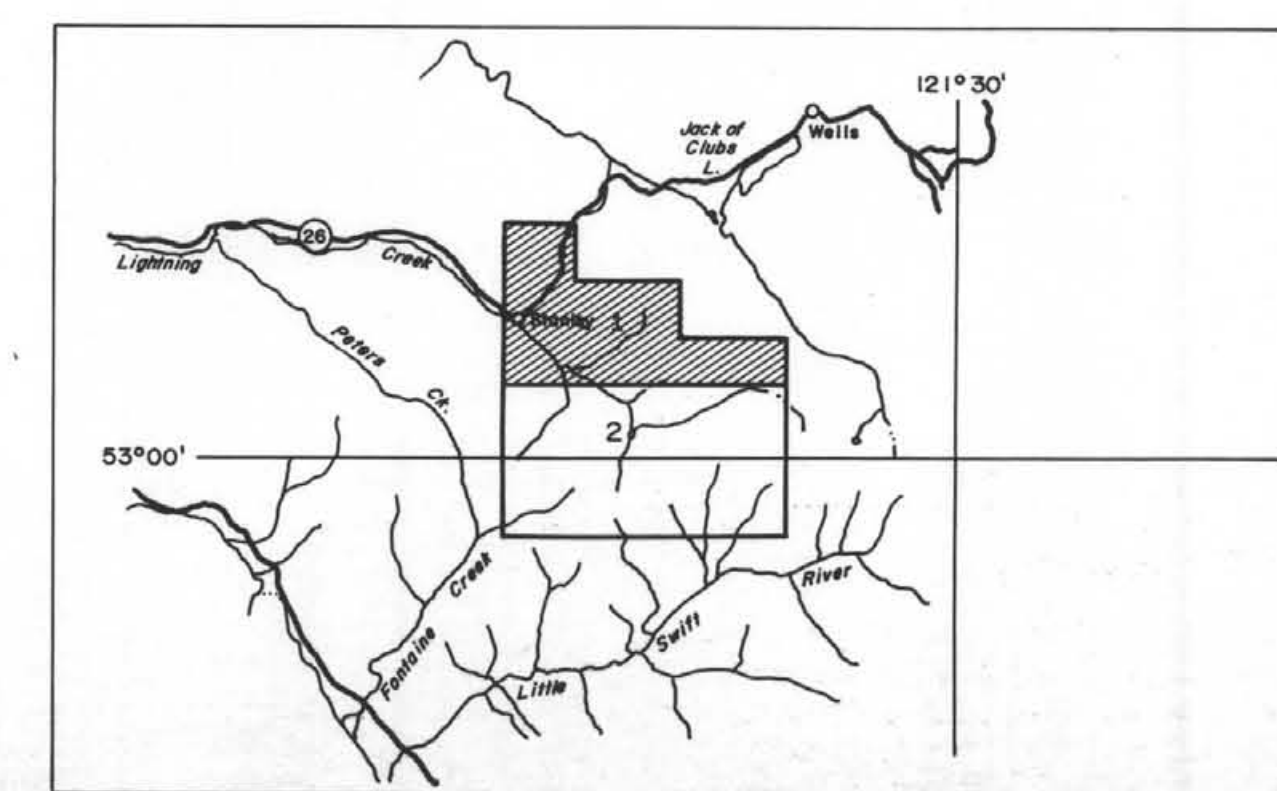
DATE: February 1967
N.T.S. No: 93A/13, 93H/4
MAP No: 1

J8703

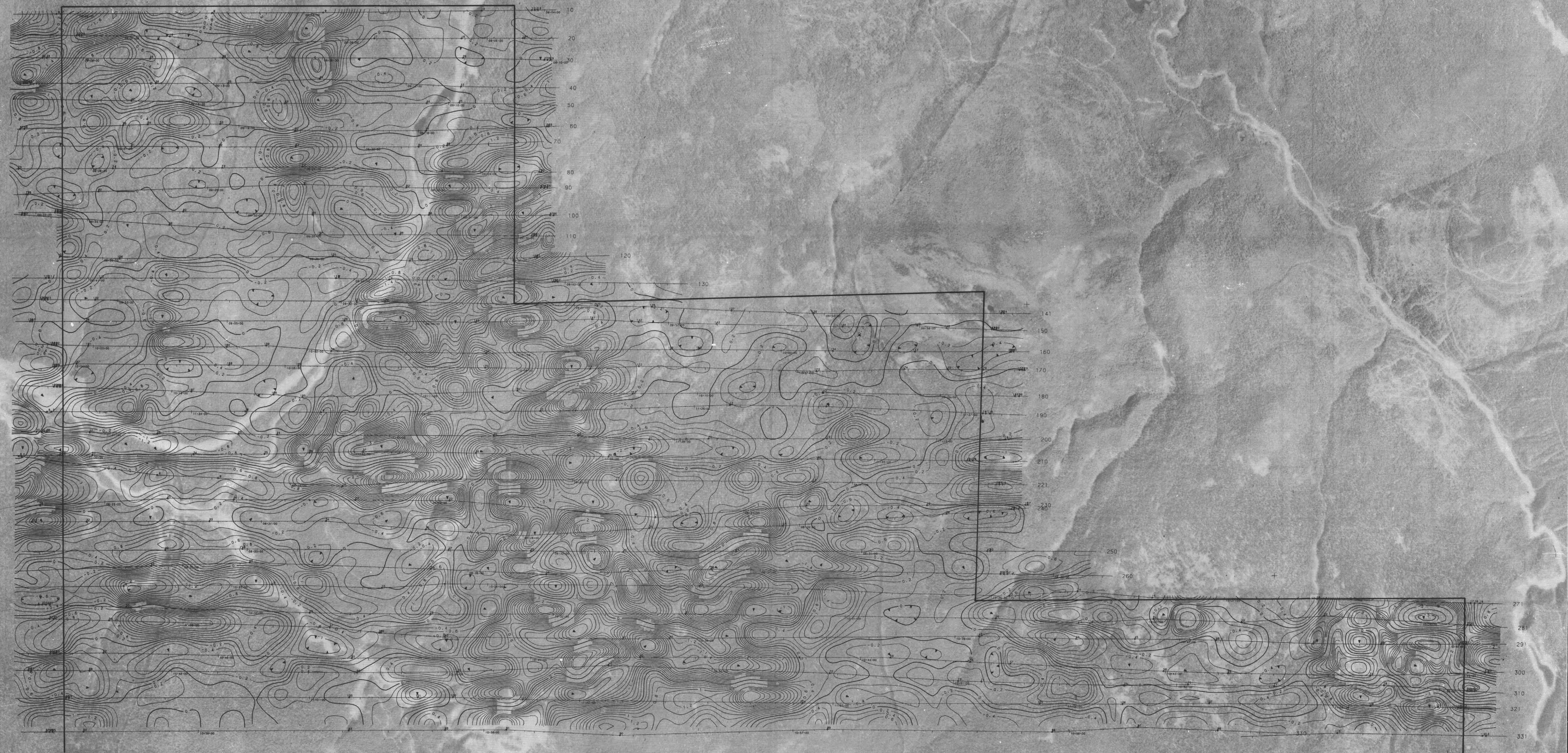


GEOLOGICAL BRANCH
 ASSESSMENT REPORT
16,315

COMPUTED OVERBURDEN THICKNESS
 Contour interval - 2 metres
 50 metres
 10 metres
 2 metres



