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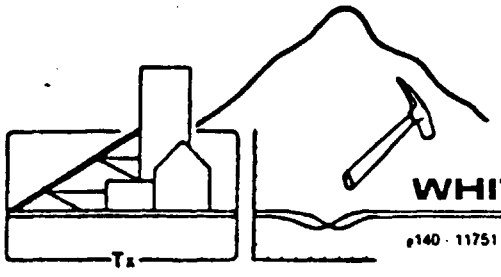

WHITE GEOPHYSICAL INC.

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GEOPHYSICS IN THE TOODOGONE GOLD CAMP

BY MARKUS SEYWARD
WHITE GEOPHYSICAL INC.

A comprehensive study of various geophysical surveys conducted on Energex Ltd's A1 property in the Toodogone Region of British Columbia during the 1986 field season.

GEOPHYSICS IN THE TOODOGGONE GOLD CAMP

During the 1986 field season, White Geophysical Inc. was contracted by Energex Minerals Ltd. to conduct a series of test surveys on their Toodoggone property. The purpose of these tests was to determine which geophysical survey would best delineate the gold carrying silicified zones being sought in the Toodoggone Gold Camp.

The surveys tested were of two basic types, direct electrical methods and electromagnetic methods. The direct electrical methods used were our in-house Multipole induced polarization system and self potential, while the electromagnetic surveys tested were, EM-31, EM-16, EM-16R and Crone Pulse EM. A proton precession magnetometer survey was also carried out. After consulting with various people working in the area it became immediately apparent that EM-16R and EM-31 were the two most popular surveys.

The EM-16R is an attachment to the normal EM-16, which allows direct measurement of the electrical component of the VLF field in addition to the magnetic component. The instrument is calibrated in such a way that the electric magnetic field ratio allows direct reading of ground apparent resistivity. The EM-31 is a self-contained induction technique. The instrument consists of boom mounted transmitter and receiver coils approximately 3.6 metres apart. Terrain conductivity readings are obtained in units of millimhos/metres. The advantage of both of these systems is that they are light weight, can be operated by a single individual and produce numbers that require no additional manipulation in order to be interpreted. (Note: It is much more efficient to survey with two people for the EM-16R.) The best response for both of these systems was on line 1150SE across the Thesis deposit. The EM-31 picked up

well defined anomalies on the A, B, and C zones (Fig. 1) but the EM-16R failed to detect Zone B (Fig. 2). Both systems failed to detect silicified zones in areas of deeper overburden. (The overburned was shallow on line 1150SE.)

The other EM systems we tested were the Crone pulse EM and the EM-16. The Crone pulse electrometer is a time domain EM system which we used in fix source mode. On line 1150SE we picked EM responses at 875N, 975N, and 1070N, the best being 875N (Fig. 3). The half width of the anomalous responses is small and the anomalies decay rapidly. This indicates that the conductors are of poor to moderate quality and are shallow sourced. The VLF conductors (Fig. 4) tend to correlate with the PEM conductors and both conductors tend to flank silicified zones. This suggests the conductors may be sourced in conductive clays in the altered zones flanking zones of interest.

The proton precession magnetometer survey (Fig. 5) proved to be of little use in locating the silicified zones. However, on a marco scale, as seen in the regional airborne magnetics, most of the known deposits are situated in magnetic lows in the proximity of large magnetic highs, which are probably sourced in underlying intrusives (Fig. 8).

