GEOLOGICAL SURVEY OF CANADA

OPEN FILE 2343

Results of multifrequency horizontal-loop EM measurement along transects in northeastern Ontario

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1991

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MINERAL RESOURCES DIVISION

OPEN FILE REPORT 2343

CANADA-ONTARIO MINERAL DEVELOPMENT AGREEMENT 1985-1990

PROJECT C.7.4

RESULTS OF MULTIFREQUENCY HORIZONTAL-LOOP ELECTROMAGNETIC MEASUREMENTS ALONG TRANSECTS IN NORTHEASTERN ONTARIO

G.J. Palacky and L.E. Stephens

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Appendix

Copies of 1:100,00 map sheets with survey locations and groups of MaxMin profile plots:

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42B/SW (Elsas)

42G/SE (Kapuskasing)

42G/NE (Guilfoyle Lake)

42H/SW (Smooth Rock)

42H/NW (Island Falls)

42J/SE (Smoky Falls)

Abstract

This Open File presents results of multifrequency horizontal-loop (HLEM) surveys in northeastern Ontario (near Kapuskasing and Timmins). The first phase (1987) was a follow-up of helicopter electromagnetic surveys carried out earlier that year. The second phase (1988) focused on interesting targets on the fringes of the helicopter EM survey area. In all field surveys, the APEX MaxMin I system was used with a coil separation of 100 m. The HLEM results are presented as plots of in-phase and quadrature components obtained at 8 frequencies. The locations of Rotasonic drillholes are also indicated. The plots are grouped according to their geographic location on 8 sheets of 1:100,000 Ontario Government maps. Their location is depicted in portions of map sheets which are in the Appendix.

The survey results will be of use in mineral exploration, structural mapping, and Quaternary geological studies. While several previously unknown bedrock conductors and shear zones were detected as a result of HLEM surveys, the most important contribution is new information on bedrock topography and composition of Quaternary cover. Identification of glacial till layers is of importance in drift prospecting. Because of the variety of users and potential applications, each requiring a different approach, no interpretation is provided in this Open File. References are given to papers, which outline different interpretation procedures.

This work was a contribution to the Canada-Ontario Mineral Development Agreement, 1985-1990 (Project C.7.4).

1. Introduction

Ground electromagnetic (EM) surveys which are released as Open File 2343 were funded under Project C.7.4 of the Canada - Ontario Mineral Development Agreement 1985-1990. The aim of the project was to carry out tests with existing airborne and ground EM systems and to assess their suitability for mapping of Quaternary sediments.

Reliable identification of glacial tills is important for selection of sampling sites in drift prospecting. Geochemical analysis of basal tills is an established technique of gold exploration in glaciated terrains. After completion of geophysical tests and interpretation of results, a recommendation was made to routinely use selected EM methods in drift prospecting. Application of EM surveys is more cost-effective under most conditions than of shallow reflection or refraction seismic methods.

The project was conceived and executed in close cooperation with scientists of the Terrain Science Division of the Geological Survey of Canada (GSC). As part of their project C.7.1 (leader S.L. Smith) in the same area of northeastern Ontario, stratigraphic Quaternary drilling using Rotasonic equipment was carried out in 1987-88. Contacts were also maintained with the Ontario Geological Survey (OGS), particularly with R.B. Barlow, Head of the Geophysics Section. While all ground geophysical surveys and their

interpretation were performed by the GSC staff, line cutting, chaining and airborne geophysical surveys were carried out by contractors.

2. Historic Overview

The initial phase of the project consisted of field reconnaissance and limited ground geophysical surveys at a test site near Val Gagné. The site measuring 6.1 x 2.7 km was chosen by one of the authors, G.J. Palacky, and R.B. Barlow of the OGS after a joint field visit in June 1985. The area is covered by Quaternary glaciolacustrine clays which in some places are underlain by glacial tills. Interpretation of geophysical data indicates that thickness of overburden varies from 15 to 45 m. Two holes were previously drilled at the test site by OGS geologists as part of their Black River-Matheson program. In October-November 1985, multiparameter time-domain induced polarization and resistivity surveys were carried out by GSC crews in the southern part of the area.

Extensive field work at the Val Gagné test site was carried out in 1986. The first activity was an airborne geophysical survey flown in March by Geoterrex Ltd. of Ottawa. The time-domain GEOTEM EM system and a magnetometer were used for detailed coverage of the test site (line spacing 100 m). During the year, the following tasks were accomplished: permission from land owners to carry out geophysical surveys, line cutting, ground EM surveys using Geonics EM-31 and EM-34 instruments (direct measurements of apparent conductivity), Geonics EM-16R (resistivity measurements using VLF

transmitters), multifrequency horizontal-loop measurements with the APEX MaxMin I equipment, and high-resolution shallow reflection seismic surveys. A contractor cut, surveyed, and chained all survey lines. Ground electromagnetic surveys were performed by the staff of the Electrical Methods Section of the GSC. Seismic surveys were carried out by the Terrain Geophysics Section. A paper on seismic work at the Val Gagné test site was published by Pullan et al. (1987).

The prime consideration during the test surveys was to obtain sufficient information to allow selection of the most appropriate methodology for routine use along transects in northern Ontario that were previously selected for drilling under Program C.7.1. From the beginning, there was no intention to obtain a complete coverage of the Val Gagné test site using all available geophysical techniques. After interpretation and assessment of field results acquired during the first field season, a decision was made to use helicopter EM surveys for regional reconnaissance and multifrequency horizontal-loop EM surveys for ground follow-up.

A helicopter EM survey of the Val Gagné test site (27 lines 6.1 km long) was carried out by Aerodat Ltd. of Mississauga in January 1987. Magnetic total-field, VLF total-field and apparent resistivity maps were compiled. In February 1987, helicopter EM surveys were flown along 360 km of roads north and south of Kapuskasing (Guerney Lake to Lisgar Lake) and from Smoky Falls over

Fraserdale and Smooth Rock Falls to Timmins. Total transect airborne EM coverage along the roads was 830 line km (using double or quadruple lines). The survey results were presented in the form of stacked profiles and three map sets, in which apparent conductivity, apparent overburden thickness, and VLF total field were displayed as colour bars along the flight path. Examples of the data were included in a paper by Palacky (1989), in which the survey was described in detail. For presentation of the results, the airborne survey was divided into 4 transects: Kapuskasing (code KAP), Smoky Falls - Fraserdale - Smooth Rock Falls (code SF), Smooth Rock Falls - Kamiskotia (code SRF), and from a road junction south of Smooth Rock Falls to Timmins (code TIM).

Results of the helicopter EM surveys were interpreted in spring of 1987 by G.J. Palacky and 70 targets were selected for a ground follow-up. Factors considered in the evaluation of EM anomalies were conductance (large values indicated either a thickening of Quaternary sediments or an increase in the clay component), representative sampling along transects (each helicopter EM segment had at least two follow-up areas), Quaternary geology (preference was given to sites where presence of tills could be assumed), and logistics of the field work (some targets originally selected could not be reached in the field because of bridge washouts).

The ground follow-up surveys were carried out in summer 1987 with the multifrequency horizontal-loop EM technique. Two APEX MaxMin I units were used simultaneously in the field. Details of the survey procedures and data presentation are given in Chapter 3 of this report. Most of the follow-up segments were one km long; one coil separation (100 m) and 8 frequencies were routinely used. The geographic distribution of the surveys follows: KAP - 27 targets along the Kapuskasing transect (map sheets Guilfoyle Lake 42G/NE, Kapuskasing 42G/SE, and Elsas 42B/NE; 1:100,000 series published by the Ontario Ministry of Natural Resources), SF - 26 targets between Smoky Falls and Smooth Rock Falls (map sheets Smooth Rock 42H/SW, Island Falls 42H/SW, and Guilfoyle Lake 42G/NE), SRF - 10 targets between Smooth Rock Falls and Kamiskotia (map sheets Pamour 42A/NW and Smooth Rock 42H/SW), TIM - 7 targets between a junction south of Smooth Rock Falls and Timmins (map sheet Pamour 42A/NW and Smooth Rock 42H/SW). The location of all follow-up target areas is given in copies of 1:100,000 Ontario Government maps. A summary of the targets for each map sheet is also given in the Appendix. After interpretation of ground EM data, drilling was carried out at 26 locations.

During the 1988 summer field season, ground horizontal-loop EM surveys (total of 39 km) were carried out at sites which were not included in the 1987 helicopter EM survey. Unlike the follow-up surveys, the lines in most areas were more than one km long. The sites surveyed during this second phase were given names

derived from the nearest landmark: map sheet Pamour 42A/NW (Geary Road, Wilhelmina Road, Steep Lake Road), Smoky Falls 42J/SE (Little Long Rapids), Guilfoyle Lake 42G/NE (Bennet Lake Road), Timmins 42A/NE (Godfrey Lake Road). An additional test site was established at the Kam-Kotia mine near Kamiskotia, where a large amount of drilling was done in the course of a previous GSC investigation. Detailed multifrequency horizontal-loop EM and high-resolution shallow reflection seismic surveys were carried out at the site by the GSC staff (Electrical Methods Section and Terrain Geophysics Section). Geoprobe Ltd. of Mississauga contributed to the project by surveying a one-km long profile using the Maxiprobe frequency-domain EM equipment. Investigations by the Terrain Science Division in northeastern Ontario continued in summer 1988. A total number of 70 Rotasonic holes were drilled during the two field seasons. The drilling results were described in Smith and Wyatt (1988) and Smith (1990). Dr. T.J. Katsube of the Electrical Methods Section studied electrical properties of selected borehole samples in the laboratory.

During 1989 and 1990, various data processing and interpretation methods were used on experimental basis to determine the most realiable technique. Perhaps the most useful approach to interpretation of HLEM data is one based on data inversion using the EMIX-MM and EMIX-MM PLUS programs developed by Interpex Ltd. (1988,1989) of Golden, Colorado. However, experience and extreme care are required as the programs do not produce geologically

meaningful sections, if the initially selected interpretation model is incorrect. As other interpretation techniques, the inversion is highly dependent on skills of the interpreter. Two papers were published in international geophysical journals in which ideas about interpretation of HLEM in glaciated terrains were discussed (Palacky and Stephens, 1990, Palacky, 1991). Numerous examples from this project were included in both articles. In 1990, HLEM survey results included in this Open File were plotted in the final form and the locations of Rotasonic drillholes were added to the plots.

Also in 1990, portions of the helicopter EM surveys were reprocessed by Aerodat Ltd. of Mississauga using inversion techniques. Two inversion routines were used in the reprocessing, one based on the generalized inversion, the other on centroid depth calculations (Sengpiel, 1988). Results in the final form were delivered by the contractor in summer of 1990. The findings were reported by Palacky, Holladay and Walker (1990).

3. Multifrequency Horizontal-Loop Electromagnetic Surveys

The MaxMin I is the latest of the multifrequency ground EM systems designed and manufactured by APEX Parametrics Ltd. of Uxbridge, Ontario. Surveys with the system can be carried out in five modes, but in our study only MAX 1 (horizontal-loop mode) was used. The transmitter-receiver separation can be changed for fixed distances between 12.5 and 400 m. After completion of field tests at the Val Gagné site we opted for a constant coil separation of 100 m in all surveys.

The operating frequencies of the MaxMin I system are 110, 220, 440, 880, 1760, 3520, 7040, and 14080 Hz. In order to obtain a sufficient number of data points for inversion, all available frequencies were used. In mineral exploration programs, the measurements of in-phase and quadrature components are usually performed at only 2 or 3 frequencies; the results are plotted as one graph for two components at a given frequency. In the presentation used in this report (see Appendix), the in-phase and quadrature data were plotted separately showing all frequencies in the same graph.

During the field surveys, the distance between the stations was measured using a metallic tape. The correct distance between the transmitter and the receiver (100 m) was checked before each

sequence of readings by stretching the connecting cable. The average error in the coil distance did not exceed 30 cm. Most survey lines were located in flat areas, where topographic corrections were not necessary. In those few areas where the topography was undulating, corrections were made using procedures recommended in the instrument manual. All field data were recorded using a hand-held computer KTP-84, which is manufactured by Rautaruukki Oy of Oulu, Finland. After each survey, at least once a day, raw data were dumped onto a Compaq 386/20 computer and the results plotted on an HP plotter. After a quality check, the HLEM data were saved on diskettes. Lines were resurveyed, if quality of the data did not meet our standards.

Preliminary interpretation of the HLEM results was done in the field. Responses due to bedrock conductors (massive sulphides, graphitic layers) and shear zones were identified. In areas free of bedrock inhomogeneities, HLEM responses were analyzed using the model of multiple layers. At selected stations, the measurements were interpreted with the aid of phasor diagrams (Eadie, 1979). Using the EMIX-MM program (Interpex, 1988) for a 2-layer model, the EM data were inverted to obtain resistivity and thickness values along the whole profile. Subsequently, recommendations were made for drilling. More detailed interpretation using 3- and 4-layer models was done in 1989 and 1990; the drilling results were used to constrain the inversion and to gain an insight into the limitations of the technique.

4. Concluding Remarks

In this Open File, HLEM data obtained with the APEX MaxMin I instrument are released for all transect measurements, which were carried out as a follow-up of helicopter EM surveys. In order to maintain consistence in labelling with the airborne data, the original transect codes were kept and letters were added for ground EM profiles; e.g., KAP-1A designates Kapuskasing transect (KAP), its southernmost segment (1) and the first follow-up profile from the south (A).

In addition to 70 targets which resulted from the interpretation of helicopter EM data and which were surveyed in 1987, additional surveys performed in 1988 are included in this Open File: Geary Road (3 profiles), Wilhelmina Road (2 profiles), Steep Lake Road (1 profile), Bennet Lake Road (5 profiles), and Little Long Rapids (8 profiles). HLEM data from the Val Gagné and Kamiskotia test sites will be subject to a separate release.

In the Appendix the survey areas are grouped according to their location in the 1:100,000 map sheets published by the Ontario Government. The first page in each segment gives a listing of all HLEM profiles. It is followed by copies of 1:100,000 maps showing the location of survey lines. Plots of in-phase and quadrature responses for 8 frequencies and the locations of Rotasonic

drillholes described in Smith (1990) are given on subsequent pages.

Conductors of three types have been detected in the course of this survey: horizontal layers (Quaternary sediments), highly conductive subvertical conductors (massive sulphide or graphitic sediments), and poorly conductive shear zones. The characteristics of MaxMin responses over the three conductor types are explained in Palacky (1989).

The aim of the survey was to investigate conductors of the first type (accumulations of Quaternary sediments). Resistivity of upper layers, which can be estimated from the MaxMin data, depends on lithology. Therefore, in areas where layering is not too complex, it is possible to determine Quaternary lithology from the EM response. The three sediment types most frequently encountered in the survey area have the following resistivities and standard deviations: clay 47.3 ± 6.7 Ω.m, till 122.8 ± 35.5 Ω.m, and sand 251 ± 70 Ω.m. These values were obtained by inversion of MaxMin data and correlation with the results of drilling at selected sites. A determination of sediment resistivities was also done in the laboratory by T.J.Katsube. More details about HLEM interpretation and resistivity determinations can be found in Palacky and Stephens (1990). The methodology of HLEM interpretation using inversion for 2-, 3- and 4-layer models was explained in Palacky (1991).

Acknowledgements

The cooperation of Dr. J.A.M. Hunter, Dr. S.E. Pullan, and S.L. Smith of the Terrain Science Division, Dr. T.J. Katsube and Dr. J. Mwenifumbo of the Mineral Resources Division, all of the Geological Survey of Canada, and R.B. Barlow of the Ontario Geological Survey is gratefully acknowledged. G.R. Bernius and S. Birk of the Mineral Resources Division and student assistants J. Allison, M. Eising and S. Ratté took part in ground electromagnetic surveys and data interpretation. The coauthor L.E. Stephens passed away tragically in May 1989.

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A P P E N D I X

SHEET 42A/NW (PAMOUR)

Timmins (6 profiles 1000 m long)

TIM-1A, TIM-1B, TIM-1C, TIM-2A, TIM-2B, TIM-2C

Smooth Rock Falls

SRF-1A, SRF-1B, SRF-2A (1600 m long)

SRF-2B, SRF-2C, SRF-3A (1000 m long)

Geary Road

GR-1 (2000 m long, 2 plots)

GR-2 (2000 m long, 2 plots)

GR-3 (2800 m long, 2 plots)

Wilhelmina Road

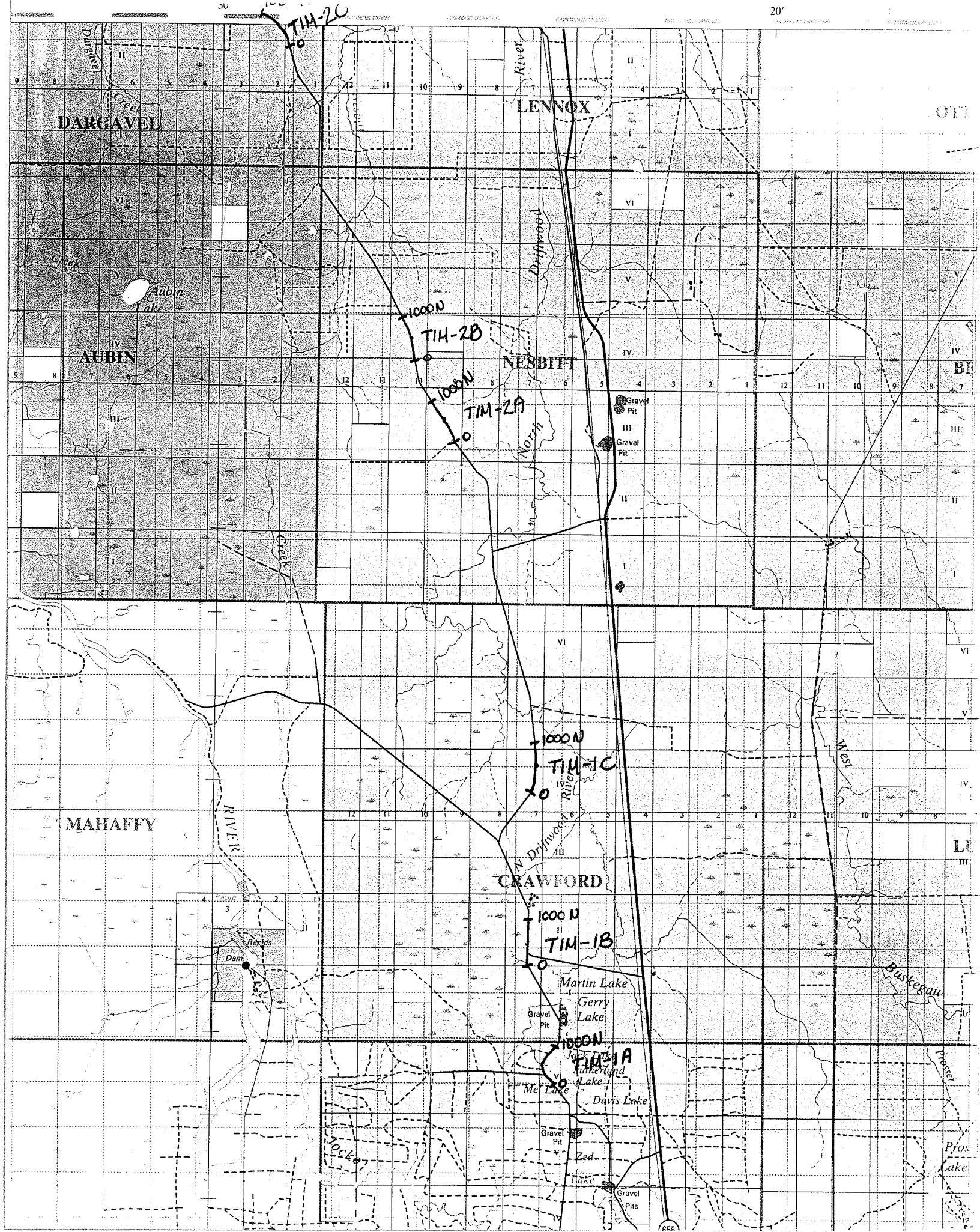
WR-1 (1000 m long)

WR-2 (1600 m long)

Steep Lake Road

SL-1 (1200 m long)