LIGHTNING CREEK RESOURCES LTD.	
COMPUTED OVERBURDEN THICKNESS	
QUESNEL BRITISH COLUMBIA	
SCALE 1/10,000 0 300 600 900 1200 0 100 200 300 400 500 1/2 mile 1 Kilometre	
DATE: February 1987	N.T.S. No: 93A/13, 93H/4
AERODAT LIMITED	MAP No: 8

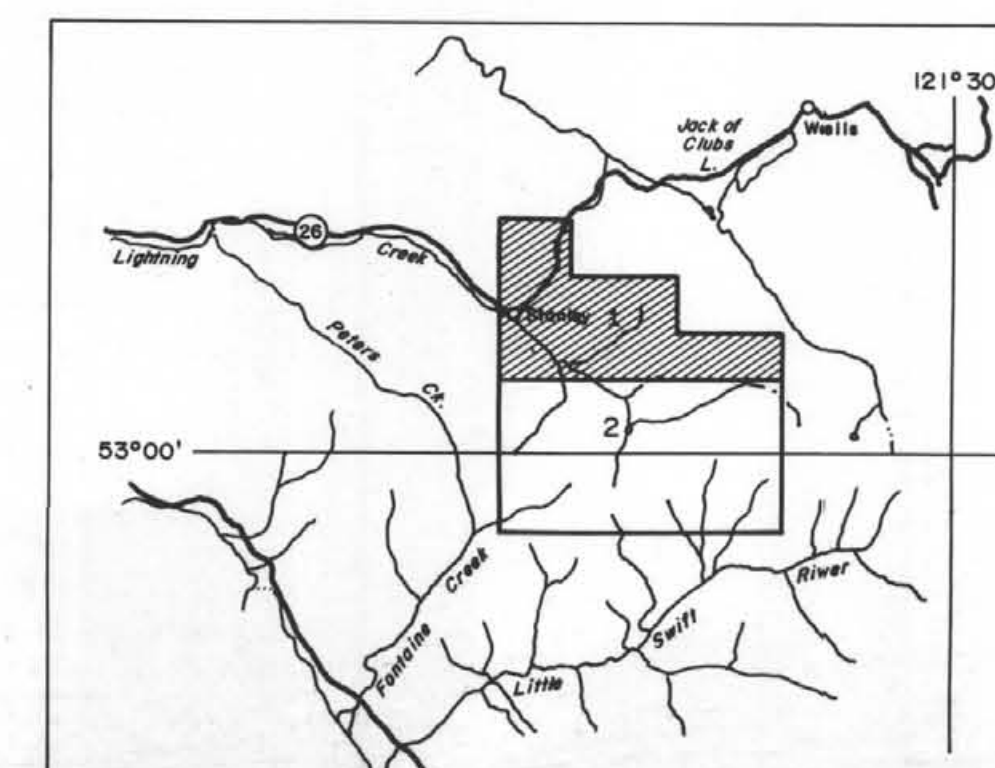


**GEOLOGICAL BRANCH
ASSESSMENT REPORT**

VERTICAL MAGNETIC GRADIENT
(CALCULATED FROM TOTAL MAGNETIC FIELD)
CONTOUR INTERVAL:

- 5 gammas / metre
- 1 gammas / metre
- 2 gammas / metre

16,315



LIGHTNING CREEK RESOURCES LTD.

