GEOPHYSICAL REPORT

STEELHEAD AND HORSEFLY PROSPECTS, N.W. BRITISH COLUMBIA
NTS. 103H/11, 14

FOR

ATNA RESOURCES LTD

BY

DELTA GEOSCIENCE LTD

FEBRUARY 23, 1996. GRANT A. HENDRICKSON, P.GEO.

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INTRODUCTION

At the request of Atna Resources Ltd., Delta Geoscience has conducted a Horizontal Co-Planar Loop Electromagnetic (Maxmin) survey of the Steelhead and Horsefly mineral deposits. The survey area is located in northwestern British Columbia, just to the west of the Ecstall River.

The exploration target is volcanogenic massive sulphide style mineralization hosted in an intercalated sequence of volcanics and metasedimentary rocks.

The geophysical work described in this report was conducted during the period September 6 to September 15, 1995.

In all, 8.2 kms of multifrequency horizontal co-planar loop EM was completed during the survey period. The breakdown per grid is 5.5 kms at Steelhead and 2.7 kms at Horsefly.

The survey area can be classed as forested sub-alpine mountainous terrain. The terrain and thick forest combined to make line cutting and chaining a difficult task. Access to the survey area is by helicopter from either Prince Rupert or Terrace.

Since this report is to be appended to the geologic reports, no location, grid or claim maps will be included. Please refer to the geologic reports for these maps and a more detailed description of the geology and mineralization.

PERSONNEL

Matthew Chamberlain	- Geophysicist, Field Crew Chief.
Will Kahlert	- Field assistant provided by Atna.
Grant Hendrickson	- Geophysicist, Supervisor.

EQUIPMENT

1 - Apex Parametrics Maxmin 1-9-MMC Electromagnetic System.
1 - Toshiba 5200 Field Computer.
1 - Fujitsu Printer/Plotter.

DATA PRESENTATION

For both grids, the horizontal co-planar loop EM data is presented as stacked profile plans of the inphase and quadrature components for each frequency. Basic E.M. coverage of both grids was carried out at a 100 meter coil separation and four frequencies. Survey maps are presented at 1:2000 scale in this report.

Profile data is presented increasing to the top of the maps (north) from a base level (value at the line position). The inphase response is plotted as a solid line, whereas the quadrature response is shown by the dashed line.

Conductor axes for both grids are shown on the 1760Hz plans (Figs. #5 & 9) by bold black lines and also on the Horsefly grid 7040Hz plan (Fig. #3). The boundary areas of weaker conductivity that generally envelope the main conductor axes are shown by dashed lines.

Figures #5 and 9 are also reproduced at page size to facilitate the quick viewing of the main conductor axis.

The single line of 50 meter coil separation detail work completed on the Steelhead grid is presented as a combined plot of the inphase and quadrature components (Fig. #11) for all four frequencies. The individual frequencies are not labelled, since the steady attenuation of the response with lower frequency makes it easy to distinguish the profiles.

SURVEY PROCEDURE

Atna personnel ensured that both grids were established prior to the arrival of the Delta Geoscience geophysicist. Line separation was generally 100 meters, with station separations approximately slope corrected to maintain a 25 meter horizontal interval between pickets.

The horizontal co-planar loop EM surveying was carried out at four frequencies: 440, 1760, 3520 and 7040 hertz. The majority of the electromagnetic survey work was completed with a 100 meter coil separation. A minor amount of detailing work was also completed on L.1950N of the Steelhead grid, with a coil separation of 50 meters.

Note that the maximum depth of investigation for a horizontal co-planar loop EM system is generally considered to be 50% of the coil separation for vertical conductors and 100% of the coil separation for flat lying conductors.

Despite the fact that effort was made to ensure the chaining of the grid was slope corrected, so that the Maxmin receiver and computer could be programmed to correct the data for the topography, significant amplitude inphase noise remained in the data. This inphase noise was largely due to chaining errors, which caused coil separation problems. To some extent, the chaining error problem is unavoidable in forested mountainous terrain like the Ecstall River area.

To further eliminate the noise, the inphase response at 440Hz was used as a reference, i.e. the 440Hz inphase signal was subtracted from the higher frequency in-phase responses. This procedure works well when the conductors of interest are weak to moderate conductors, i.e. weak inphase response at 440Hz, which is the general case for this survey area. Coil separation errors have generally the same amplitude at each frequency, therefore the subtraction process can largely eliminate the separation errors from the more important higher frequency inphase data, without adversely affecting the anomalous responses. In hindsight, it would have been better practice to record the 220Hz data and use it for the subtraction process instead of the 440Hz data.

The quadrature response remains largely unaffected by coil separation and orientation errors and does respond better to poor quality conductors. These two facts have proven very useful in evaluating and outlining the moderate to weak strength conductors detected in the two survey areas.

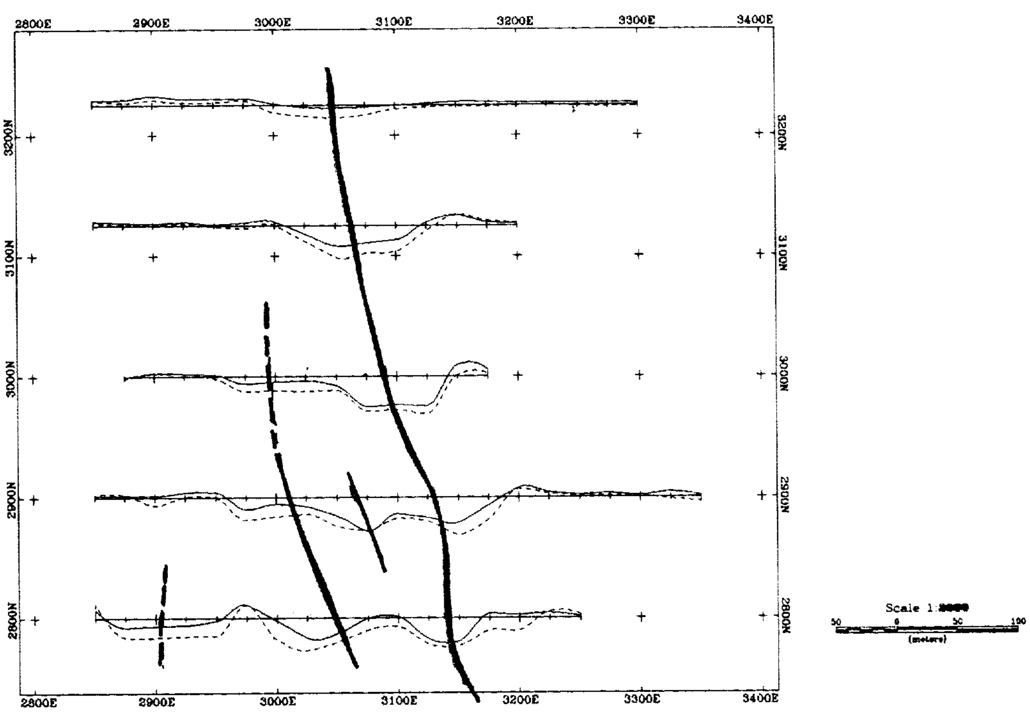

FIG. #1.

