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WATSON LAKE, Y.T.
I.A. & N.D.

GEOLOGICAL - GEOPHYSICAL REPORT

ON THE

CAL 1 - 26 MINERAL CLAIMS
YA68886-909

Latitude 60°19'N　　　　Longitude 132°02'W

NTS 105C/8

WATSON LAKE MINING DISTRICT

by

J.C. STEPHEN
H. AWMACK

WORK DONE: - JULY 20 - 27, 1983
BY: J.C. STEPHEN EXPLORATIONS LTD
FUNDED BY: D.C. SYNDICATE　　　　SEPTEMBER 20, 1983

091488

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LIST OF ILLUSTRATIONS

GEOLOGICAL - GEOPHYSICAL REPORT

ON THE

CAL 1 - 26 MINERAL CLAIMS

SUMMARY AND CONCLUSIONS

Preliminary mapping and sampling of skarn mineralization on the CAL claims in 1982 was followed by more detailed examination and a magnetometer survey in 1983. The 1982 sampling was found to be extremely selective and the grade of mineralization indicated is so isolated as to be non economic.

The skarn zones are probably more extensive than first indicated but are apparently developed in the vicinity of a steeply dipping granitic contact and are not therefor strata bound. Assay results from samples taken are very low but sampling has not been systematic nor thorough.

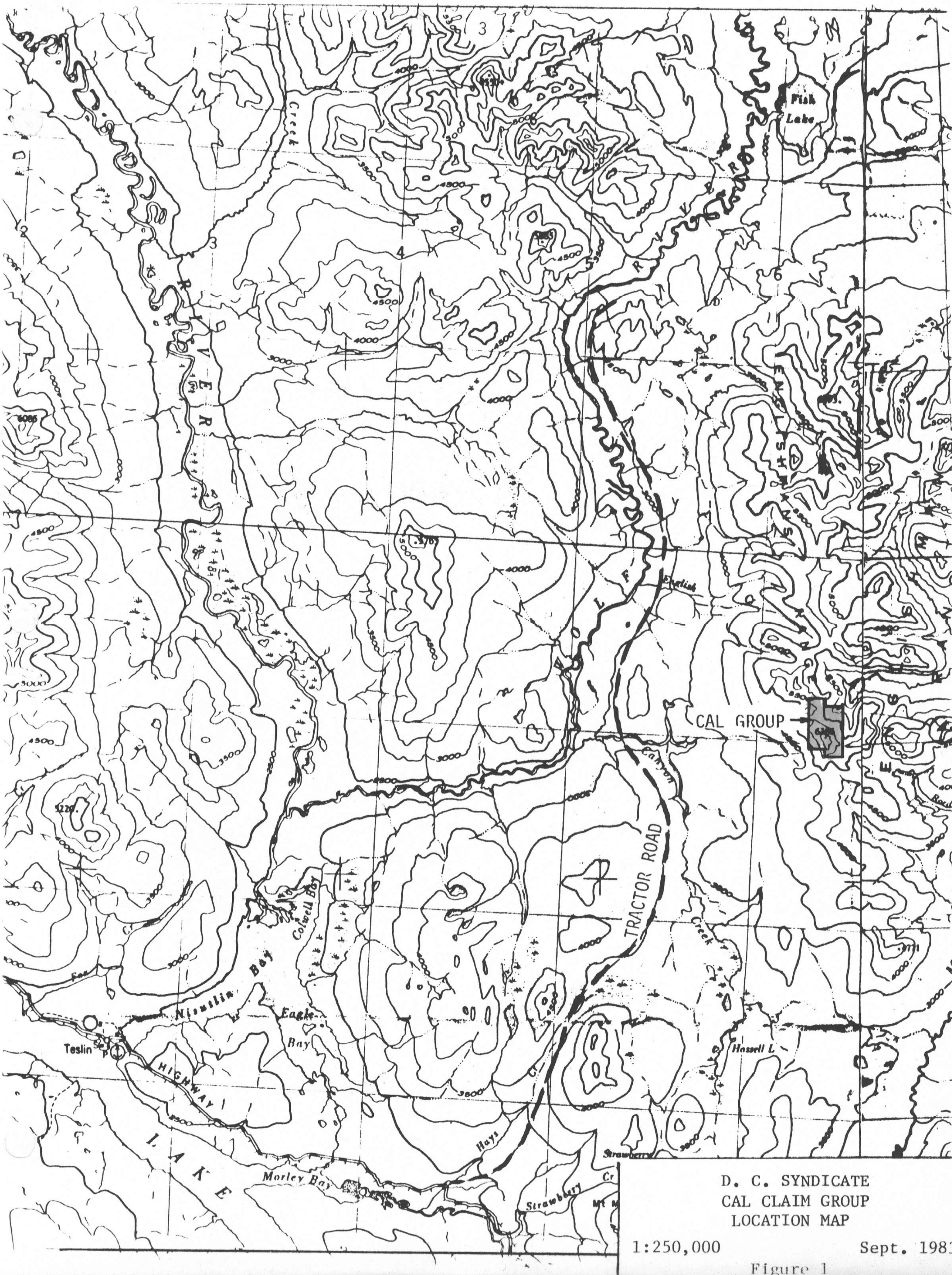
The magnetometer survey covers only that portion of the claims where United Keno Hill sampling had indicated anomalous copper values. It had been thought this mineralization might be controlled by ENE fractures but the magnetic results are strongly influenced by magnetite in volcanics and no ENE trend associated with mineralization is indicated.

