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GEOPHYSICAL REPORT

ON

AIRBORNE MAGNETIC AND VLF-EM SURVEYS

OVER THE

FRED CLAIM GROUP

BRITTANIA BEACH AREA

VANCOUVER MINING DIVISION

BRITISH COLUMBIA

PROPERTY : 50 km due north of Vancouver,  
B.C. on Meslillooet Creek south  
of Mamquam River  
: 49° 120° NW  
: N.T.S. 92G/10W

WRITTEN FOR : ALSTER ENERGY LTD.  
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DATED : January 14, 1983



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Engineering & Mining Geophysicists

VANCOUVER, CANADA

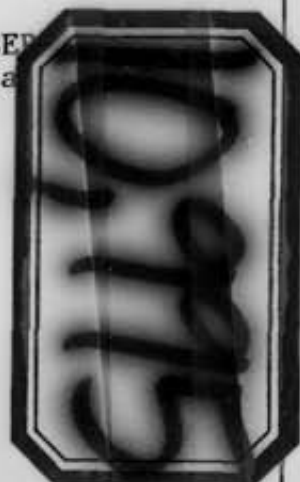


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ASSESSMENT REPORT**

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LIST OF ILLUSTRATIONS

Claim Map

1:50,000

Sheet 1

Airborne Magnetic  
& VLF-EM Survey  
Results

1:10,000

Sheet 2

## SUMMARY

Airborne magnetometer and VLF-EM surveys were carried out over the Fred Claim Group owned by Alster Energy Ltd. of Vancouver, B.C. during the summer of 1982. The claims are located on Meslilloet Creek approximately 50 km due north of Vancouver. The terrain is steep and mountainous with vegetation being fir, cedar and spruce trees. Access is easily gained by a series of 4-wheel drive roads from Squamish. The purpose of the surveys was to aid in the mapping of geology as well as locate probable areas for the exploration of mineralization.

The area is underlain by metasedimentary and metavolcanic rocks of the Gambier formation of Jurassic age, and quartz diorites and related rocks of the Cretaceous Coast Range Intrusives.

The claim is located in proximity to the Maggie Mines Ltd. property on which the presence of significant intersections of gold, copper, lead, zinc and silver mineralization is known to occur. The Alster property is also located near the Anaconda-Brittania Mine property which produced copper, silver, zinc and gold mineralization.

The airborne surveys were flown at about a 50-meter terrain clearance on contour type lines with a separation averaging about 100 meters. The instruments used were a Sabre Electronics proton precession magnetometer and a Sabre Electronics VLF-EM receiver. The magnetic data were picked up from the strip charts, and plotted on a survey plan with the magnetic contours.

### CONCLUSIONS

1. The Alster property is underlain by rocks that may be favourable to mineralization. In the area occurs the Britannia Mines property as well as the Maggie Mines property. A number of gossan areas and mineral showings are known to occur on recently staked claims in the surrounding area as well.

2. The magnetic survey probably has mapped more basic phases of the Coast Intrusives. The more favourable Gambier Group metavolcanics may occur on the property but do not appear to have a magnetic signature different from that of the quartz diorites.

3. Both the VLF-EM and magnetic surveys revealed lineations on the Fred Claim Group that are likely caused by fault, shear and/or contact zones. These usually are important as indicators of sulphide and native gold mineralization, especially where the lineations cross.

### RECOMMENDATIONS

The property should be geologically mapped and/or prospected. If the results are then warranted, then the exploration program should be continued in the form of soil sampling, ground EM and possibly magnetics.

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INTRODUCTION AND GENERAL REMARKS

This report discusses the survey procedure, compilation of data and the interpretation of airborne magnetic and VLF-EM surveys carried out over the Fred Claim Group during the summer of 1982. The surveys were carried out by E.A. Dodd, instrument operator and project manager, and Lloyd Brewer, navigator, both of whom are of Columbia Geophysical Services Ltd. The survey data were brought to the writer, already compiled and contoured, for interpretation.

The Fred Claim Group was staked for gold, silver and copper mineralization which occurs nearby on the very promising prospect of Maggie Mines Ltd. as well as within the long-running Brittania Mine (not running at present).

The object of the two surveys was to aid in the geological mapping of lithology and structure for the purpose of explor-

ation of this type of mineralization.

#### PROPERTY AND OWNERSHIP

The property consists of four 2-post claims and one 20-unit modified grid claim to give a total of 24 units described as follows and as shown on the claim map.

