KERR ADDISON MINES LIMITED
SUITE 405 - 1112 WEST PENDER STREET
VANCOUVER 1, B.C.
PHONE 682-7401

822409

October 25, 1974

AIRBORNE MAGNETIC AND VLF SURVEYS

FULTON RIVER AREA, B.C. (93L)

SUBJECT: ABSTRACT

Through past experience in the Babine area with aeromagnetic surveys, we were aware that the Tertiary intrusions which occur with all of the meaningful copper deposits, were susceptible to detection by airborne magnetometer when flown at an altitude of less than 500 ft. above the terrain.

During the summer of 1973, we elected on a limited budget to fly an area SW of Newman Penninsula which appeared geologically favourable and in which outcrop was limited to less than 20%. This 120 square mile area is in the shape of a triangle with rounded corners and is bounded on the north by latitude 55°; on the south by Fulton River; on the east by Babine Lake and on the west by Chapman Lake.

The "geologically favourable" aspect arises from the fact that (a) the area forms part of the NE trending "Skeena Arch", (b) the right rocks were indicated by limited exposures and (c) the Granisle and Bell copper deposits occur on the east side of the area.

INTERPRETATION OF AIRBORNE WORK

The magnetic interpretation is relatively simple but VLF suffers from its overability to detect conductors of all types and from the fact that it is hyper-sensitive to altitude changes. In addition, there are occasional changes in power transmission which can raise or lower the datum level without warning. For the purposes of our survey we used power from the Jimmy Creek military transmitter near Seattle which transmits on a frequency of 18.60 kHz.

In the interpretation of magnetic-VLF surveys in this area, we are basically concerned with our ability to discover unmapped porphyritic intrusions of Tertiary age. Because of the limited size of these intrusions, we quickly eliminated large areas which give high magnetic response even where they are conductors as well, for the simple reason that magnetite is detectible with both instruments. Large areas of magnetic lows are usually sedimentary belts and large areas of magnetic highs are usually caused by basic lava flows.

.....2

Interpretation of Airborne Work cont'd.....

Where porphyry intrusions have been mapped such as five miles north of the west end of Fulton Lake, these rocks responded either as magnetic highs or lows with generally weak EM response. We should point out that we are measuring only the field strength component and not the dip-angle of the transmitted electromagnetic field. This is because in our work thus far we have found it to be more reliable over the deposits in the Babine area than is the dip-angle component.

Follow-up work has not been done thus far in the Fulton River area because some of the more interesting targets located by the survey were on claims held by major mining companies, and because we were not very keen about work in the province as a whole during the currency of the present political regime.

Follow-up work should be considered for those anomalies which do not exceed one mile in length and on which magnetic response may or may not be accompanied by electromagnetic response. On the accompanying mag-EM sheet (Fig. 1), positive magnetic response is shown in green and negative anomalies are shown in yellow. In the case of field strength response, this is always positive and is shown in red on the map. High EM response is shown in red on the map. Very high EM response is shown in purple.

In attempting to make head or tail of the presentation in Fig. 1, it is necessary to consult the accompanying generalized geological map Fig. 2. From these two maps it may be seen that the large mass of extrusive rocks in the north centre portion of the map (Unit 12) causes every form of response varying from positive to negative magnetic anomalies and high to very high EM response. These rocks are Tertiary extrusives equivalent in composition to the porphyritic intrusions which are so important in this area. The magnetic response is understandable but for the time being we do not know why the electromagnetic response is as widespread as it is, but it probably results from the fact that in a gross way, this extrusive unit contains more polarized magnetite than do the older (Jurassic and Triassic) lava flows in this area.

The lower Jurassic volcanics at Saturday Lake and at Fulton Lake and elsewhere in relatively low terrain, appear to be nonconductive, but in higher terrain such as at the fire lookout south west of Doris Lake, the same rocks are quite conductive. It seems reasonable to conclude that these lava flows are in the main conductive to some degree but this conductivity is only detectible at lower altitudes than prevailed in the course of some of the flight lines. From this it would appear to follow that if the VLF work is to be meaningful in any way, it is necessary to have very close control over the altitude of the aircraft and the instrument seems unable to differentiate between magnetite and sulphides.

CONCLUSIONS

The airborne magnetometer accurately depicts most of the rock types in the area and has no difficulty in locating porphyritic intrusions in

.....3

Conclusions cont'd...

sedimentary terrain. To a lesser extent it would locate those intrusions in volcanic terrain provided there are tuffaceous or rhyolitic members which are not strongly magnetic.

The value of VLF response which has not been corrected for altitude remains to be demonstrated but experimental work over known sulphide deposits suggests that the method is worth pursuing.

