MINING RECORDER

1978 Geophysical Assessment Report

Electromagnetic and Magnetic Surveys

TITLE	Anvil Creek Property LU 1-100 Claims
AUTHOR	J.L. LeBel
DATE	December, 1978
COMMODITY	Pb-Zn
LOCATION	Anvil Range, Yukon Territory Whitehorse Mining District 62°30'N latitude 133°50'W longitude NTS 105 K 5 & 12
WORK PERIOD	August 7 - 13, 1978

090402.

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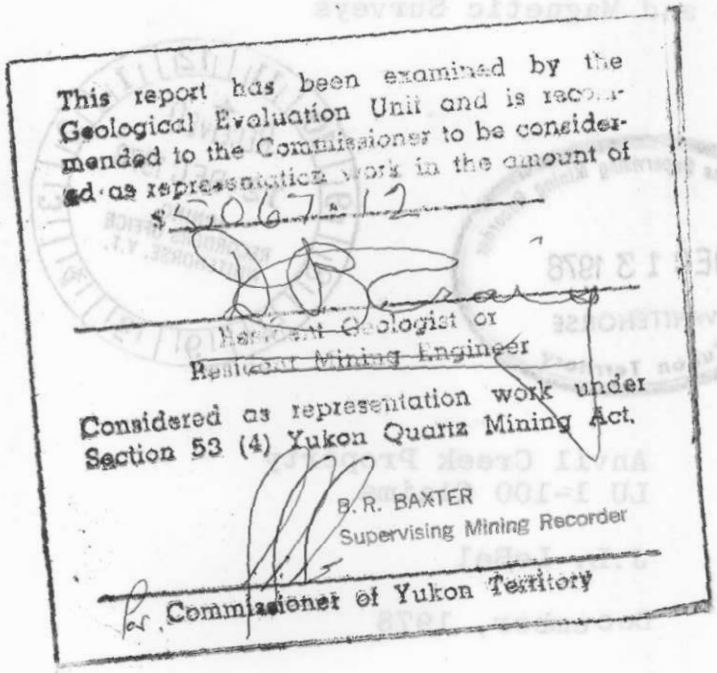
This report has been examined by the Geological Evaluation Unit and is recommended to the Commissioner to be considered as representation work in the amount of
$ 5067.12
Resident Geologist or
Resident Mining Engineer
Considered as representation work under Section 53 (4) Yukon Quartz Mining Act.
B. R. BAXTER
Supervising Mining Recorder
for Commissioner of Yukon Territory

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ILLUSTRATIONS

SUMMARY

Approximately 30 km of horizontal loop electromagnetic and magnetic surveys were completed on the Anvil Creek property (LU 1-100 claims). The surveys detected a series of weak, shallow, flat lying conductors accompanied by intermittent and variable magnetic anomalies. The conductors are attributed to graphitic sericite schists with associated narrow but discontinuous bands of pyrrhotite. No anomalies consistent with a large massive sulphide occurrence with properties similar to the Anvil area deposits were detected.