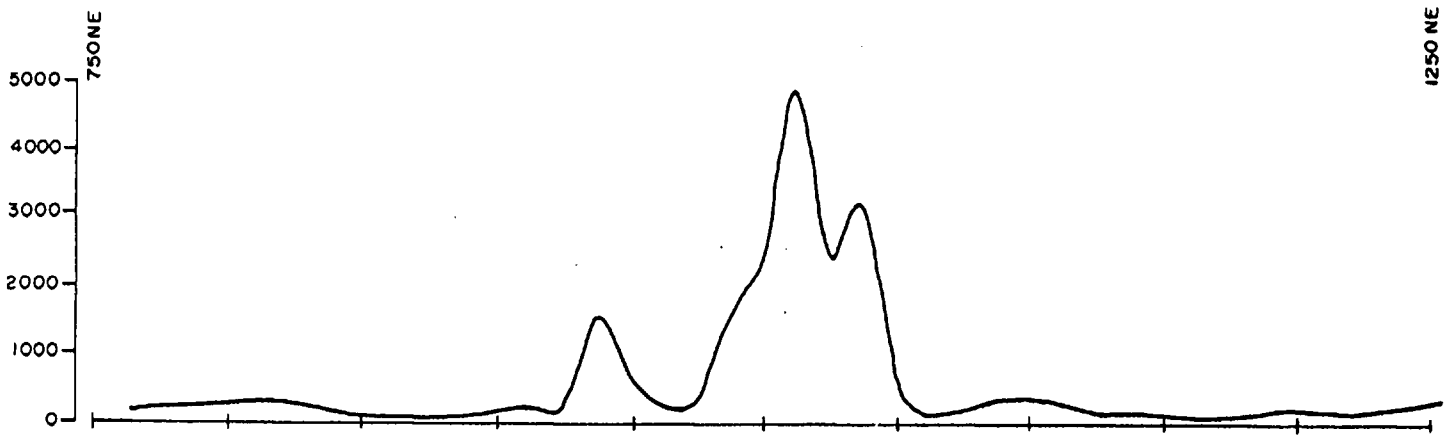
The self potential survey (Fig. 6) failed to correlate with any of the geological features, the only feature of the test survey was a regional gradient.

The multipole induced polarization survey proved to be very effective in locating the silicified zones. The general character of the response is illustrated on Figure 7. The apparent fall off of resistivity with depth is the result of diluting of the response with lower resistivity country

rock. The chargeability highs flanking the resistivity high are likely sourced in chargeable clays associated with the alteration zone.

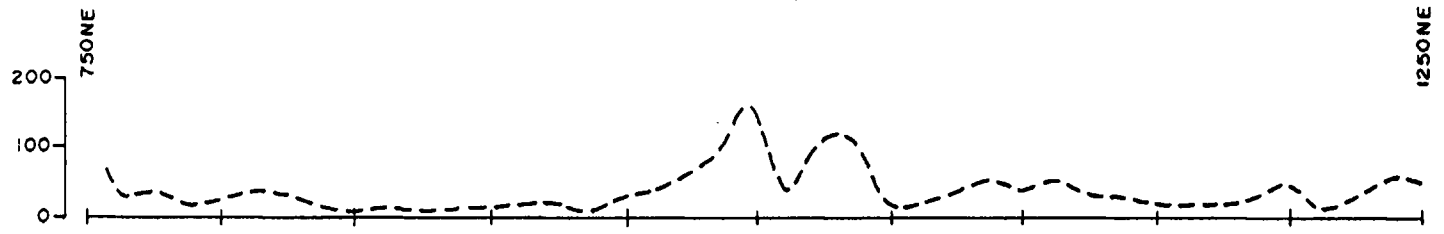
In Figure 7 one can see three subzones associated with the Thesis III deposit, the A, B, and C zones. All three zones are well defined in the resistivity data. The very symmetric nature of the pseudosections indicates the bodies are steeply dipping. The A zone is the least pronounced of the three zones but it is still clearly indicated on the pseudosection. There are two reasons why it is less pronounced, the first being the zones proximity to the larger C zone, whose effects tend to shadow the smaller A zones effects. The second factor contibuting to the smaller effect associated with the A zone is its lateral extent. Mapping and Trenching show the zone pinches out towards the immediate southwest which is reflected in the geophysical data. The most pronounced zone in this pseudosection is the B zone. The data indicates a narrow zone with good lateral and depth extent, unfortunately no diamond drill information on this zone was available to the author, on this line.

After the tests on the Thesis zones were completed, the multipole induced polarization system was used to survey the Thesis, Bonanza Ridge and B.V. zones. In all three areas the silicified zones had the same signature, a high resistivity, low chargeability zone typical of the quartz-barite; flanked by high chargeability, low resistivity zones probably sourced in the conductive, chargeable clays of the alteration halo. The survey was successfully used to help guide Energex Minerals Ltd.'s trenching and drilling program.