Total for the sheet 24,400 m.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Dargavel
Creek
LENNOX
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1000N
TIM-2A
North
Gravel
Pit
Gravel
Pit
Creek
1000N
TIM-1C
MAHAFFY
RIVER
N. Driftwood
River
West
CRAWFORD
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TIM-1B
Rapids
Dam
Martin Lake
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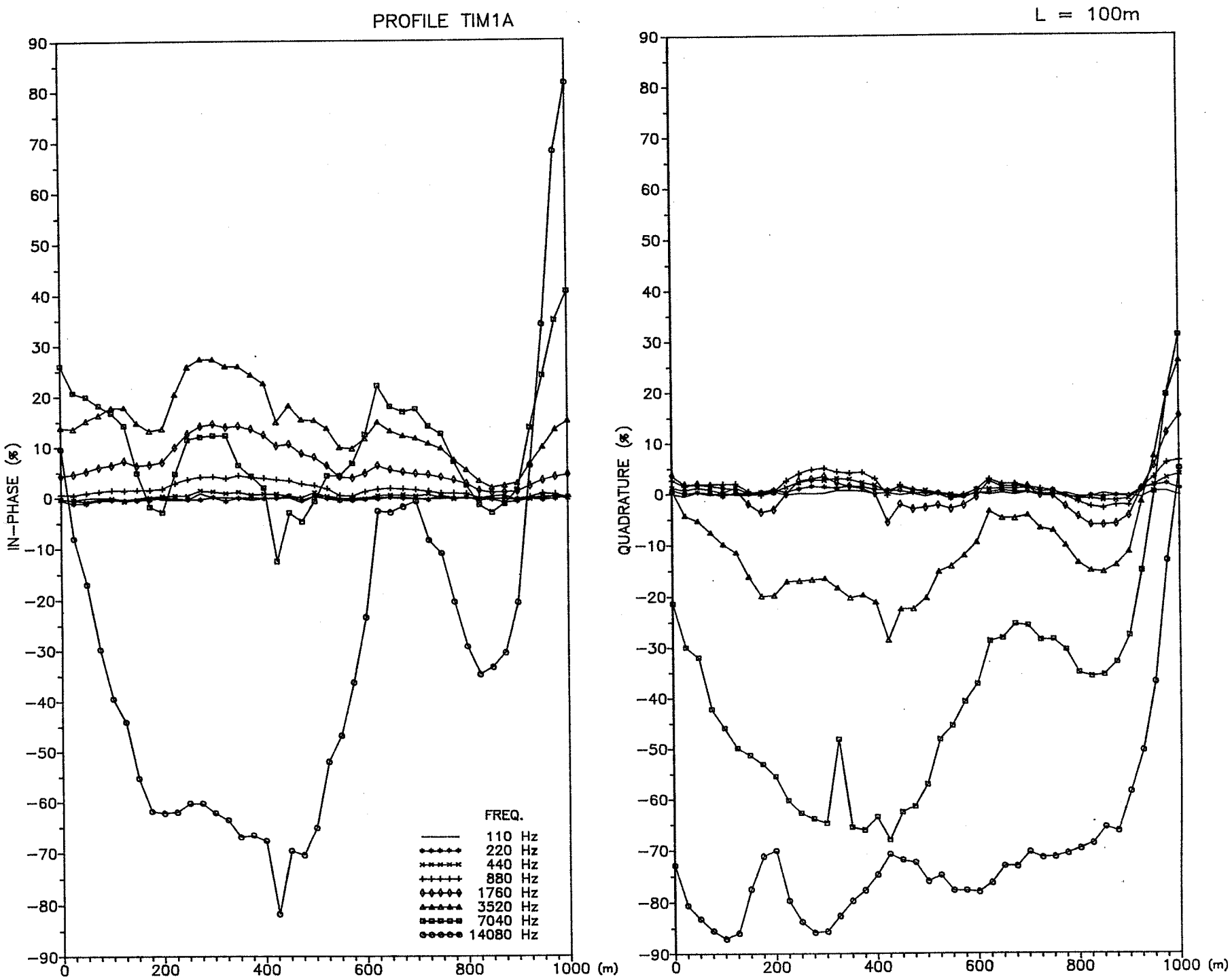
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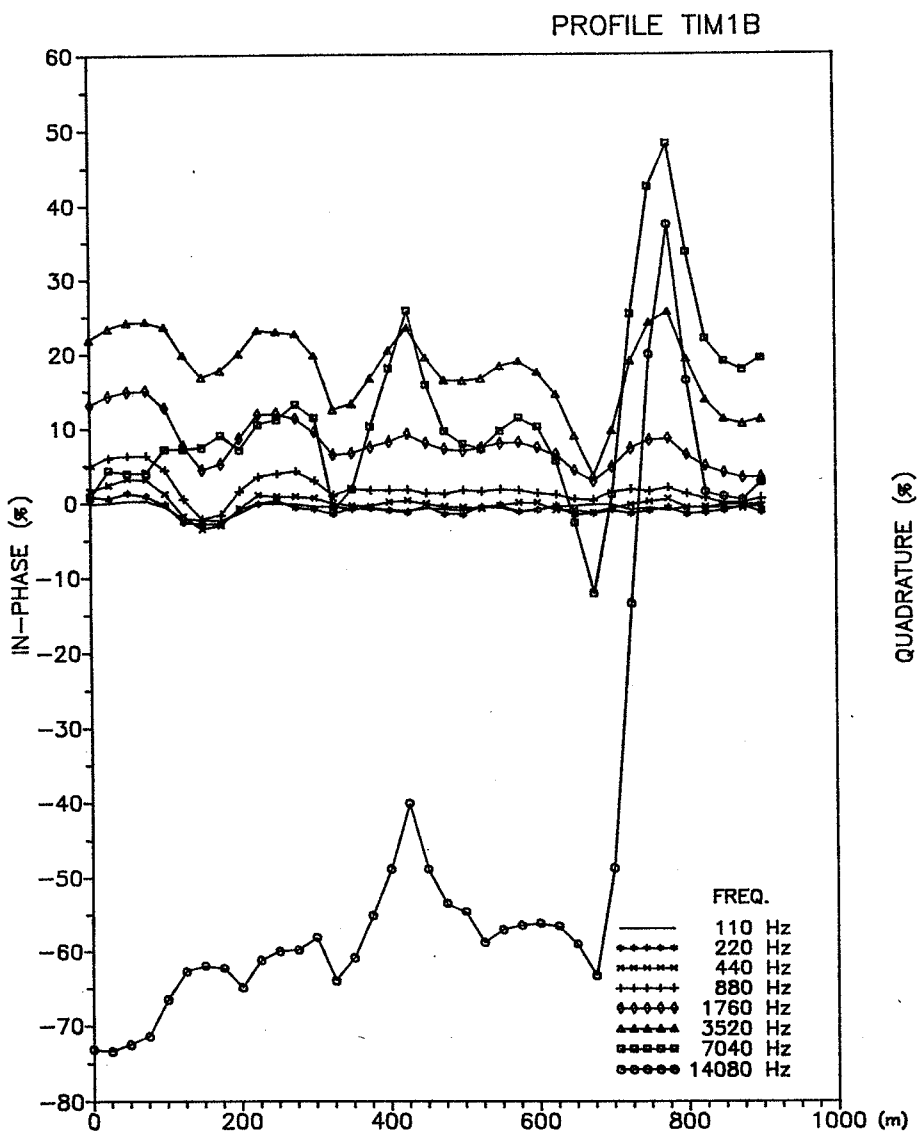
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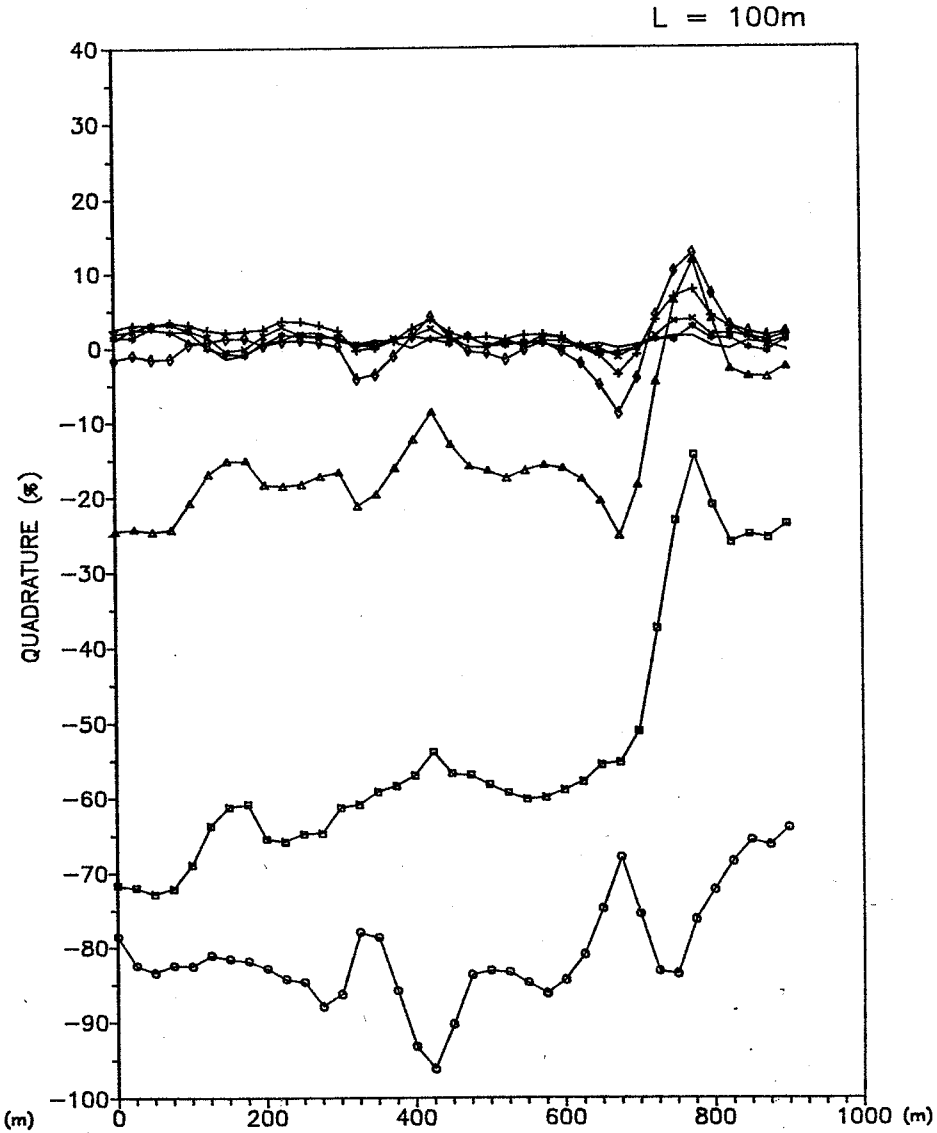
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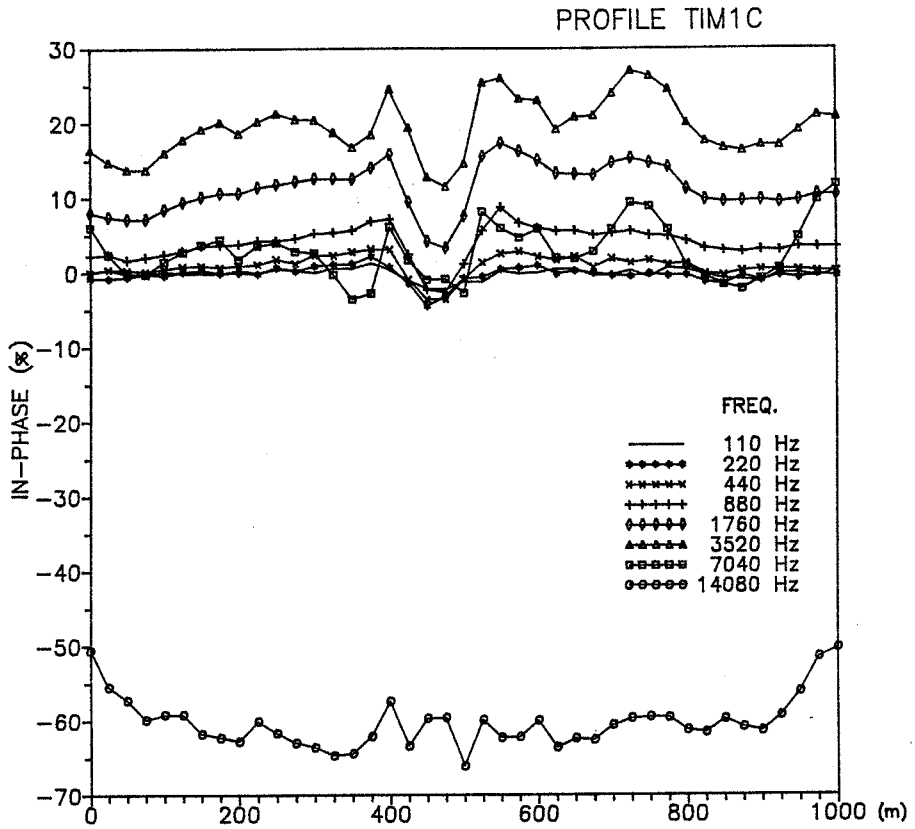
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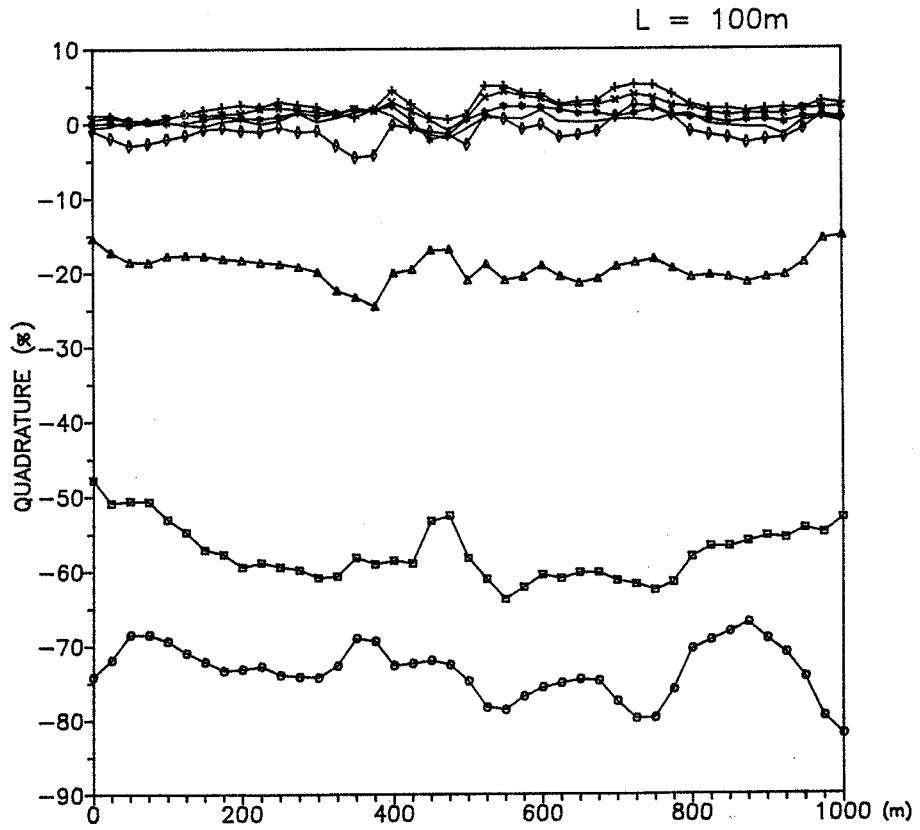
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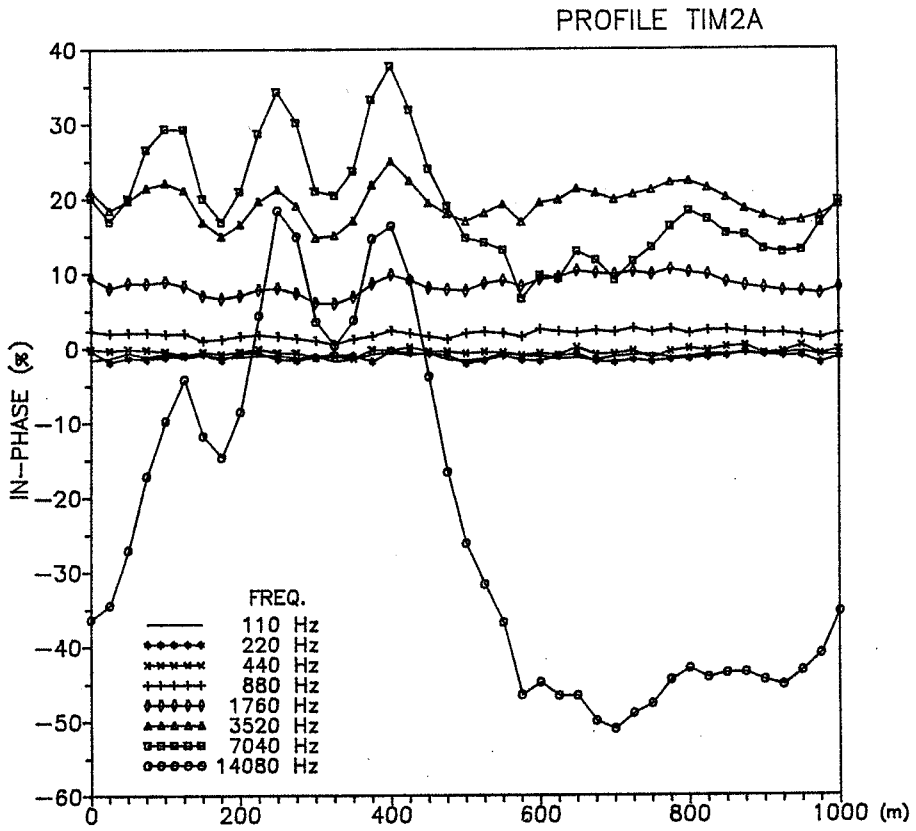
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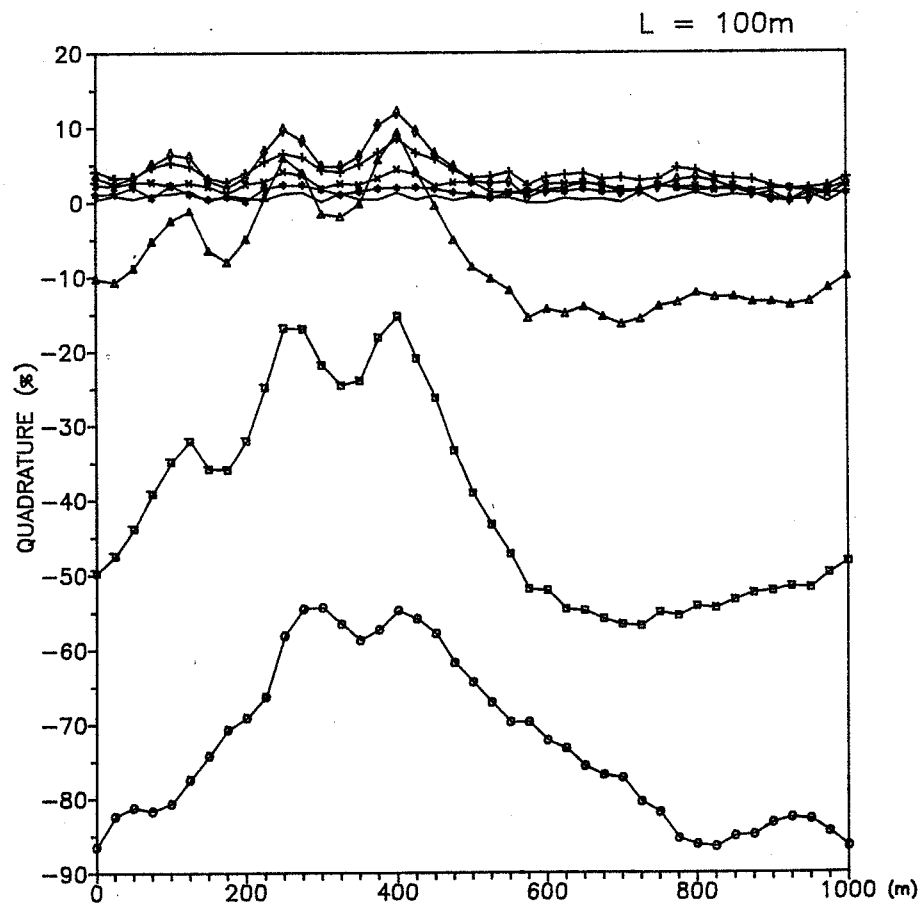
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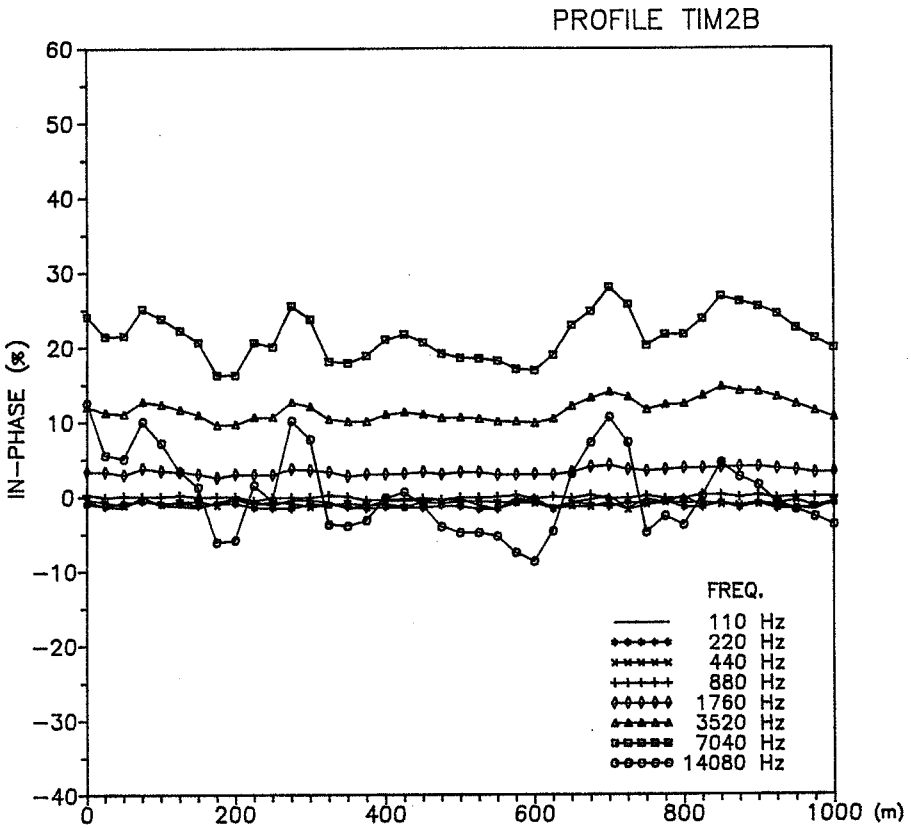
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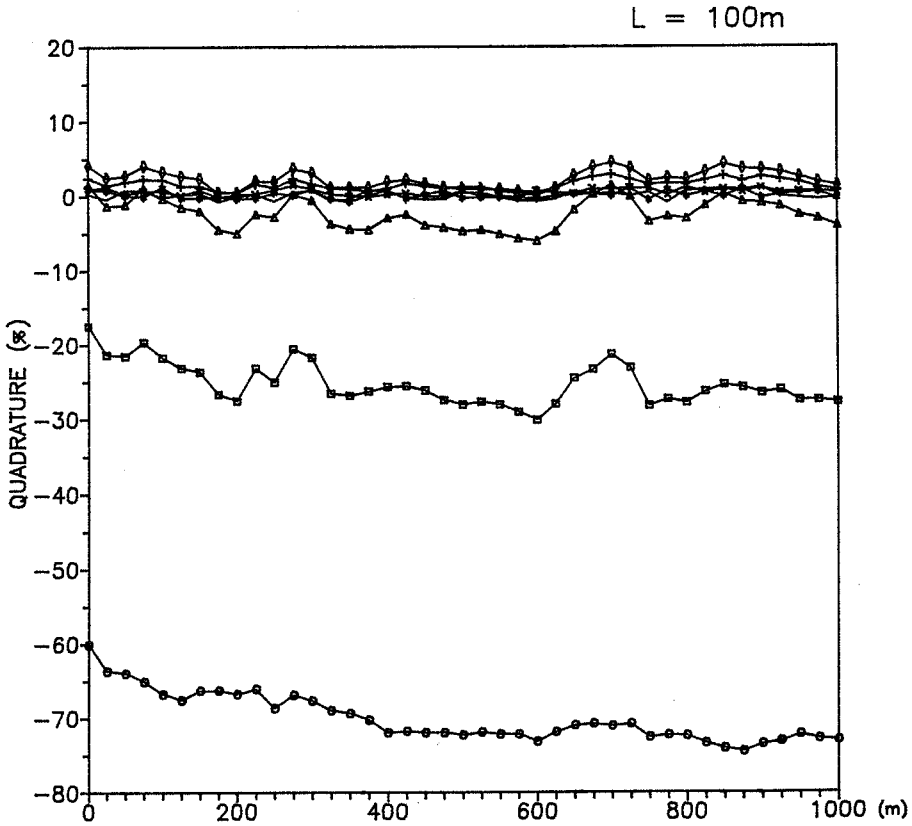
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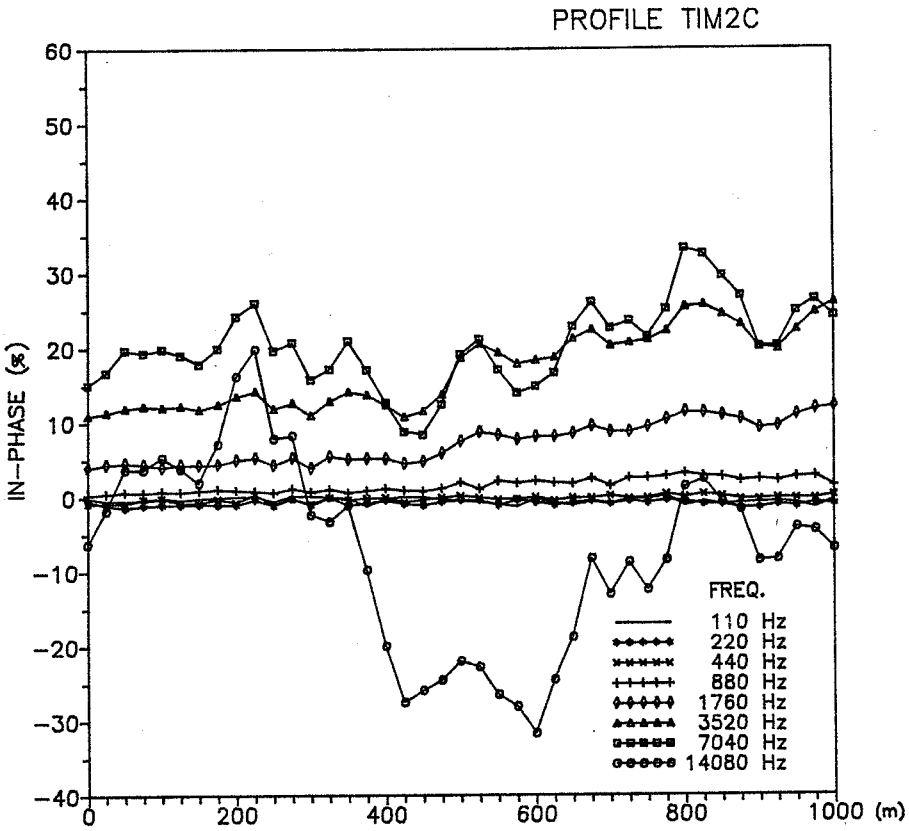
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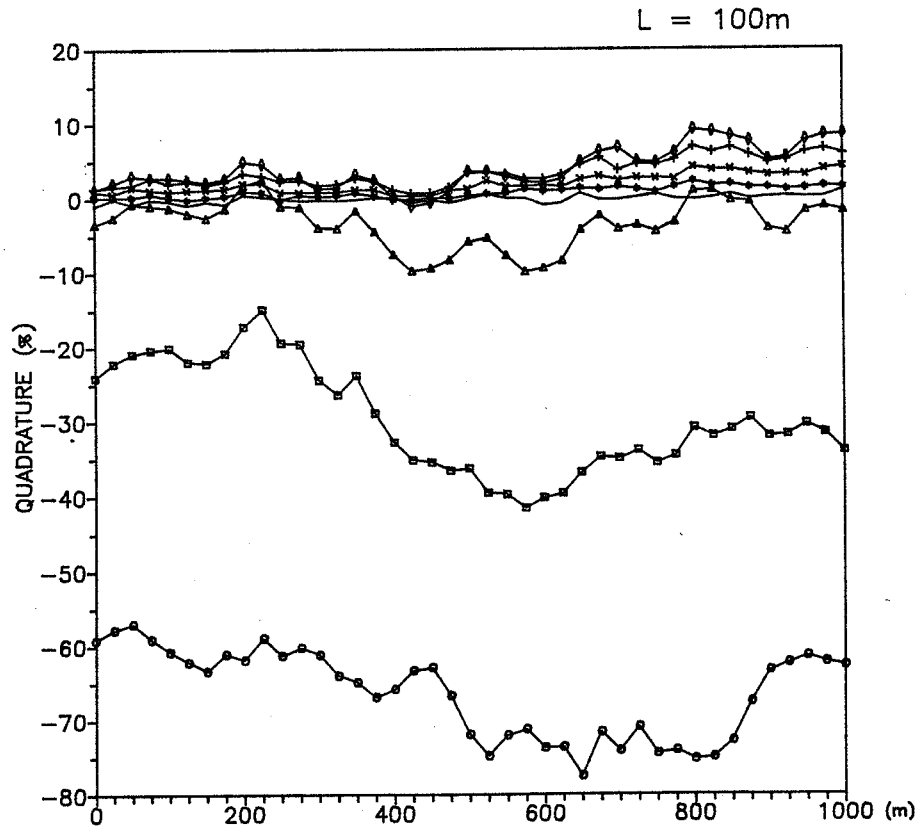
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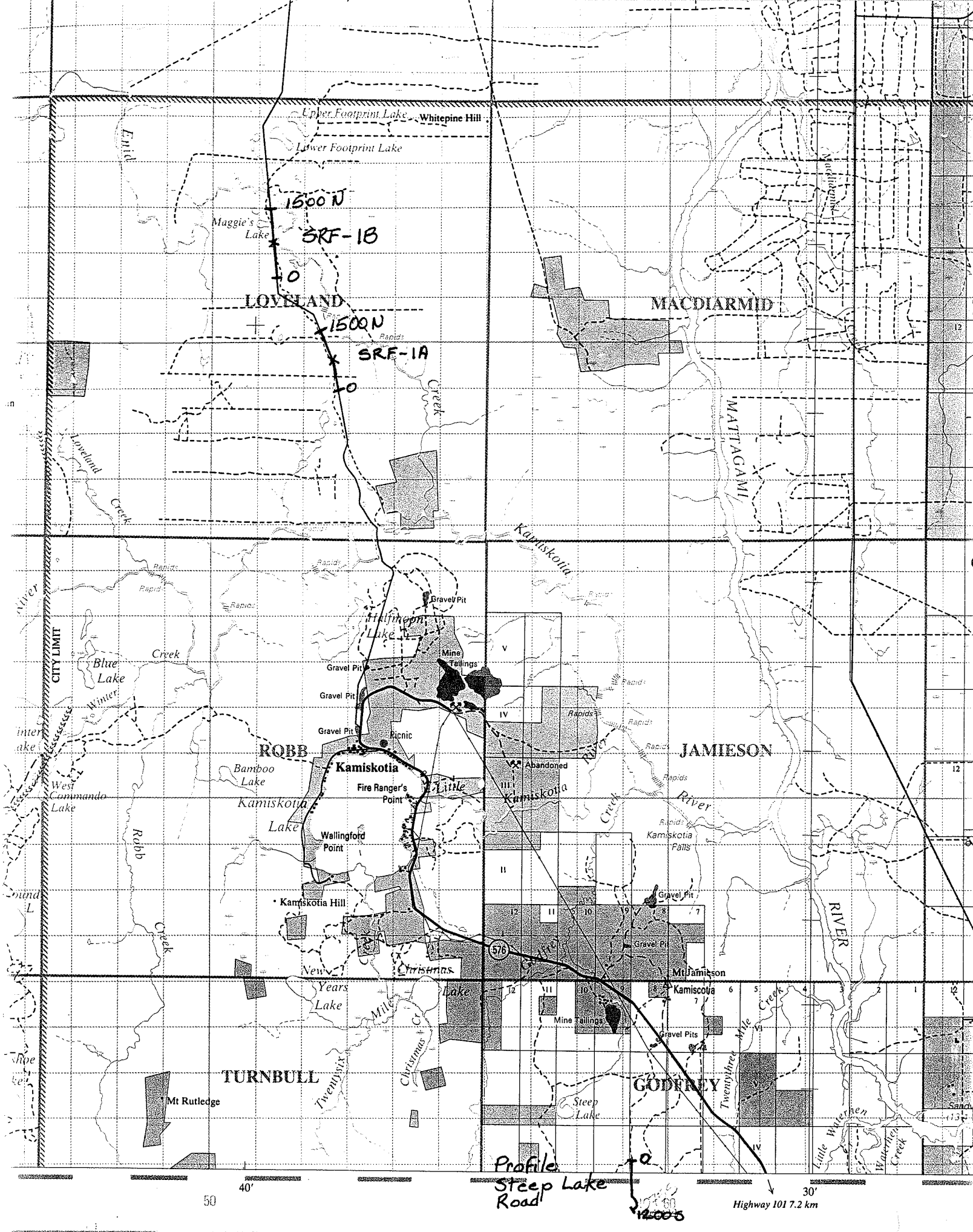
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MATTAGAMI
Kamiskotia
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Halfmoon Lake
Mine Tailings
Gravel Pit
Gravel Pit
Gravel Pit
Picnic
CITY LIMIT
Blue Lake
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ROBB
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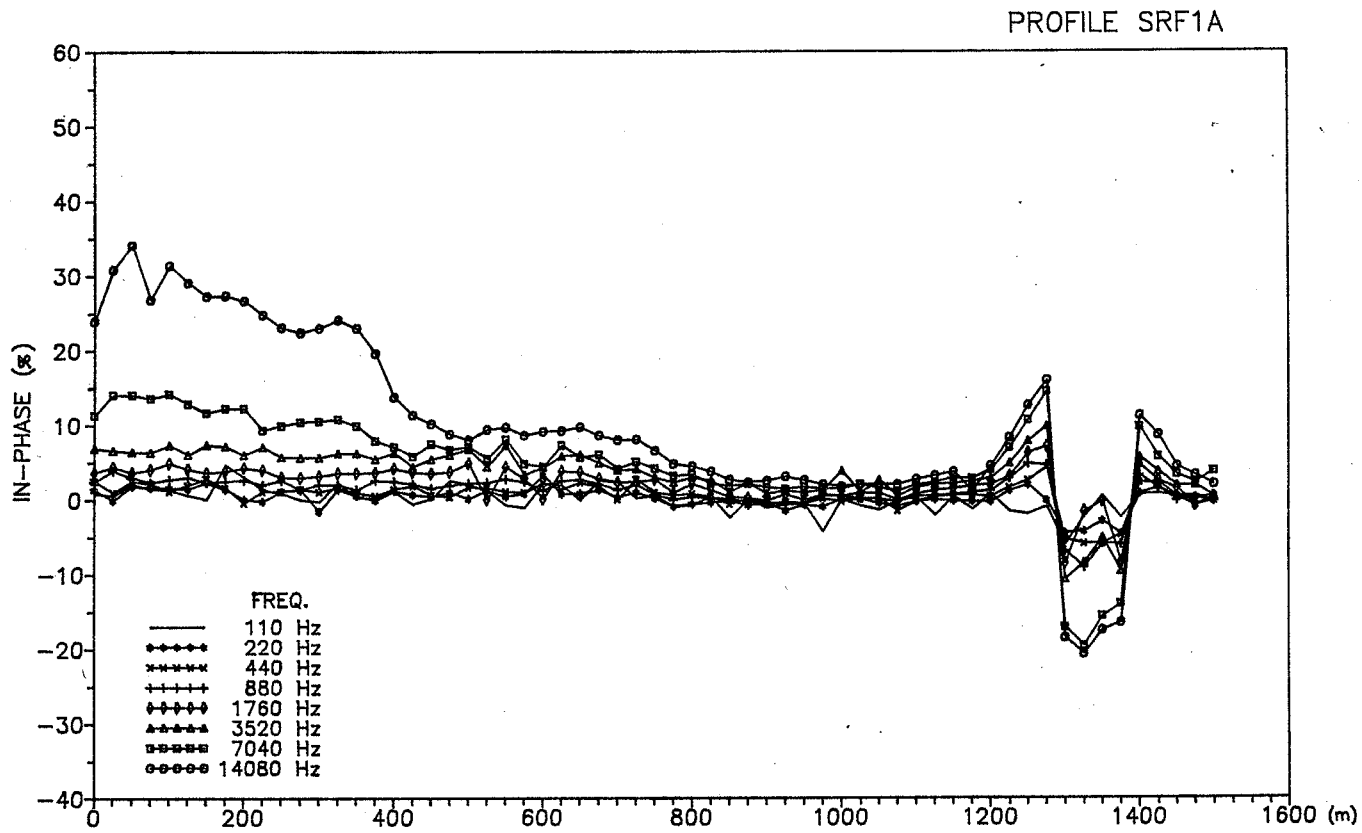
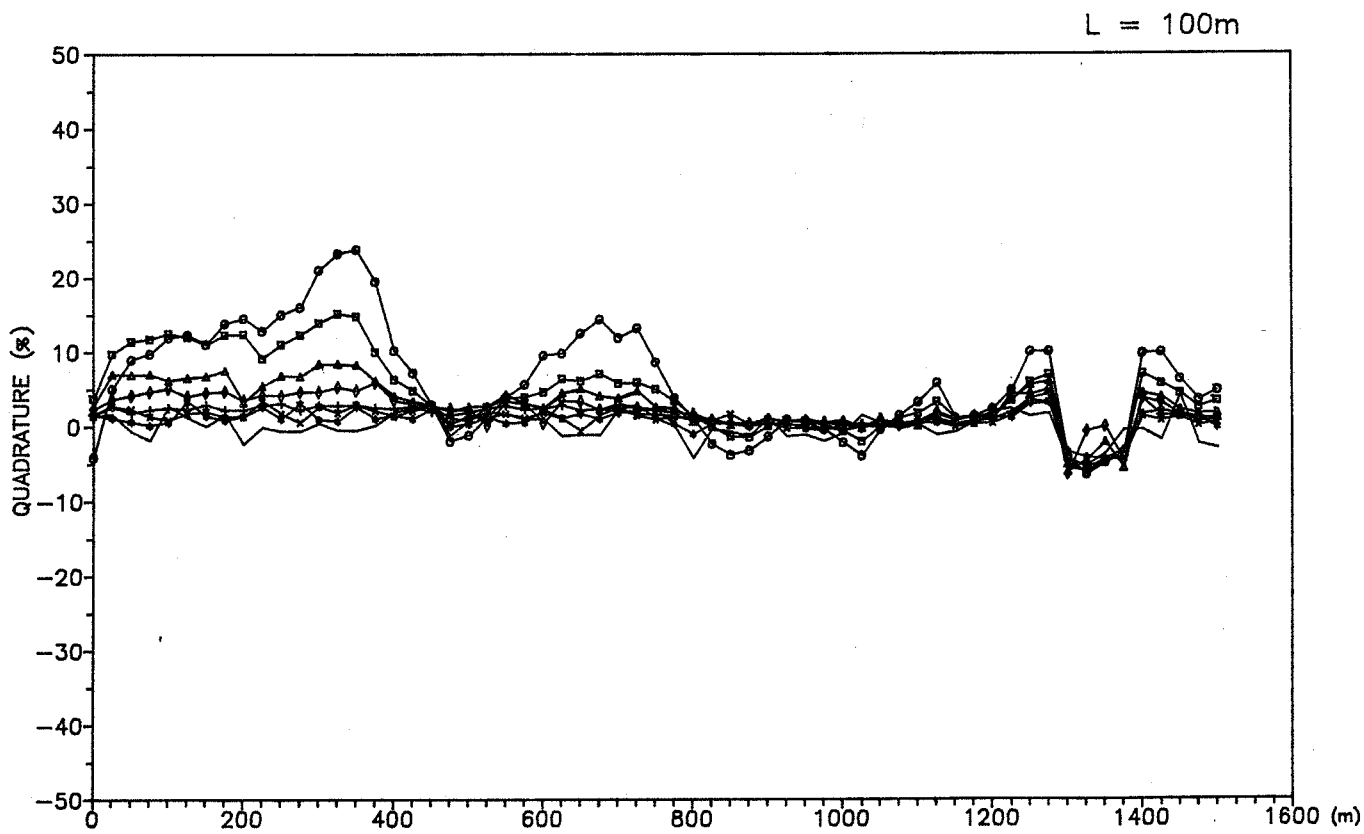
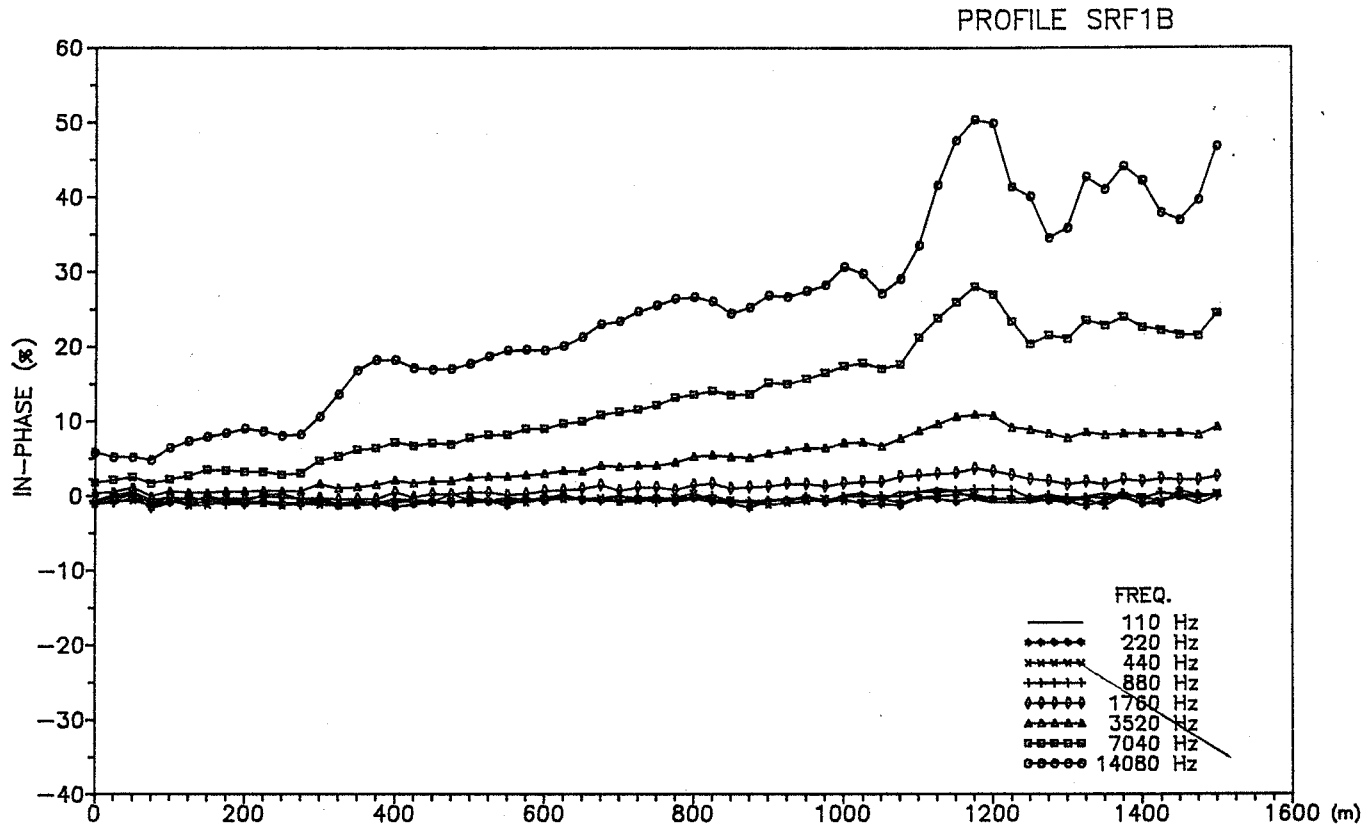
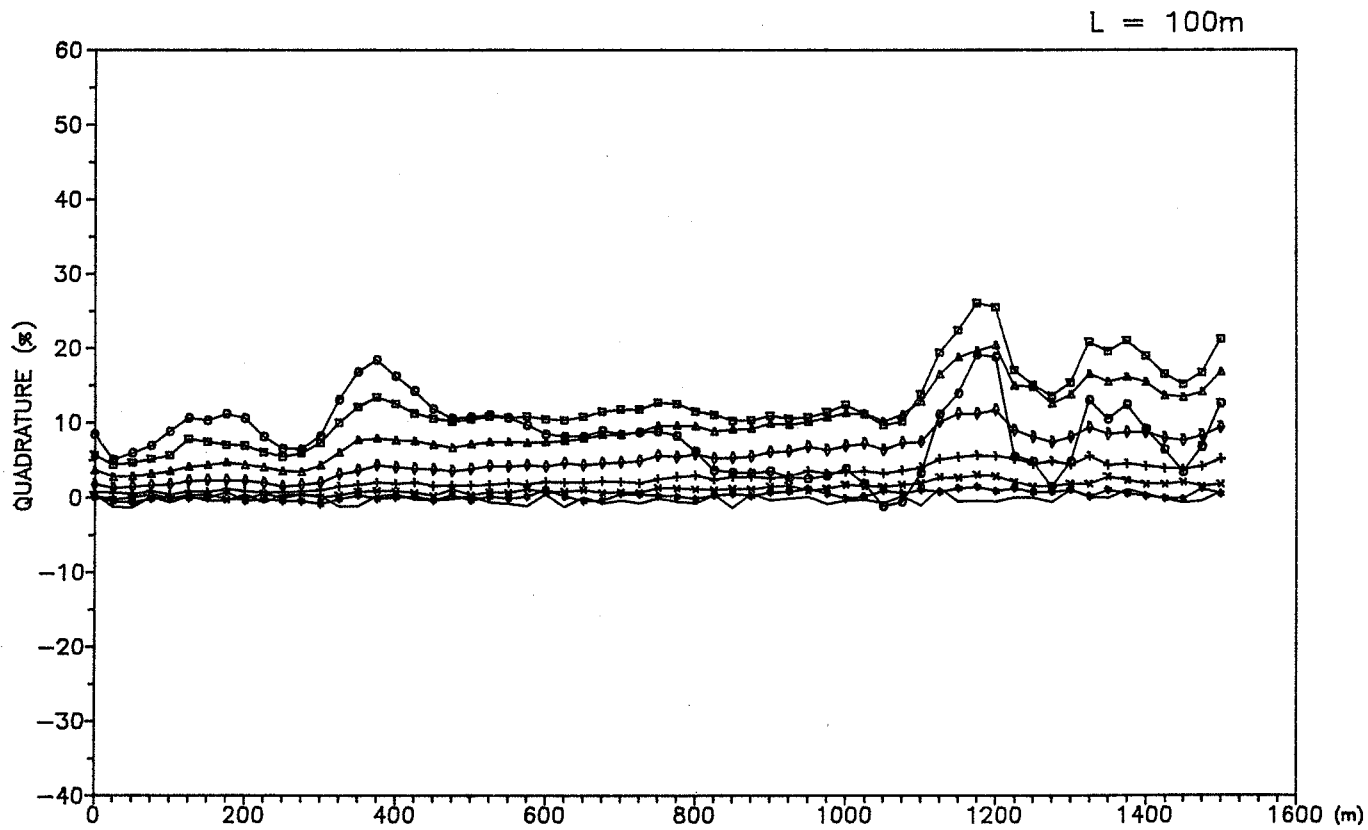
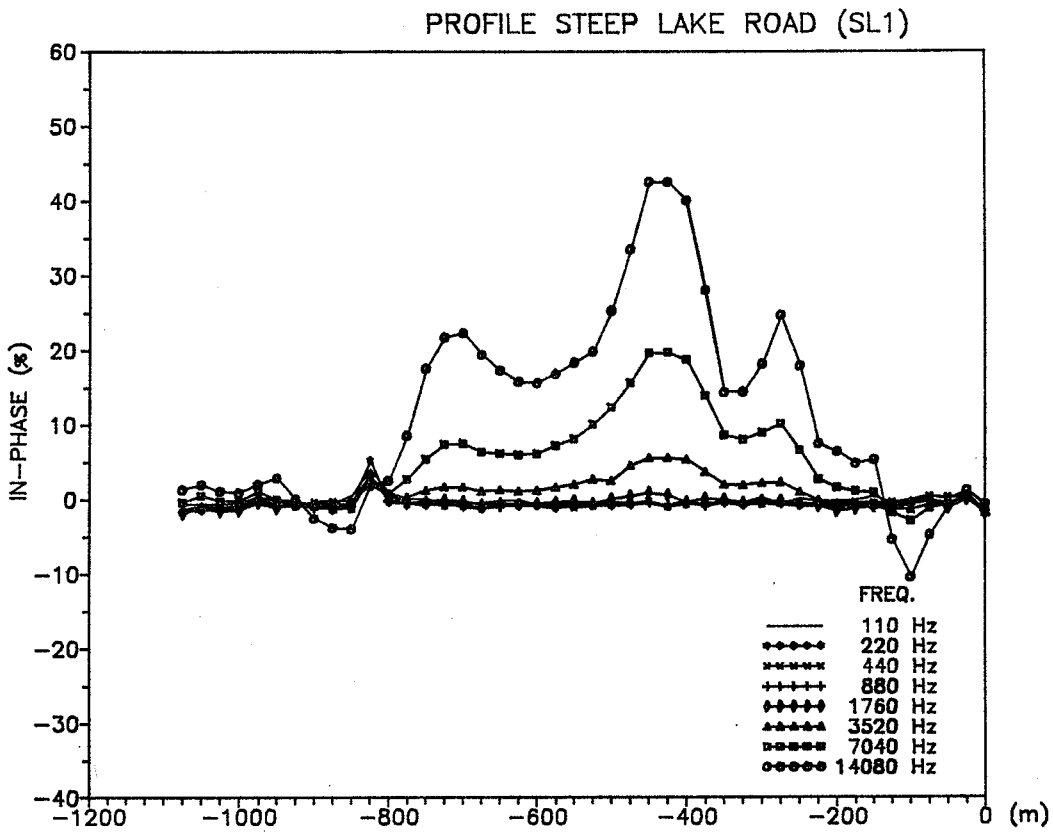
Kamiskotia
Abandoned
JAMIESON
West Commando Lake
Kamiskotia Lake
Wallingford Point
Robb
Creek
Kamiskotia Falls
River
Kamiskotia Hill
Gravel Pit
Gravel Pit
576
RIVER
New Years Lake
Christmas Lake
Mt Jamieson
Kamiscotia
Mile
Mine Tailings
Gravel Pits
Twentysix
Christmas Cr
TURNBULL
Mt Rutledge
GODFREY
Twentythree
Mile Creek
Steep Lake
Little Waterhen
Waterhen Creek
Profile
Steep Lake Road
0
40'
30'
Highway 101 7.2 km

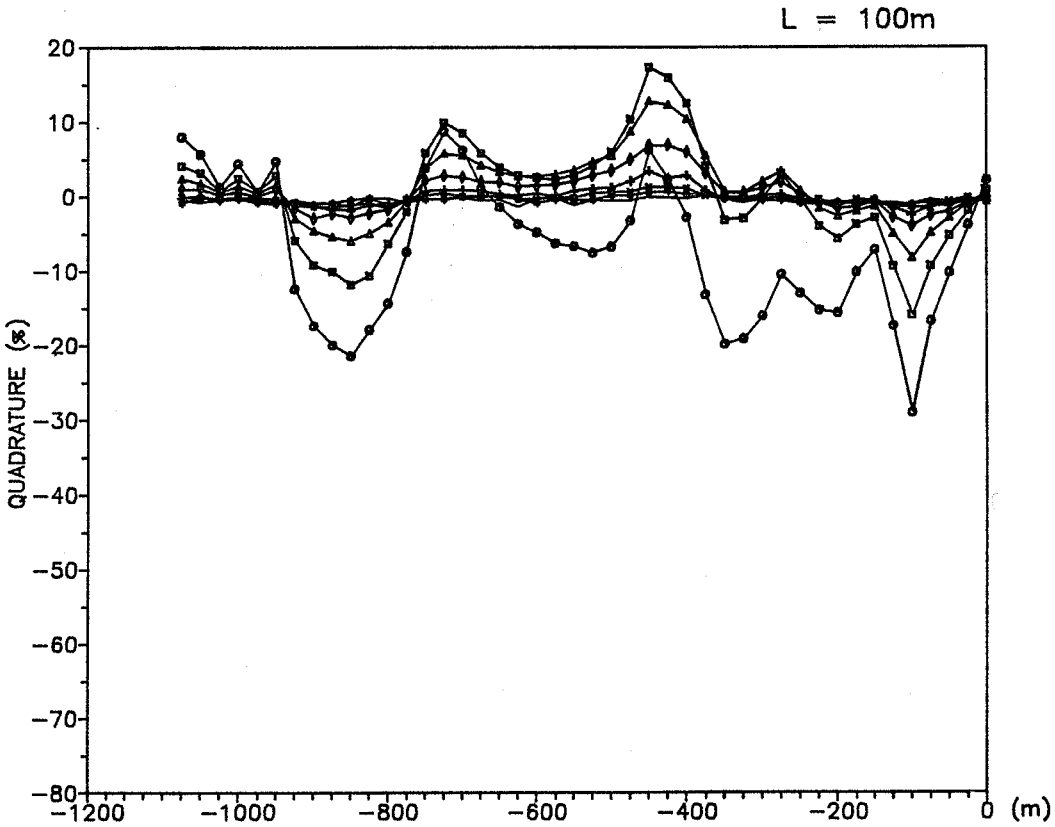

PROFILE SRF1A
IN-PHASE (%)
60
50
40
30
20
10
0
-10
-20
-30
-40
0
200
400
600
800
1000
1200
1400
1600 (m)
FREQ.
110 Hz
220 Hz
440 Hz
880 Hz
1760 Hz
3520 Hz
7040 Hz
14080 Hz

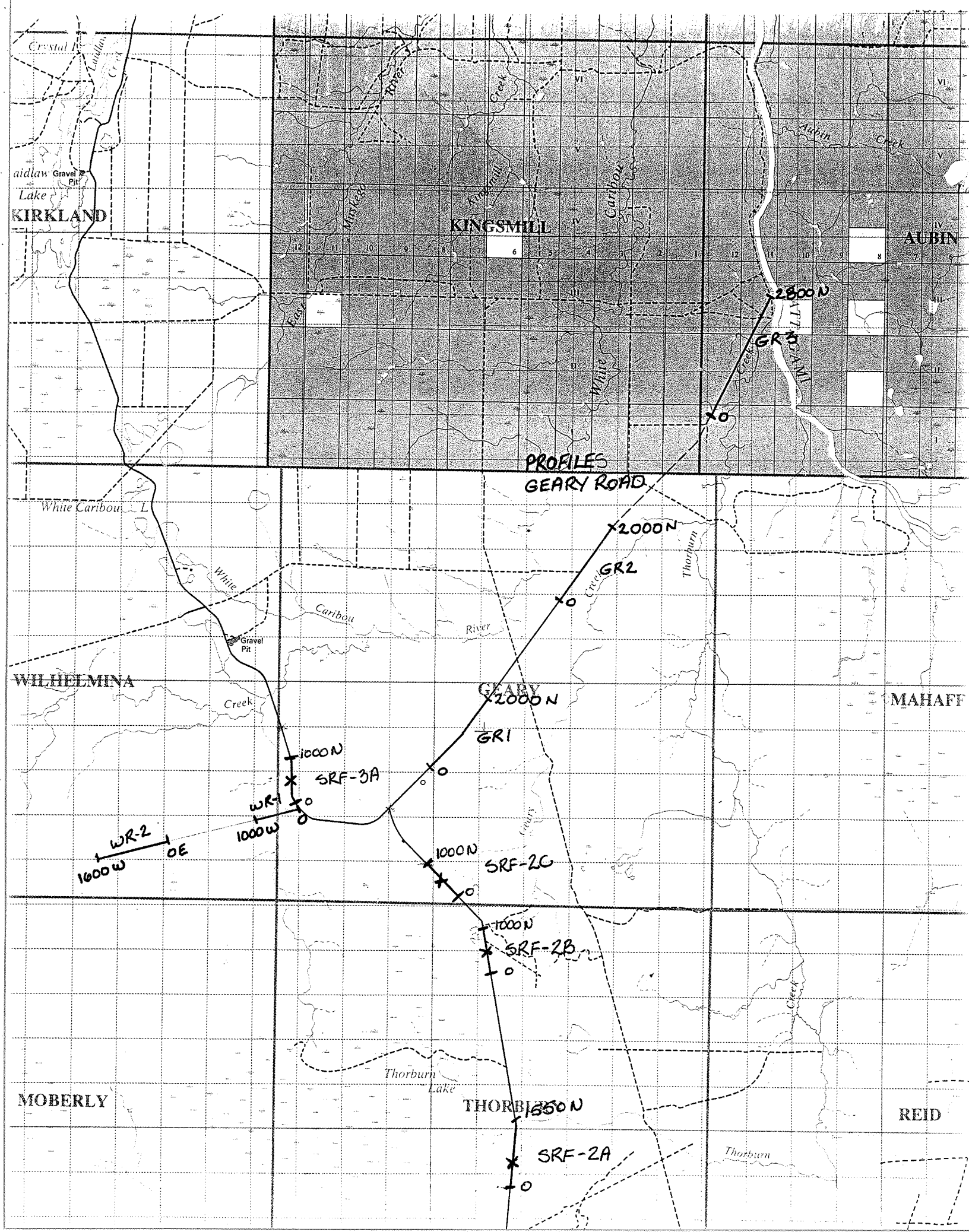

L = 100m
QUADRATURE (%)
50
40
30
20
10
0
-10
-20
-30
-40
-50
0
200
400
600
800
1000
1200
1400
1600 (m)

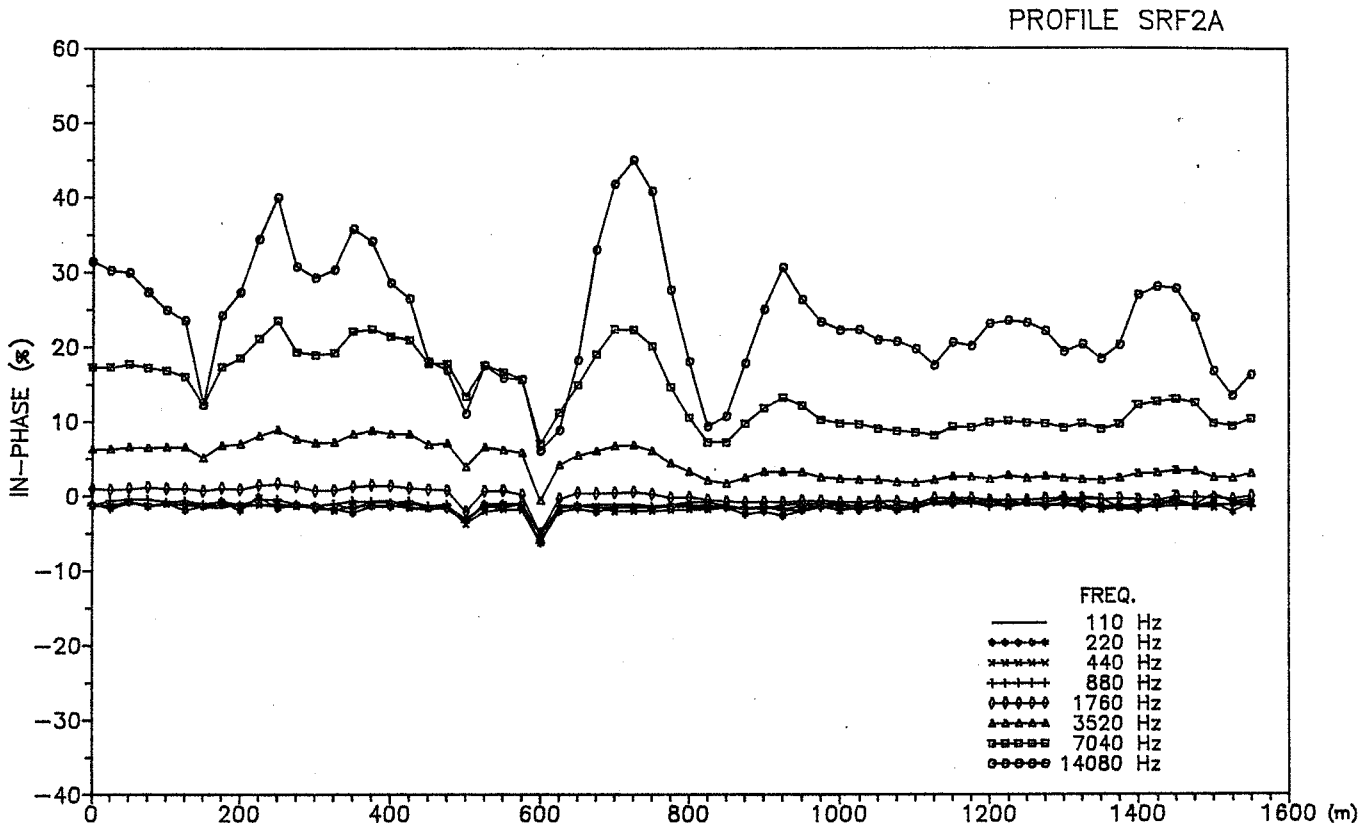

PROFILE SRF1B
IN-PHASE (%)
60
50
40
30
20
10
0
-10
-20
-30
-40
0
200
400
600
800
1000
1200
1400
1600 (m)
FREQ.
110 Hz
220 Hz
440 Hz
880 Hz
1760 Hz
3520 Hz
7040 Hz
14080 Hz

