5985

GROUND MAGNETOMETER PROFILES,

SOUP GROUP OF CLAIMS

Omineca Mining Division

(56° 27' N. Latitude; 126° 03' W. Longitude)

by

Dr. A. J. Sinclair, P. Eng.

August 22, 1976

INDEX

INTRODUCTION

The Soup Group consists of 10 mineral claims as follows:

Claim Name	Record Number
Soup 1	26941
Soup 2	26942
Soup 3	26943
Soup 4	26944
Soup 5	26945
Soup 6	26946
Soup 7	26947
Soup 8	26948
Soup 9	26949
Soup 10	26950

These claims are in Omineca Mining Division about 12 miles west of Aiken Lake on the east side of the valley containing Kliyule (Miller) Creek, and are centred on Longitude 126° 03' W. and Latitude 56° 27' N. Access is via an unpaved road (in part passable only with 4-wheel drive vehicles) north from Fort St. James through Manson Creek and Germansen Landing to Aiken Lake and thence by foot for 12 miles to the west. Helicopter service is available during the field season at Germansen Landing and Johanson Lake.

The property lies on a steep, west-facing slope with a maximum elevation of about 7500 feet and a minimum elevation of 5300 feet a. m. s. l. Outcrops are fairly abundant, particularly as cliffs along the high eastern side of the property. Elsewhere ground cover in the form of thick brush is abundant.

GENERAL GEOLOGY

Detailed geology of the property is recorded by McTaggart (1965). The area is underlain by a thick easterly-dipping succession of volcanic rocks of the Upper Triassic Takla Group. The precise dip of these volcanic rocks is not well known but they appear to be part of a conformable succession that includes sedimentary rocks farther west that dip moderately to the east. The volcanic rocks include a number of distinctive mappable units such as augite porphyry, volcanic breccias, feldspar porphyry, andesite and tuff. These units form an easterly dipping structural succession that probably also represents a stratigraphic succession on the property. A small amount of limestone occurs at the base of the structural succession at the northwestern part of Soup Group. In the southwestern part of the claims the volcanic rocks are cut by Middle to late Mesozoic granitic intrusions.

A fairly continuous magnetite-rich layer extends the full length of the property in a north-south direction, offset in several places by faults, and covered for about one full claim length by a large rock glacier. This zone of magnetite ranges from about 20 to 100 feet in thickness (McTaggart, 1965) and is fairly extensively limonitized with local occurrences of malachite. Freshest observable samples, all weathered to some extent, contain several volume percent of sulphides, mainly pyrite but with interesting