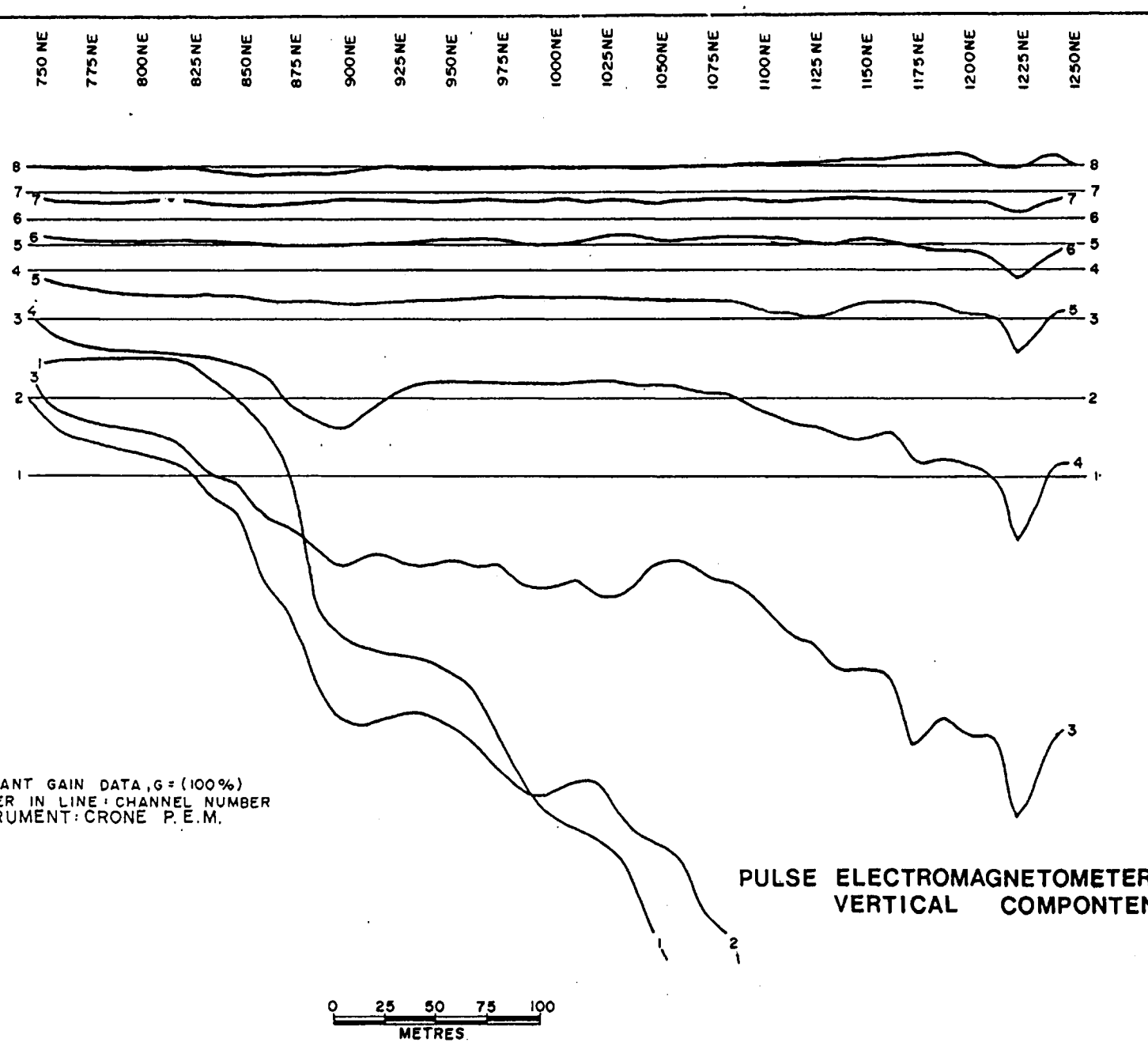
GEONICS EM - 31
APPARENT RESISTIVITY (Ohm - m)

FIG. 1



GEONICS EM - 16R
APPARENT RESISTIVITY (Ohm - m)