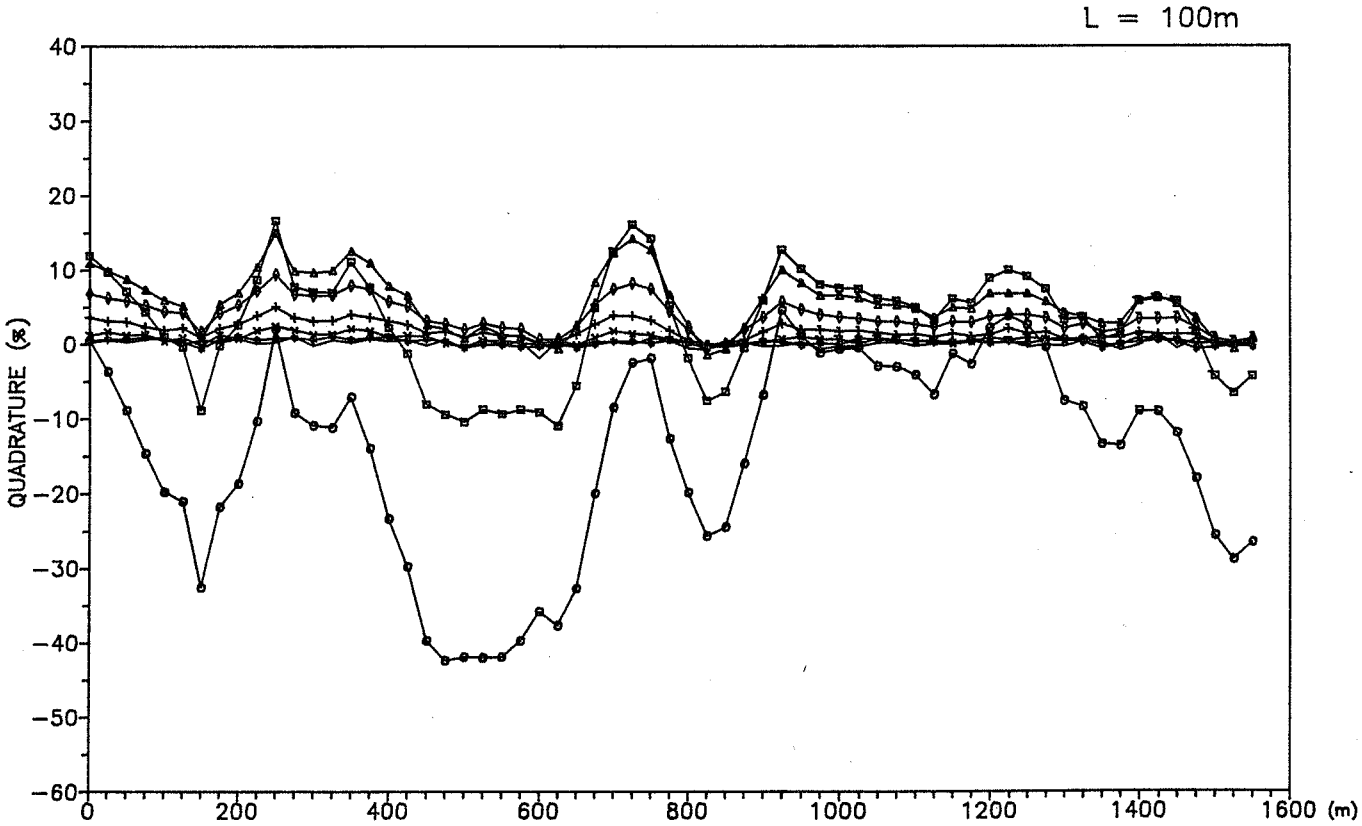

L = 100m
QUADRATURE (%)
60
50
40
30
20
10
0
-10
-20
-30
-40
0
200
400
600
800
1000
1200
1400
1600 (m)

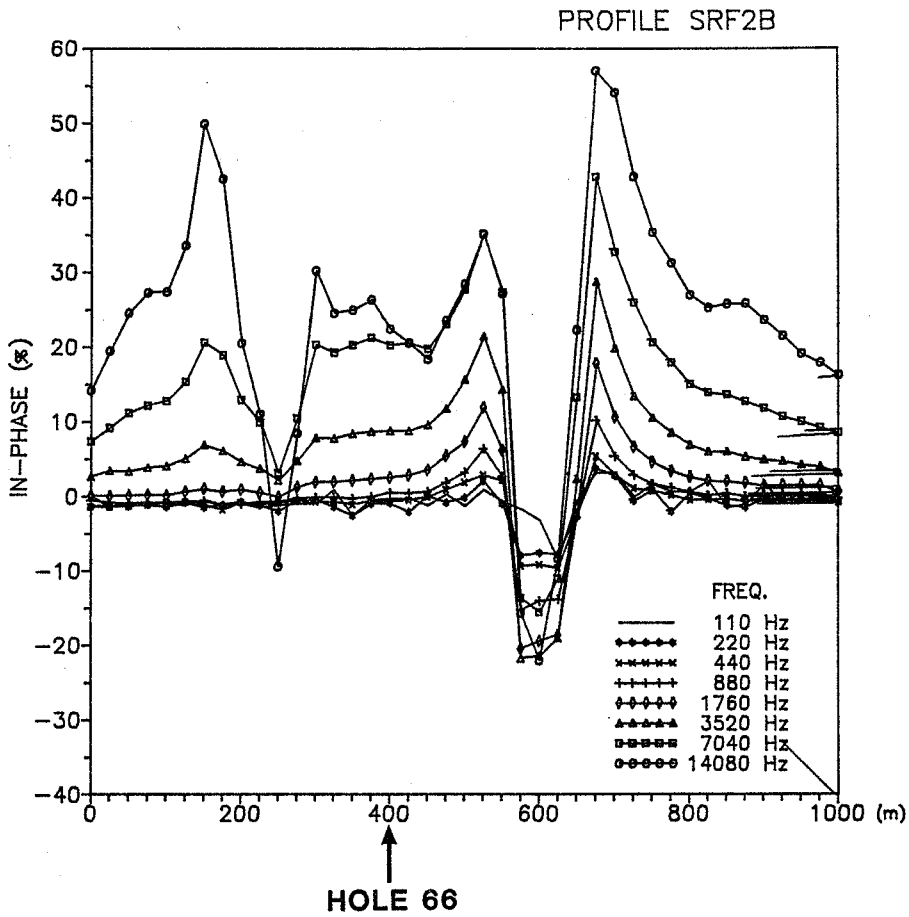

PROFILE STEEP LAKE ROAD (SL1)
IN-PHASE (%)
60
50
40
30
20
10
0
-10
-20
-30
-40
-1200
-1000
-800
-600
-400
-200
0
(m)
FREQ.
110 Hz
220 Hz
440 Hz
880 Hz
1760 Hz
3520 Hz
7040 Hz
14080 Hz

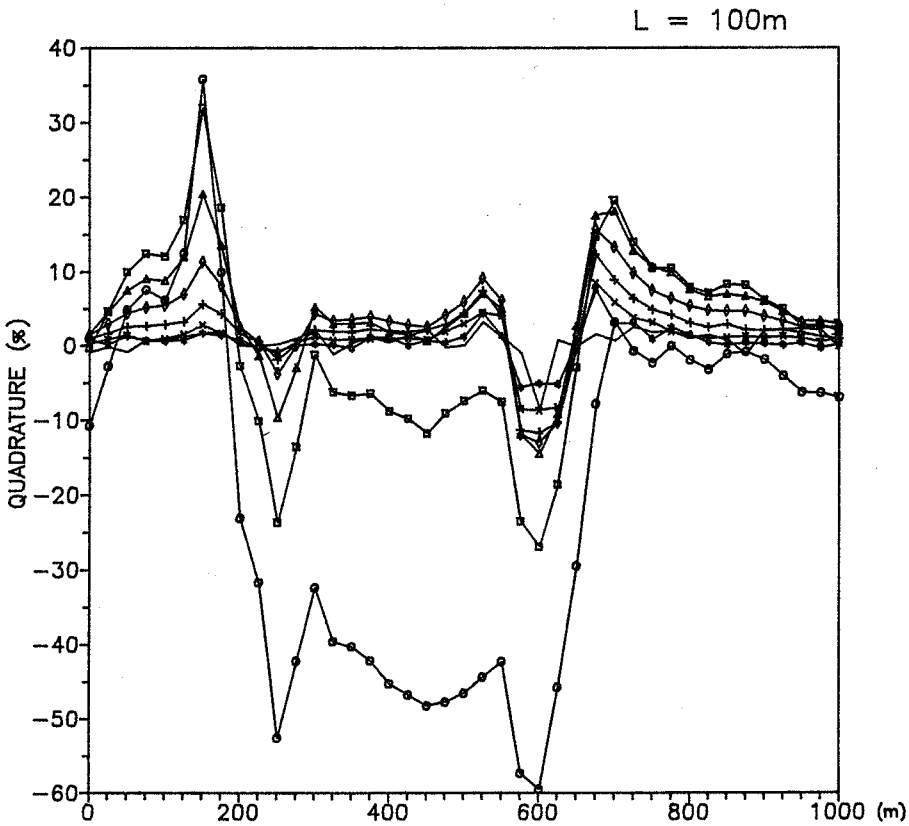

L = 100m
QUADRATURE (%)
20
10
0
-10
-20
-30
-40
-50
-60
-70
-80
-1200
-1000
-800
-600
-400
-200
0
(m)

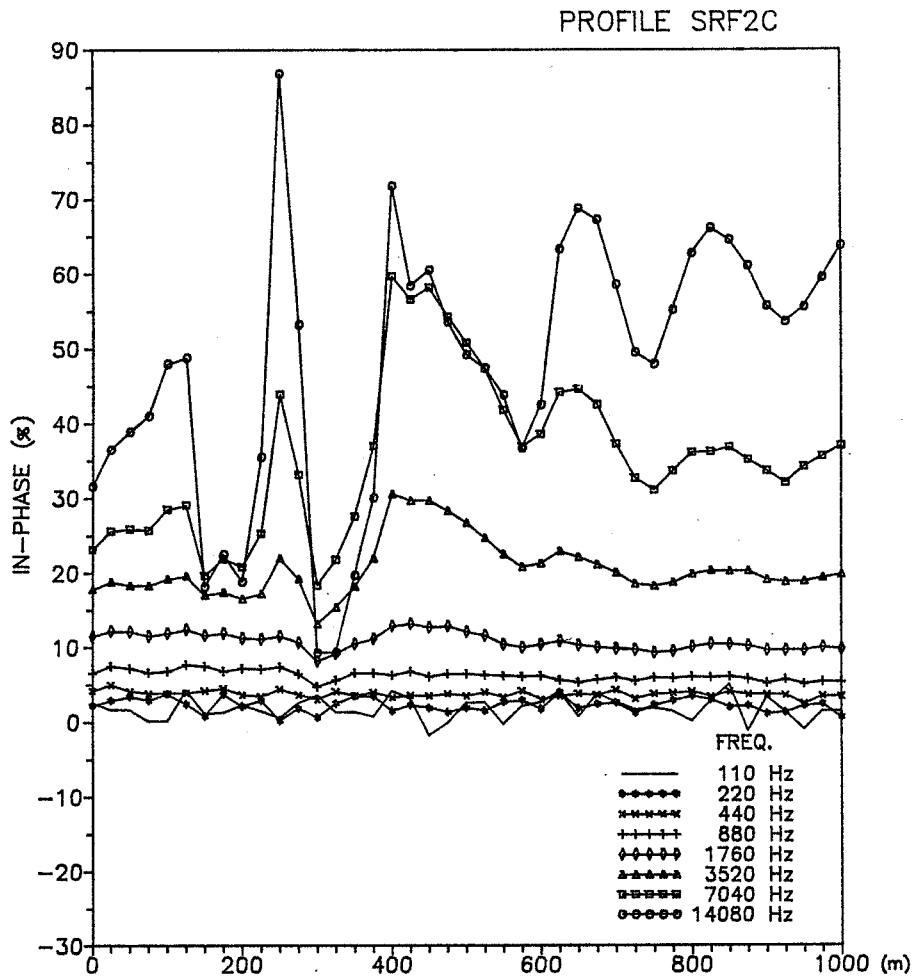

PROFILES
GEARY ROAD
KIRKLAND
KINGSMILL
AUBIN
WILHELMINA
GEARY
MAHAFF
MOBERLY
THORBURN
REID
Gravel Pit
White Caribou L.
White Caribou River
Thorburn Lake
Thorburn Creek
Aubin Creek
Kingsmill Creek
Musseau River
Caribou River
Geary Creek
2800 N
GR
2000 N
GR2
2000 N
GR1
1000 N
SRF-3A
WR-1
1000 W
WR-2
1600 W
0E
1000 N
SRF-2C
1000 N
SRF-2B
1550 N
SRF-2A

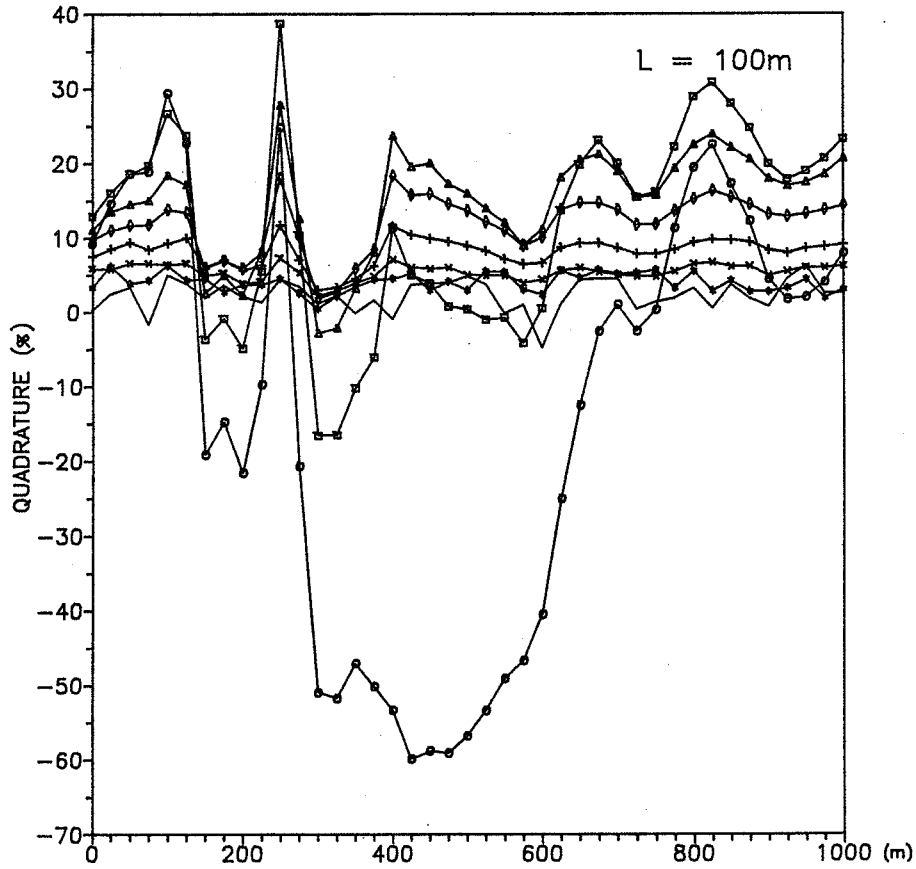

PROFILE SRF2A
IN-PHASE (%)
60
50
40
30
20
10
0
-10
-20
-30
-40
0
200
400
600
800
1000
1200
1400
1600 (m)
FREQ.
110 Hz
220 Hz
440 Hz
880 Hz
1760 Hz
3520 Hz
7040 Hz
14080 Hz

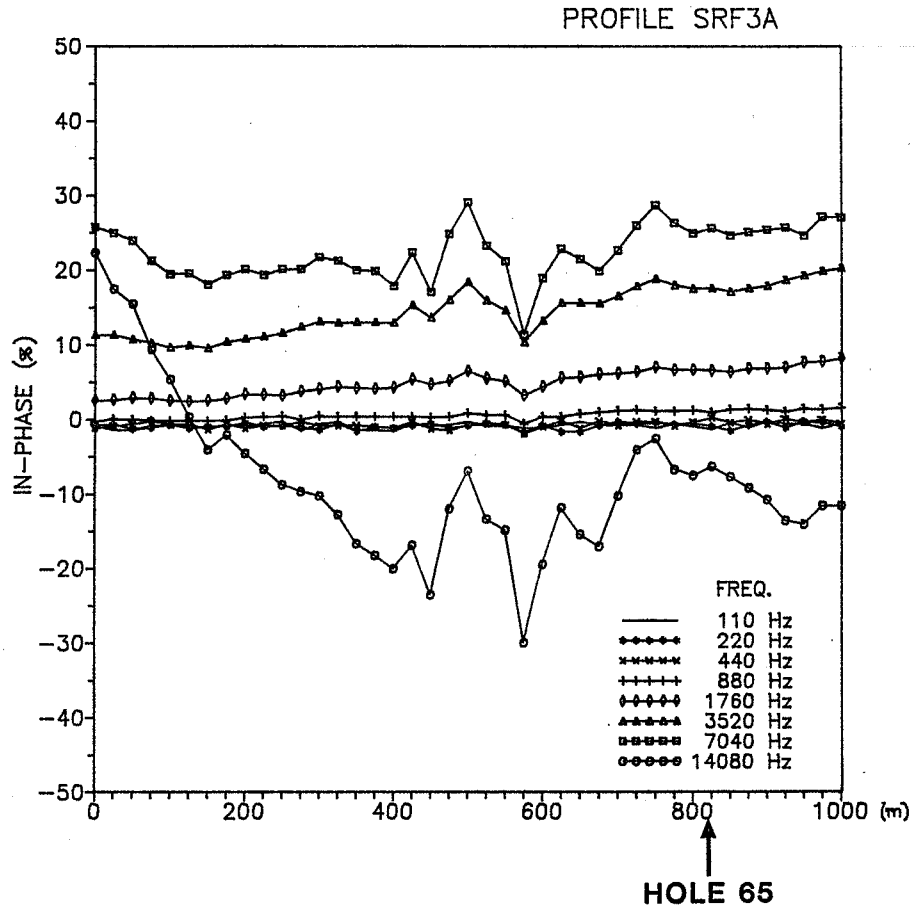

L = 100m
QUADRATURE (%)
40
30
20
10
0
-10
-20
-30
-40
-50
-60
0
200
400
600
800
1000
1200
1400
1600 (m)

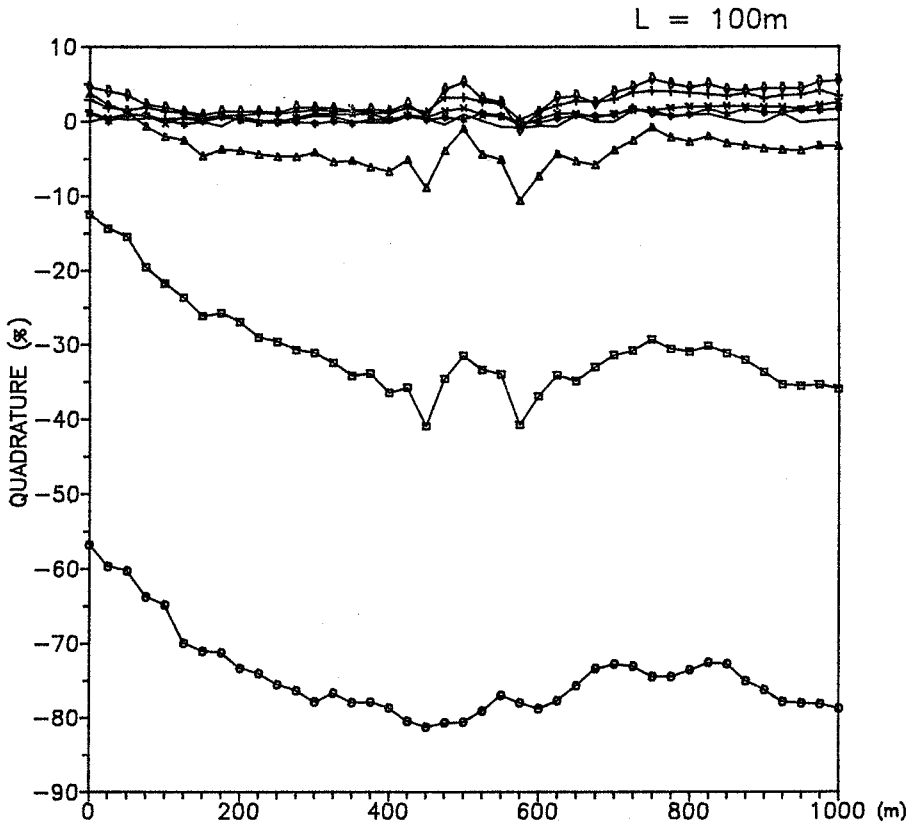

PROFILE SRF2B
IN-PHASE (%)
60
50
40
30
20
10
0
-10
-20
-30
-40
0
200
400
600
800
1000 (m)
FREQ.
110 Hz
220 Hz
440 Hz
880 Hz
1760 Hz
3520 Hz
7040 Hz
14080 Hz
HOLE 66

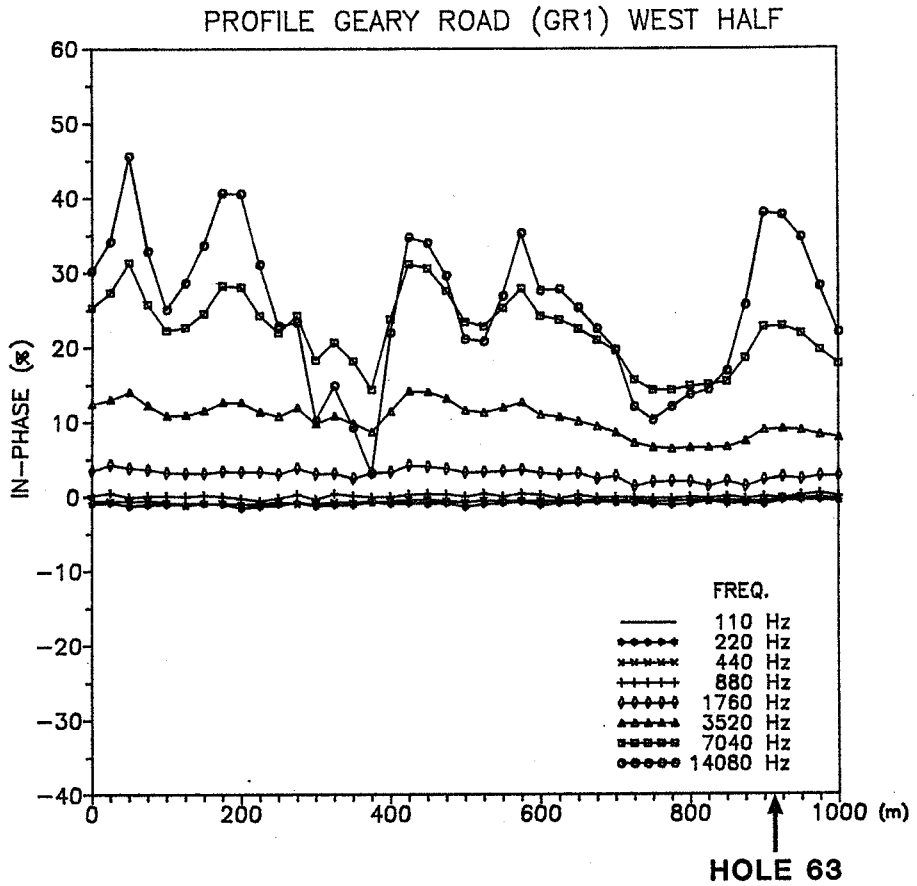

L = 100m
QUADRATURE (%)
40
30
20
10
0
-10
-20
-30
-40
-50
-60
0
200
400
600
800
1000 (m)

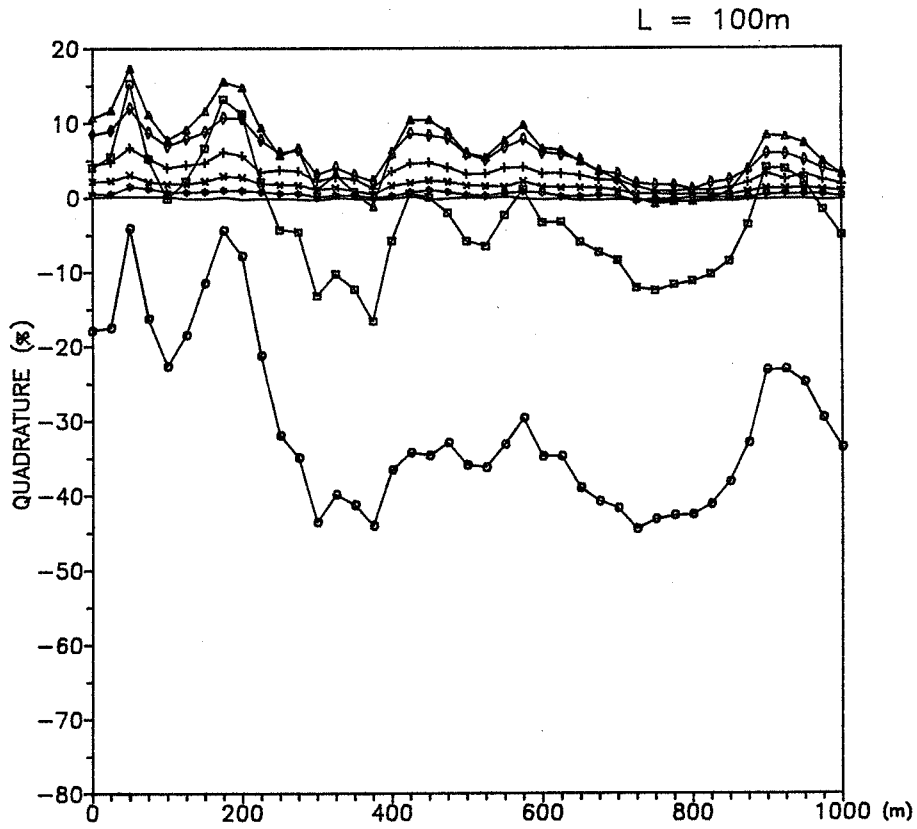

PROFILE SRF2C
IN-PHASE (%)
90
80
70
60
50
40
30
20
10
0
-10
-20
-30
0
200
400
600
800
1000 (m)
FREQ.
110 Hz
220 Hz
440 Hz
880 Hz
1760 Hz
3520 Hz
7040 Hz
14080 Hz

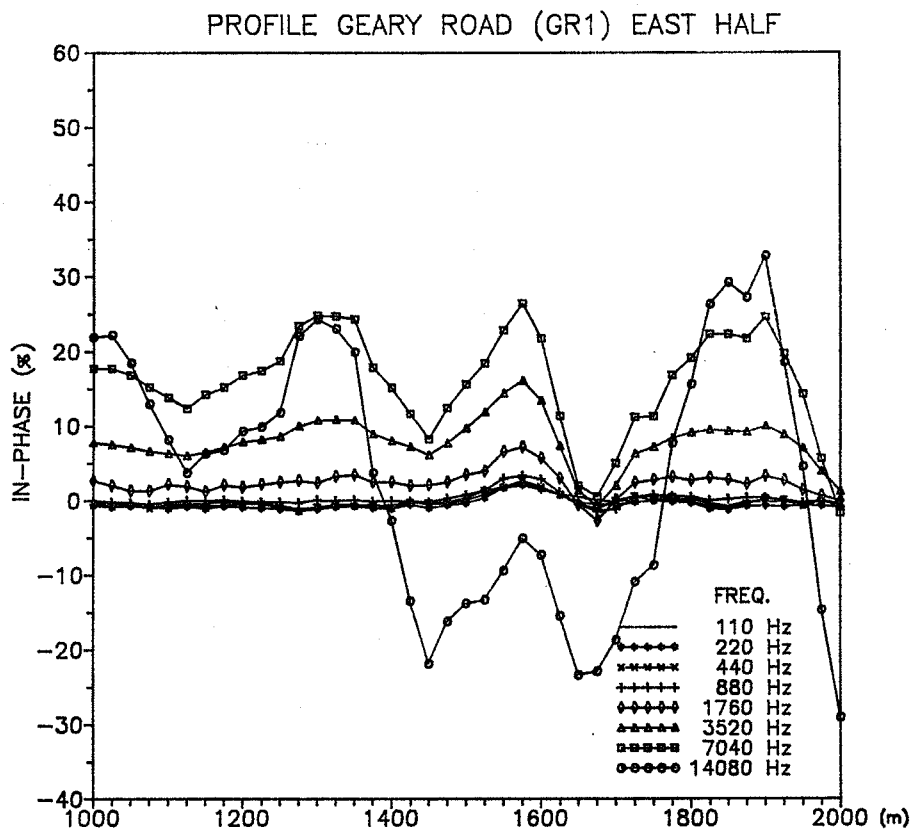

L = 100m
QUADRATURE (%)
40
30
20
10
0
-10
-20
-30
-40
-50
-60
-70
0
200
400
600
800
1000 (m)

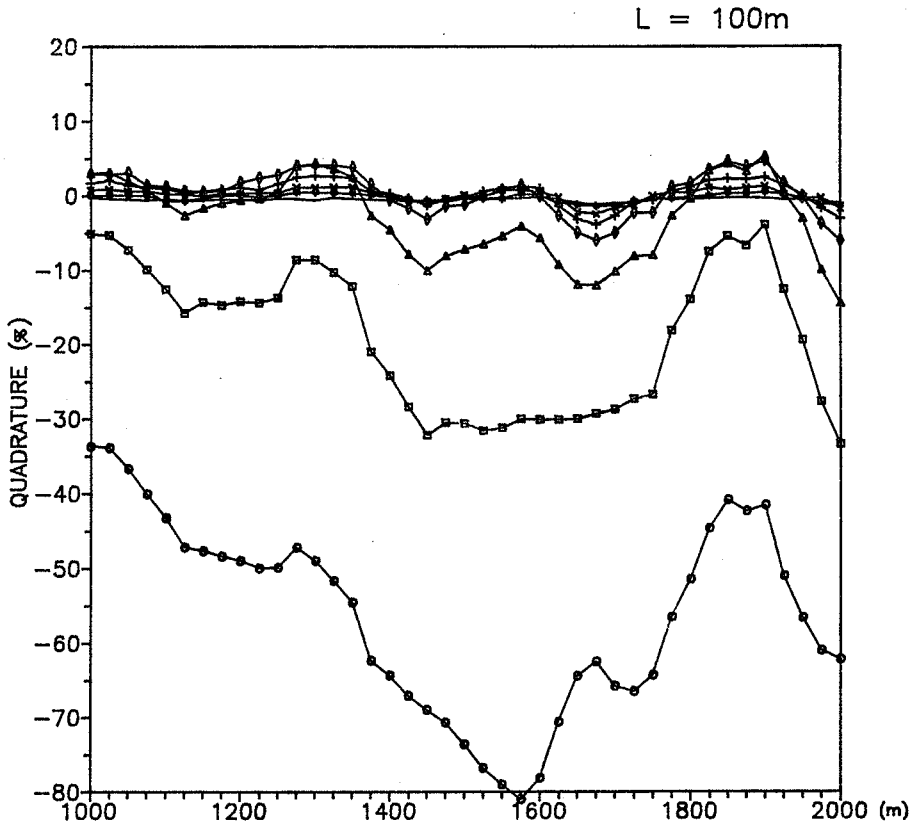

PROFILE SRF3A
IN-PHASE (%)
50
40
30
20
10
0
-10
-20
-30
-40
-50
0
200
400
600
800
1000 (m)
FREQ.
110 Hz
220 Hz
440 Hz
880 Hz
1760 Hz
3520 Hz
7040 Hz
14080 Hz
HOLE 65


L = 100m
QUADRATURE (%)
10
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
0
200
400
600
800
1000 (m)

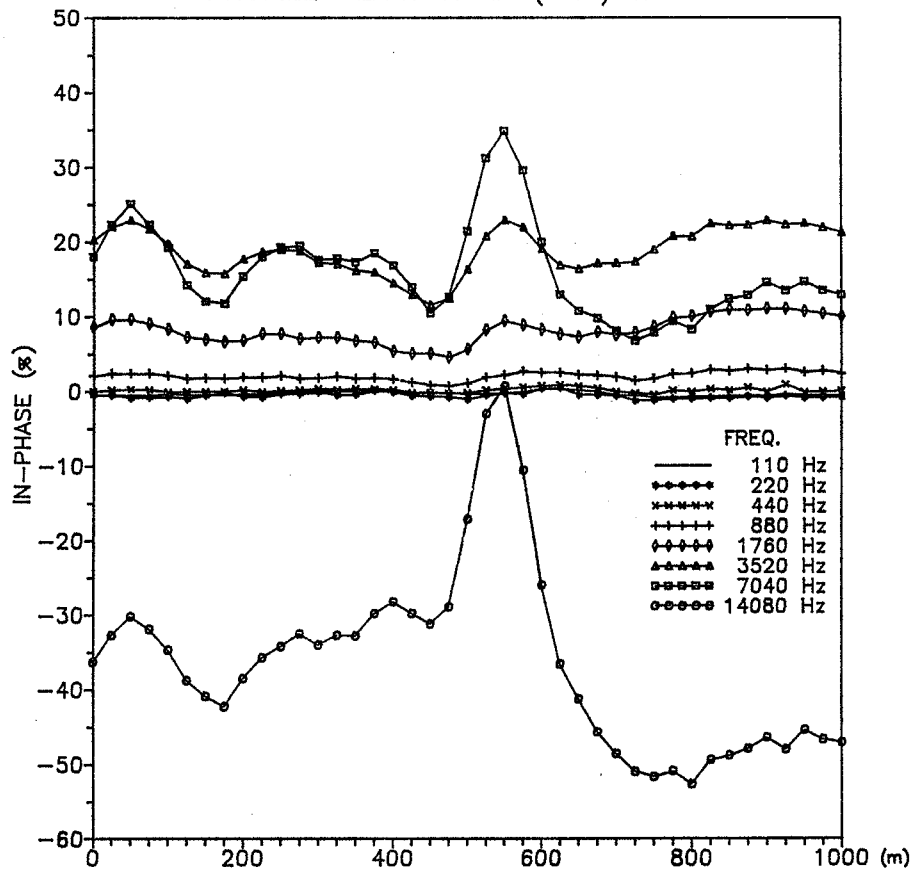

PROFILE GEARY ROAD (GR1) WEST HALF
IN-PHASE (%)
60
50
40
30
20
10
0
-10
-20
-30
-40
0
200
400
600
800
1000 (m)
FREQ.
110 Hz
220 Hz
440 Hz
880 Hz
1760 Hz
3520 Hz
7040 Hz
14080 Hz
HOLE 63


L = 100m
QUADRATURE (%)
20
10
0
-10
-20
-30
-40
-50
-60
-70
-80
0
200
400
600
800
1000 (m)

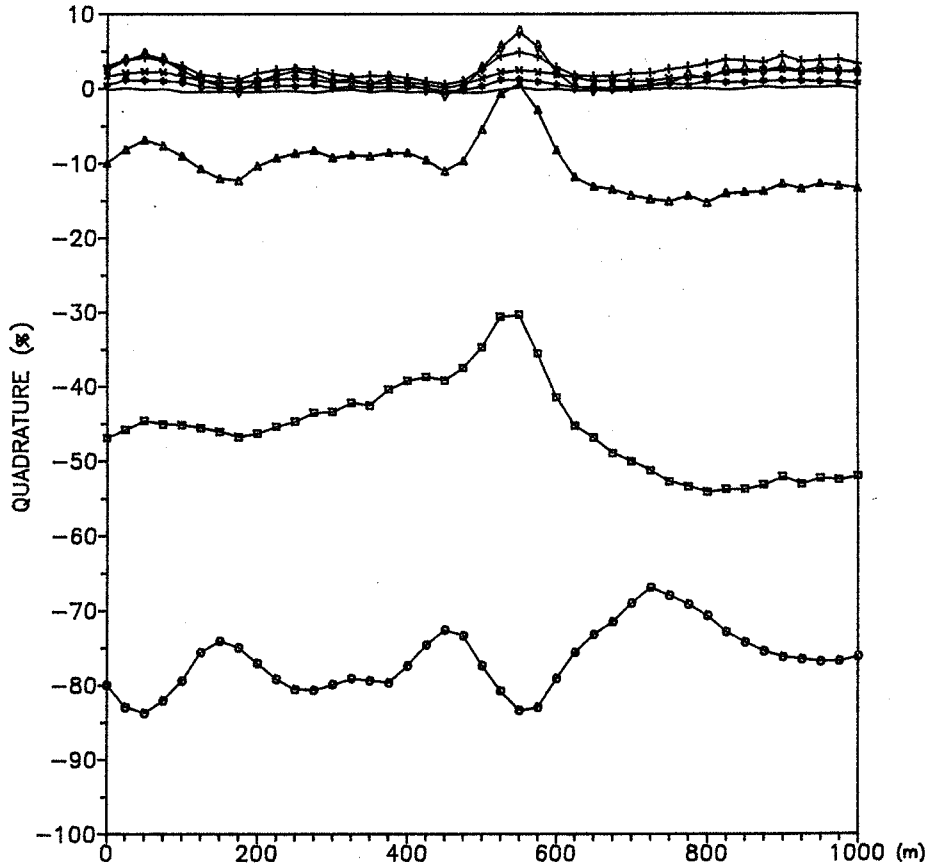

PROFILE GEARY ROAD (GR1) EAST HALF
IN-PHASE (%)
60
50
40
30
20
10
0
-10
-20
-30
-40
1000
1200
1400
1600
1800
2000 (m)
FREQ.
110 Hz
220 Hz
440 Hz
880 Hz
1760 Hz
3520 Hz
7040 Hz
14080 Hz


L = 100m
QUADRATURE (%)
20
10
0
-10
-20
-30
-40
-50
-60
-70
-80
1000
1200
1400
1600
1800
2000 (m)