INTRODUCTION

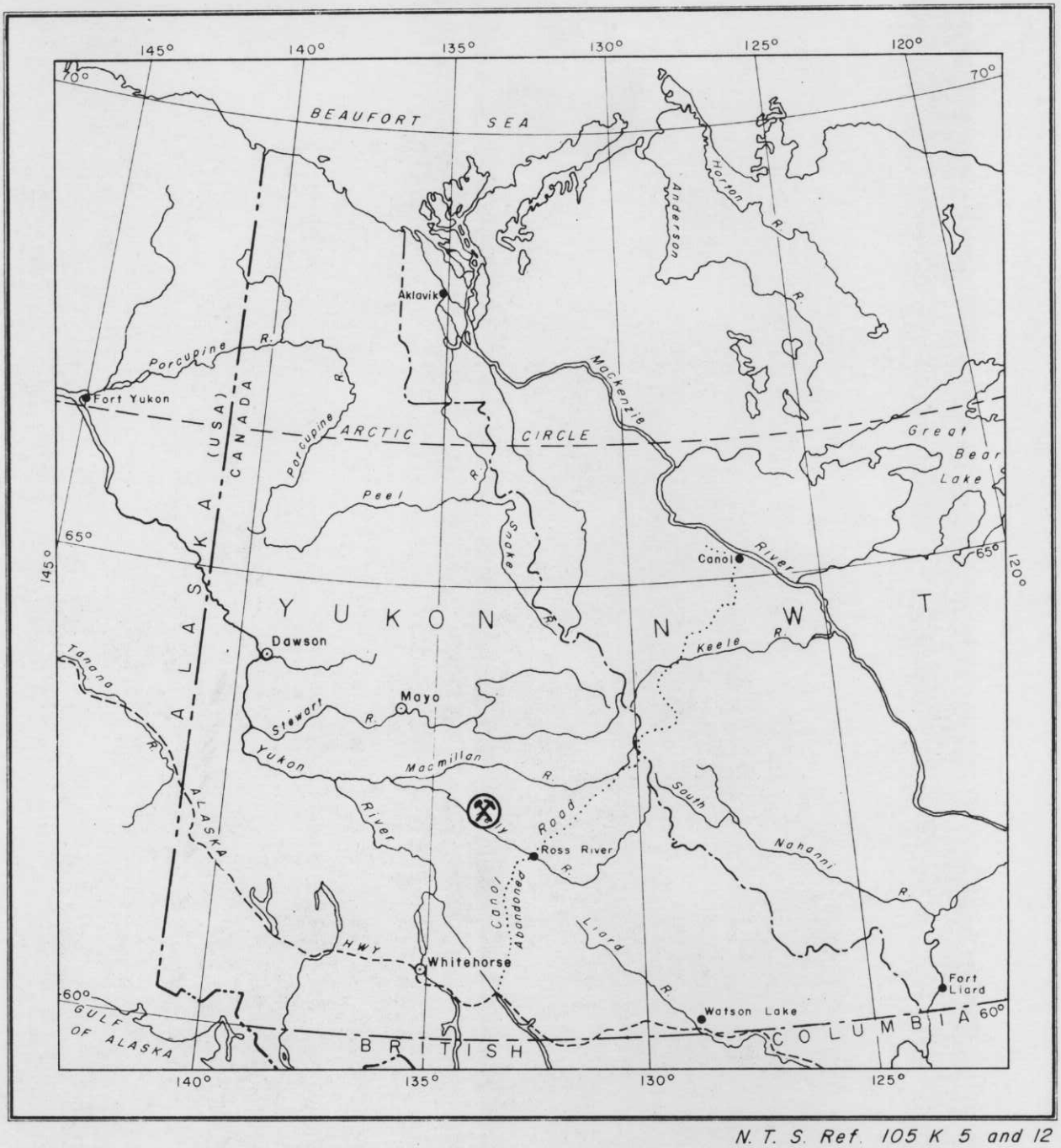
During the period August 7 to August 13, 1978, a horizontal loop electromagnetic (HEM) survey and a magnetometer survey were conducted on the Anvil Creek property.

The approximate centre of the property, which consists of the LU 1-100 claims (Figure 2), is located at coordinates 62°30'N latitude and 133°50'W longitude about 40 km northwest of Faro, Yukon Territory as shown in Figure 1.

The surveys were conducted along 30.0 km of lines prepared by Eastman Associates of Whitehorse. Pickets were placed at 30 m true horizontal distances along lines spaced at 240 m intervals. Slope lengths required for the chaining were determined using a Suunto model PM-5 inclinometer.

29.5 km of HEM surveys were conducted by a two-man crew from Geoterrex Limited of Ottawa, Ontario. A 30.0 km magnetic survey was conducted by AMAX personnel.

The surveys were conducted to follow-up airborne electromagnetic (AEM) conductors recorded in 1976 over known or anticipated graphitic sericite schists similar to the rocks which host the Pb/Zn orebodies in the Faro area.



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ANVIL CREEK PROPERTY
LU CLAIMS