FIG. 2

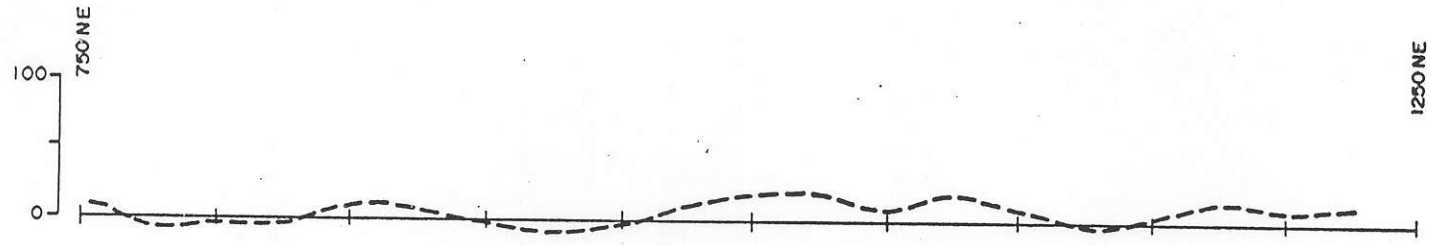


PULSE ELECTROMAGNETOMETER SURVEY
VERTICAL COMPONTENT

FIG. 3

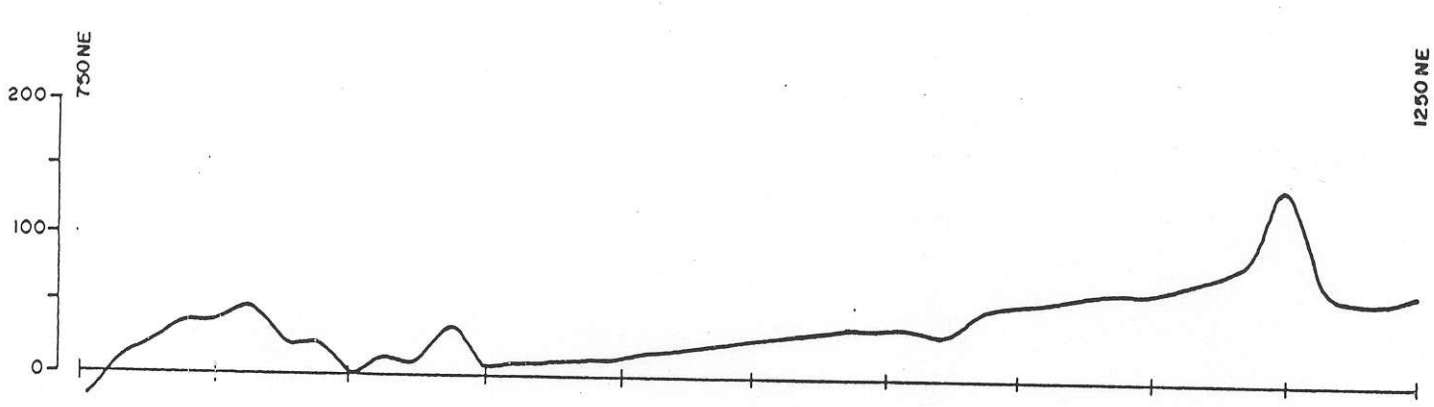
RONKA EM - 16
INPHASE AND QUADRATURE COMPOTENT (PERCENT)