**COMPUTED VERTICAL MAGNETIC
GRADIENT CONTOURS**

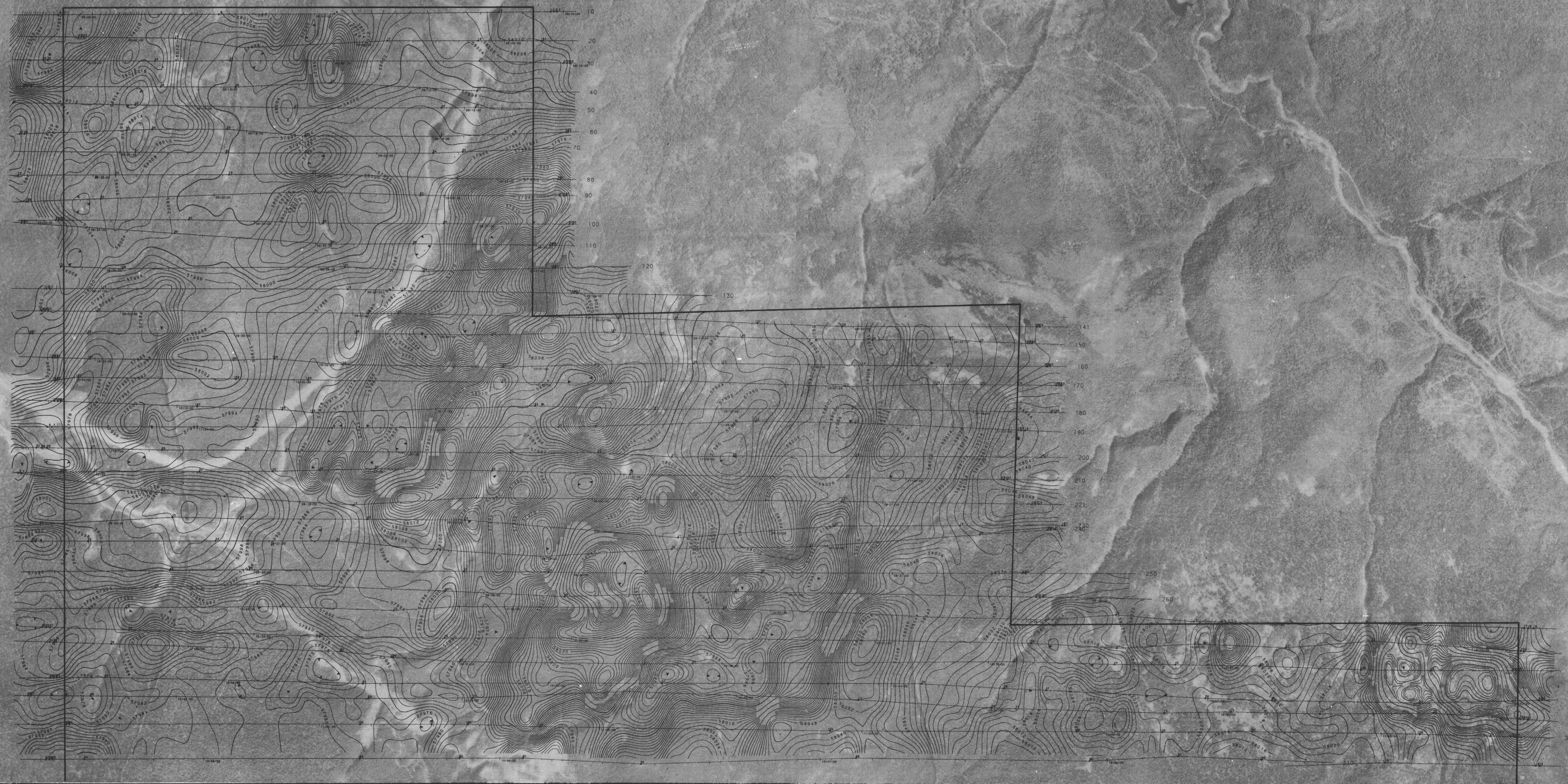
QUESNEL
BRITISH COLUMBIA

⑤

SCALE 1/10,000
0 320 640 960 1280
0 100 200 300 400
1/2 mile
1 Kilometre

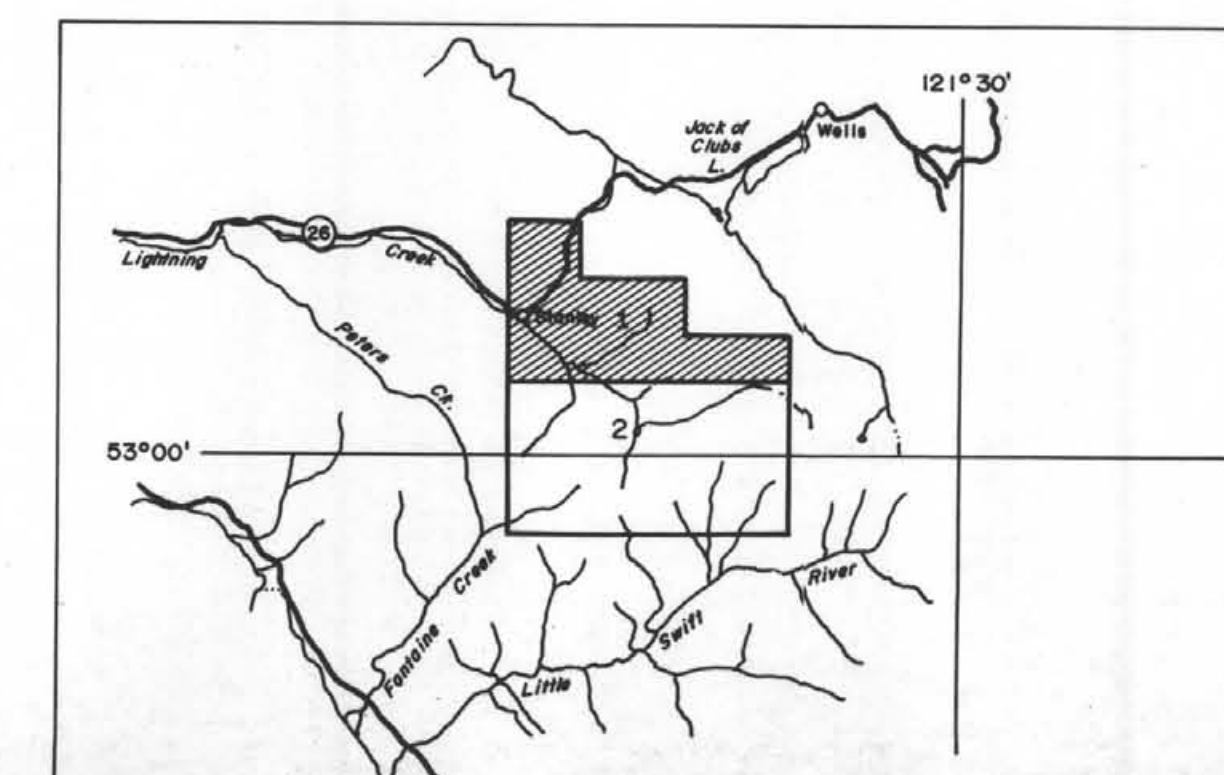
AERODAT LIMITED

DATE: February 1987
N.T.S. No: 93A/13, 93H/4
MAP No: 5



GEOLOGICAL BRANCH
ASSESSMENT REPORT
16,315

TOTAL FIELD MAGNETIC CONTOURS
MEAN MAGNETOMETER
SENSOR ELEVATION: 46 metres
CONTOUR INTERVAL: 2 gammas
100 gammas.....
10 gammas.....
2 gammas.....



LIGHTNING CREEK RESOURCES LTD.

TOTAL FIELD MAGNETIC CONTOURS

QUESNEL
BRITISH COLUMBIA

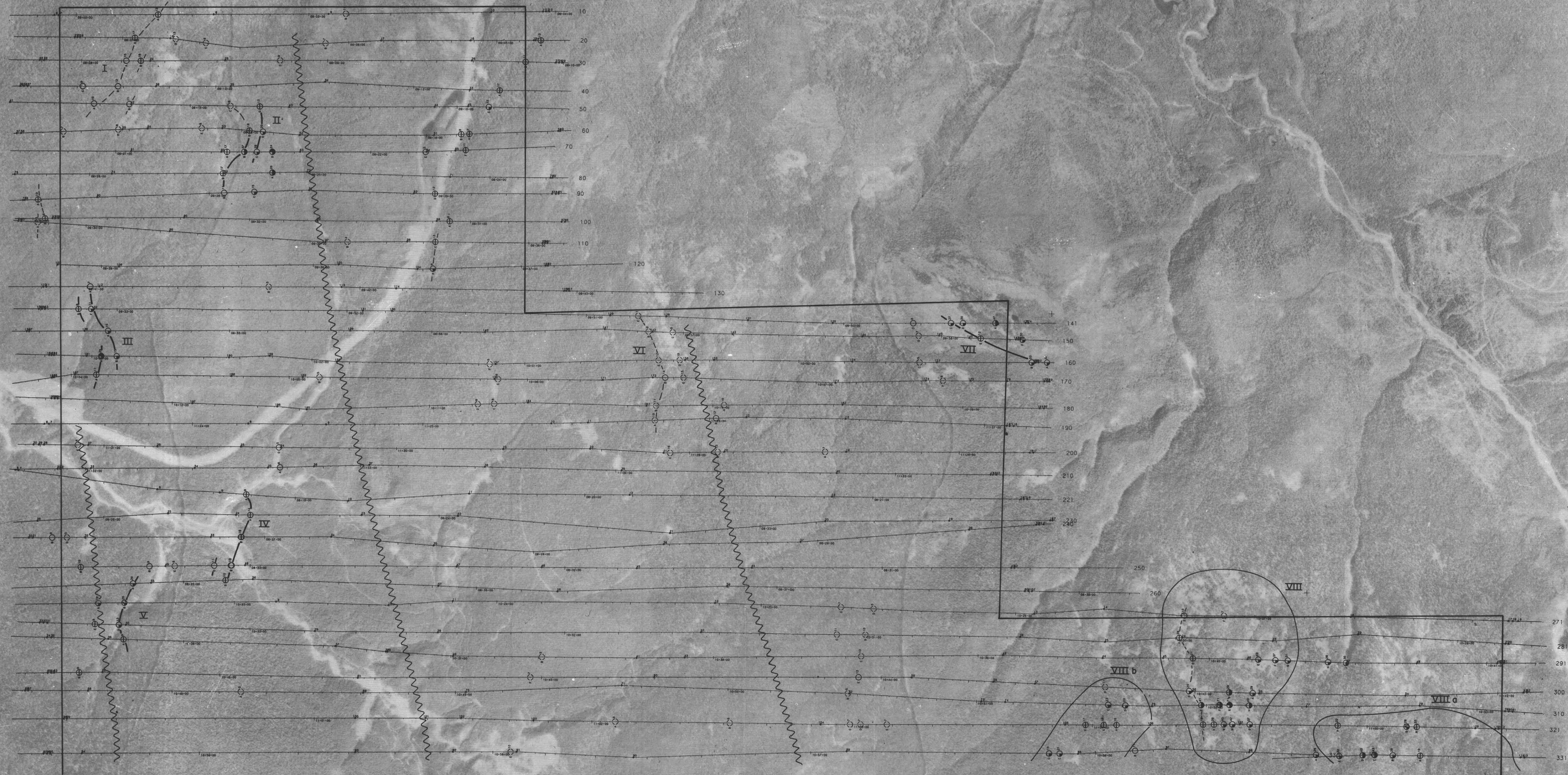
SCALE 1/10,000
0 100 200 300 400 500 600 700 800 900 1000
0 100 200 300 400 500 600 700 800 900 1000
1 Kilometre