No economic mineralization has been located but because of the size of the skarn zones and proximity to the FF skarn showings the claims should be held pending results on the FF claim group.

LOCATION AND ACCESS

Figure 1 shows location of the CAL claims in relation to the village of Teslin and the Alaska highway. The claims lie 42 km north east of Teslin and access during 1983 was entirely by helicopter from the airstrip at Teslin.

A tractor road originating at the junction of Hayes Creek and the Alaska highway runs northerly on the east side of Wolf River approximately 10 km west of the CAL Group.



D. C. SYNDICATE
CAL CLAIM GROUP
LOCATION MAP

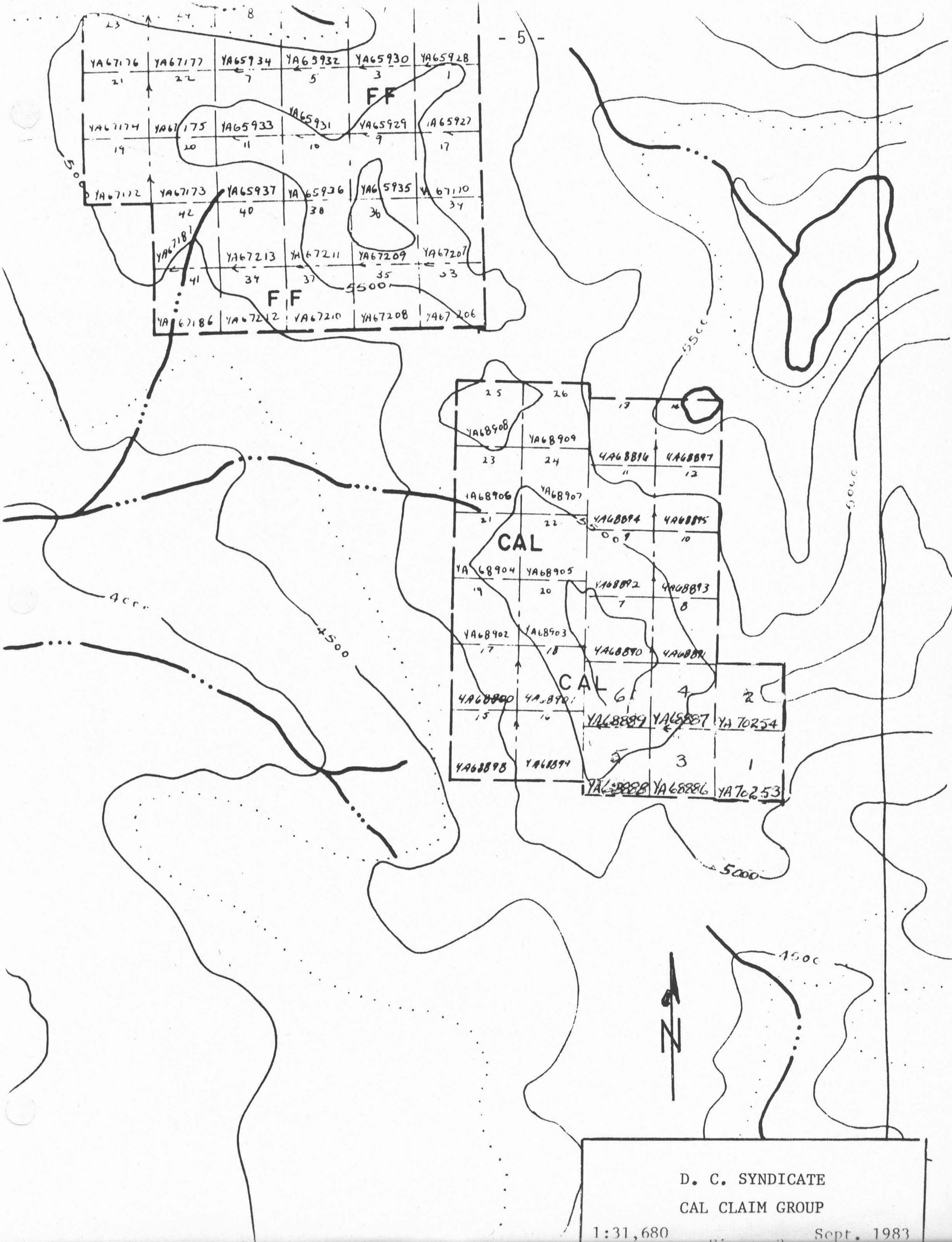
1:250,000 Sept. 1983

Figure 1

CLAIMS REGISTER

Name	Record No.	Record Date	Expiry Date
CAL 1, 2	YA70253, 254	July 28, 1983	July 28, 1984
CAL 3 - 18	YA68886 - 901	Aug. 20, 1982	Aug. 20, 1984
19 - 26	YA68902 - 909	Aug. 23, 1982	Aug. 23, 1984

This report is submitted to cover an additional one years assessment work on CAL 3 - 26 mineral claims.


FF
YA67176
YA67177
YA65934
YA65932
YA65930
YA65928
YA67174
YA65933
YA65931
YA65929
YA65927
YA67172
YA67173
YA65937
YA65935
YA67213
YA67211
YA67209
YA67207
FF
5500
YA67186
YA67210
YA67208
YA68908
YA68909
YA68906
YA68907
CAL
YA68904
YA68905
YA68902
YA68903
CAL
YA68898
YA68896
YA68897
YA68894
YA68895
YA68892
YA68893
YA68890
YA68889
YA68887
YA70254
YA68886
YA70253
5500
5000
4500
5000
4500
N
D. C. SYNDICATE
CAL CLAIM GROUP
1:31,680
Sept. 1983

GEOLOGY

Geological Report on the CAL 3 - 26 Claim Group dated November 30, 1982 contains a brief section on regional geology taken as excerpts from G.S.C. publications. Property geology was plotted on a sketch map prepared from 1 inch to 1/2 mile air photos and brief descriptions were provided as taken from field notes prepared by Rob Campbell.

Mapping by H. Awmack in 1983 was done using the same geological legend as has been used in our reports on the FF claim group to the north. The same rock descriptions are used here with qualifying notes as supplied by Awmack.