<u>Claim Name</u>	<u>Record No.</u>	<u>Expiry Date</u>
Fred 3	1041	October 8, 1983
F	1042	October 8, 1983
R	1043	October 8, 1983
E	1044	October 8, 1983
D	1045	October 8, 1983

The property is owned by Alster Energy Ltd. of Vancouver, British Columbia.

#### LOCATION AND ACCESS

The claim area is 50 km due north of Vancouver and is located south of the Mamquam River on Meslilloet Creek.

The geographical coordinates are  $49^{\circ} 35'$  N latitude and  $122^{\circ} 52'$  W longitude.

It can be reached by taking the Mamquam River Road, immediately south of Squamish, then turning right on the Stawamus River Road. This is followed for several kilometers before turning left to cross Indian River and heading up a road on the north side of Meslilloet Creek for approximately 0.8 km. Most of the claim can be reached on old logging roads by a 4-wheel drive vehicle.

### TOPOGRAPHY

The property is located at the south end of the Pacific Ranges which is a physiographic unit of the Coast Mountains. The terrain is, in general, steep and mountainous with elevations ranging from 400 m to 1,800 m. The claims are dissected by major northwest drainage systems with general relief from ranges to valleys being in the order of 1,000 m. The area is forested and overburden covered with only scattered outcrops generally exposed except for precipitous rock at high elevation. Vegetation on the lower slopes consists of Douglas fir, cedar and spruce.

### HISTORY OF PREVIOUS WORK

The area of the Britannia district to the southwest of the claim area has long been well known for production from the Anaconda Mine. Production between 1905 and 1974 yielded 55 million tons of ore grading 1.1% copper, 0.65% zinc, 0.2 oz/ton silver and 0.02 oz/ton gold.

Exploration work on the Maggie Mines property, in proximity to the recently acquired land, between 1977 and 1981 included trenching, geological mapping, diamond drilling, geochemical analysis on diamond drill core, soils and stream sediments, Turam surveys performed by another company in 1970 and re-interpreted, and magnetometer surveys.

On the Fred Claim Group no previous work has been done since the property has been staked.

### GEOLOGY

The following is quoted from the geological report on the



property by W.G. Timmins:

"The area is underlain by metasedimentary and metavolcanic rocks of the Gambier Formation of Jurassic age, and quartz diorites and related rocks of the Cretaceous Coast Range intrusives. The favourable metavolcanics appear to be of rhyolite to dacite composition, and are associated with argillites, cherts, anhydrites and minor barite units. The greenstones, cropping out discontinuously as pendants within granitics, are the host rocks for the Brittania Mine, the Maggie, McVicar and other nearby prospects, the Northair Mine, Seneca and Fire Lake prospects as well as numerous other showings.

"They are metamorphosed regionally in the lower greenschist facies and intensely deformed.

"The regional structure is dominated by transposition of pendants of the older metavolcanics in northwest striking attitudes. These may or may not be accompanied by massive regional shear zones such as the Brittania shear.

"Structure and stratigraphy in the area are complicated and as yet, not well known. The structure in the area of the Maggie Mines property consists of tight folds and the transposition of rocks into S-Tectonites."

"The following is an abstract quoted from a paper titled "Deformed Mesozoic Volcanogenic Cu-Zn Sulphide in the Brittania District, British Columbia" authored by J.T. Payne, J.A. Bratt and B.G. Stone and printed in Economic Geology, volume 75, 1980, pages 700 - 721:

'The Brittania copper-zinc sulphide deposits, previously described as having formed from hydrothermal solutions emplaced into foliated host rocks, are re-interpreted as volcanogenic in origin and to have been deposited from hydrothermal and exhalative solutions related to contemporaneous dacitic volcanism and then deformed during later shearing and faulting. Massive sulphide deposits occur near the upper contact of coarse dacitic tuff. Anhydrite, barite, and chert form related exhalative deposits.'

"Pyrite, pyrrhotite, chalcopyrite, sphalerite and galena are the principal sulphide minerals [on the Maggie Mines property]. The mode of occurrence of silver and gold which has been reported in minor quantities is not known.

"The sulphide minerals occur in several forms. Pyrite and pyrrhotite are frequently disseminated in some of the volcanoclastic units, although not necessarily together. Observations suggest that the principal occurrence of the other sulphides is associated with silicified zones.