Going back to Fig. 1, the only anomalies worthy of field investigation are those which were detected on one or two flight lines and which do not exceed one mile in length. Such anomalies can be spotted by individual red areas such as L-3 4,000 ft. west of C-1; L-5 between C-2 and C-3; L-10 4,000 feet east of C-4; L-14 at L-10; L-20 at 3,500 feet west of C-4; L-26 2,000 feet west of C-3 and L-27 and 28 at 6,000 feet east of Babine Lake.

W. M. Sirola.

enclosures

Fig. 3	-	Location Map, scale 1" = 10 miles
Fig. 2	-	Fulton River Generalized Geology (after N.C. Carter August, 1973)
Fig. 1	-	Fulton River Mag-E.M. Survey
Fig. 4	-	Profiles of Selected Flight Lines showing Magnetic and VLF Field Strength Response.

SUMMARY OF AEROMAGNETIC AND VLF-E.M. SURVEYS IN THE FULTON RIVER AREA, B.C.

AREA FLOWN:

1 Fulton River Area - North of Fulton River and west of Babine Lake.

TIME FLOWN:

1 Fulton River Area - June 13-15, 1973; 800 line miles.

The line spacing used was ¼ mile and the flight elevation was approximately 200-300 feet above the ground level.

EQUIPMENT USED IN SURVEY:

1 An Elsec Proton magnetometer (592D) using a sensing head housed in a small bird constructed by T. Walker of Noranda. The bird was suspended by a cable 40 feet below the 47-G B-3 helicopter.

11 A very low frequency (VLF) E.M. unit constructed by Sabre Electronics.

DISCUSSION OF RESULTS:

1 Fulton River Area - In this area the interpretation of geophysical data is facilitated by geological mapping (1" = 1 mile) done by N.C. Carter of the B.C. Dept. of Mines. The majority of magnetic and

electromagnetic activity within this area can be attributed to the Hazelton group of volcanics, Tertiary volcanics and a number of small intrusive bodies.

11 By far the most geophysically "active" area is the NE corner of the sheet. Here one finds numerous magnetic highs with often adjacent lows as well as corresponding E.M. anomalies. This area of "activity" corresponds exactly to a unit of Tertiary volcanic rocks which often give such a geophysical response.

111 Another such area of geophysical activity similar to the above is found on a hilltop one mile west of Granisle. This area corresponds to a sequence of Tertiary basalts and andesites (13) and partially to Lower Jurassic volcanics (5).

1V Due east and extending the length of Chapman Lake is a large area of magnetic highs and E.M. anomalies. The location of the anomalies within a NNW-SSE trending belt of magnetic highs suggest that this area is underlain by volcanic rocks containing both magnetite and conductive minerals (i.e. pyrite). The mapping of this area as Lower Jurassic volcanics having a roughly N-S trend substantiates this view.

V Within the survey area there have been mapped a number of small intrusive bodies composed of biotite feldspar porphyry.

Owing to such effects as nearby volcanic rocks, low swampy ground or small size, not all of the intrusive

bodies gave a definite geophysical expression. The magnetics in the vicinity of these intrusives varies from low moderate - positive to moderate - strong negative while the E.M. was either nonexistent or weak to moderate. An example of the geophysical expression of these intrusives is found immediately NNW of Saturday Lake. This area is known to contain at least four intrusive plugs cutting Lower Jurassic volcanics and sediments.

The dominant geophysical feature is the series of moderate magnetic lows. Electromagnetically the response was poor even though drill core from Amoco's 1972 camp indicated the presence of both pyrite mineralized intrusive rock and graphitic bands in the sediments.

In other areas known to be underlain with similar intrusives a quite different response was often observed. Therefore, it can be seen that delineation of intrusive bodies through the use of geophysics may prove rather difficult especially in cases where such complicating factors as nearby volcanic rocks exist.