TABLE OF ROCK UNITS

12, PORPHYRITIC GRANITE	- Pink, fine to medium grained, K Spar phenocrysts, also includes white equigranular granite and aplitic dykes and sills.
11. HAKE BATHOLITH	.- Coarse grained, massive quartz, feldspar, biotite granite.
	Intrusive Contact
9. CHERT PEBBLE CONGLOMERATE	- Thin bedded quartzite, greywacke, conglomerate, generally rusty brown weathering.
8. LIMESTONE	- Thin bedded, granular to sandy, dirty white to grey.
7. CHERTY QUARTZITE	- Argillaceous quartzite, greywacke, chert. Generally very siliceous, light rusty weathering.
6. TUFF, VOLCANIC BRECCIA, ANDESITE	- Grey to dark green massive rocks featuring dark green chlorite, actinolite, tourmaline filled fractures. Little or no apparent bedding or structure.
5. ARGILLACEOUS QUARTZITE	- Siliceous dark grey to purple-brown interbedded "tuffaceous" and argillitic formations. Some calc-silicate altered beds and lenses. Commonly contains blebs of pyrrhotite.
5(a)	- black argillite bed, possibly in part lapilli tuff. Possible marker horizon.
5(b)	- Chert
4. LIMESTONE	- Massive to thin bedded white to grey limestone. Minor skarn and calc-silicate interbeds.
3. SKARN	- Red and green garnet skarn, magnetite skarn epidote skarn etc.
2. TUFFITE	- Greygreen to dark grey siltstone, tuff, lapilli tuff and agglomerate. Minor skarn bands.
1. QUARTZ PLAGIOCLASE PORPHYRY	- Grey green fine to medium grained massive intrusive or flow. Numerous 2 - 3 mm grey white plagioclase phenocrysts. "Microdiorite"

ROCK DESCRIPTIONS

1. Quartz Plagioclase Porphyry

A single outcrop in the creek west of the main skarn deposit on FF group consists of a fresh looking fine to medium grained massive dark grey rock. Grey white 1 to 3 mm anhedral feldspar phenocrysts are common. The groundmass appears brownish on weathered surface but dark grey to purple grey on the fresh surface. It may contain very fine secondary biotite as a result of metamorphism. Rare, very dark quartz eyes occur. Minor fractures are filled with thin pegmatitic quartz veins.