"Reports and news releases on the Maggie Mines Ltd. property indicate the presence of significant intersections of copper, lead, zinc and silver mineralization indicated by drilling carried out on the property within a possible massive sulphide volcanogenic mineral belt sub-parallel to and some four miles northeast of the past productive Brittania ore zones."

#### SURVEY PROCEDURE

The survey was contour flown at 75 meter elevation intervals. The main bird terrain clearance was 50 meters. Navigation was visual, using 1:50,000 scale N.T.S. maps blown up to

1:10,000. The flying was difficult, due to the rugged and varied terrain, but the chief navigator, Mr. Lloyd Brewer, who had previously done much of the claim staking in the area, was able to draw on his experience to overcome numerous navigational pitfalls. He carried out his duties in a thoroughly diligent and professional manner.

Aerial platforms used to conduct this survey were Bell Jet Ranger III helicopters owned and operated by Quasar Aviation and Corporated Helicopters Ltd. The pilots were Mr. Dave VanPatten and Mr. Jim Logue, who were chosen over other operators in the province because of their rotary-wing experience and their familiarity with the mountainous terrain east and west of Howe Sound.

Mr. Eugene Dodd, President of Columbia Geophysical Services Ltd., was the instrument operator and project supervisor.

A two meter bird, specifically designed for the Squamish airborne project, was fitted with a magnetometer coil and two omni-directional EM receivers and towed beneath the helicopter on a 10-meter cable.

Airspeed was a constant 60 K.P.H. Creek valleys and 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. Increased airspeed would increase the inconsistency of the results.

The project supervisor, Mr. Dodd, has over 14 years of experience in conducting aerial magnetic, electromagnetic, and radio-metric surveys from fixed and rotary-wing aircraft, under all types of terrain conditions.

## 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 a 12 cm analog strip chart.

The magnetic patterns obtained from a regional airborne survey are directly related to the distribution of magnetite in the surveyed 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, pipeline, 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. The researcher must make use of other data such as geological, photogeological, and electromagnetic information in combination with magnetic data to make accurate geological analyses.

### 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 were NLK Arlington (Seattle) Washington, operating at 24.8 KHz, and Annapolis, Maryland, transmitting at 21.4 KHz. These signals were used due to their ideal orientation with respect to northwest-southeast and east-west geological structures, and their good signal strengths. The measurement taken during the survey is the variation in the horizontal component of the signal field strength.

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 northeast to southeast strikes will respond to Annapolis, while conductors striking south-southwest to east-northeast will respond to Seattle transmissions. Conductors striking southeast may respond to both stations, giving coincident field strength peaks.

The theory of VLF-EM interpretation is quite simple. Conductors are located at field strength maxima. In the Howe Sound area, one may assume that a Seattle field strength peak represents a conductor with a generally northwest-southeast trend, and an Annapolis peak will be a conductor with an east-west trend. This, of course, only applies to conductors with

clearly linear trends and cannot be assumed for single line anomalies.

It is impossible to determine the quality of conductors with any reliability, using field strength data alone. The question of linearity is in doubt if the conductor does not appear to cross the adjacent flight lines. The relatively high frequency results in a multitude of anomalies from unwanted sources such as swamps, creeks and cultural debris. However, the same characteristic also results in the detection of poor conductors such as faults, shear zones, and rock contacts, making the VLF-EM a powerful mapping tool.

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

#### DISCUSSION OF RESULTS

The magnetic field over the survey area is relatively quiet compared to that of other areas in the surrounding region. The field varies from less than 1,500 gammas in the northwestern part of the Fred 3 Claim to over 2,500 gammas near the northeastern part giving a range of about 1,000 gammas. However, most of the property ranges from 1,800 to 2,000 gammas, indicating a magnetically quiet rock-type.

The G.S.C. map of the area shows the property to be underlain by quartz diorites. The magnetite within the rock is usually fairly evenly distributed and in fairly low amounts. This correlates with the results of the magnetic survey.

However, there are three highs located just out of the property boundaries to the north, northeast and southwest, respectively. The writer feels the likely cause of these highs are more basic phases of the Coast Intrusives such as diorite or gabbro, both of which occur in this area. Two other causes could be: (1) a magnetite-enriched area of quartz diorite, or (2) cappings of the Tertiary Garibaldi volcanics.

Some magnetic lows follow the creeks, especially Meslillooet Creek. It would appear that these lows are a reflection of the thickness of the overburden cover.

