GEOPHYSICAL ORIENTATION SURVEY
FOR
CANICO-NETALL-MATT BERRY
JOINT VENTURE

Frances Lake Area, Yukon

By
Kenting Earth Sciences Eastern Division
Toronto, Ontario

December, 1970

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INTRODUCTION

Kenting Earth Sciences carried out a geophysical orientation survey in the Frances Lake Area, Yukon during the period November 7th to December 1st, 1970. The field crew was joined during the latter part of the survey by T. R. B. Dundas, geophysicist, in order to interpret results and change survey parameters where necessary.

Purpose

The purpose of the survey was to determine which geophysical methods (a) could be used to locate the extension along strike of a known lead/zinc deposit on a local basis and (b) be used on a more regional basis in exploration for similar deposits.

1. I.P. METHOD

1.1 Equipment and Method Used

The equipment used consisted of a 2 1/2 Kw transmitting unit manufactured by Huntec Limited, Toronto combined with a Newmont type receiver manufactured by Scintrex Limited, Toronto.

The array used was pole-dipole, the majority of the survey being conducted with a C_1 P_1 distance of 200 feet but on some lines this was increased to 400 feet to give greater penetration.

1.2 Results and Interpretation

The apparent chargeability and apparent resistivity results for the 200 foot separation have been presented as plan maps (Drawings 1 and 2) with the interpreted causative represented on the chargeability plan. The results are also presented as profiles (Drawings 3 - 7) which include the results from the 400 foot separation and also the corresponding magnetic values. The location of the causative body projected to surface has been given, but the direction of dip has been assumed as this cannot be definitely established

from the results. There are some indications from the 400 foot results that the dip is to the east along the profiles.

The results in general are characteristic of a very narrow zone which is what would be expected from the lead/zinc deposit. The country rock appears to contribute only a small percentage to the total I.P. effect as background values are very low and the anomaly is expressed as a very sharp feature.

The anomaly appears to close to the north at the edge of the lake but this effect could be produced by a rapid increase in water depth resulting in a lack of penetration. The anomaly is still obvious on Line 22 S but the level has been reduced considerably.

2. MAGNETIC METHOD

2.1 Equipment and Method Used

The instrument used consisted of a Sharp M.F. 2 magnetometer which is a fluxgate instrument reading the vertical component of the earths magnetic field.

A base station of 590 gammas was established between Lines 0 and 2S just west of the baseline and all readings were corrected to this level. Readings were taken at 100 foot station intervals in a series of loops, and these values were corrected for diurnal drift. The station interval was reduced to 50 feet over anomalous areas.

2.2 Results and Interpretation

The results are presented as a plan map (Drawing 8) and are also shown as profiles in combination with the I.P. results (Drawings 3 - 7).

In general the magnetic results show an increase directly over the area where a causative body has been projected to the surface. The anomaly is greatest on Line 14 S where values show an increase of approximately 300 gammas. The correlation of higher magnetic values with the

surface extent was not established on all lines. Anomalous values are usually not greater than 50 gammas over the location of the deposit, a variation which appears to be near the background level.

3. VERTICAL LOOP E.M. METHOD

3.1 Equipment and Method Used

The instrument used was a Vertical Loop SS15 system manufactured by McPhar Limited, Toronto. The unit can generate either 1,000 c.p.s. or 5,000 c.p.s.

The transmitter was set up along the strike of the lead/zinc deposit and readings were taken along the survey lines, the penetration being approximately equal to half of the transmitter/receiver separation. The transmitter is orientated for each reading so that the plane of the coil passes through the station, and the change in dip of the generated field is measured at each station in turn.

3.2 Results and Interpretation

The results are presented as a series of profiles (Drawing 9). Only two lines, ie. 10 S and 14 S were covered by the survey using the 1,000 c.p.s. frequency which did not indicate any change over the deposit. The survey was therefore completed using the 5,000 c.p.s. frequency which is highly susceptible to near surface features.

The testing showed that the faulting in the area produces a very complex pattern which is dependent entirely on the exact location and relative positions of the transmitter and receiver. Repetition of lines from different transmitter locations produced changes in the location of the cross-overs demonstrating that conductive zones in the area are numerous and multi-directional.

It was not expected that the lead/zinc deposit would give a strong response and it would appear that any response would be completely masked from effects produced by faults. It must therefore be concluded that this type of method cannot be used directly to locate this type of deposit.