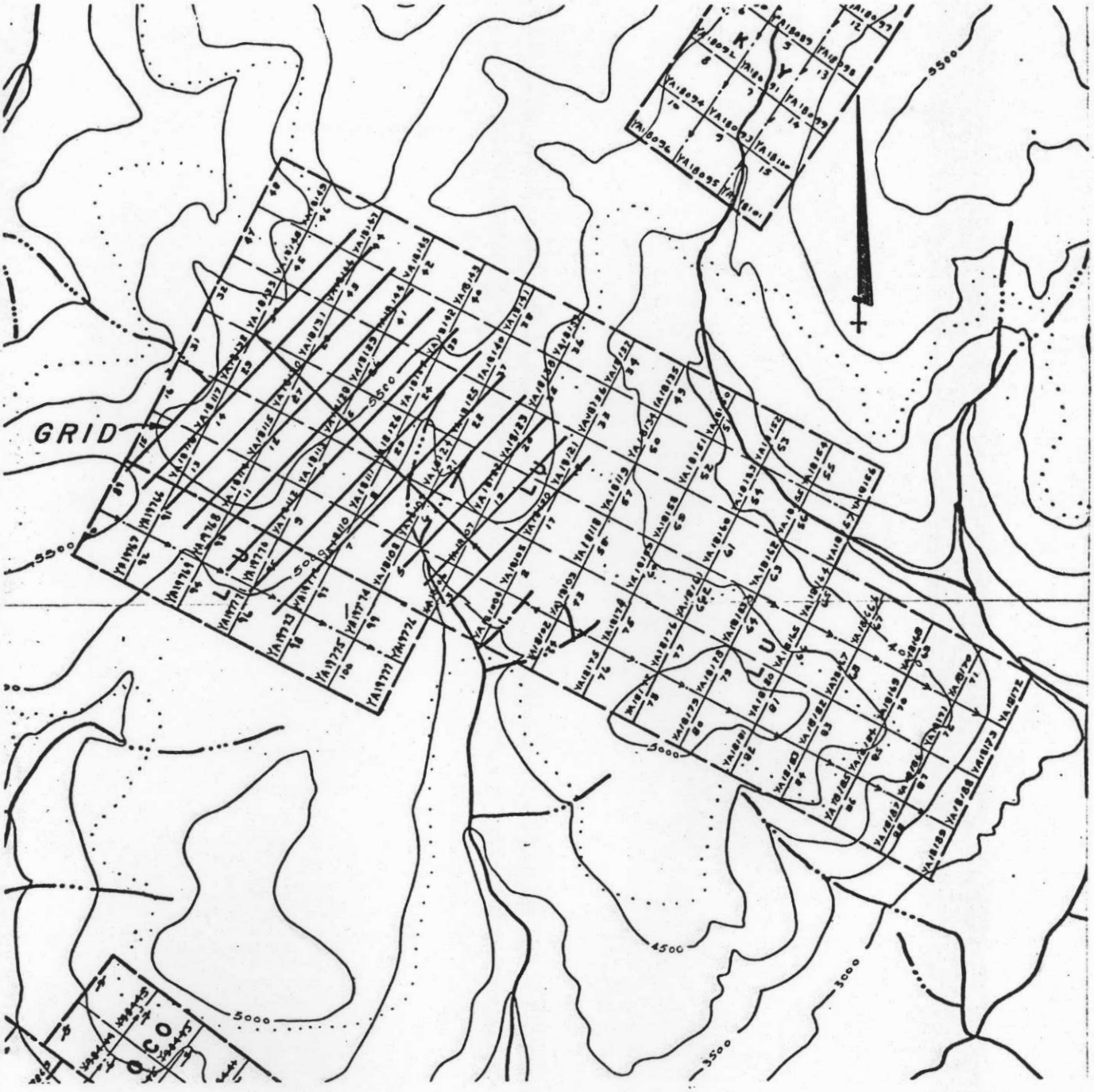
WHITEHORSE MINING DISTRICT — YUKON TERRITORY

LOCATION MAP

SCALE 1" = 120 MILES

Vancouver - H.P.

FIG. 1



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ANVIL CREEK PROPERTY
LU CLAIMS

WHITEHORSE MINING DISTRICT — YUKON TERRITORY

CLAIM MAP

SCALE 1200 0 1200 METRES
4000 0 4000 FEET
1 : 50,000

Vancouver — H.P.

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FIG. 2

PROPERTY GEOLOGY

The geology of the LU claims is separated into two blocks by a southwest-northeast trending fault zone or an unexposed Cretaceous quartz monzonite intrusion. North of the break and underlying the grid quartz-biotite-sericite andalusite schists, calc-silicate and graphitic schists dip moderately to the northeast. These rocks probably represent the metamorphic equivalent of a greywacke-shale turbidite sequence with a redeposited argillaceous to fairly pure carbonate member. Narrow quartz-graphite and quartz-sericite-graphite bands are poorly exposed but appear to be present in both the schist and calc-silicate. South of the break a sequence of schists and phyllites is present in which the lowest exposed rocks are quartz biotite schists and calc-silicate similar to those north of the break but which rapidly grade upward into cherty calc-schist rocks and a thick section of interbedded chlorite phyllite, and amphibolite (metabasite).

