GEOPHYSICAL INVESTIGATIONS

BY MAGNETIC METHODS

BY CLAIM GROUP (W.M.)

Location: 133° 05' W. Long.
62° 15' N. Lat.

Reference: Claim Sheets 105 K3 & K6

WHITENHORSE MINING DIVISION
VANGORDA CREEK AREA Y.T.

BY: John S. Brock
March 1965
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INTRODUCTION

General
The magnetometer was employed as a method of geophysical survey on the BT claim group (N.W.), between September 19 and October 6, 1964. It was hoped that magnetic surveys would prove useful in outlining unusual zones indicative of sub-surface mineralization as well as geological conditions masked by overburden. A Sharpe A3 magnetometer was employed in order to measure the vertical component of the earth's magnetic field. This instrument is a portable, hand-held magnetometer with a sensitivity of approximately 15 gammas per scale division, designed primarily for reconnaissance and mining surveys. The actual survey and subsequent interpretations were conducted by John S. Brock, an employee of Dynasty Explorations Limited, who presently hold the BT claim group.

Location and Access

The geophysical investigations as discussed in this report were conducted on a portion of the BT claim group located west of Blind Creek. The general area is of gentle, rolling relief, much of the originally timbered areas have been burned over, and sections of swamp and marsh predominate west of the terrain of low relief.

The BT claim (N.W.) are only directly accessible by helicopter. Wheeled aircraft may land at Vananda air strip approximately two miles southwest of the property, and aircraft equipped with floats may land at Shrimp Lake, ½ miles south of the property.

Summary of Magnetometer Survey Portion of Costs

A) Line Cutting - total cost $7/1000 ft.
   Cost of cut lines over area surveyed
   (54,000 feet of line cut)  $400.00

B) Grid Location and Survey  200.00

C) Magnetometer Survey
   Carried out over 18 Days Total Time
   1) Operator @ $18.50/day = $333.00
   2) Supplies @ $ 4.00/day = 108.00
   3) Transportation
      a) Into property - 2 trips
         Bell 62 from Swim Lake  60.00
      b) Out from property - Beaver
         'N.8' from Shrimp to
         Swim Lakes  20.00
      c) Pre-rated portion of
         Beaver flights from
         Whitehorse  105.00
      d) Supply Air Drop  30.00  656.00

D) Compilation of Data (10 Days)  300.00

E) Supervision and Final Report  200.00

TOTAL  $2,001.00
PERSONNEL

1) Geophysical Operations:  John S. Brock
   3850 Procter Avenue
   West Vancouver, B.C.

2) Line Cutters:
   a) William Peter
   b) George Starlish
   c) Robert Kisel
   d) John Ollie

3) Grid Locations:
   Ross River, Yukon Territories

4) Supervision:
   David Barclay
   6040 Lone Drive
   Vancouver S, B.C.

   R.E. Gordon Davis
   4754 West 6th Avenue
   Vancouver S, B.C.

AFFIDAVIT Supporting Statement of Costs
Dy (NW) Mineral Claim Group

I, John S. Brock, of West Vancouver, British Columbia, have compiled the statement of costs (Geophysical Investigations by Magnetic Methods on the Dy Claim Group).

I make oath and say that to the best of my knowledge and belief, the statement of costs as presented in this report, is true and an accurate representation of cost to be applied for assessment work on the Dy (NW) mineral claim group.

John S. Brock

A commissioner for taking affidavits, in and for the Yukon Territory

Witness (signed in presence of commissioner of oaths)
GEOLOGY

The N.W. 1/4 anomaly is situated in the crestal area of a gentle N.W.-plunging synform where greenschist-chlorite schist and sericite schist contact superficially. Nearby N.E.-trending, steeply-dipping faults are situated in Blind Creek and on the slopes of Nye Mountain. Porphyry outcrop occurs 3/4 mile west.