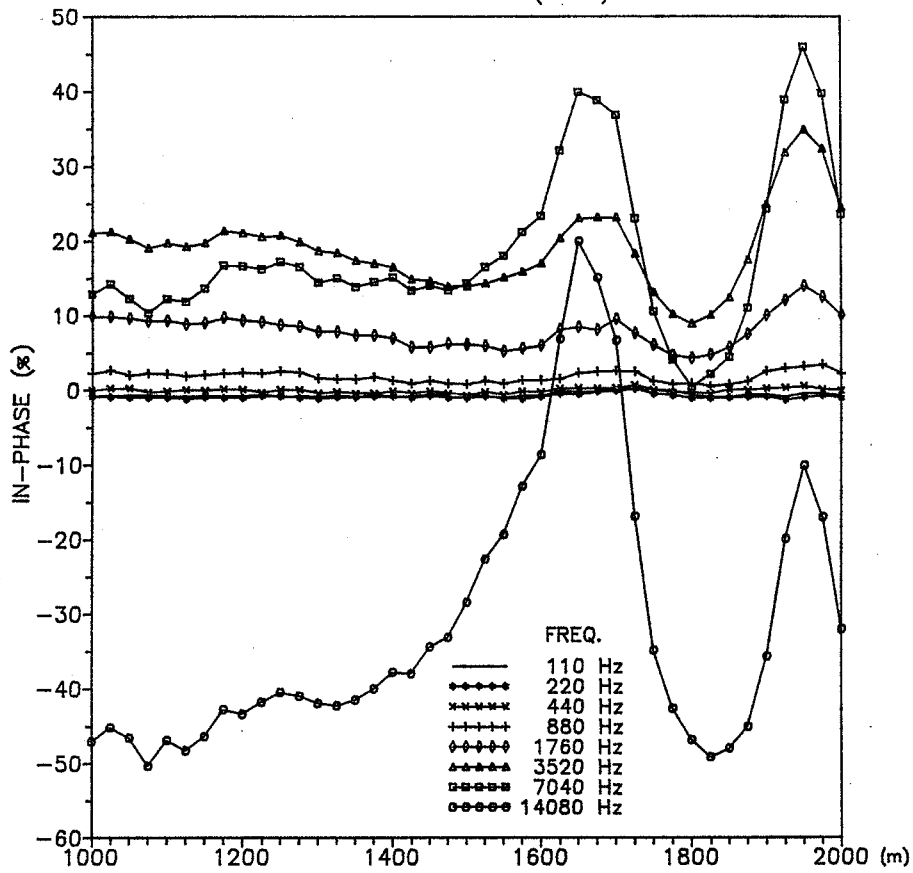
PROFILE GEARY ROAD (GR2) WEST HALF

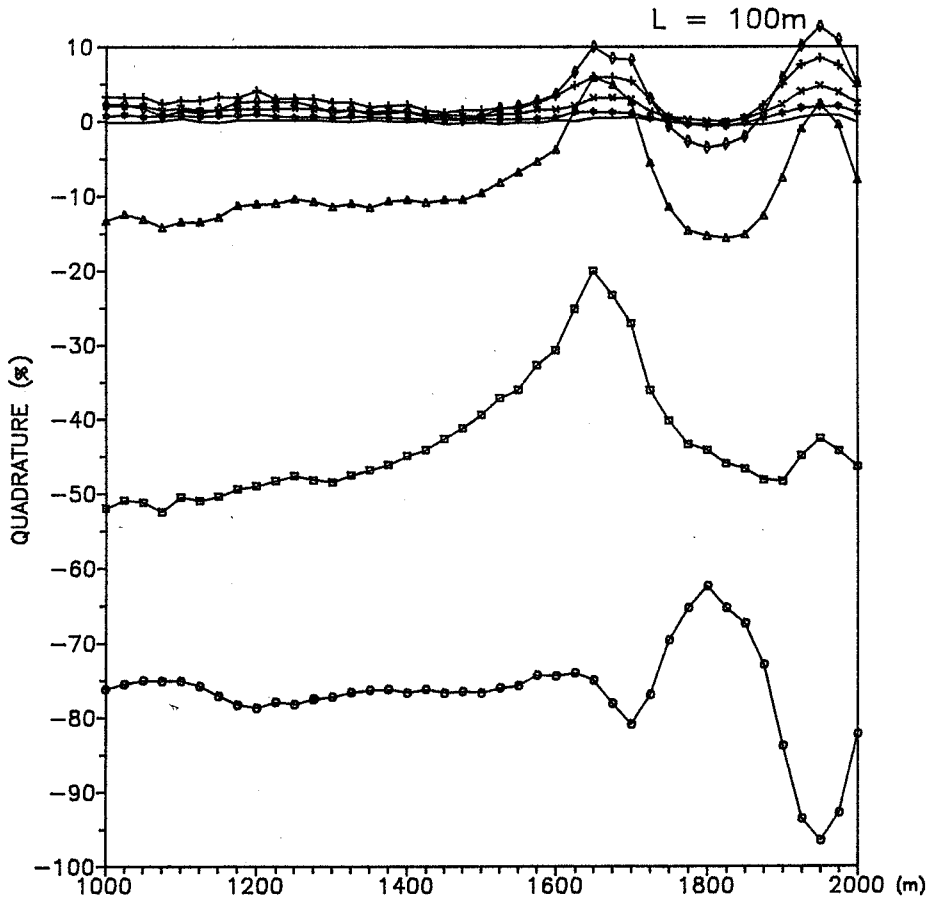


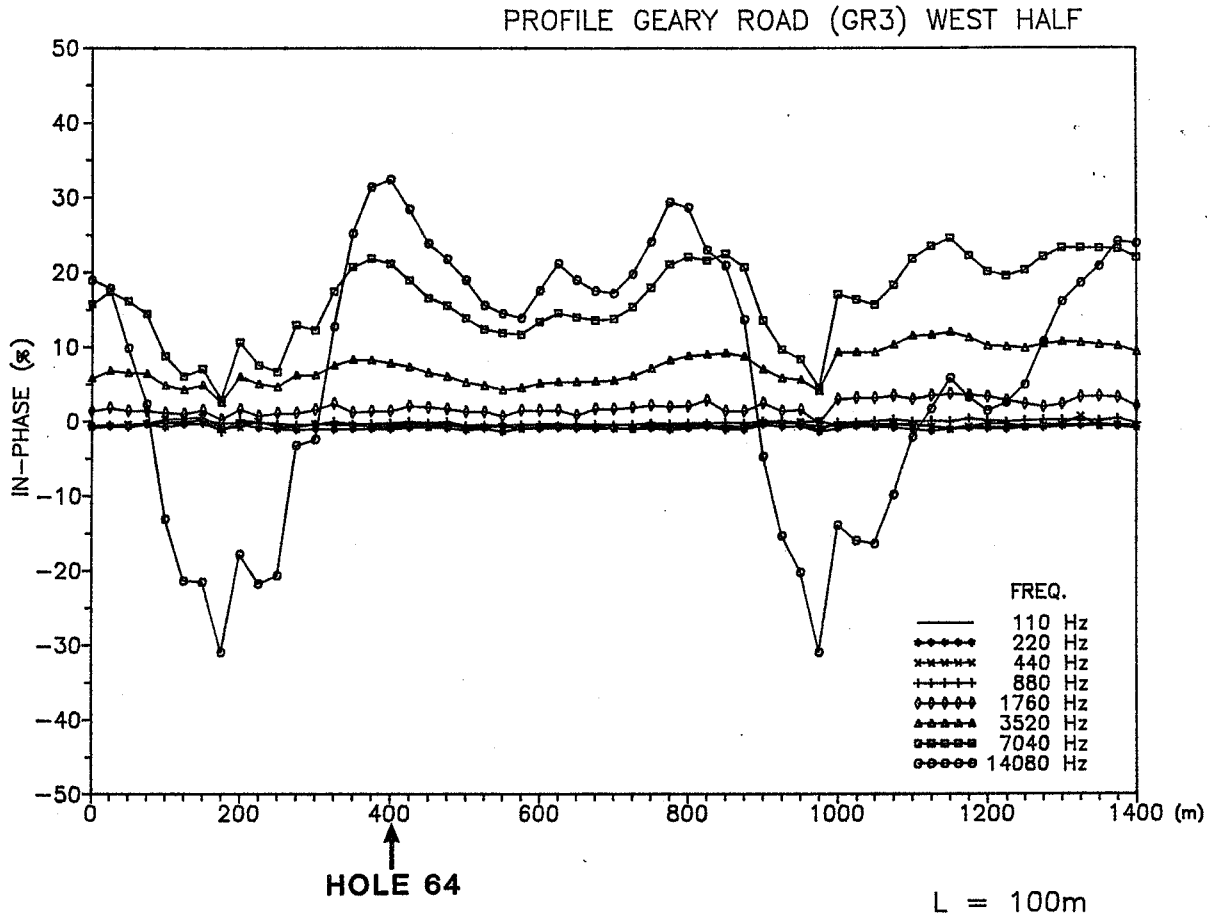
L = 100m

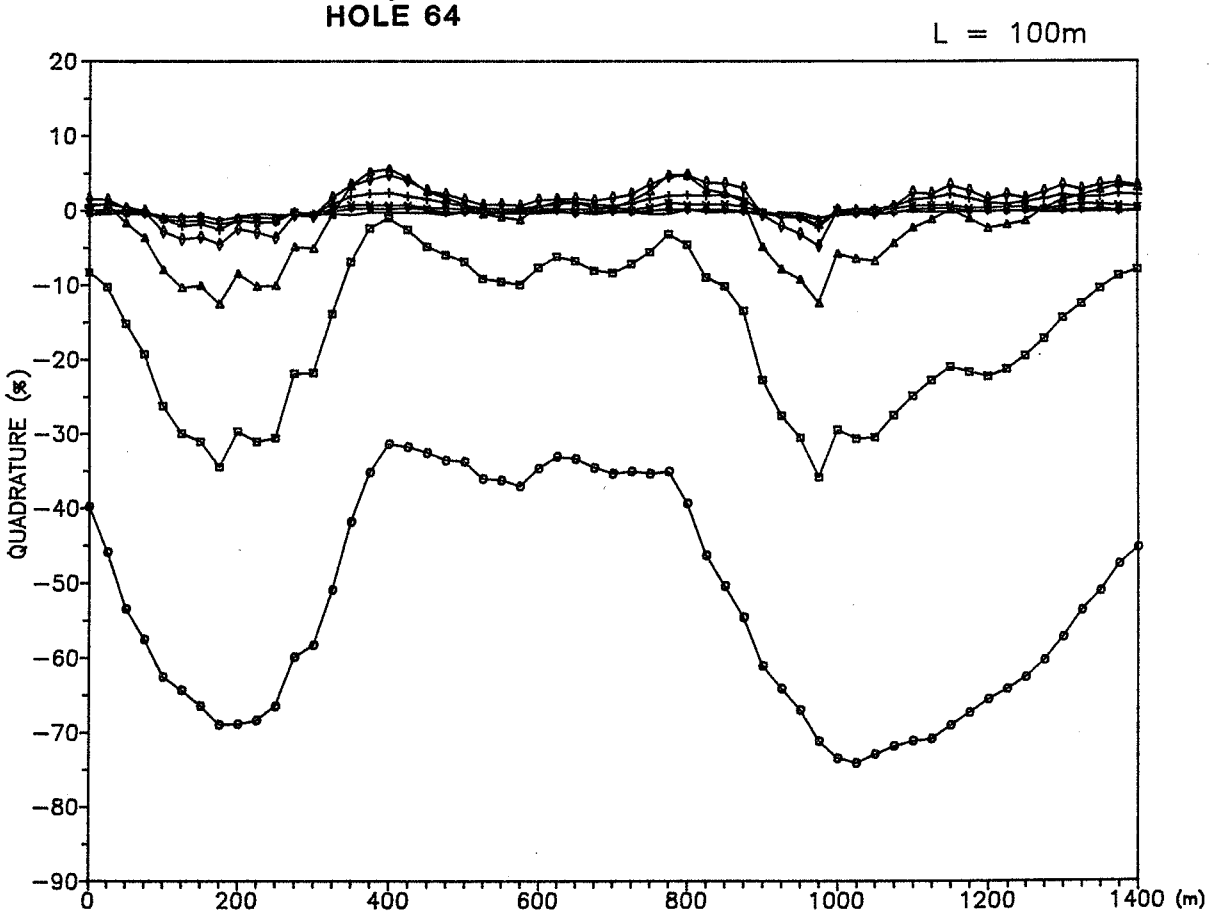


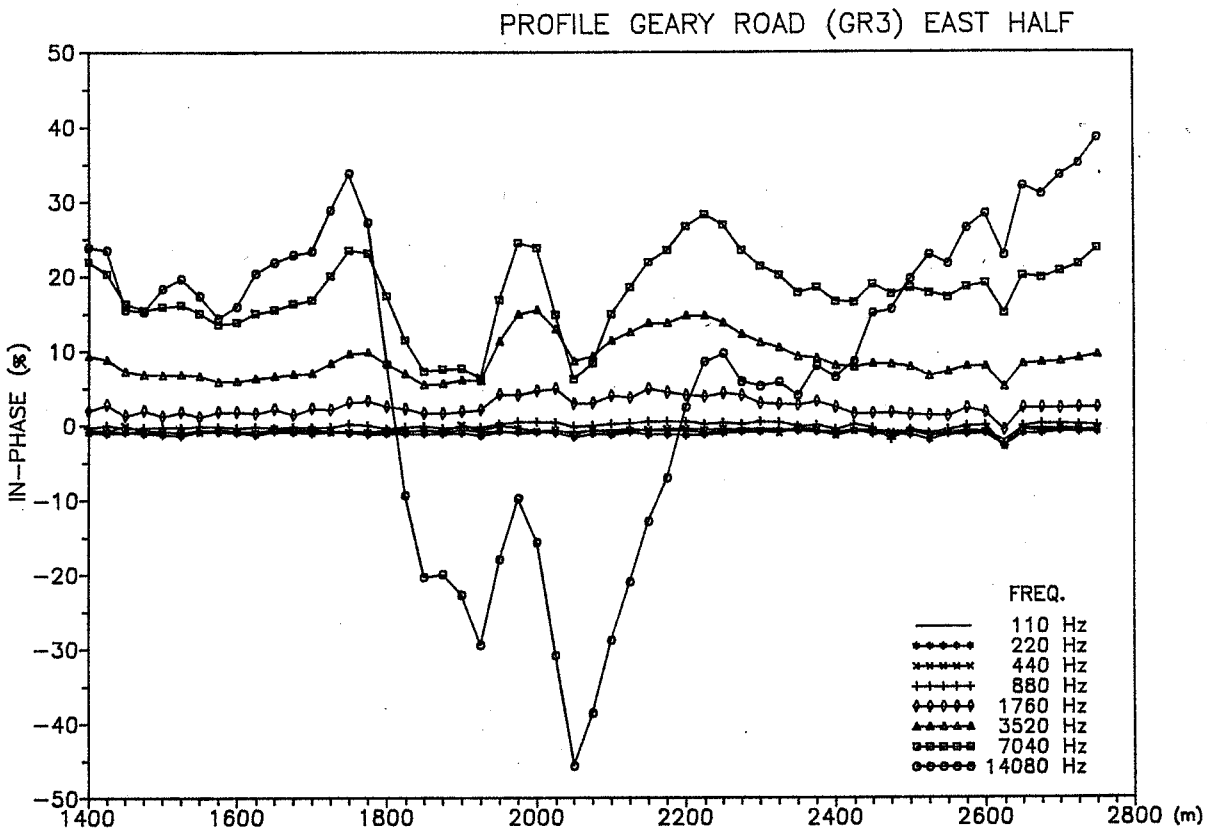
PROFILE GEARY ROAD (GR2) EAST HALF

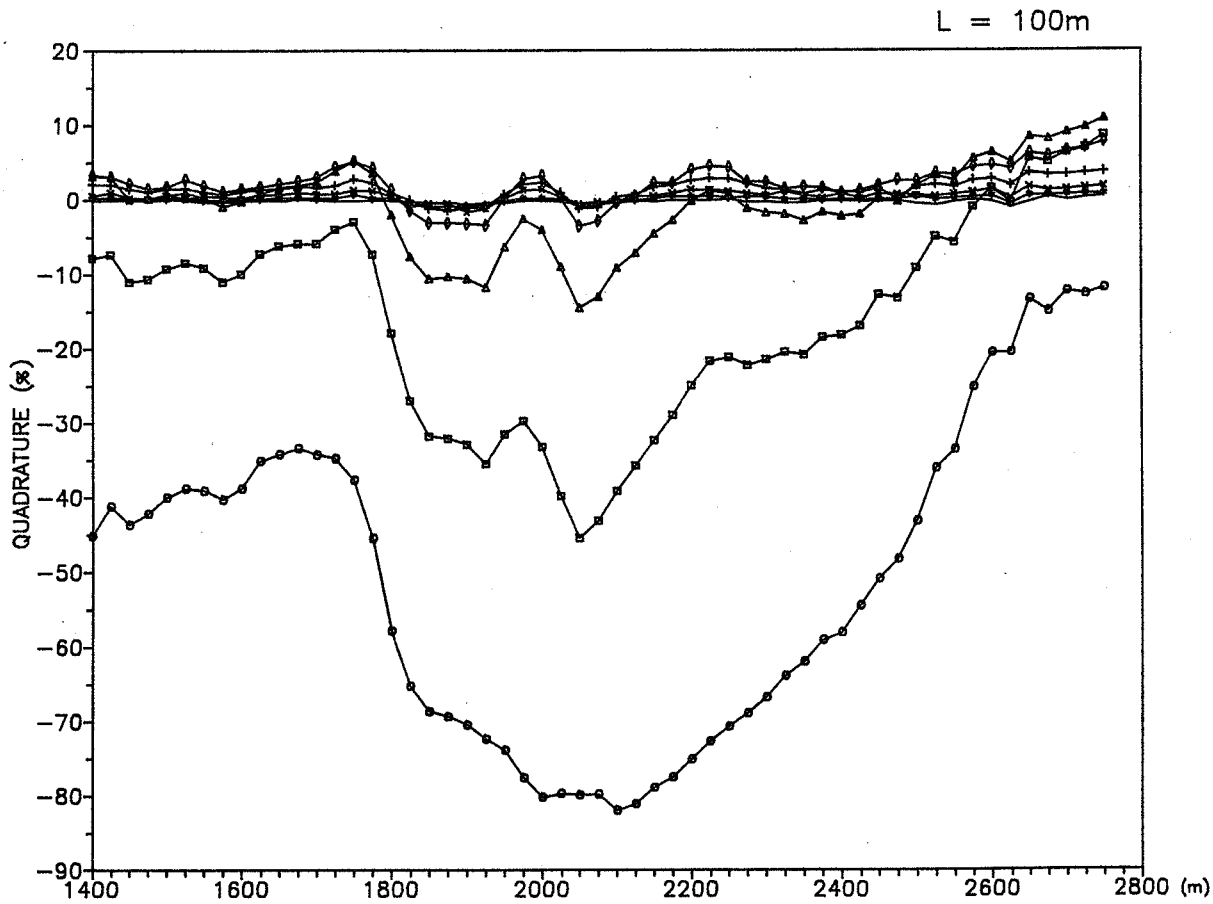


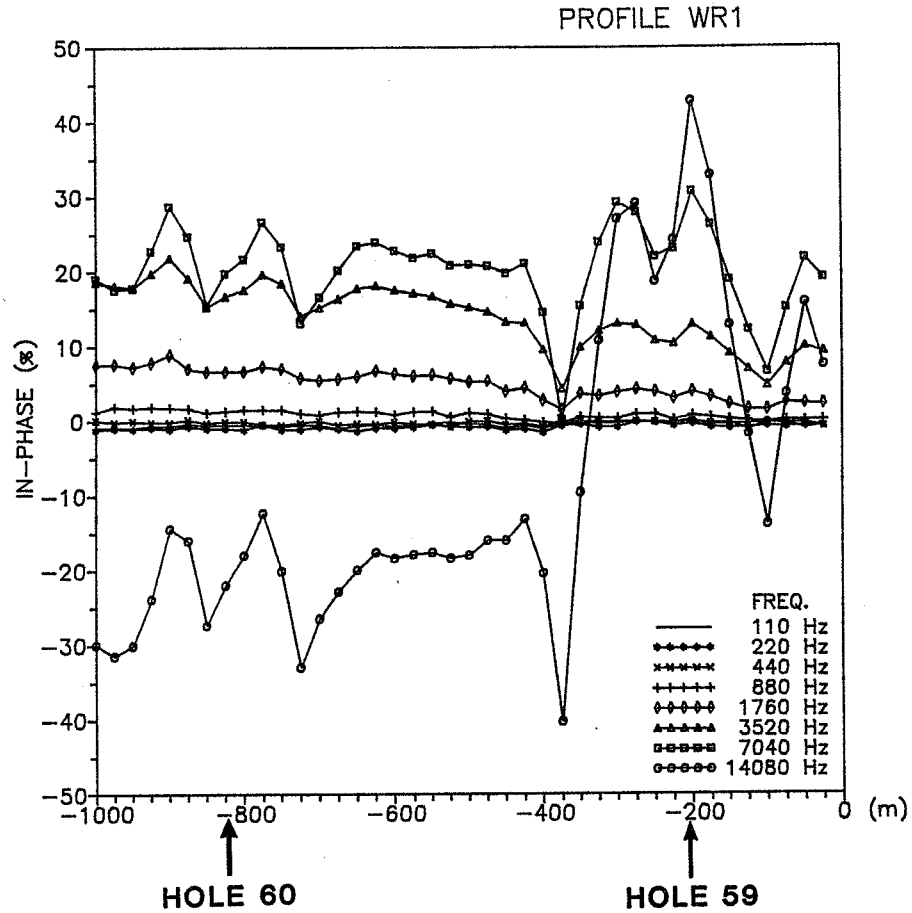


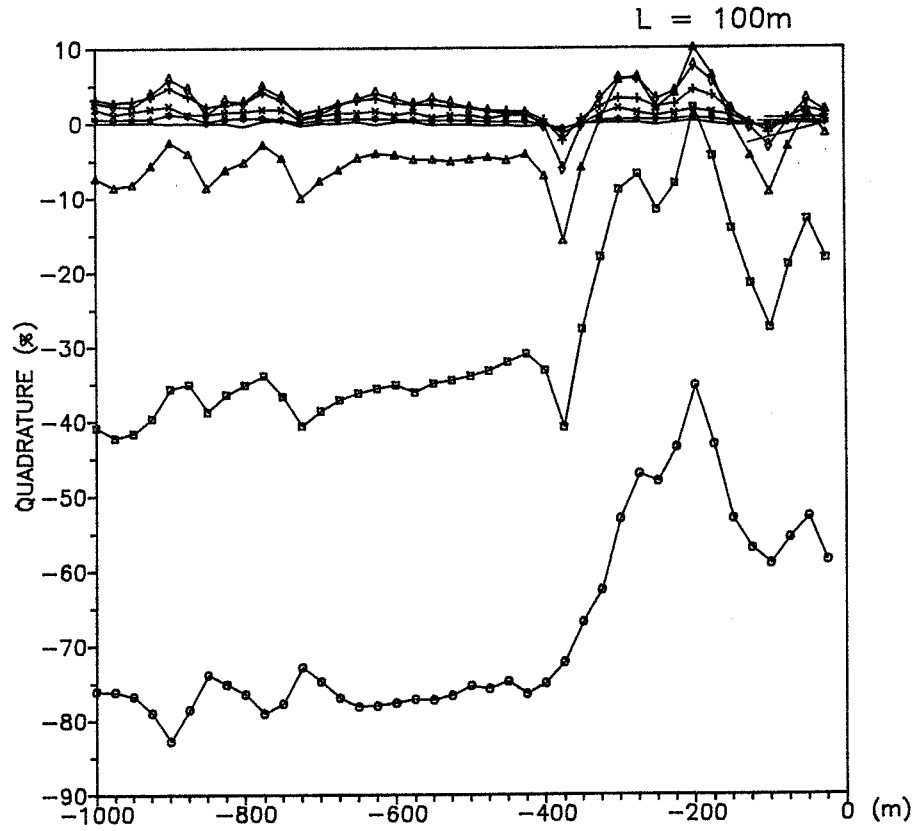

PROFILE GEARY ROAD (GR3) WEST HALF
IN-PHASE (%)
50
40
30
20
10
0
-10
-20
-30
-40
-50
0
200
400
600
800
1000
1200
1400 (m)
FREQ.
110 Hz
220 Hz
440 Hz
880 Hz
1760 Hz
3520 Hz
7040 Hz
14080 Hz
HOLE 64

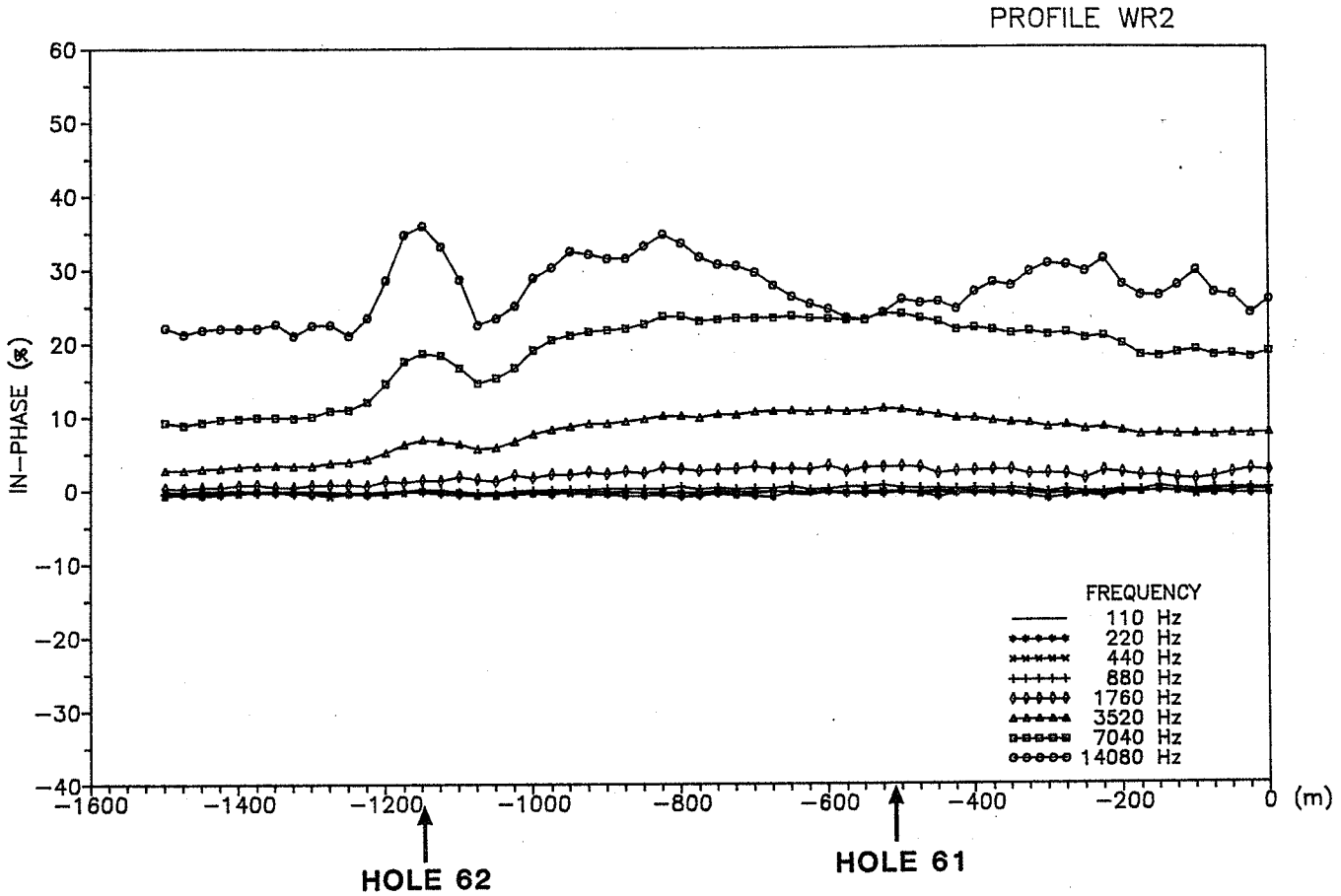

L = 100m
QUADRATURE (%)
20
10
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
0
200
400
600
800
1000
1200
1400 (m)

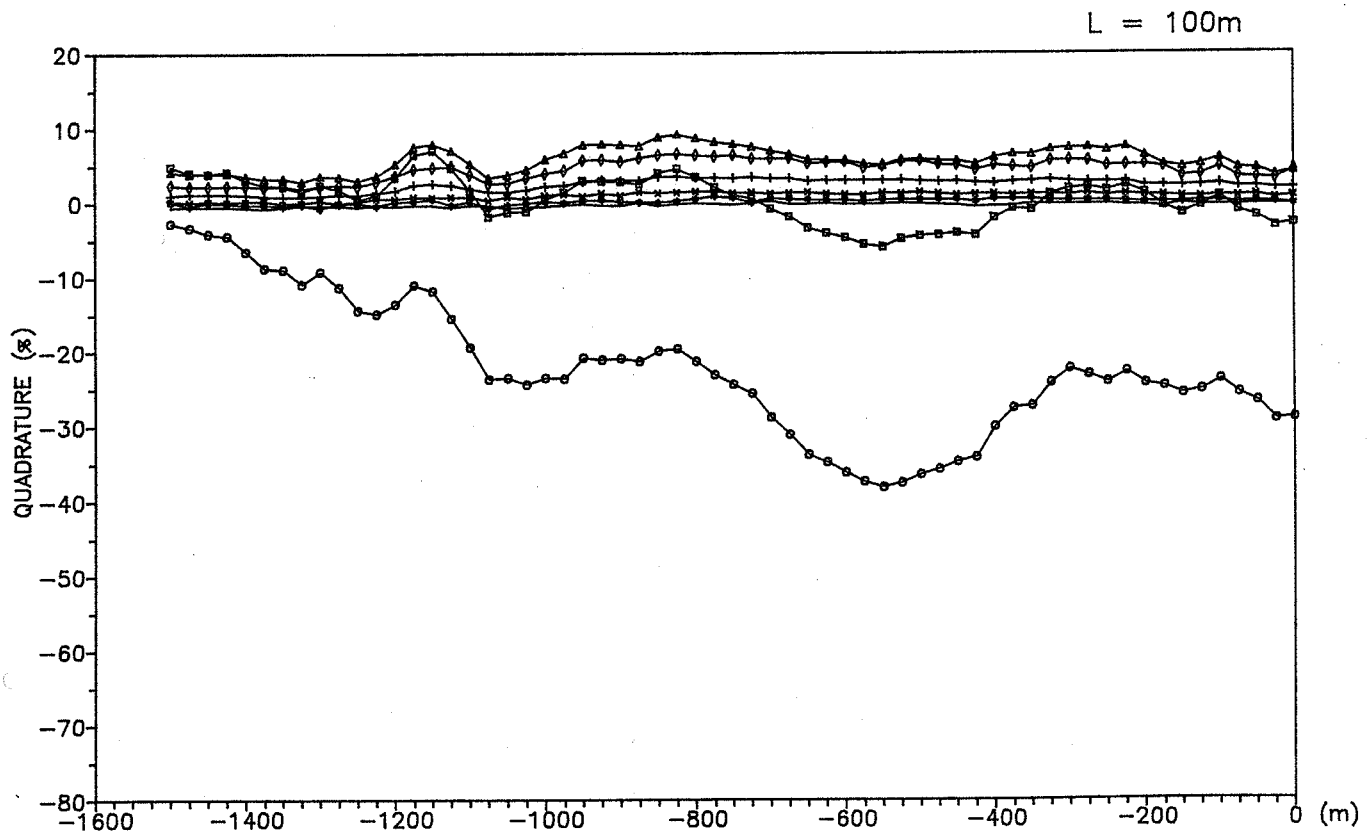

PROFILE GEARY ROAD (GR3) EAST HALF
IN-PHASE (%)
50
40
30
20
10
0
-10
-20
-30
-40
-50
1400
1600
1800
2000
2200
2400
2600
2800 (m)
FREQ.
110 Hz
220 Hz
440 Hz
880 Hz
1760 Hz
3520 Hz
7040 Hz
14080 Hz


L = 100m
QUADRATURE (%)
20
10
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
1400
1600
1800
2000
2200
2400
2600
2800 (m)


PROFILE WR1
IN-PHASE (%)
50
40
30
20
10
0
-10
-20
-30
-40
-50
-1000
-800
-600
-400
-200
0 (m)
FREQ.
110 Hz
220 Hz
440 Hz
880 Hz
1760 Hz
3520 Hz
7040 Hz
14080 Hz
HOLE 60
HOLE 59


L = 100m
QUADRATURE (%)
10
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
-1000
-800
-600
-400
-200
0 (m)


PROFILE WR2
IN-PHASE (%)
60
50
40
30
20
10
0
-10
-20
-30
-40
-1600
-1400
-1200
-1000
-800
-600
-400
-200
0
(m)
FREQUENCY
110 Hz
220 Hz
440 Hz
880 Hz
1760 Hz
3520 Hz
7040 Hz
14080 Hz
HOLE 62
HOLE 61

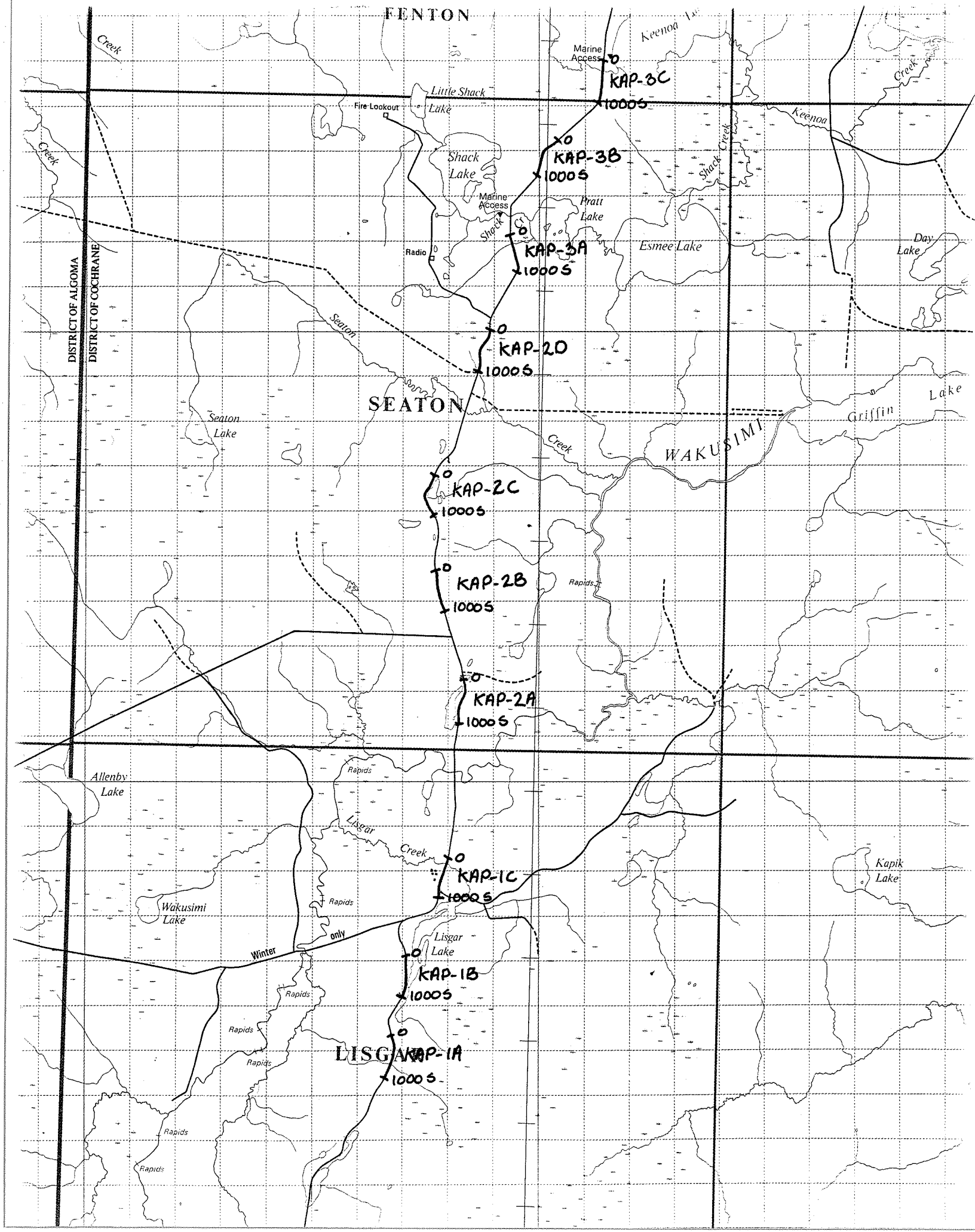

L = 100m
QUADRATURE (%)
20
10
0
-10
-20
-30
-40
-50
-60
-70
-80
-1600
-1400
-1200
-1000
-800
-600
-400
-200
0
(m)

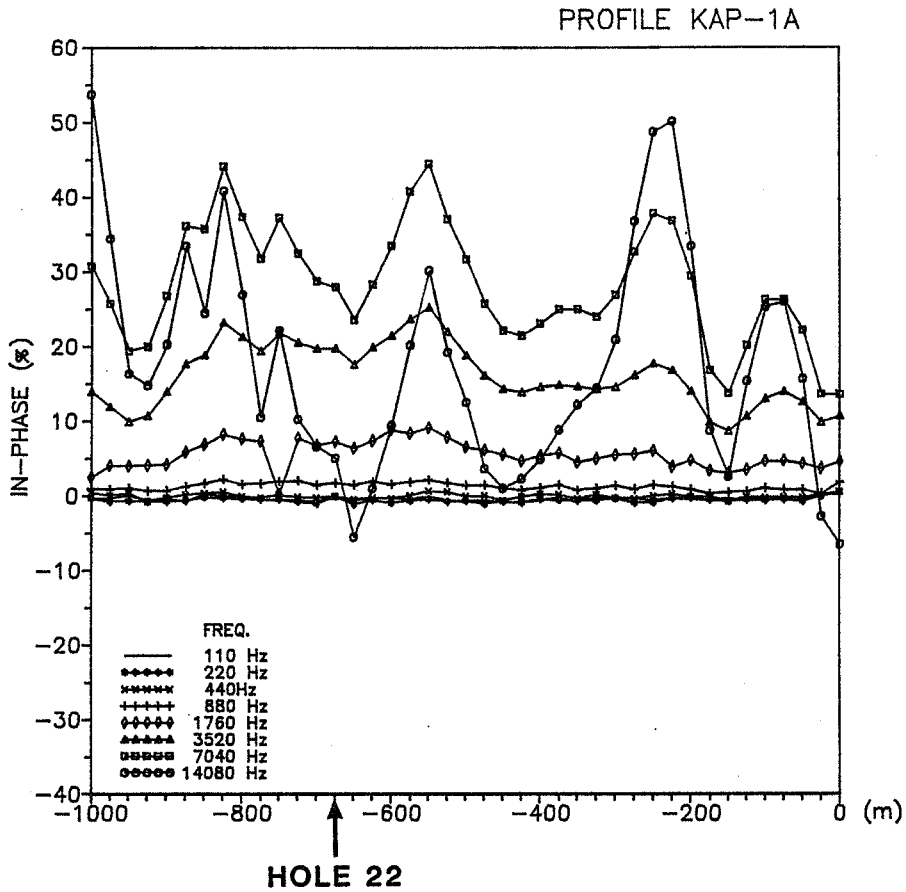
SHEET 42B/SW (ELSAS)

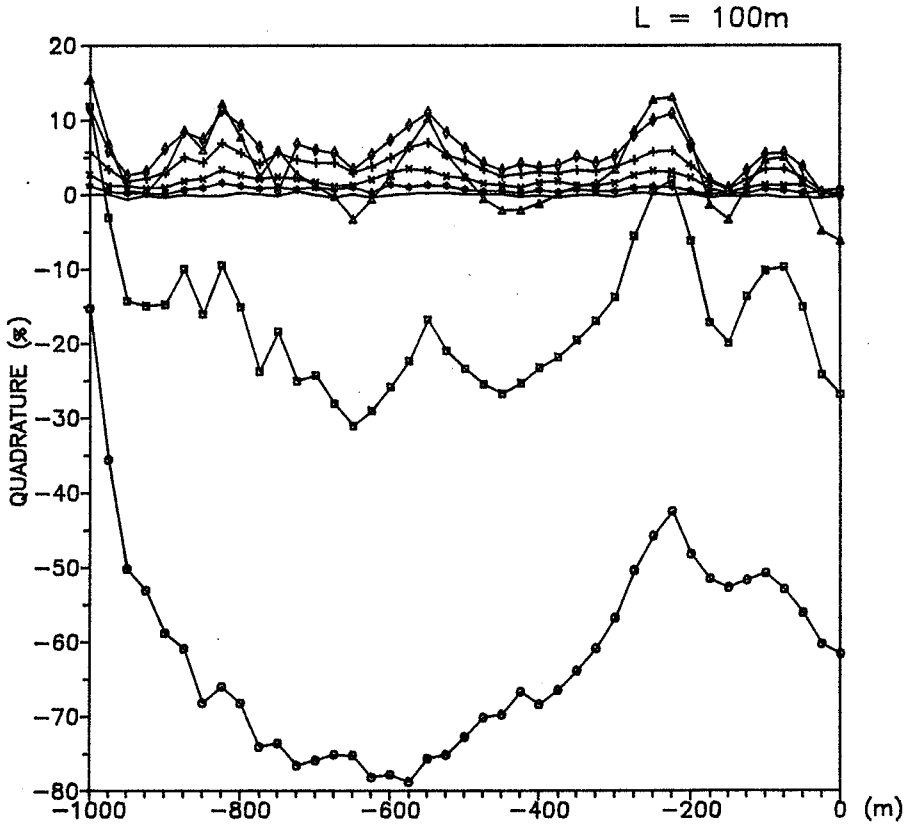
Kapuskasing (10 profiles 1000 m long)

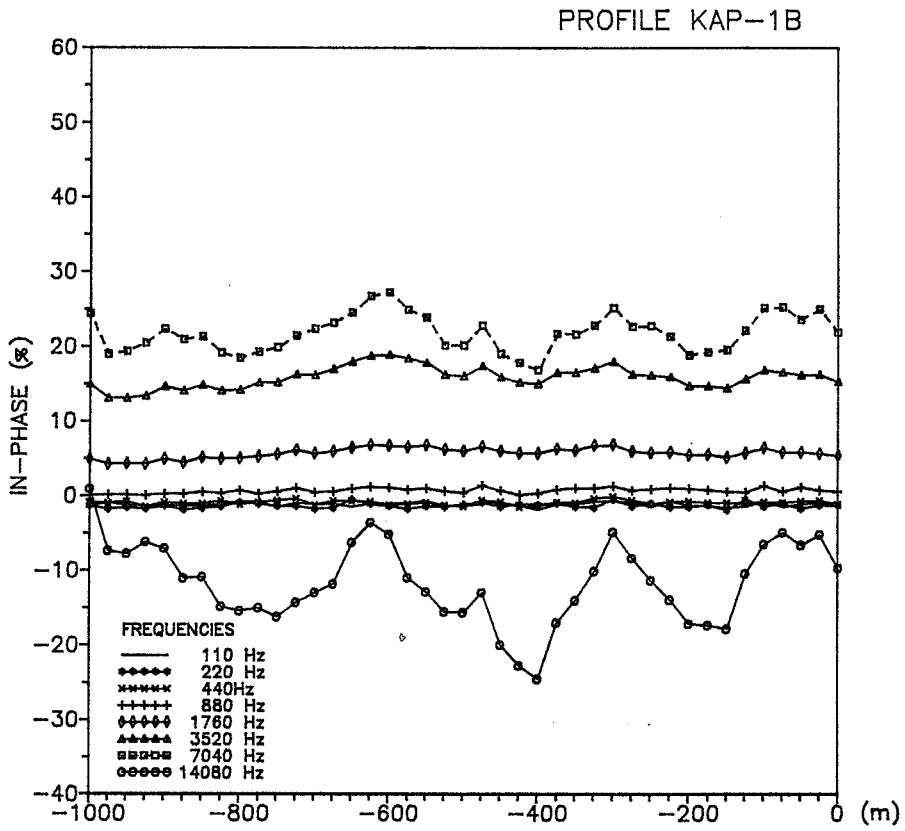
KAP-1A, KAP-1B, KAP-1C, KAP-2A, KAP-2B, KAP-2C, KAP-2D, KAP-3A, KAP-3B, KAP-3C

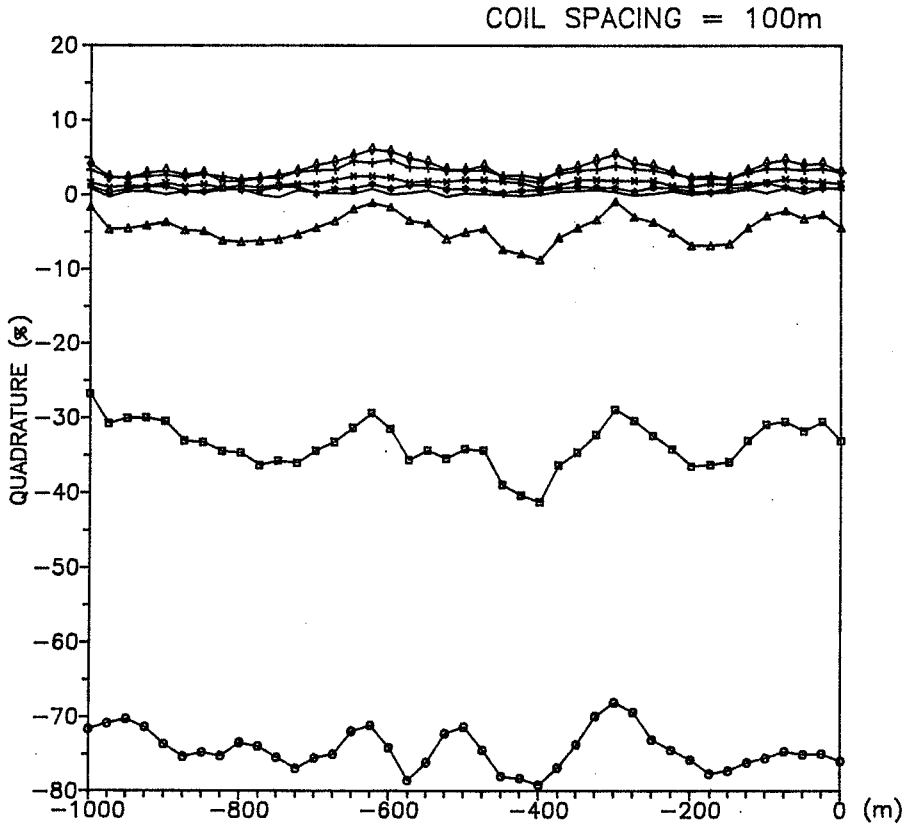
Total for the sheet 10,000 m.