The most visible structural feature in outcrop is a lustrous crenulation foliation surface on which an earlier compositional banding has been transposed.

Geologic contacts between the schist and calc-silicate are almost parallel to the strike of the crenulation foliation.

Two faults at the north end of the property have repeated the section.

A more detailed description of the geology is contained in the report; 1978 Geological Assessment Report, Anvil Creek Property LU 1-100 Claims by A.C. Hitchins, September, 1978.

EQUIPMENT AND PROCEDURE

The HEM survey was conducted using an Apex Parametrics Max-Min II system and two frequencies -- 444 hertz and 1777 hertz. Nominal station separation and reading interval were 180 m and 30 m respectively. Line 480W was resurveyed with a 120 m coil separation. The coplanar coil configuration was maintained by using slopes recorded by the line cutters during chaining. The slope data was also used to subsequently correct the in-phase results for changes in coil separation caused by changes in slope.

The magnetic survey was conducted with a Geometrics G-816 magnetometer which records total magnetic field. The sensor was carried in a backpack harness thereby limiting measuring accuracy to ±5 gammas. Accurate base stations were established along the base line so that diurnal variations could be monitored (and subsequently removed) each time the base line was crossed during the survey.

PRESENTATION OF RESULTS

The results of the HEM survey are plotted in profile on a 1:5,000 horizontal scale. The in-phase and out-of-phase electromagnetic components are plotted at 1 cm ≈ 33% (Figures 3 and 4).

Conductor axes are indicated by heavy dashed lines and labelled alphabetically. The width of a wide conductor is indicated by cross-hatching. Conductors are picked separately from high and low frequencies to emphasize any changes in position, length and/or conductance.

The results of the magnetometer survey are shown in 1:5,000 scale plan contoured at 50 or 100 gamma intervals (Figure 5). For convenience in plotting a value of 58,000 gammas has been subtracted from each reading. A "bar" over a reading indicates a value less than 58,000 gammas.

RESULTS

Numerous conductors more or less consistent with the pattern of AEM anomalies were detected by the HEM survey. The electromagnetic merits of the conductors, labelled A to F will be discussed followed by an assessment of any correlating magnetic features.

Conductor A-A'

Conductor A, parallel to and just north of the base-line, extends from Line 960W to Line 960E for a strike length of 2000 m. A broad but weak high frequency out-of-phase anomaly on Line 1200E supports the continuation of conductor A along strike to the southeast. The 180 m separation results indicate a wide zone of anomalous conductivity on Lines 0, 240W and 480W which is resolved into two separate narrow conductors by the 120 m separation detailed survey on Line 480W. The second conductor, labelled A', occurs south of conductor A and extends between Lines 720W and Line 0 where it is tenuously suggested by the high frequency results. Conductor A and A' anomalies consists largely of out-of-phase response, significant in-phase response (16%) is limited to the high frequency 180 m results. Severely reduced low frequency anomaly amplitudes also attest to the weakness of conductors A and A'.

Conductor A correlates with both magnetic highs and magnetic lows. The ends of the conductor correlate with narrow one line highs on Lines 960W and 960E, while the central part of the conductor crosses a broad 25 gamma anomaly. The minor magnetic low at 270N on Line 0 coincident with the axis of conductor A is probably a geometric effect rather than a valid magnetic anomaly. On Line 0 conductor A' coincides with a positive 450 gamma anomaly. The amplitude of the magnetic anomaly decreases on either side of Line 0 and coincidence with conductor A' degrades from direct to flanking (on Line 480W the 50 gamma peak of the anomaly is 30-60 m north of the axis of conductor A').

Conductor B

Conductor B extends the length of the grid just south of the base line. The best response (36% in-phase and 46% out-of-phase at high frequency) was recorded on Line 240E at 270S where abbreviated coverage prevents definition of the width of the conductor. The widest part of the conductor (150 m) occurs on Line 0 centred at 360S but an in-phase/out-of-phase ratio less than 0.5 indicates very low conductance. One Line 720E the high frequency results indicate the presence of a satellite conductor (labelled B') at 150S. Conductor B' is short but probably causes the weak high frequency out-of-phase anomalies at 120S on adjacent Lines 480E and 960E.

