

013157

PRELIMINARY GEOPHYSICAL SURVEY
(MAGNETOMETER) OF PART OF MACKS
COPPER CLAIM GROUP IN KIRKLAND
CREEK AREA

(For Arctic Mining & Explor.)
Oct. 7 - 19, 1964

By: P.S. White

(115-H-9)

Mack's Copper

Report Jan. 20, '65

Suite 103,
Blaris Bldg., Box 1188,
Whitehorse, Y.T.
November 30th, 1964

Mr. J.A. Simmons:
President
Arctic Mining and Exploration Ltd.,
Vancouver, B.C.

Dear Mr. Simmons:

I herewith submit respectfully the enclosed report titled "Preliminary Geophysical Survey (Magnetometer) of Part of Mack's Copper Group", as requested by officers of your Company. I trust that you will find it in order and that you will inform me of any points which might have been overlooked, or about which you might wish to have more information.

Yours truly,



Paul S. White P. Eng. D. L. S. A. L. S.

REPORT OF
PRELIMINARY GEOPHYSICAL SURVEY (MAGNETOMETER) OF
PART OF MACK'S COPPER MINERAL CLAIM GROUP
IN
THE KIRKLAND CREEK AREA
OF
THE WHITEHORSE MINING DISTRICT OF THE YUKON TERRITORY
FOR
ARCTIC MINING AND EXPLORATION LTD.
BY
WHITE & HOSFORD - ENGINEERS & SURVEYORS
OCTOBER 7th - 19th 1964

P.S. WHITE ENG. D.L.S.

TABLE OF CONTENTS

<u>SUBJECT</u>	<u>PAGE</u>
INTRODUCTION.....	1
PURPOSE OF REPORT.....	1 - 2
SCOPE OF REPORT.....	2
GEOLOGY and TOPOGRAPHY.....	2 - 3
PROCEDURE.....	3 - 4
PERSONNEL and EQUIPMENT.....	4 - 5
RESULTS OF SURVEY (A-B-C).....	5 - 6
INTERPRETATION OF RESULTS.....	6 - 7 - 8
RECOMMENDATIONS AND CONCLUSIONS.....	8
SUMMARY	8 - 9

REPORT OF RESULTS OF PRELIMINARY GROUND MAGNETOMETER
SURVEY OF PORTION OF MACK'S COPPER CLAIM GROUP

INTRODUCTION:

The Mack's Copper group of mineral claims consist of 6 surveyed crown Grants (Mineral claims) as shown on Plan 1038 and attached to Field Book 11664 of the Canada Land Surveys Records, surveyed in 1910, and augmented in 1964 by newly staked claims, 64 in number, as shown on Claim Sheet No. 115-H-9 of the Whitehorse Mining District Y.T. The claim group is located south-west of Montague at approximately Longitude $136^{\circ} 11' 20''$ W Latitude $61^{\circ} 37' 20''$ N as shown on the accompanying composite map of the Kirkland Creek East and Twin Lakes West sheets (1:50,000), and approximately nine miles West of the Whitehorse to Mayo Road at Mile 71, South West of Carmacks, Y.T.

The Mack's Copper group was staked and investigated in the first decade of this century as reported in Memoir 284 of the Geological Survey of Canada by D.D. Cairnes in 1908. Since that time, little if any new work was done on the group due to complexity of ownership and economic factors until the Arctic Mining and Exploration Ltd. company acquired working control of the existing Crown Grants and staked new claims in the summer and fall of 1964 to improve and consolidate their interest in the area. In September of 1964, Dr. A.C. Skerl, Consulting Geologist, visited the property and made a report on his findings which resulted in the ground magnetometer survey described in report.

PURPOSE:

The purpose of this survey as recommended by Dr. Skerl was to assess by geophysical and to a minor extent geochemical means the area shown on the enclosed plan (Appendix) which is 5000 feet long with axial dimension of bearing $N 17^{\circ} 30' E$ (Astronomic) and 800 feet wide measured perpendicularly to the axial dimension, in an attempt to delineate or indicate the extent of the known copper-magnetite-gold ore body as seen from surface and tunnel workings on the Bonanza Mineral Claim.

The survey was recommended as an aid to an exploration drilling program to assist in determining the location and direction of proposed diamond drill holes.