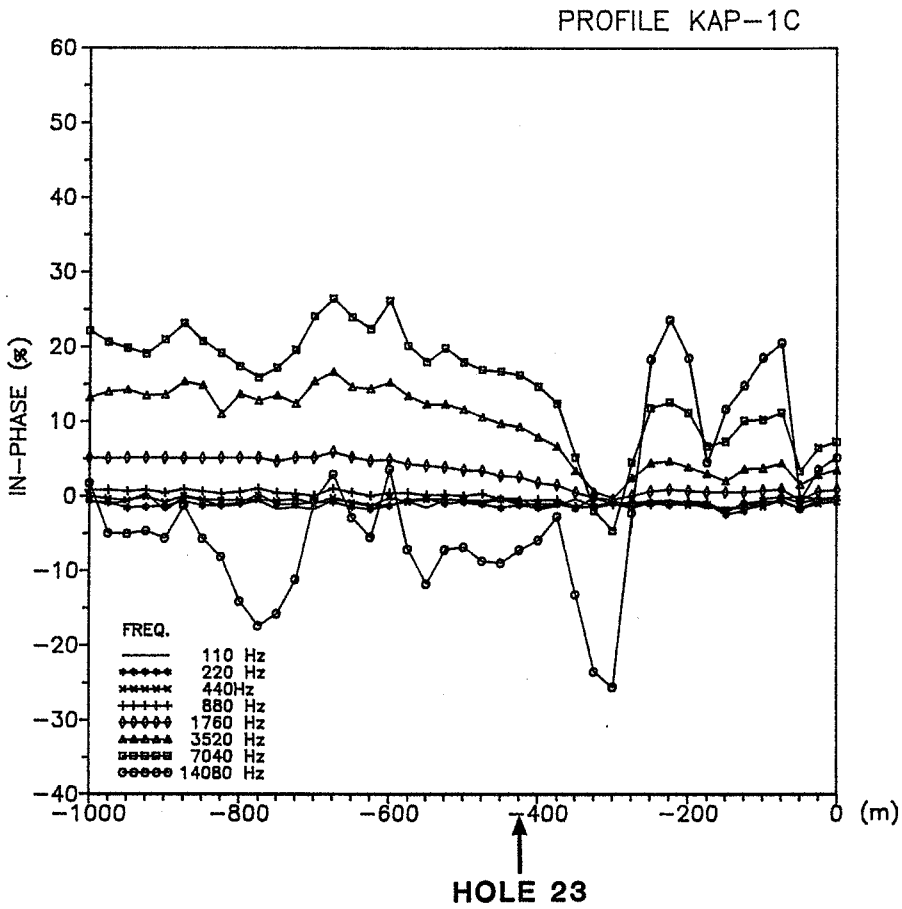

FENTON
Keenoa
Creek
Marine Access
KAP-3C
1000S
Little Shack Lake
Fire Lookout
Keenoa
Shack Lake
KAP-3B
1000S
Shack Creek
Marine Access
Pratt Lake
Shack Cr.
KAP-3A
1000S
Esmee Lake
Day Lake
Radio
DISTRICT OF ALGOMA
DISTRICT OF COCHRANE
Seaton
KAP-2D
1000S
SEATON
Seaton Lake
Griffin Lake
WAKUSIMI
Creek
KAP-2C
1000S
KAP-2B
1000S
Rapids
KAP-2A
1000S
Allenby Lake
Rapids
Lisgar Creek
KAP-1C
1000S
Kapik Lake
Wakusimi Lake
Rapids
Winter only
Lisgar Lake
KAP-1B
1000S
Rapids
Rapids
LISGAR
KAP-1A
1000S
Rapids
Rapids

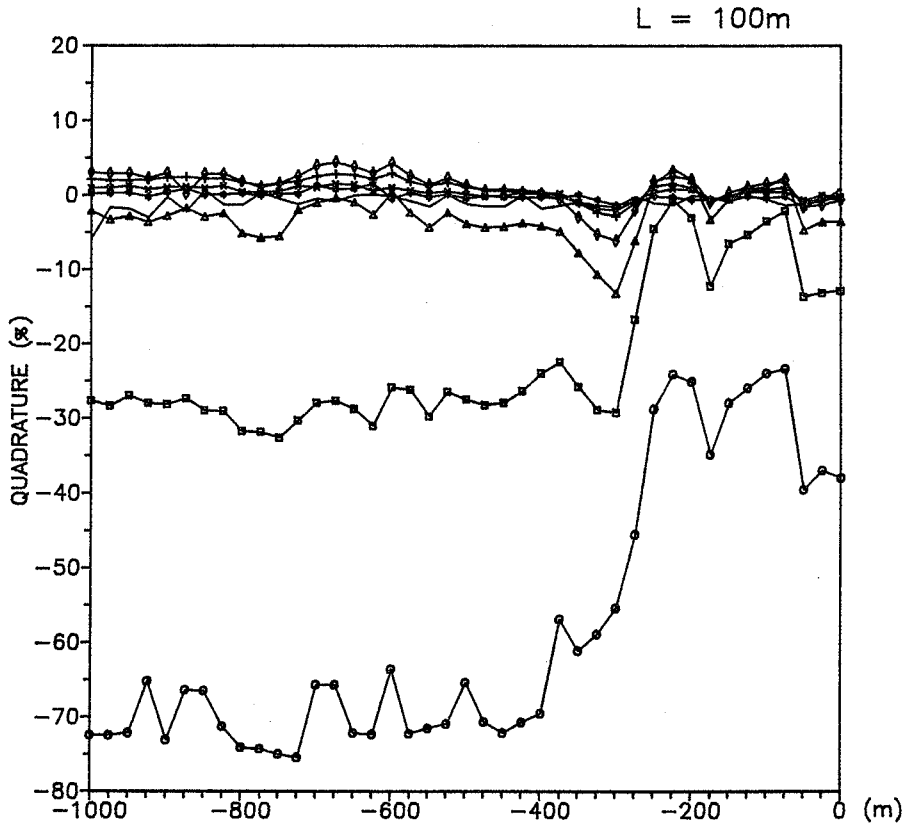

PROFILE KAP-1A
IN-PHASE (%)
60
50
40
30
20
10
0
-10
-20
-30
-40
FREQ.
110 Hz
220 Hz
440Hz
880 Hz
1760 Hz
3520 Hz
7040 Hz
14080 Hz
-1000
-800
-600
-400
-200
0 (m)
HOLE 22

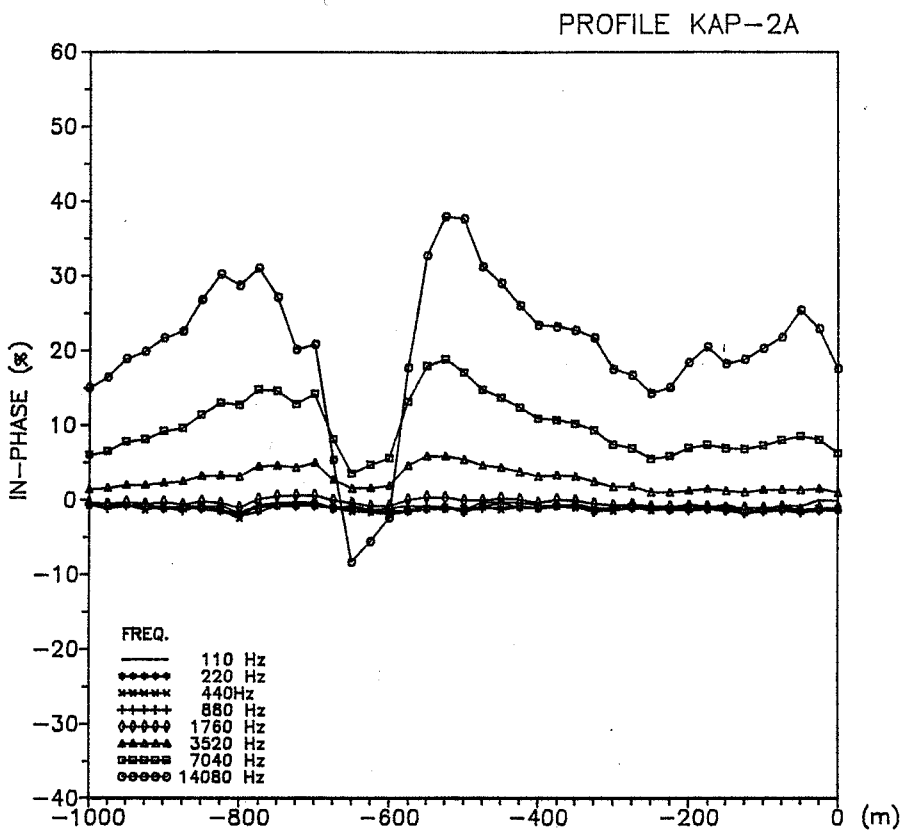

L = 100m
QUADRATURE (%)
20
10
0
-10
-20
-30
-40
-50
-60
-70
-80
-1000
-800
-600
-400
-200
0 (m)

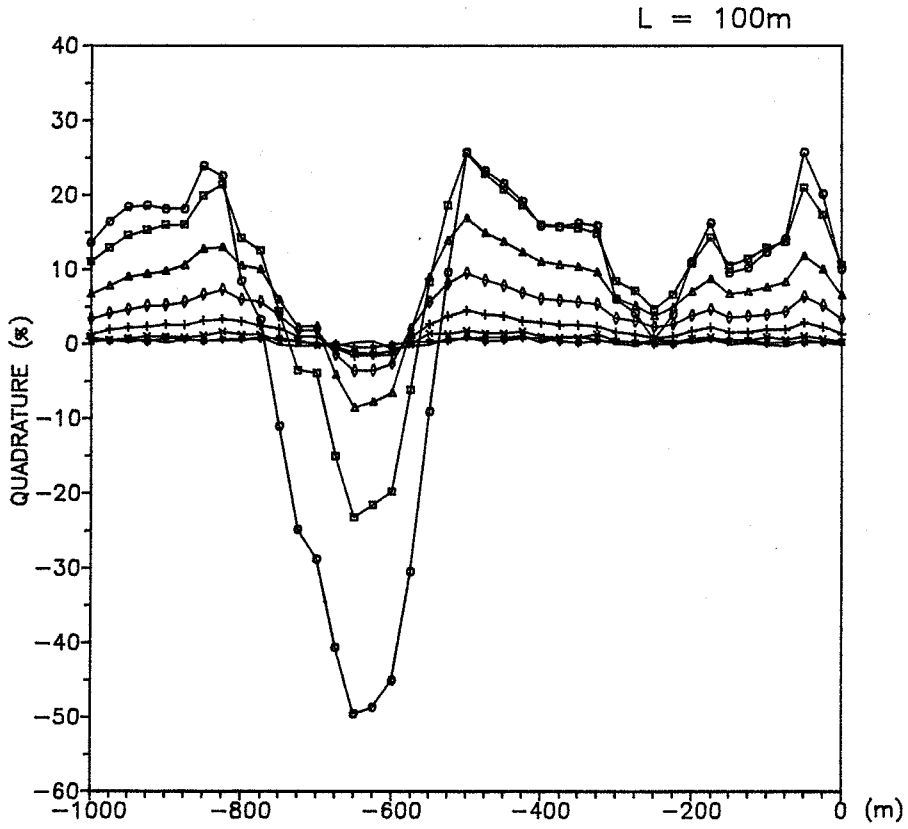

PROFILE KAP-1B
IN-PHASE (%)
60
50
40
30
20
10
0
-10
-20
-30
-40
-1000
-800
-600
-400
-200
0
(m)
FREQUENCIES
110 Hz
220 Hz
440Hz
880 Hz
1760 Hz
3520 Hz
7040 Hz
14080 Hz

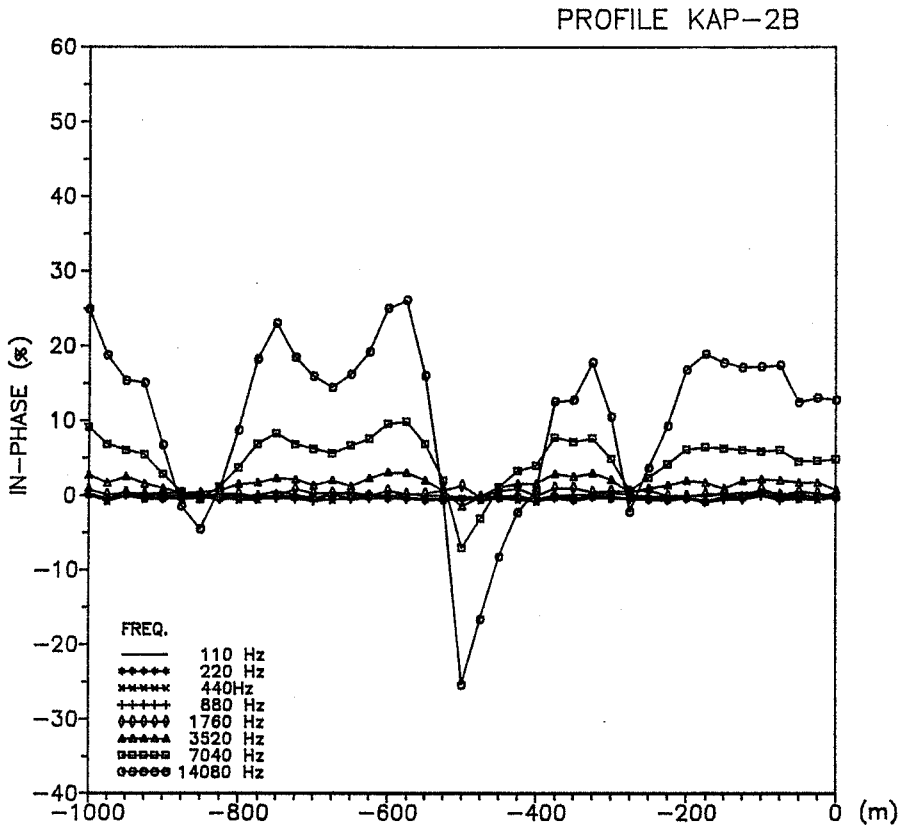

COIL SPACING = 100m
QUADRATURE (%)
20
10
0
-10
-20
-30
-40
-50
-60
-70
-80
-1000
-800
-600
-400
-200
0
(m)

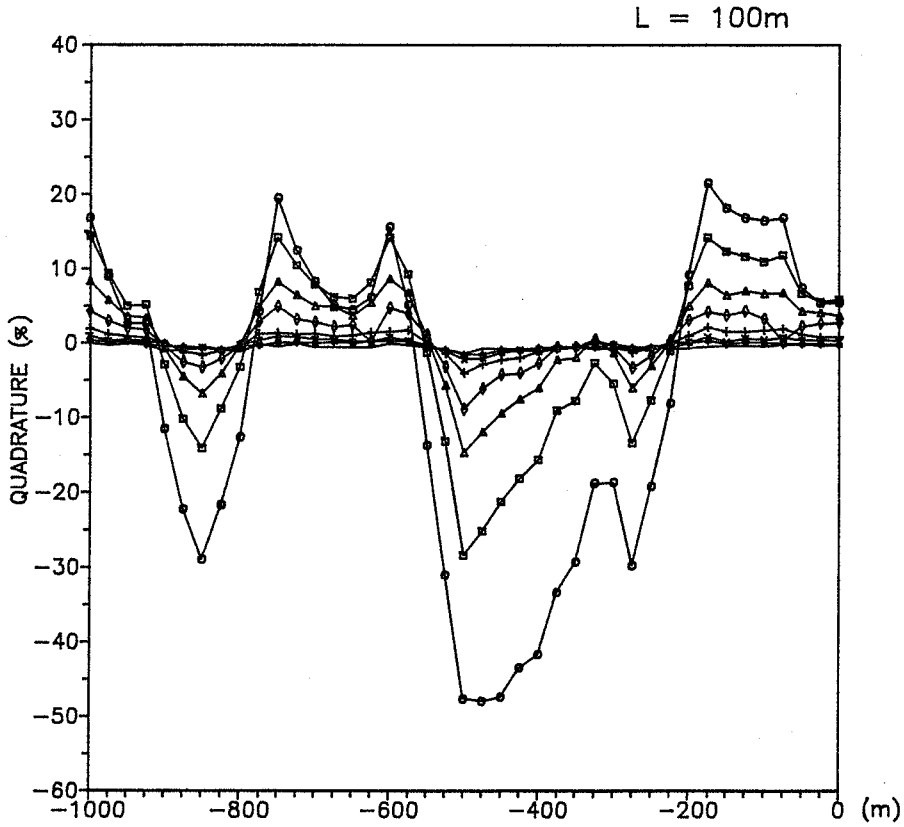

PROFILE KAP-1C
IN-PHASE (%)
60
50
40
30
20
10
0
-10
-20
-30
-40
-1000
-800
-600
-400
-200
0 (m)
FREQ.
110 Hz
220 Hz
440Hz
880 Hz
1760 Hz
3520 Hz
7040 Hz
14080 Hz
HOLE 23

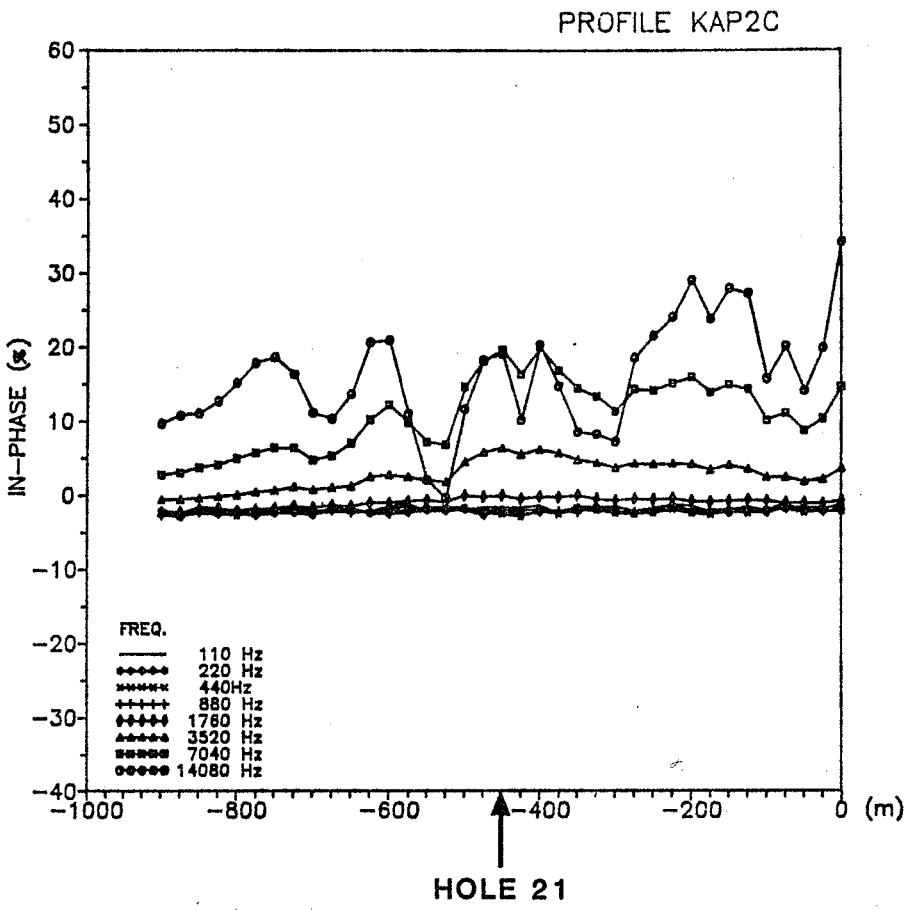

L = 100m
QUADRATURE (%)
20
10
0
-10
-20
-30
-40
-50
-60
-70
-80
-1000
-800
-600
-400
-200
0 (m)

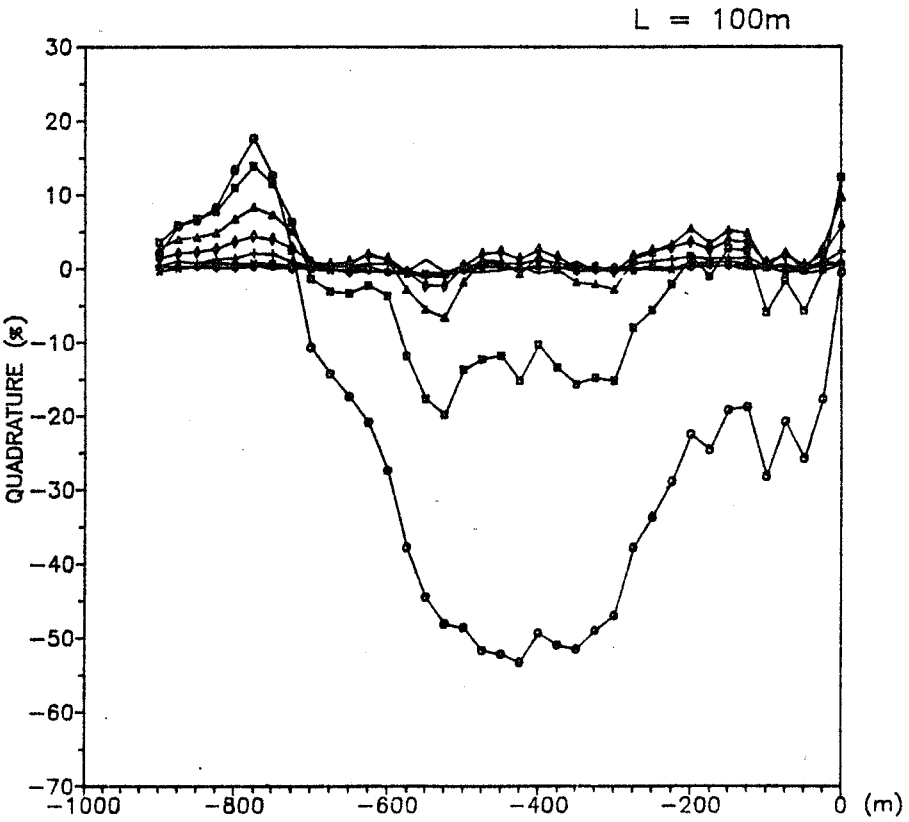

PROFILE KAP-2A
IN-PHASE (%)
60
50
40
30
20
10
0
-10
-20
-30
-40
-1000
-800
-600
-400
-200
0
(m)
FREQ.
110 Hz
220 Hz
440Hz
880 Hz
1760 Hz
3520 Hz
7040 Hz
14080 Hz

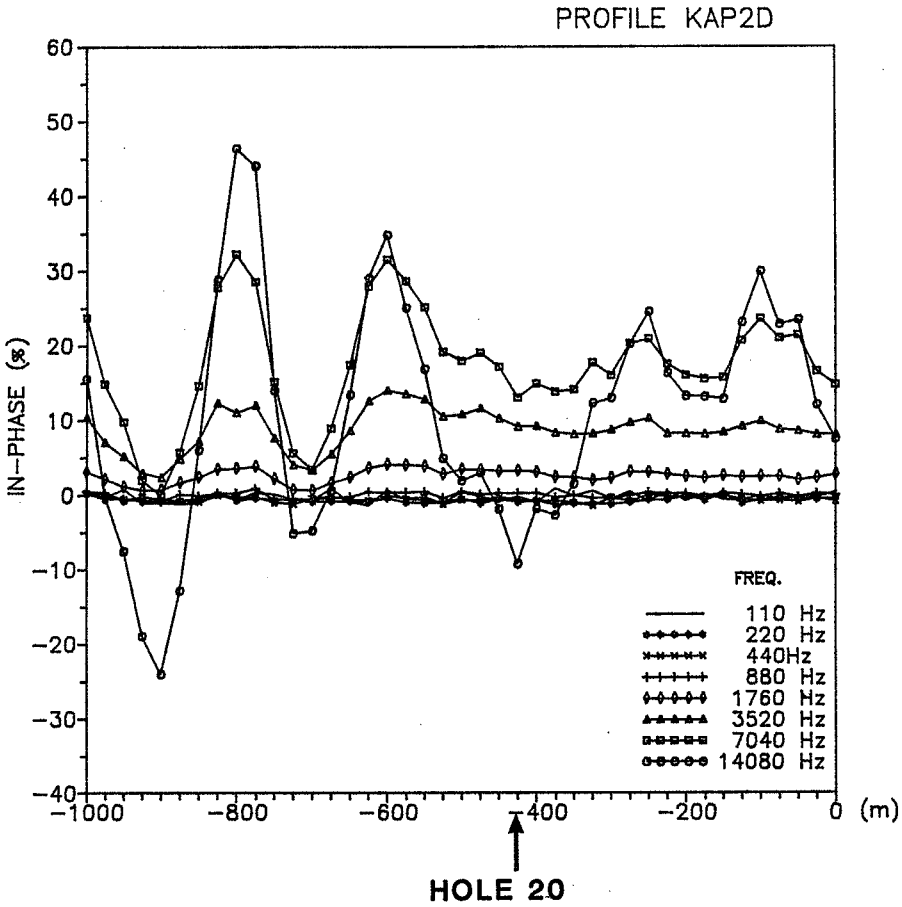

L = 100m
QUADRATURE (%)
40
30
20
10
0
-10
-20
-30
-40
-50
-60
-1000
-800
-600
-400
-200
0
(m)

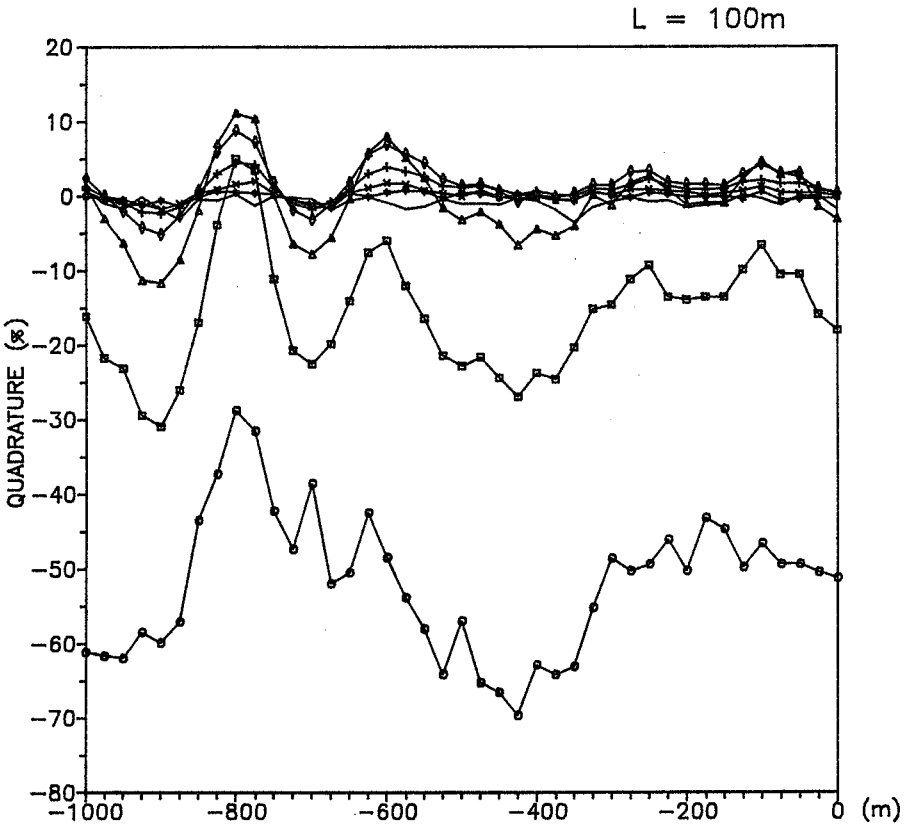

PROFILE KAP-2B
IN-PHASE (%)
60
50
40
30
20
10
0
-10
-20
-30
-40
-1000
-800
-600
-400
-200
0
(m)
FREQ.
110 Hz
220 Hz
440Hz
880 Hz
1760 Hz
3520 Hz
7040 Hz
14080 Hz

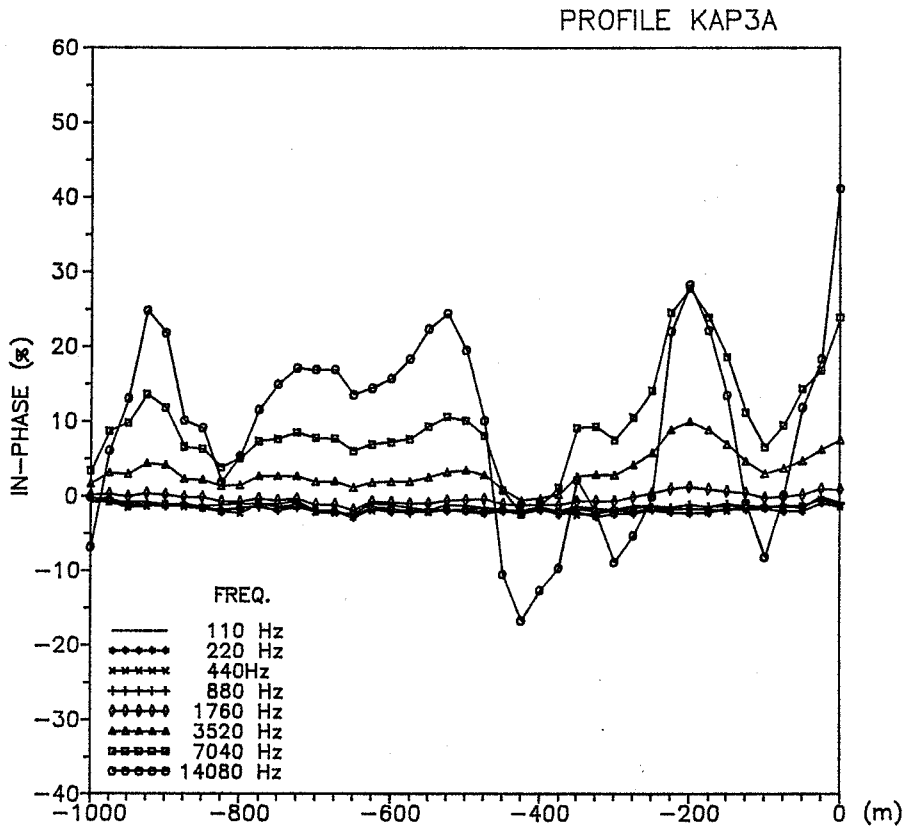

L = 100m
QUADRATURE (%)
40
30
20
10
0
-10
-20
-30
-40
-50
-60
-1000
-800
-600
-400
-200
0
(m)

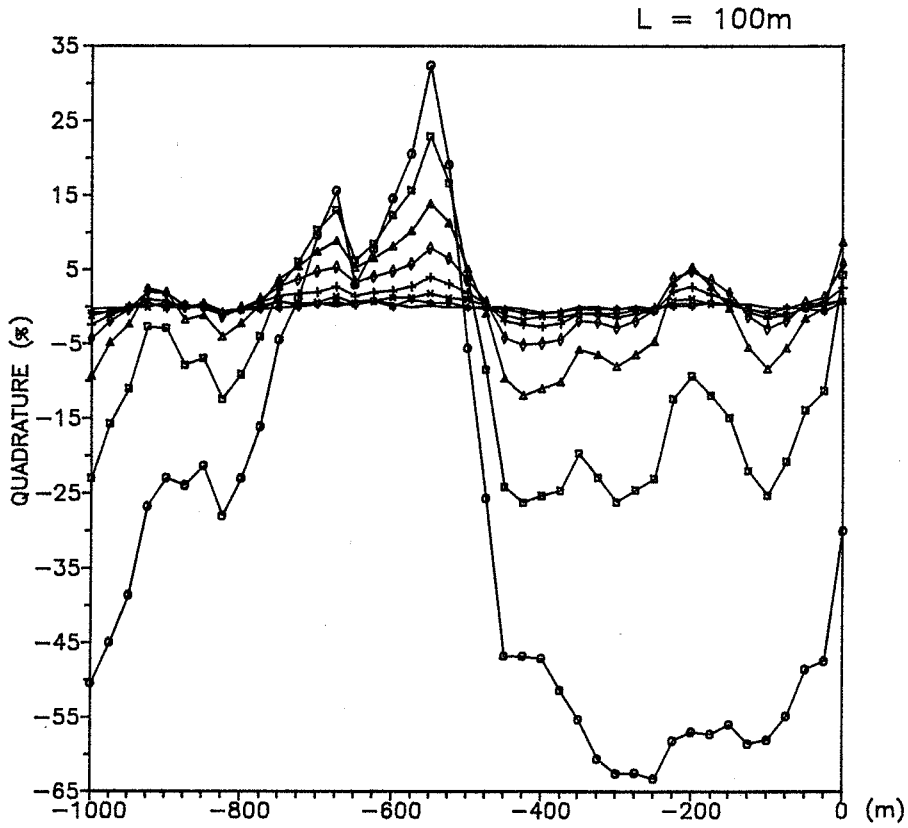

PROFILE KAP2C
IN-PHASE (%)
60
50
40
30
20
10
0
-10
-20
-30
-40
-1000
-800
-600
-400
-200
0
(m)
FREQ.
110 Hz
220 Hz
440Hz
880 Hz
1760 Hz
3520 Hz
7040 Hz
14080 Hz
HOLE 21

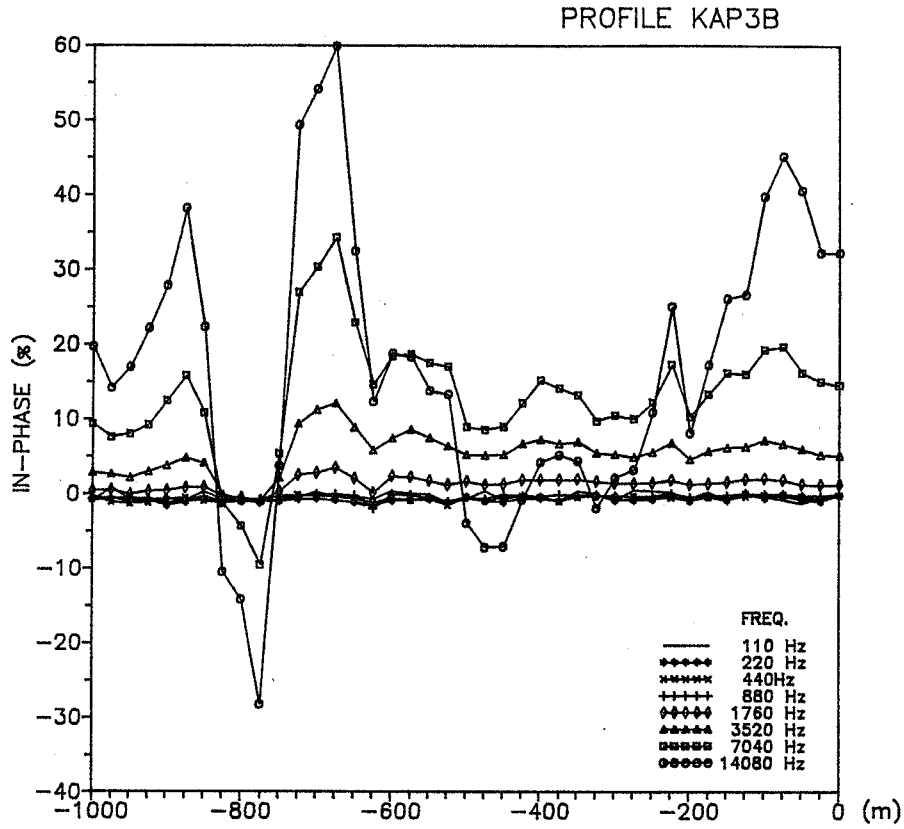

L = 100m
QUADRATURE (%)
30
20
10
0
-10
-20
-30
-40
-50
-60
-70
-1000
-800
-600
-400
-200
0
(m)

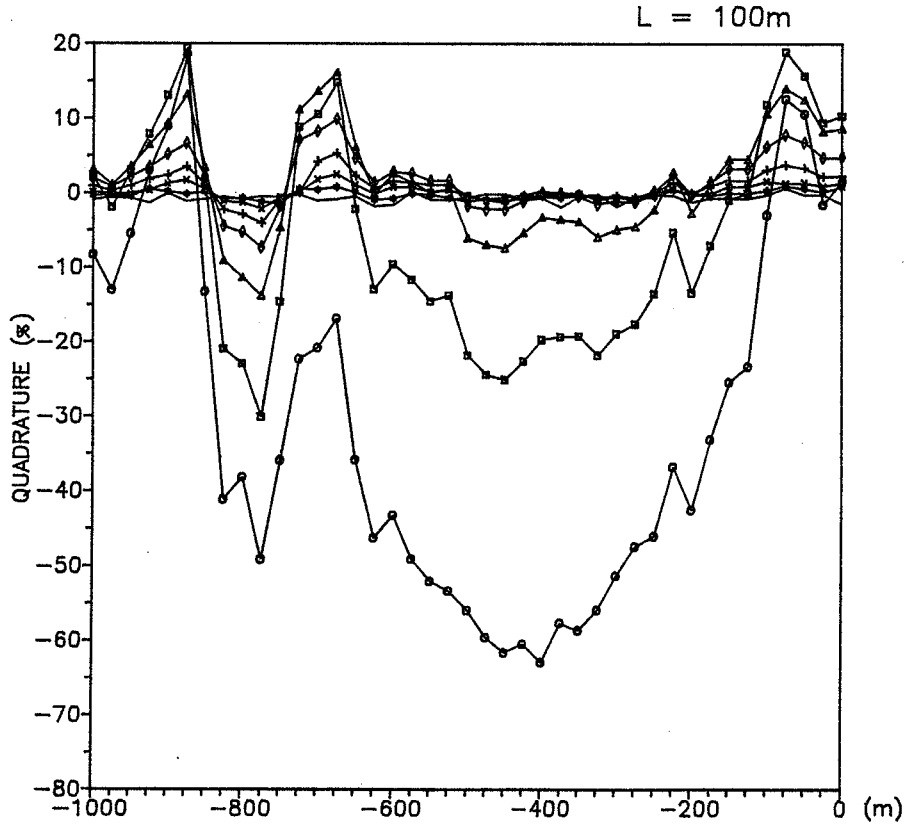

PROFILE KAP2D
IN-PHASE (%)
60
50
40
30
20
10
0
-10
-20
-30
-40
-1000
-800
-600
-400
-200
0
(m)
FREQ.
110 Hz
220 Hz
440Hz
880 Hz
1760 Hz
3520 Hz
7040 Hz
14080 Hz
HOLE 20

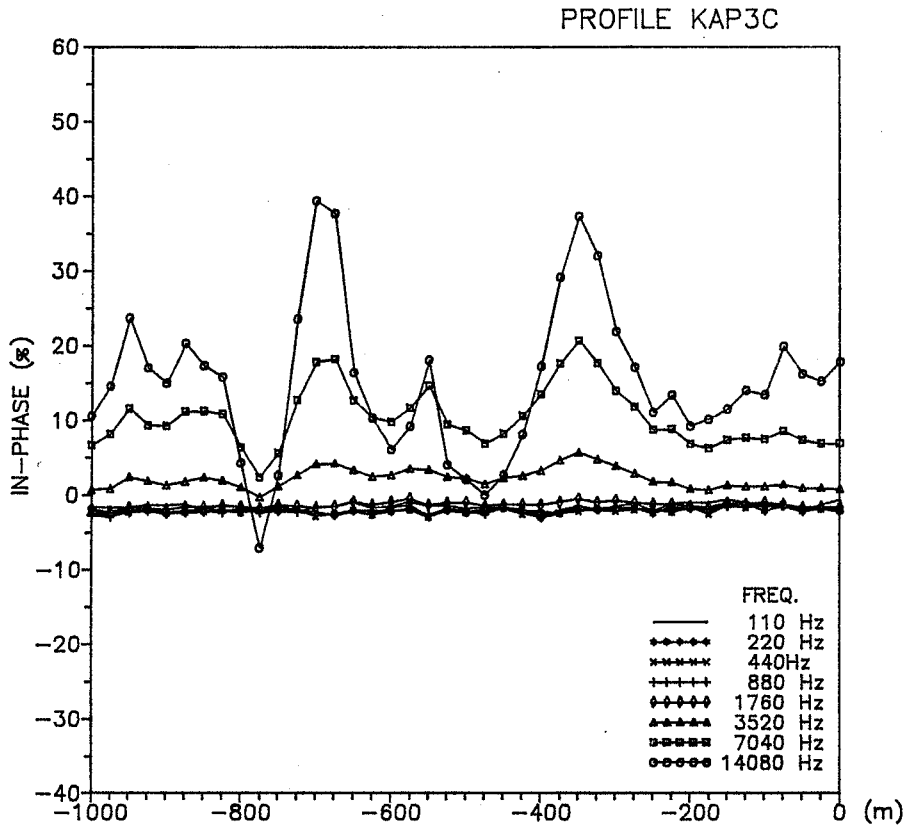

L = 100m
QUADRATURE (%)
20
10
0
-10
-20
-30
-40
-50
-60
-70
-80
-1000
-800
-600
-400
-200
0
(m)

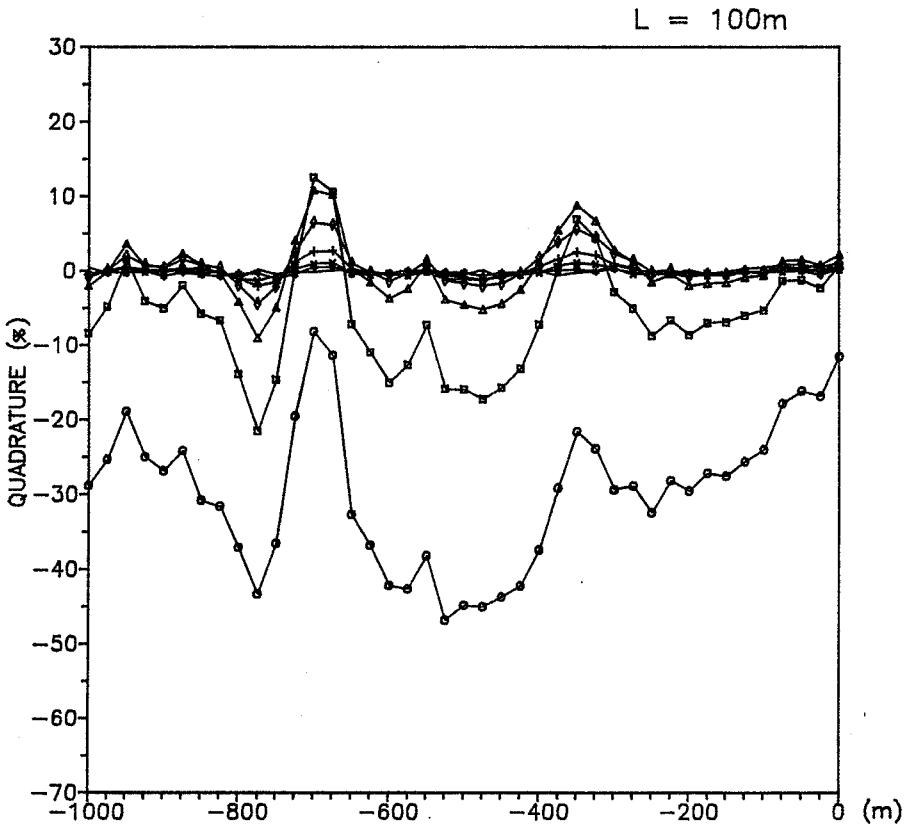

PROFILE KAP3A
IN-PHASE (%)
60
50
40
30
20
10
0
-10
-20
-30
-40
-1000
-800
-600
-400
-200
0
(m)
FREQ.
110 Hz
220 Hz
440Hz
880 Hz
1760 Hz
3520 Hz
7040 Hz
14080 Hz