Werner Gruenwald

September 1973

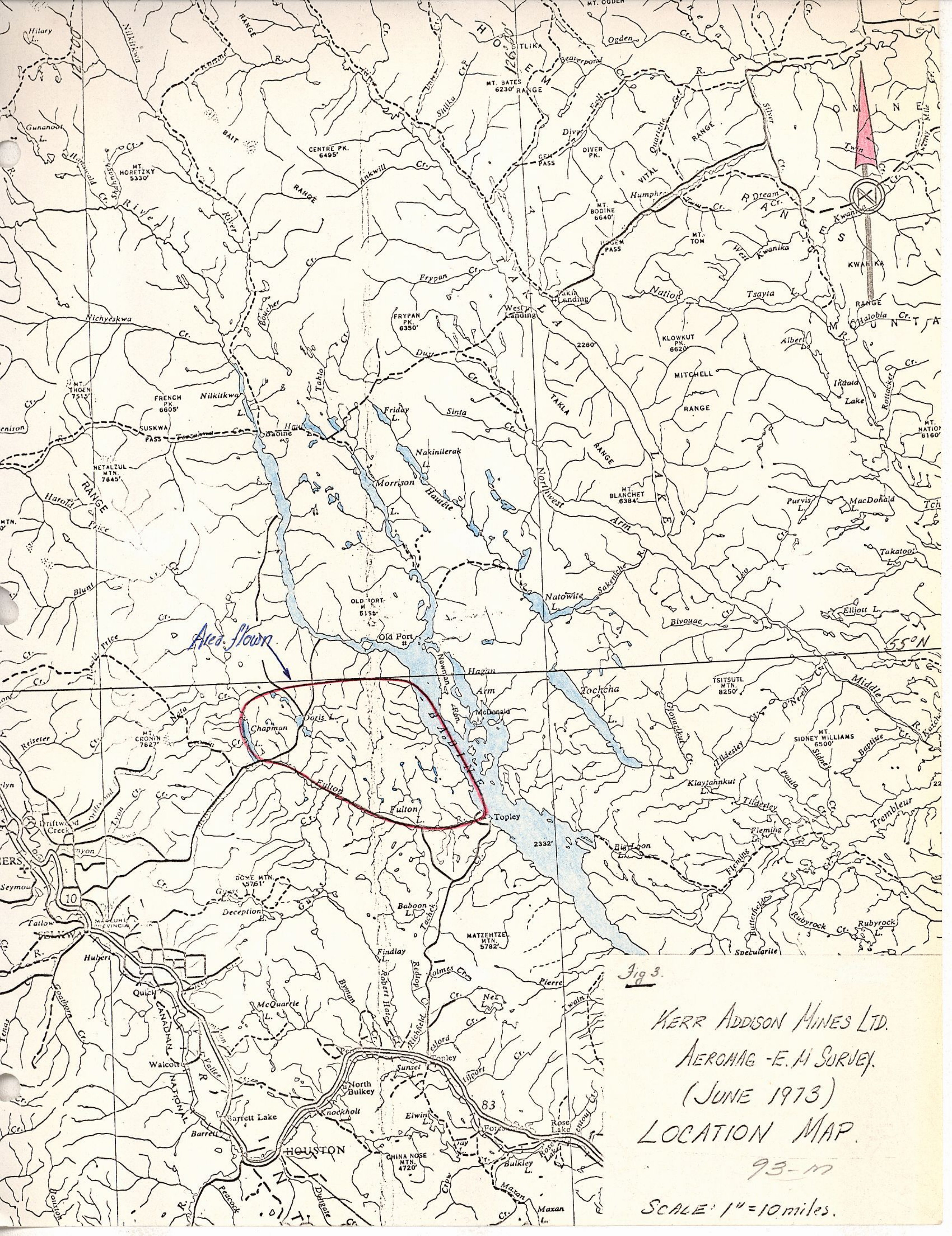


Fig 3.

KERR ADDISON MINES LTD.
AEROMAG - E.M SURVEY.
(JUNE 1973)
LOCATION MAP.

93-M

SCALE: 1" = 10 miles.