Somewhat higher in the outcrop the groundmass is fine to aphanitic with more prominent dark quartz eyes. Vertical narrow fractures are bleached on the margins and contain dark green chloritic material and small tourmaline crystals.

The rock is probably a relatively coarse grained volcanic flow rather than an intrusive.

This rock type has not been reported on the CAL claim group.

2. Tuffite

Conformably above the quartz plagioclase porphyry on FF group is a sequence of thin bedded black siltstone, grey tuff and minor agglomerate. The sequence is apparently about 30 metres in thickness. Siltstone beds are very fine grained, black and massive. Interbedded with this siltstone are beds of variable grain size which appear to be mixtures of silt, volcanic ash and lapilli. The agglomerate consists of siltstone and volcanic ash with sparse to numerous rounded pebbles of apparently tuffaceous and volcanic material. These pebbles range from a few millimetres to about 8 centimetres in long dimension. They appear to be of uniform composition and some may be of fragments of underlying beds.

Thin bands of green skarn occur within the tuffite horizon. Below the main skarn deposit joints and fractures are often coated with fine black tourmaline.

The most distinctive horizon in unit 2 on CAL is a basaltic agglomerate composed of flattened black vessicular basalt cobbles in a light grey diopside-epidote-magnetite matrix (Specimen HA83-63). Overlying this are various black, soft, easily weathered rocks, at least partly tuffaceous.

Unit 2 outcrops below the main limestone in several places and is probably the same as the "tuffite" unit on FF.

3. Skarn

On FF group skarns of varied character occur at several stratigraphic levels. Most of these occur in association with carbonate horizons.

The main skarn horizon occurs on a north facing steep slope almost continuously for about 610 metres. The horizon can be traced westerly a further 200 metres to the creek containing the quartz plagioclase porphyry outcrop and good exposures of tuffite.

Along its length the main skarn generally exhibits a sharp lower contact with the underlying tuffite although the two formations interfinger in some areas. The lower portion of the skarn consists of reddish garnet and epidote at the west end, mainly red garnet in the central portion with a progressive change to a magnetite skarn in the east portion. Several lenses rich in pyrrhotite with some chalcopyrite and arsenopyrite occur at intervals.

Above the red garnet skarn a thin intermittant limestone bed occurs which is followed by a green garnet skarn. Contacts of the skarn with the limestone beds are usually sharp but may be gradational over several inches with knots of garnet occurring in the limestone in places.

At the east end of the skarn horizon thin irregular vein like skarns cut the limestone beds.

The main skarns on CAL group occur at the contact of Limestone with the Hake batholith. Minor skarns occur in most limestone beds.

The largest skarn occurence is exposed on CAL 11 (Map I Geology) on a very steep north east facing cliff. The outline of the skarn is much more complex than shown in plan view on the map. The skarn consists largely of garnet and tourmaline and is exposed for about 200 metres over a height of 40 metres. Banding within the skarn appears to parallel limestone bedding but the zone is quite irregular and from a distance appears to crosscut the limestone much as an intrusive dyke might.

Along the west boundary of CAL 10 small skarn zones are generally conformable to a small limestone lens within the unit 6 volcanics.

A second zone of garnet tourmaline skarn is well exposed in the cirque wall south of the large pond on CAL 10. This zone follows the contact of the Hake and the limestone,is about 30 metres wide at its lowest point, 15 metres wide at 50 m in elevation and pinches out at the ridge top. Banding within the skarn follows limestone bedding but the trend of the skarn body is along the contact not along the bedding.

4. Limestone

The main limestone horizon occurs directly above the main skarn in the central part of the FF property. In places the limestone appears massive but it is generally bedded with individual beds varying from two or three centimetres to about 60 centimetres in thickness. Faint bedding traces vaguely outline isoclinal to tight folding. Folding probably repeats some parts of the horizon but a maximum thickness of about 120 metres is indicated on CAL group. The limestone is silicified or calc-silicated within five to twenty meters of its upper contact and irregularly throughout.

5. Argillaceous Quartzite

Rusty brown weathering hornfelsed quartzitic rocks overlie the main limestone horizon within FF group and in the east portion of claims CAL 4, 8, 10, 22, and 24. These quartzites are impure and quite variable in composition. The horizon appears to be much thinner, and in places missing, on CAL group as compared to FF and its place is taken by much more extensive volcanic formations.

