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A REPORT

ON

AN INDUCED POLARIZATION SURVEY

Whitehorse Copper Belt, Whitehorse M.D., Y.T.

FOR

WHITEHORSE COPPER MINES LTD.

Whitehorse, Y.T.

BY

PETER E. WALCOTT & ASSOCIATES LIMITED

Vancouver, British Columbia

MAY 1978

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ACCOMPANYING MAPS - Scale 1" = 100'

INTRODUCTION.

Between October 11th and 17th, 1977, Peter E. Walcott & Associates Limited carried out a small induced polarization (I.P.) survey programme for Whitehorse Copper Mines over parts of their properties around the Whitehorse Copper Belt, Yukon Territory.

This programme consisted of (a) a gradient and pole-dipole surface survey around the Little Chief (b) some downhole - current electrode underground - at Little Chief (c) two pole - dipole check lines on the Best Chance grid and (d) multi separation traverse over an E.M. 16 anomaly at Annie Lake, all carried out using a time domain I.P. system.

Measurements of apparent chargeability (the I.P. response parameter) were made at selected stations on the above grids. In addition simultaneous measurements of apparent resistivity were also made.

The data are presented in profile and contour form on Maps W-249-1 to 5 that accompany this report.

PURPOSE.

The purpose of the surveys was (a) in the Little Chief area to try to determine using the I.P. technique if any ore occurrences existed between surface and the 1000 foot below level, that would need to be mined prior to completing mining operations on that level.

(b) in the Best Chance area to check out existing one point I.P. anomalies obtained on a previous survey

(c) in the Annie Lake area to see if any I.P. response, that might be indicative of sulphide mineralization, was associated with a previously obtained V.L.F. conductor.

GEOLOGY.

The reader is referred to reports held by Whitehorse Copper Mines Ltd.

SURVEY SPECIFICATIONS.

The induced polarization (I.P.) survey was carried out using a pulse type system, the principal components of which are manufactured by Huntec Limited and Crone Geophysics Limited of Metropolitan Toronto, Ontario.

The system consists of basically three units: a receiver (Crone), a transmitter and a motor generator (Huntec). The transmitter which provides a maximum of 7.5 kw d.c. to the ground, obtains its power from a 7.5 kw 400 c.p.s. three phase alternator driven by a gasoline engine. The cycling rate of the transmitter is 2 seconds "current-on" and 2 seconds "current-off" with the pulses reversing continuously in polarity. The data recorded in the field consists of careful measurement of the current (I) in amperes flowing through electrodes C_1 and C_2, the primary voltage (V) appearing between the two potential electrodes, P_1 and P_2, during the "current-on" part of the cycle, and the apparent chargeability (M_a) presented as a direct readout (two samples of the decay curve M_a (0.45 - 0.90 seconds) and N_a (0.90 - 1.35 seconds) are taken for 3 current cycles, automatically averaged, adjusted to the $\frac{3}{33}M_1$ standard and stored).

The apparent resistivity (P_a) in ohm metres is proportional to the ratio of the primary voltage and the measured current, the proportionality factor depending on the geometry of the array used. The chargeability and resistivity are called apparent as they are values which that portion of the earth sampled would have if it were homogeneous. As the earth sampled is usually inhomogeneous the calculated apparent chargeability and resistivity are functions of the actual chargeability and resistivity of the rocks.

The survey in the Little Chief area was carried out using the gradient array. In this method the two current electrodes, C_1 and C_2, were fixed 6000 feet (2A) apart while measurements were made with a square block (A x A) on the survey lines using a 200' dipole ($P_1 - P_2$ = 200').

In addition a multiseparation traverse was carried out on Line 82N using the "pole - dipole" array. In this method the current electrode C_1, and the two potential electrodes, P_1 & P_2, are moved in unison along the survey line. The spacing "na" (n an integer) between C_1 and P_1 is kept constant for each traverse at a distance roughly equal to the depth to be explored by that traverse, while that of $P_1 - P_2$ is kept constant at "a". The second current electrode is kept fixed at "infinity". A dipole of 300' was used, and 2nd, 3rd, 4th separation (n= 2, 3 & 4) readings were obtained.

SURVEY SPECIFICATIONS cont'd

An attempt was also made to do some modified down hole surveying. The C_1 electrode was implanted in the orebody on the 1000' below surface level approximately at the edge of the grid, and measurements were made along the lines using a 200 foot dipole. The second current electrode was again fixed at "infinity".

The traverses in the Best Chance area were carried out using the "pole - dipole method" with 100' and 200' dipoles and n = 1 and 2.

The Annie Lake traverses were done using the same method with a 100 foot dipole, and n = 1, 2 and 3.

DISCUSSION OF RESULTS.

Little Chief Area.

The results of the gradient survey showed the area surveyed to exhibit a fairly regular chargeability background with a gradual build-up to the west presumably reflecting a rock-type change, above which one very local anomaly was discernible on Line 82 N around 51 E (Map W-249-1).