Although magnetite is not apparent in the rocks of this area, the anomaly high is centered over greenschist outcrop. Greenschists elsewhere may contain up to 10% magnetite. Altered, medium-grain, subedral amphibole and feldspar crystals in some of the greenschists indicate a possible basic intrusive origin. There is a continuous textural gradation from blocky greenschist to fine-grained chlorite schist. A thin member of limy-silicious rock, apparently short, is intercalated in the chlorite and sericite schist. This light green, fine-grained rock is not always common but similar associations occur south of the Vangorde property. The sericite schist occasionally grades toward impure limestone and may also be graphitic. Serpentine alteration is associated with greenschist along a probable fault.

The interpretation map indicates a high degree of complexity with torsional strains giving rise to anomalous structural trends. Magnetic highs correspond to the areas of greatest disturbance. Several periods of folding, including one isoclinal period which produced a schistosity, have apparently been followed by buckling and torsional strains which "confuse" all the attitudes and give a "scattered" stereogram indicating only general trends.

Structurally, there are possibilities of replacement mineralization at shallow depth (less than 100 feet). Rocks favourable for replacement as well as porphyry occur in the vicinity. The porphyry may not directly carry metal content, but metamorphism appears to be somewhat statistically associated with porphyry occurrences. However, magnetite in greenschist is the most likely cause of the anomaly.

METHODS OF SURVEY

Grid System
Base and tie lines were cut over the BY claim group by contracted line cutters, and survey control was maintained by picket and chain methods with systematic and periodic checks by means of Brunton compass. Base lines were cut with a spacing of 3000 feet, tie lines were cut at 0-00, 30-00, 90-00 and 165-00 N.E. A total of 127,000 feet of line were cut; 54,950 feet of line cut were used for the magnetometer survey.

Base stations were established on each of the base lines at intervals of 400 feet. The magnetometer survey was conducted on cross lines laid out by pace and compass methods with terminal points of each cross line corresponding to the 400-foot stations on each base line. The survey was therefore carried out over lines of 400 feet spacing with readings taken at intervals of 200 feet on each line.
**Magnetometer Survey**

Diurnal variations and drift were eliminated as much as possible by the following methods. Prior to actual survey, readings were taken at all 600 foot stations on the base lines, at the same time the diurnal variations were recorded by a second and stationary magnetometer. After reading of the base stations was completed, each value was corrected for diurnal variation as exhibited by records from the stationary magnetometer.

The use of predetermined magnetic values for each of the base line stations or terminal points of cross lines, lends to the accuracy and speed with which the survey may be carried out.

The survey was executed in the following manner:

(See Fig. ii)

![Diagram](image)

**Fig. ii**

**Method of Survey**

1) A reading was taken at base line B (Stn 4+00);
2) The cross line 4+00 was traversed with readings taken at 200 foot stations located by pace and compass;
3) At base line B (Stn 4+00) a reading was taken;
4) The same procedure was repeated for lines 8+00, 12+00, etc.

As the base line stations A 4+00, B 4+00, etc. all have predetermined magnetic values corrected for diurnal variation, re-reading each station at the terminal points of each cross line will give a corrective factor that can be applied to the stations on the cross lines. In this way, all values obtained during the course of the survey can be corrected for diurnal variation.
TREATMENT OF DATA

All field readings were recorded directly as read from the vernier of the magnetometer. Conversion to gamma values was carried out by means of a "vernier division - gamma value conversion curve", supplied by Sharpe for use with the particular magnetometer employed during the survey. Values were then corrected for diurnal variation by the method mentioned previously. An absolute background of 53,000 gammas was adopted.

After corrections were carefully carried out, all gamma values were plotted on a base map (see map 7-a), in accordance with the station at which they were derived. The results were then contoured using an interval of 100 gammas. (See map 7-b.)

INTERPRETATION OF RESULTS

General Observations

One anomaly of large areal extent was outlined, this anomaly strikes approximately 110° for 4,500 feet and may be considered 'open' at its eastern limit due to lack of survey coverage in this area; the greatest width obtained is approximately 1,350 feet.

