

GEOPHYSICAL REPORT

ON

AIRBORNE MAGNETIC AND VLF-EM SURVEYS

OVER THE

ST. MARY LAKE PROPERTY

ST. MARY LAKE, KIMBERLEY AREA

FORT STEELE MINING DIVISION

BRITISH COLUMBIA

PROPERTY : 23 km N60°W of Cranbrook, B.C.
 and 6.5 km southwest of
 Kimberley, B.C. on Bootleg Mtn.
 : 49° 39' North Latitude
 116° 08' West Longitude
 : N.T.S. 82F/9E

WRITTEN FOR : AMSTAR AMERICAN PETROLEUM CORP.
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DATED : April 4, 1985



GEOTRONICS SURVEYS LTD.
 Engineering & Mining Geophysicists
 VANCOUVER, CANADA

13632

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ASSESSMENT REPORT**

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13,632

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SUMMARY

Airborne magnetic and VLF-EM surveys were carried out over the St. Mary Lake property owned by the Amstar American Petroleum Corp. of Vancouver, B.C., during mid-February of 1985. The claims are located 6.5 km southwest of the town of Kimberley, B.C. on Bootleg Mountain and to the immediate north of St. Mary Lake and River. Access is gained by four-wheel drive vehicle but helicopter is recommended to more remote areas of the property. The terrain consists of gentle 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. Within the central part of the property, the sediments and meta-intrusives alternate one with the other, with the strike of the contacts averaging north-northeasterly. The High Peak prospect, consisting of copper mineralization within a Moyie intrusive, occurs on the west central part of the property and a prospect of unknown mineralization within the sediments occurs on the east 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. Also two small thumbprint-type anomalous highs could be reflecting a basic intrusive.
2. The VLF-EM survey revealed 17 main conductors throughout the property. One correlates directly with the High Peak prospect and indicates a possible strike length of up to 1000 m. Two others, because of their size, could be reflecting zones of alteration, or fracturing, or lithological units. At least 3 other conductors, because of their lineal shapes, are in all likelihood, reflecting fault zones.
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

The airborne geophysics has revealed several target areas throughout the property such as the magnetic highs and the VLF-EM highs. It is recommended to check these out by prospecting, geological mapping and possibly soil geochemistry. Soil geochemistry lines could be run in the areas of interest, such as across the VLF-EM conductors. Ground VLF-EM and magnetic surveying may be quite useful as well in finding and delineating more accurately the target areas.

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

However, if one wants to cover the property effectively, the following program is 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 St. Mary Lake property 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 275.9 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 18 claims containing 271 units as shown on Map 2 and as described below:

<u>Claim Name</u>	<u>No. Units</u>	<u>Record No.</u>	<u>Expiry Date</u>
Denver 1	20	2118	Feb. 21, 1986
Denver 2	9	2087	Feb. 21, 1986
Denver 3	20	2088	Feb. 21, 1986
Denver 4	20	2089	Feb. 21, 1986
Denver 5	6	2090	Feb. 21, 1986
Denver 6	9	2102	Feb. 21, 1986
Bootleg 1	10	2103	Feb. 21, 1986
Bootleg 2	20	2105	Feb. 21, 1986
Bootleg 3	2	2106	Feb. 21, 1986
Bootleg 4	16	2107	Feb. 21, 1986
Alki 1	20	2108	Feb. 21, 1986
Mathew 1	20	2091	Feb. 21, 1986
Knave	20	2098	Feb. 21, 1986
Ace	15	2114	Feb. 21, 1986
King	20	2115	Feb. 21, 1986
Deuce	6	2120	Feb. 21, 1986
Ledge	18	2117	Feb. 21, 1986
High Peak	20	2353	Jan. 28, 1986

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

The property is owned by Amstar American Petroleum Corp. of Vancouver, British Columbia.

LOCATION AND ACCESS

The northeast corner of the property (Ace claim) is found 6.5 km due southwest of the town of Kimberley, B.C. and the southeast corner is found 23 km N60°W of the town of Cranbrook. The property is located on Bootleg Mountain to the immediate north of St. Mary Lake and St. Mary River, and to the immediate west of Mathew Creek.

The geographical coordinates for approximately the center of the property are 49° 39' north latitude and 116° 08' 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 7 km at which point is the eastern boundary of the property. This road travels along the southern boundary and the Mathew Creek forestry access road runs along the eastern boundary.