Scale Reduced to 1cm = 62.5m.

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HORIZONTAL COPLANAR LOOP EM SURVEY
ECSTALL PROJECT, HORSEFLY GRID
NORTH WEST BRITISH COLUMBIA

Coil separation 100 meters, Freq. 1760 hz
corr. inphase solid line @ 1 cm = 20%, base 0
quadrature dashed line @ 1 cm = 20%, base 0
Sept, 1996

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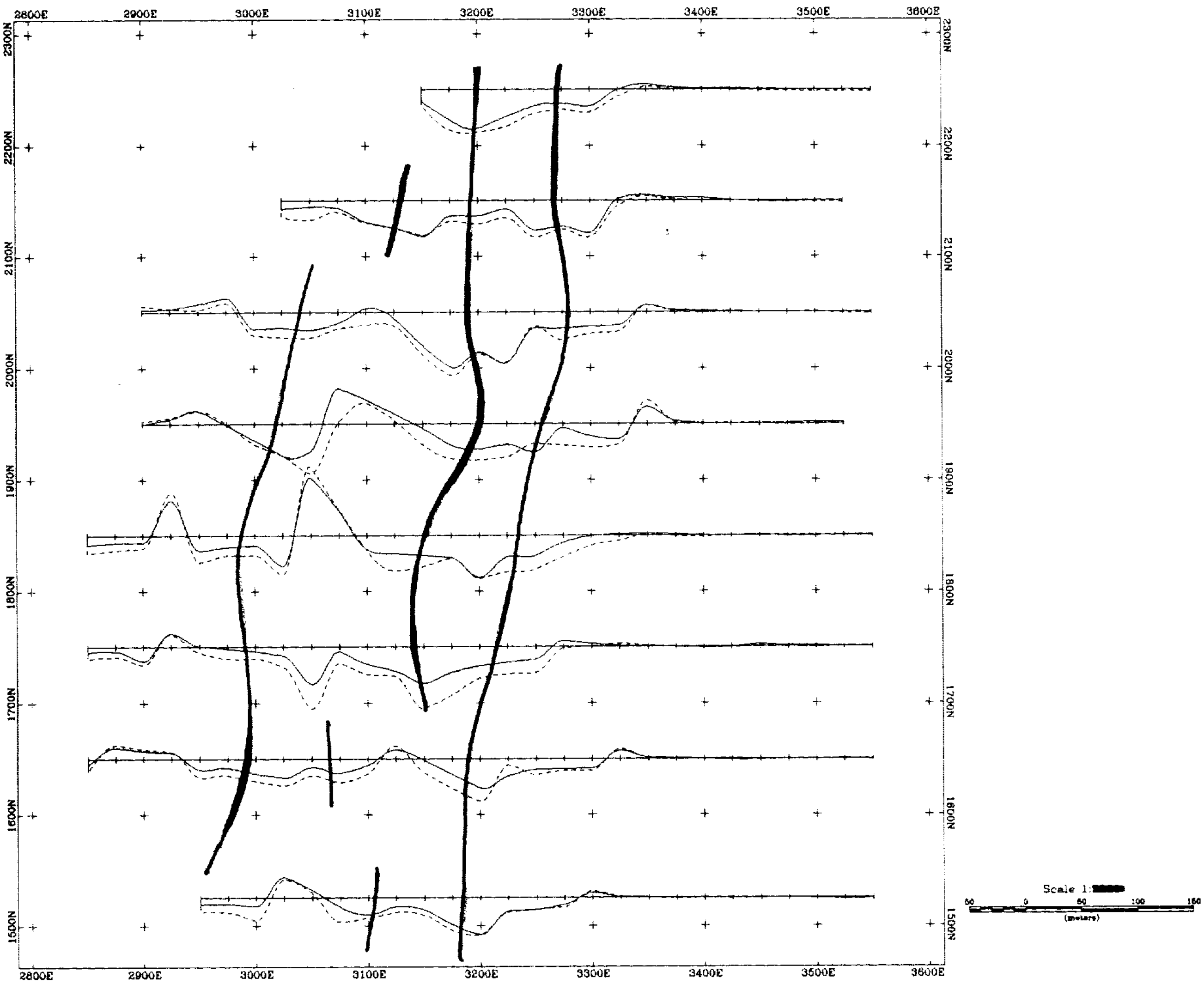

Scale Reduced to 1cm = 62.5m.

FIG. #2.

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HORIZONTAL COPLANAR LOOP EM SURVEY
ECSTALL PROJECT, STEELHEAD GRID
NORTH WEST BRITISH COLUMBIA

Coil separation 100 meters, Freq. 1760 hz
corr. inphase solid line @ 1 cm = 20%, base 0
quadrature dashed line @ 1 cm = 20%, base 0
Sept. 1995

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DISCUSSION OF THE DATA

Horsefly Grid:

A northwest trending moderate strength conductor (Figs. #3 & 5), centered around 3100E, 3000N, dominates this grid. This shallow conductor (10 meter depth to top) has a core width of 6 to 8 meters which has relatively good conductivity. This core is enveloped by a much weaker zone of poor conductivity that has a width of at least 20 to 30 meters. Dip appears steeply to the west. The apparent minor thickening of the core conductor at 3125N, 3050E may be a significant exploration feature.

To the west, there are several narrow zones of relatively good conductivity hosted in a very weakly conductive rock unit (Fig. #3). This type of conductivity is likely indicative of a bedrock graphitic metasediment sequence intercalated with the volcanics. The narrow zones of better conductivity (marked by a single thin dark line) contained within this postulated broad metasediment package, probably have the most exploration significance. Some of the narrower conductors have an apparent short strike length, which may be more indicative of VMS style mineralization, i.e. the shallow, narrow conductive zone centered at 3070E, 2900N (Fig. #5). Additional H.L.E.M. surveying of L.2900N, utilizing a 50 meter coil separation, would have helped isolate this particular E.M. anomaly and improve its interpretation.

Steelhead Grid:

A striking feature in the data from this grid is that east of approximately 3325E, and extending to at least 3600E, the resistivity of the bedrock is very high. Overburden thickness appears very minimal over the entire survey area. West of 3325E, the underlying bedrock is generally weakly conductive, which again suggests a graphitic metasediment sequence intercalated within the volcanics. The contact area (3325E) is marked by a narrow conductor striking throughout the grid.