4. HORIZONTAL LOOP E.M. METHOD

4.1 Equipment and Method Used

The instrument used was a Huntematic manufactured by Huntec Limited, Toronto. This uses frequencies of 500 c.p.s., 1,000 c.p.s. and 5,000 c.p.s. with coil separations up to 500 feet.

4.2 Results and Interpretation

The results are presented as a series of profiles (Drawings 10 - 15). These show that there is only very small changes in the out-of-phase component and there is no indication of any anomalous areas over the lead/zinc deposit.

The large changes in the in-phase component are due to a combination of topographic effects and errors in the coil separation so that this component has to be ignored in the interpretation.

5. CONCLUSIONS AND RECOMMENDATIONS

The results in general show that over the area tested the Induced Polarization method was the only one which could be used to definitely establish the location of the lead/zinc deposit. The I.P. effect appears to result directly from the economic mineralization and not from variations in the composition of the country rock, e.g. grphitic and pyritic content. It is difficult to establish the source of the I.P. effect on an experimental basis. Research by Dr. West, University of Toronto, has concluded that work on core samples can produce completely misleading results and has suggested that the only method that could be used would be by using the I.P. method down the drill holes.

The magnetic results show a higher response over parts of the surface extent of the deposit but this is not large enough to determine its location over the whole area by this method alone.

The lack of response obtained by the electromagnetic methods cannot rule out the use of these methods elsewhere in the Frances Lake area. This could have resulted in a lack of sufficient concentration of the mineralization combined with

with an area which is highly faulted producing considerable "noise" as was observed with the vertical loop system. The Turam survey previously carried out over a much larger area than that of this survey, demonstrated that response to the electromagnetic systems can be obtained. It is expected that better response would be obtained over areas where copper mineralization becomes more prominent.

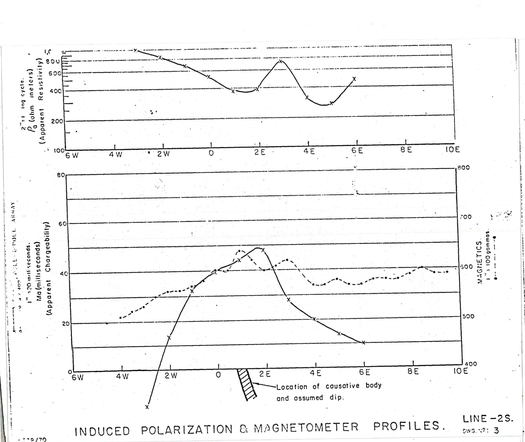
It is recommended that the methods to be used in future work should consist of combined Induced Polarization and magnetics. The use of electromagnetic systems in the area does not appear to be justified.

The use of gravity to estimate the volume of the deposit along the dip has been investigated and it is concluded that the body would have to attain a thickness of at least 300 feet before its gravity effect would be obvious over the errors produced by topography, etc. This also means that a thickness estimate of any deposit could only be made to within this accuracy. These estimates assume that the gravity field in the area is reasonably uniform. If this is not the case then a more regional survey would have to be carried out before any

estimates of the residual gravity in any local area could be made, thus involving considerable costs.

Respectfully submitted,
KENTING EARTH SCIENCES,

T. R. B. Dundas,
Geophysicist.



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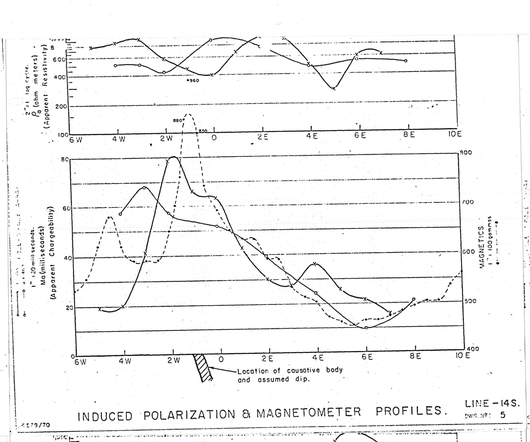

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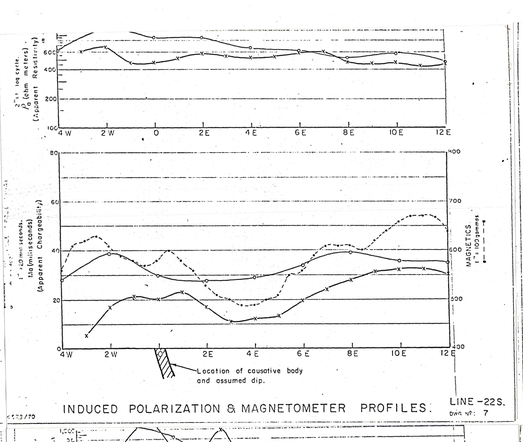