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

For the more remote parts of the property, helicopter is recommended.

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 gentle slopes within the southeastern corner. It lies on the southern slope of Bootleg Mountain within the St. Mary Lake valley.

The elevation varies from 920 m (3,018 feet) a.s.l. on St. Mary River (at the property's eastern boundary) to 2,608 m (8,558 feet) a.s.l. on the peak of Bootleg Mountain to give a relief of 1,688 m (5,540 feet). The topography trends northeasterly.

The main water source is the easterly-flowing tributary of Mathew Creek. Other water sources are several southerly- and southeasterly-flowing creeks, namely Argyle, Resort, Denver, and

some unnamed creeks. Of course, St. Mary Lake and St. Mary River, are major water sources as well.

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, especially considering that it contains two showings. However, since the present claims have been staked, no previous work has been carried out.

GEOLOGY

According to G.S.C. geologist Leech, 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.

For the most part, the bedding strikes northerly to northwesterly and dips at a shallow angle, mostly around 15° but up to 45°, to the west.

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 almost the remainder of the property. Within the center of the property, the meta-intrusives alternate with the sediments to give a banded appearance. The contacts strike north-northeasterly.

Within the east central part of the property occurs a small acidic intrusive of Mesozoic or (?) Cenozoic age. The rock-types are granodiorite, quartz monzonite and/or pegmatite.

The only known major structures on the property, other than the contacts, are the Bootleg Fault which trends easterly across the northern part of the Bootleg 1 claim, and the Alki Fault, which trends southeasterly across the southwest corner of the Alki 1 claim.

The High Peak prospect occurs on the western side of the High Peak claim. The only information available to the writer is that it consists of copper mineralization within a Moyie intrusive. Within the center of the Denver 4 claim is another mineral prospect within the Aldridge sediments. No other information about this prospect was available.

The property was staked for the exploration of gold mineralization such as is known to occur to the south on both Angus and Perry Creeks. Often the gold occurred 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 an average 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 275.9.

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 25-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. Anomalies from the Seattle transmitter or the Annapolis transmitter is designated as 'S' or 'A', respectively. Also, a distinction has been made on the map between weaker and stronger anomalies.

DISCUSSION OF RESULTS

a) Magnetics

The magnetic field over most of the property is very quiet which is typical of sediments and metamorphosed intrusives. The general intensity is 475 to 575 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 delineate between these different rock groups.

The most prominent feature is a small magnetic high of relatively strong intensity occurring on the border of the Bootleg 4 and High Peak claims. It probably reflects a basic intrusive, possibly a volcanic rock-type. The anomaly reaches about 150 gammas above background. A smaller anomalous high of 125 gammas above background occurs 1300 m to the northwest.

There are three other small low-intensity highs, about 50 gammas above the background, occurring in other parts of the property. These could be reflecting small bodies of intrusives or possibly volcanics as well.

Magnetic lows often occur along creek valleys, and/or areas of low topography. The reasons for this area s 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 St. Mary Lake area 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, 17 EM conductors have been mapped within the property boundaries which stand out above the noise level. These have been labelled by the lower case letters a to q, respectively. Since there are so many conductors the description for each one has been limited to point form. The conductor is first named, which is then followed by the length in meters and the strike. The letters 'min' in front of the length, means minimum length indicating at least one end of the conductor is open. Any other comments are then given below.

Conductor a min 700 m, north-northeast.

Conductor b min 450 m, east.

Conductor c 3500 m, east-northeast. Considering its length, this conductor is very likely a fault.

Conductor d min 4800 m, east-northeast. Like c, this conductor is likely a fault.

Conductor e 950 m, northwest. This conductor is of greater interest since it is of moderate strength.

Conductor f 200 m, northwest? Very weak and minor anomaly.

Conductor g min 200 m, east?

- Conductor h 400 m, northeast.
- Conductor i 450 m, northwest. Correlates with a magnetic high.
- Conductor j 1050 m, northeast and northwest. Correlates with the property's strongest magnetic high. This conductor to date is the most interesting on the property because it is of moderate strength and correlates with the High Peak zone of copper mineralization. The mineralization occurs within the northeasterly-striking part of the anomaly which is about 450 m long. The northwesterly-striking part is about 600 m long. It is possible that the anomaly consists of two separate causative sources. The mineralization may be either the cause or related to the cause of the northeasterly-striking arm, or it could be the cause or related to the cause of both arms.
- Conductor k min 900 m, west-northwesterly.
- Conductor l 1300 m, northwest.
- Conductor m 350 m, northwesterly. A very weak conductor that could be structurally related to conductor l.
- Conductor n 1100 m, northeasterly. Could be part of conductor o.
- Conductor o 3000 m long by as much as 700 m wide, northeast to northerly. Considering the size of this conductor, there is a likely probability that the causative source is an alteration zone, a fracture zone, or a different, but more conductive lithological

unit. This anomaly could be connected to conductor n.

