85-323-13705
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GEOPHYSICAL REPORT

ON

AIRBORNE MAGNETIC AND VLF-EM SURVEYS

OVER THE

ANGUS 1, 2 AND BURN 1 CLAIMS

PUDDING BURN CREEK, KIMBERLEY AREA

FORT STEELE MINING DIVISION

BRITISH COLUMBIA

PROPERTY	: 24 km N75°W of Cranbrook, B.C. and 12 km S40°W of Kimberley, B.C. on Pudding Burn Creek
	: 49° 35' North Latitude 116° 07' West Longitude
	: N.T.S. 82F/9E
WRITTEN FOR	: TRANS-ARCTIC EXPLORATIONS LTD. #805-850 West Hastings Street Vancouver, B.C., V6C 1E2
SURVEYED BY	: COLUMBIA AIRBORNE GEOP... SERVICES (1984) LTD. #1808-1450 West Georgi... Vancouver, B.C. V6G 2...
WRITTEN BY	: David G. Mark, Geophys... GEOTRONICS SURVEYS LTD. #403-750 West Pender S... Vancouver, B.C., V6C 2...
DATED	: May 17, 1985

GEOTRONICS SURVEYS LTD.
Engineering & Mining Geophysicists
VANCOUVER, CANADA

13705

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SUMMARY

Airborne magnetic and VLF-EM surveys were carried out over the Angus 1, 2 and Burn 1 claims owned by Trans-Arctic Explorations Ltd. of Vancouver, B.C., during mid-February of 1985. The claims are located 12 km S40°W of the town of Kimberley, B.C. on Pudding Burn Creek just south of St. Mary River. Access is gained by four-wheel drive vehicle. The terrain consists of moderate to mainly steep and rugged slopes forested with moderately dense coniferous trees. The purpose of the surveys was to aid in the mapping of geology as well as to locate probable areas for exploration of gold mineralization. The prime target is porphyritic sills and/or dykes containing gold mineralization commonly known as "miner's porphyry".

The property is mostly underlain by quartzites, siltstones, and argillites of the Aldridge Formation. Intruding into the sediments and covering a large area of the property are meta-diorites and meta-quartz diorites of the Moyie Intrusions. The sediments and meta-intrusives alternate one with the other, with the strike of the contacts being northerly on the west side of the property, and easterly within the central part.

The airborne surveys were flown at about a 50-meter terrain clearance on contour lines with a separation of 100 - 200 meters. The instruments used were a Sabre Electronics proton precession magnetometer and a Sabre Electronics VLF-EM receiver. The magnetic data were picked from the strip charts and hand contoured. The contours were drawn on a survey plan on which the VLF-EM anomalies were plotted as well.

CONCLUSIONS

1. The magnetic survey has verified that the property is almost entirely underlain by the Aldridge sediments, and by the Moyie meta-intrusives.

2. The VLF-EM survey revealed several conductive zones throughout the property. Five of the zones, because of their lineal shapes, are in all likelihood, reflecting fault zones. Two others, because of their size, could be reflecting lithological units and/or zones of alteration or fracturing.

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

RECOMMENDATIONS

Though VLF-EM conductors were mapped by the survey, it is not felt that target areas for the exploration of gold mineralization have been effectively delineated.

If one wants to cover the property effectively, the following program is therefore recommended:

1. Take large soil samples every 50 m along contour lines preferably about 100 m apart in elevation. Silt, sand, and/or gravel along creeks and tributaries should also be sampled. In the lab, the total sample should be pulverized, and not screened at all in order to preclude the screening out of coarser gold. The anomalous samples should then be followed up by sampling on a tight grid, say 15 to 20 m centers on a grid, say 200 m square.

2. At the same time, careful geological mapping and prospecting should be carried out preferably by a geologist and prospector familiar with gold mineralization. One large benefit of this will be a better interpretation of any geophysics that are carried out. Special attention should be paid to the VLF-EM conductors and magnetic highs.