FIG. 4



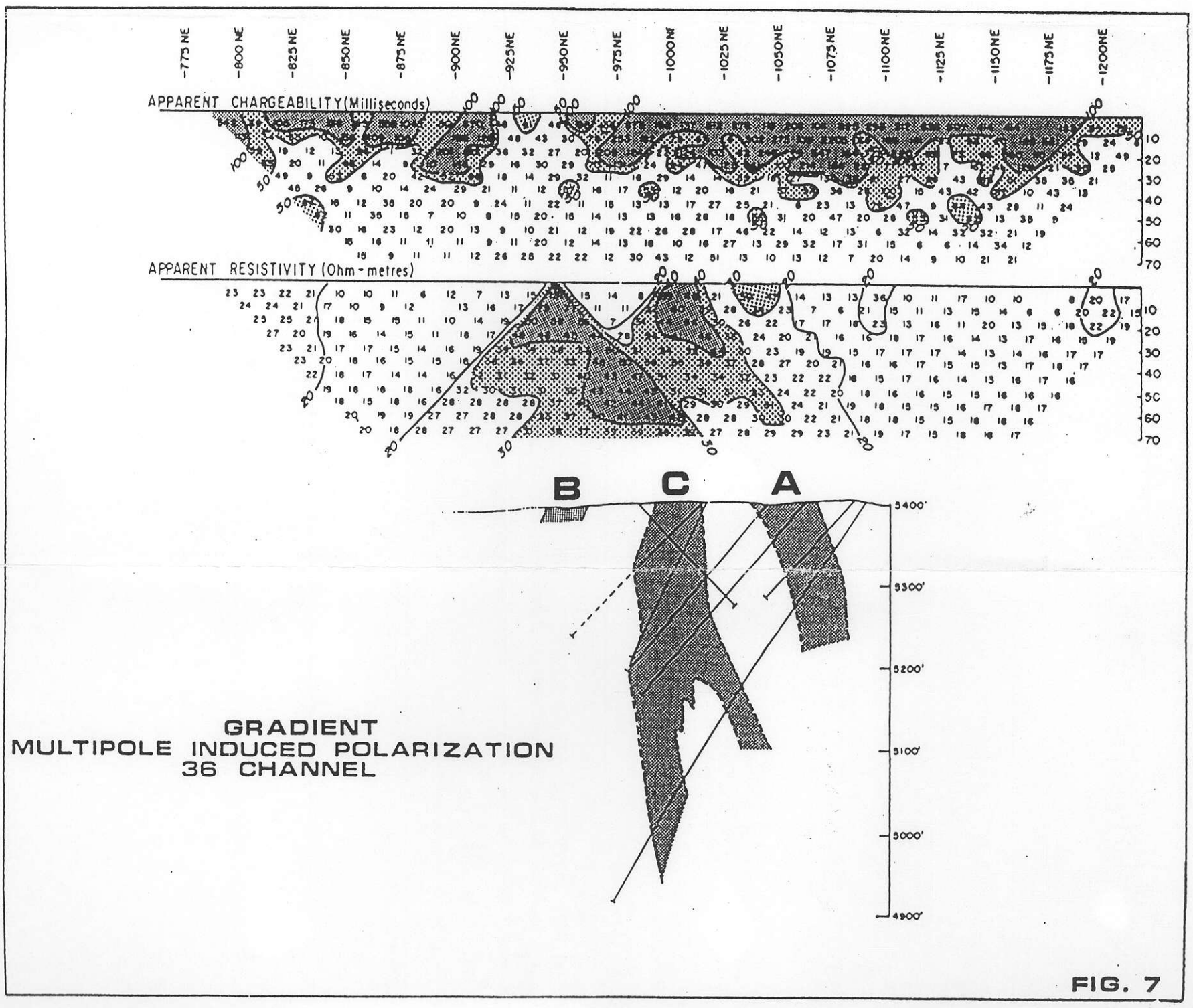
GSM - 8 PROTON PRECESSION MAGNETOMETER
TOTAL FIELD MAGNETICS (nT)