Conductor p 2100 m long by up to 600 m wide, northeasterly. The same comments for conductor o holds for conductor p.

Conductor q 2600 m, northeasterly. The length and the shape suggests this conductor to be a fault.

There are also some single-line anomalies any of which could easily be reflecting bedrock conductors associated with mineralization. For these, the strike of the causative source is unknown.

c) Lineations

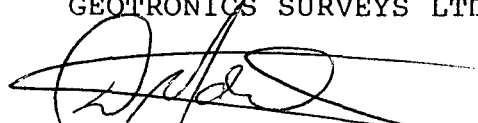
Lineal trends considered to be indicative of geological structure have been drawn on Map 3 taking into account:

- 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. Some or parts of the lineations are seen to correlate directly with lithologic contacts and shear zones.

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

Respectfully submitted,
GEOTRONICS SURVEYS LTD.



David G. Mark,
Geophysicist

April 4, 1985

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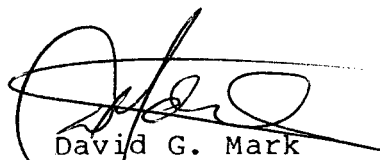
GEOPHYSICIST'S CERTIFICATE

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 Amstar American Petroleum Corp., nor do I expect to receive any interest as a result of writing this report.


David G. Mark
Geophysicist

April 4, 1985

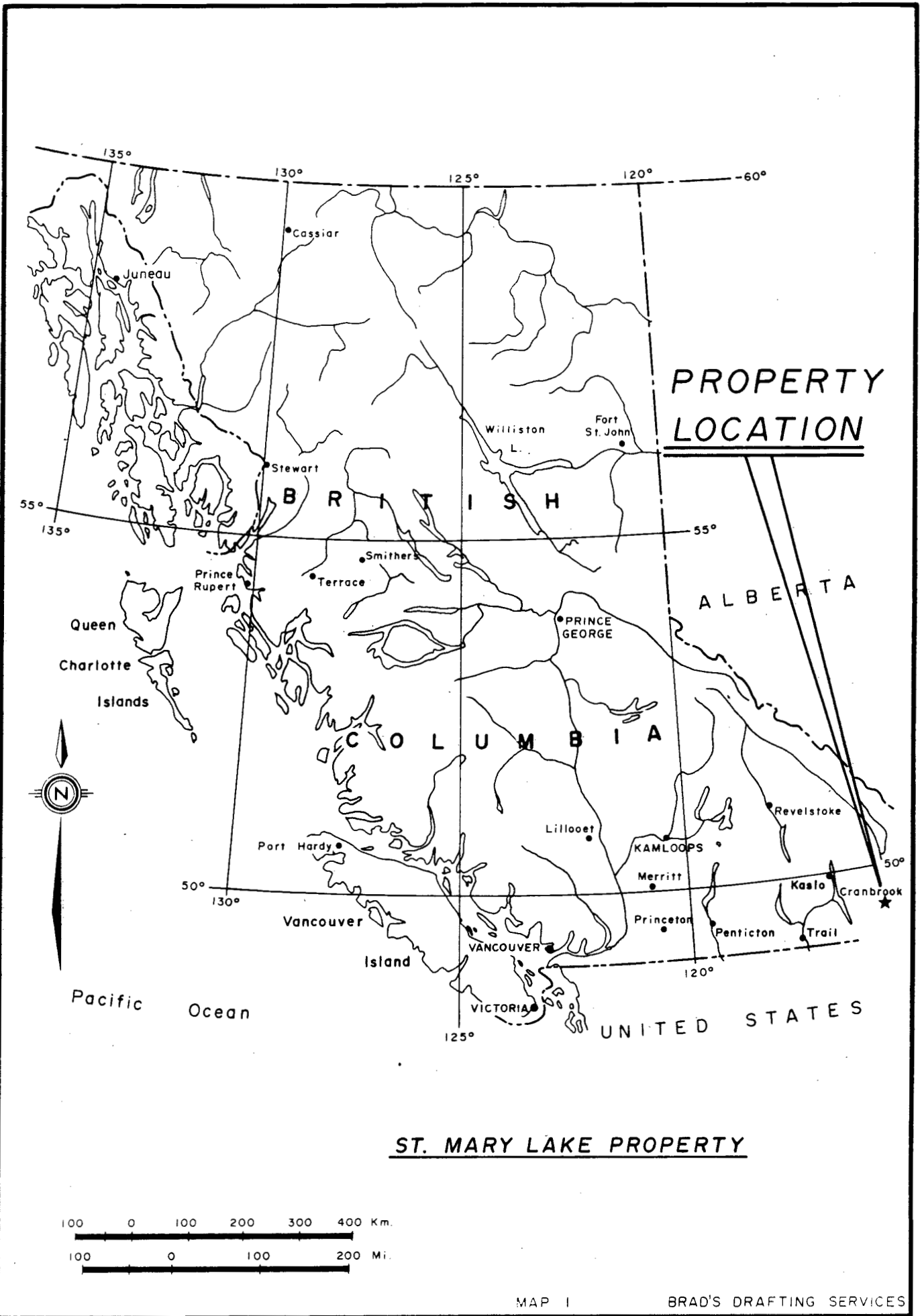
AFFIDAVIT OF COSTS

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 a cost of \$100/km, the total number of km being 275.9 to give a total cost of \$27,590.00.