3. The defined soil anomalies in gold should then be 'cat' trenched, if access and terrain permit.

4. Resistivity - IP mapping and/or MaxMin EM should then be considered in order to optimize drill targets.

5. Diamond drilling should then be carried out using a large diameter drill and a face discharge bit.

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INTRODUCTION AND GENERAL REMARKS

This report discusses the survey procedure, compilation of data and the interpretation of low-level airborne magnetic and VLF-EM surveys carried out over the Angus 1, 2 and Burn 1 claims within the Kimberley area during mid-February of 1985. The surveys were carried out by Lloyd Brewer, instrument operator and project manager, and John Kime, navigator, both of whom are of Columbia Airborne Geophysical Services (1984) Ltd. A total of 38.2 line km of airborne surveys were done over the property and surrounding area.

The object of the two surveys was to aid in the geological mapping of lithology and structure for the purpose of exploration of the type of gold mineralization as has been found in the Perry Creek and Angus Creek areas.

PROPERTY AND OWNERSHIP

The property consists of three claims containing 56 units as shown on Map 2 and as described below:

Claim Name	No. Units	Record No.	Expiry Date
Angus 1	18	2112	Feb. 21, 1986
Angus 2	18	2095	Feb. 21, 1986
Burn 1	20	2093	Feb. 21, 1986

The expiry dates shown take into account the surveys under discussion as being accepted for assessment credits.

The property is owned by Trans-Arctic Explorations Ltd. of Vancouver, British Columbia.

LOCATION AND ACCESS

The northeast corner of the property (Burn 1 claim) is found 12 km S40°W of the town of Kimberley, B.C. and the southeast corner is found 24 km N75°W of the town of Cranbrook. The property is located just south of the St. Mary River.

The geographical coordinates for approximately the center of the property are 49° 35' north latitude and 116° 07' west longitude.

Access is easily gained by travelling to Marysville, which is 6 km from Kimberley and 23 km from Cranbrook. One then takes the westerly St. Mary River road for a further 16 km to the east end of St. Mary Lake at which point is a bridge crossing the river to the south. One then doubles back in an easterly direction for 3.5 km at which point a road leads southerly for about 1 km to

the northern boundary of the Angus 1 claim.

It is recommended to use 4-wheel drive for the off-highway roads.

PHYSIOGRAPHY

The property lies to the west of the Rocky Mountain Trench within the Purcell Mountains which is a physiographic division of the Columbia Mountain System. The terrain consists of steep slopes throughout most of the property, but moderate slopes within the northwestern corner.

The elevation varies from 1,060 m (3,500 feet) a.s.l. at the northwestern corner of the property to 2,100 m (6,900 feet) a.s.l. within the southeastern corner of the Angus 1 claim to give a relief of 1,040 m (3,400 feet). The topography trends northeasterly.

The main water sources are the northerly-and westerly-flowing Pudding Burn Creek as well as the northerly-flowing Bannock Creek.

The forest cover is moderately dense and consists of fir, spruce and hemlock (?).

HISTORY OF PREVIOUS WORK

Exploration in the area dates back to the turn of the century. Probably much prospecting and possibly physical work has been done on the property itself. However, since the present claims

have been staked, no previous work has been caried out.

GEOLOGY

According to G.S.C. geologist Leech (1957), the property is mostly underlain (60-70%) by the Lower Division of the Aldridge Formation which is of Purcell or (?) Later age. The rocks consist of rusty weathering grey quartzite, siltstone, and argillite; grey weathering massive quartzite; and the metamorphosed equivalents of the above.

Also of Purcell or (?) Later age, but intruding into the sediments are meta-diorites and meta-quartz diorites of the Moyie Intrusions. These rocks cover the remainder of the property and alternate with the sediments.

Within the above two rock groups occur small acidic intrusives of Mesozoic or (?) Cenozoic age though none are so far known on the property. The rock-types are granodiorite, quartz monzonite and/or pegmatite.

The bedding strikes northerly on the western part of the property and easterly within the central part. Over the reminder of the property there is too much overburden to determine strike. The dip of the bedding is quite variable over the property indicating much folding. The easterly and northeasterly-striking St. Mary Fault occurs about 600 m southeast of the southeast corner of the property.