The favourable Gambier Group metavolcanics and metasediments may occur on the property since they have been mapped by the G.S.C. in close proximity. This group also has a quiet magnetic signature, like that of the quartz diorites, which correlates with the magnetics as has been mapped on the property. This means that the magnetic signature between the two rock types is probably similar. It is also quite possible that the Gambier Group has lower magnetic intensity than the quartz diorites. If this is the case, then the magnetic lows such as those along the valleys may be indicative of the Gambier Group.

Since magnetic lows as well as VLF-EM anomalies are often indicative of geological structure, such as fault, shear and contact zones, the writer has drawn on the map lineal trends of magnetic lows and VLF-EM anomalies. Often the two are coincidental. Structure is often important for the emplacement of mineralizing fields. For the same reason, where lineations intersect, it is considered to be of greater exploration interest.

The northwest-striking lineation crossing the northeastern corner of the property could well be a contact between a more basic phase of the Coast Intrusives to the north and a more acidic phase and/or Gambier Group rocks to the south.

It should also be pointed out that the VLF-EM anomalies may be indicating sulphide mineralization directly. This would hold true whether the VLF-EM anomalies occur on lineal trends or whether they are only 1-line anomalies.

Respectfully submitted,  
GEOTRONICS SURVEYS LTD.



David G. Mark,  
Geophysicist

February 1, 1983



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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 at #403-750 West Pender Street, Vancouver, British Columbia.

I further certify:

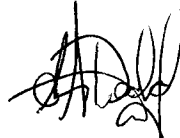
1. That I am a graduate of the University of British Columbia (1968) and hold a B.Sc. degree in Geophysics.
2. I have been practising my professional for the past 15 years and have been active in the mining industry for the past 18 years.
3. That I am an active member of the Society of Exploration Geophysicists and a member of the European Association of Exploration Geophysicists.
4. This report is compiled from data obtained from VLF-EM and an airborne magnetic survey carried out by Columbia Geophysical Services Ltd. under the supervision of E.A. Dodd during the period from June 3rd to October 5th, 1982.
5. I have no direct or indirect interest in the Fred Claim Group nor in Alster Energy Ltd., Vancouver, B.C. nor do I expect to receive any interest therein as a result of writing this report.