Contained within this sequence of weakly conductive rocks are three zones of relatively good conductivity that have appreciable width.

Zone 1 - centered at approx. 3225E, 1950N.

This long conductive zone clearly extends further to the north, however the localized thickening of the conductor from approx. 1900N to 2080N may have exploration significance. The apparent thickening could also result from a very closely spaced parallel conductor. The 50 meter coil separation detail work (L.1950N) suggests relatively good near surface conductivity can be expected from 3210E to 3285E.

Zone 2 - centered at 3120E, 2150N.

This apparent short strike length conductor has appreciable width. The combination of short strike length and width may be of exploration significance. The very narrow conductive zone outlined at 3120E on the 50 meter coil separation detail work (L.1950N) is likely marking the southern extent of Zone 2.

Zone 3 - centered at 2990E, 1650N.

The localized apparent thickening of this long strike length shallow conductor at its southern end, could be of exploration significance. Moving to the north, this conductive horizon thins, but remains relatively conductive. The 50 meter coil separation detail line, 1950N, also suggests that the conductivity of this horizon improves to the north (particularly the extreme west edge of the conductor), although the width remains narrow (1-5 meters). This shallow zone is dipping steeply to the west.

CONCLUSIONS AND RECOMMENDATIONS

Electromagnetic surveys of VMS style mineralization (economic occurrences) in British Columbia has frequently shown that the massive sulphide mineralization has weak conductivity at best. This geophysical exploration problem is further compounded in volcanic belts (like the Ecstall River area), in which a large weakly conductive graphitic metasediment component is intercalated with the volcanics. The lack of a strong conductivity contrast between the host rock and mineralization, lends to an ambiguity in EM target selection. Clearly other exploration techniques will have to play a lead role, i.e. geology, geochemistry, in EM target selection.

The five conductors, two from the Horsefly Grid and three from the Steelhead Grid, discussed in the preceding section, represent the best candidates for possible VMS style sulphide mineralization. However, bear in mind this selection is basely solely on the geophysics.

The best geophysical targets appear to be on the Steelhead Grid, thus it probably should have exploration priority over the Horsefly Grid.

If future EM surveys are contemplated, more of the 50 meter coil separation work should be undertaken to achieve better isolation of the closely spaced shallow EM targets that can be expected. Frequencies measured should include 220Hz, 440Hz, 1760Hz and 3520Hz.

Grant A. Hendrickson, P.Geo.

PROVINCE OF BRITISH COLUMBIA
G. A. HENDRICKSON
PROFESSIONAL GEOSCIENTIST

REFERENCES

Ketola, M., and Puranen, M., 1967: Type curves for the interpretation of Horizontal Loop EM anomalies over tabular bodies: Geological Survey of Finland, Report on Investigations, N:01.

Apex Parametrics, 1980: Technical Manuals on the Maxmin System.

STATEMENT OF QUALIFICATIONS

Grant A. Hendrickson.

- B.Science, University of British Columbia, Canada, 1971. Geophysics option.

- For the past 25 years, I have been actively involved in mineral exploration projects throughout Canada, the United States, Europe and Central and South America.

- Registered as a Professional Geoscientist with the Association of Professional Engineers and Geoscientists of the Province of British Columbia, Canada.

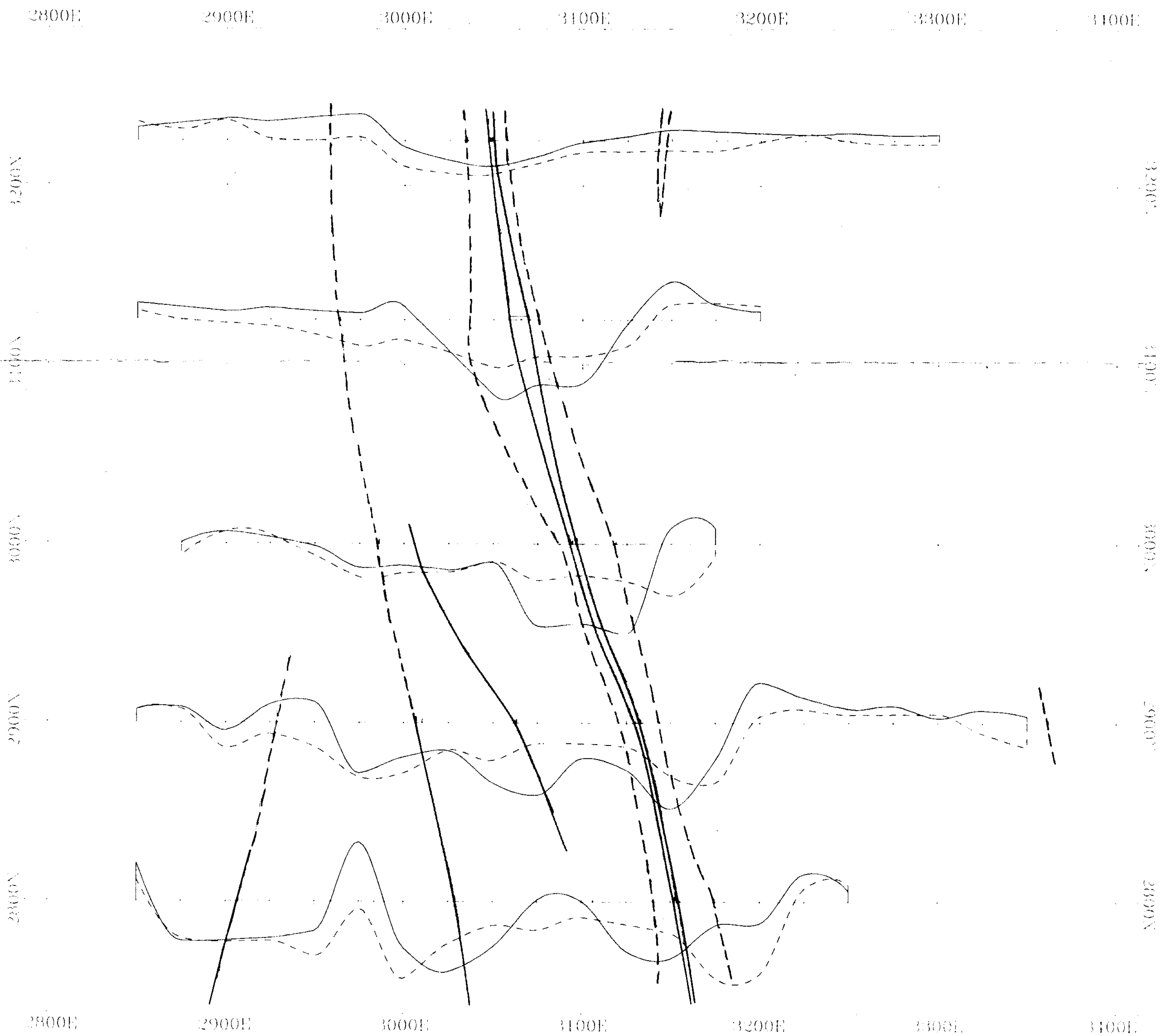
- Registered as a Professional Geophysicist with the Association of Professional Engineers, Geologists and Geophysicists of Alberta, Canada.