No I.P. response was observed over and around the extension of the orebody (56 E on Line 86 N and 84 N) that lies some 1000 feet below surface at this point.

Line 82 N was then traversed with a "pole-dipole" array with resulting single point peaks at 54 + 50 E and 56 E respectively on the a = 300' n = 3 and 4 traverses (Map W 249-2).

It was then ascertained that the above chargeability highs and also the negative readings on the gradient, a = 300' n = 2 traverse and the ensuing downhole survey all occurred when a potential electrode was located at 50 N under the power line.

As this power line was supposedly dead and no similar readings were obtained under it on adjoining lines it was not suspected to be the cause of the anomalous readings. However a search of the area failed to turn up anything on the surface that could account for this effect. Accordingly it was felt that some shallowly buried man-made conductor or possibly some small sulphide occurrence could be responsible for higher values.

Map W-249-3 shows contours of the apparent chargeability measured along the grid lines when the orebody was directly energized by implanting the current electrode in it. Although this was not a conventional type downhole survey - i.e. the lines run radially out from the vertical projection of C_1 - the results do show that the orebody is apparently detectable on surface using this method, while it was not using normal surface arrays.

Best Chance Area.

Both lines traversed showed no anomalous responses. The chargeability and resistivity for the most both decrease with depth (Map W-249-4).

Annie Lake Area.

The resistivity survey indicates the presence of an upper resistive layer (n= 1 n = 2 resistivities), and shows a definite resistivity change in the lower layer around 3 W.

DISCUSSION OF RESULTS cont'd

The chargeability results show a peak on the a = 100' n = 2 and 3 traverses around 1 + 50 W. A build-up to the same value occurs to the west on the n = 1, 2 and 3 traverses.

Were it not for the difference in resistivities the writer would automatically suspect that the anomalous peak was due to an offshoot or stringer of the rocktype to the west. However as the resistivities are different it would be prudent to extend the traverse some 1000' on either side and conduct adjoining traverses to better explain the high chargeability readings.

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS.

Between October 11th and 17th, 1977, Peter E. Walcott & Associates Limited carried out a small I.P. programme for Whitehorse Copper Mines Ltd.

These properties were generally located around the Whitehorse Copper Belt.

The surface survey over the Little Chief area located a small local anomaly that was suspected to be due to man-made causes but was not confirmed. A borehole was also drilled to investigate whether it could be due to mineralization with negative results.

The buried electrode - down hole survey - confirmed the above anomaly and detected the orebody that was not picked up by normal surface arrays.

The survey over the Best Chance area negated the previously detected one point chargeability highs.

The Annie Lake traverse showed the presence of a possible anomalous zone. However the survey coverage would need to be extended to more properly explain the results.

As a result the writer concludes that

(1) there would not appear to be any sulphide zone of significant size within 600 feet of surface in the Little Chief area.

(2) by implanting electrodes underground in the ore zone and by running radial surveys it might be possible, if required, to trace the ore zone.

(3) Ambiguity exists in the Annie Lake area and additional surveying in the form of extending the traverse and running other traverses might clarify the picture.

Respectfully submitted,

PETER E. WALCOTT & ASSOCIATES LIMITED

Peter E. Walcott, P.Eng.
Geophysicists

Vancouver, B.C.

May 1978

APPENDIX

COST OF SURVEY.

Peter E. Walcott & Associates Limited undertook the survey on a daily basis. Mobilization and draughting charges were extra so that the total estimated cost of the survey was $6,956.52.

PERSONNEL EMPLOYED ON SURVEY.

Name	Occupation	Address	Dates
Peter E. Walcott	Geophysicist	Peter E. Walcott & Assoc. 605 Rutland Court, Coquitlam, B.C.	Oct. 11 - 14th, 77 May 12 - 14th, 78
G. MacMillan	Geophysical Operator	" "	Oct. 14 - 17th, 77
V. Pashniak	"	" "	Oct. 11 - 17th, 77
J. Kieley	"	" "	Oct. 11 - 14th, 77
R. Brown	Geophysical Helper	" "	Oct. 13 - 14th, 77
P. Charlie	"	" "	Oct. 11 - 17th, 77
S. Scurvey	"	" "	Oct. 15 - 17th, 77
J. Walcott	Typing	" "	May 26th, 1978
J. Winfield	Draughting	Altair Drafting Services Vancouver, B.C.	May 16 - 31st, 1978

CERTIFICATION.

I, Peter E. Walcott of the Municipality of Coquitlam, British Columbia, hereby certify that:

1. I am a Graduate of the University of Toronto in 1962 with a B.A.Sc. in Engineering Physics, Geophysics Option.

2. I have been practising my profession for the last fifteen years.

3. I am a member of the Association of Professional Engineers of British Columbia, Ontario and the Yukon Territory.

4. I hold no interest, direct or indirect in the securities or properties of Whitehorse Copper Mines Ltd., nor do I expect to receive any.

Peter E. Walcott, P.Eng.

Vancouver, B.C.