AERODAT LIMITED

DATE: February 1987
N.T.S. No: 93A/13, 93H/4
MAP No: 4

GEOLOGICAL BRANCH
ASSESSMENT REPORT

16,315



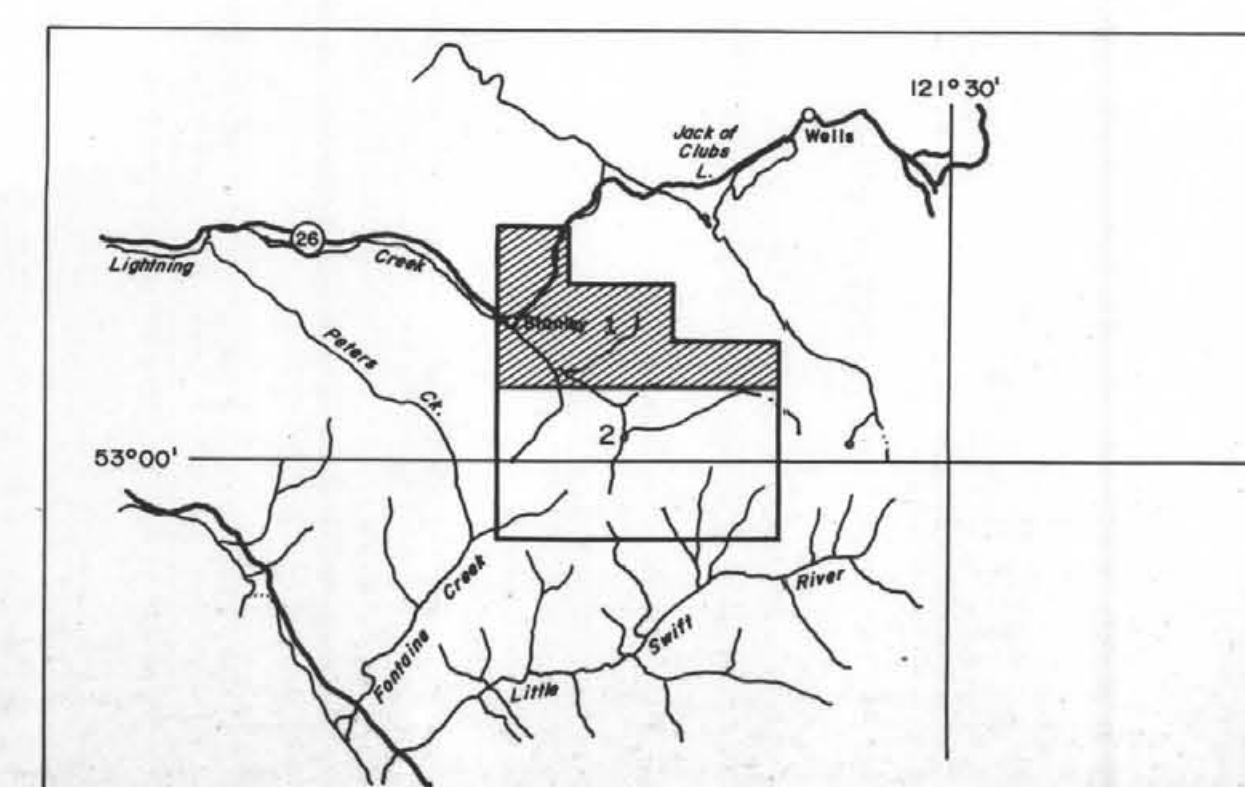
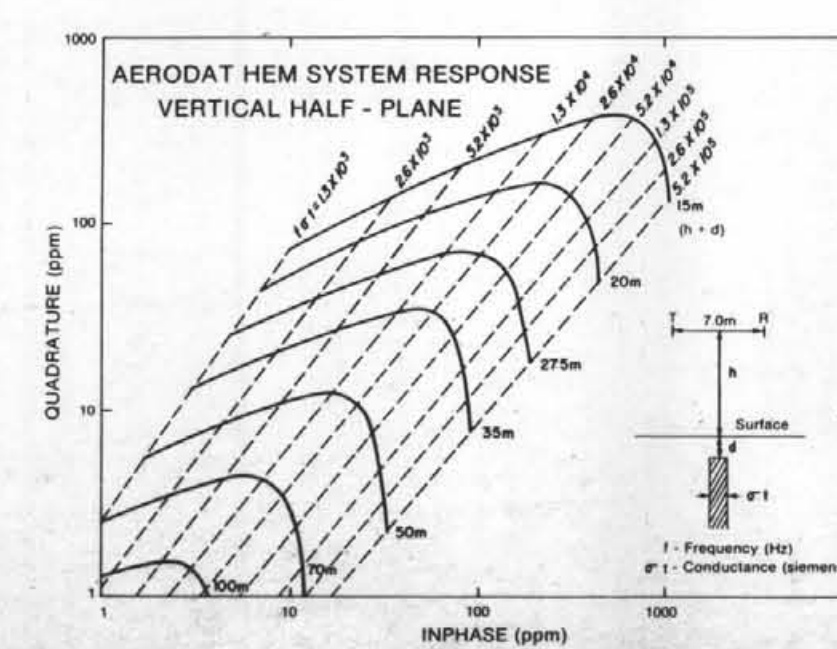
INTERPRETATION LEGEND