January 14, 1983

AFFIDAVIT OF COSTS

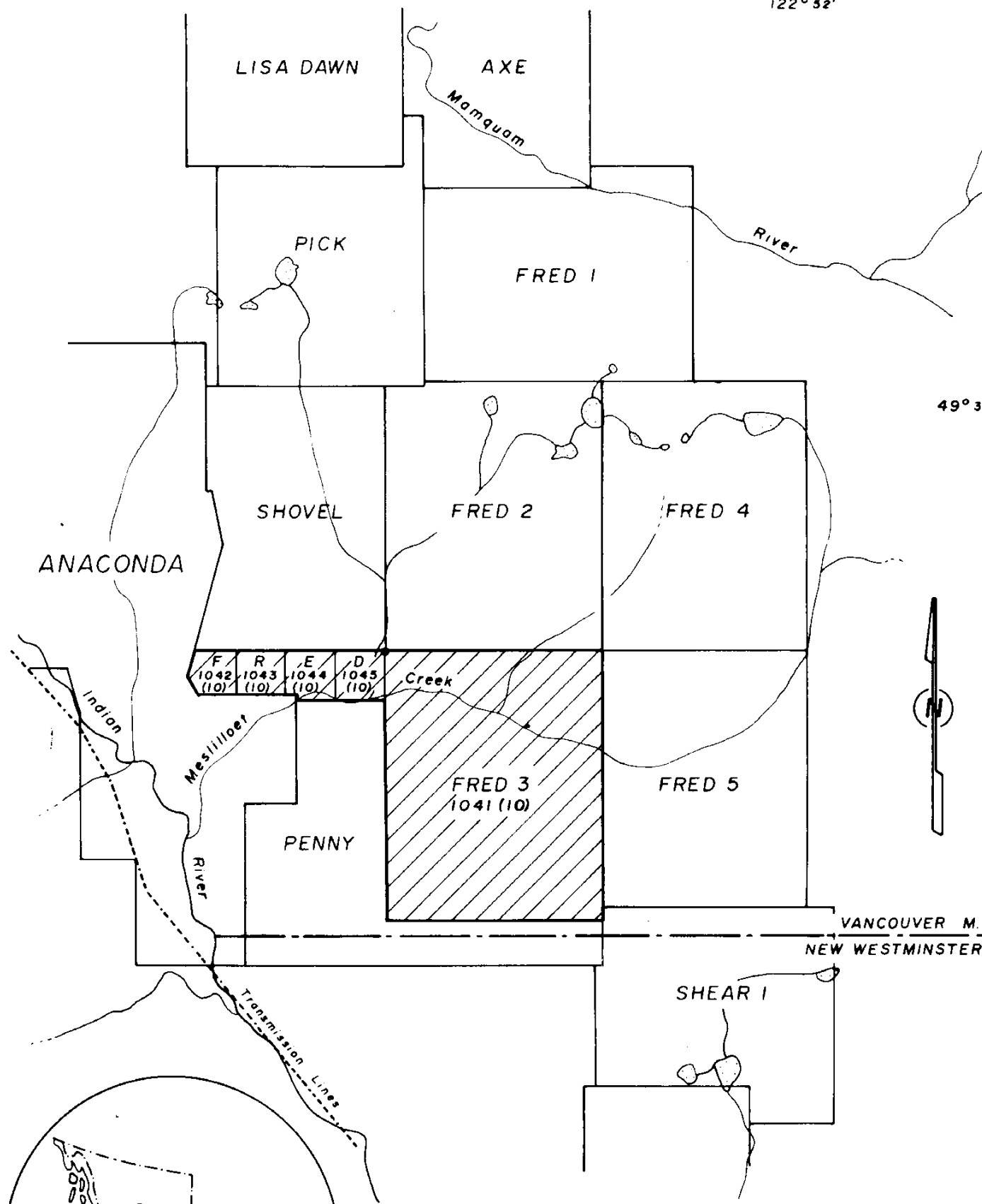
This is to certify that I, Eugene A. Dodd, manager of Columbia Geophysical Services Ltd. carried out airborne magnetic and VLF-EM surveys between the dates of June 5th to October 3rd, 1982 over the Fred Claim Group in the Squamish area of Vancouver Mining Division, British Columbia for the value of \$100/km. The total number of kms flown were 35, giving a total value of \$3,500.00 to the surveys.



Eugene A. Dodd

122° 52'

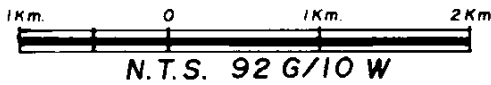
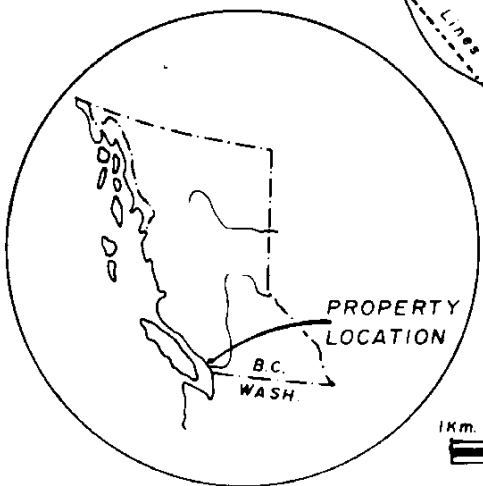
49° 37'



F	R	E	D
1042	1043	1044	1045
(10)	(10)	(10)	(10)



VANCOUVER M.D.  
NEW WESTMINSTER M.D.