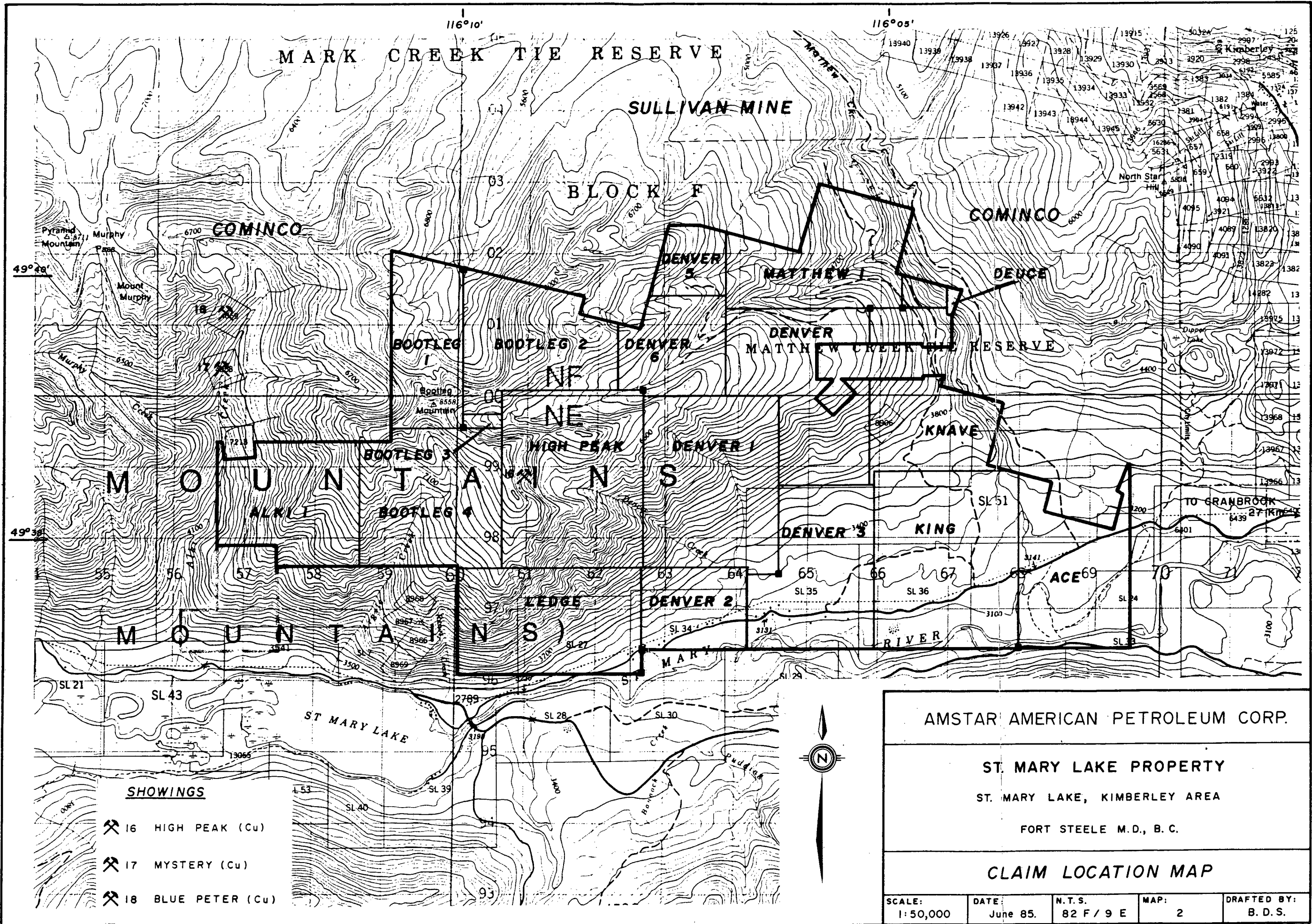


Lloyd Brewer

April 4, 1985