- EM Anomaly A, in-phase amplitude 7 ppm
- Conductivity thickness of 2 mhos (See code)
- Interpreted bedrock conductor axis
- Conductive Zone
- Possible bedrock conductor axis
- ~~~~~ Fault

EM RESPONSE

- Conductivity thickness in mhos
- 30 -
- 15 - 30
- 8 - 15
- 4 - 8
- 2 - 4
- 1 - 2
- 0 - 1

Positioning 35 mm TRACKING FILM
Mean EM sensor elevation 30 metres
Mean flight line spacing 150 metres



LIGHTNING CREEK RESOURCES LTD.

ELECTROMAGNETIC SURVEY
INTERPRETATION

QUESNEL
BRITISH COLUMBIA

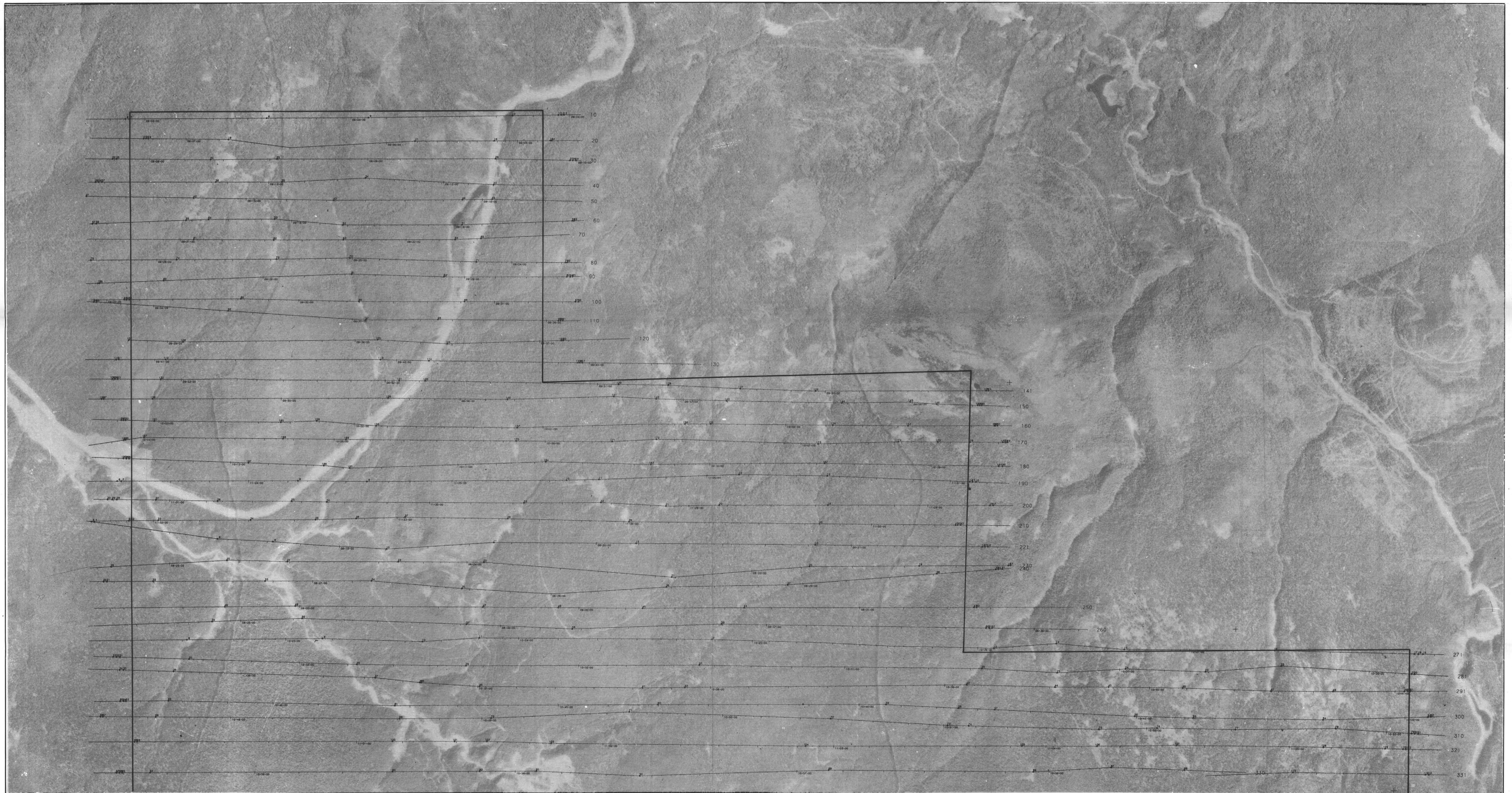
SCALE 1/10,000

DATE: February 1987

N.T.S. No: 93A/13, 93H/4

MAP No: 3

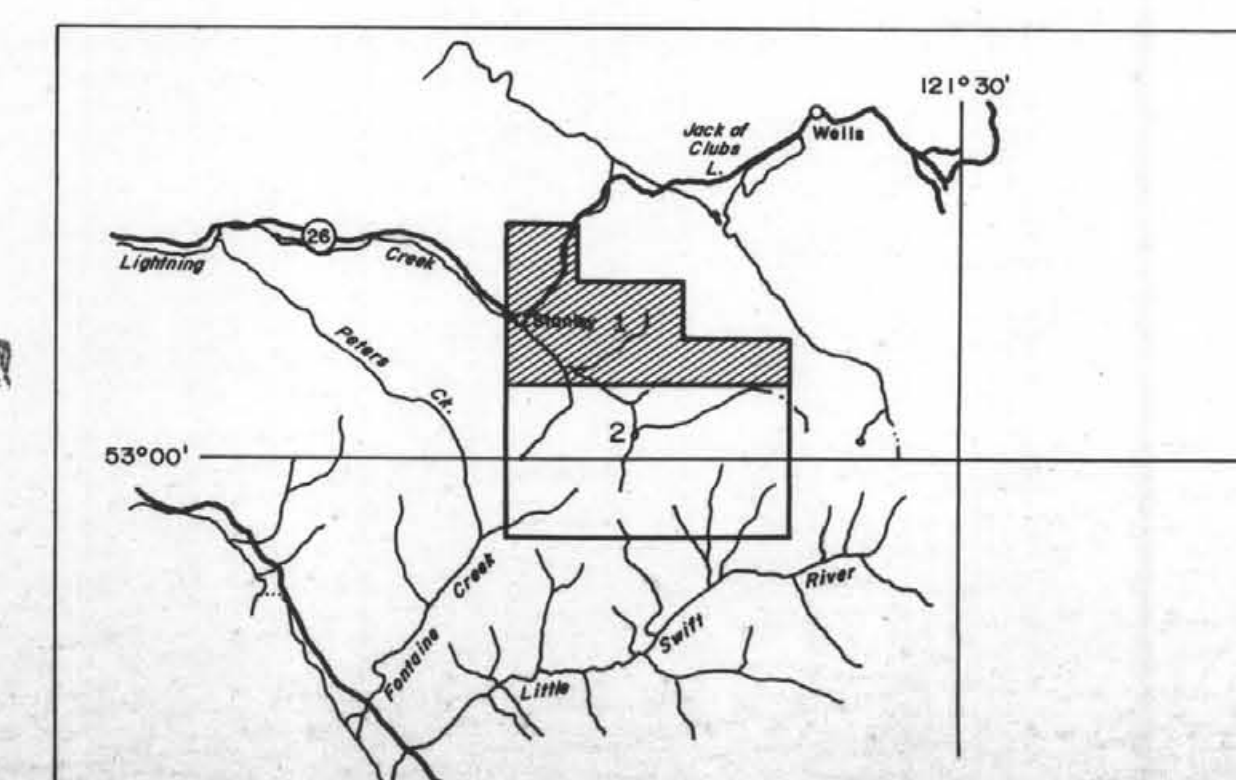
