77-#141-#6260

6260

GEOPHYSICAL-GEOCHEMICAL REPORT

on

VLF-EM AND SOIL SAMPLE SURVEYS

SNOWFLAKE CLAIM GROUP

ASPEN GROVE AREA, NICOLA M.D., B.C.

SNOWFLAKE CLAIMS:		2 1/2 miles N25E of Aspen Grove and 13 miles S43E of the town of Merritt, B.C.
	:	49° 120° NW
	:	N.T.S. - 92H/15E

Written for: Fred Gingell
6400 Roberts Street
Burnaby, B.C.

by: David G. Mark
GEOTRONICS SURVEYS LTD
307-475 Howe Street,
Vancouver, B.C.

Dated: January 26, 1977

TABLE OF CONTENTS

ILLUSTRATIONS

SUMMARY

In the Spring and in the Fall of 1976, soil sampling was carried out on the Snowflake Claim Group, and also in the Fall, a VLF-EM survey was carried out. The Snowflake Claim Group is located 13 miles southeast of Merritt and two miles south of Courtney Lake, abutting the east side of Highway No. 5. Access to all parts of the property is easily gained by two-wheel drive vehicle. The terrain consists of lightly forested grasslands with mainly gentle slopes. The object of the surveys was to locate probable areas of copper and silver mineralization.

Previous work consists of geological mapping, two ground magnetic surveys, an IP survey, trenching, diamond drilling, and percussion drilling.

Much of the property is underlain by a sequence of rocks of the Nicola Group of Triassic Age which, on this property, consist of various volcanic rocks and some sedimentary rocks. Within the centre of the property is a large dioritic plug of Upper Triassic to Lower Jurassic age. Within the centre of the diorite is a syenite-monzonite. The mineralization is found mostly in the diorite but also in the Nicola volcanics. It occurs as finely disseminated native copper with lesser amounts of chalcopyrite, chalcocite and bornite. A considerable amount of pyrite is also found on the property.

The VLF-EM readings and the soil samples were taken every 100 feet on 400-to 600-foot separated east-west lines (some samples were taken at 200-or 400-foot intervals). The VLF-EM readings were Frazer-filtered, plotted and contoured. The soil samples were tested for copper and silver, and the results statistically analyzed, plotted and contoured. In addition, the magnetic, frequency effect (IP), and resistivity data from previous surveys was statistically analyzed for threshold values. The sub-anomalous contour outlines from this data were drawn with the VLF-EM and soil geochemistry anomalies on a compilation map.

CONCLUSIONS

1. The Snowflake property is underlain by volcanic and sedimentary series of the Nicola Group that is intruded by a plug of diorite and syenite-monzonite. Fault, shear and breccia zones with related copper mineralization are found throughout these rocks.

2. The VLF-EM anomalies are probably for the most part caused by these fault, shear and breccia zones.

3. The VLF-EM anomalies correlate very well with the copper and silver soil geochemistry anomalies. This indicates the causitive sources are related closely to structure and that they may be narrow zones.

4. VLF-EM anomalies 'd' and 'e', located where no soil sampling has been carried out, are probably related to copper mineralization as well.

5. The ground magnetic survey very well defines the diorite intrusive. The syenite-monzonite may be reflected by a low. The magnetic survey indicates the diorite intrusive extends well past the eastern boundary of the Snowflake Claim.

6. A major IP anomaly in the eastern part of the Snowflake 3 claim is likely caused by pyritization and minor copper mineralization. Copper and silver anomalies are found within this IP anomalous zone.

7. The above named IP anomaly, together with three other IP anomalies, may be the result of a pyrite halo. This would therefore indicate a sulphide body of economic interest may occur on the central eastern boundary of the property.

8. From the apparent results (that is, word of mouth) of diamond drill hole BJ-1 drilled underneath the meadow and north-trending VLF-EM anomaly 'C', and from the VLF-EM survey results, the meadow is likely the result of a N60E-trending fault (and partly a north-trending fault as well). The drill hole, encountering a fault and sulphides on the west side of the fault, strongly suggests sulphides are related to the 'meadow' faults.

9. At first glance at the location of the diamond drill and percussion drill holes, it would seem the property has been thoroughly drilled. However, very few of these holes have properly drilled the soil geochemistry anomalies, and only BJ-1 and BJP-5 have drilled VLF-EM anomalies. Furthermore, the results of any of the drill

holes are not available. Therefore, the drilling, in assessing the property, should be discounted.

RECOMMENDATIONS

1. Considering the strong potential to the east of the Snowflake Claim, the mineral rights to this area should be acquired.

2. The soil sampling should be extended to the west, to the east, and possibly to the south of the area so far sampled.

3. The VLF-EM survey should be continued to the east and possibly to the south as well.

4. If possible, deep soil samples should be taken at several spots on the meadow. It would be desirable to sample the C horizon and compare the results to C horizon samples from elsewhere on the property.

5. A few of the lines should be rerun by the induced polarization method and compared with the previous results. The previous survey was done nine years ago and electronics have changed considerably since then.

6. Any drill targets resulting from the above program should be diamond drilled rather than percussion drilled. Logging of the core is considered to be important on this property.

GEOPHYSICAL-GEOCHEMICAL REPORT

on

VLF-EM AND SOIL SAMPLE SURVEYS

SNOWFLAKE CLAIM GROUP

ASPEN GROVE AREA, NICOLA M.D., B. C.

INTRODUCTION AND GENERAL REMARKS

This report discusses the survey procedure, compilation of data, and the interpretation of a soil sampling survey and a very low frequency electromagnetic (VLF-EM) survey carried out over most of the Snowflake Claim Group during the past year. In addition, this report discusses the recompilation and re-interpretation of data from induced polarization, resistivity, and magnetic surveys carried out by Geosearch Consultants Ltd for Ashland Oil and Refining Company during 1968.

The soil samples were picked up by or under the immediate supervision of R. W. Yorke-Hardy in two different groups.

The first group, consisting of 176 soil samples, were picked up from April 21 to May 2, 1976, and were tested for copper and silver. The results were subsequently discussed in a report by R. W. Yorke-Hardy and submitted for assessment work. The second group consists of 160 samples and were picked up during September and October, 1976. The total number of samples is 336.

The VLF-EM survey was carried out by the writer during November 1st and 2nd, 1976.

The purpose of the soil geochemistry survey was to extend the known zones of copper and silver mineralization found on the property. That of the VLF-EM survey was to do the same as well as delineate structure such as faults and shear zones.

PROPERTY AND OWNERSHIP

The property consists of three contiguous claims totalling 16 units as shown on Figure 2 and as described below:

Claim Name	No of Units	Record No.	Tag No.	Expiry Date
Snowflake	6	8(5)	02059	May 13 1978
Snowflake 2	4	93(4)	19656	April 14, 1978
Snowflake 3	6	167(8)	19657	Aug. 20, 1977

The property is owned by Fred Gingell of Burnaby, B.C.

LOCATION AND ACCESS

The centre of the Snowflake claims is two miles south of Courtney Lake, 2 1/2 miles N25E of Aspen Grove, and 13 miles S43E of the town of Merritt.

The geographical coordinates are 49° 59'N latitude and 120° 36'W longitude.

Access to the property is excellent as it abuts the east side of Highway 5, which is paved. By road, the property is sixteen miles south of Merritt and three miles north of Aspen Grove. At this point is a dirt road which turns east off the highway, and runs through the northern part of the Snowflake Claim. Connecting roads run throughout the whole property as shown on Figure 2 and sheets 1-4.

