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Fig. 1 - Location Map
Fig. 2-Claim Map
Fig. 3 - Sample Record

This report describes the specifications and results of a geophysical survey carried out for 655 Group Holdings Limited of Timmins, Ontario by Terraquest Ltd., 905-121 Richmond St. W., Toronto, Canada. The field work was performed on Mar. 24, 1985, and the data processing, interpretation and reporting from March 1985 to May 27, 1985.

The purpose of a survey of this type is two-fold. One is to prospect directly for anomalously conductive and magnetic areas in the earth's crust which may be caused by, or at least related to, mineral deposits. A second is to use the magnetic and conductivity patterns derived from the survey results to assist in mapping geology, and to indicate the presence of faults, shear zones, folding, alteration zones and other structures potentially favourable to the presence of gold and basemetal concentration. To achieve this purpose the survey area was systematically traversed by an aircraft carrying geophysical instruments along parallel filght lines spaced 100 meters apart, 100 meters above the terrain surface, and aligned so as to intersect the regional geology in a way to provide the optimum contour patterns of geophysical data.

## 2. THE PROPERTY

The property is located in Turnbull Township, in the Porcupine Mining Division of Ontario about 25 kilometers due east of the city of Timmins, Ontario. The claims are divided into two goups as shown in figure 3 and referred to as Block 1 (the western group) and Block 2 (east). They can be reached by forestry road from the Kam Kotia Mine road some 8 kilometers to the east.

The latitude and longitude are 48 degrees 30 min., and 81 degrees 40 min. respectively, and the N.T.S. reference is 42 A/5

The claim numbers are:
P628225, 649632-642, 699719-730, 700246-251, 708902-909, 708914-921, 796746-755, 805430-438, and 806295-299.

## 3. GEOLOGY

Map Reference:

1. Map 2330, Turnbul1 and Godfrey Twps, O.D.M., 1:31,680 1975

Block 1 (west) is underlain by Archean mafic and ultramafic intrusives which have been intruded in places by granitic rocks and by diabase dykes striking north-south. One small exposure of mafic volcanics occurs in the southern part.

A mineral occurence, presumably gold, operated in the past by New Hope Porcupine Gold mines Ltd., lies in the ultramafics and includes a shaft. A property owned by Staten Porcupine Gold Mines



Ltd. lies on the east boundary and the workings appear to be in the ultramafics.

Block 2 (east) is underlain mainly by felsic intrusives defined as granophyric quartz-albite porphyry, with some of the earlier mafic
intrusives to the north and exposures of very early mafic volcanics along the west edge. A few diabase dykes traverse the group from north to south and northwesterly.

Some old workings lie in the centre of the property in the felsic rocks.

## 4. SURVEY SPECIFICATIONS

### 4.1 Instruments

The survey was carried out using a Cessna 182 aircraft, registration C-FAKK, which carries a magnetometer and a VLF electromagnetic detector.

The magnetometer is a proton precession type with the sensor element mounted in an extension of the right wing tip. It's specifications are as follows:

Resolution: $\quad 0.5$ gamma
Accuracy: One gamma
Cycle time: One second
Range: 20000 - 100000 gammas in 23 overlapping
steps
Gradient tolerance: Up to 5000 gammas per meter
Model: GSM-8BA
Manufacturer: GEM Systems Inc., 105 Scarsdale Rd., Don Mills, Ontario, M3B 2R5

The VLF-EM unit uses three orthoganol detector coils to measure (a) the total field strength of the time-varying EM field and (b) the phase relationship between the vertical coil and both the "along line" coil (LINE) and the "cross-line" coil (ORTHO). The LINE coil is tuned to a transmitter station that is ideally positioned at right angles to the flight lines, while the ORTHO coil transmitter should be in line with the flight lines. It's specifications are:

Accuracy:
Reading interval: $1 / 2$ second
Model:
Manufacturer:
The VLF sensor is mounted in the left wing tip extension.
Other instruments are:
. King KRA-10A Radar altimeter
. UDAS-100 data processor with Digidata nine track tape recorder, manufactured by Urtec Ltd., Markham, Ontario.
. Geocam video camera and recorder for flight path recovery,
manufactured by Geotech Ltd., Markham, Ontario.
4.2 Lines and Data

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a) Line spacing: }100\mathrm{ meters
b) Line direction:
c) Terrain clearance:
d) Average ground speed: }156\textrm{km}/\textrm{hr}
e) Data point interval:
                Magnetic: 42 meters
f) Tie Line interval:
2 kilometers
g) Channel 1 (LINE): NSS Annapolis, 21.4 kHz.
h) Channel 2 (ORTHO): NAA Cutler, Maine, 24.0 kHz.
i) Line km within claim boundaries: 135
j) Line km over total survey area: 224
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### 4.3 Tolerances

a) Line spacing: Any gaps wider than twice the line spacing and longer than 10 times the line spacing were filled in by a new line. b) Terrain clearance: Portions of line which were flown above 125 meters for more than one $k m$ were reflown if safety considerations were acceptable.
c) Diurnal magnetic variation: Less than twenty gammas deviation from a smooth background over a period of two minutes or less as seen on the base station analogue record.
d) Manoeuvre noise: Approximately $+1-5$ gammas.