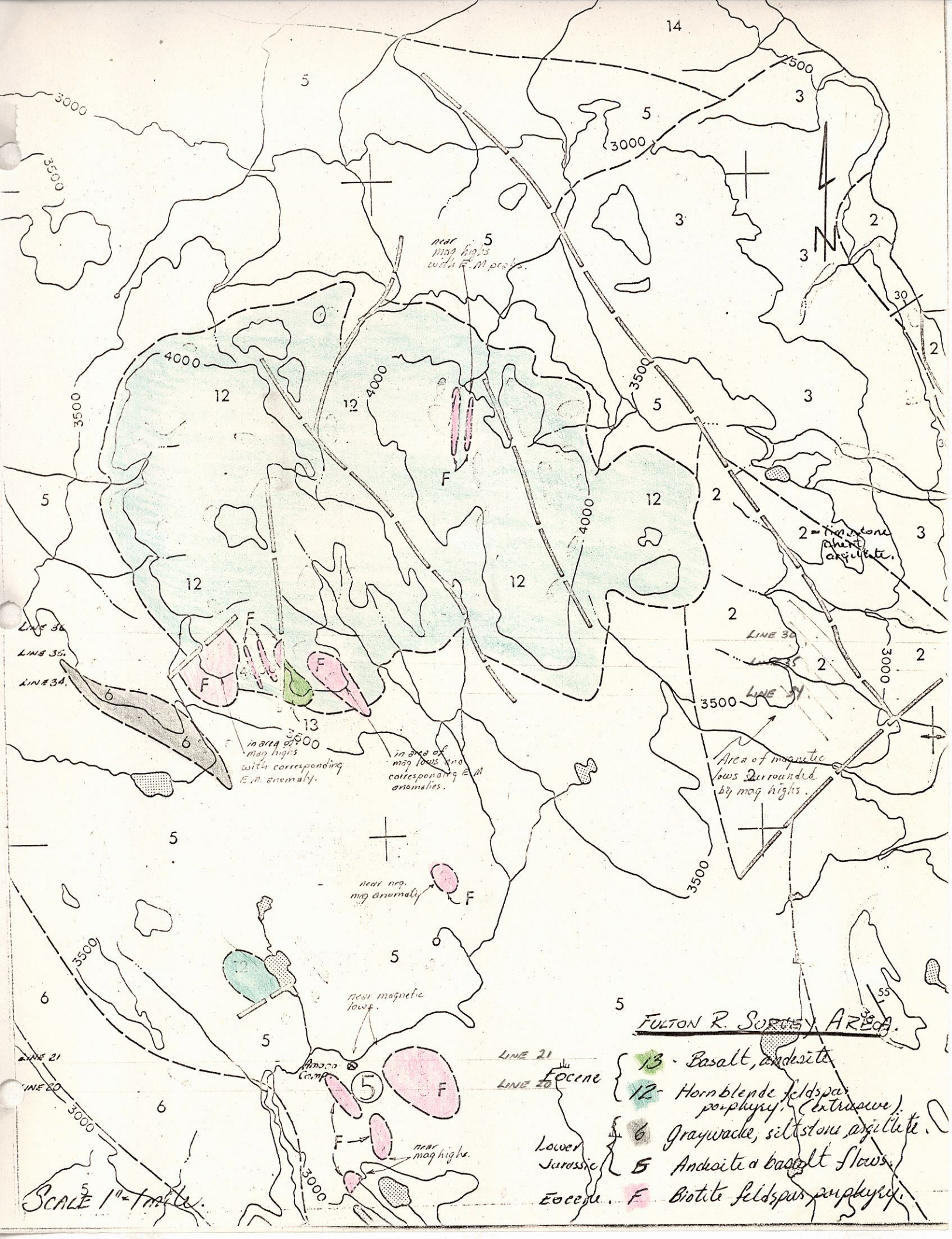
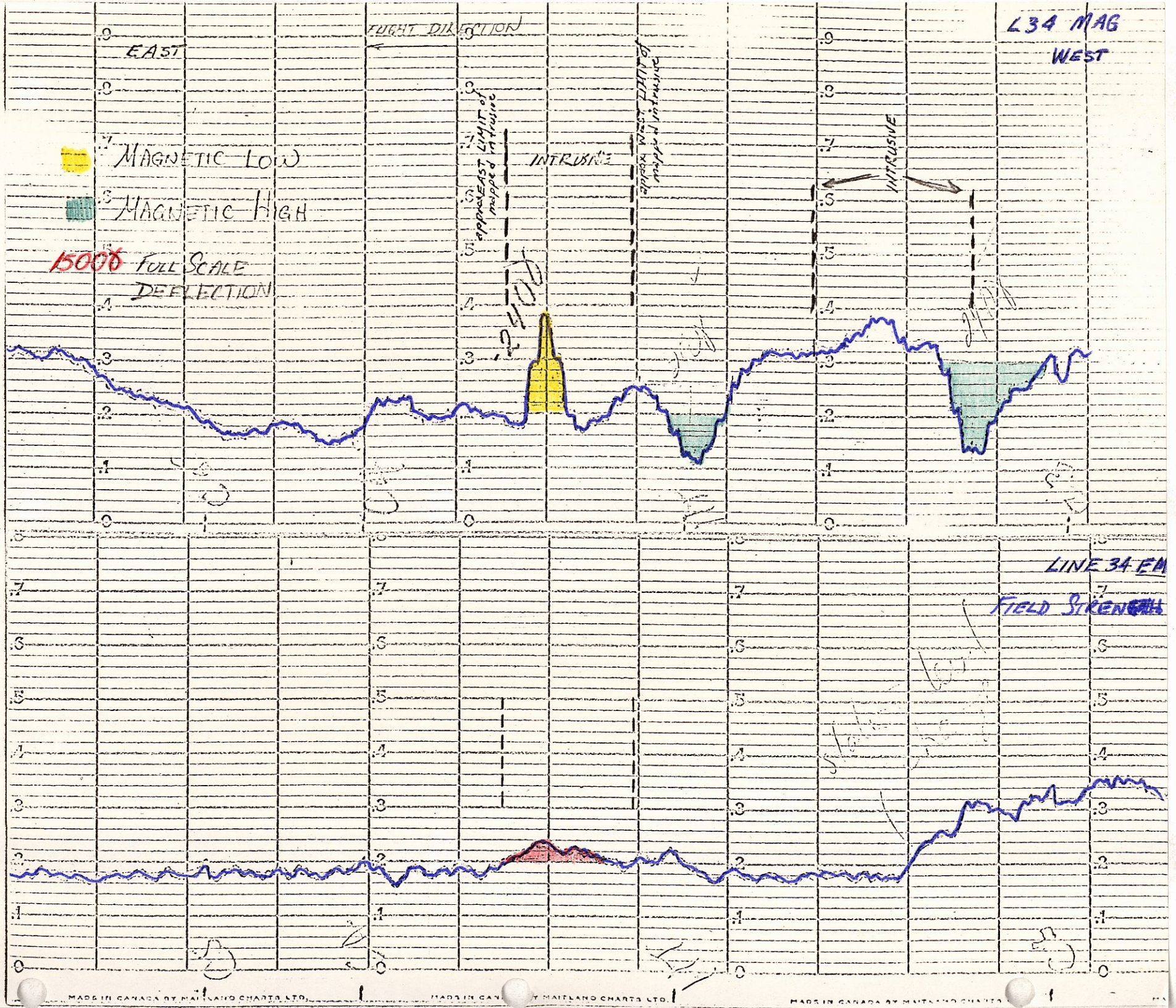