PHYSIOGRAPHY

The Snowflake claims lie in the southern part of the physiographic division known as the Thompson Plateau which is part of the Interior Plateau System. The terrain varies from flat or rolling hills over most of the property to very moderate slopes in certain parts. The general trend of the topography runs north and northeast. Elevations vary from

3300 feet a.s.l in the northeast part of Snowflake 3 to 3900 feet a.s.l. in the northeast part of Snowflake 2 to give a relief of only 600 feet.

The main water source is a large lake-type swamp as shown on Figure 2 and sheets 1-4. A northeast-flowing creek drains this swamp.

Vegetation of the property can be described as forested ranchland. The trees are coniferous and consist mainly of pine, fir and spruce.

HISTORY OF PREVIOUS WORK

Work on the property probably goes back a number of decades but the writer is only aware of work done when the property was previously staked as the Blue Jay Claims owned by H. Nesbitt of Aspen Grove, B.C.

In 1967, Valnicola Copper Mines Ltd optioned the property and drilled six diamond drill holes totalling 2000 feet.

About 1968 the property was optioned to Ashland Oil and Refining Co. Ltd. They, by contracting to Geosearch Consultants Ltd carried out a frequency domain induced polarization survey and a magnetic survey.

In 1971 the property was optioned to Rio Tinto Canadian Exploration Ltd. They carried out geological mapping and a magnetic survey.

In 1973 Craigmont Mines Ltd carried out a 19-hole percussion drilling program. They drilled one diamond drill hole as well.

In 1975 the claims were allowed to lapse, and R. W. Yorke-Hardy restaked the ground as the Snowflake claims. Under his direction limited soil sampling was done.

In addition to the above, numerous trenches, pits, and adits have been dug at unknown dates.

GEOLOGY

The oldest rock, and by far the most pervasive, on the property and general area, is the Nicola Group which is Upper Triassic to Lower Jurassic in age. These rocks are distributed and described as follows: On the eastern part of the Snowflake 3 claim are grey to green, massive, pyroxene-rich andesite and green volcanic breccia. Below the northeast-trending meadow-type swamp are siltstone, sandstone and argillite; green and red volcanic breccias; well-bedded red crystal tuff, lapilli tuff, and volcanic silstone; red to maroon autobrecciated augite basalt porphyry.

Intruding into the Nicola Group is a fine-to medium-grained diorite of Upper Triassic to Lower Jurassic Age, possibly of the Coast Intrusions. It occurs along the western part of the Snowflake Claim. According to Preto, et al, it contains pyroxene and amphibole, is porphyritic and is brecciated along the western margin.

Within the diorite intrusive is a northeast-trending ellipsoid of fine-to medium-grained monzonite-syenite, also of Upper Triassic to Lower Jurassic age, but probably younger than the diorite.

The major trend of the structure on the property is northerly. However, as evidenced by topography and geological mapping by E. Bohn, some structure trends northeasterly as well. Strong fracturing is found throughout the rocks.

The alteration, as noted by E. Bohn, consists of widespread epidote and chlorite as well as generally strong secondary K-spar veining. In addition, silicification is locally strong and secondary biotite and magnetite are spotty but locally moderate.

Widespread mineralization is found throughout the diorite and syenite-monzonite as well as the red and green andesites south of the northeast-trending meadow. It

occurs mainly as finely disseminated native copper with lesser amounts of chalcopyrite, chalcocite, and bornite. Pyrite is found throughout the area as well, especially on the eastern part of the Snowflake 3 claim.

GOVERNMENT AEROMAGNETIC SURVEY

The survey over the property and up to the 50th latitude was flown for the federal and provincial governments by Geoterrex Limited from October, 1969 to April 1972. North of the 50th latitude was flown by Lockwood Survey Corporation Ltd from December, 1966 to May, 1968. Both surveys were flown at a terrain clearance of 1000 feet.

The Snowflake property sits on a 59,000-gamma aeromagnetic high that is the northernmost anomaly of a series of highs trending in a northerly direction. In correlating with the geological map of Preto, et al, and from the ground magnetic and geological surveys carried out on the Snowflake claims, the anomalous highs seem to be reflecting dioritic rocks (an intrusive, or dioritic phase of the Nicola volcanics).

The writer has interpretted aeromagnetic lineations as shown on Figure No. 2. These lineations very likely reflect major, regional faults. The most prominent lineation is a northwest-trending one that runs near the northeast corner of the Snowflake 3 claim and through Courtney and

Corbett Lakes.

VLF-EM SURVEY

1. Instrumentation and Theory:

A VLF-EM receiver, Model 27, manufactured by Sabre Electronic Instruments Ltd of Burnaby, B.C. was used for the survey. This instrument is designed to measure the magnetic component of a very low frequency (VLF) electromagnetic field. The U.S. Navy submarine transmitter located at Seattle, Washington and transmitting at 18.6 KHz. was used.

In all electromagnetic prospecting, a transmitter produces an alternating magnetic field (primary) by a strong alternating corrent usually through a coil of wire. If a conductive mass such as a sulphide body is within this magnetic field, a secondary alternating current is induced within it which in turn induces a secondary magnetic field that distorts the primary magnetic field. It is this distortion that the EM receiver measures. The VLF-EM uses a frequency range from 16 to 24 KHz. whereas most EM instruments use frequencies ranging from a few hundred to a few thousand Hz. Because of its relatively high frequency, the VLF-EM can pick up bodies of a much lower conductivity and therefore is more susceptible to clay beds, electrolyte-filling fault or shear zones and porous horizons, graphite, carbonaceous sediments, lithological-

contacts as well as sulphide bodies of too low a conductivity for other EM methods to pick up.

Consequently the VLF-EM has additional uses in mapping structure and in picking up sulphide bodies of too low a conductivity for conventional EM methods and too small for induced polarization (in places it can be used instead of IP). However, its susceptibility to lower conductive bodies results in a number of anomalies, many of them difficult to explain and, thus, VLF-EM preferably should not be interpreted without a good geological knowledge of the property and/or other geophysical and geochemical surveys.

2. Survey Procedure:

The survey was run on a pre-established grid on which the survey lines ran east-west at about a 400-to 600-foot separation. Dip angle readings were taken every 100 feet with the instrument facing towards the transmitter at Seattle.

3. Compilation of Data:

The readings were reduced by applying the Fraser Filter. Filtered data, as shown on Sheet 1, are plotted between the reading stations. The positive filtered values were contoured at intervals of 5^{o}.

The Frazer filter is essentially a 4-point difference operator which transforms zero crossings into peaks, and a low pass smoothing operator which reduces the inherent high frequency noise in the data. Therefore, the noisy non-contourable data are transformed into less noisy, contourable data. Another advantage of this filter is that a conductor that does not show up as a cross-over on the unfiltered data quite often will show up on the filtered data.

SOIL GEOCHEMISTRY SURVEY

1. Survey Procedure:

The soil sampling done before the VLF-EM survey, was carried out on the pre-established grid, except that the lines had to be rechained, repicketed, and reflagged. The lines are 400 to 600 feet apart and run east-west. The samples were picked up every 100 feet (a few places every 200 or 400 feet) with an auger or folding 'army shovel' and a stainless steel spoon. The depth of sample was from 10 to 12 inches. The horizon sampled was B except where it could not be obtained, then horizon C was sampled. Samples were placed in brown wet-strength paper bags with grid coordinates marked thereon.