SCOPE OF REPORT:

This report describes the method, results and interpretation of a preliminary ground magnetometer survey carried out over the aforementioned 5000 feet by 800 feet area on a 100 foot grid interval in early October 1964. Some soil and surface plant life samples were taken for geochemical analysis, but the sampling was irregular and intended as an indicator of copper presence in surface matter over the surveyed area and should be considered a minor addition to the ground magnetometer survey.

GEOLOGY and TOPOGRAPHY:

To quote from D.D. Cairnes report on "Mack's Copper" - Page 281 of

G.S.C. Memoir 284:

The ore, which occurs in a fine grained, greenish, porphyrite at or near its contact with limestone, consists chiefly of magnetite, with hematite in minor quantities, both being more or less impregnated with copper minerals, chiefly chalcopyrite, malachite and azurite. The main mass of mineral is in the form of a small knoll of almost solid iron ore, about 200 feet wide, by, perhaps 300 or 400 feet long. On the south side of the hill the iron carries considerable copper, while the ore on the top of the knoll shows no copper, possibly because of leaching. A cross-cut tunnel has been started in one of the most promising places on the hillside, and when visited was in about 35 feet.

The only other work done on the property is in the form of an open-cut on an adjoining knoll to the west. The ore bodies in the two places apparently are not connected. The ore body in the more westerly locality is only 10 or 12 feet wide and lies next to and more or less in the limestone. The richest ore is found here, but has only been traced a short distance; it may, however, continue farther along the limestone, for the contact is so deeply covered with superficial deposits that only a few feet as yet have been uncovered.

The surface geology is also described in Dr. Skerl's September 1964 report.

The topography of the area investigated is shown on a print of surface topography as determined by altimeter readings taken over the area surveyed and adjusted to minimize the wide variations in elevations as recorded by daily datum checks. From

At the northerly end of the long axis of the surveyed area the long axis rises from a saddle containing small lakes (sloughs) and rises 200-300 feet in the first 1000 feet of the south-westerly directed base line to the No. 1 Post of the Bonanza Mineral Claim on the easterly slope of a steep hill with rock cliff outcropping. The long axis or base line then follows a sidehill of gentler slope which falls 200-300 feet over a further distance of 400 feet in the south-westerly direction. The region surveyed is lightly covered with spruce and pine of diameters from 2-30 inches with some willow and alder undergrowth, and most of the surface area surveyed is covered by superficial deposits of erosion and weathering products as well as the normal humus matter resulting from the vegetation cover.

PROCEDURE:

A base-line was laid out with a transit and chain on an astronomic bearing of $N 17^{\circ} 30' E$ for a distance of 1000 feet north-easterly from the found legal survey post No. 1 of the Bonanza Mineral Claim and 4000 feet southeasterly on a production of the same straight line, ($S 17^{\circ} 30' W$ Astro.), with chainage corrected for slope, temperature and sag. Stations were then laid out at 100 foot intervals on the said base-line throughout its length and grid lines were cut perpendicular to the base line for distances of 500 feet westerly and 300 feet easterly from the base line, and wooden hubs and pickets placed at 100 foot intervals on the grid lines. The grid lines were started on transit lines ~~and~~ for 200 feet in each direction transverse to the base line and run for the remainder of their length on picket lines. The pickets were set by plumb-bob lining-in and cross checks showed grid line extremity displacements of 0-5 feet from the true 100 foot horizontal grid. Slope Corrections were made for grid line chainage in the field from tables with the aid of slope measurements determined by clinometer and transit, in order to provide a horizontal (plan) grid of 100 foot intervals over the surveyed area.

The flux gate type magnetometer was read at each 100 foot station, and altimeter readings were taken at each station in the course of the line cutting and chainage proceedings. The average progress was 5000 feet of line per day which was established by the rate of line-cutting. Soil samples were taken by hand at stations where weather and the frost permitted, although a portion of the surveyed area (from Sta. 23 to 273) was not soil sampled at all due to weather conditions and the demands of the line cutting and surveying in that area, which was the prime purpose of the operation. Altimeter readings varied widely due to large variations in barometric pressure as evidenced by inclement weather (snow and wind) for the entire survey period. The Altimeter readings were checked daily against an arbitrary bench mark adopted near the Bonanza No. 1 Post, and showed diurnal variations of 50-300 feet. The Magnetometer readings showed diurnal variations of 0-250 gammas and the base reading of 180 gammas at Sta. 22S, determined on October 11th, 1964, on the Ease Line, was adopted as the datum level of the magnetometer survey. The magnetometer showed a general datum level of +500 gammas on Lambert Street in Whitehorse on the 19th of October 1964 P.M., with the magnetometer calibration controls set at a level comparable to the Mack's Copper Survey operating level.