L = 100m
QUADRATURE (%)
35
25
15
5
-5
-15
-25
-35
-45
-55
-65
-1000
-800
-600
-400
-200
0
(m)


PROFILE KAP3B
IN-PHASE (%)
60
50
40
30
20
10
0
-10
-20
-30
-40
-1000
-800
-600
-400
-200
0
(m)
FREQ.
110 Hz
220 Hz
440Hz
880 Hz
1760 Hz
3520 Hz
7040 Hz
14080 Hz


L = 100m
QUADRATURE (%)
20
10
0
-10
-20
-30
-40
-50
-60
-70
-80
-1000
-800
-600
-400
-200
0
(m)


PROFILE KAP3C
IN-PHASE (%)
60
50
40
30
20
10
0
-10
-20
-30
-40
-1000
-800
-600
-400
-200
0
(m)
FREQ.
110 Hz
220 Hz
440Hz
880 Hz
1760 Hz
3520 Hz
7040 Hz
14080 Hz

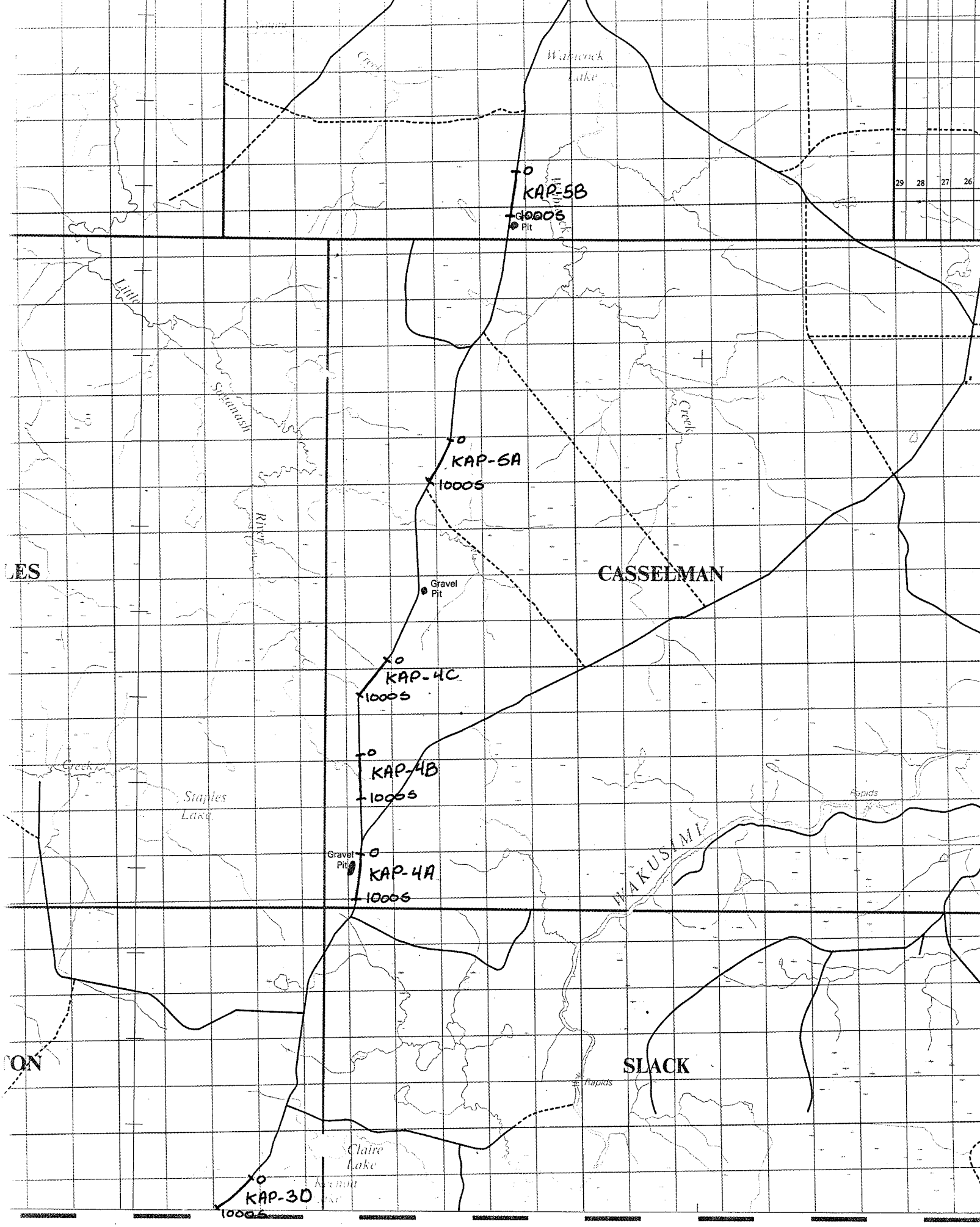

L = 100m
QUADRATURE (%)
30
20
10
0
-10
-20
-30
-40
-50
-60
-70
-1000
-800
-600
-400
-200
0
(m)

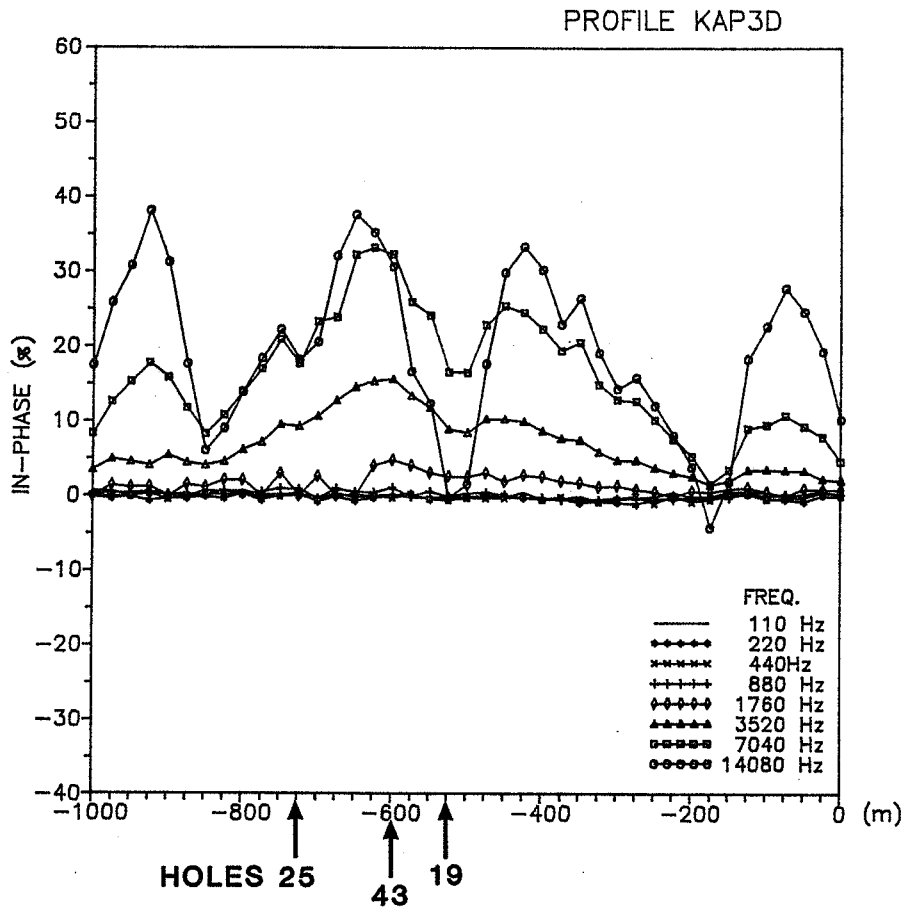
SHEET 42G/SE (KAPUSKASING)

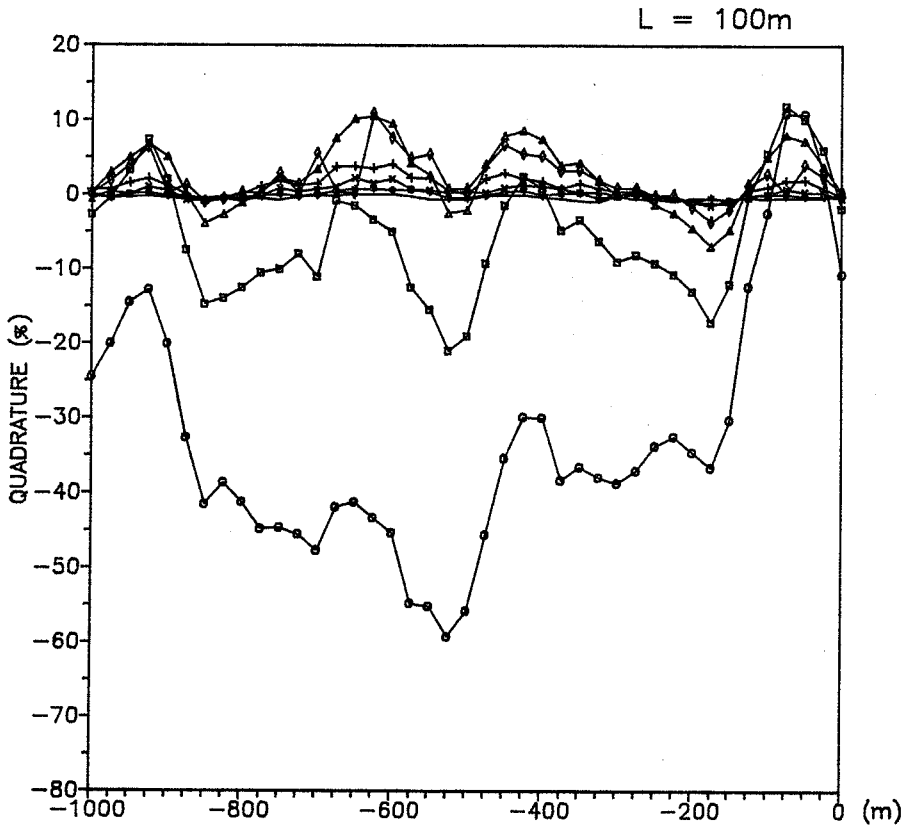
Kapuskasing (13 profiles 1000 m long, 1 profile 2000 m long)

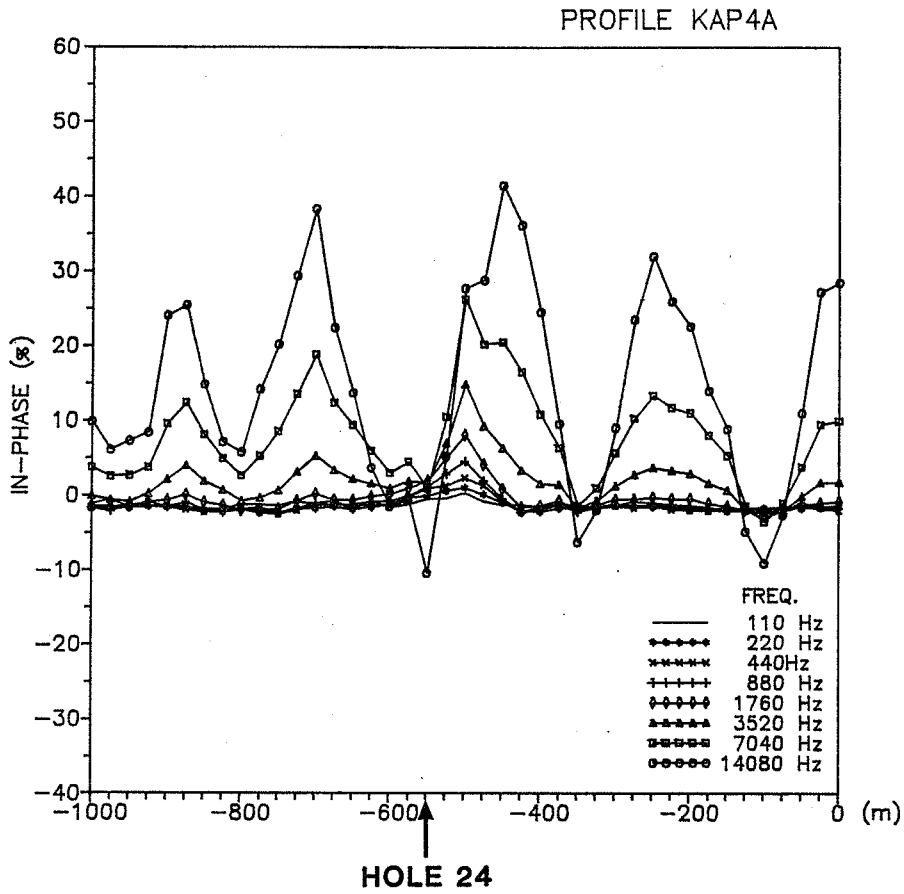
KAP-3D, KAP-4A, KAP-4B, KAP-4C, KAP-5A, KAP-5B, KAP-5C, KAP-5D, KAP-6A (2000 m), KAP-6B, KAP-7A, KAP-7B, KAP-7C, KAP-7D

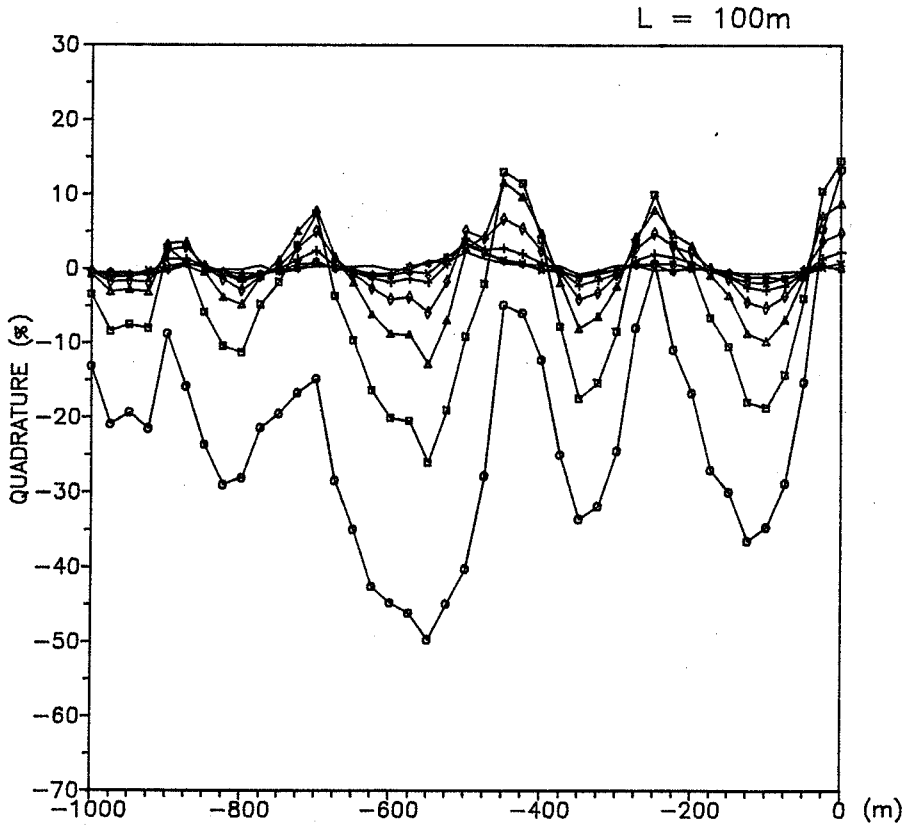
Total for the sheet 15,000 m.

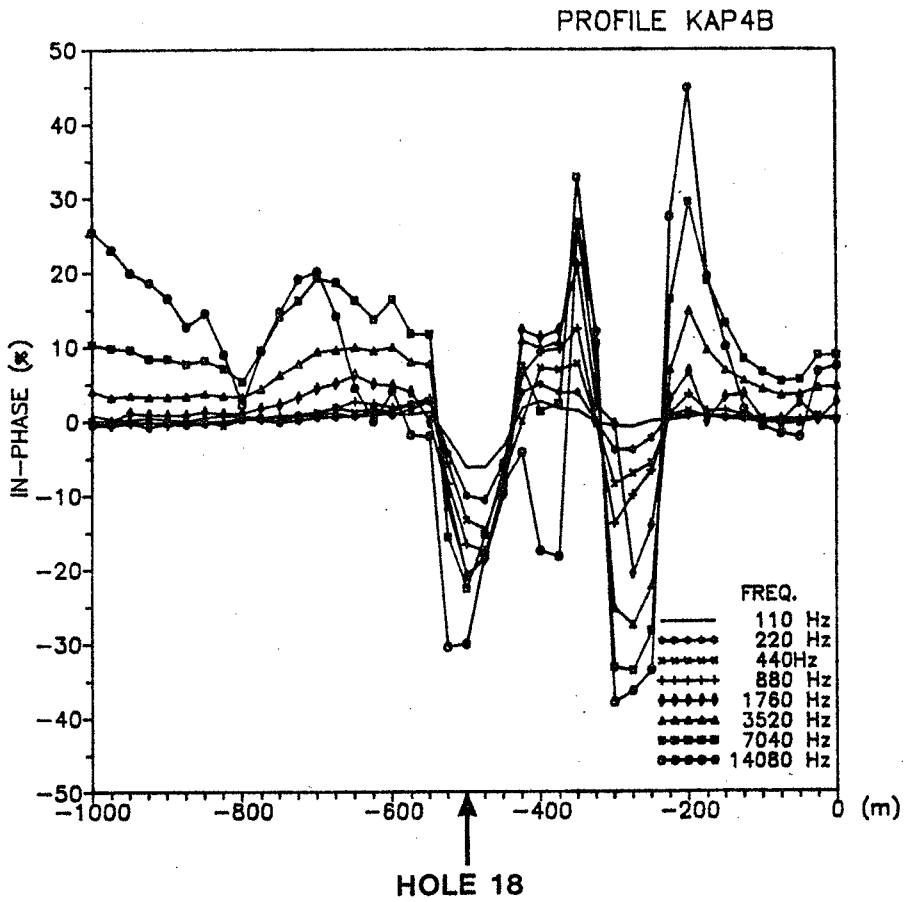

KAP-5B
0
1000S
Gravel Pit
KAP-5A
0
1000S
CASSELMAN
Gravel Pit
KAP-4C
0
1000S
KAP-4B
0
1000S
Gravel Pit
KAP-4A
0
1000S
WAKUSIMI
Rapids
SLACK
Rapids
Claire Lake
KAP-3D
0
1000S
Staples Lake
Little
Spanish
River
Creek
Waskeock Lake
29
28
27
26
30'
20'

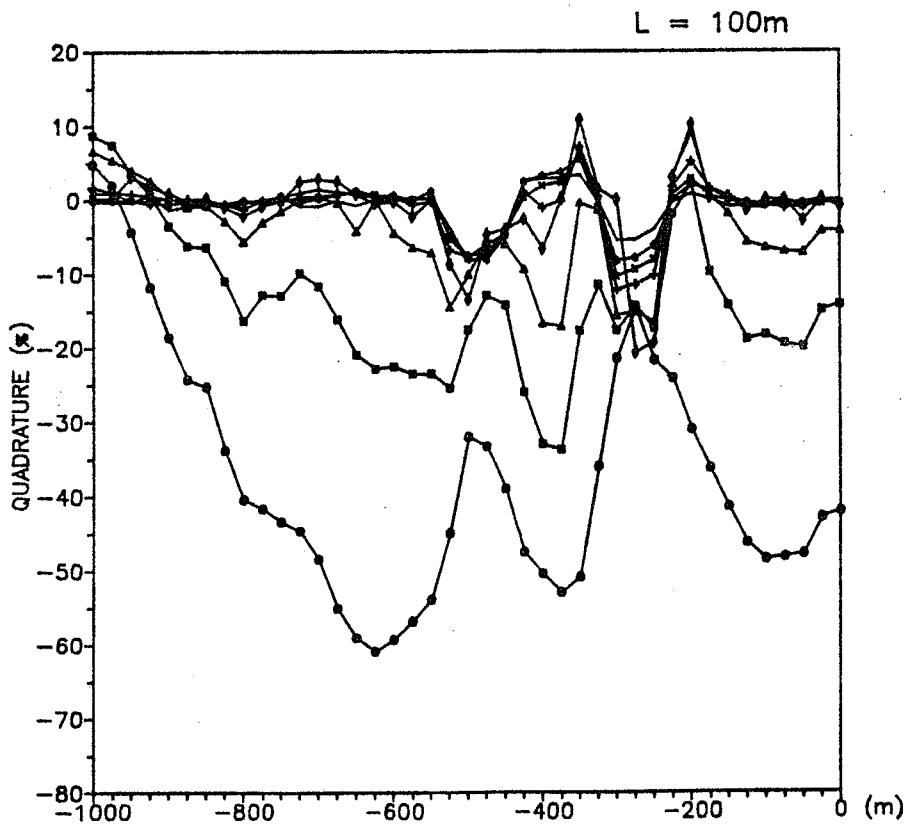

PROFILE KAP3D
IN-PHASE (%)
60
50
40
30
20
10
0
-10
-20
-30
-40
-1000
-800
-600
-400
-200
0 (m)
FREQ.
110 Hz
220 Hz
440Hz
880 Hz
1760 Hz
3520 Hz
7040 Hz
14080 Hz
HOLES 25
43
19

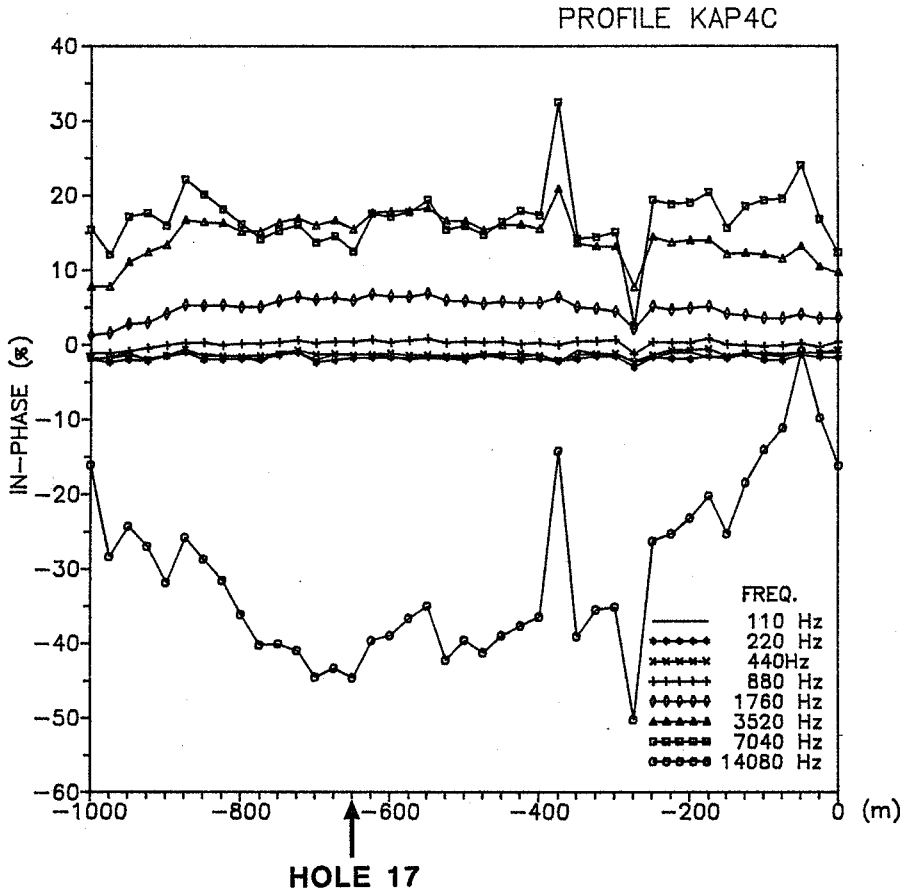

L = 100m
QUADRATURE (%)
20
10
0
-10
-20
-30
-40
-50
-60
-70
-80
-1000
-800
-600
-400
-200
0 (m)

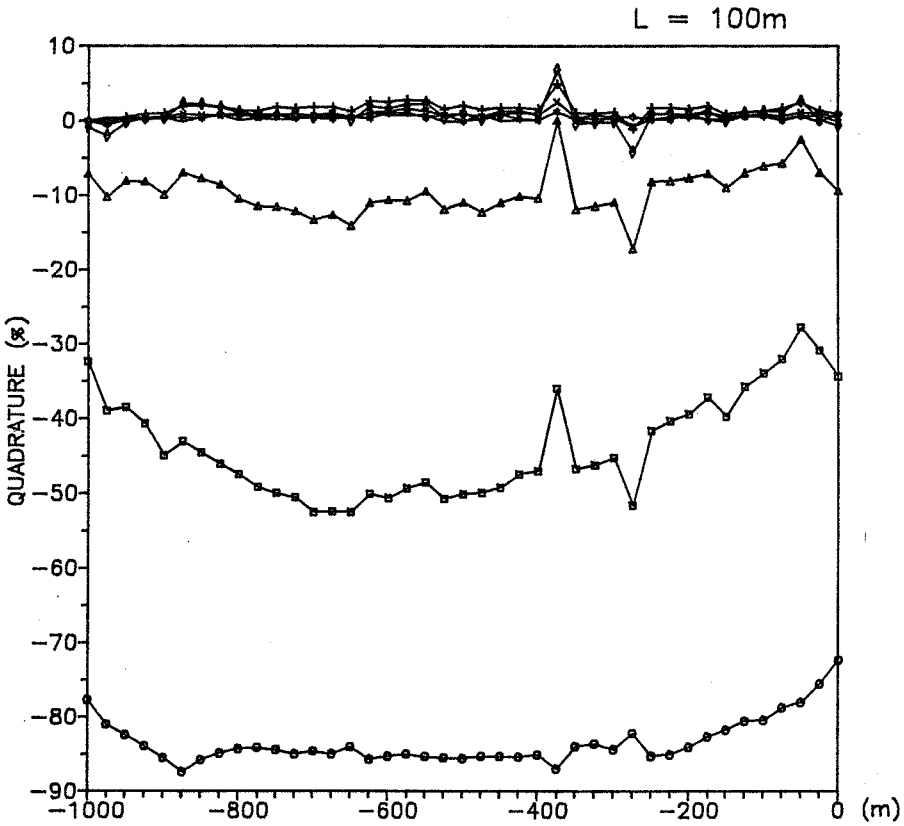

PROFILE KAP4A
IN-PHASE (%)
60
50
40
30
20
10
0
-10
-20
-30
-40
-1000
-800
-600
-400
-200
0
(m)
FREQ.
110 Hz
220 Hz
440Hz
880 Hz
1760 Hz
3520 Hz
7040 Hz
14080 Hz
HOLE 24

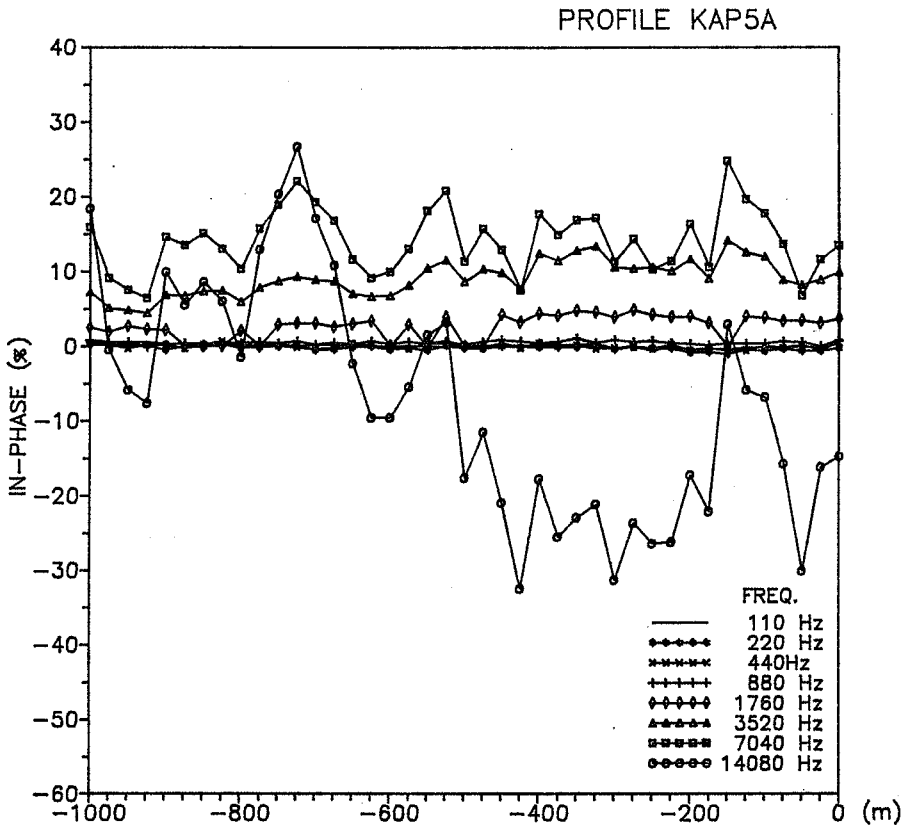

L = 100m
QUADRATURE (%)
30
20
10
0
-10
-20
-30
-40
-50
-60
-70
-1000
-800
-600
-400
-200
0
(m)

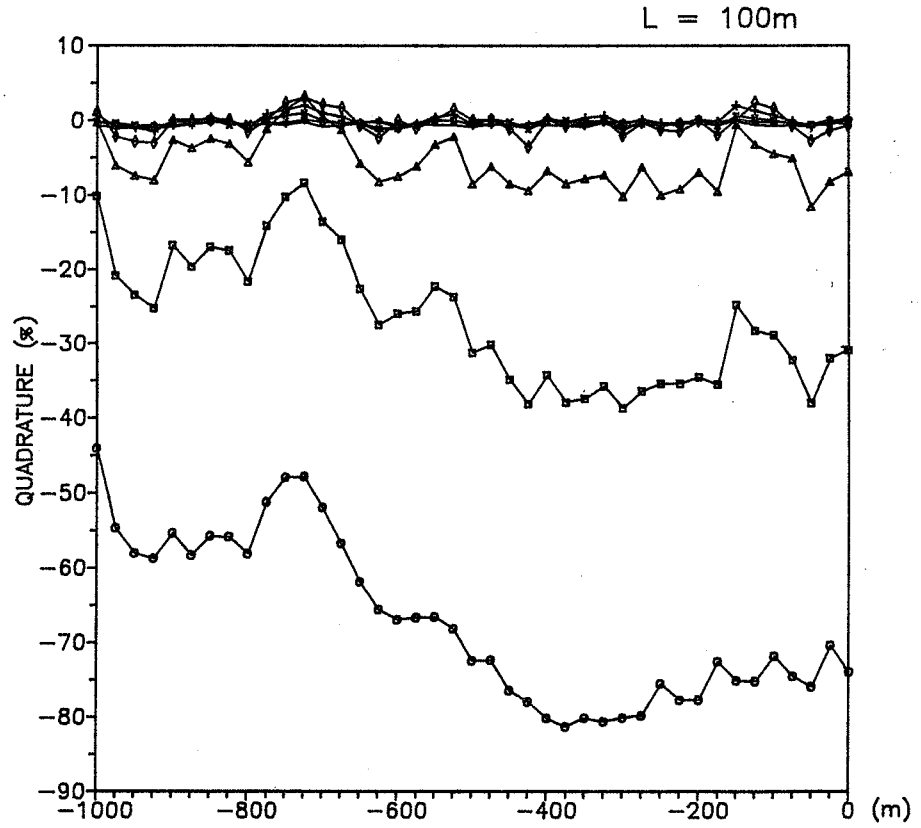

PROFILE KAP4B
IN-PHASE (%)
50
40
30
20
10
0
-10
-20
-30
-40
-50
-1000
-800
-600
-400
-200
0
(m)
FREQ.
110 Hz
220 Hz
440Hz
880 Hz
1760 Hz
3520 Hz
7040 Hz
14080 Hz
HOLE 18

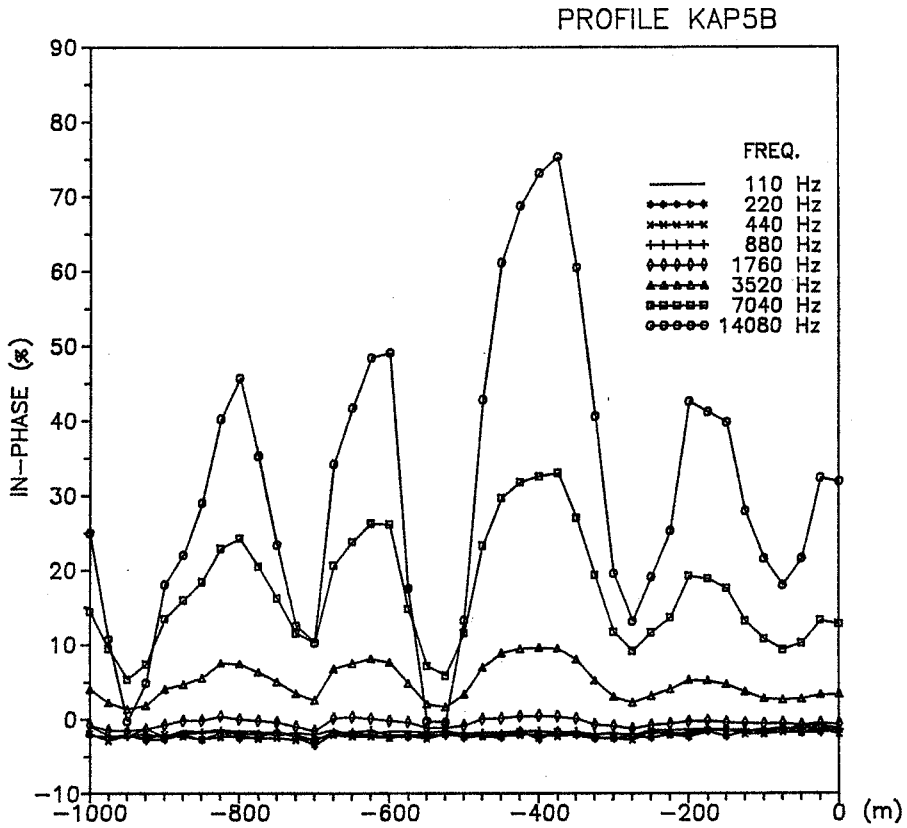

L = 100m
QUADRATURE (%)
20
10
0
-10
-20
-30
-40
-50
-60
-70
-80
-1000
-800
-600
-400
-200
0
(m)

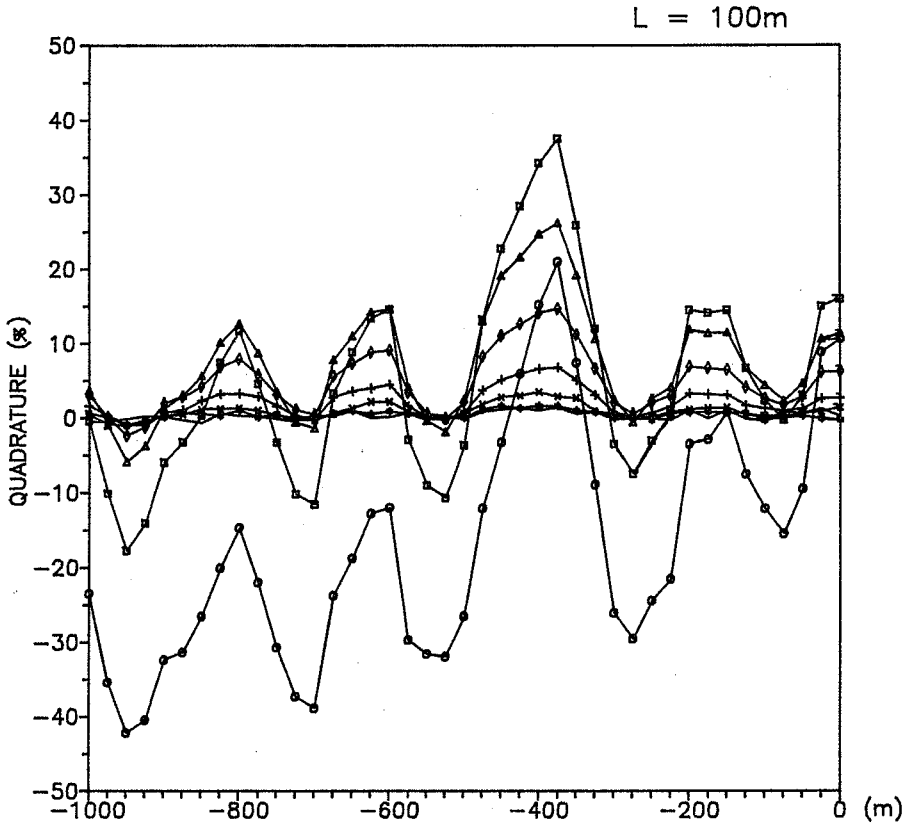

PROFILE KAP4C
IN-PHASE (%)
40
30
20
10
0
-10
-20
-30
-40
-50
-60
-1000
-800
-600
-400
-200
0 (m)
FREQ.
110 Hz
220 Hz
440Hz
880 Hz
1760 Hz
3520 Hz
7040 Hz
14080 Hz
HOLE 17

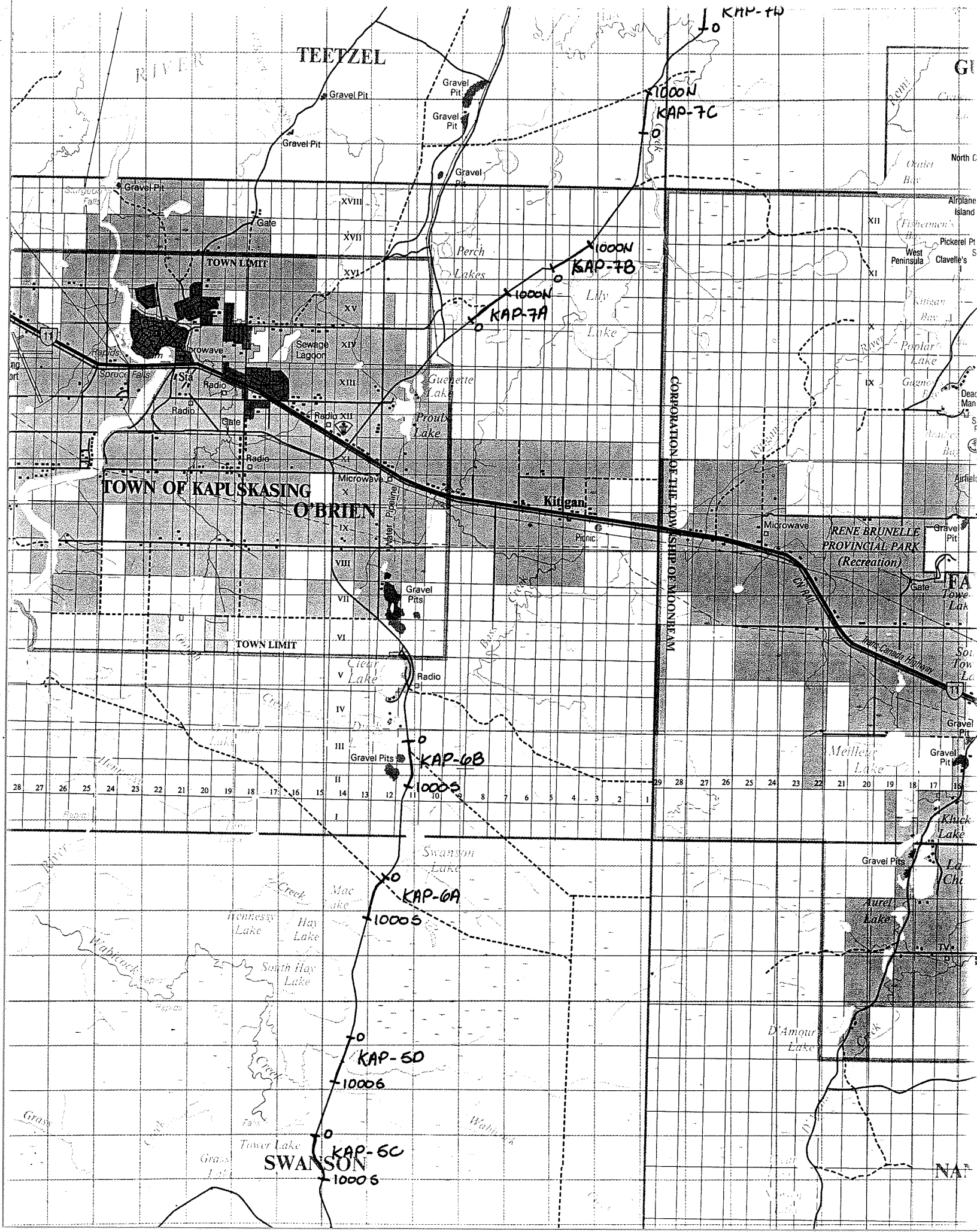

L = 100m
QUADRATURE (%)
10
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
-1000
-800
-600
-400
-200
0 (m)