The property was staked for the exploration of gold mineraliza-

tion such as is known to occur to the south on both Angus and Perry Creeks. Often the gold occurs close to or within a diorite sill that became known as a "miner's porphyry". This porphyry was likely a Moyie intrusive, which is an abundant rock-type on this property.

INSTRUMENTATION AND THEORY

a) Magnetic Survey

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

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

accurate geological analysis.

b) VLF-EM Survey

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

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

It is impossible to determine the quality of conductors with any reliability, using field strength data alone. The question of linearity is in doubt if the conductor does not appear to cross the adjacent flight lines. The relatively high frequency results

in a multitude of anomalies from unwanted sources such as swamps, creeks and cultural debris. However, the same characteristic also results in the detection of poor conductors such as faults, shear zones, and rock contacts, making the VLF-EM a powerful mapping tool.

SURVEY PROCEDURE

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

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

The aircraft used to conduct this survey was a Bell Jet Ranger helicopter. Airspeed was a constant 60 KPH so that creek valley sand canyons were penetrated thoroughly. The slow airspeed provided safety, detailed coverage of boxed-in areas, and consistency of data retrieval, which is critical in rugged terrain, such as within this survey.

The number of line km flown as shown on Map 3 is 38.2.

The project supervisor, Mr. L. Brewer, has over 4 years of experience in conducting aerial magnetic and electromagnetic surveys from rotary-wing aircraft, under all types of terrain conditions.

DATA REDUCTION AND COMPILATION

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

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

The VLF-EM survey measured the field strength. The resulting anomalies were taken from the strip charts and plotted on the sheet with the magnetics.

DISCUSSION OF RESULTS

a) Magnetics

The magnetic field over the property is very quiet which is typical of sediments and metamorphosed intrusives. The general intensity is 470 to 500 gammas which can be considered as the magnetic background. The sediments, as mentioned above, are those of the Lower Division of the Aldridge Formation and the metamorphosed intrusives of the Moyie Intrusions.

The magnetics does not appear to effectively delineate between these different rock groups.

However, there are several small low-intensity highs, 10 to 20 gammas above the background, occurring throughout the property. These could be reflecting parts of the Moyie metaintrusives that

have not been quite as metamorphosed as the rest. That is, some of the magnetite remains unaltered.

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

1. Valleys almost always contain deeper overburden which means the detecting element is further from the bedrock causing the magnetic field.

2. If the survey is flown across the valley or gully, then the detecting element is also further from the bedrock.

3. Gullys and valleys are often caused by faults or shear zones which are often reflected by magnetic lows.

b) VLF-EM

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

There is some variation in intensity from one VLF-EM anomaly to the next. This is not only due to the conductivity of a causative source, but also the direction it strikes relative to the direction to the transmitter. In other words, those conductors lying close to the same direction as the direction to the transmitter can be picked up easier than those that are lying at a

greater angle. Depending upon its conductivity, a conductor may not be picked up at all if it is at too great an angle.

The property are is characterized by extremely rough topography which adversely affects the VLF-EM results. The noise level is greatly increased which can thus obliterate signals from EM conductors such as geological structure and/or mineral zones. Therefore, the VLF-EM system may have responded to some of the known mineral zones but the signal may have been masked by the noise level.

However, there are seven VLF-EM anomalous zones that could be reflecting conductors. The zones are quite weak in intensity and therefore the response could just as easily be from topography. Nevertheless, a positive feature is that the anomalies correlated from one line to the next.

Five of the anomalies are very lineal in shape, therefore suggesting the causative sources are geological structures such as faults. The other two zones are somewhat wider suggesting that the cause may be a lithological unit and/or alteration or fracture zones.

c) Lineations

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

a) Magnetic lows which are often caused by the magnetite within the rocks being altered by geological structure processes.

b) VLF-EM anomalies which more often than not are reflecting structure.

c) Topographic depressions such as creek valleys which are usually caused by structure.

