#### A REPORT

## <u>ON</u>

# **INDUCED POLARIZATION & MAGNETIC SURVEYING**



BY

# PETER E. WALCOTT & ASSOCIATES LIMITED

Vancouver, B.C.

**NOVEMBER 2006** 

#### TABLE OF CONTENTS

Introduction	3
Purpose	4
Survey Specifications	5
Discussion of Results	8
Summary, Conclusions & Recommendations	10

## **APPENDIX**

Cost of Survey Personnel Employed on Survey Certification 3D view of stacked chargeability sections 3D view of stacked resistivity sections

ACCOMPANYING MAP 1:10,000	MAP POCKET		
Contours of Total Field Intensity	2006 Grid		ST1
cc cc cc	2005 & 200	6 Grids	ST2
Stacked Chargeability Pseudo section	is –	2006 Grid	ST3
Stacked Resistivity Pseudo sections	-	2006 Grid	ST4
Stacked Chargeability Pseudo section	is -	2005 Grid	ST5
Stacked Resistivity Pseudo sections	~	2005 Grid	ST6
I.P. Pseudo sections Line 10000, 1020	00, 10400, 1	0600, 10800, 1	1000, 11200, 11400
I.P. Modeled Sections "	~~ ~~	46 46	** ** **

Peter E. Walcott & Associates Limited Geophysical Services Page

## **INTRODUCTION.**

Between July 28<sup>th</sup> & August 11<sup>th</sup>, 2006, Peter E. Walcott & Associates Limited undertook a magnetic and induced polarization (I.P.) survey over a part of the Sofia property, located some 500 kilometres north northwest of Prince George, British Columbia, for Stealth Minerals Limited.

The survey was carried out over eight northeasterly trending lines established by line cutters contracted by Stealth. Five of these were terminated short of their planned length due to rough topography.

Readings of the earth's total magnetic field were recorded using a GSM proton magnetometer on the magnetic survey, while measurements – first to sixth separation – of apparent chargeability – the I.P. response parameter – and resistivity were made using the pole – dipole technique with a 100 metre dipole.

In addition the elevations and horizontal positions of the line stations were measured using a Brunton altimeter and a Garmin (DGPS corrected) handheld GPS unit.

The I.P. data are presented as individual pseudo sections at a scale of 1:10,000 while the magnetic data is presented in contour form on an idealized plan map of the grid at the same scale.

#### PURPOSE.

The purpose of the survey was to extend and further define the chargeability anomaly obtained on the 2005 survey by Lloyd Geophysics Inc - data included in this report – associated with a porphyry showing hosted within a magnetite bearing monzonite phase of the Black Lake plutonic suite with an eye to selecting targets for diamond drilling investigation.

## SURVEY SPECIFICATIONS.

#### Magnetic Survey.

The magnetic survey was carried out using a GSM 19 proton precession magnetometer manufactured by GEM Instruments of Richmond Hill, Ontario. This instrument measures variations in the total intensity of the earth's magnetic field to an accuracy of plus or minus one nanotesla. Corrections for daily variations in the earth's field – the diurnal – were made by comparison with a similar instrument set up at a fixed location – the base – where recordings were made at 10 second intervals.

#### The Induced Polarization Survey.

The induced polarization (I.P.) survey was conducted using a pulse type system, the principal components of which were manufactured by Huntec Limited of Metropolitan Toronto, Canada and Iris Instruments of Orleans, France.

The system consists basically of three units, a receiver (Iris), transmitter (Huntec) 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 Honda 20 h.p. 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 measurements of the current (I) in amperes flowing through the current electrodes  $C_1$  and  $C_2$ , the primary voltages (V) appearing between any two potential electrodes,  $P_1$  through  $P_7$ , during the "current-on" part of the cycle, and the apparent chargeability, (M<sub>a</sub>) presented as a direct readout in millivolts per volt using a 120 millisecond delay and a 900 millisecond sample window by the receiver, a digital receiver controlled by a micro-processor – the sample window is actually the total of ten individual windows of 90 millisecond widths.

The apparent resistivity  $(\int_a)$  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

## SURVEY SPECIFICATIONS cont'd

sampled is usually inhomogeneous the calculated apparent chargeability and resistivity are functions of the actual chargeability and resistivity of the rocks.