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Positioning 35 mm TRACKING FILM
Mean flight line spacing 150 metres

**GEOLOGICAL BRANCH
ASSESSMENT REPORT**

16,315



LIGHTNING CREEK RESOURCES LTD.

**ELECTROMAGNETIC SURVEY
FLIGHT PATH**

**QUESNEL
BRITISH COLUMBIA**

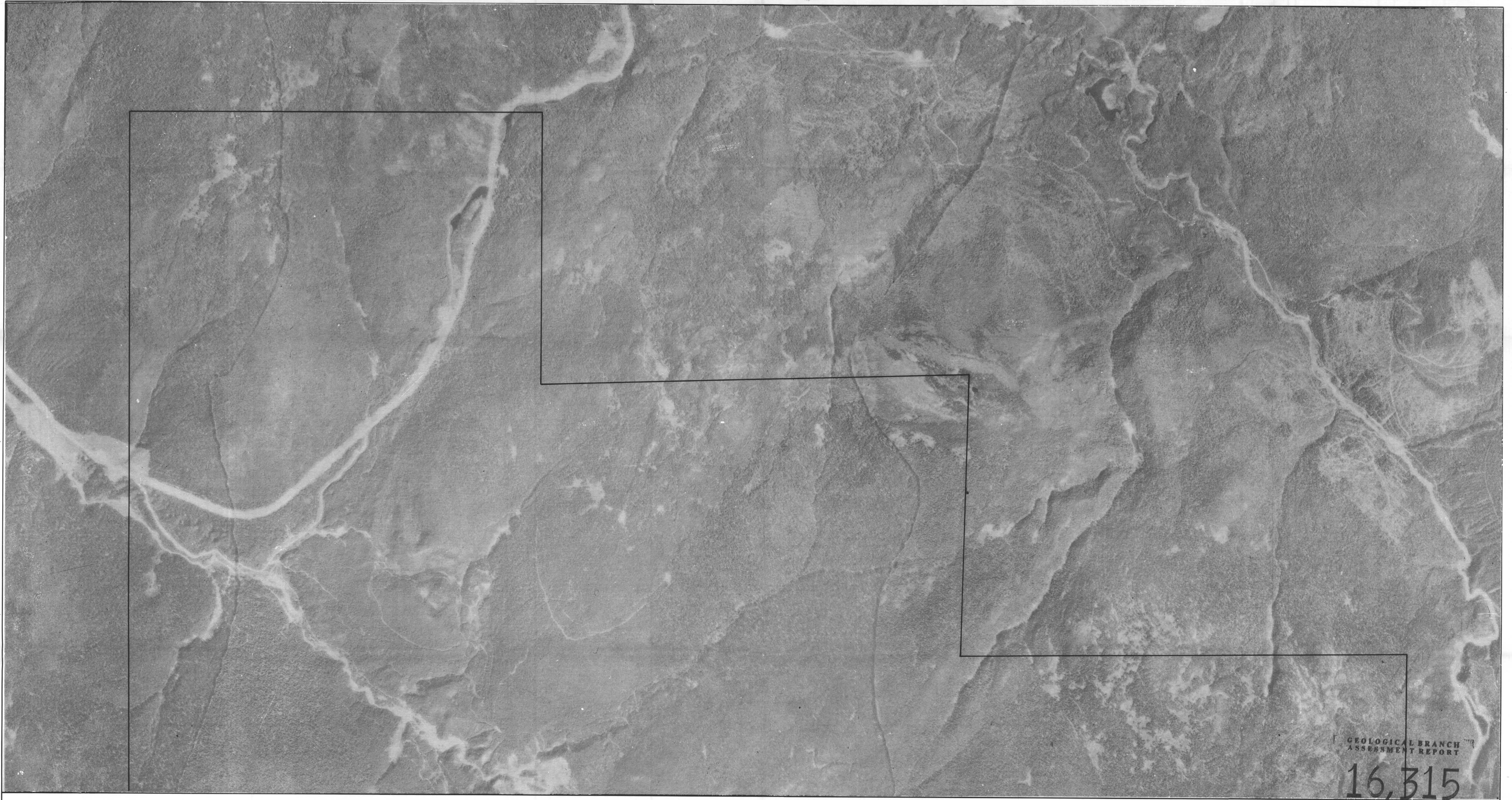
②

SCALE 1/10,000
0 300 600 900 1200
0 100 200 300 400 500 600 700 800 900 1000 1100 1200
1/2 mile
1 Kilometre

AERODAT LIMITED

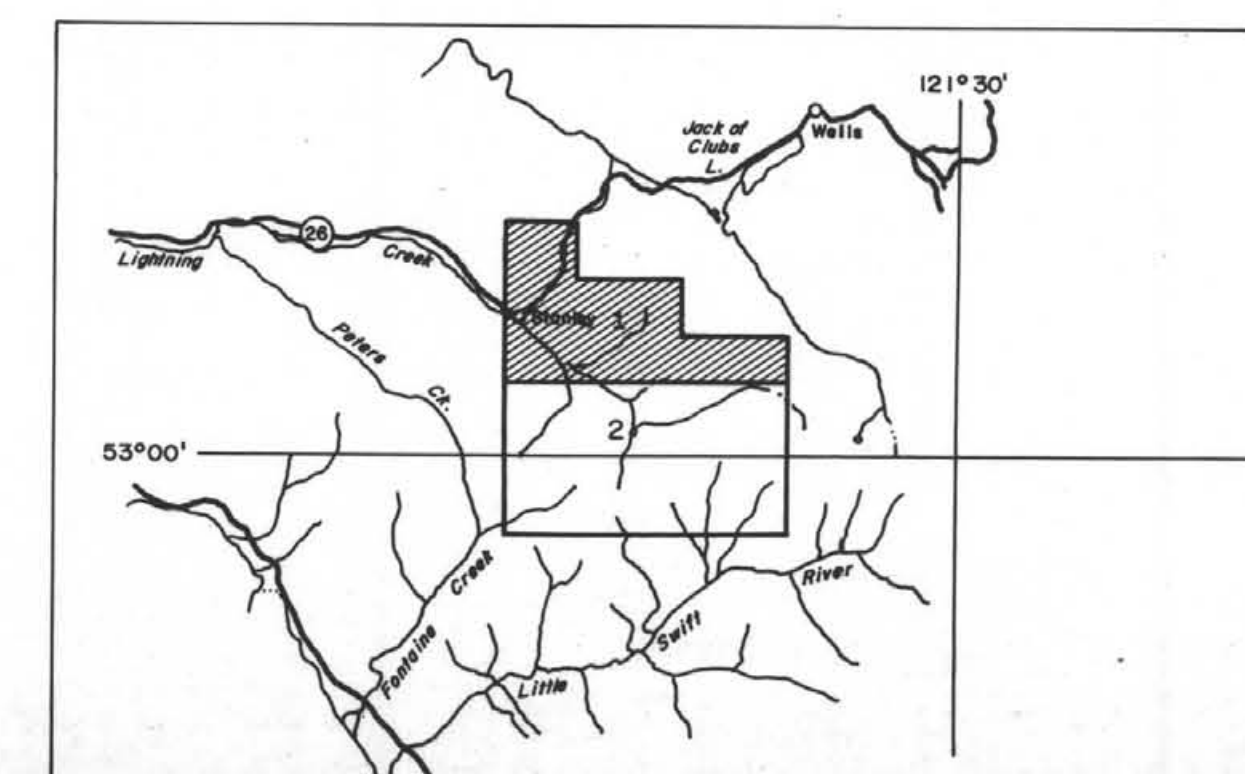
DATE: February 1987
N.T.S. No: 93A/13, 93H/4
MAP No: 2

J 8703



GEOLOGICAL BRANCH
ASSESSMENT REPORT

16,315



LIGHTNING CREEK RESOURCES LTD.