- Active member of the Society of Exploration Geophysicists, European Association of Exploration Geophysicists and the British Columbia Geophysical Society.

Dated at Delta, British Columbia, Canada, this 23 day of Feb, 1996.

Grant A. Hendrickson, P.Geo.

PROVINCE OF G. A. HENDRICKSON BRITISH COLUMBIA GEOSCIENTIST



Scale 2000

(meters)

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HORIZONTAL COPLANAR LOOP EM SURVEY
ECSTALL PROJECT, HORSEFLY GRID
NORTH WEST BRITISH COLUMBIA

Coil separation 100 meters, Freq. 7040 hz
corr. inphase solid line @ 1 cm = 20% base 0
quadrature dashed line @ 1 cm = 20%, base 0
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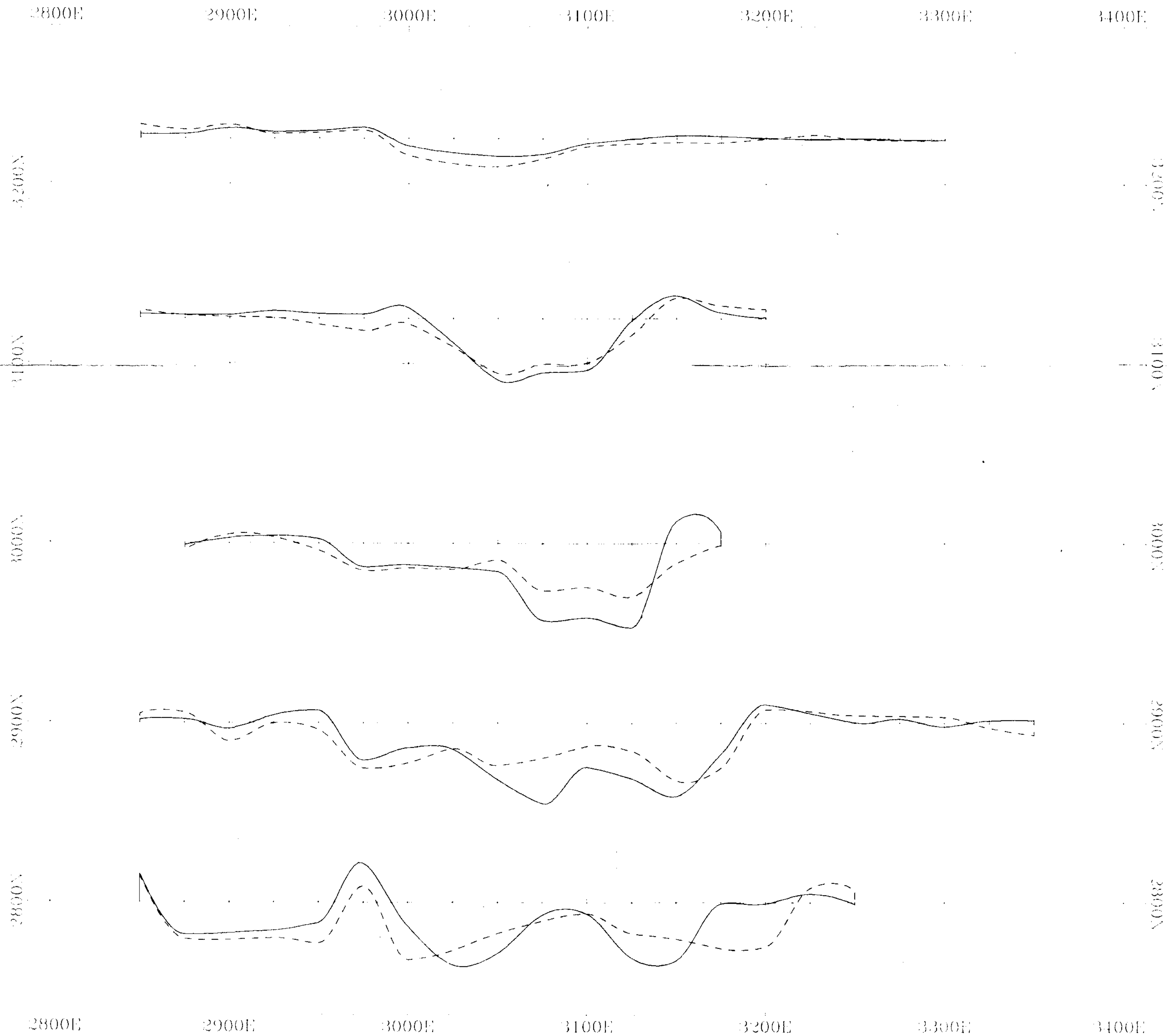
FIG. 3



Scale 1:2000
50 0 50 100
(meters)

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HORIZONTAL COPLANAR LOOP EM SURVEY
ECSTALL PROJECT, HORSEFLY GRID
NORTH WEST BRITISH COLUMBIA