FIG. 5



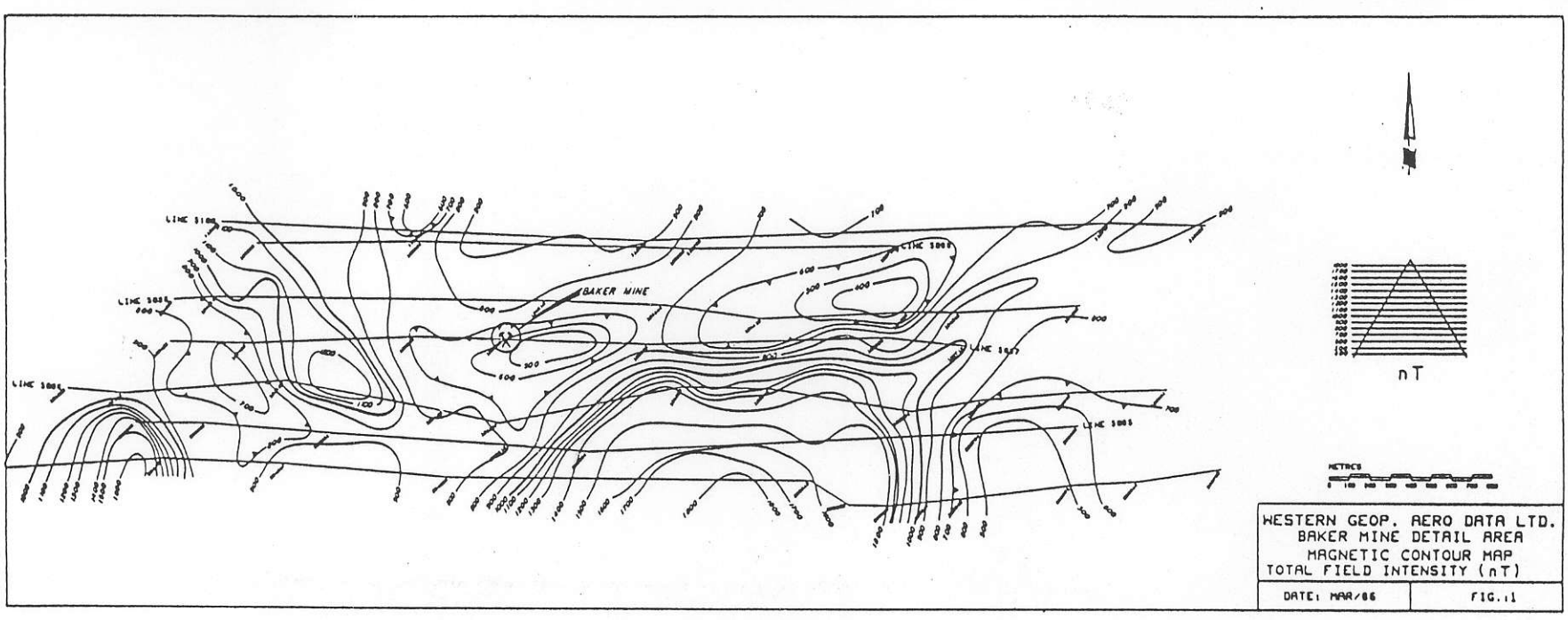
SELF POTENTIAL

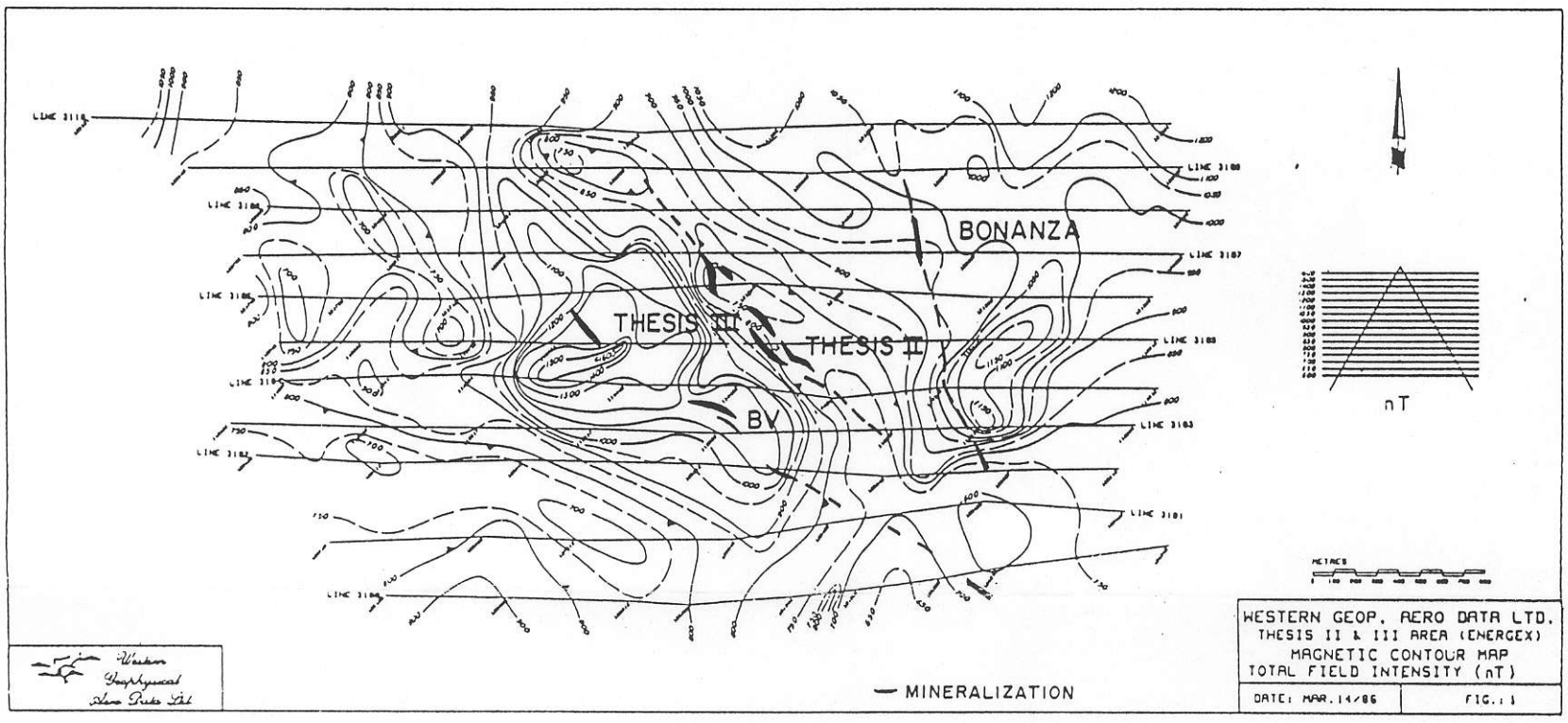
FIG. 6

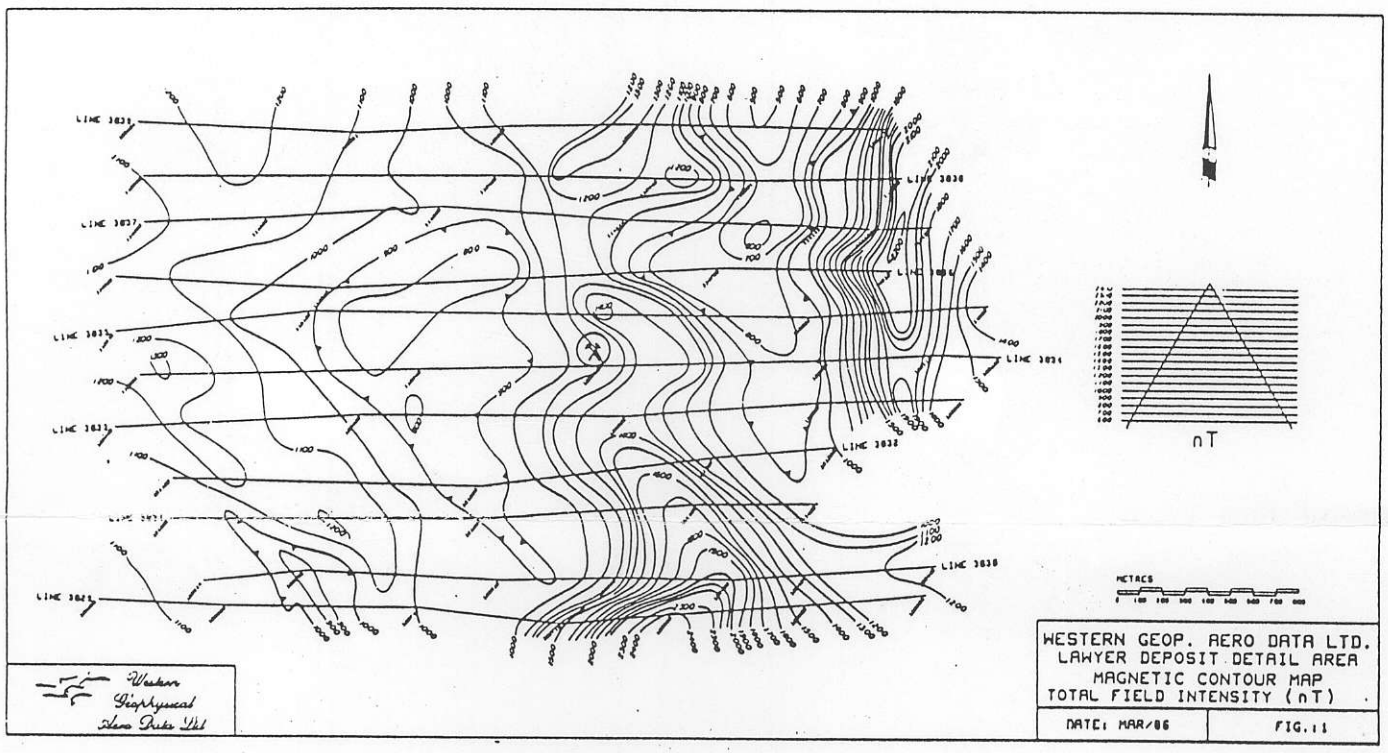


GRADIENT
MULTIPOLE INDUCED POLARIZATION
36 CHANNEL

FIG. 7



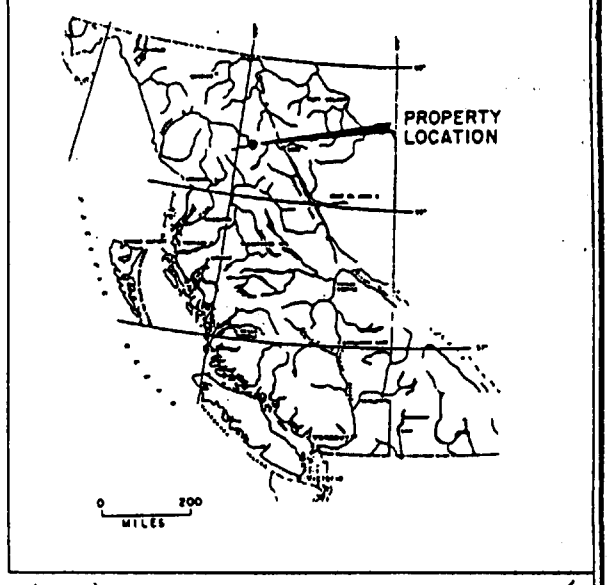




MAGNETIC RESPONSE EXAMPLES
BASE VALUE 58,000 – nT

Western Geophysical Aero Data Ltd.

FIG. 8