BASE MAP

QUESNEL
BRITISH COLUMBIA

①

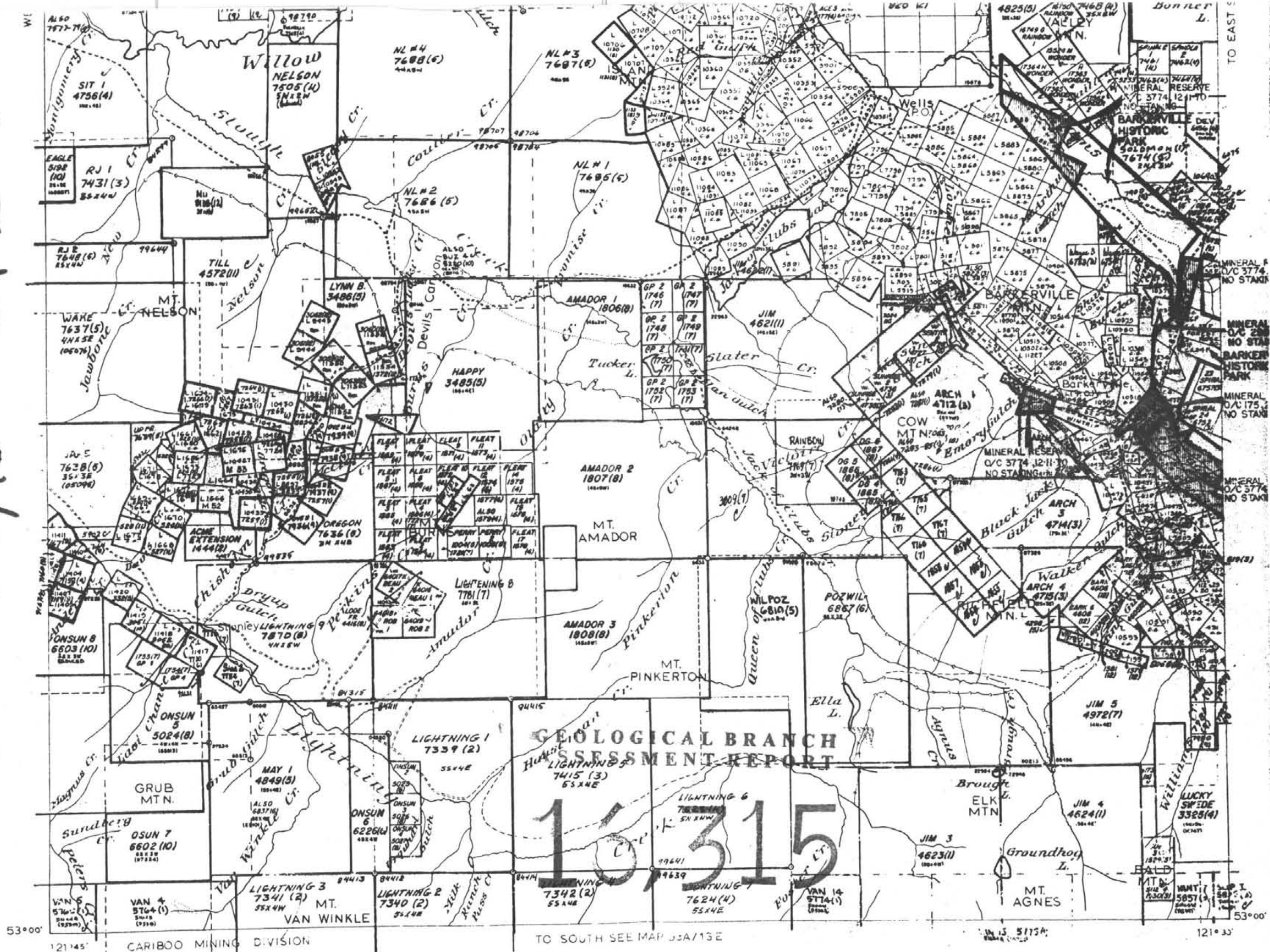
SCALE 1/10,000
0 320 640 960 1280
0 100 200 300 400 500 600 700 800 900 1000 1100 1200 1300 1400 1500
1/2 mile
1 Kilometre

AERODAT LIMITED

DATE: February 1987
N.T.S. No: 93A/13, 93H/4
MAP No: 1

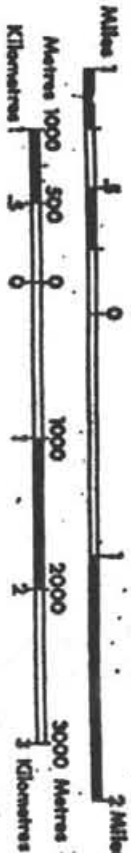
J 8703

1



DA	LATTER MINERAL CLAIM
FOR DA	"B. MINERAL CLAIM
BY	MINERAL CLAIM
WAS	LEGAL CORNER POST
AND	RTV

ER PORT "A" TAG NUMBER 6-894

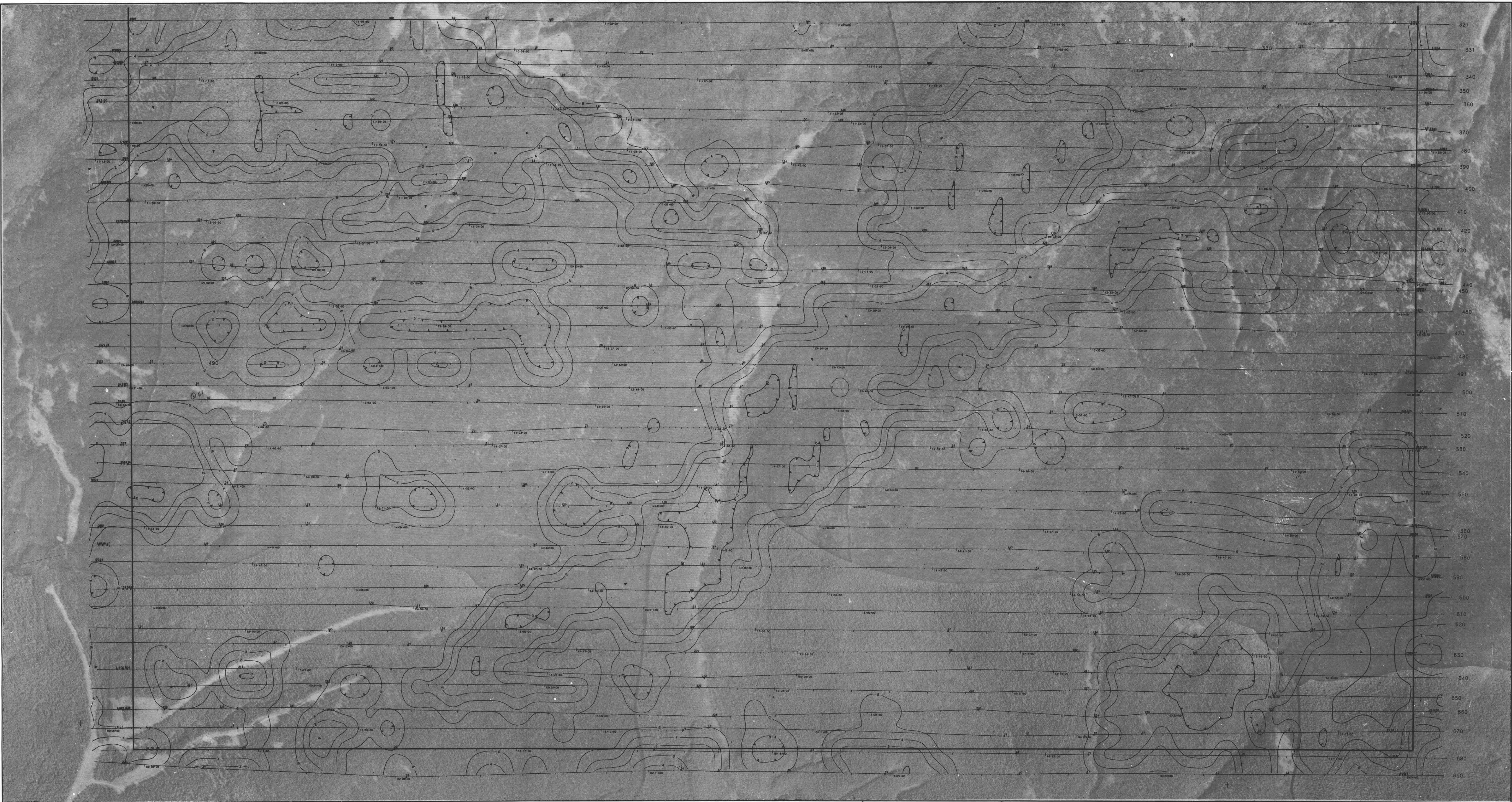


**Professor of British Colonial
History of Thought, Ideas and Political Processes**