Coil separation 100 meters. Freq 3520 hz
corr inphase solid line @ 1 cm = 20 % base 0
quadrature dashed line @ 1 cm = 20 % base 0
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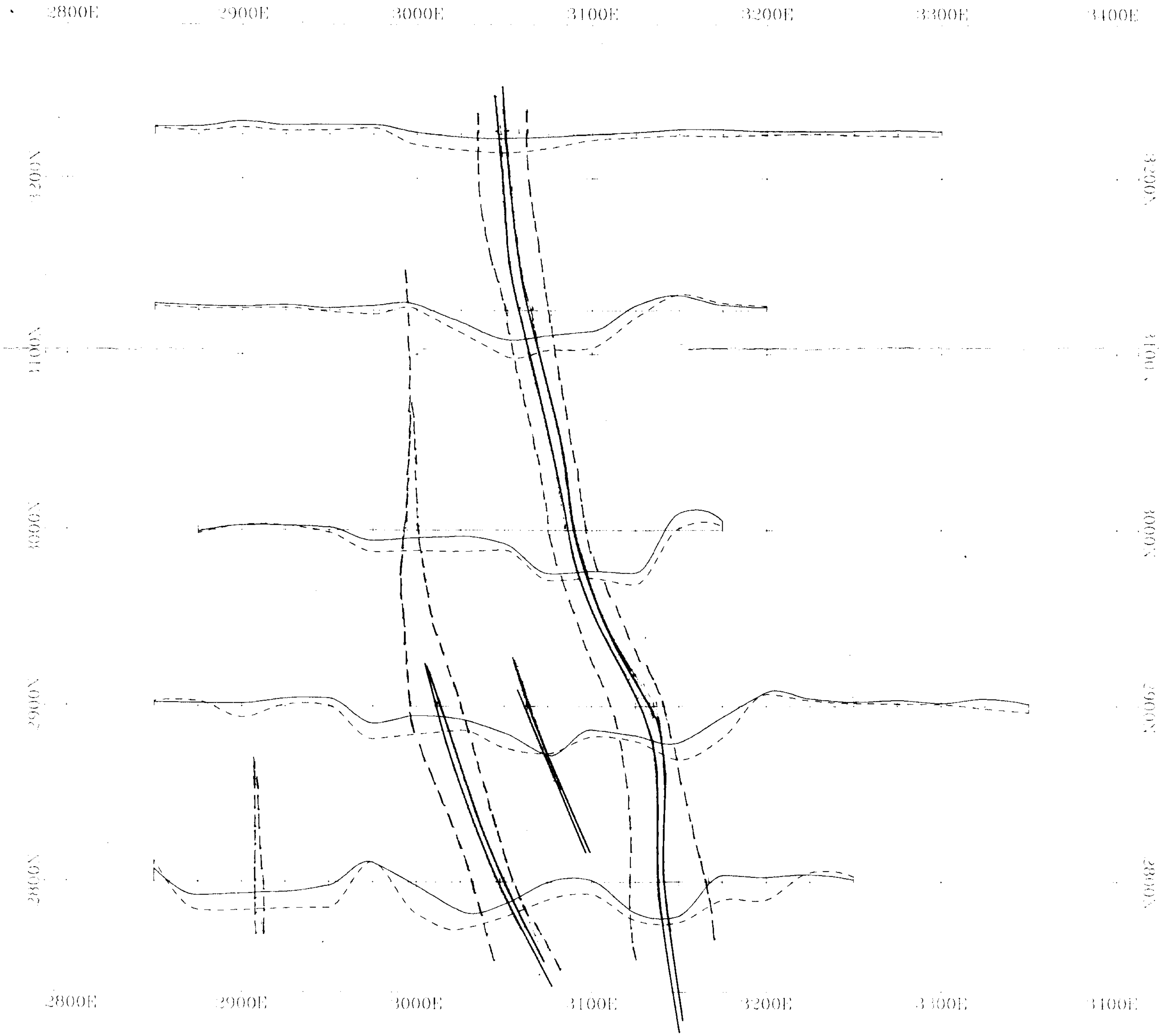
FIG. 4



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Scale 1:2000

50 0 50 100

(meters)

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HORIZONTAL COPLANAR LOOP EM SURVEY
ECSTALL PROJECT, HORSEFLY GRID
NORTH WEST BRITISH COLUMBIA

Coil separation 100 meters. Freq. 1760 hz
corr. inphase solid line @ 1 cm = 20%, base 0
quadrature dashed line @ 1 cm = 20%, base 0
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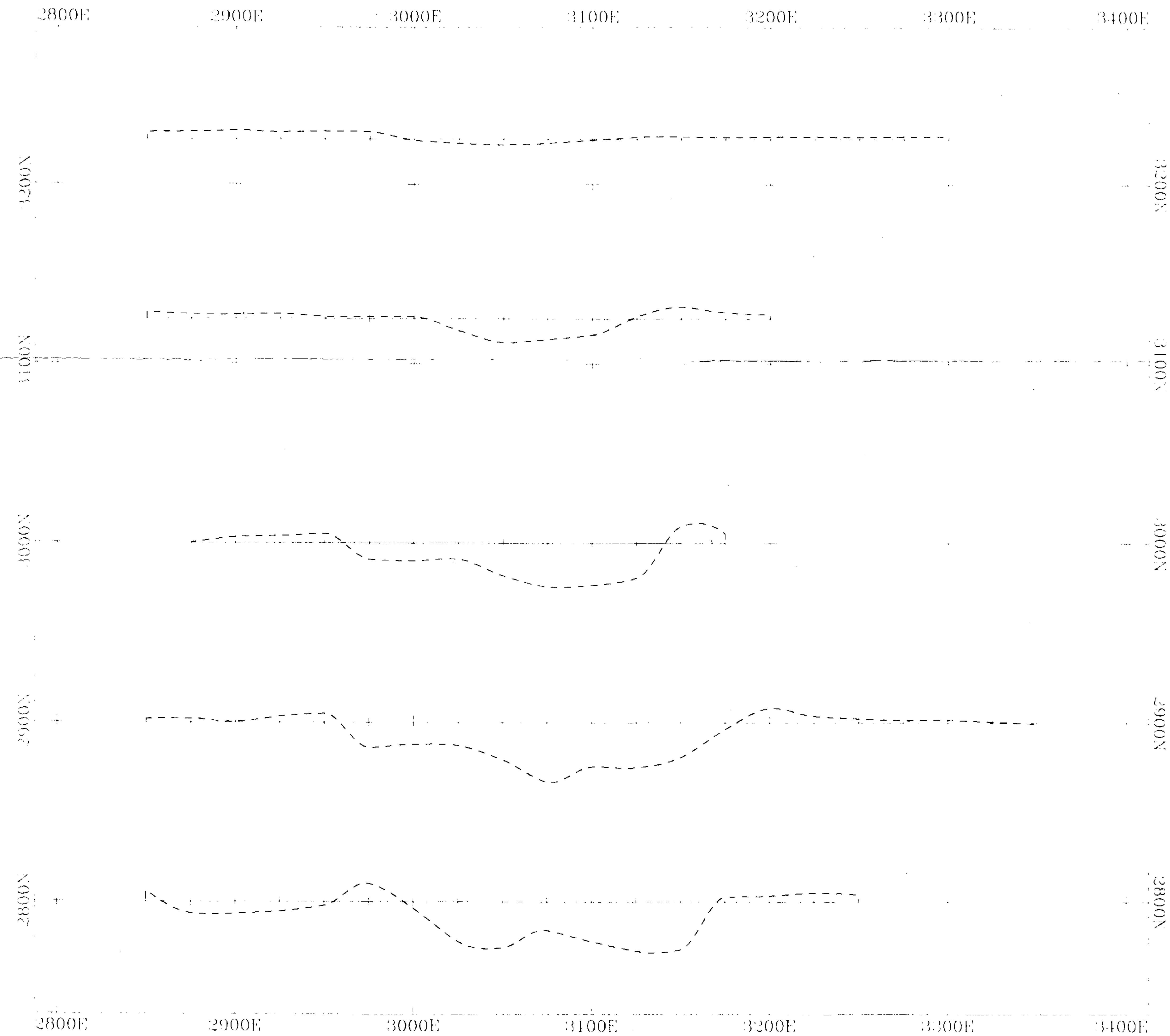
FIG. 5