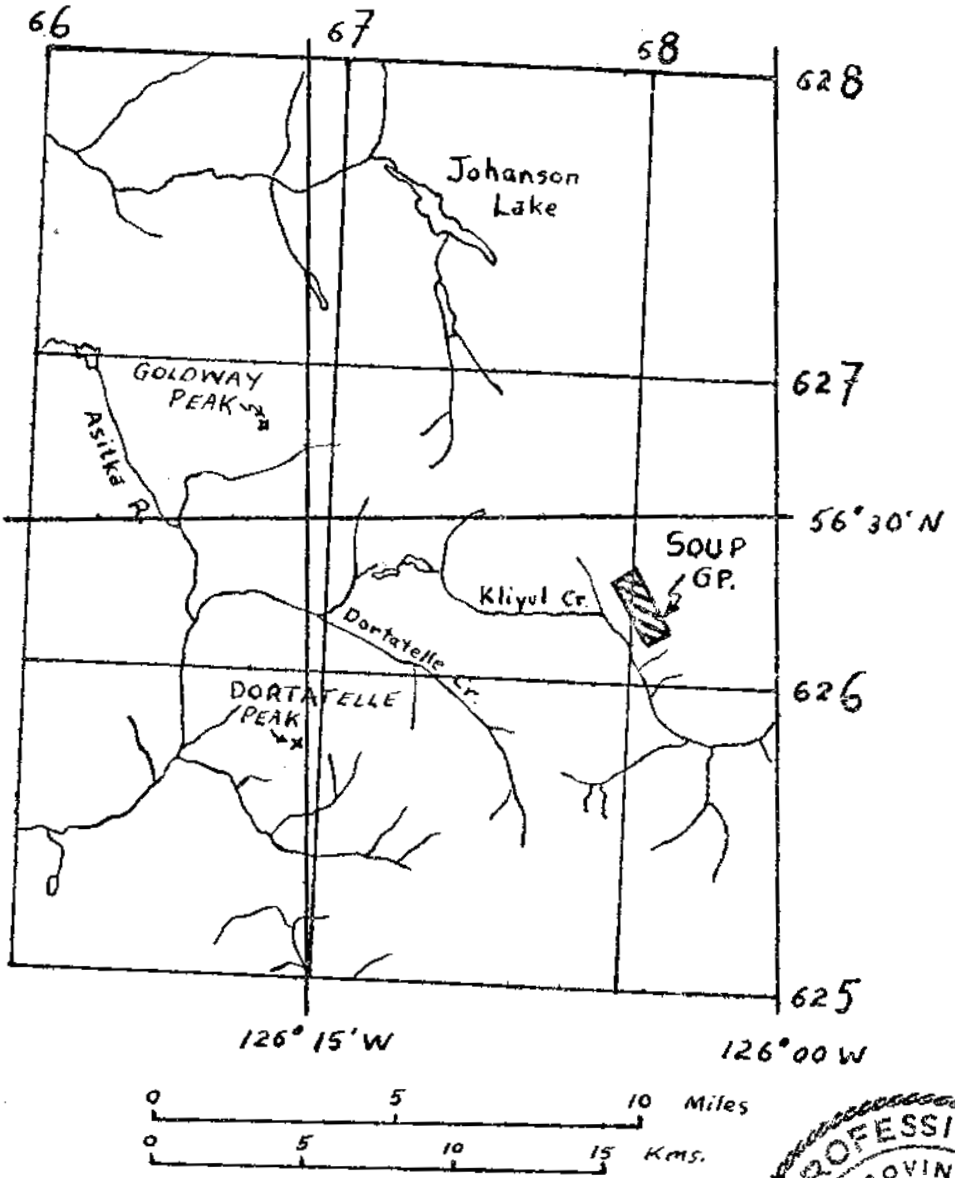

Figure 1(a)

LOCATION OF SOUP GROUP

Base map: McConnell Creek map sheet, National Topographic Series, 1: 250,000, 94 D. Location is shown relative to both a metric grid (UTM coordinates) and longitudes and latitudes.