Several lineations that are indicative of faults and contacts have been mapped across the property striking in different directions.

The lineations cross each other on the property in different areas. Structure is often important for the emplacement of mineralizing fluids especially where lineations intersect. Thus these areas may have greater exploration interest.

Respectfully submitted,
GEOTRONICS SURVEYS LTD.

David G. Mark,
Geophysicist

May 17, 1985

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Minister of Mines Reports

GEOPHYSICIST'S CERTIFICATE

I, DAVID G. MARK, of the City of Vancouver, in the Province of British Columbia, do hereby certify:

That I am a Consulting Geophysicist of Geotronics Surveys Ltd., with offices located at #403-750 West Pender Street, Vancouver, British Columbia.

I further certify:

1. That I am a graduate of the University of British Columbia (1968) and hold a B.Sc. degree in Geophysics.

2. I have been practising my profession for the past 16 years and have been active in the mining industry for the past 19 years.

3. That I am an active member of the Society of Exploration Geophysicists and a member of the European Association for Exploration Geophysicists.

4. This report is compiled from data obtained from airborne magnetic and VLF-EM surveys carried out by Columbia Airborne Geophysical Services (1984) Ltd., under the supervision of L. Brewer during February, 1985.

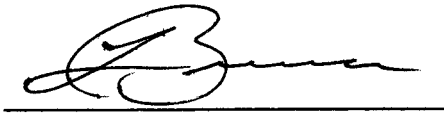
5. I have no direct or indirect interest in any of the properties mentioned within this report, nor in Trans-Arctic Explorations Ltd., nor do I expect to receive any interest as a result of writing this report.