UNLESS VERIFIED OR SUBMITTED, THE MAP PORTION OF A LEGAL CORNER POST IS BASED ON THE LOCATOR'S SKETCH. FOR FURTHER INFORMATION, APPLY TO THE OFFICE OF THE MINING DIVISION CONCERNED.

DATE OF MICROFILM: 87-07-30

121 • 33

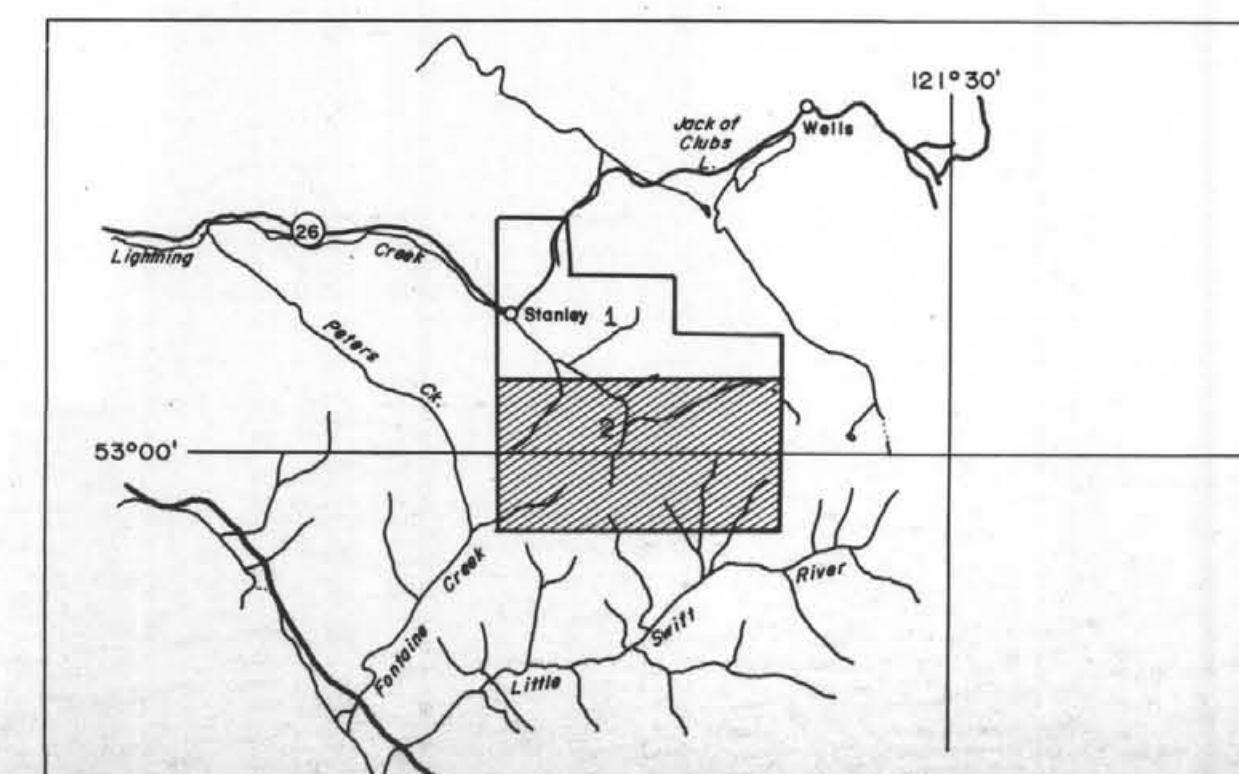


GEOLOGICAL BRANCH
ASSESSMENT REPORT

16,315
COMPUTED OVERBURDEN THICKNESS

Contour interval - 2 metres

50 metres
10 metres
2 metres



LIGHTNING CREEK RESOURCES LTD.

COMPUTED OVERBURDEN THICKNESS

QUESNEL
BRITISH COLUMBIA

SCALE 1/10,000
0 300 600 900 1200
0 100 200 300 400 500 600 700 800 900 1000 1100 1200
1/2 mile
1 Kilometre

AERODAT LIMITED

DATE: February 1987
N.T.S. No: 93A/13, 93H/4
MAP No: 8