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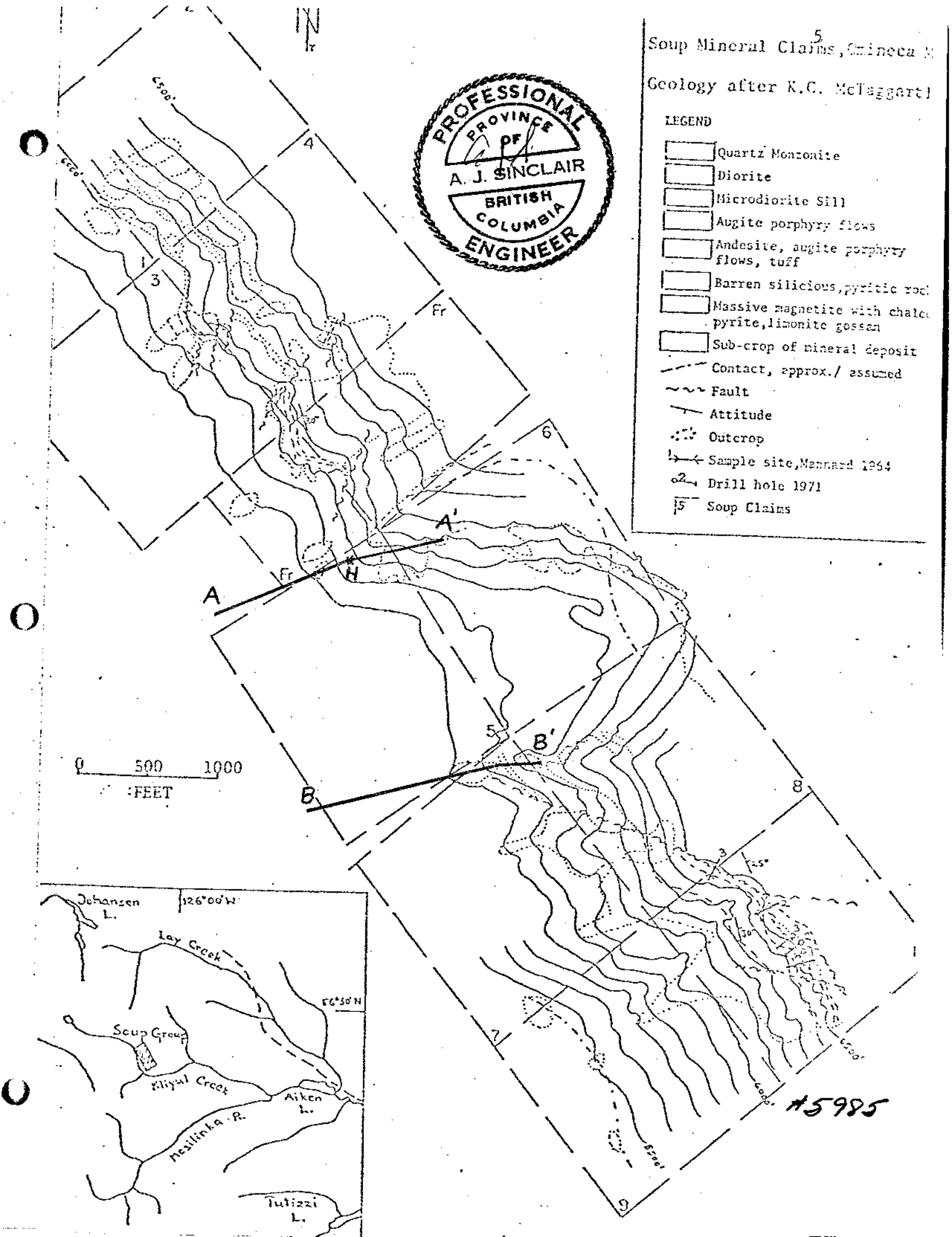
To accompany report by
Dr. A. J. Sinclair, P. Eng.

Figure 1(b)

Geological map of Soup Claims showing locations of two ground magnetic profiles AA' and BB'. Point H on profile AA' is a rock-base heliport and probably the best helicopter landing site on the property. Profiles are shown in figures 2 and 3.


Soup Mineral Claims, Omineca M
Geology after K.C. McTaggart
LEGEND
Quartz Monzonite
Diorite
Microdiorite Sill
Augite porphyry flows
Andesite, augite porphyry flows, tuff
Barren silicious, pyritic rock
Massive magnetite with chalc pyrite, limonite gossan
Sub-crop of mineral deposit
Contact, approx./ assumed
Fault
Attitude
Outcrop
Sample site, Mannard 1964
Drill hole 1971
Soup Claims
PROFESSIONAL ENGINEER
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A. J. SINCLAIR
BRITISH COLUMBIA
N
A
A'
B
B'
H
Fr
0 500 1000
FEET
Johansen L.
126°00'W
Ley Creek
56°30'N
Soup Group
Kliyul Creek
Aiken L.
Nesilinka R.
Tutizzi L.
#5985

quantities of chalcopyrite here and there. Assays for both copper and gold indicate that the property has economic potential worthy of further testing. A detailed consideration of mineralogy and available assays has been presented by Sinclair (1975).

MAGNETOMETER PROFILES

One particularly crucial aspect of the magnetite-rich zone that relates to its economic potential and could affect a decision as to whether or not to conduct further exploration is the dip of the apparently tabular zone. Detailed mapping on the property suggests a moderate dip to the east for the volcanic succession, a dip that is consistent with regional information. However, local data from the Soup Group of claims are both sparse and approximate in nature because layering in the volcanic succession is not well defined.