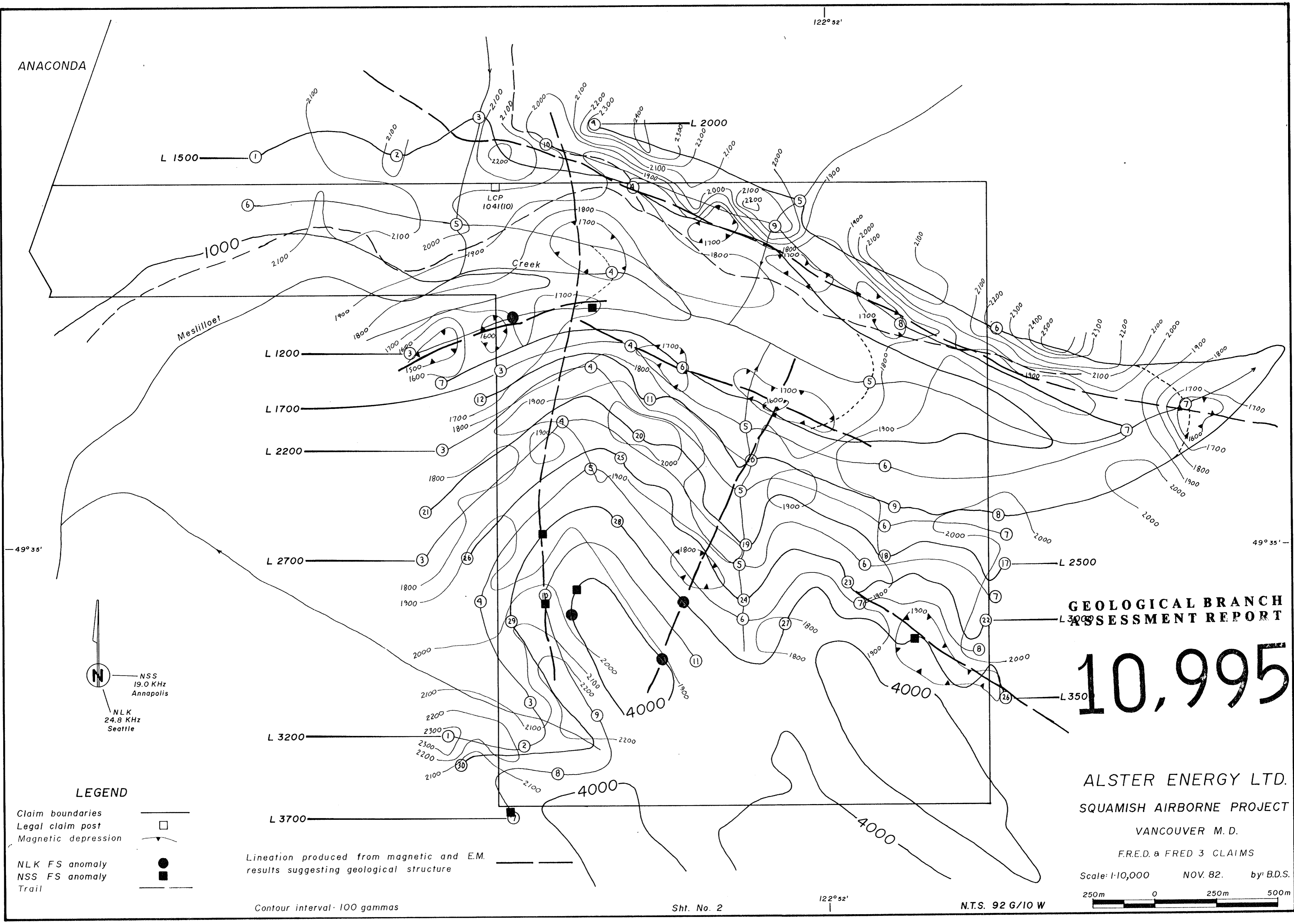


ALSTER ENERGY LTD.  
CLAIM LOCATION MAP  
FRED 3 & FRED. CLAIMS  
INDIAN RIVER AREA  
VANCOUVER M.D.

1:50,000    JAN 83    B.D.S.  
Sht. No.1

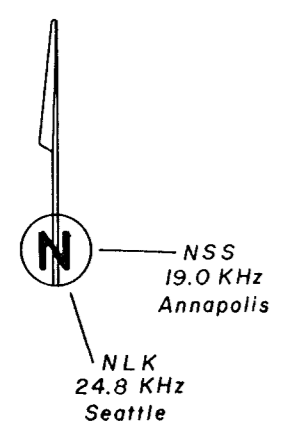
ANACONDA

122° 52'



49° 35'

49° 35'



**LEGEND**

- Claim boundaries
- Legal claim post
- Magnetic depression
- NLK FS anomaly
- NSS FS anomaly
- Trail

Lineation produced from magnetic and E.M. results suggesting geological structure

Contour interval: 100 gammas

**GEOLOGICAL BRANCH  
ASSESSMENT REPORT**

**10,995**

**ALSTER ENERGY LTD.  
SQUAMISH AIRBORNE PROJECT  
VANCOUVER M.D.**

F.R.E.D. & F.R.E.D. 3 CLAIMS

Scale: 1:10,000 NOV. 82. by: B.D.S.



Sht. No. 2

122° 52'

N.T.S. 92 G/10 W