6. Tuff, Volcanic Breccia, Andesite

Grey to dark green-black massive rocks with very little evidence of bedding or other structures. The rock is generally fine grained, dense and very hard. It is characterized mainly by intersecting fractures filled with chlorite, actinolite (?) and tourmaline. The coarsest grained varieties of these rocks are greenish grey granular rocks containing small rounded knots of dark green volcanic? material. Specular hematite is common in the quartz-actinolite-chlorite stringers which cut most of the horizons of this unit. Much of this unit is tuffaceous (e.g. HA83-59) but is variable between horizons from fine or coarse brown tuff to green chloritic tuff, all with or without quartz-chloritic-actinolite-spec stringers.

7. Cherty Quartzite

These sediments are generally more siliceous than the lower quartzites with a greater abundance of chert.

8. Limestone

This limestone, which can be clastic and thin bedded or fossiliferous (reef?), is fairly thin (50 cm to 20 cm thick) and inclosed by unit 6 volcanics, usually associated with unit 9 siltstone and conglomerate.

9. Chert Pebble Conglomerate

This unit, of phyllitic siltstone, greywacke and conglomerate, commonly overlies the unit 8 limestone. The pebbles in the conglomerate are hard and white and may be chert. They become scarcer upward, quartz-chlorite-actinolite-specularite stringers become more common; the rock up grades into a unit 6 tuff.

11. Hake Batholith

The batholith consists of massive usually fresh looking quartz feldspar biotite granite. In some areas this rock disintegrates rapidly as the feldspars break down but within CAL group it is relatively hard and fresh. Toward the contact the intrusive exhibits local coarse grained to pegmatitic phases. These are irregular and ill defined and appear to be simply phases of the Hake rather than separate intrusives.

STRUCTURE

Almost all bedding and schistosity strikes roughly SE and dips gently (10°-40°) to the southwest. The isolated limestone knob southwest of the claim group could be unit 4 limestone and is the only evidence for a southeast plunging shallow syncline (as the GSC and UKHM believed): it could more readily be explained by faulting or as a different limestone horizon.

Minor folds are very rare, but a few in the limestone, are tight to isoclinal. The only measured axial planes are 160/40W and 090/25S (approximately).

Faulting is common. Roughly east-west striking, vertical faults are required to explain the abrupt change in elevation of the unit 4 limestone (a) in the pass at the CAL 24-26 boundary; (b) at the south end of the northern tourmaline skarn; (c) south of CAL 1. Slip on each of these faults could be 100 metres or less. In each case, the southern block has been dropped down. Minor faults offset contacts on CAL 26 and on CAL 6. The nature of the main showing fault (if it is a fault) is ambiguous; it apparently truncates the unit 4 limestone but cannot be traced past the cirque wall on which it is exposed.

MINERALIZATION

The "Main Showing" is negligible. A few seams and pockets of high-grade chalcopyrite-bornite parallel a rusty gully (trending 060°). They would average about 15% Cu and do not comprise more than 10% of the volume of rock within 1.5 m of the gully. (Thus, a generous estimate of the grade and width would be 1.5% Cu over 1.5m). Samples (from 1982) 41470, 41471, and 41472 run up the gully wall, are each about 3 m apart and of their advertised lengths (8' and 10'). They parallel the seams and are of no meaning. The showing extends for less than 10 m, the rusty gully for another 10 m. Cobalt bloom is insignificant on the cpy-bornite seams. Only two pieces of erythrite coated limestone float were found, their source is probably miniscule.

A prominent fault is exposed just west of the "Main Showing" in the cirque headwall, apparently striking about 000° and dipping 40° to the west. Minor copper mineralization occurs in unit 5 sediments near (but west of) this fault at the ridge-top (Specimen HA83-61).

The fault, and several parallel splays in the limestone, are variably altered and mineralized for widths varying from 5 to 15 metres. Specimen HA83-64 is of this altered material, with much fine grained chlorite (malachite?) and a powdery yellow stain. Sample 32999 covers a ten-meter width of the fault zone, mainly calc-silicate with locally abundant arsenopyrite and minor pyrite.

Malachite staining, due to minor chalcopyrite, is very common, especially in the unit 5 sediments and unit 6 volcanics. It occurs along fractures and in quartz stringers. Mineralization is sporadic, low-grade and not associated with any alteration or major structure.