The survey was carried out using the "pole-dipole" method of surveying. In this method the current electrode,  $C_1$ , and the potential electrodes,  $P_1$  through  $P_7$ , are moved in unison along the survey lines at a spacing of "a" (the dipole) apart, while the second current electrode,  $C_2$ , is kept constant at "infinity". The distance, "na" between  $C_1$  and the nearest potential electrode generally controls the depth to be explored by the particular separation, "n", traverse.

On this survey a 100 metre dipole was employed and first to sixth separation readings were obtained. In all some 19 kilometres of I.P. and magnetic traversing were completed.

#### Horizontal control.

The horizontal position of the stations were recorded using a Garmin 76 GPS unit and CDGPS receiver.

The latter output corrections obtained from Canadian reference stations via Pacific Crest radio modems to the Garmin for more accurate horizontal locations.

#### Vertical Control.

The elevation of the stations were recorded using an ADC Summit altimeter manufactured by Brunton of Wyoming, U.S.A. This instrument measures elevations using barometric pressures to an accuracy of plus or minus 3 metres. Corrections for errors due to variations in atmospheric pressure were made by comparison to readings obtained on a similar instrument, held stationary at one location – base -, at 10 minute intervals.

## SURVEY SPECIFICATIONS cont'd

#### Data Presentation.

The I.P. data are presented as individual pseudo section plots of apparent chargeability and resistivity at a scale of 1:10,000 on the topographic profile. Plots of the 21 point moving filter – illustrated on the pseudo section – for the above are also displayed in the top window to better show the location of the anomalous zones. Stacked sections of the data and those of the 2005 survey by Lloyd Geophysics are also shown for a better visualization at the same scale.

The magnetic data is presented in contour form on an idealized plan map of the grid at 1:10,000. In addition the data of the 2005 was leveled to conform with the merged data is presented in a similar manner.

Two dimensional smooth model inversion of the resistivity and chargeability was carried out on the five lines using the Geotomo RES2DINV Algorithm, an algorithm developed by Loke et-al. This algorithm uses a 2-D finite element method and incorporates topography in modeling resistivity and I.P. data. Nearly uniform starting models are generated by running broad moving-average filters over the respective lines of data. Model resistivity and chargeability properties are then adjusted iteratively until the calculated data values match the observed as closely as possible, given constraints which keep the model section smooth. The smooth chargeability and resistivity models were then imported into Geosoft format for presentation at the same scale of 1:10,000 on the topographic profile. A slight discrepancy can be observed between the measured and modeled plots as the former are processed in Geosoft which assumes horizontal distances for the station separation.

## **DISCUSSION OF RESULTS.**

The results should be studied in conjunction with those of the previous I.P. survey along with the geological report on the property, to which this report is appended.

The results of the 2005 and 2006 magnetic surveys show good agreement with those of the airborne survey as evidenced on maps ST1 & 2, the contoured plots of the 2006 and 2005 & 2006 combined magnetics, defining for the most the eastern ring of the large doughnut magnetic anomaly.

The magnetic patterns looked similar on the 2005 and 2006 although done over two different rock units – quartz mazonite intrusions and andesite flows.

The strong anomaly on Line 9400N is probably due to a thin dyke running down the line as it is not reflected on the airborne results. Its width could be checked with a short cross line.

The results of the I.P. survey carried out with a 100 metre dipole showed similar chargeabilities to those on the 2005 survey done with a 50 metre dipole but with the same delay and integration time. This is readily discernible on the stacked pseudo section plots of apparent chargeability and resistivity – Maps ST 3, 4, 5 & 6 respectively.

As a result a band of high chargeability – outlined by the 25 mV/V contour – is observed stretching from Line 86N to Line 110N, a distance of some 2.4 kilometres, and undefined for the most on the eastern and western extremities of the lines, in the underlying quartz monzonites to the south and the andesite flows and tuffs to the north.

The northern portion of this chargeability zone can be readily seen on the 3D view of the stacked chargeability sections bound in the appendix.

Moderate chargeabilities – high teens to low twenties – are observed on the western flank of the aforementioned high on the three long lines – Lines 10000, 10200 and 10400N. These chargeabilities extend out for some 1500 metres to the west in the underlying volcanics.