One approach to the problem of evaluating dip of the succession and the magnetite-rich zone in particular is to consider the nature of the magnetic response in traverses <u>across</u> the strike of the sequence. The sequence appears particularly suitable for such a study because within the confines of the property the rocks form essentially a homoclinal succession dipping easterly, and such regular geometries to large rock masses with variable magnetite contents are especially suitable for interpretation by magnetit profiles. Furthermore, the magnetite zone may or may not conform to layering in the

general homoclinal succession, and a ground magnetometer profile study should help in delineating its orientation relative to that of the volcanic succession as a whole. For these reasons a ground magnetometer survey was outlined that at a minimum involved two profiles, one over the bulk of the volcanic succession and a second over the magnetite-rich zone and adjacent volcanic rocks. Unfortunately, only this minimum program could be achieved due to inclement weather and access problems; however, as will become apparent, data obtained are sufficient for the problems outlined.

SURVEY RESULTS

Two ground magnetometer profiles were run across the volcanic succession on Soup Group using a Scintrex fluxgate magnetometer. Diurnal variations checked at intervals during the survey were essentially equivalent to the reproducibility of the instrument (about 20 gammas)for the range of background values encountered in the survey) and, thus, were negligible i.e. no diurnal corrections were found to be necessary. Survey results are listed in Appendix I. Magnetic data are plotted in figures 2 and 3 and locations of the two profiles are shown in figure 1.

Figure 2

Ground magnetic profile AA' across thick volcanic succession on north side of rock glacier, Soup Mineral Claims. Raw data of Appendix I have been corrected for background. See Figure 1(b) for location.

Figure 3

Ground magnetic profile BB' across magnetite la layer and adjacent volcanic rocks on south side of rock glacier, Soup Mineral Claims. Raw data of appendix I have been corrected for background. See Figure 1(b) for loca tion.