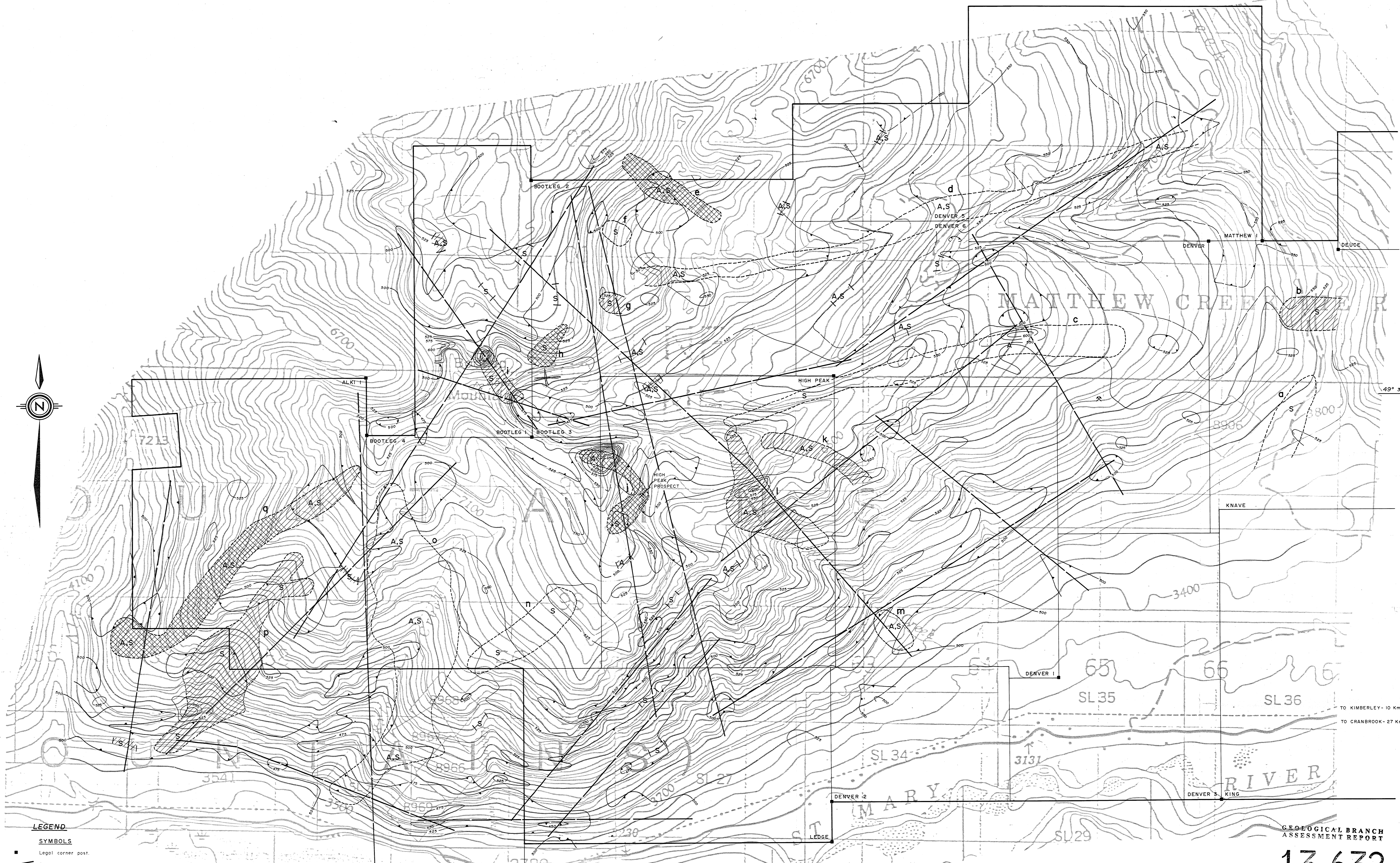
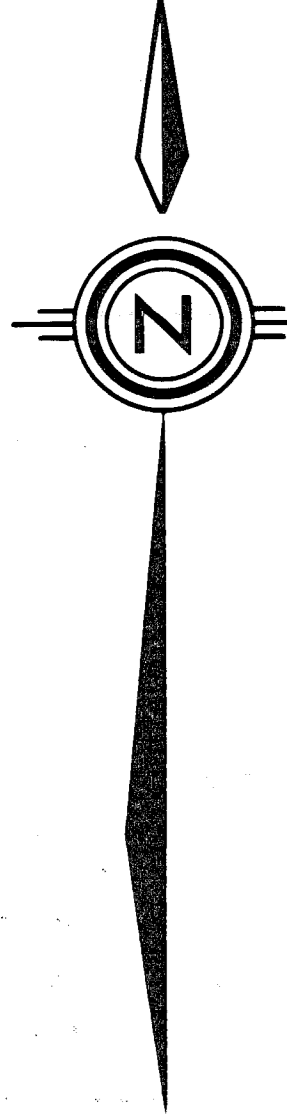