#### **DISCUSSION OF RESULTS cont'd**

The western portion of the chargeability high and the area of moderate chargeability are characterized by low total field magnetics and moderate to high potassium counts as seen on the airborne survey results.

Lower resistivities can be seen over the high chargeabilities and over the altered volcanics on the western portion of the long lines as depicted on the 3D view of the resistivity stack sections.

2D inversion of the chargeability data shows modeled moderate responses at depth accompanied by higher restistivities on the western portions of these three lines suggesting that the volcanic cover could be thin with intrusives at depth. The writer is unaware of the results of previous drilling in the area that could prove or disprove this observation.

## SUMMARY, CONCLUSIONS & RECOMMENDATIONS.

Between July 28<sup>th</sup> and August 11<sup>th</sup>, 2006, Peter E. Walcott and Associates Limited conducted a limited magnetic and induced polatization survey for Stealth Minerals Limited.

The survey was carried out over eight northeasterly oriented lines on the Sofia property located in the Toodoggone district of British Columbia, circa 500 kilometres north northeast of Prince George.

The survey was an extension to the northwest of a similar survey undertaken in 2005 by Lloyd Geophysics Inc.

The I.P. results extended the strong chargeability anomaly obtained on the previous survey one kilometre to the northwest.

It also defined the western boundary of this strong anomalous zone on the three long traverses and detected a complex zone of moderate chargeability of some 1500 metre width adjoining the strong zone on the west, mostly observed on the larger separations.

The western part of the strong zone and the zone(s) of moderate chargeability correlates with low magnetics and high potassium counts on the airborne survey.

As a result of the above the writer suggests that the following be undertaken:

1. The results of the previous drilling be plotted on the inversion sections to correlate mineralization – if any – with the modeled chargeability zones.

2. A fence of drill holes be established across the I.P. responses on Line 10000N to investigate their causative nature.

## SUMMARY, CONCLUSIONS & RECOMMENDATIONS cont'd

3. Should encouraging results be obtained, then the I.P. survey be extended eastwards across the Toodoggone River, and westwards to properly define the anomalous response extents.

Respectfully submitted,

PETER E. WALCOTT & ASSOCIATES LIMITED

"h place

Peter E. Walcott, P.Eng. / Geophysicist

Vancouver, B.C. November 2006

## **APPENDIX**

\_\_\_\_\_

\_

---

-

Magnetic & Induced Polarization Surveying Sofia Property ---

•

## COST OF SURVEY.

Peter E. Walcott & Associates Limited undertook the survey on a daily basis. Mobilization and reporting were extra so that the total cost of services provided was \$40,025.00.

.....

## PERSONNEL EMPLOYED ON SURVEY.

----

\_\_\_

Name	Occupation	Address	Dates	
Peter E. Walcott	Geophysicist	Peter E. Walcott & . Associates Limited 506-1529 W, 6 <sup>th</sup> Ave. Vancouver, B.C.	Aug. 14 <sup>th</sup> , Nov. 12 <sup>th</sup> – 14 <sup>th</sup> , 06	
Alexander Walcott	Geophysicist	**	Sept. $2^{nd} - 5^{th}$ , 06	
T. Kocan	Geophysical Operator	دد	July 28 <sup>th</sup> – Aug. 11 <sup>th</sup> , 2006	
M. Magee	دد	دد	٠.	
M. Russell	Geophysical Assistant	دد	**	
T. Scott	۲۵	٠٠	65	
I. White	"	دد	"	
C. Blackwater	+	۰۵	"	
J. Walcott	Report Prep.	دد	Nov. 14 <sup>th</sup> , 2006	

•

#### **CERTIFICATION.**

- 1. I am graduate of the University of Toronto in 1962 with a B.A.Sc. in Engineering Physics, Geophysics Option.
- 2. I have been practicing my profession for the last forty four years.
- 3. I am a member of the Association of Professional Engineers of British Columbia and Ontario.
- 4. I hold no interest, direct nor indirect, in Stealth Minerals Limited, nor do I expect to receive any.

Peter E. Walcott, P.Eng.

Vancouver, B.C. November 2006







9500E	10000E	10500E	11000E	11500E	12000E
					L11400
					L11000
					L10800 N
					L1
	L10400 N	000 PS			

9500E

10000E

10500E

11000E

12000E

















