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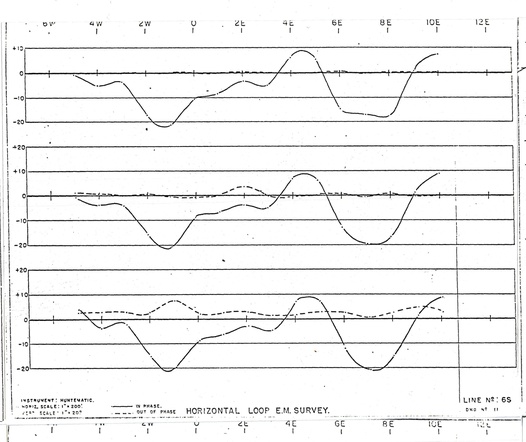
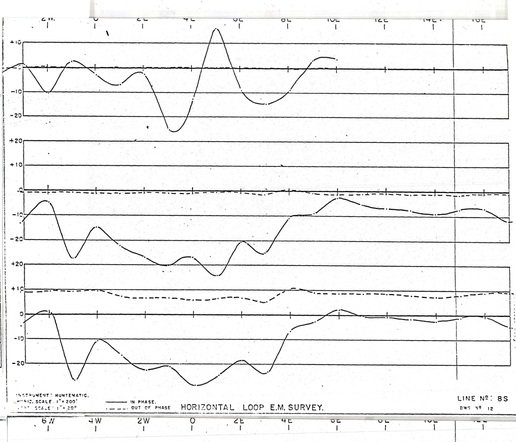


INSTRUMENT: HUNTEMATIC. HORIZ. SCALE: 1"=200' VERT. SCALE: 1"=20' — IN PHASE. - - - OUT OF PHASE HORIZONTAL LOOP E.M. SURVEY. LINE NR: 6S DWG NR: 11



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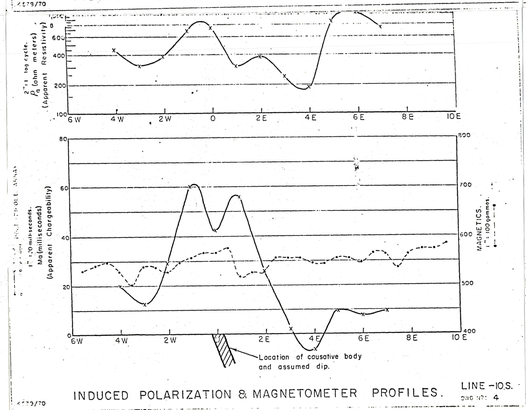
APPENDIX I



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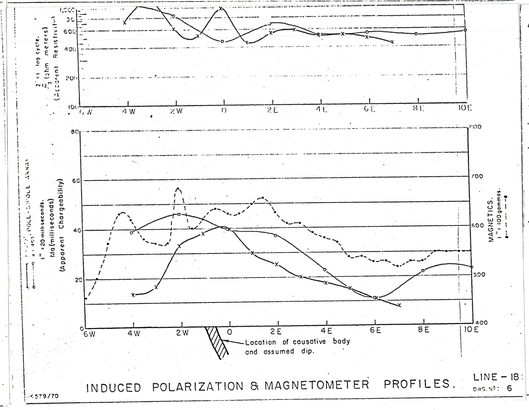

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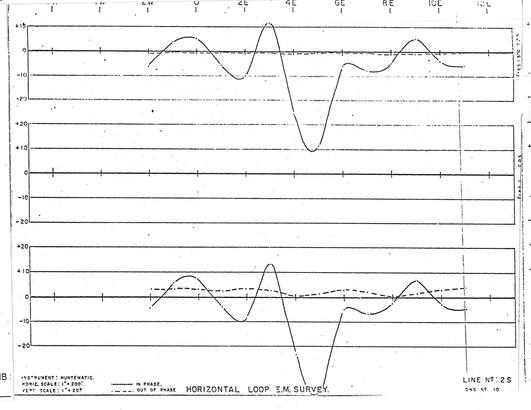