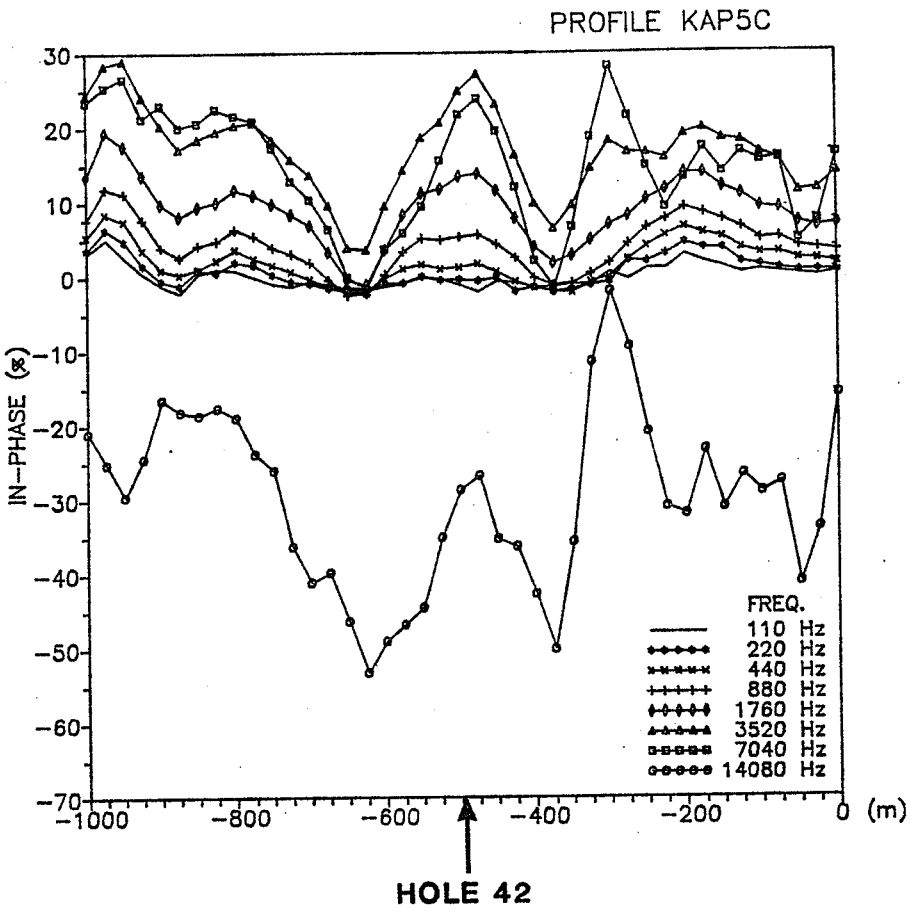

PROFILE KAP5A
IN-PHASE (%)
40
30
20
10
0
-10
-20
-30
-40
-50
-60
-1000
-800
-600
-400
-200
0
(m)
FREQ.
110 Hz
220 Hz
440Hz
880 Hz
1760 Hz
3520 Hz
7040 Hz
14080 Hz

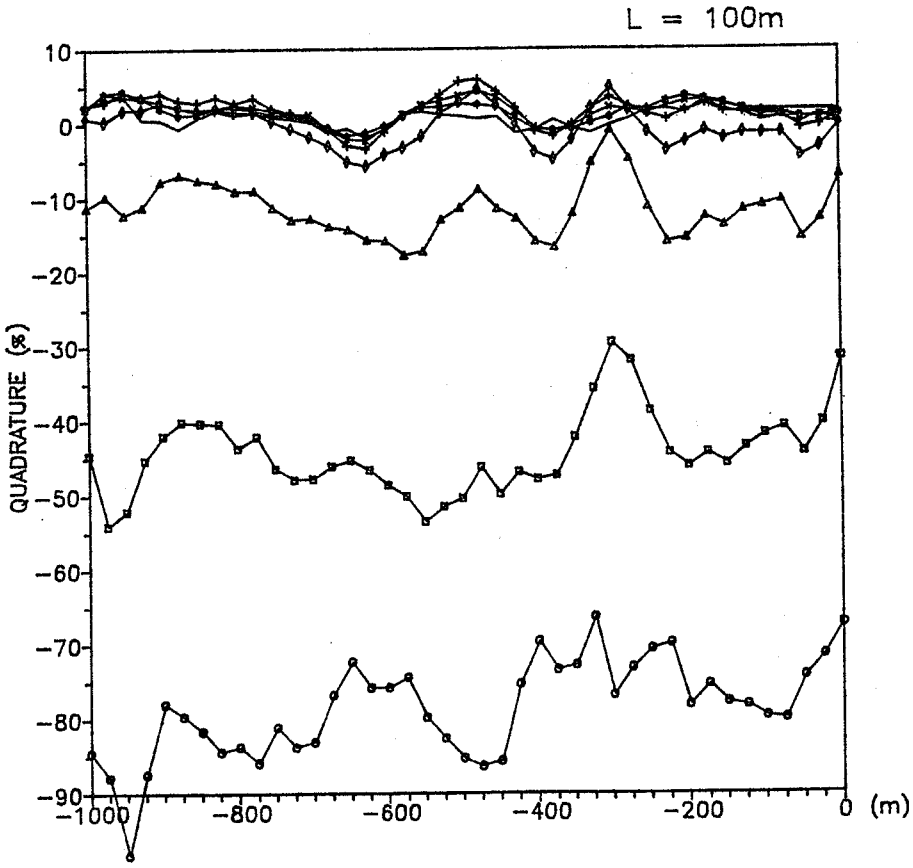

L = 100m
QUADRATURE (%)
10
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
-1000
-800
-600
-400
-200
0
(m)

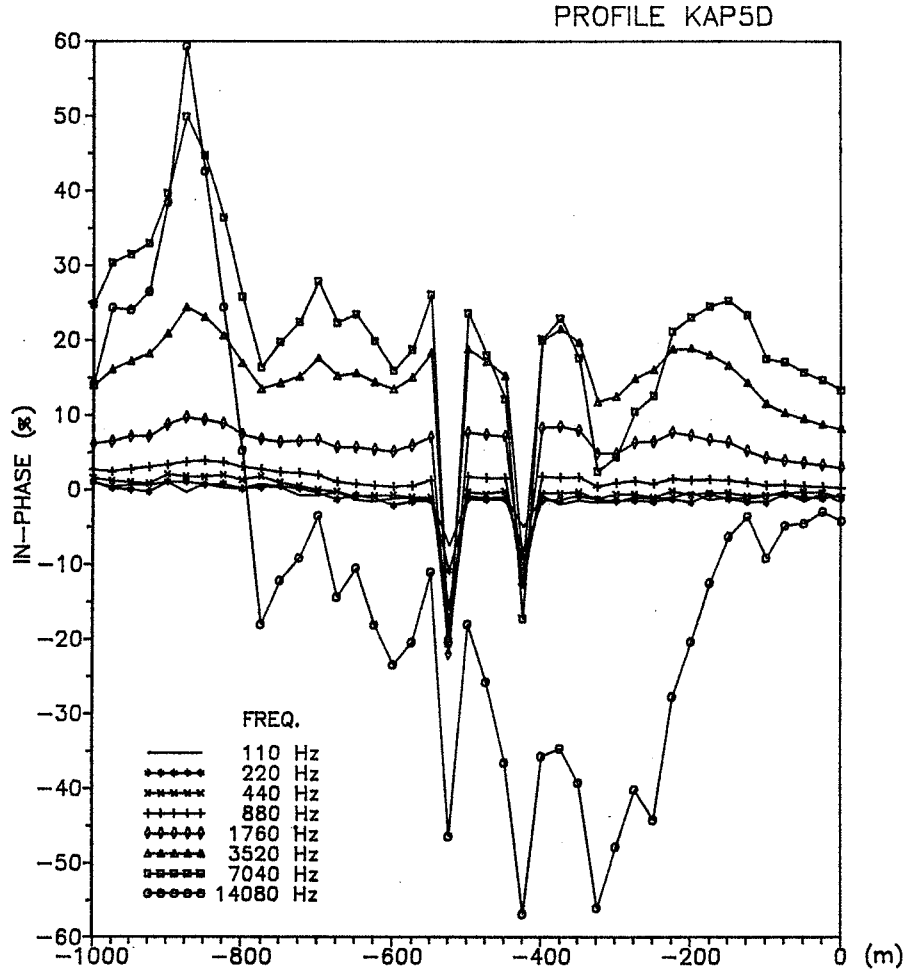

PROFILE KAP5B
FREQ.
110 Hz
220 Hz
440 Hz
880 Hz
1760 Hz
3520 Hz
7040 Hz
14080 Hz
IN-PHASE (%)
90
80
70
60
50
40
30
20
10
0
-10
-1000
-800
-600
-400
-200
0
(m)

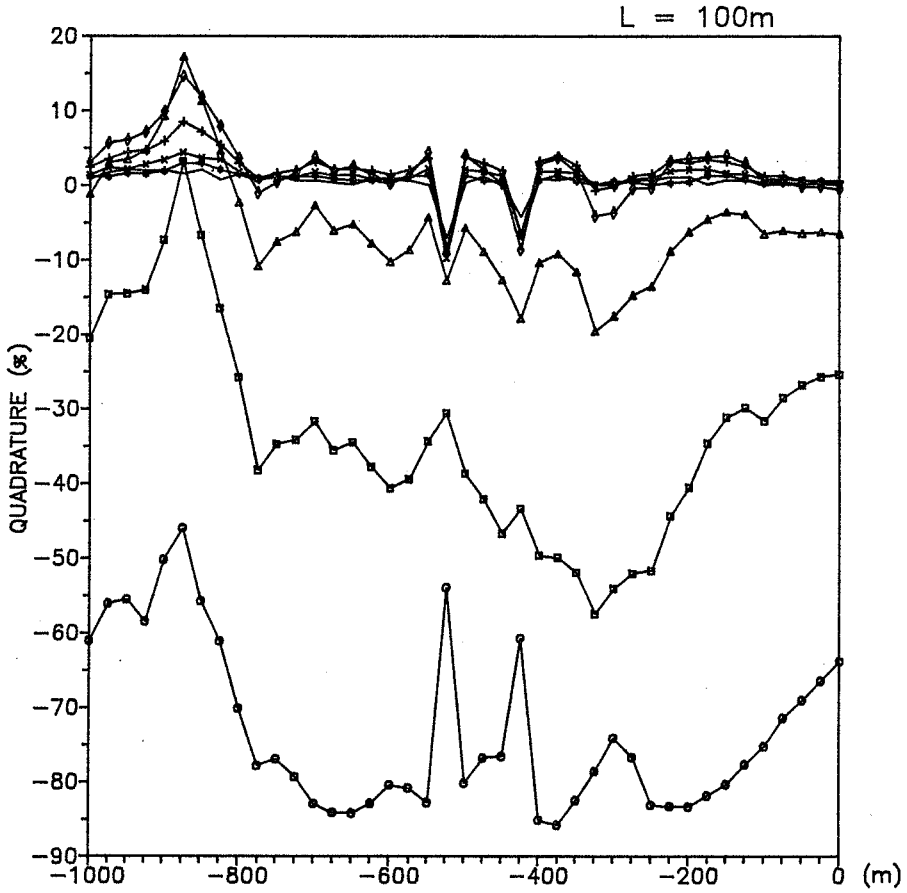

L = 100m
QUADRATURE (%)
50
40
30
20
10
0
-10
-20
-30
-40
-50
-1000
-800
-600
-400
-200
0
(m)

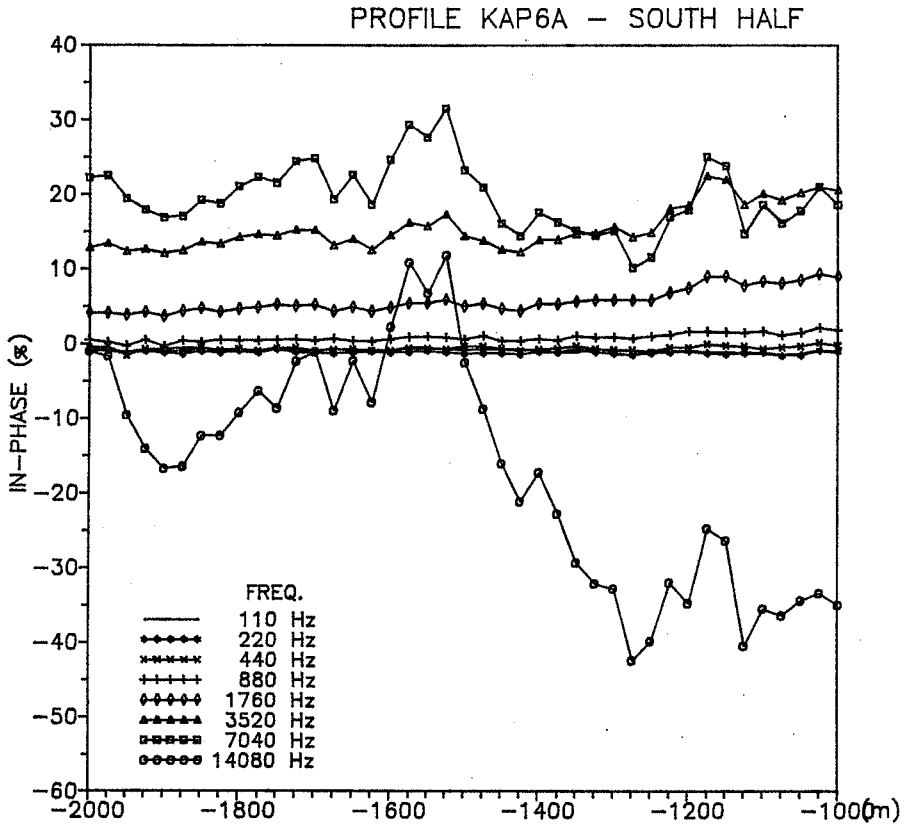

TEETZEL
RIVER
Gravel Pit
Gate
TOWN LIMIT
Sewage Lagoon
Radio
Microwave
Sta
Rapids
Spruce Falls
Perch Lakes
Lily Lake
Guenette Lake
Proulx Lake
TOWN OF KAPUSKASING
O'BRIEN
Water Pipeline
Kittgan
Picnic
CORRIDOR OF THE TOWNSHIP OF MOONBEAM
RENE BRUNELLE PROVINCIAL PARK (Recreation)
Trans-Canada Highway
Gravel Pits
Clear Lake
Swanson Lake
Mac Lake
Ironness'y Lake
Hay Lake
South Hay Lake
Tower Lake
SWANSON
Meilleur Lake
Kluck Lake
Laurel Lake
D'Amour Lake
Poplar Lake
Airplane Island
Pickerel Pt
West Peninsula
Clavelle's
KAP-7D
1000N
KAP-7C
1000N
KAP-7B
1000N
KAP-7A
KAP-6B
1000S
KAP-6A
1000S
KAP-5D
1000S
KAP-5C
1000S

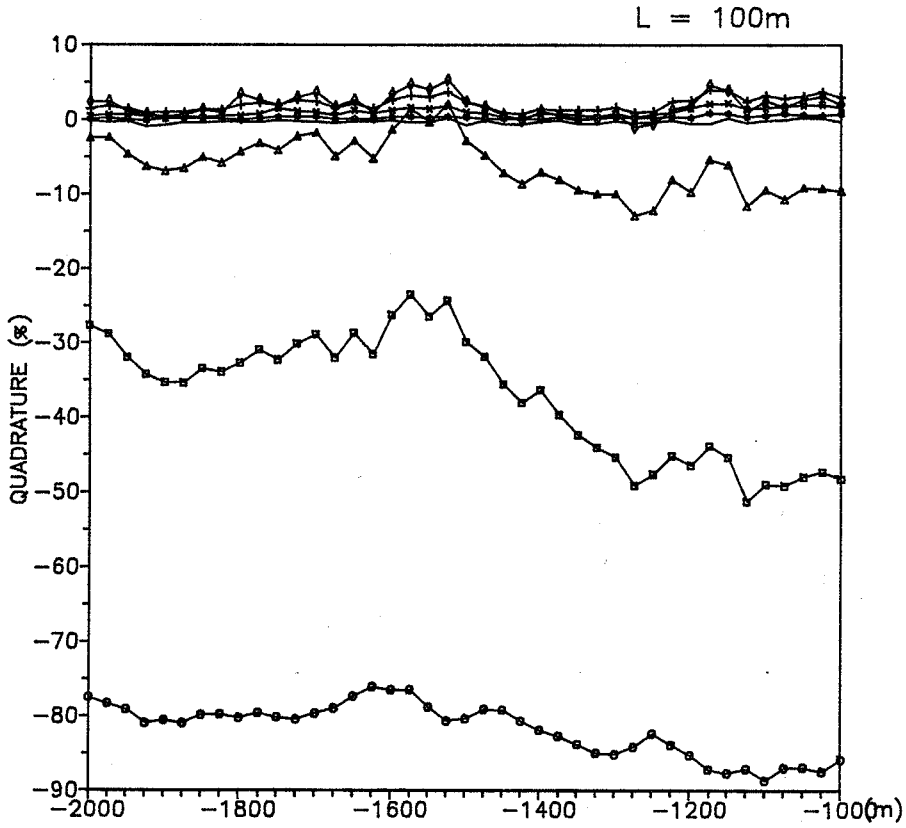

PROFILE KAP5C
IN-PHASE (%)
30
20
10
0
-10
-20
-30
-40
-50
-60
-70
-1000
-800
-600
-400
-200
0
(m)
FREQ.
110 Hz
220 Hz
440 Hz
880 Hz
1760 Hz
3520 Hz
7040 Hz
14080 Hz
HOLE 42

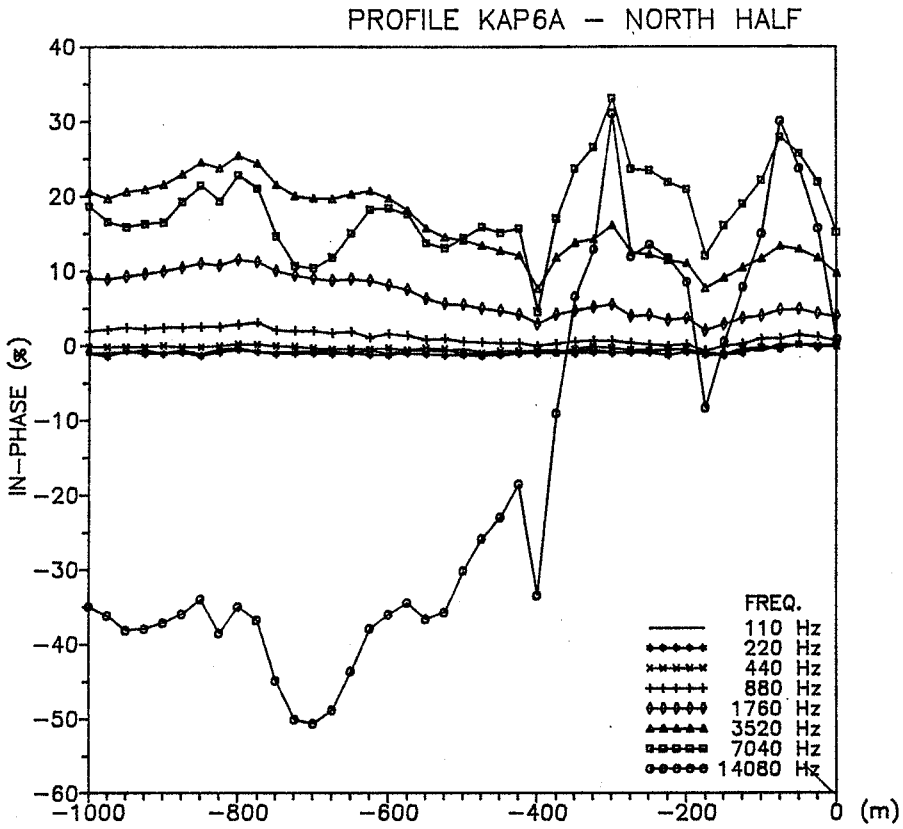

L = 100m
QUADRATURE (%)
10
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
-1000
-800
-600
-400
-200
0
(m)

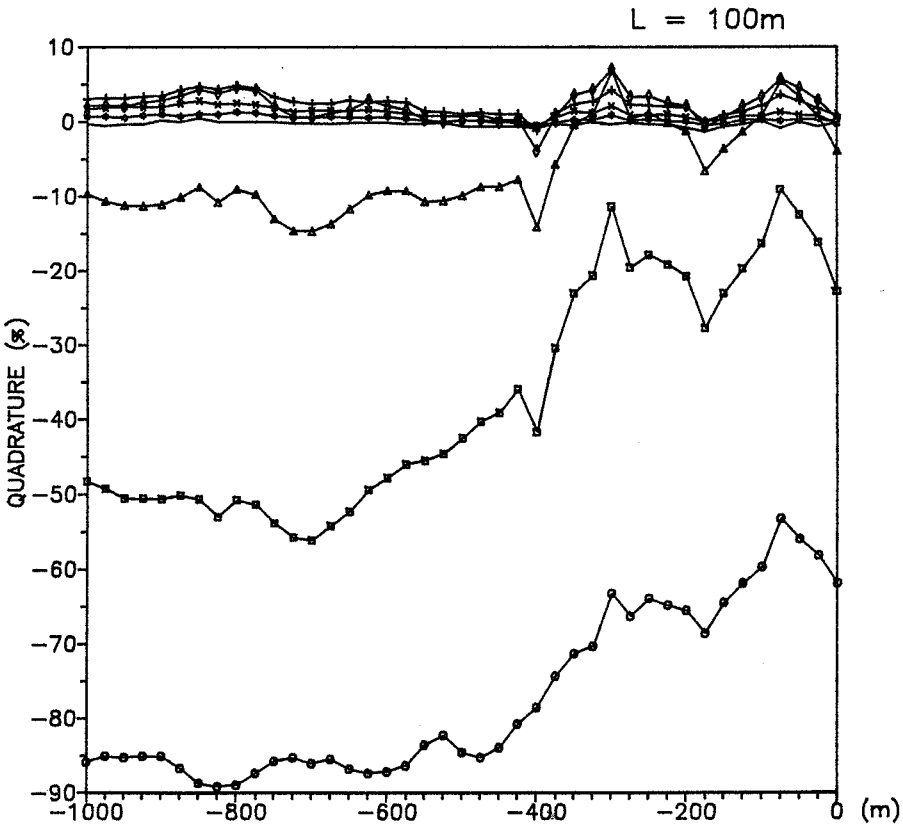

PROFILE KAP5D
IN-PHASE (%)
60
50
40
30
20
10
0
-10
-20
-30
-40
-50
-60
-1000
-800
-600
-400
-200
0
(m)
FREQ.
110 Hz
220 Hz
440 Hz
880 Hz
1760 Hz
3520 Hz
7040 Hz
14080 Hz

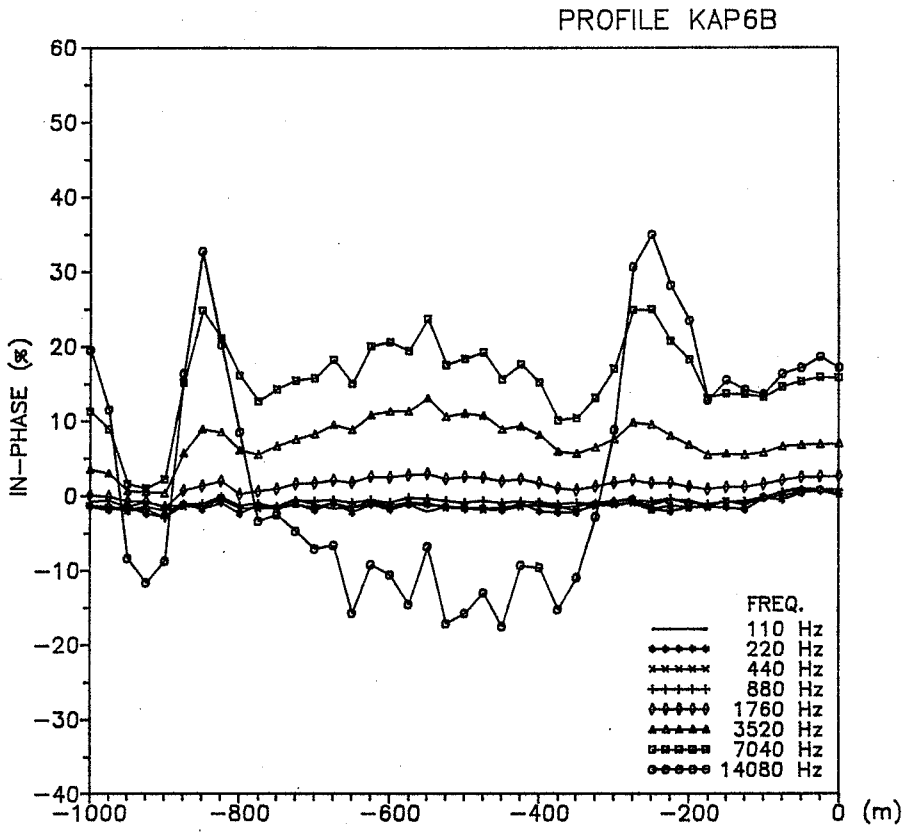

L = 100m
QUADRATURE (%)
20
10
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
-1000
-800
-600
-400
-200
0
(m)

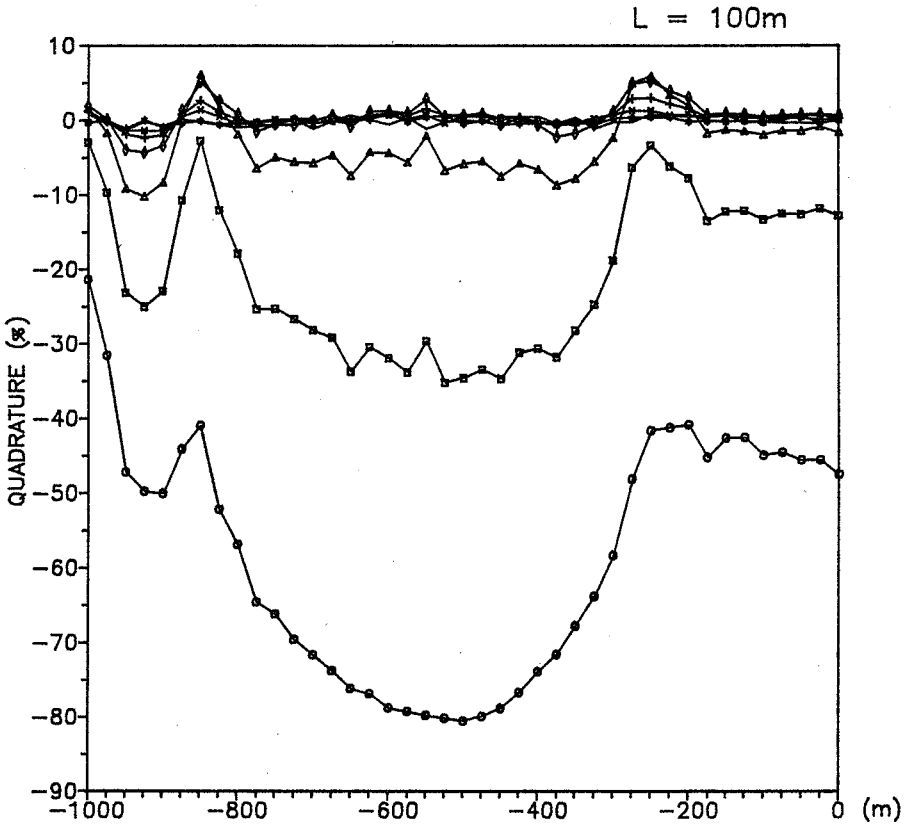

PROFILE KAP6A – SOUTH HALF
IN-PHASE (%)
40
30
20
10
0
-10
-20
-30
-40
-50
-60
-2000
-1800
-1600
-1400
-1200
-1000
(m)
FREQ.
110 Hz
220 Hz
440 Hz
880 Hz
1760 Hz
3520 Hz
7040 Hz
14080 Hz

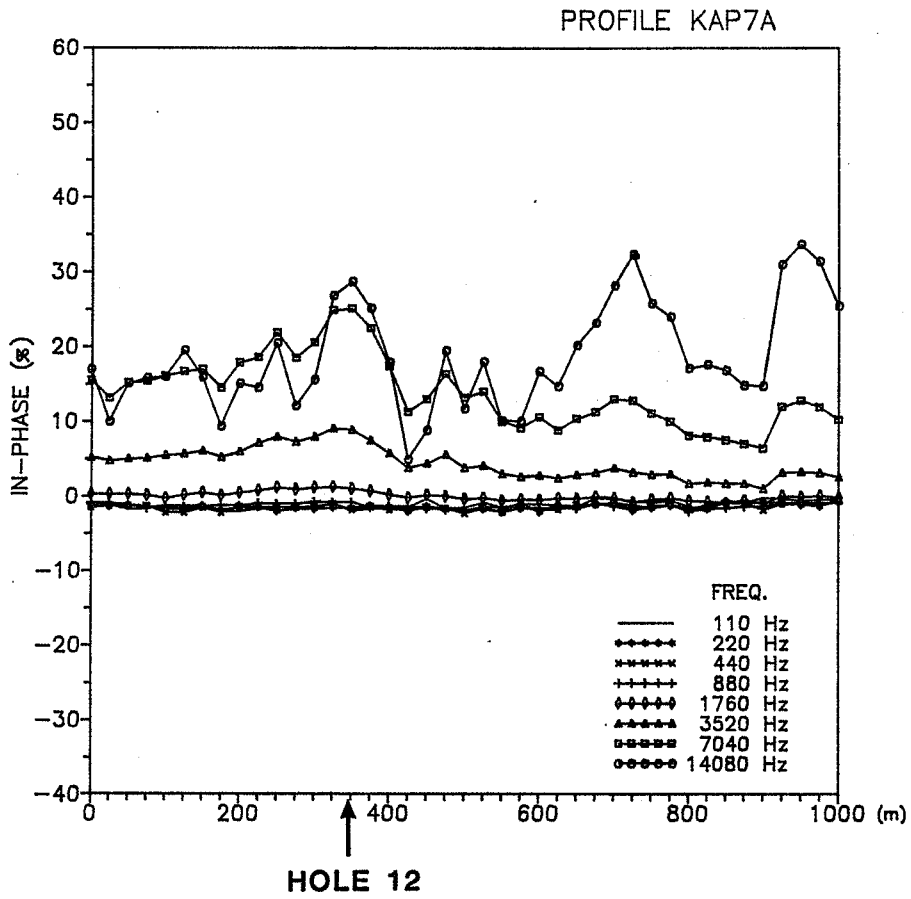

L = 100m
QUADRATURE (%)
10
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
-2000
-1800
-1600
-1400
-1200
-1000
(m)

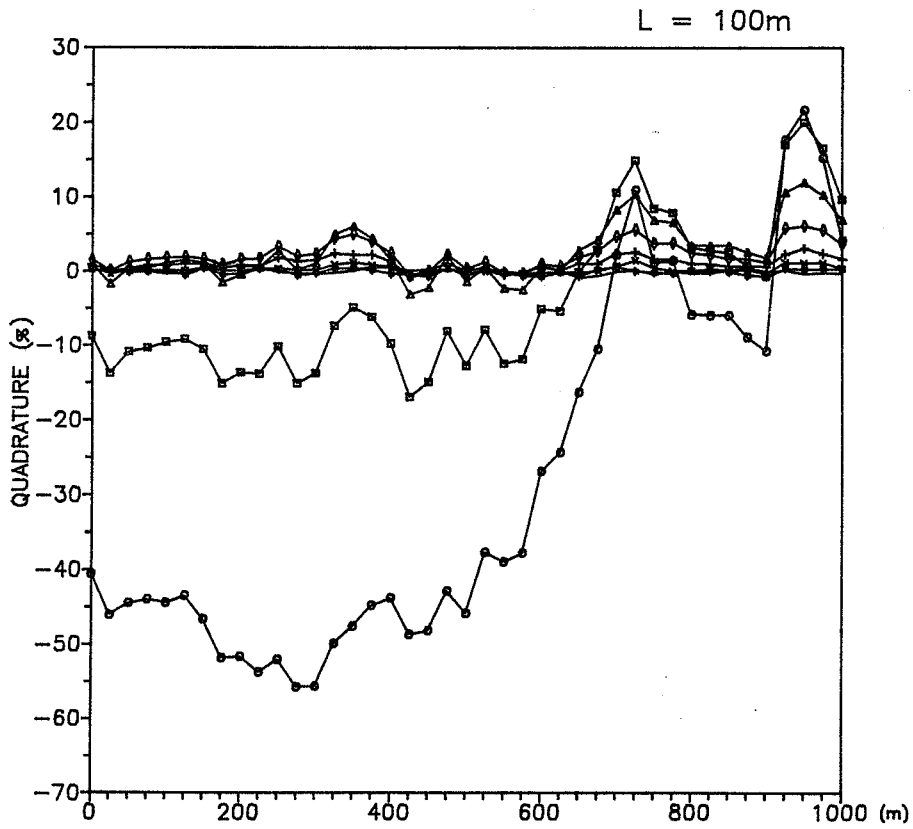

PROFILE KAP6A – NORTH HALF
IN-PHASE (%)
40
30
20
10
0
−10
−20
−30
−40
−50
−60
−1000
−800
−600
−400
−200
0
(m)
FREQ.
110 Hz
220 Hz
440 Hz
880 Hz
1760 Hz
3520 Hz
7040 Hz
14080 Hz

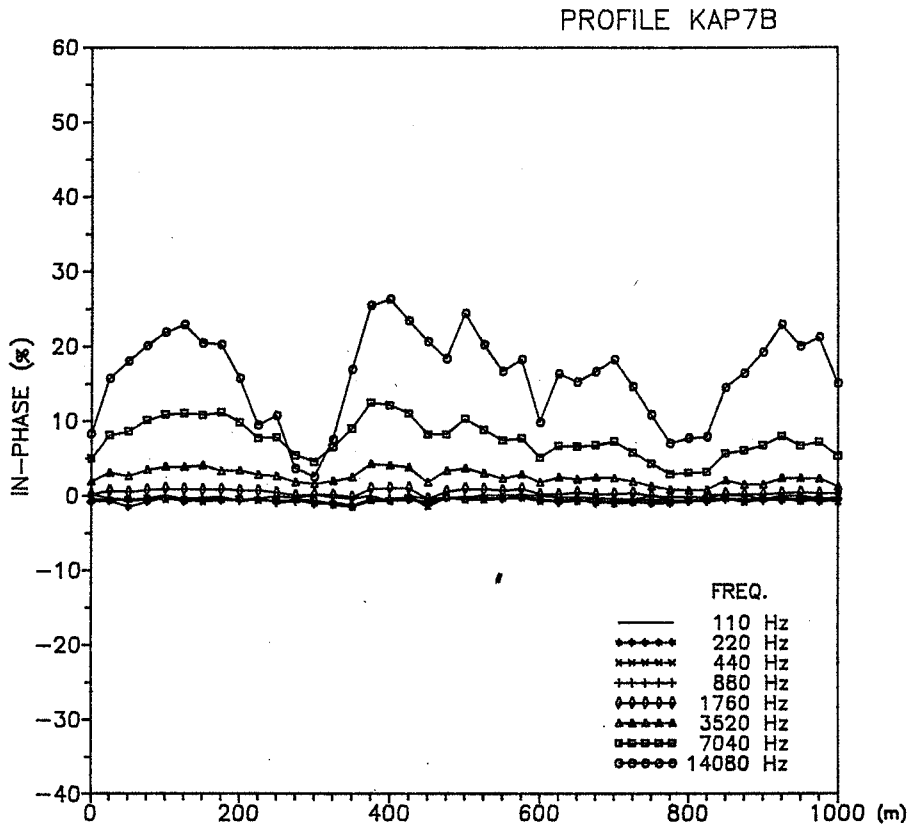

L = 100m
QUADRATURE (%)
10
0
−10
−20
−30
−40
−50
−60
−70
−80
−90
−1000
−800
−600
−400
−200
0
(m)

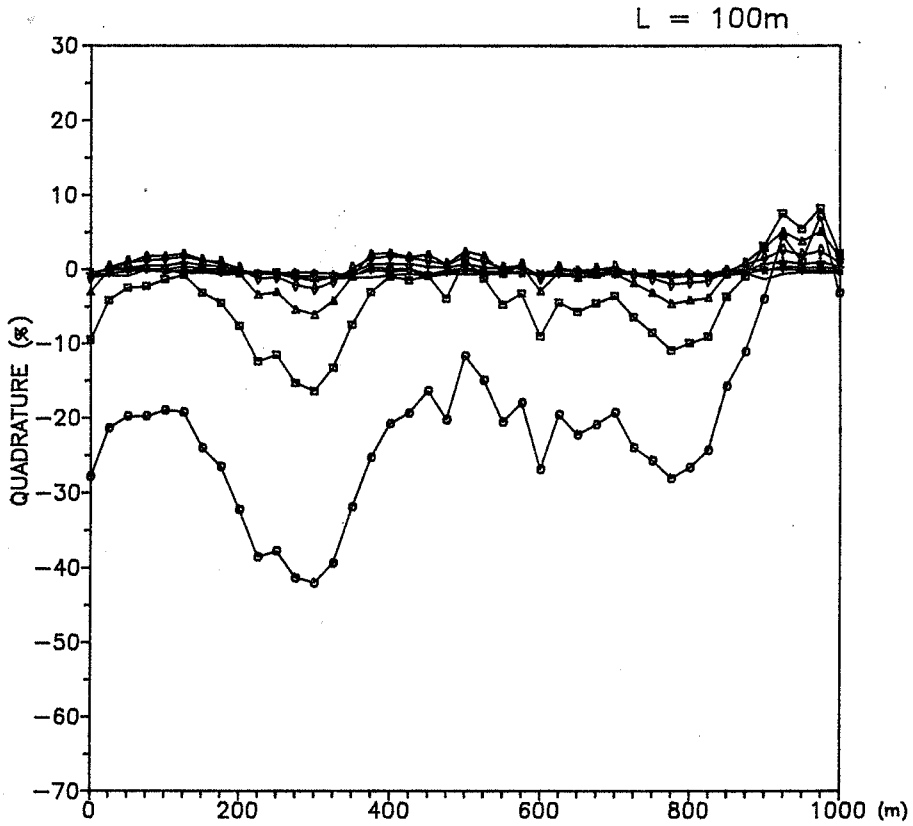

PROFILE KAP6B
IN-PHASE (%)
60
50
40
30
20
10
0
-10
-20
-30
-40
-1000
-800
-600
-400
-200
0
(m)
FREQ.
110 Hz
220 Hz
440 Hz
880 Hz
1760 Hz
3520 Hz
7040 Hz
14080 Hz

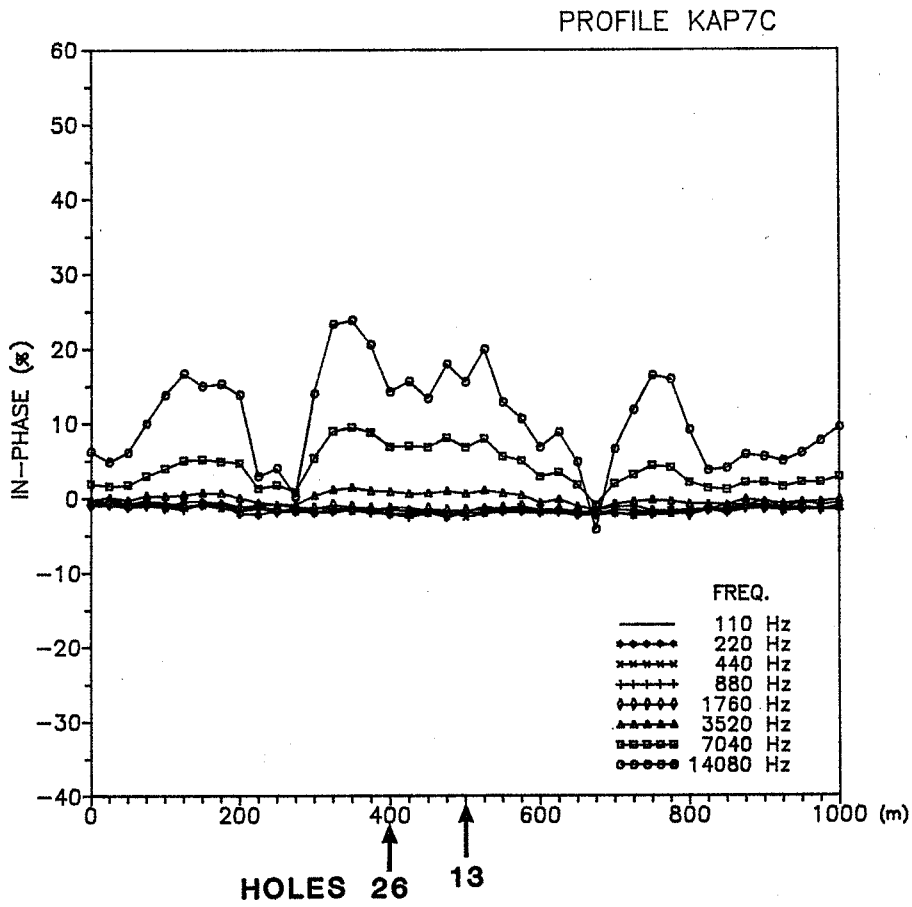

L = 100m
QUADRATURE (%)
10
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
-1000
-800
-600
-400
-200
0
(m)