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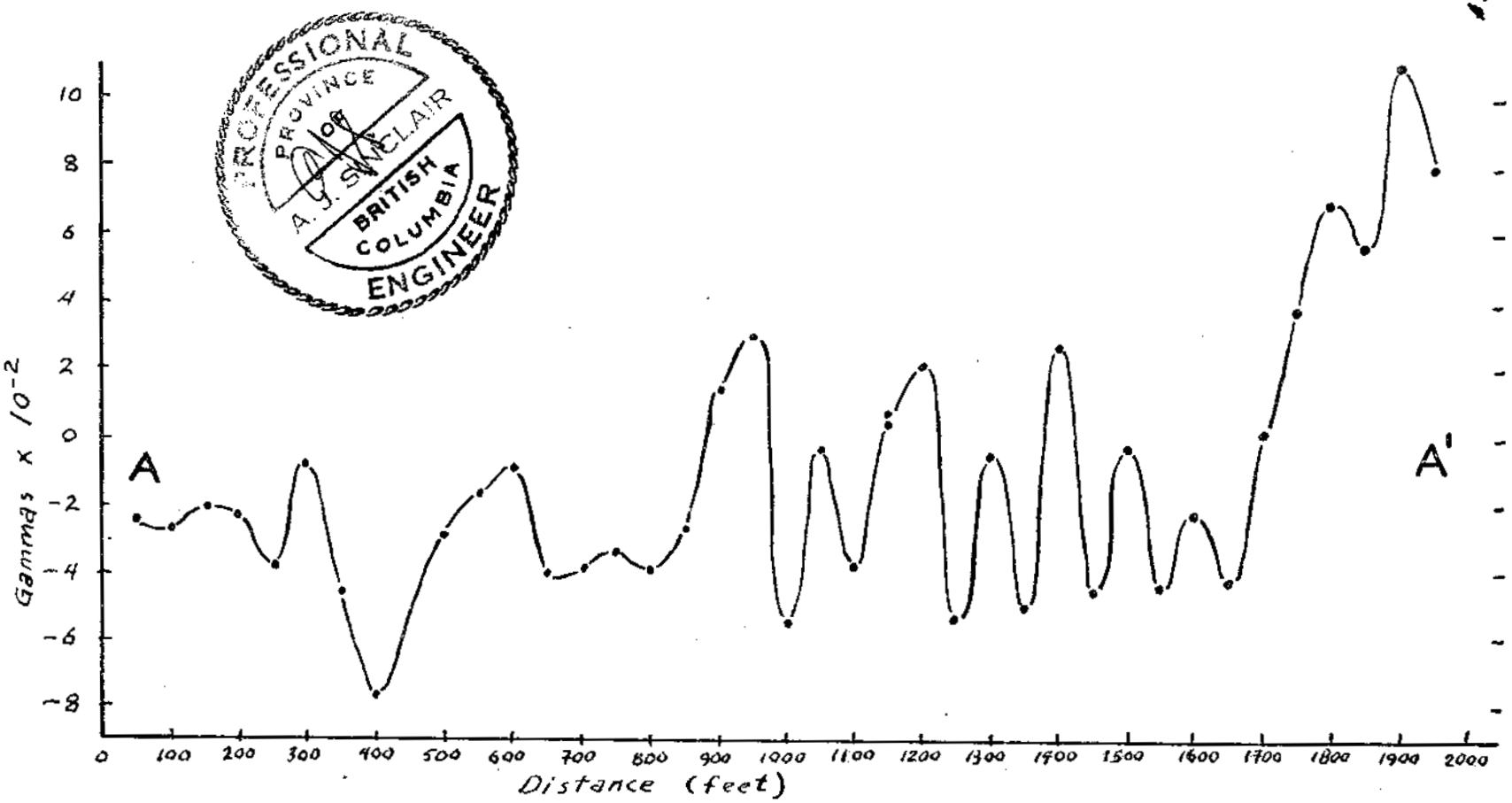
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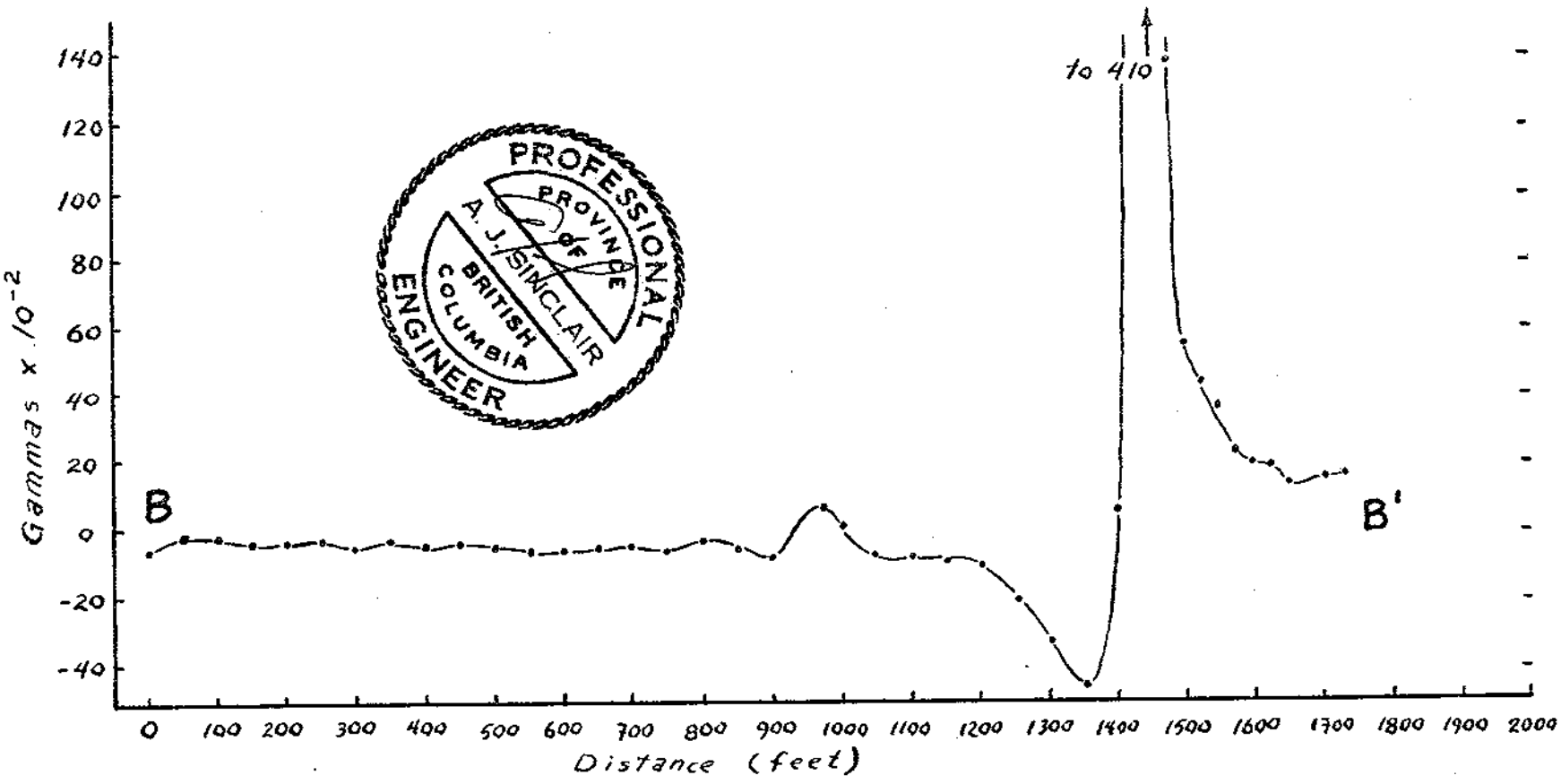
Gammas x 10^{-2}
10
8
6
4
2
0
-2
-4
-6
-8
A
A'
0
100
200
300
400
500
600
700
800
900
1000
1100
1200
1300
1400
1500
1600
1700
1800
1900
2000
Distance (feet)