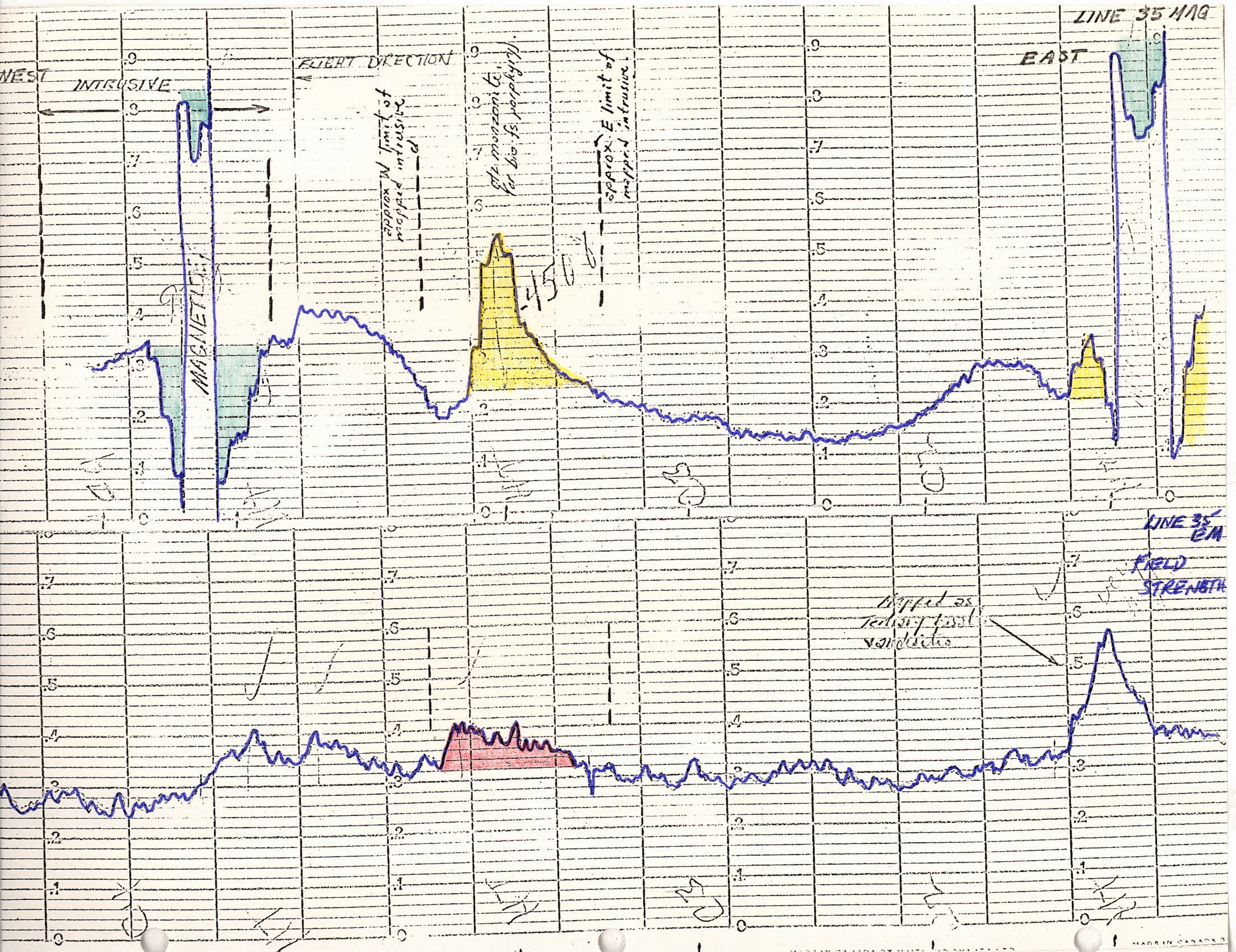