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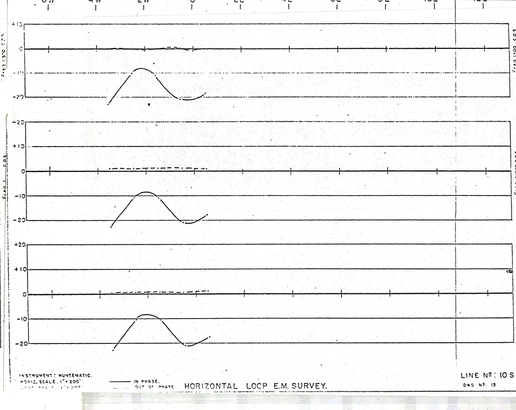

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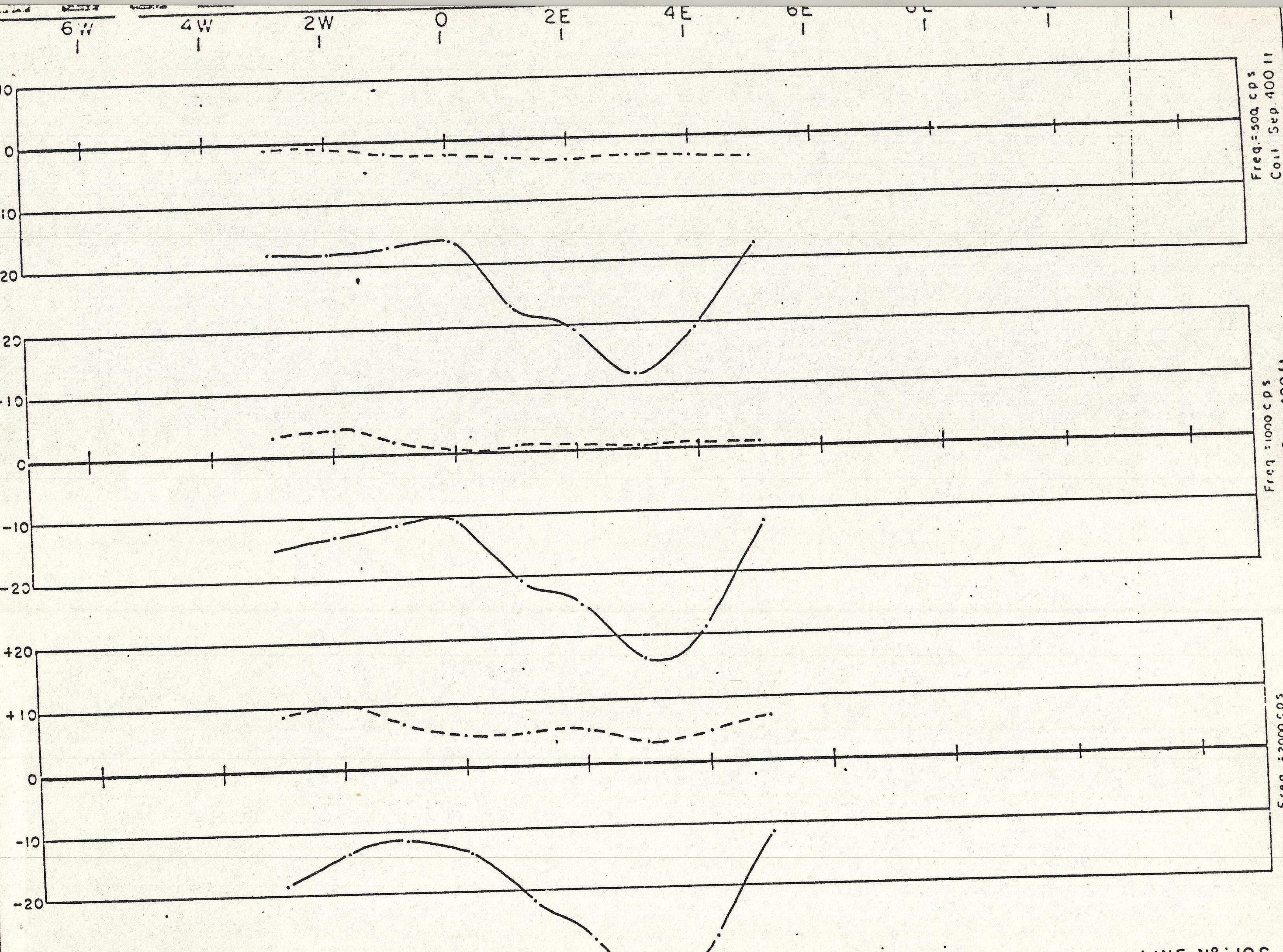