2. Testing Procedure:

All samples were tested by Kamloops Research and Assay Laboratory Ltd of Kamloops, B.C. The sample is first thoroughly dried and then sifted through a -80 mesh screen. A measured amount of the sifted material is then put into á test tube with subsequent measured additions of aqua regia. This mixture is next heated for a certain length of time. The parts per million (ppm) copper or silver is then measured by atomic absorption.

3. Treatment of Data:

The values in ppm copper and silver were grouped into logarithmic intervals of 0.10. The cumulative frequency for each interval of each element was then calculated and then plotted against the correlating interval to obtain the logarithmic cumulative frequency graph as shown on Figure 3.

The copper graph shows two populations with the division being at the 67% level. Generally, the statistical parameters are taken over that part of the graph that is longest and runs through the 50% level. In this case it would be the bottom leg. But this gives an anomalous level of 340 ppm which is much too high. In the writer's experience, the anomalous area for copper in the general

region is 50 to 70 ppm. The writer therefore concludes that the bottom leg of the graph has been produced by an over abundance of anomalous copper values in the population. In other words, the limits of the soil sample survey were much too restrictive. A true representation of the distribution of copper values on the property is probably the top leg of the graph. If it is extended, it gives statistical parameters that are much more in line with the general area.

The coefficient of deviation, indicative of the range or spread of values was calculated for copper and silver to be 0.15, a somewhat low figure . Therefore the range of values is rather narrow. This statistical parameter is indicative of how well the element has been mechanically or chemically dispersed. Considering the lower than average value, one could then say the dispersion rate for each element is rather low.

The graph for copper shows the mean background value to be about 54 ppm taken at the 50% level. The sub-anomalous threshhold value (a term used by the writer to denote the minimum value that is not considered anomalous but still important as an indicator of mineralization) is taken at one standard deviation from the mean background value which is at the 16% level and is in this case 77 ppm. The

anomalous threshold value is two standard deviations away at the 2 1/2% level and is on this property 110 ppm.

The statistical parameters for silver are:

Mean background value.....	0.65 ppm
Sub-anomalous threshold value.....	0.92 ppm
Anomalous threshold value.....	1.30 ppm

The copper values were plotted on sheet 2 and contoured at an interval of one standard deviation starting at the sub-anomalous contour (77 ppm). This contour was dashed in and the anomalous contours (110, 160, 225, 320, 460, 660, 940 ppm) were drawn in solid. In addition, the anomalous contour of 110 ppm was drawn in on sheet 4, the compilation map.

The silver values were plotted on Sheet 3 and also contoured at an interval of one standard deviation starting at the sub-anomalous contour (0.9 ppm). This contour was dashed in as well and the anomalous contours of 1.3, 1.9, 2.7, 3.8 and 5.2 ppm were drawn in solid. The silver sub-anomalous contour was drawn in on sheet 4.

TREATMENT OF DATA OF PREVIOUS SURVEYS

The data from magnetic and induced polarization surveys carried out in 1968 for Ashland Oil have been statistically analyzed similar to the soil geochemistry data as described above. The only difference is that the magnetic and the frequency effect data were analyzed using arithmetic probability paper. The resistivity data was analyzed with logarithmic probability paper.

1. Magnetics:

Class interval	-500 gammas
Standard deviation interval	-500 gammas
Mean background value	- 1000 gammas
Sub-anomalous low threshhold value	- 500 gammas
Anomalous low threshold value	- 0 gammas
Sub-anomalous high threshhold value	- 1500 gammas
Anomalous high threshold value	- 2000 gammas

The graph clearly showed at least two populations - values below 1500 gammas probably produced by the Nicola Group rocks, and values above 1500 gammas probably produced by the diorite intrusive. The diorite leg of the graph can further be divided into two populations - 1500 to 3000 gammas, and above 3000 gammas. The above 3000 gamma population may simply be a more magnetic phase of the diorite.

The statistical parameters as given above were taken from the Nicola Group 'leg' of the graph. The data was plotted on a property plan map (1" = 400 feet) and contours were drawn at a one standard deviation interval of 500 gammas. The magnetic anomalous lows and highs are shown on the compilation map, sheet 4, as delineated by the 500- and 1500 gamma contours, respectively.

2. Frequency Effect (IP)

Class interval	0.5%
Standard deviation interval	1.0%
Mean background value	2.8%
Sub-anomalous threshold value	3.8%
Anomalous threshold value	4.8%

The anomalies as delineated by the sub-anomalous contour are shown on sheet 4.

3. Resistivity

Logarithmic interval	0.1
Logarithmic standard deviation interval	4.5
Mean background value	180 ohm-feet
Sub-anomalous low threshold value	35 ohm-feet
Anomalous low threshold value	10 ohm-feet
Sub anomalous high threshold value	830 ohm-feet

The resistivity anomalous low as delineated by the sub-anomalous contour are drawn on sheet 4 as well. There are no sub-anomalous high contours. Therefore, a contour of 400 ohm-feet, 1/2 standard deviation interval above the mean background level, was drawn on sheet 4.

DISCUSSION OF RESULTS

The writer will first briefly review the magnetic, induced polarization (frequency effect) and resistivity results before discussing the results of the VLF-EM and soil geochemistry surveys.

In correlating the magnetic survey with the geological maps of Preto, et al, and Bohn, it is clearly seen that the magnetic high occurring over the eastern half of the Snowflake Claim is reflecting the diorite, Within it is a low stretching from L-1S to L-5N that may well be a reflection of the syenite-monzonite. A dyke-like magnetic high on lines 3S to 5S at about 4W correlates directly with a dyke of dioritic composition.

As mentioned above, those areas with values below 1500 gammas probably are reflecting Nicola Group rocks. The magnetic lows are probably reflecting non-magnetic members of this group such as sedimentary rocks, tuffs, and other related rocks.

The main IP anomaly occurs in the northeastern part of the property. It extends northeast from L-5N to-7N and from thence north to off the property. It is the only anomaly with a significant area of anomalous values (as opposed to sub-anomalous values). The causitive source is likely pyrite as it is understood that much pyrite occurs in this area.

A major anomaly occurs 1500 to 2000 feet off of the eastern boundary of the Snowflake claims. It is unknown what the causitive source is as little is known in that area. This anomaly with a small one to the south, a small one centered on (L-1N, 10E) and the major anomaly discussed in the preceding paragraph, may well be the result of a pyrite halo. Therefore, a mineral body of economic interest may possibly occur within the center of the halo.

Another IP anomaly of interest occurs just south of the northeast-trending meadow. Native copper and chalcocite is found in this area and is, therefore, likely the causitive source.

The resistivity results are generally inconclusive, except as noted below.

A major resistivity sub-anomalous low is found to the south-east and around the lake-type swamp. The low is therefore likely a reflection of the swamp. There is minor correlation between the resistivity highs off of the east side of the property and magnetic lows.

As can be seen on Sheet No. 1, a number of VLF-EM conductive zones as represented by the anomaly contours occur on the Snowflake property. Probably the main causitive source are faults and/or shears with the possible assistance of sulphides. The main trend of the anomalies is northerly which is certainly the main structural trend in the area. However, a few of the anomalies also strike northeasterly and one strikes northwesterly. For ease of identification the anomalies are labelled by small letters.

Anomaly 'a' is the main anomaly within the survey area since it has the greatest intensity and length. The intensity reaches 31% and the length is at least 3700 feet being open on the south end. The north end is truncated by a northeast-striking anomaly. Anomaly 'a' correlates roughly with the 3000-gamma magnetic contour on the west side of the main magnetic anomaly. Considering the magnetic anomaly likely reflects the diorite and that the diorite is brecciated.

along the western margin, it is quite probable that the causitive source of the VLF-EM anomaly is this brecciated zone.