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PART 2 OF 2

Scale 1: 2000

50 0 50 100

(meters)

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HORIZONTAL COPLANAR LOOP EM SURVEY
ECSTALL PROJECT, HORSEFLY GRID
NORTH WEST BRITISH COLUMBIA

Coil separation 100 meters, Freq. 440 hz
corr. inphase solid line @ 1 cm = 20%, deleted
quadrature dashed line @ 1 cm = 20%, base 0
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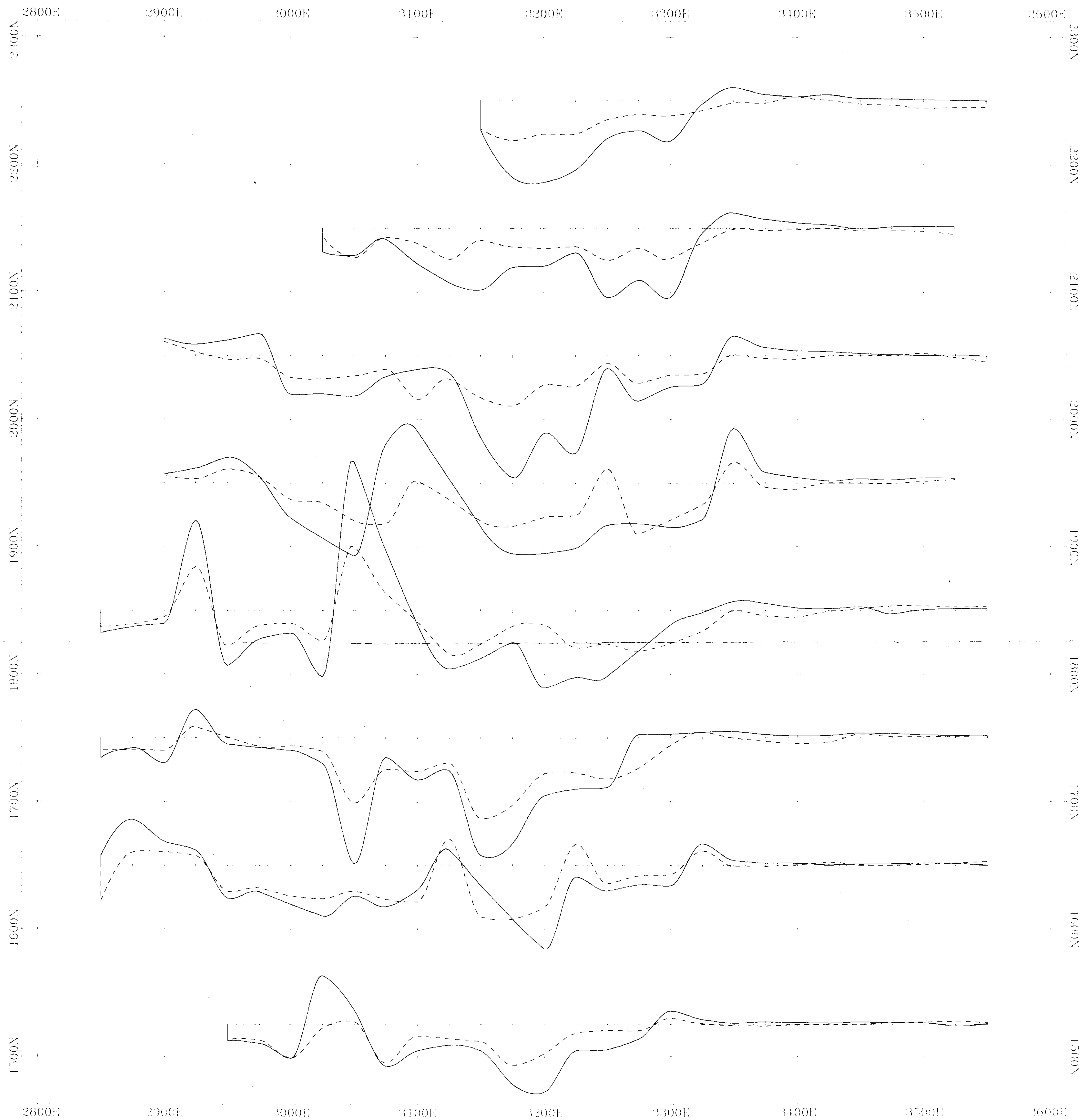
FIG. 6



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Scale 1:2000

50 0 50 100 150

(meters)