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NEWMONT

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GOLDEN RULE RESOURCES

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NEWMONT

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BLACK DIAMOND RES.

DUKE MIN.

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CONTOURS ON ORTHOPHOTO MOSAIC
TOODOGGONE GOLD CAMP
AIRBORNE MAGNETOMETER
DATA FOR SALE

1:25,000 1:50,000 1:100,000

LIARD - OMINECA MINING DIVISIONS

BRITISH COLUMBIA

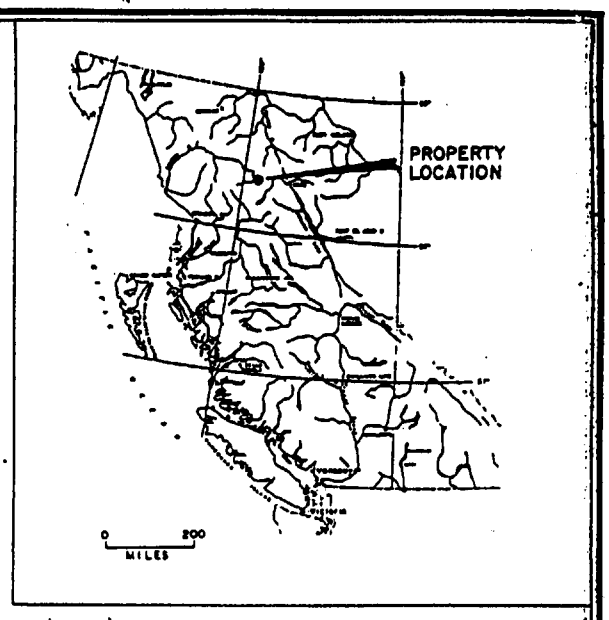
0 1 2 4 6 8 10 Miles

0 1 2 4 6 8 10 12 14 Kilometres

— PROPOSED OMINECA ROAD EXTENSION

• GOLD OCCURRENCE

AIRBORNE SURVEYS FOR THE MINING INDUSTRY



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