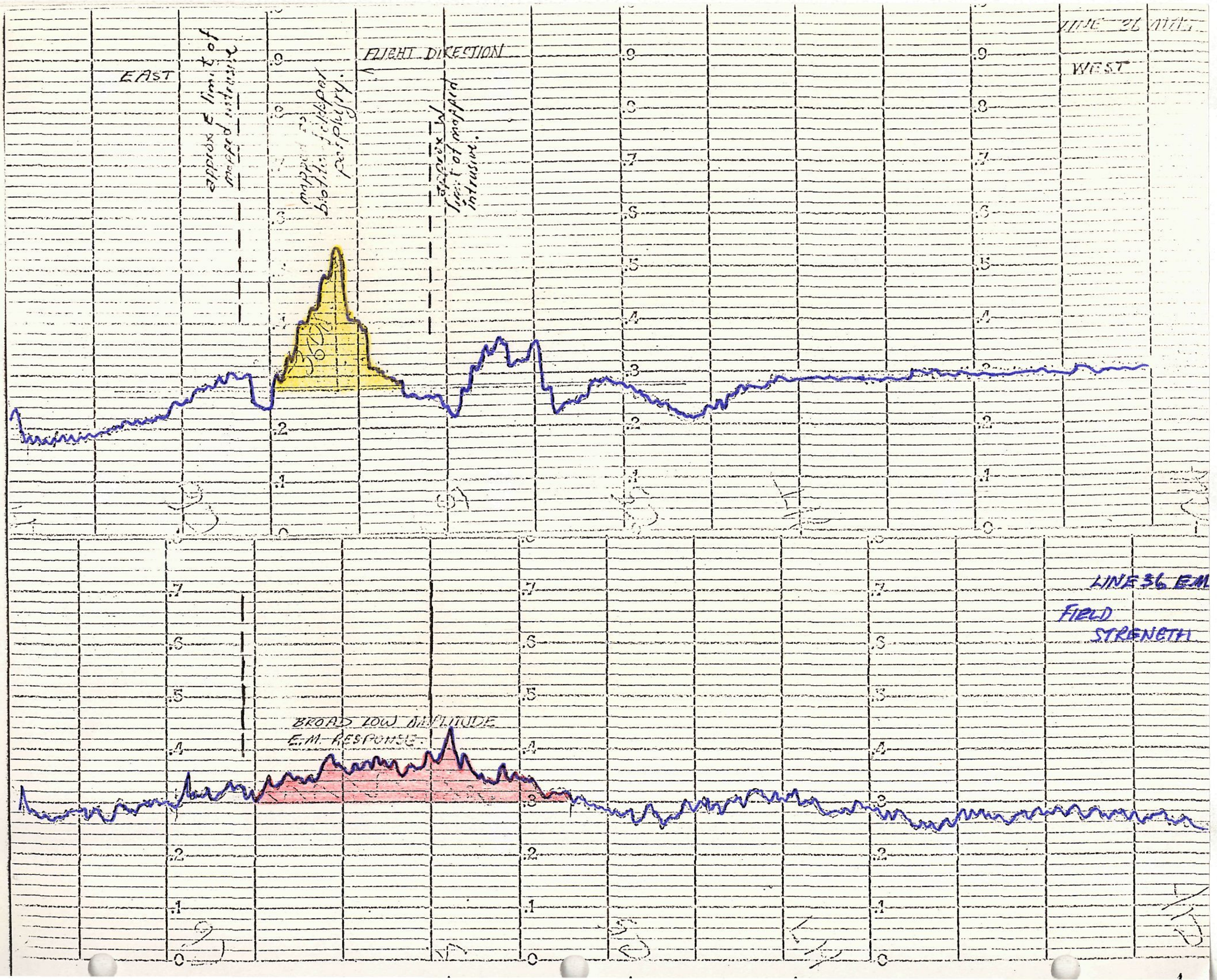
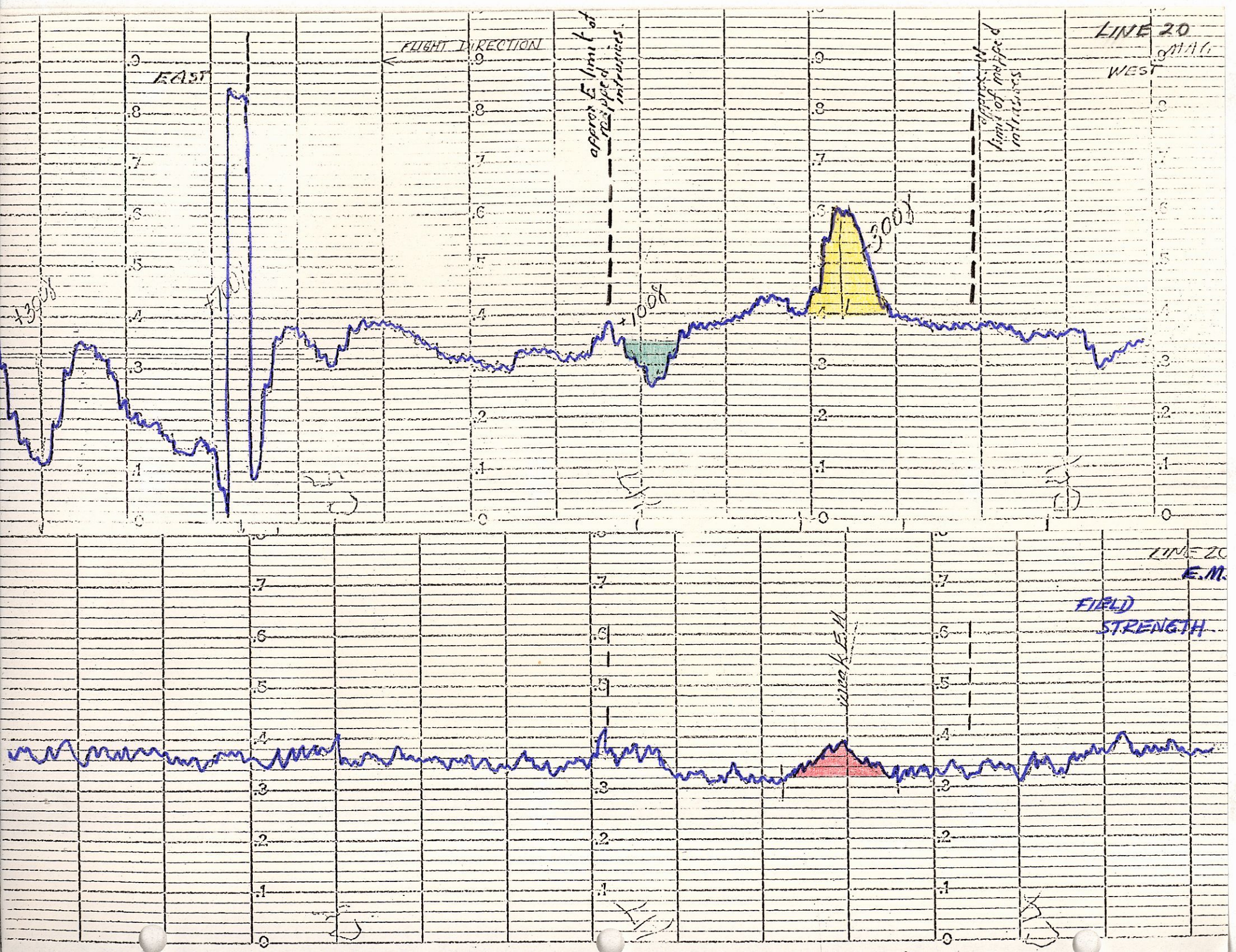