Although a strike length can be approximated, the actual anomaly is irregular in nature (see map 7-b). If a background of 300 gammas is assumed, the anomaly appears to be composed of seven irregularly spaced peaks of intensity ranging from 600 gammas to 3000 gammas above background. Generally, these localised 'highs', strike 110° and are separated from each other by 'lows' ranging from 100 to 400 gammas below background.

Two separate anomalies of smaller extent occur near the southern limit of the main anomaly. Both are approximately 1000 feet in length and strike in a north easterly direction, each anomaly is comprised of twin peaks which range from 300 to 600 gammas above background.

Two localized 'highs' also occur in the northwestern half of the DT survey area, they will not be considered due to the fact that each is caused by only one anomalous gamma value.

Quantitative Interpretations

Due to the irregularity in anomalous profiles as portrayed by the magnetics, it is felt that detailed calculations in order to determine the depth, extent, and shape of the causative body or bodies are not warranted. The combination of sharp profile 'peaks', lack of profile symmetry and poor contour control would require too many assumption factors for precise calculations. Other general assumptions such as induced magnetization, uniform and vertical magnetization, magnetic susceptibilities as applied to this specific area, would lead to an inaccurate quantitative interpretation.²

Depth calculations have been carried out on profiles across some of the localized anomalies making up the major DT magnetic anomaly (see plates 1-4, Appendix). In all cases Peters³ depth derivations were used, also type curves and half-width calculations were applied for assumption, causative structures.⁴
Qualitative Interpretation

A general comparison of ground magnetic results from the DT claims EW, and the Vangorda ore deposit, area was carried out. The Vangorda ore deposit is approximately three miles west of the DT anomaly, both anomalies are partially associated with a common sericite schist-greenschist complex.

Chisholm in his summary of investigations on the Vangorda deposit, made the following observations: residual magnetic values ranged from 800 to 2000 gamma, contours were lenticular along the length of the deposit, most intense anomalies were obtained where overburden is shallow, anomalies of similar magnitude and shape were found outside the mineralized zone, certain sections of massive mineralization gave no magnetic anomalies.

From this evidence it would appear that the magnetometer alone would not produce definitive anomalies signifying underlying sulphide mineralization because of the variable magnetic content of the sulphide deposit itself as well as widely disseminated magnetite in certain sections of country rock which, when near surface, produce a mass effect equal in magnitude to the main section of the Vangorda mineralized zone.

The DT anomaly is similar in character to the Vangorda magnetic anomaly and is also in the same relative geologic environment, it is therefore reasonable to assume that many of the observations as stated above could apply to the DT anomalies. Campbell notes that the DT anomaly is situated in schist, with the possibility of extension of the porphyry sill that underlies the Vangorda deposit. The general trend of the DT anomaly is along the schistosity, it is the closest known magnetic anomaly to the Vangorda deposit, it is the same distance from the intrusion to the north as the Vangorda and nearly the same distance from the Tintina Fault.

"There is geologic evidence that the magnetic anomaly may be due to sulphides contained within localized synformal folds that trend northerly, within a larger easterly plunging synclinal belt. The indicated width of this crossfold is about 1000 feet but of an irregular complex nature."7

Inspection of the DT magnetic anomaly and the geologic interpretation map (7-5) gives some evidence as to the cause of most of the localized anomalies. Anomaly (7) appears to be due to serpentinized greenschist associated with a probable major northwest-trending fault. Extension of this fault to the northeast is also shown magnetically as is the fault contact of the chloritic schist-greenschist and sericite schist. Most of the other localized anomalies trend generally in the same attitude as recognized fold structures in the area. Anomaly highs usually correspond with areas of greatest structural disturbance. Geologic and magnetic profiles correlate well (Plate 5, Appendix), the fold structures exhibited by greenschist are easily comparable to magnetic highs over the same section. Although no susceptibility measurements of local greenschists have been recorded it is known that greenschist found in this area may carry up to 10% disseminated magnetite. Greenschist structures may be a major cause of a number of these anomalies.
Qualitative Interpretations (Continued)

Anomalies (4) and (5) are thought to be associated with cross faulting related to the major northwest-plunging synform. Anomaly (3) may also be a result of an assumed fold structure, however, no greenschist is immediately evident and mineralization has been found in this area, thus making this anomaly more interesting economically.