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INTERPRETATION

The two profiles A and B represent respectively the volcanic sequence and the magnetite-rich zone with adjoining volcanic rocks. Profile A provides knowledge of general background variations for the volcanic succession. Considerable variations are shown by the profile and these, in large part, probably represent variations in the magnetite contents of different units within the volcanic sequence. A small amount of variation represents instrument precision and variations in depth to bedrock. One small high almost certainly represents a particular flow or flows that are relatively rich in magnetite. Shape of this small anomaly is consistent with a moderate easterly dip of the layer(s) but it is not well-enough defined to use as substantial proof. Such a layer could be of importance if further detailed explora tion were conducted on the property because, if continuous, the layer represents a marker that would serve as an aid in sorting out relative movement along faults.

Profile B is particularly informative as to the dip of the magnetite-rich layer. Shape of the anomaly is such as to indicate an easterly shallow dip of what must be a sheeted or tabular zone rich in magnetite. The zone can thus properly be considered a layer within the volcanic sequence. The slight low that occurs just downslope from the high positive anomaly might be due all or in part to a topographic effect (see Heiland, 1946). The relativ-

ely high background upslope from the high positive anomaly is a reflection of the eastern shallow dip. This background can be expected to decrease gradually upslope to values that are comparable to those found in profile A. However, topographic conditions on the property precluded extension of profile B further upslope.

Quantitative Modelling

Data from profile B can be approximated by idealized models of a variety of sorts. There is little point in conducting a detailed model study of the data to ascertain a precise shape and orientation of body that would produce a magnetic response comparable to that obtained in the field. The reasoning such modelling is unecessary is that it would not produce any more definite statements than have already been made in the forgoing qualitative interpretation which in itself is fairly unequivocal. It is fairly certain that the zone is tabular (i.e. a layer within the volcanic sequence) and dips at a low angle (less than 30°) to the east.

Using the forgoing information plus a knowledge of the thickness of the magnetite-rich zone in the area where the magnetic profile was obtained, it is possible to calculate an effective susceptibility (magnetic susceptibility) and from this to make some rough estimates of the magnetite content of the layer and the continuity of the magnetite-rich zone with depth. It is apparent that both of these unknowns are of interest to the explorationist in evaluating the worth of the property and in aiding him in deciding an exploration strategy

Estimation of the effective magnetic susceptibility of the magnetite-rich layer is a first step to any further modelling studies. Geological constraints on the shape of the zone and its thickness provide the critical information that can be used along with the magnetic profile information to make the calculation using a formula given by Parasnis (1973)

$$b \times I = 0.5 \times 10^{-2} \times a \times Z_{max}$$

where b = width of the magnetite-rich zone

I = intensity of magnetization

Z_{max} = maximum reading of vertical intensity over magnetite-rich zone in gammas

a = estimate of depth to top of magnetite-rich zone

and

$$I = K_d Z / u_o$$

where K = magnetic susceptibility

Z = field strength of the earth's field

$u_o = 4 \times \pi \times 10^{-7}$ ohm s/m

For our case the following values apply:

b = 20 m.