FULTON R. SURVEY AREA.
13 - Basalt, andesite
12 - Hornblende feldspar porphyry. (Intrusive)
6 Graywacke, siltstone, argillite.
5 Andesite & basalt flows.
F Biotite feldspar porphyry.
Eocene
Lower Jurassic
Eocene
SCALE 1" = 1 mile.
LINE 36
LINE 35
LINE 34
LINE 21
LINE 20
near mag highs with E.M. profs.
in area of mag highs with corresponding E.M. anomaly.
in area of mag lows and corresponding E.M. anomalies.
Area of magnetic lows surrounded by mag highs.
near mag. mag anomaly
near magnetic lows.
Amoco camp
near mag highs.
2 - limestone chert argillite.
3000
3500
4000

Figure 4. (5pp).


EAST
FLIGHT DIRECTION
L34 MAG
WEST
MAGNETIC LOW
MAGNETIC HIGH
15000 FULL SCALE DEFLECTION
approx EAST LIMIT of mapped intrusive
approx WEST LIMIT of mapped intrusive
INTRUSIVE
INTRUSIVE
LINE 34 EM
FIELD STRENGTH


LINE 35 MAG
WEST
INTRUSIVE
FLIGHT DIRECTION
EAST
MAGNETICS
approx W limit of mapped intrusive
approx E limit of mapped intrusive
450γ
LINE 35 EM
FIELD STRENGTH


EAST
FLIGHT DIRECTION
WEST
approx E limit of mapped intrusive
approx W limit of mapped intrusive
.9
.8
.7
.6
.5
.4
.3
.2
.1
0
BROAD LOW AMPLITUDE
E.M. RESPONSE
LINE 36 EM
FIELD
STRENGTH


LINE 20
MAG.
EAST
WEST
FLIGHT DIRECTION
approx. limit of recognizable intensities
approx. limit of recognizable intensities
+300γ
+700γ
+100γ
-300γ
LINE 20
E.M.
FIELD STRENGTH
mean E.M.