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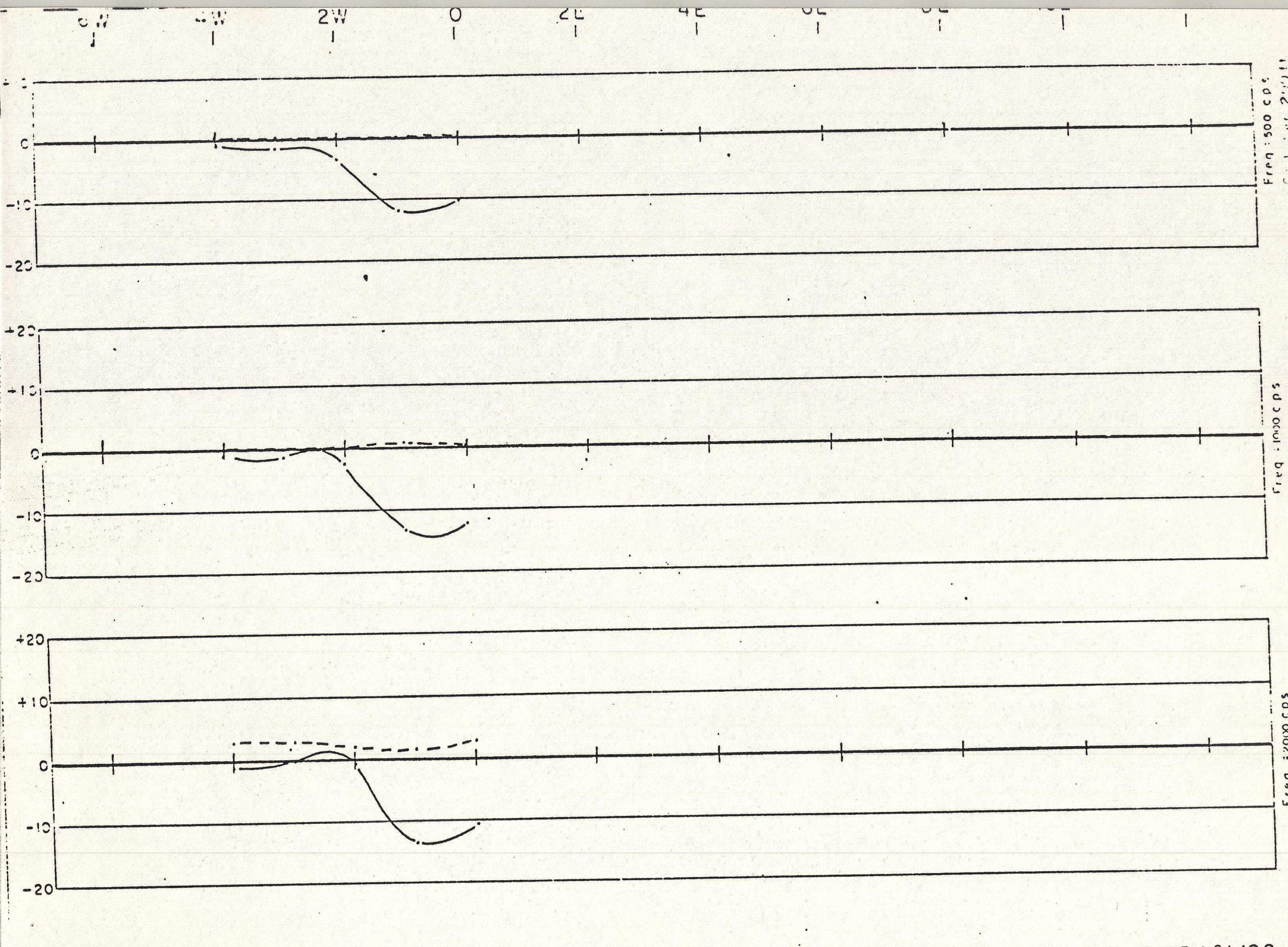
HORIZ. SCALE: 1" = 200'

—— IN PHASE.
- - - OUT OF PHASE

HORIZONTAL LOOP E.M. SURVEY.

LINE Nº: 10S
DWG. Nº. 15



INSTRUMENT: HUNTEMATIC.
HORIZ. SCALE: 1" = 200'

—— IN PHASE.
- - - OUT OF PHASE

HORIZONTAL LOOP E.M. SURVEY.

LINE Nº: 10S
DWG. Nº. 14