Z_{max} = 41,000 gammas

a = 1.2 m.

Z = 60,000 gammas

$u_o = 4.0\pi \times 10^{-7}$

From these values one calculates a magnetic intensity of 12.3 and an effective susceptibility of 0.26.

The calculation has been done conservatively so these are realistic values perhaps slightly on the low side. In particular, the Z_{max} value is almost certainly an underestimate and would be larger if closer spaced readings were available.

The high susceptibility value that has been calculated (0.26) suggests a fairly high magnetite content (greater than 30 volume percent) throughout. The implications of continuity with depth are somewhat more uncertain because of the shallow dip of the zone. However, the independent evidence of the relatively high background maintained to the east of the anomaly's peak implies continuity down dip.

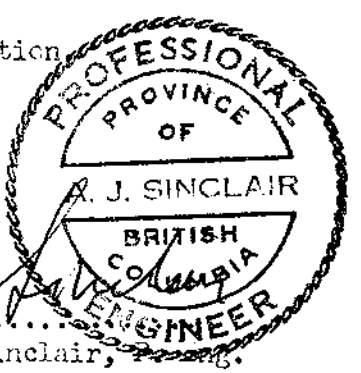
CONCLUSIONS

1. The magnetite-rich zone underlying Soup Group of claims is tabular in shape and is amenable to analysis by a ground magnetometer survey, particularly by evaluation of profiles across the strike.
2. Two such profiles have effectively defined (a) the magnetic background in volcanic rocks enclosing the magnetite-rich zone, and (b) the nature of the magnetic anomaly (i.e. the vertical intensity anomaly) over the magnetite-rich zone itself.
3. Analysis of the anomaly over the magnetite-rich zone permits an experimental estimation of the effective magnetic susceptibility (K 0.26) which necessitates a high average magnetite content to the zone--of the order of 30 volume percent or more.

4. Shape of the anomaly over the magnetite-rich zone requires a relatively shallow dip to the layer, no more than 20 to 30 degrees to the east.

5. Implications for detailed exploration relate principally to the effect a knowledge of dip and continuity will have on (a) feasibility of a cheap, large scale mining method--the possibility of such a method could have considerable weight in a decision as to whether or not to continue exploration, and (b) details of a drilling program if a further exploration program is embarked upon.

6. Complete and detailed ground magnetometer coverage of the claims should precede further detailed exploration.



Dr. A. J. Sinclair, P.Eng.

REFERENCES

Heiland, C. A., 1946, Geophysical Exploration; Prentice-Hall Inc., New York, 1013 p.

McTaggart, K. C., 1965, Geology of the Soup Mineral Claims, Assessment report dated August 2, 1965, 10 p. plus map.

Parasnis, D. S., 1973, Mining Geophysics, in Methods in Geochemistry and Geophysics, No. 3, Elsevier Scientific Pub. Co., Amsterdam, 395 p.

Slichter, L. B., 1955, Geophysics applied to prospecting for ores; Econ. Geol., 50th Anniv. Vol., No. 1, p. 885-969.

Sinclair, A. J., 1975, A mineralographic study of surface and drill core specimens from the Soup group of claims, and its importance to beneficiation; Assessment report dated August 7, 1975, 18 p.

CERTIFICATE

I, Alastair J. Sinclair, of the city of Vancouver, province of British Columbia, hereby testify:

1. That I am a Geological Engineer residing at 2972 West 44th Ave., Vancouver, B. C.

2. That I obtained a B. A. Sc. degree in Applied Geology from the University of Toronto in 1957, an M. A. Sc. degree in Geological Engineering from the University of Toronto in 1958, and a Ph. D. in Economic Geology from the University of British Columbia in 1964.

3. That I am a registered Professional Engineer in the Province of Ontario in the Mining Division, and in the Province of British Columbia in the Geology Branch.

4. That I have practiced my profession for nineteen years.

5. That the accompanying report is based on work done by me on the Soup claims in July 1976.

Dated at Vancouver in the Province of British Columbia this 6th day of August 1976.