ATNA

HORIZONTAL COPLANAR LOOP EM SURVEY
ECSTALL PROJECT, STEELHEAD GRID
NORTH WEST BRITISH COLUMBIA

Coil separation 100 meters. Freq. 7040 hz
corr. inphase solid line @ 1 cm = 20% base 0
quadrature dashed line @ 1 cm = 20% base 0
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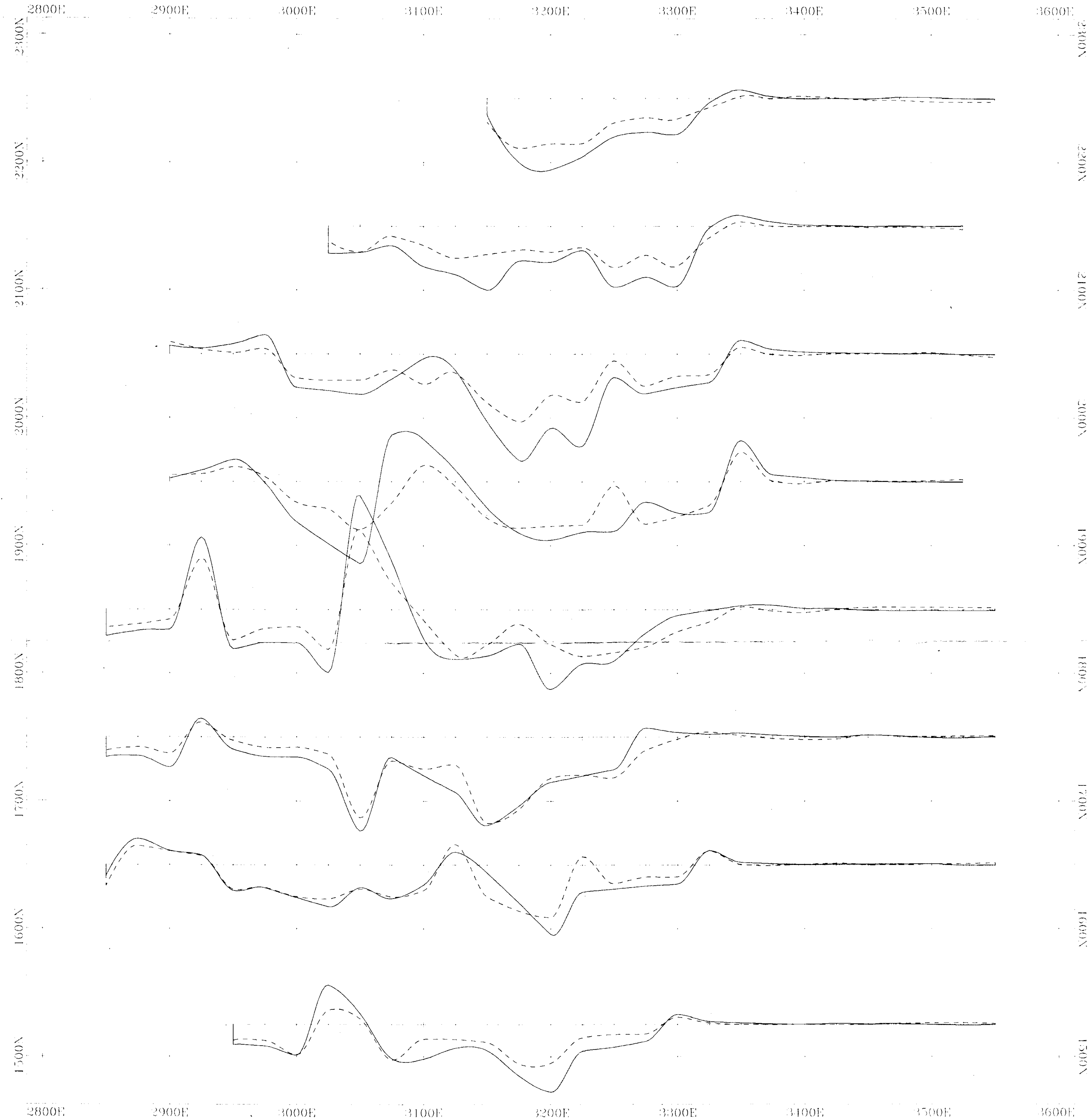
FIG. 7



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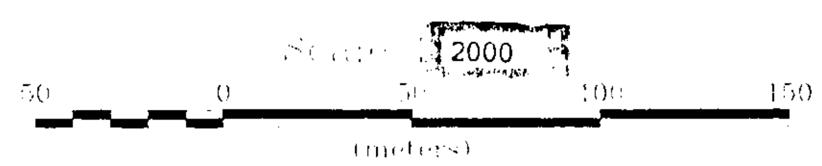

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HORIZONTAL COPLANAR LOOP EM SURVEY
ECSTALL PROJECT, STEELHEAD GRID
NORTH WEST BRITISH COLUMBIA

Coil separation 100 meters. Freq. 3520 hz
corr. inphase solid line @ 1 cm = 20% base 0
quadrature dashed line @ 1 cm = 20% base 0
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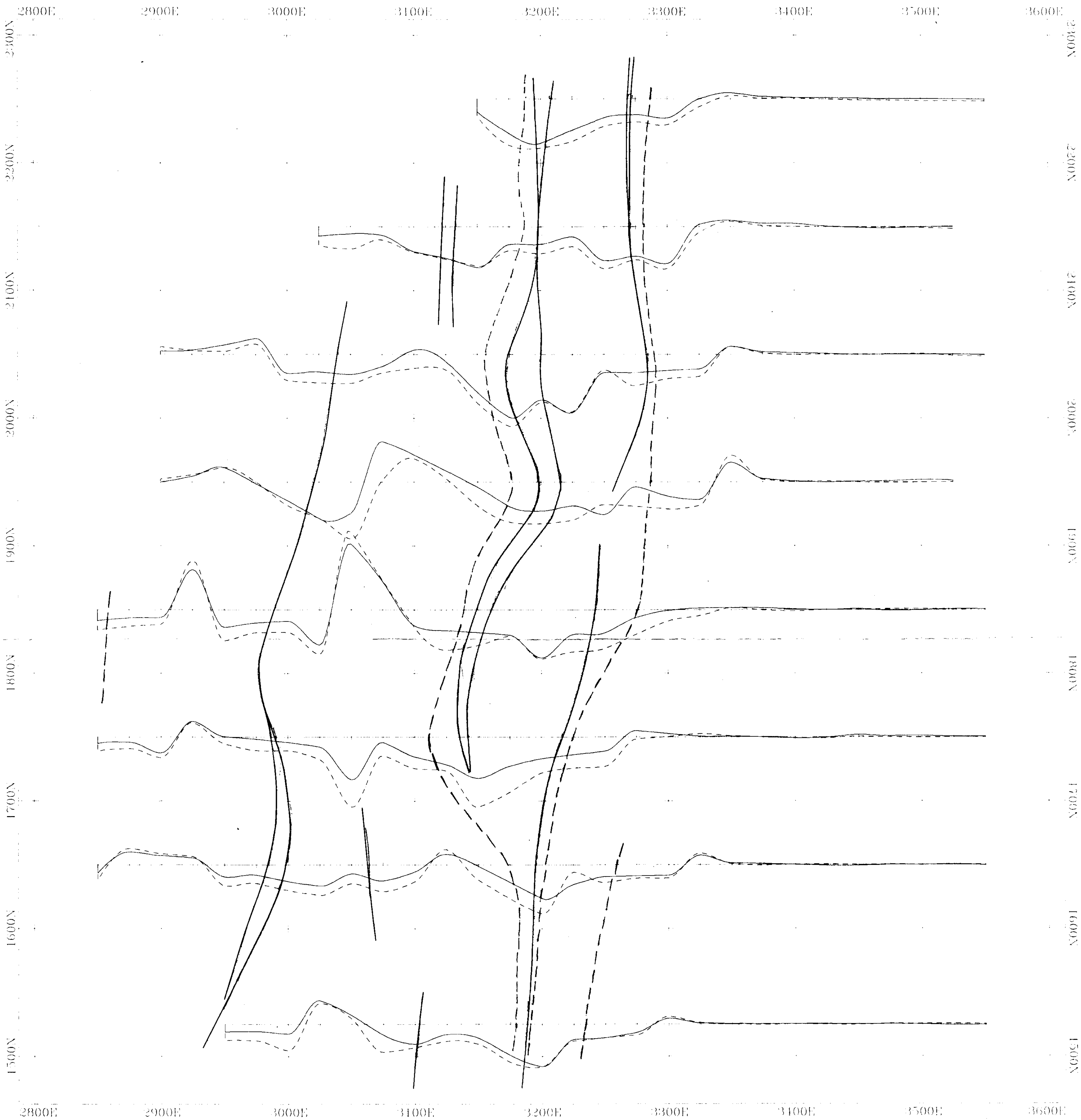
FIG. 8