David G. Mark
Geophysicist

May 17, 1985

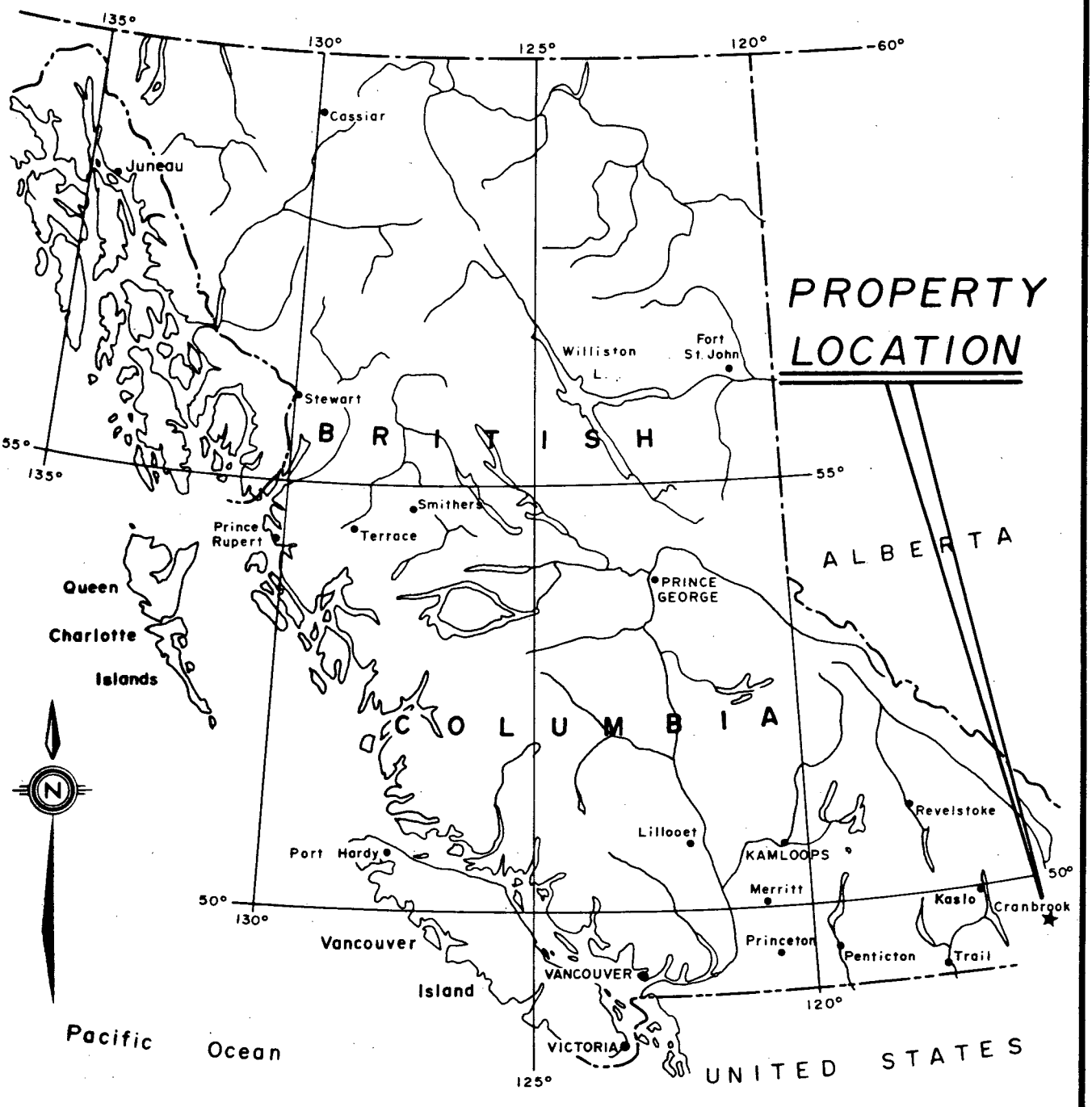
AFFIDAVIT OF COSTS

I, Lloyd Brewer, president of Columbia Airborne Geophysical Services (1984) Ltd., certify that the airborne magnetic and VLF-EM surveys were flown in February of 1985, and that they were flown at an all inclusive cost of $7,500.00.