SUMMARY

Magnetic methods can only be justified on the DY claim group (W.W.) when used as a preliminary geophysical exploration tool. Magnetic evidence obtained from the Vangorda ore deposit is generally inconclusive in relation to the actual location of economic zones of sulphide mineralization. The DY anomaly is in an area of similar geologic conditions and is also in close proximity to Vangorda, it is therefore assumed that magnetite can only serve as a guide in locating favourable areas for further exploration on this property.

In some cases localized magnetic anomalies may easily be due to sulphides contained within northwesterly-trending synclinal folds. Most of the anomalies appear to be readily accounted for by comparison with geologic evidence.

RECOMMENDATIONS

Further geophysical methods should be applied to the DY group. It is felt that electromagnetic surveys may be employed to gain new results. Gravity surveys have been carried out over the anomaly but interpretations to date have not been fully completed.

Since a dry rotary drill program will be used to test all geophysical anomalies held by Dynasty Explorations Limited, it is recommended that approximately 6000 feet of drilling be done to test the DY magnetic anomaly.

Respectfully submitted,

John S. Brock

[Approved Signature]
BIBLIOGRAPHY:


(2) JANKSY : Exploration Geophysics, TRLA Pub. Ind. Ed., 1961 (For further technical discussion of interpretations see Chapter III);

(3) DOBREIN : PP. 312-313 Geophysical Prospecting McGraw-Hill (1960);

(4) HETTYETON, L.L. : Gravity and Magnetic Calculations Geophysics Vol. 7 pp 299-310 (1946);

(5) CHISNOLM, E.O. : Geophysical Exploration of a Lead-Zinc Deposit in Yukon Territory; Methods and Case Histories in Mining Geophysics, (C.I.M.M. Pub. 1957);

(6) CAMPBELL, D.P. : Consultants Report to Dynasty Explorations Limited (1964);


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GEOPHYSICAL INVESTIGATIONS
BY MAGNETIC METHODS ON THE
BY (MN) CLAIM GROUP

APPENDIX
DY CLAIM GROUP (NW)
GROUND MAGNETOMETER SURVEY
PROFILE 1

SCALE: 100' : 1"
section strikes 102' faces 2°

Calculations
Peter's Depth Estimation: (Slip Method)
Assume long slab, thickness 't', Top at depth 'h'

$ h = \frac{1.6}{1} \times t$  
$ h = 88.5'$

Half Width Depth Estimation:
Assume Eqn $\frac{1}{x} = \frac{1}{5}$  
$ h = \frac{1}{2} \times 10'$ to center
DF CLAIM GROUP (H)GROUNDMAGNETOMETER SURVEYPROFILE 2

SCALE: 100' 1"
sction strikes 3' faces 93°
DY CLAY GROUP (60y)
GROUND MAGNETOMETER SURVEY
PROFILE 3

SCALE 100' = 1'
section strikes 30' faces 110'

Depth to center 2

\[ V = \frac{1}{3} \rho \frac{d^2}{h} \]

\[ d = 65 + 107 \times \frac{K}{100} \]

\[ K = 75 \]

31' top of clay

grammeter

1500

1000

500

0

100

200

300

400

500

600

distance (feet)
DY CLAIM GROUP (N.W.)
GROUND MAGNETOMETER SURVEY
PROFILE 4

SCALE: 100' = 1"
section strikes 123° faces 33°