Conductor B parallels a series of narrow intermittent magnetic highs except for the southeast end which falls in a narrow band of relative magnetic low. On Line 480W the peak of the magnetic anomaly is south of the axis of the conductor but on Line 720W the peak of the magnetic anomaly is north of the conductor axis. The widest part of the conductor on Lines 0, 240E and 480E correlates with more subtle lower relief anomalies. The peak of a narrow positive 100 gamma anomaly is situated about 30 m north of conductor B' on Line 720W. Persistence of the magnetic feature on adjacent lines support the presence of weak extensions of conductor B' on Lines 480E and 960E.

Conductor C

Conductor C includes relatively poor anomalies at 960W, 780S; 720W, 690S; and 480W, 540S and the best response on the grid at 240W, 660S. There is a 120 m off-set in the location of the anomalies between Lines 480W and 240W; an improvement in the quality of the conductor is indicated by an increase in the high frequency in-phase/out-of-phase ratio from 0.3 to 1.8; and an increase in the width of the conductor from narrow on Line 480W to 30 m on Line 240W. A positive anomaly at the projected position of conductor C on Line 0 suggests the conductor ends close to Line 240W but it is possible that the conductor tracks to the south and coalesces with conductor D on Line 0.

On Lines 960W, 720W and 480W conductor C coincides with a zone of relative magnetic low, which occurs along the south flank of a series of modest positive anomalies. The intercept on Line 240W also occurs in an area of magnetic low relief which is not spatially related to any positive magnetic features.

Conductors D and D'

Conductor was recorded on all the lines on the south edge of the grid. The high frequency 180 m results indicate a wide zone of anomalous conductivity extending from the axis of the conductor south to the limit of the coverage on Lines 960W, 720W and 480W. On Line 480W the low frequency results and the results with coil separation reduced to 120 m clearly indicate two features -- conductors D and D'. The width of conductor D on Line 480W may be exaggerated by the effects of the shallow dip of the stratigraphy.

The in-phase/out-of-phase ratios for conductor D are consistently less than one except on Line 480W where high frequency amplitudes of 60% and 40% were recorded.

Conductor D' spans Lines 960W to 240W. There is some evidence, especially in the high frequency results on Lines 720W and 480W, that weakly anomalous conditions extend south of the axis of conductor D'. Elsewhere the conductor is adequately delimited. The best anomaly (high frequency in-phase and out-of-phase amplitudes of 70% and 40% respectively) occurs on Line 720W at 1290S.

Conductor D encompasses a variety of magnetic response including juxtaposed magnetic low and magnetic high on adjacent Lines 480W and 720W. Conductor D' coincides with a magnetic high. On Line 480W the axis of conductor D' and the 500 gamma peak of the anomaly are separated by 60 m. Most of the magnetic anomalies associated with conductors D and D' are intermittent and narrow.

Conductor E

Conductor E occurs at 480N on Line 1200E. A low-high frequency in-phase/out-of-phase ratio and barely perceptible low frequency response indicates low conductance. A subtle high frequency anomaly on Line 960E indicates that the conductor ends between Lines 1200E and 960E.

Conductor E occurs on a steep gradient caused by a narrow 350 gamma anomaly situated 60 m north of the conductor.

Conductor F

Conductor F consists of a single poor anomaly on Line 1200E at 840N. The weak response indicates a depth of 50 m, too deep to be detected by the AEM survey. The conductor occurs in an area of featureless magnetic relief. A narrow 100 gamma anomaly which can be traced northwest to Line 480E occurs just north of the conductor.

DISCUSSION OF RESULTS

The pattern of HEM conductors detected agrees with patterns detected by the AEM survey. Comparison of the two surveys indicates that the primary AEM targets are reflected by ground conductors B and D.

A prominent feature of the HEM survey is the large amplitude of the anomalies recorded. The large amplitudes are attributed to a combination of shallow depth, wide widths, and shallow dips (although not strongly indicated by the results).

Another feature of the ground geophysics is the erratic and discontinuous nature of the magnetic anomalies. Depths to the sources of all the magnetic anomalies recorded by the magnetometer survey are shallow and no anomalies caused by a deep magnetic body are evident in the results.