Lloyd Brewer

May 17, 1985



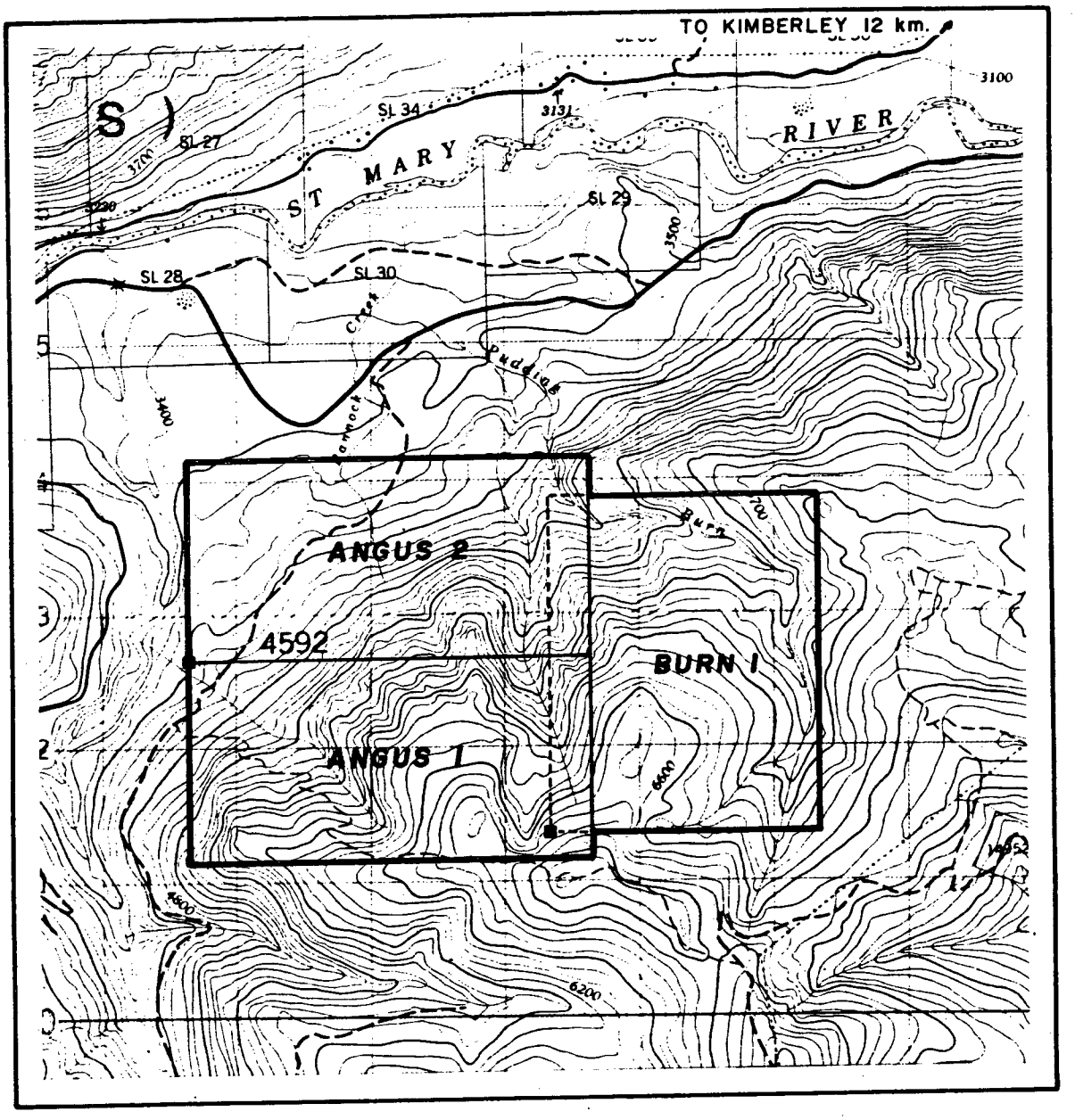
ANGUS 1, 2 & BURN 1 CLAIMS

100 0 100 200 300 400 Km.

100 0 100 200 Mi.

MAP 1

BRAD'S DRAFTING SERVICES



TRANS-ARCTIC EXPLORATIONS LTD.			
ANGUS 1, ANGUS 2 & BURN 1 CLAIMS			
PUDDING BURN CREEK, KIMBERLEY AREA			
FORT STEELE M. D., B. C.			
CLAIM LOCATION MAP			
SCALE: 1:50,000	DATE: June 85	MAP: 2	N.T.S. 82 F/9 E

116° 07'

49° 35'

ANGUS 2

ANGUS 1

BURN 1

VLF-EM TRANSMITTER DIRECTION

ANNAPOLIS 21.4 KHz.

SEATTLE 24.8 KHz.

GEOLOGICAL BRANCH
ASSESSMENT REPORT

13,705

LEGEND

- LEGAL CORNER POST.
- PROPERTY BOUNDARY.
- CLAIM BOUNDARY.
- FLIGHT LINE.
- LINEATIONS PRODUCED FROM MAGNETIC AND EM RESULTS SUGGESTING GEOLOGICAL STRUCTURE.

VLF-EM

- ANOMALY

NOTE: THE VLF-EM SURVEY MEASURES FIELD STRENGTH.

ALL ANOMALIES ARE VERY WEAK ANOMALIES, ANY OF WHICH COULD BE CAUSED BY TERRAIN.

500 0 1 Km

METRES

Survey Carried Out By: COLUMBIA AIRBORNE GEOPHYSICAL SERVICES (1984) LTD.

To Accompany Report By: DAVID G. MARK, Geophysicist.

TRANS-ARCTIC EXPLORATIONS LTD.

ANGUS 1, ANGUS 2 & BURN 1 CLAIMS

PUDDING BURN CREEK, KIMBERLEY AREA

FORT STEELE M.D., B.C.

AIRBORNE SURVEY

MAGNETIC CONTOURS & VLF-EM ANOMALIES

SCALE:	DATE:	N.T.S.	MAP:	DRAFTED BY:
1: 10,000	May 85.	82 F/9 E	3	B. D. S.