The second item with potential for significant mineralization is the abundant float, locally, of a fault (?) breccia containing casts of chert, banded chalcedony and massive fine grained pyrite, all in a silicious, vuggy matrix with abundant fluorite lining the vugs (Spec 32998). This was not found in place, but massive fluorite replacements in limestone (Spec 32997) and minor associated silicification occur above the float at the bottom of a rusty north south trending gully. I assume that the breccia outcrops farther up the gully. The amount of breccia float is too small to hope for a large exposure (50 m x 2 m is optimistic), but could carry precious metals.

A huge tourmaline-garnet skarn was partially sampled in 1982 for tin and tungsten with disappointing results (2 ppm → .03% Sn; 1 ppm → .005% W). This skarn, on CAL 11 and 13 near the contact of Hake and unit 4 limestone is greater than 200 m long, 40 m high and 30 m deep. Banding 130/20W parallels the limestone bedding.

A similar tourmaline-garnet skarn (Spec 32996) un-noted in 1982 is well exposed in the cirque wall south of the large pond on CAL 10. This one follows the contact of Hake and unit 4 limestone, is about 30 m wide at its lowest exposure, 15 m wide at a 50 m higher elevation and pinches to nothing at the ridge top. Banding here also follows limestone bedding, dipping gently to the west. Worth noting is the fact that the skarn body follows the intrusive contact (145/70 SW), not the skarn banding or limestone bedding. I think that the northern body of tourmaline-garnet skarn (on CAL 11 and 13), in a similar fashion, followed the Hake/limestone contact (since eroded away); no great down-dip extension (perpendicular to the contact) should be expected.

Despite the low assays received on the 1982 grab samples of the northern skarn, the rarity of sulphides and magnetite, these skarns are the most promising structures on the property. Some chip sampling, where possible, should be done on them before dismissing them as too low grade.

Minor skarns, rarely more than a meter wide and not very exciting in appearance (e.g. Spec 32995C) occur elsewhere at the Hake/limestone contact. A small pod of limestone on CAL 10, surrounded by unit 6 volcanics, has a 3 metre thick copper rich magnetite-diopside-brown garnet calcite skarn at its contact. Unfortunately, the skarn is only 10m long, daylighting on all sides. (Campbell's samples 41486, 41469)

MAGNETOMETER SURVEY

PURPOSE

Fine magnetite had been observed to be widespread in some rock types and a magnetometer survey was conducted to outline the magnetite rich areas and test for possible indications of structures which might host significant copper silver mineralization.

METHOD

A grid was laid out as shown on Map I using lath to mark survey stations at 50 metre intervals on lines 100 metres apart. The baseline trends 340° approximately parallel to the stratigraphy. This grid covers the copper geochemical anomalies located by United Keno Hill. The lines terminate to the east at the top of the cliff edge.

A Scintrex MP-2 proton magnetometer was used to take readings at each station. Results are plotted on Map II Magnetometer Survey.

RESULTS

A large strong positive anomaly between 20E and 22E from 33N to 40 N is located at the cliff top above steep exposures of unit 6 volcanics. Magnetic values within this anomaly range between 1000 and 4185 gammas. Other more localized anomalies to the south and west with values in excess of 1000 gammas are also assumed to be due to magnetite content in volcanics as supported by scattered outcrop in the area.

The magnetic low area ranging in values from 0 to minus 2090 gammas in the northwest portion of the grid is probably underlain by units 8 and 9 limestone and chert pebble conglomerate. The rather neutral areas from 00 to +1000 gammas are probably underlaim by mixtures of volcanic tuffs, quartzite and some limestone.

The pattern of positive anomalies in a zone east west through the middle of the survey area corresponds apparently with the copper geochem anomalies. Awmack reports that none of the mineralization observed here would warrant further work.

The survey does not extend over significantly large areas of unit 4 limestone but in the area covered does not suggest the presence of large magnetite skarns.

RECOMMENDATIONS

No economic mineralization has been located on CAL group. Assays for copper and silver obtained by Campbell in 1982 result from very selective sampling.

The main skarn horizons have not been systematically sampled as was done on FF group. Values obtained from limited sampling gave only very low tin tungsten values.

No overall soil or talus sample grid has been established in a search for tin tungsten anomalies. Geochemical data of this type is available only for copper and molybdenum as a result of United Keno Hill sampling.

The claims should be retained as long as assessment work credits allow with the purpose of re-examining these large skarn bodies if commercial tin or tungsten values are eventually outlined on the nearby FF groups.

Gold values obtained from selected samples taken in 1983 are listed on the geochemical data sheet supplied with this report as Appendix I. No values of economic significance were obtained.

Respectfully submitted,
J.C. Stephen Explorations Ltd.

J.C. Stephen

JCS/ms

A P P E N D I X I

GEOCHEMICAL DATA SHEET

J.C. STEP[illegible]EN EXPLORATIONS LTD.