PERSONNEL and EQUIPMENT:

The survey crew consisted of six men;

Engineer-Land Surveyor.....Party Chief
 Transit Man
 2 Chain men
 2 Axe men

The Theodolite transit used was a Wilde TL-A Serial No. 80359 and the magnetometer used was a Sharpe Model MF 1 Flux Gate type unit, Serial No. 30856. The altimeter was a 8 inch diameter Precision Instruments Unit reading to ten feet (Aneroid). The taping chain was a 200 foot surveyor's chain, checked for length against a legal subsidiary standard in August of 1964.

The crew and supplies were transported from Whitehorse, Y.T. to the Twin Lakes public camp ground by truck (80 miles) and from the camp ground

approximately 10 miles by Bell Helicopter on October 7th 1964. A tent Camp was established and maintained until the removal of men and equipment by Hiller Helicopter on October 19th, 1964 again to Twin Lakes and thence to Whitehorse by truck.

RESULTS OF SURVEY:

A-Magnetometer Results

The field magnetometer readings were reduced to correct for diurnal variations, calibration variations due to accidental alteration of calibration controls, and variations of metallic content of operator's clothing and equipment (maximum of 500 gammas). The corrected results were then plotted on linen as corrected readings on a grid to the scale of 100 feet = 1 inch and interpreted to give the regional analysis of anomalous contouring results. Contours were drawn at 500 gamma intervals except where the variations of -32,000 gammas to + 41,000 gammas in the region of the adit and dump of the Bonanza mineral claim working made such an interval impracticable due to crowding of contours in an obviously anomalous area. In the high intensity areas the contour interval was changed to 5000 gammas. In the southerly region of the surveyed area the station differentials were so small as to necessitate the presentation of the 250 foot contour interval to demonstrate the magnetic gradient. The negative results obtained in certain areas were contoured in the same quantitative manner as positive results to give a pictorial representation of the intensity of the magnetic field in each area regardless of field polarity. This practice results in high intensity anomalies appearing on the plan side by side (one positive and one negative) in certain areas which might be misleading to the casual observer. This aspect of the contouring is discussed more fully in the following section of this report; (Interpretation of Results). It was originally intended to take readings at 50 foot intervals on the transverse grid lines but repeated field checks showed variations between 100 foot stations to be very nearly linear and the practice of magnetometer reading at smaller intervals was abandoned except for the checking procedure.

RESULTS OF SURVEY (CONT.)

B - Soil Sample Results

The "soil samples" were bagged on the spot at each station where taken by hand scratching to 8" below surface or frost zone, and tested for copper indication by a rubianic acid test on 21 Oct. 1964 by P.S. White and L. Ostengoe. The results were qualitative at best and each grab sample tested showed the presence of copper in the qualitative "poor-good" range, with the majority of results in the "fair" category, indicating consistent presence of copper over the surveyed area.

C - Altimeter Results

The Altimeter results were adjusted to compensate for the varied atmospheric conditions and varying rates of change of such conditions. The results were then plotted on a grid of the surveyed area at a scale of 1 inch = 100 feet and a datum estimated from the 1:50,000 Topographic map contours. The results were then contoured in a manner designed to ignore the pure elevations and to indicate in plan form the qualitative nature of the topography changes for comparison with the plan of the magnetometer results for interpretation. Thus the "Surface Topography" plan (Appendix V) is only a qualitative tool for comparison of magnetic field intensity contouring to the general nature of surface topographic contours in any one region.

INTERPRETATION OF RESULTS

Appendix IV is a contour plan of collected Magnetometer Readings and anomalous areas shown thereon are divided into three principle zones.

"Zone A" is at the North East corner of the plan between Sta. D1 and 3E and J-1 & 3E and expresses a regular anomaly with 2000-3000 gamma relief, extending eastward from the survey base line, over an area at least 700 N/S by 300 Ft. E/W. Topographically this area is a gently sloping nose with axis roughly parallel to the base line. This area is covered with vegetation and overburden and is worthy of extension of the magnetometer work at some further date to check out the eastern portion of The Hazel May Crown Granted Mineral Claim.