Except for the east end which parallels a contact between biotite and graphitic schist conductor A occurs within

quartz biotite and andalusite schist and is unexplained. Conductor A' straddles the contact between andalusite schist and calc-silicate rocks but no reason for the conductor was found in outcrops.

Conductor B is not explained by the geology. Disseminated pyrrhotite found in line with the projection of conductor B' on to Line 480E accounts for its magnetic and weakly conductive properties.

The northwest end of conductor C coincides with graphitic sericite schist which continues northwest beyond the apparent end of the conductor between Lines 960W and 1200W. No explanation for improvement of conductor C on Line 240W was found although the conductor is caused by a shallow source.

The northwest end of conductor D also coincides with a unit of graphitic sericite schist. The mapping suggests a zone of graphite wider than the narrow conductive zone indicated by the HEM survey. No outcrops are present to confirm or define the character of the southeast continuation of the zone. Conductor D' is attributed to low tenor graphite but no outcrops were found in its vicinity. The magnetic anomaly coincident with conductor D' indicates a continuous horizon of pyrrhotite unlike the erratically distributed pyrrhotite associated with conductor D.

Conductors E and F are not explained by the geology but the combined weak magnetic and electromagnetic responses are similar to the other anomalies on the grid.

CONCLUSIONS

A series of conductors more or less consistent with the pattern of anomalies recorded by an AEM survey was detected by the HEM survey. The conductors are weak, have shallow depth and shallow dips. Most of the conductors have variable to intermittent magnetic responses but all magnetic anomalies recorded are caused by narrow and shallow sources.

A specific cause for many of the best anomalies was not found because of the lack of outcrop. Parts of some of the conductors were found to be caused by graphitic schists as expected and can be used to project the stratigraphy into areas of limited bedrock exposures. Magnetic anomalies are attributed to narrow and discontinuous bands of pyrrhotite which show a variety of associations with the graphitic horizons.

Although many of the conductors would require drilling for detailed explanation, the magnetic survey does not support the existence of a large body of massive sulphides similar to the deposits in the Anvil area.

J. L. LeBel Dec 7/78

J. L. LeBel

SYMBOLS

In phase profile.

Quadrature profile.

Conductor axis.

Instrument Max Min II
Coil separation 180 m, 120 m.

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LU CLAIMS

WHITEHORSE MINING DISTRICT — YUKON TERRITORY

GEOPHYSICAL SURVEY
HORIZONTAL LOOP EM
1777 HZ.

SCALE 200 0 200 METRES
500 0 500 FEET
1:5,000

To accompany 1978 Geophysical Assessment Report by: J. L. LeBel.

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N.T.S. Ref 105 K 12

FIG. 3

Coil Separation
120 metres

900 N
600 N
300 N
BASE LINE
300 S
600 S
900 S
1200 S

L-480 W
L-1440 W
L-1200 W
L-960 W
L-720 W
L-480 W
L-240 W
L-0
L-240 E
L-480 E
L-960 E
L-1200 E

A
A'
B
B'
C
D
D'
E
F

+40%
0
-40%
PERCENT OF PRIMARY FIELD

SYMBOLS

In phase profile.

Quadrature profile.

Conductor axis.

Instrument Max Min II
Coil separation 180 m, 120 m

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ANVIL CREEK PROPERTY
LU CLAIMS
WHITEHORSE MINING DISTRICT — YUKON TERRITORY

GEOPHYSICAL SURVEY
HORIZONTAL LOOP EM
444 HZ.

SCALE 200 0 200 METRES
500 0 500 FEET
1 : 5,000

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FIG. 4

BASE LINE

L-1440 W

L-1200 W

L-960 W

L-720 W

L-480 W

L-240 W

L-0

L-240 E

L-480 E

L-720 E

L-960 E

L-1200 E

BASE LINE

S Y M B O L S

370 375 400 — Magnetometer survey readings (base value 58,000 gammas).

50 gammas
100 gammas
} Isomagnetic contour

Magnetic low.

Instrument G-816

AMAX POTASH LIMITED

ANVIL CREEK PROPERTY
LU CLAIMS
WHITEHORSE MINING DISTRICT — YUKON TERRITORY

GEOPHYSICAL SURVEY
MAGNETOMETER

SCALE 200 0 200 METRES
500 0 500 FEET
1 : 5,000

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FIG. 5