Anomaly 'b' occurs along the northeast-trending meadow in the southwest part of the Snowflake Claim. The actual strike is N60E. The anomaly is fairly strong reaching an intensity of 25°. Its length is 2200 feet and open to the southwest possibly ending at the meadow edge. The meadow is probably a topographic expression of a fault and the VLF-EM anomaly seems to verify this.

Anomaly 'c' is a north-striking anomaly that joins anomaly 'b' at its northeast end. It reaches an intensity of 24°, is at least 1800 feet long, and is open to the south. Its causitive source is likely a fault as well. Verifying this is diamond drill hole BJ-1 which apparently encountered a fault and sulphides on the west side. Considering that sulphides were encountered, though it is unknown how massive they were, sulphides may also be the causitive source of both anomalies 'b' and 'c'.

Anomaly 'd' has a length of about 1600 feet, strikes northerly, and reaches a fairly good intensity of 24°. Considering the anomaly correlates directly with a ridge, it may be a terrain-induced anomaly. The writer feels, however, that the intensity is too high to be caused solely by terrain.

Anomaly 'e' strikes in a N35E direction, has an intensity of 18°, and has a length of 2500 feet. As mentioned above, it truncates anomaly 'a' and is itself truncated by anomaly 'd'. There is a strong possibility, therefore, that it is reflecting a fault.

Anomaly 'f' is along the same lineation as anomaly 'e'. In fact, anomaly 'g' can be projected northwards to join 'e' and 'f'. This suggests, therefore, that 'g' was faulted southwards by two north-striking faults.

Anomaly 'i' is the only northwest-striking anomaly.

One of the most interesting facets of the soil geochemistry results is the good correlation with the VLF-EM anomalies. This suggests that the mineralization on the property is structurally related. It also suggests that possibly the mineralization occurs in narrow zones.

Where a soil geochemistry anomaly correlates with a VLF-EM anomaly, it has been labelled with the same letter. The copper geochemistry results of sheet 2 are dominated by one large anomaly. However, there are anomalies within the larger anomaly, and these anomalies have also been labelled, as well, where they correlate with VLF-EM anomalous zones.

On sheet 2, the main dominant anomaly has a length of up to 4700 feet and is of unknown width since it is open to the east and to the west. The intensity of the zone is quite high reaching almost 1000 ppm. At first glance, it would appear that the anomaly is from one large continuous source of copper mineralization, such as disseminated native copper. This is considered possible but the writer feels that the anomaly is caused by several different sources. This is supported by the existence and shape of the anomalous highs within the larger anomaly and by the correlation of these highs with different VLF-EM anomalies.

Almost the whole area of this large copper anomaly, except for the part labelled 'c' correlates with the magnetic high and therefore the host rock of the causitive source(s) is the diorite. The host rock for 'c' appears to be Nicola volcanics.

Anomaly 'a' correlates with VLF-EM anomaly 'a' and therefore suggests the copper mineralization is structurally related to the breccia zone. Anomaly 'a' is about 3500 feet long. Copper mineralization of chalcopyrite and malachite correlates with 'a' near L-2S.

Copper anomaly 'c' correlates with VLF-EM anomaly 'c' and is about 1600 feet long. The proximity of 'c' to the contact

between the Nicola volcanics and the diorite suggests the copper mineralization is structurally related to the contact zone.

That part labelled 'e' since it correlates with VLF-EM anomaly 'e' suggests the zone may continue to the southwest where no soil sampling has been done. The northeast end of 'e' correlates with known copper mineralization of native Cu malachite and minor chalcopyrite.

A copper anomaly of 1600 feet length occurs on lines 1S to 2N at about 8E. It doesn't correlate with a VLF-EM anomaly but does correlate with a small IP anomaly (sheet 4).

Copper anomaly 'f' of 1600 feet length correlates in part with VLF-EM anomaly 'f' as well as being found within the major IP anomaly. The trend along the creek suggests that it could be a drainage anomaly. Or, it may only be that the anomaly is fault-related and that the creek is a topographic expression of a fault.

Anomaly 'j' correlates with a VLF-EM anomaly, as well as an IP anomaly, and as well with copper mineralization. The host rock here, like 'c' and unlike all the other anomalies, is Nicola volcanics.

The two anomalies in the area 'j' each correlate with a VLF-EM anomaly and are open to the south.

Anomaly 'k' is only a 2-value 1-line anomaly, but has an intensity of 235 ppm and is open to the south and north.

Generally, the correlation between the copper and silver anomalies is not that good. There is some correlation but not a good 'one on one' type. That is, the anomalous silver highs are not found with the anomalous copper highs. Furthermore, the numbers of anomalous silver values is much less than the number of anomalous copper values.

Nonetheless, almost all the silver anomalies correlate with VLF-EM anomalies, and these have been labelled correspondingly This suggests that the silver mineralization is related to fault, shear, and/or breccia zones.

The one anomaly that doesn't correlate with any VLF-EM anomaly is silver anomaly 'o'. It is the best silver anomaly considering its minimum length of 1800 feet and its intensity of 5.0 ppm. Both anomaly 'o' and anomaly 'h' are found within the major IP anomaly in this area. It therefore appears the causitive source of the silver anomalies are more related to pyritization than the copper mineralization.

In the writer's experience, the general background value for silver in this area is unusually high. According to Polikarpochin et al, high silver values in silts indicate that a sulphide body is in the area. If this holds true for silts, it probably holds true for soils as well. Therefore, the high background value for silver on this property may mean a sulphide body is nearby.

Respectfully submitted,
GEOTRONICS SURVEYS LTD.,

David G. Mark
Geophysicist

January 26, 1977

SELECTED BIBLIOGRAPHY

Aeromagnetic Map, Aspen Grove, B.C. Geol.Surv.of Can., Map 8532G, Sheet 92 H/15, 1973.

Aeromagnetic Map, Merritt, B.C. Geol. Surv. of Can. Map 5209G, Sheet 92 I/2, 1968.

Bohn, E. Geological Map and Submittal Record of Snowflake Property, Utah Mines Ltd. December 20, 1976.

Cockfield, W.E., Geology and Mineral Deposits of Nicola Map-Area, British Columbia, Geol. Surv. of Can., Mem. 249, 1961.

Dawson, J. M. Report on the Snowflake, Bluey and Prize Properties, Aspen Grove Area, Nicola,M.D., B.C. for J. Gingell, Kerr, Dawson and Assoc. Ltd. July 9, 1975.

Dolan, W.M., Ballantyne, E.J., Macauley, T.N., Geophysics of the Copper Mountain and Ingerbelle Orebodies in British Columbia, CIM Bulletin, July 1975, pp.90-97.

Preto, V.A., Kalnins, T.E., Thomsen, N.A., and Nebocat, J., Preliminary Geological Map of Aspen Grove Area (parts of 92 H/15E and 92I/2E), B.C. Department of Mines and Petroleum Resources, Map 15, 1974.

Rice, M.A. Geology and Mineral Deposits of the Princeton Map Area, British Columbia, Geol. Surv. of Canada, Mem. 243, 1960.

Vollo, N.B. Percussion Drilling Report on the Blue Jay Group, Craigmont Mines Ltd., 1974.

Woodard, J.A. Geophysical Report on a Magnetometer and Induced Polarization Survey on the Blue Jay Claims for Ashland Oil and Refining Co.Ltd., Geosearch Consultants Ltd., 1969.

Yorke-Hardy, R.W. Geochemical Report Covering the Snowflake Group of Claims, Aspen Grove Area, Nicola M.D., B.C. 1976.