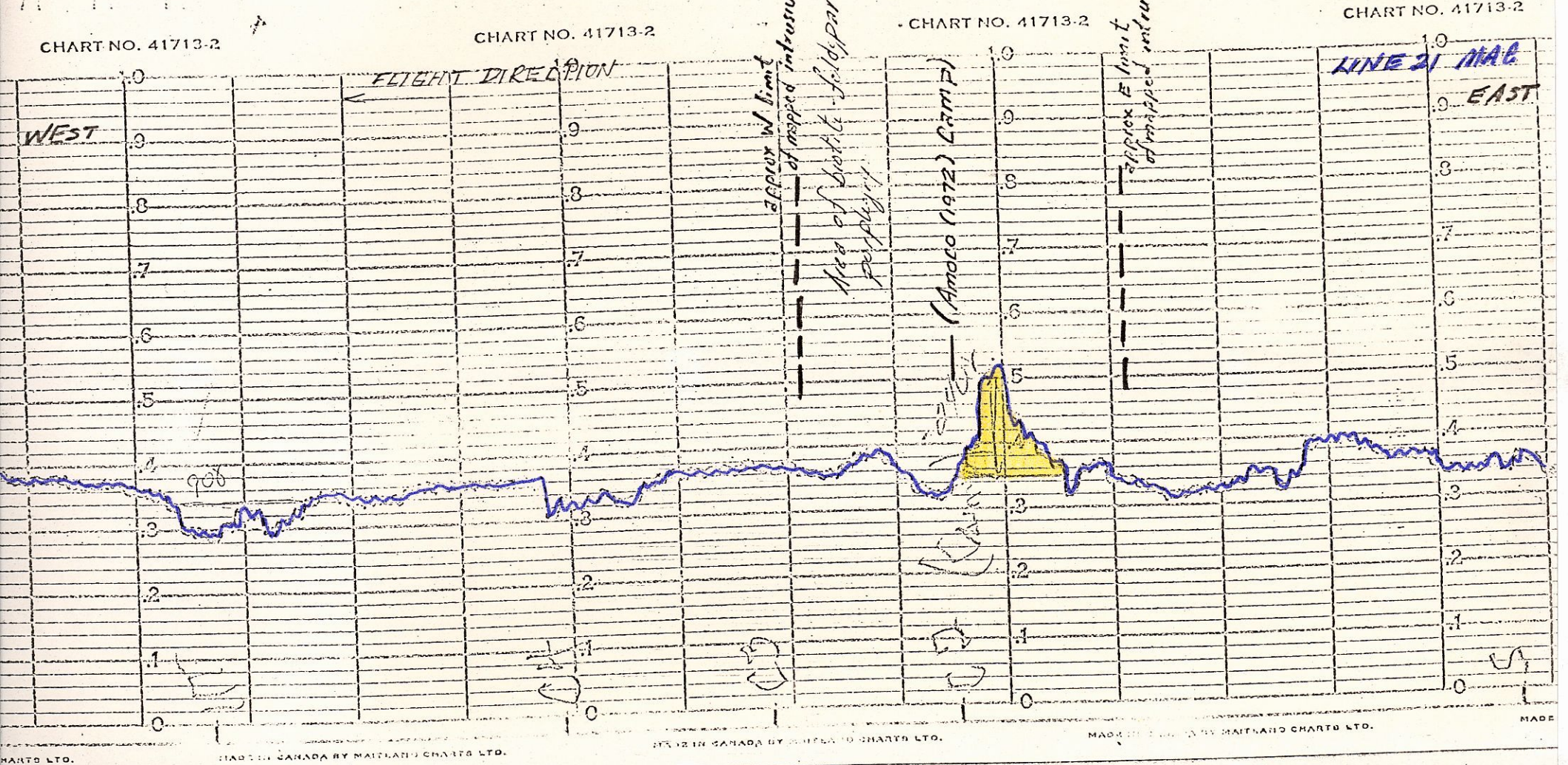


CHART NO. 41713-2
CHART NO. 41713-2
CHART NO. 41713-2
CHART NO. 41713-2
FLIGHT DIRECTION
WEST
EAST
LINE 21 MAG
Approx W limit of inspected intrusion
Approx E limit of inspected intrusion
(Amoco 1972) Camp
MADE IN CANADA BY MAITLAND CHARTS LTD.