GEOCHEMICAL DATA SHEE[illegible] — ROCK GEOCHEM SAMPLING

B.C. GOLD SYNDICATE

SAMPLER Awmack

PROJECT CAL - DC SYNDICATE

DATE

NTS

LINE

AIR PHOTO No.

	SAMPLE NUMBER	LOCATION	ROCK TYPE	ALTERATION	MINERALIZATION	STRIKE / DIP	ADDITIONAL REMARKS	APPARENT WIDTH	TRUE WIDTH	ASSAYS Sn	ASSAYS Ag	ASSAYS Au	
1)	32995 c	East of CAL 2	Mag-redgar-green skarn	gar-cal	No sulphides		In seams and pockets near Hako/ls contact	<1m		96	.	50	
2)	32996 c	East of CAL 10	Di/tour/red,gr,br skarn	gar-cal-fluor	"	Contact 145/70SW	At contact of Hako and limestone.	at bottom 50m higher	30m 15m	67	-	30	
3)	32997 c	CAL 10	Limestone	Massive fluorite replacement Some silicification, py			15m x 2m pod, trends 120° Assoc. with steep, rusty N-S gully	2m		4	0.1	<10	
4)	32998 c	CAL 10	Fault(?) breccia Clasts are chert, chalcedony or massive fg pyrite	Silicified, fluoritic	Limonitic	FLOAT	Below 32997c gully.			4	0.1	40	
5)	32999 c	CAL 2	Calc-silicates		Local aspy local py	000/40W ?	Main showing fault	10m		1	0.2	<10	
6)													
7)													
8)													
9)													
10)													
11)													
12)													
13)													
14)													
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16)													
17)													
18)													
19)													
20)													

A P P E N D I X II

STATEMENT OF QUALIFICATIONS

STATEMENT OF QUALIFICATIONS

HENRY J. AWMACK

Graduated from University of British Columbia in May 1982 with Bachelor of Applied Science (Honors) in Geological Engineering (Mineral Exploration Option).

Registered as Engineer-In-Training with B.C. Association of Professional Engineers.

Six field seasons of work in all aspects of mineral exploration, most recently as Field Geologist with J.C. Stephen Explorations Ltd.

Henry J. Awmack

STATEMENT OF QUALIFICATIONS

J.C. STEPHEN

Academic

1950	Associate Member	British Institute Engineering Technology
1950-1951	One year Geology	University of Alberta

Experience Summary

1947-1955	Development and production experience in engineering and geology at Central Patricia Gold Mines, Eldorado Mining and Refining, Madsen Gold Mines, Hasaga Gold Mines, Pickle Crow Gold Mines as Surveyor, Assistant to the Engineer, Geologist.
1955-1959	Regional exploration experience with Pickle Crow Gold Mines, Combined Developments Ltd., R.C. Crosby and Associates, Jay-Kay Syndicate as Field Geologist.
1959-1961	Municipal construction including monolithic concrete tunnels as Senior Inspector.
1962-1968	Regional exploration with Mastodon Highland Bell Mines as field geologist.
1968-1976	Regional exploration with Bacon and Crowhurst Ltd., as supervisor of exploration syndicates.
1977-Present	President J.C. Stephen Explorations Ltd.
	Management of various exploration syndicates. B.C. and Yukon

A P P E N D I X III

STATEMENT OF EXPENDITURES

STATEMENT OF EXPENDITURES

FOR CAL 3- 26 MINERAL CLAIMS

YA 68886 - 909

MAP 105C/8

WAGES

H. Awmack	July 19 - 27	8 days @ $85. =	$680.	
J. Lawton	July 19 - 27	9 days @ $60. =	540.	
I. Stephen	July 19 - 27	9 days @ $45. =	405.	
J.C. Stephen	July 27		150.	
				$1,775.00