Author unknown., Geologic Report on Nesbitt Option (Blue Jay Claims), Aspen Grove, B.C. Rio Tinto Canadian Exploration Ltd., 1971 (includes map of ground magnetic survey).

Polikarpochkin, V.V., Kasyanova, V.I., Utgof, A.A. and Cherbyanova, L.F. Geochemical prospecting for polymetallic ore deposits in the eastern Transbaikal by means of the muds and waters of the drainage system (translation from Russian): Int. Geol. Rev., v.2, p. 237-253, 1960. (original in Novoye v Metodike i Tekhniki Geologorazvedochnykh Rabot, Sbornik 1, Leningrad, p. 46-73, 1958)

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 307-475 Howe Street, Vancouver, B.C.

I further certify:

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

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

3. 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 soil sampling carried out by R. W. Yorke-Hardy and from a VLF-EM Survey carried out by myself during November 1976 on the Snowflake claims.

5. I have no direct or indirect interest in this property nor do I expect to receive any interest therein.

David G. Mark
Geophysicist

January 26, 1977

AFFIDAVIT OF EXPENSES

The soil geochemistry and VLF-EM surveys were carried out on the Snowflake Claim Group, Aspen Grove Area, Nicola M.D., B.C. to the value of the following:

FIELD	
Geophysicist, 24 hours at $25/hour	$ 600.00
Mineral Exploration Technician & helper, 30 hours at $40/hour	1,200.00
Vehicle Rental, 3 days at $40/day	120.00
Room and Board, 3 men at $25/per man-day for 8 man-days	200.00
Survey Supplies	50.00
VLF-EM Instrument Rental, 3 days at $15/day	45.00
	$ 2,215.00
LAB	
Soil testing, 160 samples at $1.80/sample	288.00
REPORT	
Geophysicist, 30 hours at $25/hour	750.00
Office Assistant, 20 hours at $10/hour	200.00
Drafting and Printing	250.00
Typing, xeroxing and compilation	155.00
	$ 1,355.00
TOTAL	$ 3,858.00

Respectfully submitted,
GEOTRONICS SURVEYS LTD

David G. Mark
Manager

GEOTRONICS SURVEYS LTD.

SNOWFLAKE CLAIM GROUP

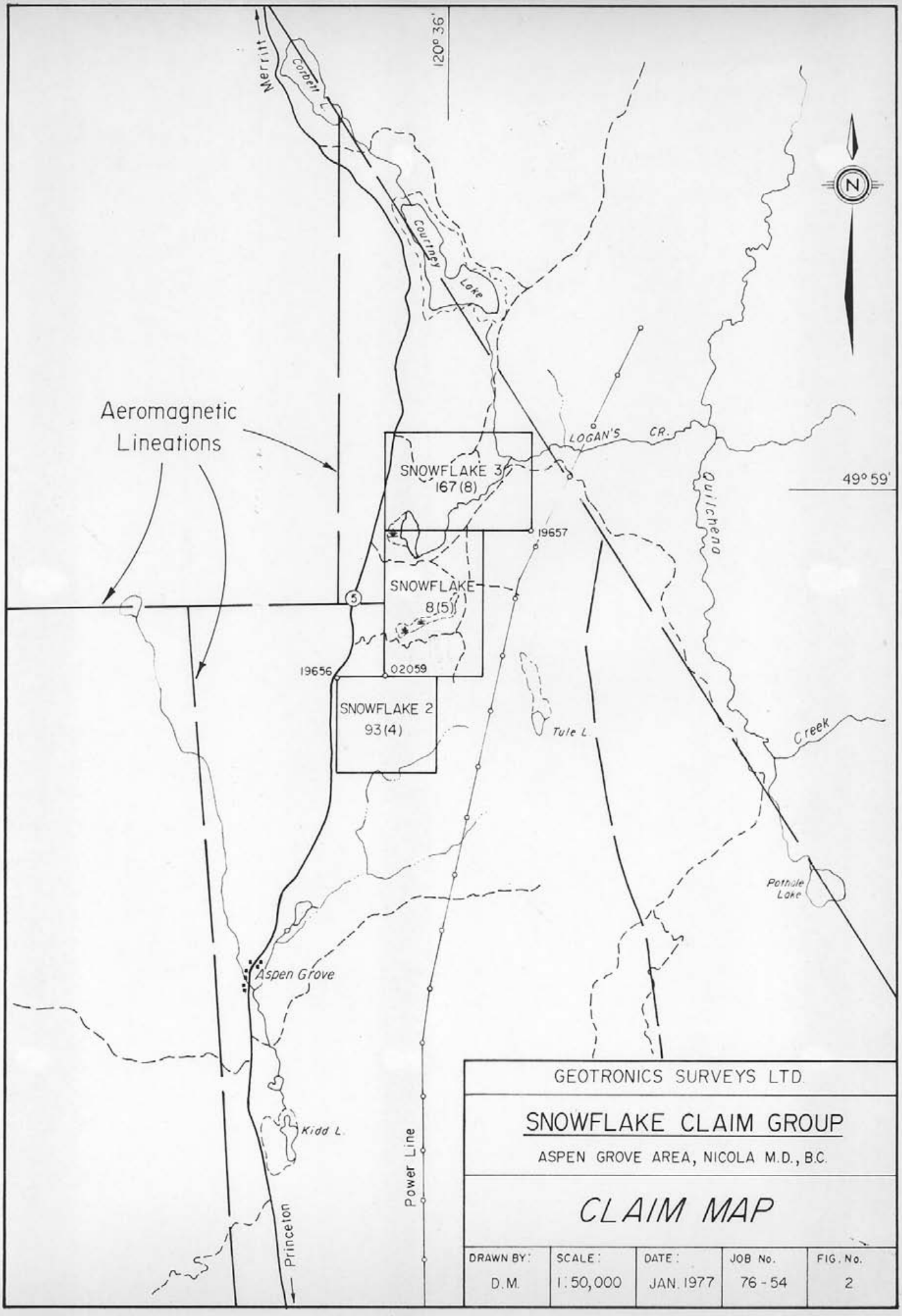
ASPEN GROVE AREA, NICOLA M.D., B.C.

LOCATION MAP

SCALE

Miles 00 50 0 100 200 Miles

ALTAIR drafting services ltd



GEOTRONICS SURVEYS LTD.

SNOWFLAKE CLAIM GROUP

ASPEN GROVE AREA, NICOLA M.D., B.C.