ST. MARY LAKE PROPERTY



AMSTAR AMERICAN PETROLEUM CORP.			
ST. MARY LAKE PROPERTY			
ST. MARY LAKE, KIMBERLEY AREA			
FORT STEELE M.D., B.C.			
CLAIM LOCATION MAP			
SCALE: 1:50,000	DATE: June 85.	N.T.S. 82 F / 9 E	MAP: 2
DRAFTED BY: B. D.S.			

116° 10'



LEGEND

- SYMBOLS**
- Legal corner post.
 - Property boundary.
 - Claim boundary.
 - Flight line.
 - Lineation produced from magnetic and E.M. results suggesting geological structure.
- VLF-EM**
- MEDIUM STRENGTH anomaly.
 - WEAK anomaly.
 - VERY WEAK anomaly.
 - Single line E.M. anomaly with no apparent strike.
 - S Denotes Seattle anomaly.
 - A Denotes Annapolis anomaly.

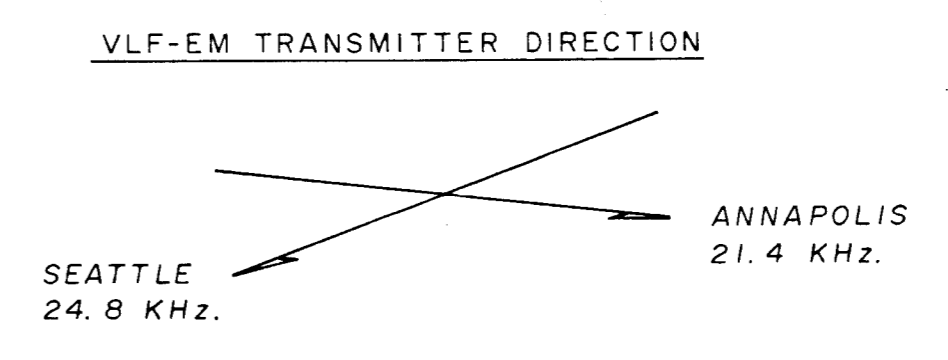
NOTE: The VLF-EM survey measures field strength.
WEAK or VERY WEAK anomalies could be caused by terrain.

MAGNETIC CONTOURS

- 500 gamma
- 100 gamma
- 50 gamma
- 25 gamma
- Depression



Prospect



GEOLOGICAL BRANCH ASSESSMENT REPORT

13,632

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

AMSTAR AMERICAN PETROLEUM CORP.

ST. MARY LAKE PROPERTY

ST. MARY LAKE, KIMBERLEY AREA

FORT STEELE M.D., B.C.

AIRBORNE SURVEY

MAGNETIC CONTOURS & VLF-EM ANOMALIES

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