### 4.4 Photomosaics

For navigating the aircraft and recovering the flight path, mosaics of aerial photographs were made from existing air photos. In order to provide a semi-controlled base the photos were laid down on a topographic map which had been photographically adjusted to the photo scale. The laydown was then photographed and printed at the final map scale.

## 5. DATA PROCESSING

Flight path recovery was carried out in the field using a video tape viewer to observe the flight path as recorded by the Geocam video camera system. The flight path recovery was completed daily to enable reflights to be selected where needed for the following day.

The magnetic data was levelled in the standard manner by tying survey lines to the tie lines. The IGRF was not been removed. The total field was contoured by computer using a program provided by Dataplotting Services Inc. To do this the final levelled data set is

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gridded at a grid cell spacing of $1 / 4$ the flight line spacing.
The vertical magnetic gradient is computed from the total field data using a method of transforming the data set into the frequency domain, applying a transfer function to calculate the gradient, and then transforming back into the spatial domain. The method is described by a number of authors including Grant, 1972 and Spector, 1968.

The VLF data was treated automatically so as to normalize the non conductive background areas to 100 (total field strength) and zero (quadrature). The algorithms to do this were developed by Terraquest and will be provided to anyone interested by application to the company.

Grant, F.S.; Review of Data Processing and Interpretation Methods Spector, A.; Spectral Analysis of Aeromagnetic maps; unpublished thesis; University of Toronto, 1961.

All of these dataprocessing calculations and map contouring were carried out by Dataplotting Services Inc. of Toronto.

## 6. INTERPRETATION

### 6.1 General Approach

To satisfy the purpose of the survey as stated in the introduction, the interpretation procedure was carried out on both the magnetic and VLF data. On a local scale the magnetic gradient contour patterns were used to outline geological units which have different magnetic intensity and patterns or "signatures". Where possible these are related to existing geology to provide a geological identity to the units. On a regional scale the total field contour patterns were used in the same way.

Faults and shear zones are interpreted mainly from lateral displacements of otherwise linear magnetic anomalies but also from long narrow "lows". The direction of regional faulting in the general area is taken into account when selecting faults. Folding is usually seen as curved regional patterns. Alteration zones can show up as anomalously quiet areas, of ten adjacent to strong, circular anomalies that represent intrusives.

Magnetic anomalies caused by iron deposits of ore quality are usually clearly seen from their high amplitude, of ten in the tens of thousands of gammas. Diabase dykes are one of the most common magnetic features seen in the Ontario part of the precambrian shield.

## a) Block 1

The magnetic contour pattern shows the presence of moderately magnetic rocks traversing the property for most of its length in a north-south direction. The vertical gradient data resolves these trends into a number of parallel bands which are identified as diabase dykes and which are well supported by the mapped geology. About nine or ten individual dykes are seen, most of which extend the full length of the claim group. Lateral offsets of these features are interpreted as faults.

The difference between the granitic rocks and the basic intrusives is not apparent in the magnetic pattern and so these units have not been outlined.

A number of VLF-EM conductor axes were found, nearly all of which strike approximately north-south. Conductor $A$ is one of the strongest, conforms with regional strike direction, coincides partly with a diabase dyke and then moves away from the dyke, and in general appears to be related to bedrock rather than overburden. Conductor $B$ is also of interest because of its strength and proximity to the old workings. Both are recommended for further investigation by conventional EM methods or Induced Polarization.

## b) Block 2

The magnetic pattern again shows a number of diabase dykes and they trend about north 15 degrees west. Unlike block 1, the mafic intrusives in this area appear to have a strong magnetic response and can be tentatively distinguished from the felsic intrusives. Unit no. 7, intermediate intrusives, have a definite signature in the south and have been outlined. The contact with the volcanics to the west, however, cannot be seen.

A number of VLF-EM conductors are seen which conform in strike direction to the local geology and so appear to be related to bedrock although mostly occur in covered areas. The conductor axes showing the reverse quadrature response are, in theory, most likely to be caused by bedrock conductors and should be investigated further.

## 7. SUMMARY

A combined magnetic and VLF-EM survey has been done on the claim group at a data density of approximately 1.6 km . per mineral claim. The magnetic data has been used to modify and update the existing geology and has shown a number of new contacts and faults. A number of VLF-EM conductor axes were found of which some are believed to be have potential sulphide origin and have been recommended for additional investigation.

 GEOPHYSICAL
__ GEOLOGICAL
_ GEOCHEMICAL
_ EXPENDITURE

MINING LANDS COMMENTS:
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655 Group Holdings Ltd
Robert M. Onotsky
680 Dieppe Street
P. O. Box 216
Timmins, Ontario
P4N 7 C 9
RE: Mining Claims $P$ 628225, et al, in Turnbull Township

I have not received the reports and maps (in duplicate) for the Airborne Geophysical (Magnetometer Electromagnetic) Survey on the above-mentioned claims.

As the assessment "Report of Work" was recorded by the Mining Recorder on March 26, 1985, the 60 day perlod allowed by Section 77 of the Mining Act for the submission of the technical reports and maps to this office will expire on May 25, 1985.

If the material is not subritted to this office by May 25, 1985, I will have no alternative but to instruct the Mining Recorder to delete the work credits from the claim record sheets.

For further information, please contact Mr. Arthur Barr at (416)965-4888.

Yours sincerely,

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