CLAIM MAP

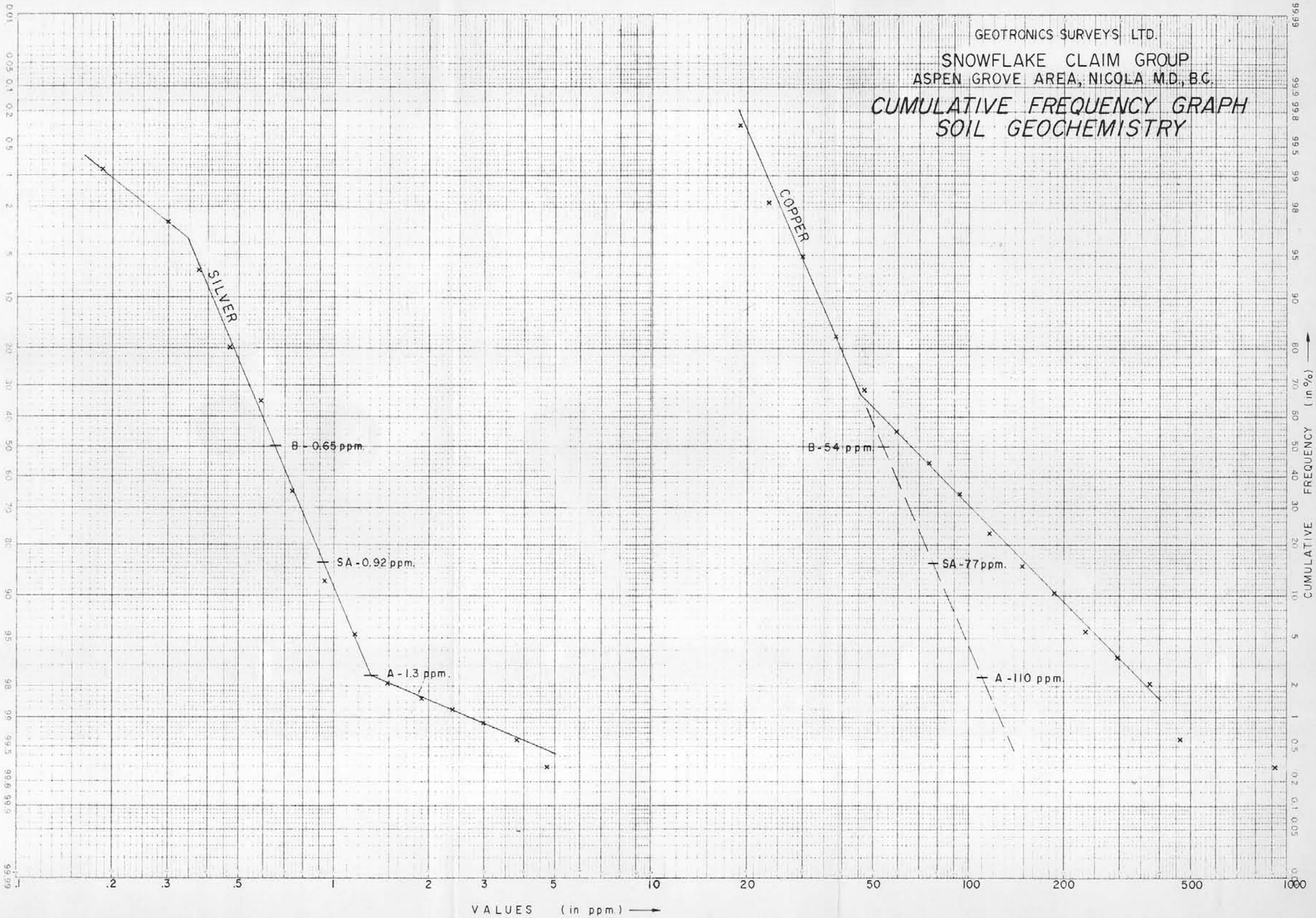
DRAWN BY:	SCALE:	DATE:	JOB No.	FIG. No.
D.M.	1:50,000	JAN. 1977	76-54	2

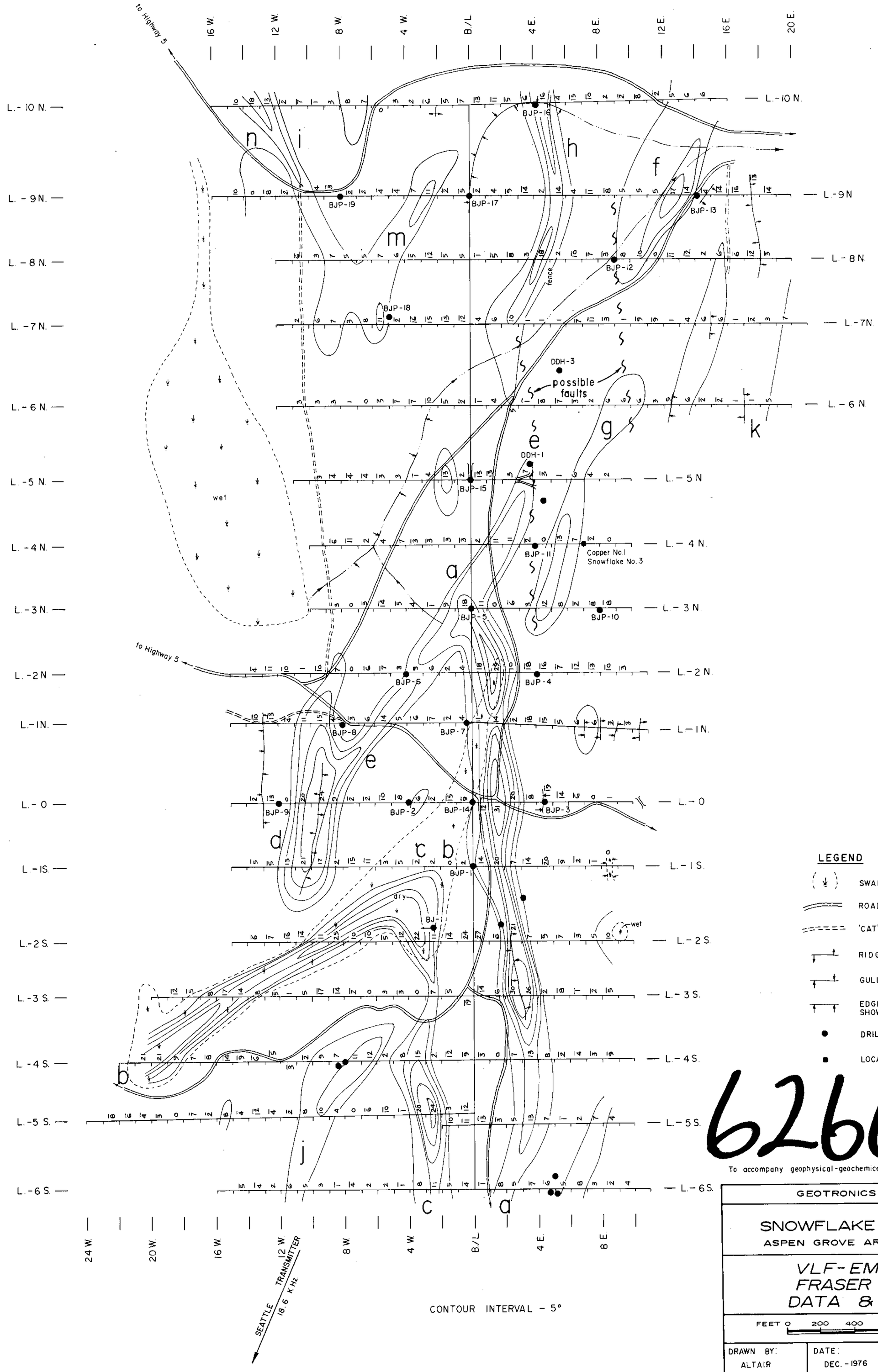
GEOTRONICS SURVEYS LTD.

SNOWFLAKE CLAIM GROUP

ASPEN GROVE AREA, NICOLA M.D., B.C.

CUMULATIVE FREQUENCY GRAPH
SOIL GEOCHEMISTRY





CONTOUR INTERVAL - 5°

LEGEND

- SWAMP
- ROAD
- 'CAT' OR MINOR ROAD
- RIDGE
- GULLY
- EDGE OF HILL WITH ARROW SHOWING SLOPE DIRECTION
- DRILL HOLE (plotted from pre-existing maps)
- LOCATED CLAIM POST

6260-M

To accompany geophysical-geochemical report by DAVID G. MARK, GEOPHYSICIST

GEOTRONICS SURVEYS LTD.