FOOD AND CAMP SUPPLIES

26 Man Days @ $12.	312.00

HELICOPTER

Capital Helicopters Hughes 500C	
2 hours @ $450. + Fuel	1,045.00

GEOCHEMISTRY AND ASSAYS

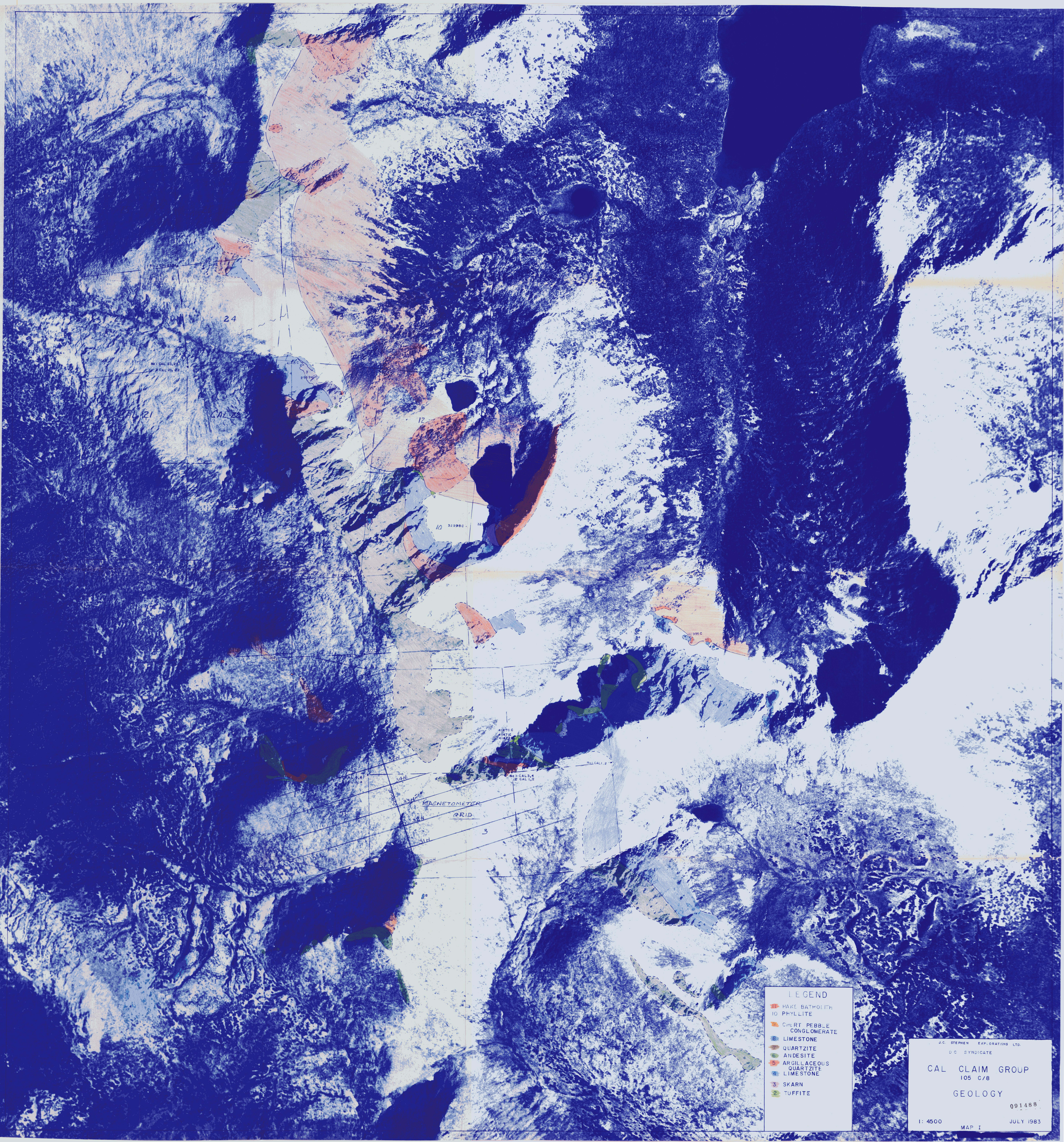
Chemex Labs Ltd.	
Invoices 312988, 313221	177.78

MAGNETOMETER RENTAL

Scintrex MP-2 Invoice G 17101	332.88
Total Expenditure	$3,642.66

J.C. Stephen


LEGEND
>3000
2000 - 3000
1000 - 2000
500 - 1000
00 - 500
-500 - 00
-1000 - -500
-2000 - -1000
<-2000
J.C. STEPHEN EXPLORATIONS LTD.
D.C. SYNDICATE
CAL CLAIM GROUP
105 C/8
MAGNETOMETER SURVEY
091488
1:2500
JULY 1983
MAP II


MAGNETOMETER
GRID
LEGEND
11 HAKE BATHOLITH
10 PHYLLITE
9 CHERT PEBBLE CONGLOMERATE
8 LIMESTONE
7 QUARTZITE
6 ANDESITE
5 ARGILLACEOUS QUARTZITE
4 LIMESTONE
3 SKARN
2 TUFFITE
J.C. STEPHEN EXPLORATIONS LTD.
DC SYNDICATE
CAL CLAIM GROUP
105 C/8
GEOLOGY
091488
1: 4500
JULY 1983
MAP I