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PROVINCE OF BRITISH COLUMBIA
A. J. SINCLAIR

Dr. A. J. Sinclair, P.Eng.

APPENDIX I

FIELD DATA FOR GROUND MAGNETOMETER TRAVERSES

AA' AND BB'

SOUP MINERAL CLAIMS

TRAVERSE AA'

Footage	Gammas	Elevations	Remarks
50	1775	7040	Outcrop
100	1725	7075	Outcrop
150	1800	7100	Outcrop
200	1775	7118	Talus
250	1625	7141	Outcrop
300	1925	7165	Talus
350	1550	7190	Talus
400	1225	7218	Talus
450	1500	7250	Outcrop
500	1725	7262	Outcrop near
550	1850	7302	Outcrop
600	1925	7350	Outcrop
650	1600	7350	Outcrop
700	1625	7370	Outcrop
750	1675	7390	Outcrop
800	1625	7408	Talus
850	1740	7432	Talus
900	2150	7456	Talus
950	2300	7470	Talus
1000	1475	7508	Talus
1050	1975	7518	Talus
1100	1625	7519	Talus
1150	2075	7522	Heliport
1200	2210	7523	Talus
1250	1470	7531	Talus
1300	1950	7540	Talus
1350	1500	7553	Talus
1400	2280	7565	Talus
1450	1550	7571	Outcrop
1500	1975	7594	Outcrop
1550	1550	7595	Outcrop
1600	1790	7602	Outcrop
1650	1590	7613	Outcrop
1700	2010	7722	Talus
1750	2390	7792	Outcrop
1800	2700	7804	Outcrop
1850	8575	7815	Outcrop
1900	3100	7850	Outcrop
1950	2800	7890	Outcrop

Elevations are not absolute as they have not been corrected for barometric variations

TRAVERSE BB'

Footage	Gammas	Elevation	Remarks
0	1450	7140	Outcrop
50	1950	7165	Talus
100	1900	7178	Talus
150	1775	7202	Talus
200	1810	7225	Outcrop-sheared
250	1850	7250	Talus
300	1625	7273	Talus
350	1850	7290	Talus
400	1750	7318	Talus
450	1824	7330	Talus
500	1725	7348	Talus
550	1474	7370	Outcrop
600	1475	7405	Outcrop
650	1575	7430	Outcrop
700	1750	7460	Outcrop
750	1550	7480	Outcrop
800	1850	7520	Outcrop
850	1575	7545	Outcrop
900	1300	7565	Outcrop
950	-		Outcrop
975	2900	7595	Px Porph
1000	2225	7615	Outcrop
1050	1425	7625	Outcrop f.g.
1100	1425	7640	Outcrop
1150	1175	7655	Talus
1200	1025	7665	Talus
1250	40	7680	Talus
1300	-1025	7720	Outcrop-rusty
1325	-2250		Outcrop
1350	2775	7728	Outcrop-Cu stain
1400	43200	7755	Outcrop
1450	7700	7765	Outcrop
1425	16000		Outcrop
1475	6400	7765	Outcrop
1500	5750	7765	Outcrop
1525	4250	7775	Outcrop
1575	4000	7780	Outcrop
1600	3500	7785	Outcrop
1650	3700	7790	Outcrop
1675	3800	7790	Outcrop

Elevations are not absolute as they have not been corrected for barometric variations.

APPENDIX II

ALLOTMENT OF CHARGES

Field Expenses

Magnetometer Rental plus Insurance	$145.00
A. J. Sinclair, Professional Services, July 18, 19, 20, 21 and 22	1125.00
Travel including airfare, vehicle rental, gasoline, etc	292.92
Helicopter Charges	425.00

Data Analysis and Interpretation

A. J. Sinclair, 2 days @ $175.00 (July 25 and 26)	350.00

Report Preparation

A. J. Sinclair, 1½ days @ $175.00	262.50
Typing, draughting	85.00
	$2685.42

This work is to be disbursed as indicated on 'Mining Receipt' No. 102519 and 'Affidavit on Application to Record Work' dated July 23, 1976 and filed in Vancouver. In brief, two years work is to be applied to Soup 1, Soup 2 and Soup 3 claims, and one year's work is to be applied to Soup 4 to Soup 10 inclusive