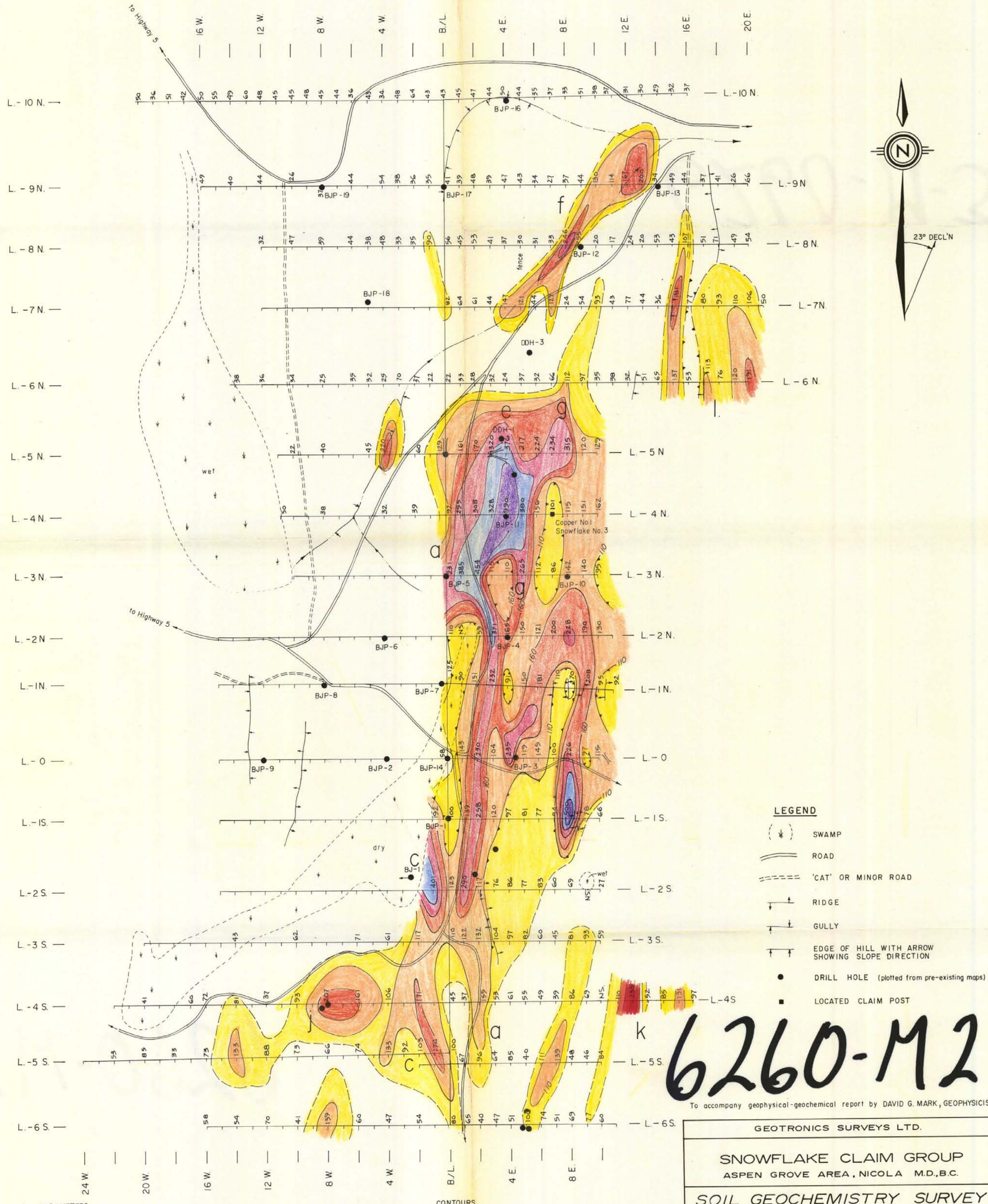
SNOWFLAKE CLAIM GROUP

ASPEN GROVE AREA, NICOLA M.D., B.C.

VLF-EM SURVEY FRASER FILTERED DATA & CONTOURS

FEET 0 200 400 800 1200 FEET

DRAWN BY:	DATE:	JOB No.:	SHEET No.
ALTAIR	DEC. - 1976	76 - 54	1



PARAMETERS

MEAN BACKGROUND VALUE ..... 54 ppm

SUB-ANOMALOUS THRESHOLD VALUE 77 ppm

ANOMALOUS ..... 110 ppm

CONTOURS

77 ppm (sub - anomalous)

110, 160, 225, 320, 460, 660, 940 ppm. (anomalous)

CONTOUR INTERAL — 1 STANDARD DEVIATION (logarithmic)

LEGEND

- SWAMP
- ROAD
- 'CAT' OR MINOR ROAD
- RIDGE
- GULLY
- EDGE OF HILL WITH ARROW SHOWING SLOPE DIRECTION
- DRILL HOLE (plotted from pre-existing maps)
- LOCATED CLAIM POST

6260-M2

To accompany geophysical-geochemical report by DAVID G. MARK, GEOPHYSICIST

GEOTRONICS SURVEYS LTD.