At the present time Zone A is considered by the writer to be a feature that indicates disseminated magnetic minerals at or near surface level or possibly a deeper seated magnetite plug similar to the other magnetite-copper showing on the Bonanza Mineral Claim. The largest and most interesting features are designated "Zone B" and extends from Sta. 9 on the base line to Sta. H on the base line, and westward over the 500 feet of surveyed ground; Zone B containing a portion of ground 1500 Feet N/S by 500 feet E/W. This zone expresses many variations in magnetic field intensity. The highest magnetic relief of the entire survey was found in the general area of the old Adit and Dump at Sta. 4 - 1 + 55 W and northward for a distance of approximately 500 feet and westward for 300 feet. Two anomalies are represented side by side, one positive to the west with positive peak intensity of 41,000 gammas at Sta. 1S - 2W and a "shadow" anomaly with negative peak of -31,000 gammas at Sta. 1S-00 on the base line. The negative or "Shadow" anomaly is interpreted as a Field Polarization indicating a mass of magnetic material lying up hill to the west (I.E. above the base line in elevation). It would be presumptuous to assume that the magnetite body would lie directly beneath the maximum intensity reading area but it is not far removed laterally from that area and is believed to express a high magnetite content zone of estimated dimensions 450 feet long (N/E) by 200 feet wide and 60-100 feet of minimum depth and unknown maximum. A "semi-detached" smaller anomaly shows at the old adit which has very high magnetite content in the rock in place and in the dump at the adit mouth. Anomalies of 2000-3000 gamma relief are expressed throughout the balance of Zone B, and it should be noted that spot readings of 1000-2500 gammas were obtained from Sta. J-00 to the small lakes shown on the Composite topographic plan to the north, of the surveyed area some hundreds of feet to waters edge. The whole of Zone A can be considered to be of interest with the emphasis on the aforementioned high intensity area immediately north of the old adit which should be tested for depth and for lateral extent of the physical anomaly at sub-surface "step-out" drilling in harmony with surface geology should be performed to delineate the magnetic bodies and to determine the base and precious metal content of the body.

Zone C lies to the south of and adjoins Zone B and is considered to be of lesser immediate significance as in this general area outcrops and float of ferromagnesian minerals were seen to give 1000 gamma readings on the magnetometer, but specimens did not in any way resemble the high magnetite-copper area near the adit in Zone B. This could be investigated by geological investigation to determine the mineralization causing the high readings.

The only other anomalous region is a 1500 gamma relief area near Sta. 38S - 3E which should be investigated at some future date for eastward extent.

As general information it should be noted that the second and high grades surface expression of the Mack's Copper showing as reported by D.D. Cairnes (G.S.C.) to the west and south of the old adit some hundreds of feet, does not seem to be connected to the mapped anomaly as indicated by low or "normal" readings in the westernmost portions of the surveyed area between Stations 6S and 10S.

RECOMMENDATIONS AND CONCLUSIONS

It is concluded by the writer that Zone A should be tested for lateral extent eastward by magnetometer work at the next phase of exploration; spot readings would suffice as a first step.

The interpretation of Zone B is more complex but diamond drilling is recommended on the high intensity relief areas with holes striking northerly and dipping westerly. The lower intensity relief areas of Zone B should be explored by surface geology investigation and selective diamond drill hole locations following such geological work. Zone C should also be investigated by further geophysical work to the west and by surface geology to establish the mineralization potential of this zone.

SUMMARY

An area of approximately 100 acres was investigated by ground magnetometer survey. The survey results indicated magnetic anomalies over 30-40 acres which seem most worthy of more investigation in the form of Surface Geology work and selective diamond drilling.

The chief area of interest is an indicated magnetite body containing a possible 1-2 million tons of magnetite mass or more with copper content of commercial potential, which body is believed to lie adjoining and to the north of the adit and dump near the easterly boundary of the Bonanza Mineral Claim.

The general area north-north west of the surveyed area warrants geophysical investigation and possibly diamond drilling after the main body of Zone B is investigated.

Paul White

Paul S. White P. Eng. D.L.S.

30 Nov 1964

APPENDICES

- I).....Composite Map showing area surveyed
(1:50,000)
- II).....Claim Sheet No. 115-H-9 (revised to
Nov. 1964)
- III).....Registered Plan of Crown Grant Survey
(Plan 1038)
- IV).....Plan of Geophysical Magnetic Survey
- V).....Plan of Surface Topography
- VI).....Plan of Anomalous areas with
recommendations