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Scale 1:2000

50 0 50 100 150

(meters)

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HORIZONTAL COPLANAR LOOP EM SURVEY
ECSTALL PROJECT, STEELHEAD GRID
NORTH WEST BRITISH COLUMBIA

Coil separation 100 meters. Freq. 1760 hz
corr. inphase solid line = 1 cm = 20% base 0
quadrature dashed line = 1 cm = 20% base 0
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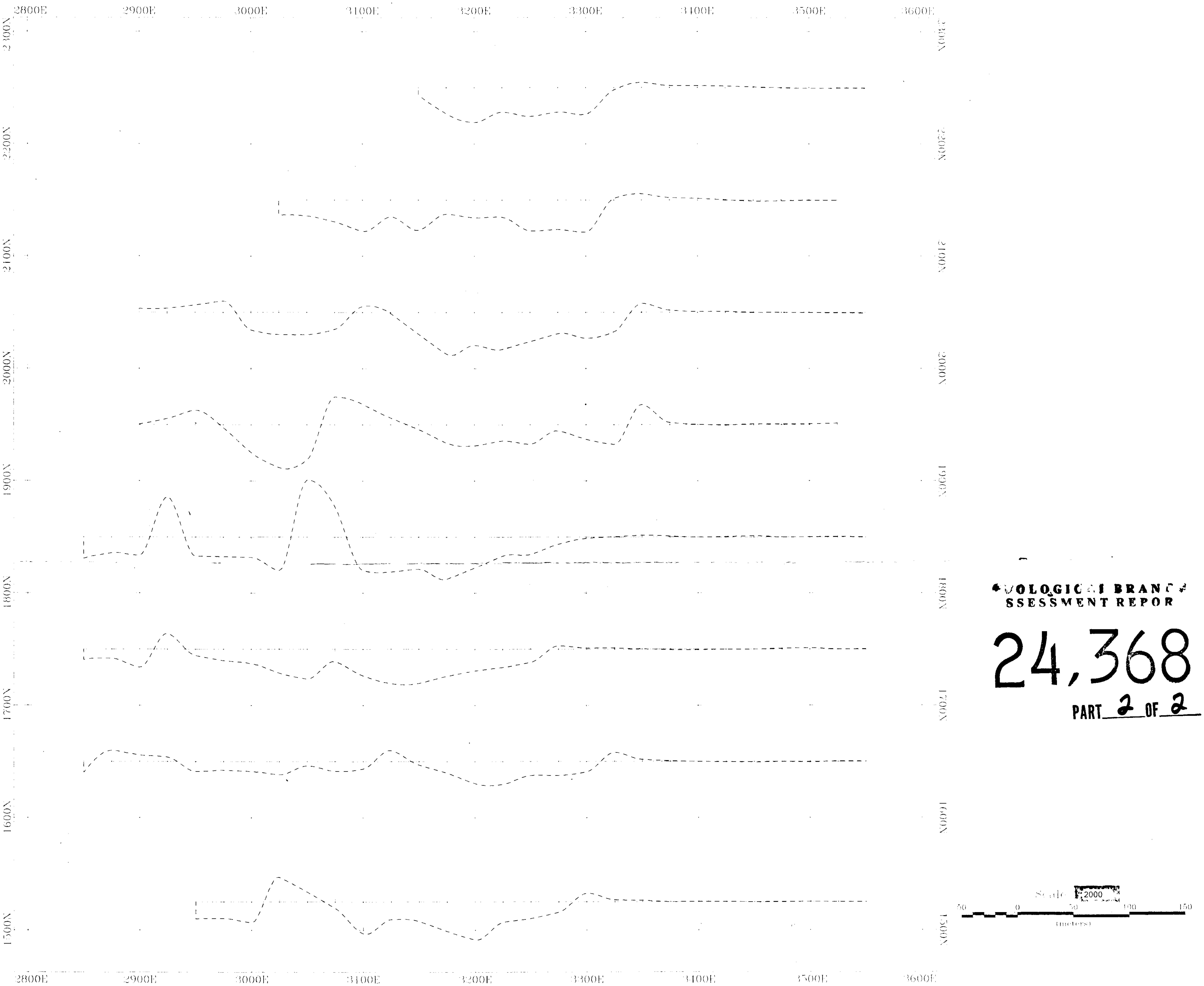
FIG. 9



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HORIZONTAL COPLANAR LOOP EM SURVEY
ECSTALL PROJECT, STEELHEAD GRID
NORTH WEST BRITISH COLUMBIA

Coil separation 100 meters. Freq. 440 hz
corr inphase solid line @ 1 cm = 20%, deleted
quadrature dashed line @ 1 cm = 20% base 0
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FIG. 10

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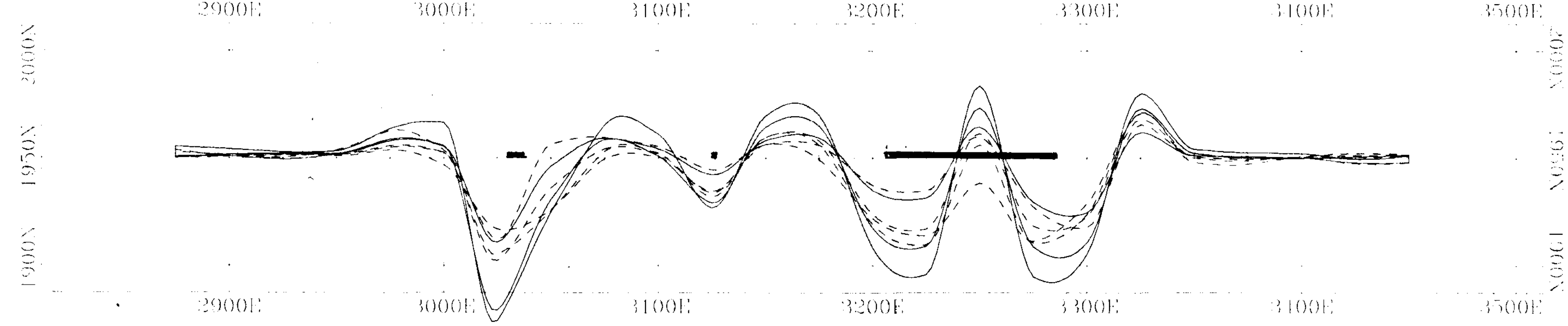

Scale 1:2000

50 0 50 100 150

(meters)

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HORIZONTAL COPLANAR LOOP EM SURVEY
ECSTALL PROJECT, Steelhead detail line 1950N
NORTH WEST BRITISH COLUMBIA

Coil separation 50 meters Freqs 440-7040 hz.
corr inphase solid line @ 1 cm = 15% base 0
quadrature dashed line @ 1 cm = 15% base 0
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FIG. 11