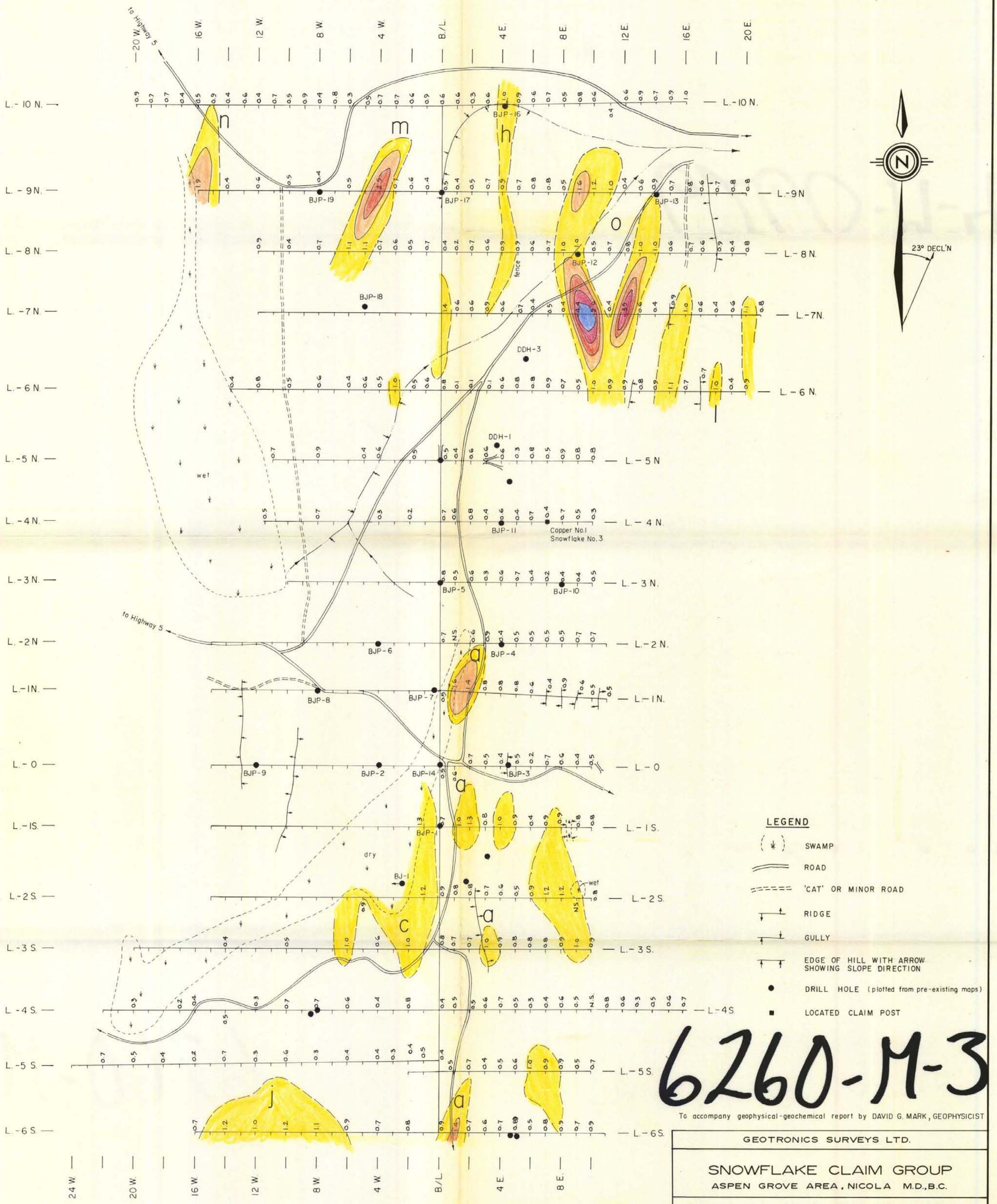
SNOWFLAKE CLAIM GROUP

ASPEN GROVE AREA, NICOLA M.D., B.C.

SOIL GEOCHEMISTRY SURVEY COPPER DATA & CONTOURS

FEET 0 200 400 800 1200 FEET

DRAWN BY:	DATE:	JOB No.:	SHEET No.
ALTAIR	DEC. - 1976	76 - 54	2



LEGEND

- SWAMP
- ROAD
- 'CAT' OR MINOR ROAD
- RIDGE
- GULLY
- EDGE OF HILL WITH ARROW SHOWING SLOPE DIRECTION
- DRILL HOLE (plotted from pre-existing maps)
- LOCATED CLAIM POST

6260-M-3

To accompany geophysical-geochemical report by DAVID G. MARK, GEOPHYSICIST

PARAMETERS

MEAN BACKGROUND VALUE ..... 0.65 ppm

SUB ANOMALOUS THRESHOLD VALUE 0.92 ppm.

ANOMALOUS THRESHOLD VALUE 1.30 ppm

CONTOURS

0.9 ppm (SUB-ANOMALOUS)

1.3, 1.9, 2.7, 3.8, 5.2 ppm (ANOMALOUS)

CONTOUR INTERVAL - 1 STANDARD DEVIATION (logarithmic)

GEOTRONICS SURVEYS LTD.

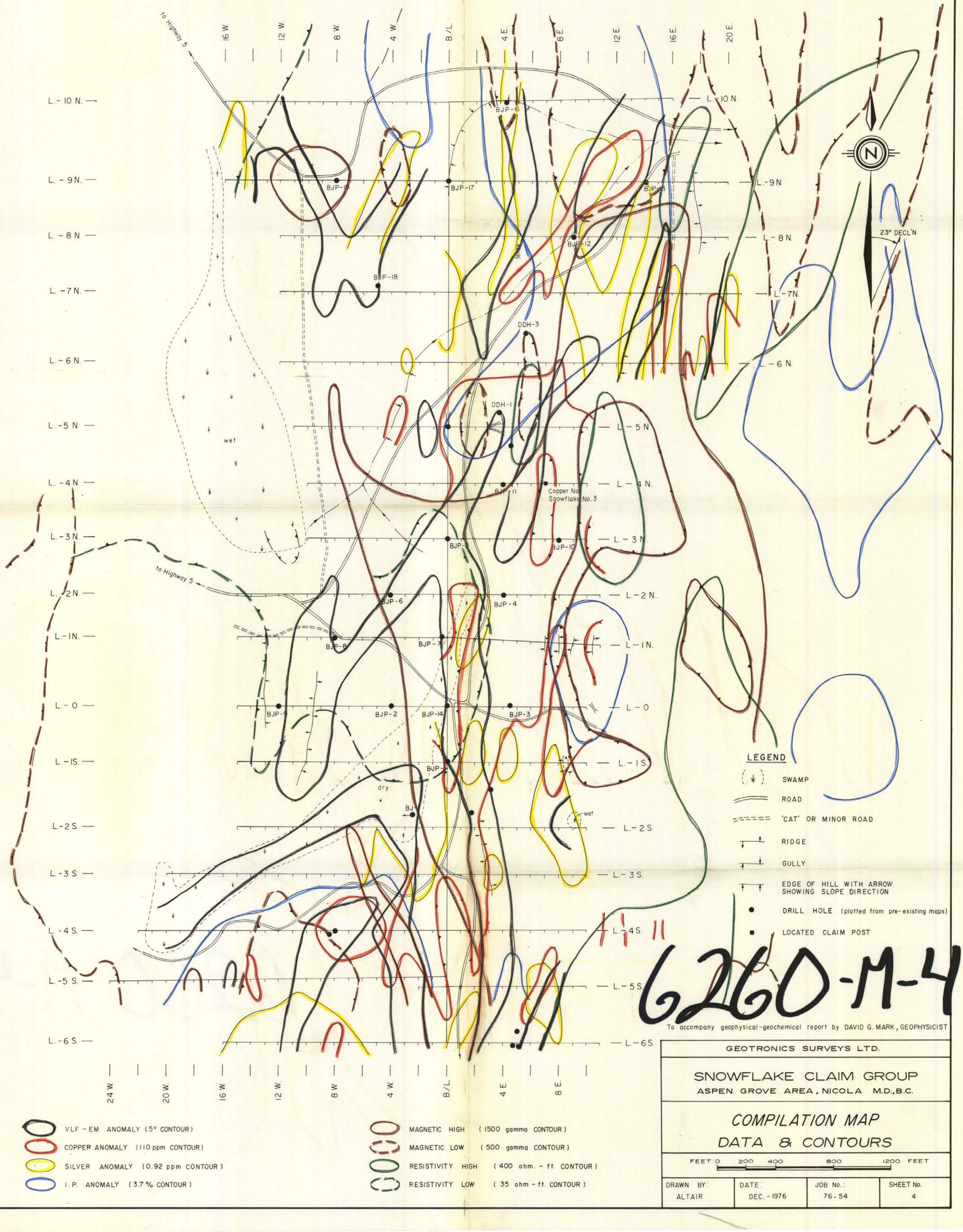
SNOWFLAKE CLAIM GROUP

ASPEN GROVE AREA, NICOLA M.D., B.C.

SOIL GEOCHEMISTRY SURVEY SILVER DATA & CONTOURS

FEET 0 200 400 800 1200 FEET

DRAWN BY:	DATE:	JOB No.:	SHEET No.
ALTAIR	DEC. - 1976	76-54	3



6260-M-4

To accompany geophysical-geochemical report by DAVID G. MARK, GEOPHYSICIST

GEOTRONICS SURVEYS LTD.

SNOWFLAKE CLAIM GROUP

ASPEN GROVE AREA, NICOLA M.D., B.C.

COMPILATION MAP
DATA & CONTOURS

FEET 0 200 400 800 1200 FEET

DRAWN BY:	DATE:	JOB No.:	SHEET No.
ALTAIR	DEC. - 1976	76 - 54	4