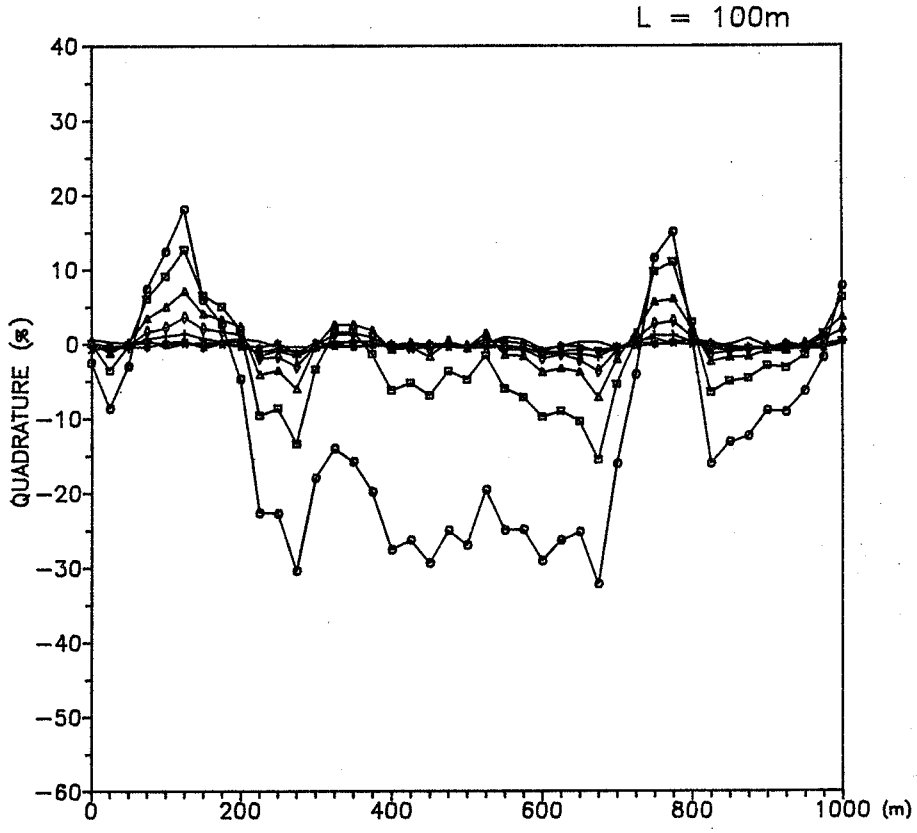

PROFILE KAP7A
IN-PHASE (%)
60
50
40
30
20
10
0
-10
-20
-30
-40
0
200
400
600
800
1000 (m)
FREQ.
110 Hz
220 Hz
440 Hz
880 Hz
1760 Hz
3520 Hz
7040 Hz
14080 Hz
HOLE 12

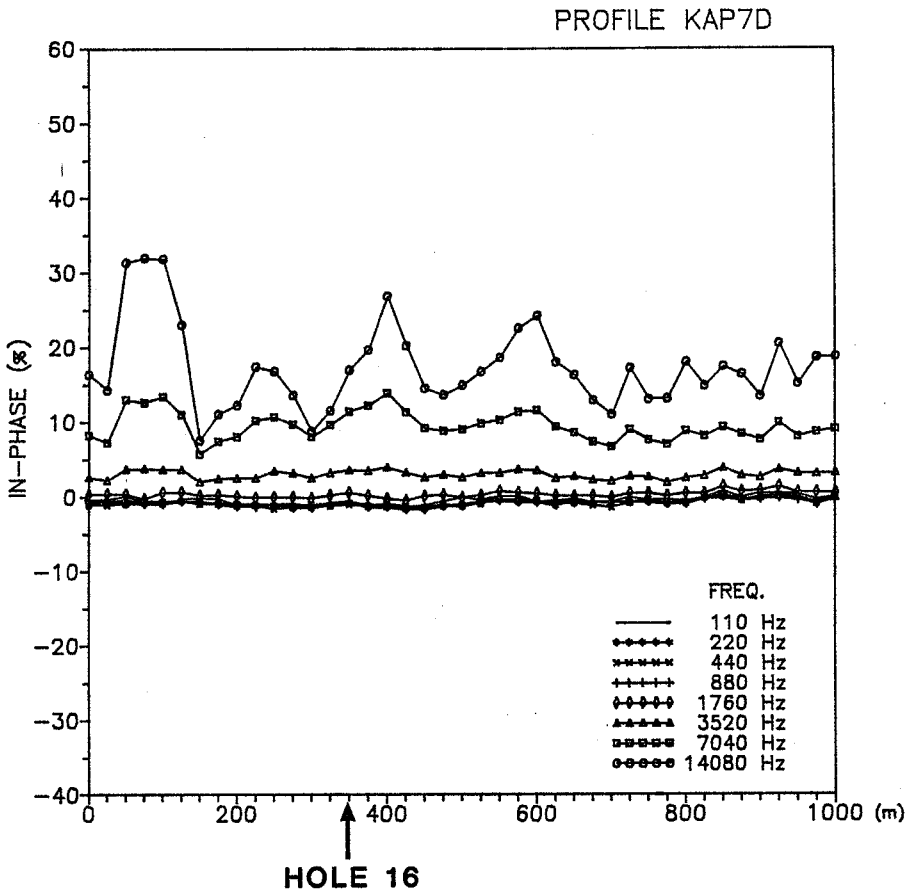

L = 100m
QUADRATURE (%)
30
20
10
0
-10
-20
-30
-40
-50
-60
-70
0
200
400
600
800
1000 (m)

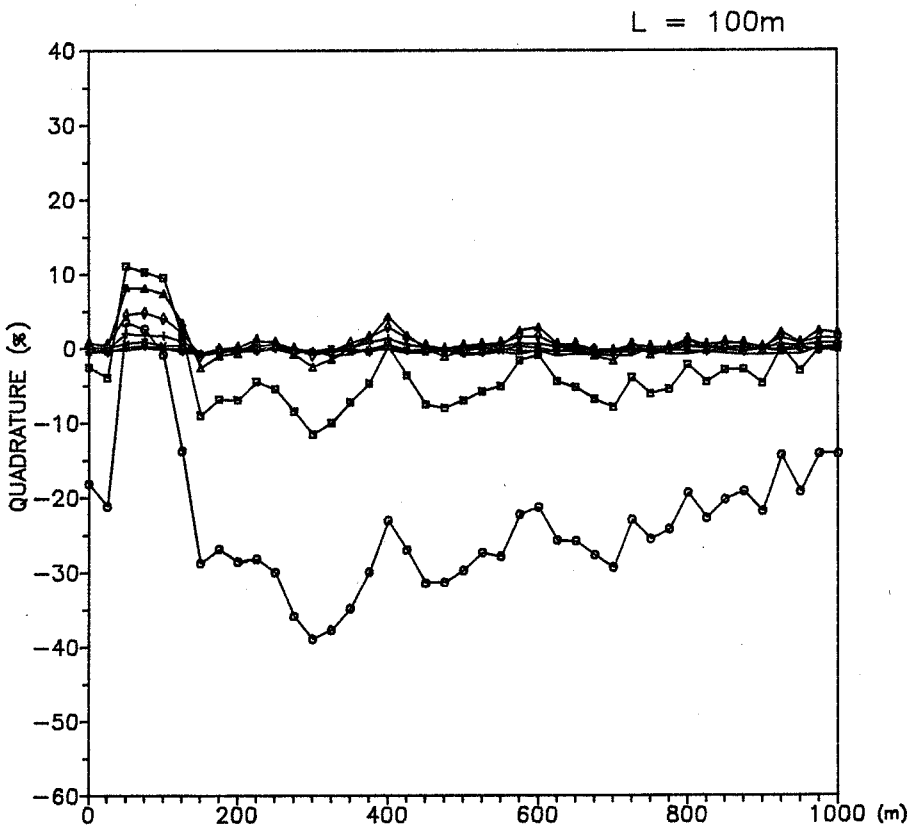

PROFILE KAP7B
IN-PHASE (%)
60
50
40
30
20
10
0
-10
-20
-30
-40
0
200
400
600
800
1000 (m)
FREQ.
110 Hz
220 Hz
440 Hz
880 Hz
1760 Hz
3520 Hz
7040 Hz
14080 Hz


L = 100m
QUADRATURE (%)
30
20
10
0
-10
-20
-30
-40
-50
-60
-70
0
200
400
600
800
1000 (m)


PROFILE KAP7C
IN-PHASE (%)
60
50
40
30
20
10
0
-10
-20
-30
-40
0
200
400
600
800
1000 (m)
FREQ.
110 Hz
220 Hz
440 Hz
880 Hz
1760 Hz
3520 Hz
7040 Hz
14080 Hz
HOLES 26
13


L = 100m
QUADRATURE (%)
40
30
20
10
0
-10
-20
-30
-40
-50
-60
0
200
400
600
800
1000 (m)


PROFILE KAP7D
IN-PHASE (%)
60
50
40
30
20
10
0
-10
-20
-30
-40
0
200
400
600
800
1000 (m)
FREQ.
110 Hz
220 Hz
440 Hz
880 Hz
1760 Hz
3520 Hz
7040 Hz
14080 Hz
HOLE 16


L = 100m
QUADRATURE (%)
40
30
20
10
0
-10
-20
-30
-40
-50
-60
0
200
400
600
800
1000 (m)

SHEET 42G/NE (GUILFOYLE LAKE)

Kapuskasing (3 profiles 1000 m long, 1 line 1400 m long)

KAP-7E, KAP-7F, KAP-7G (1400 m), KAP-7H

Smoky Falls (4 profiles 1000 m long)

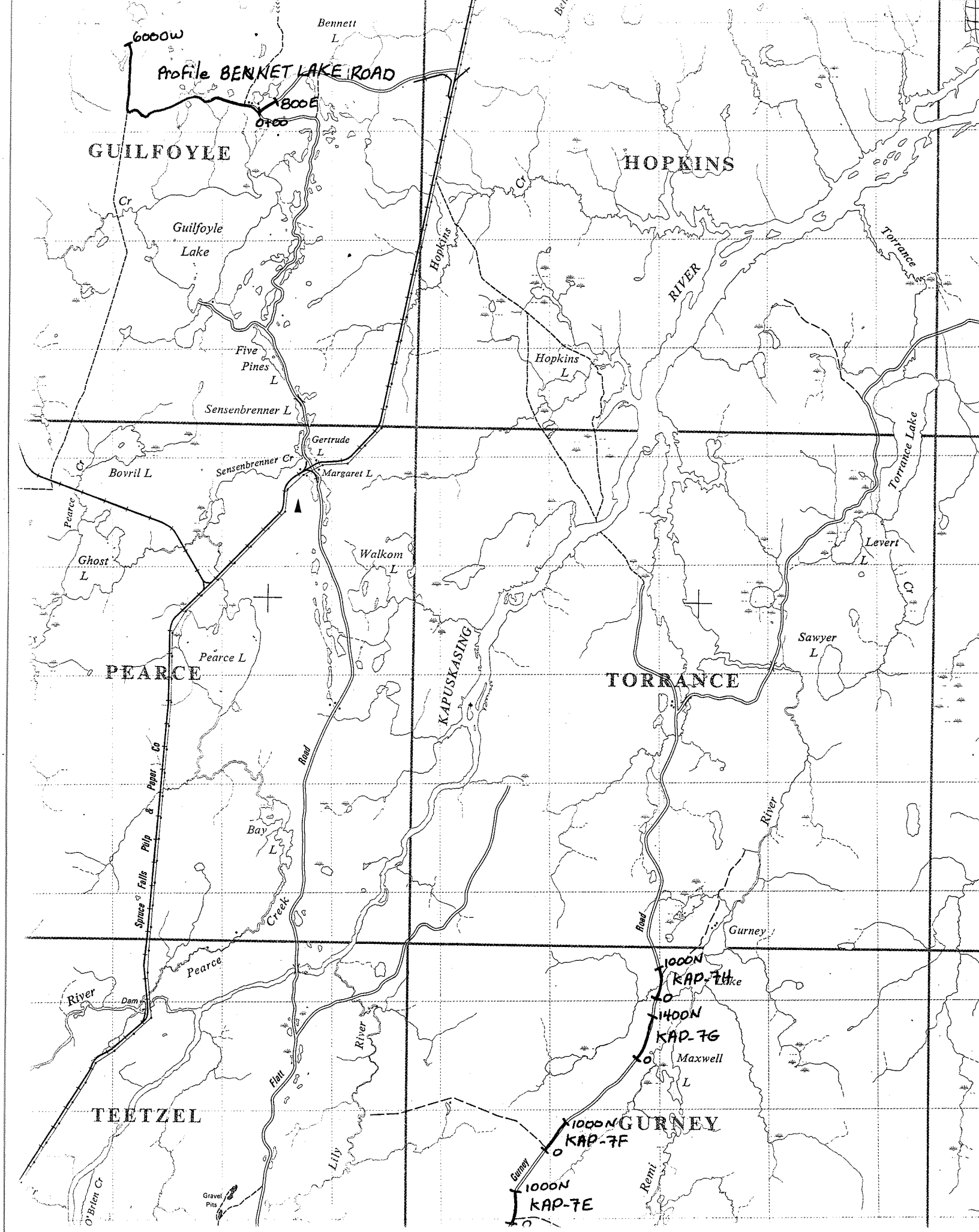
SF-8A, SF-8B, SF-8C, SF-8D

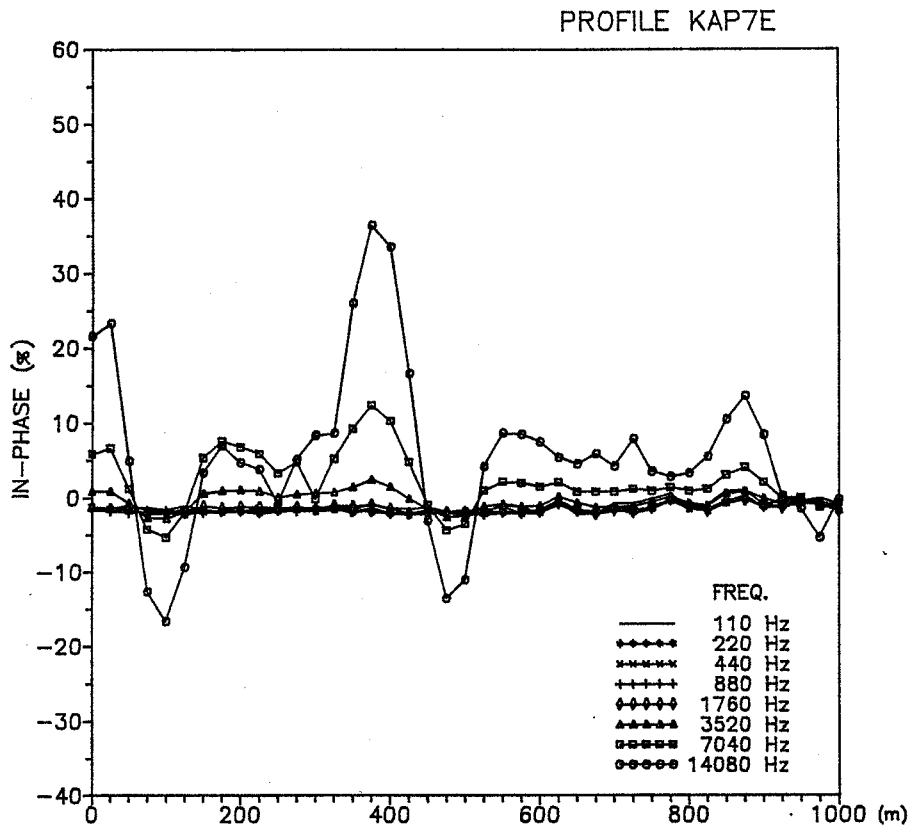
Bennet Lake Road (5 profiles)

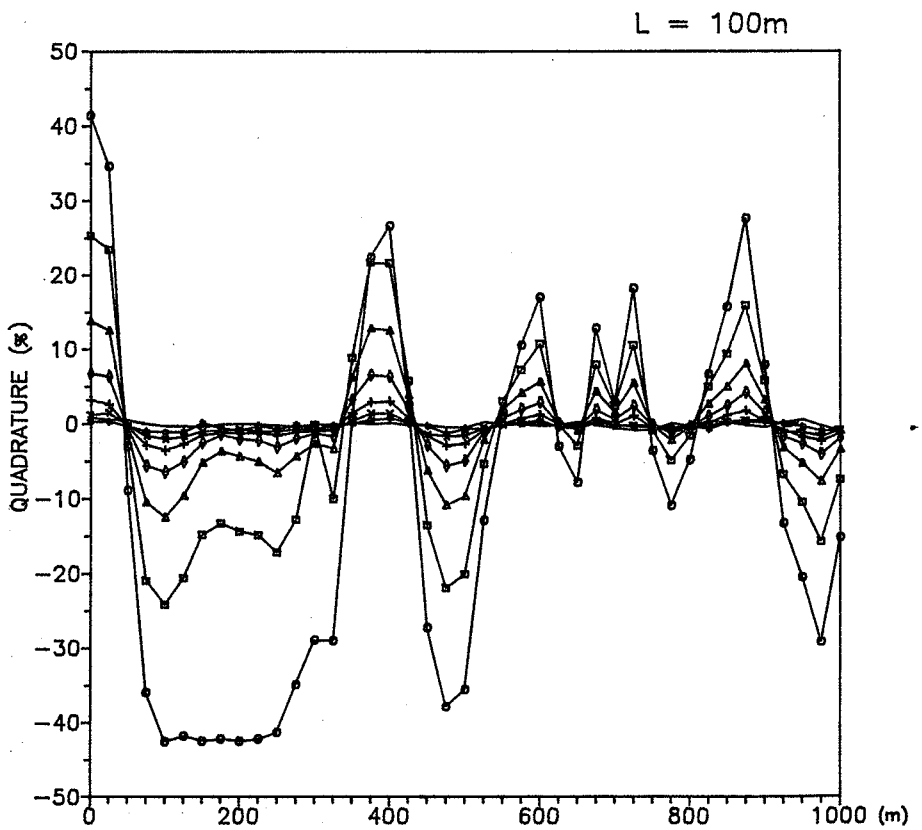
Parts A, B, C, D (each 1500 m long)

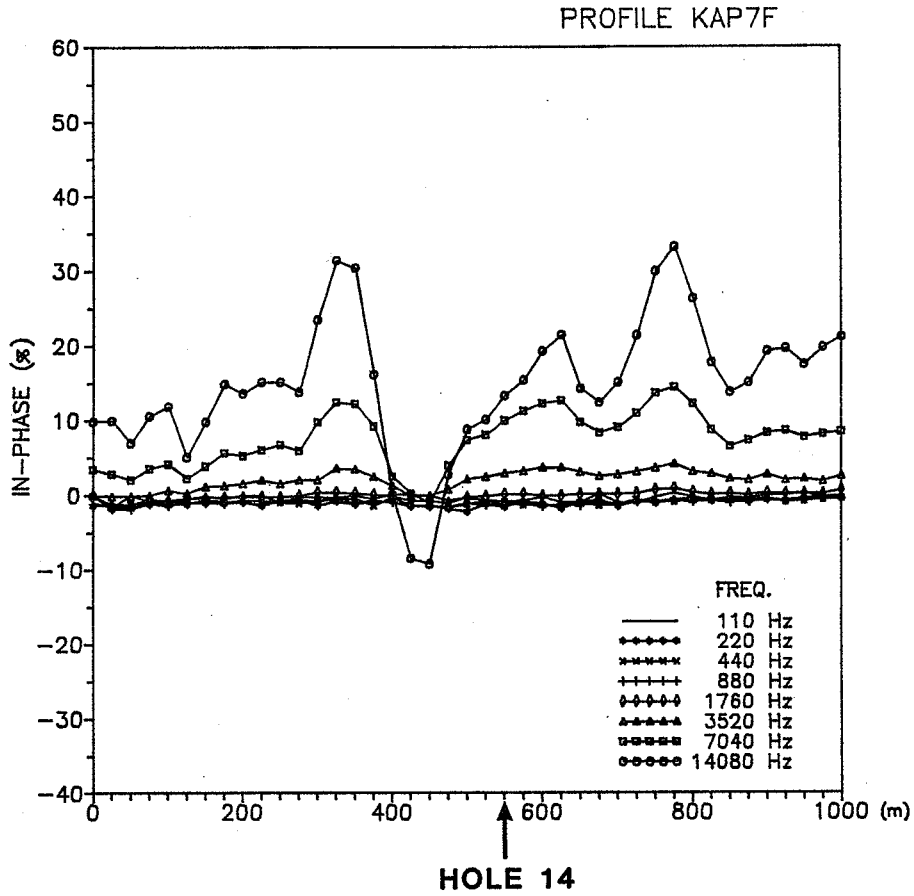
Part E (800 m long)

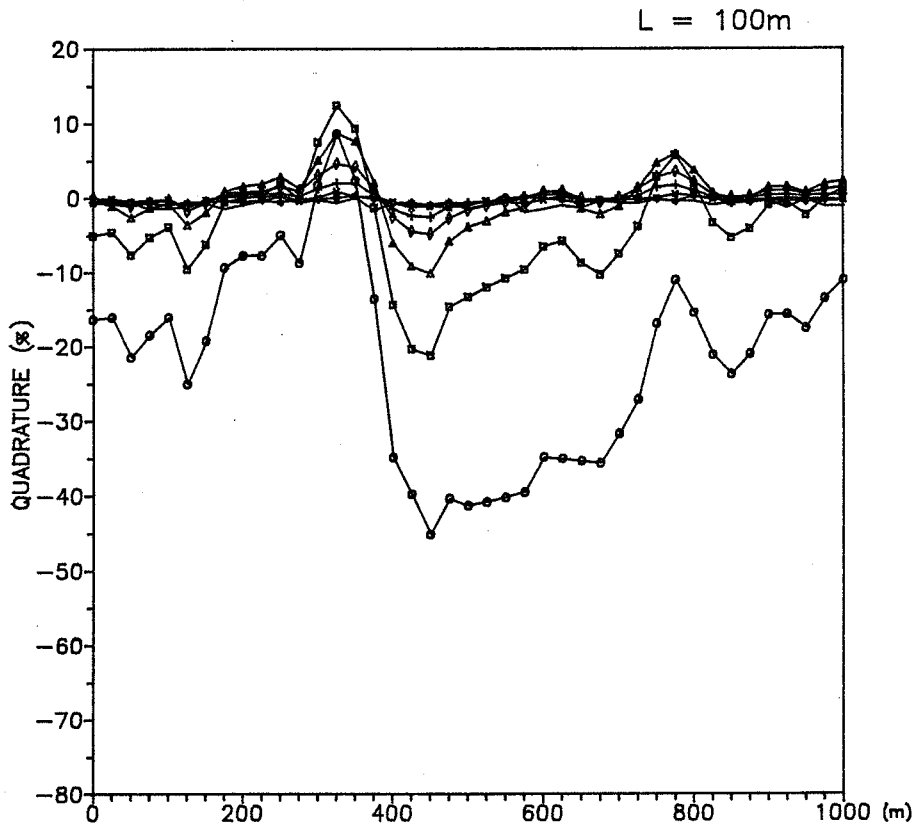
Total for the sheet 15,200 m.

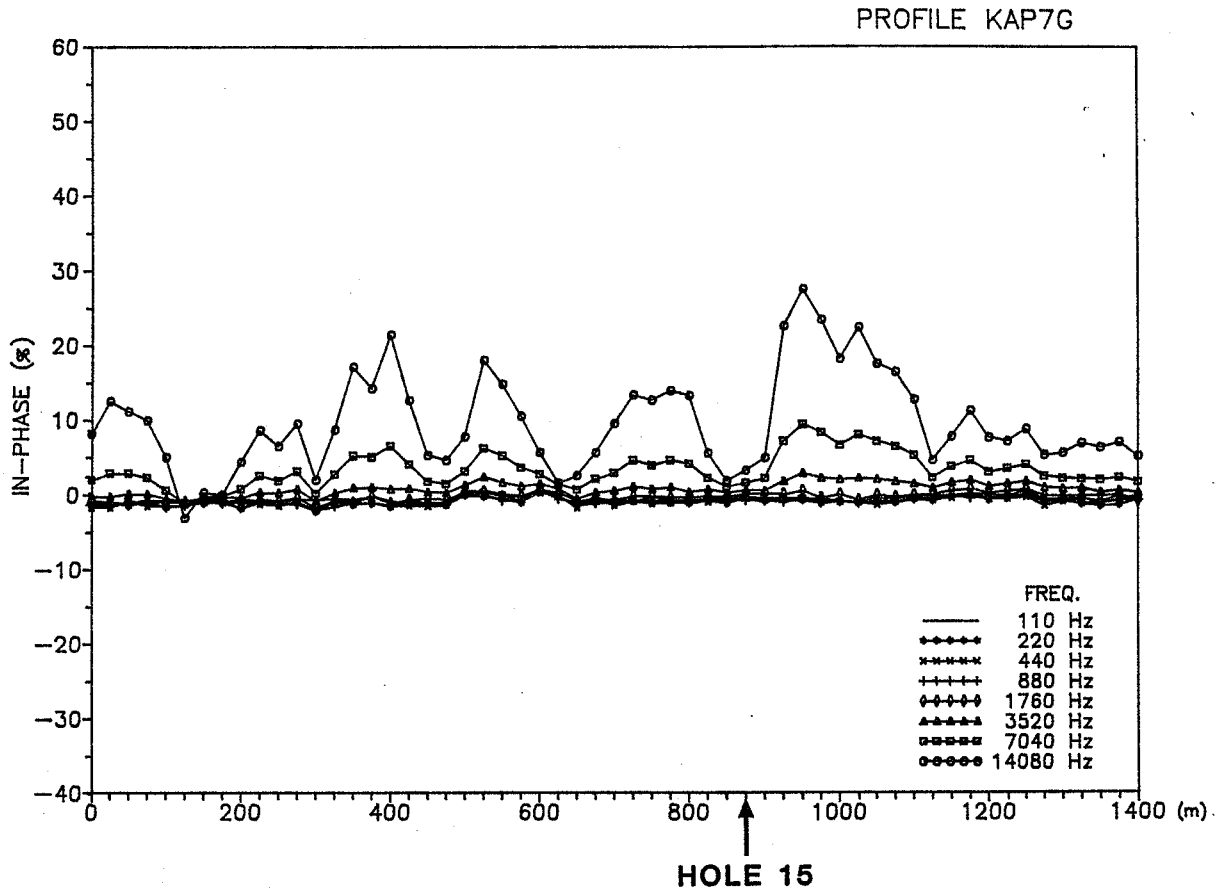

6000W
Profile BENNET LAKE ROAD
800E
0+00
Bennett L
GUILFOYLE
HOPKINS
Guilfoyle Lake
Cr
Hopkins
Cr
RIVER
Torrance
Five Pines L
Hopkins L
Sensenbrenner L
Gertrude L
Sensenbrenner Cr
Margaret L
Bovril L
Cr
Pearce
Torrance Lake
Ghost L
Walkom L
Levert L
Cr
Sawyer L
Pearce L
PEARCE
KAPUSKASING
TORRANCE
Road
Spruce Falls Pulp & Paper Co
Bay L
Creek
Pearce
River
Dam
River
Road
Gurney
Lake
1000N
KAP-7H
0
1400N
KAP-7G
0
Maxwell L
River
Flatt
Lily
TEETZEL
1000N
KAP-7F
0
GURNEY
Gurney
1000N
KAP-7E
0
Remi
O'Brien Cr
Gravel Pits

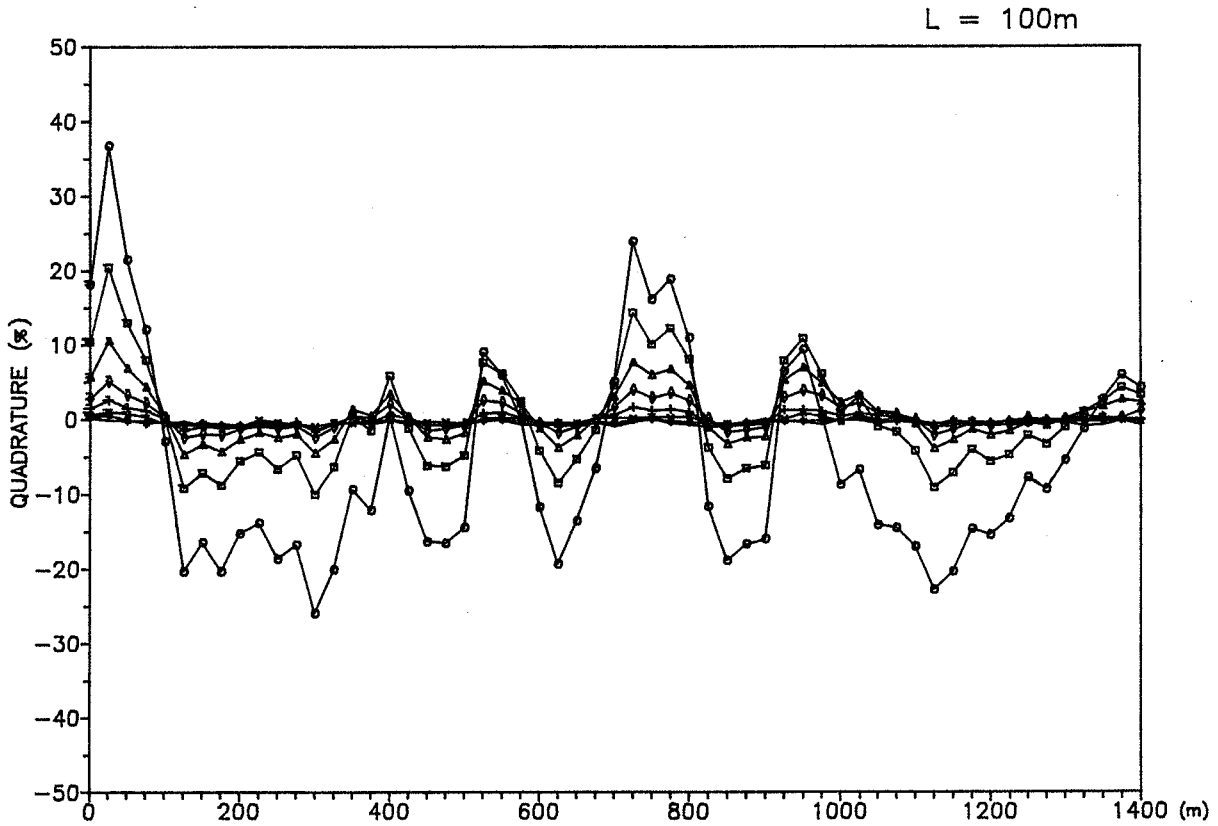

PROFILE KAP7E
IN-PHASE (%)
60
50
40
30
20
10
0
-10
-20
-30
-40
0
200
400
600
800
1000 (m)
FREQ.
110 Hz
220 Hz
440 Hz
880 Hz
1760 Hz
3520 Hz
7040 Hz
14080 Hz

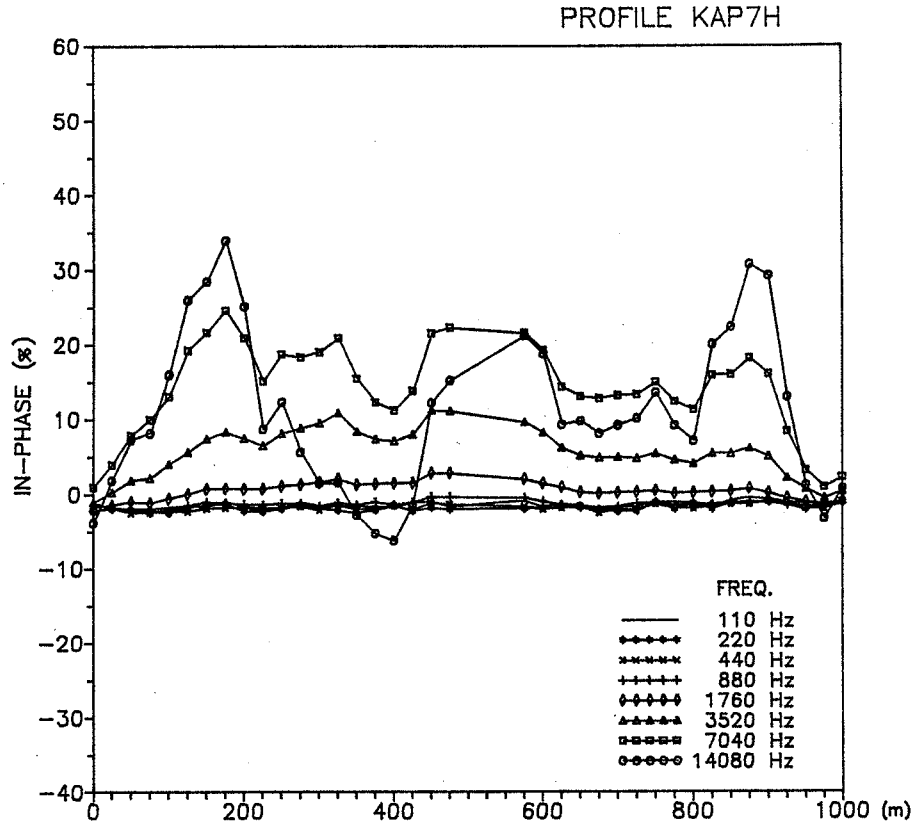

L = 100m
QUADRATURE (%)
50
40
30
20
10
0
-10
-20
-30
-40
-50
0
200
400
600
800
1000 (m)

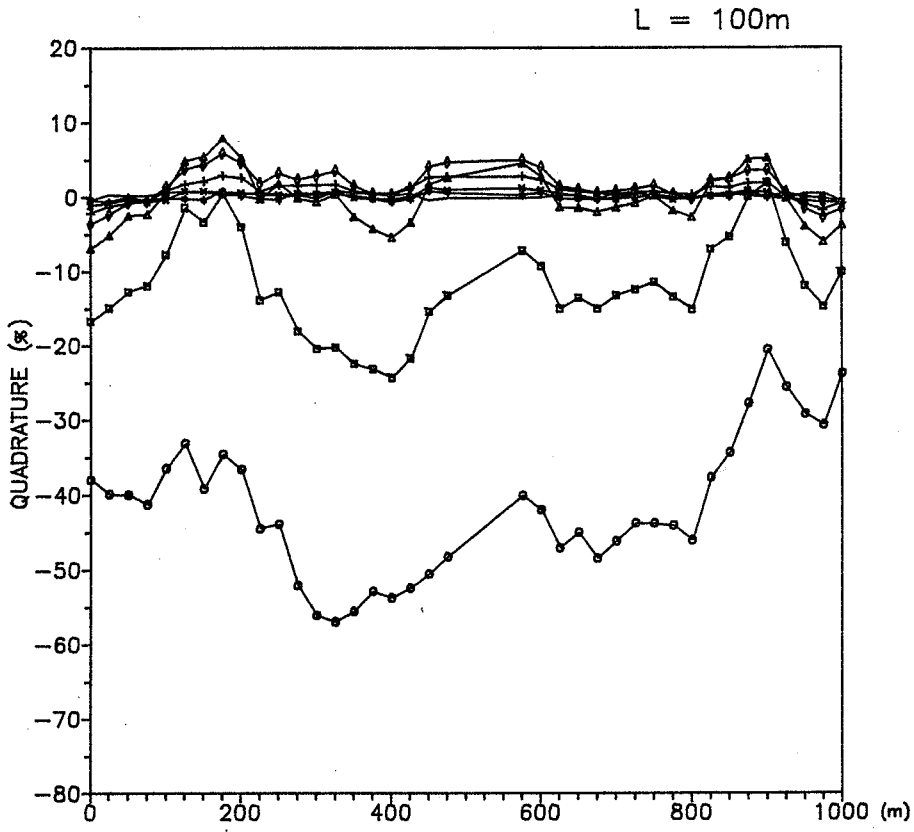

PROFILE KAP7F
IN-PHASE (%)
60
50
40
30
20
10
0
-10
-20
-30
-40
0
200
400
600
800
1000 (m)
FREQ.
110 Hz
220 Hz
440 Hz
880 Hz
1760 Hz
3520 Hz
7040 Hz
14080 Hz
HOLE 14


L = 100m
QUADRATURE (%)
20
10
0
-10
-20
-30
-40
-50
-60
-70
-80
0
200
400
600
800
1000 (m)

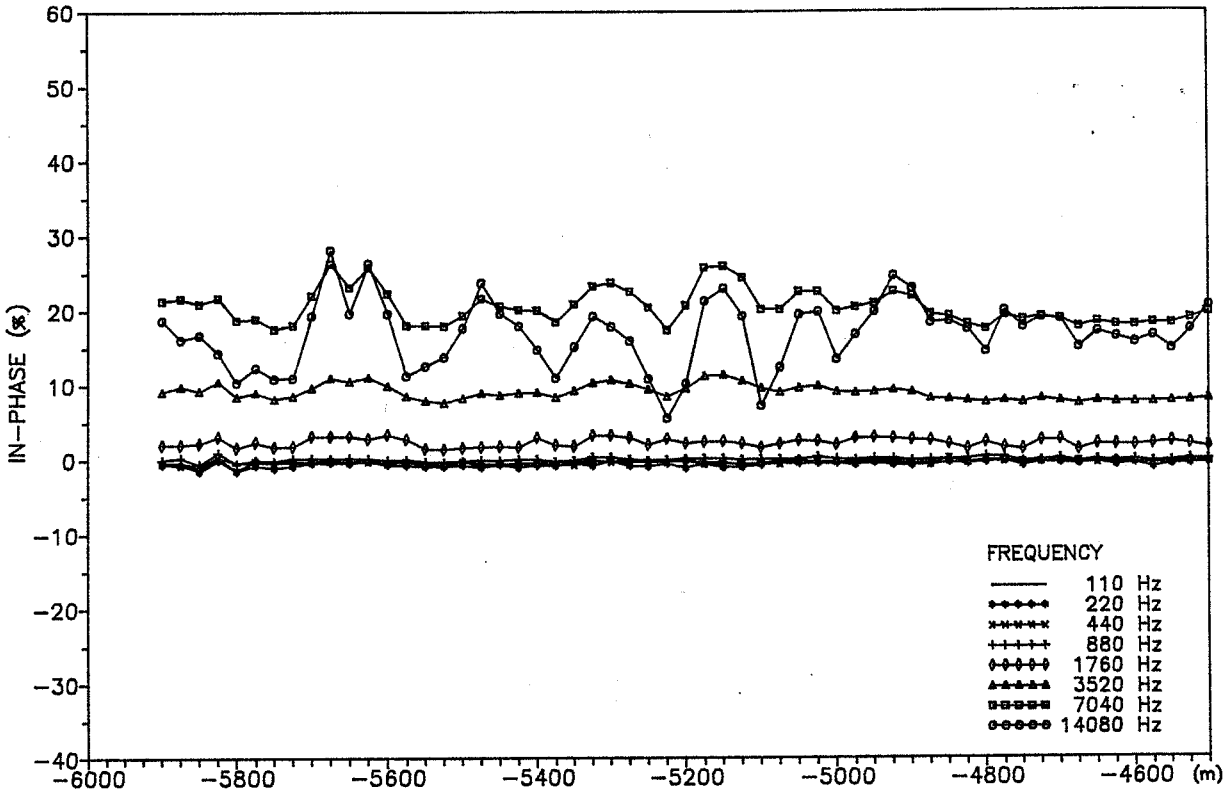

PROFILE KAP7G
IN-PHASE (%)
60
50
40
30
20
10
0
-10
-20
-30
-40
0
200
400
600
800
1000
1200
1400 (m)
FREQ.
110 Hz
220 Hz
440 Hz
880 Hz
1760 Hz
3520 Hz
7040 Hz
14080 Hz
HOLE 15


L = 100m
QUADRATURE (%)
50
40
30
20
10
0
-10
-20
-30
-40
-50
0
200
400
600
800
1000
1200
1400 (m)

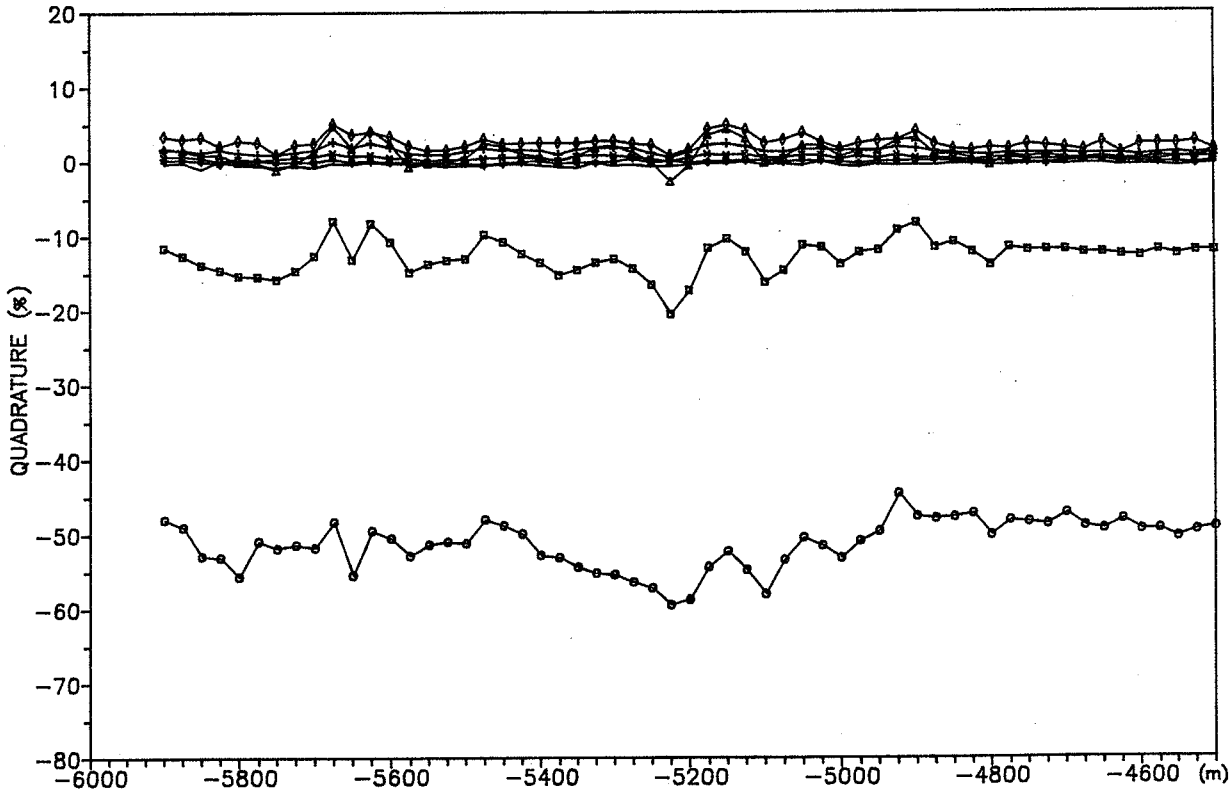

PROFILE KAP7H
IN-PHASE (%)
60
50
40
30
20
10
0
-10
-20
-30
-40
0
200
400
600
800
1000 (m)
FREQ.
110 Hz
220 Hz
440 Hz
880 Hz
1760 Hz
3520 Hz
7040 Hz
14080 Hz


L = 100m
QUADRATURE (%)
20
10
0
-10
-20
-30
-40
-50
-60
-70
-80
0
200
400
600
800
1000 (m)

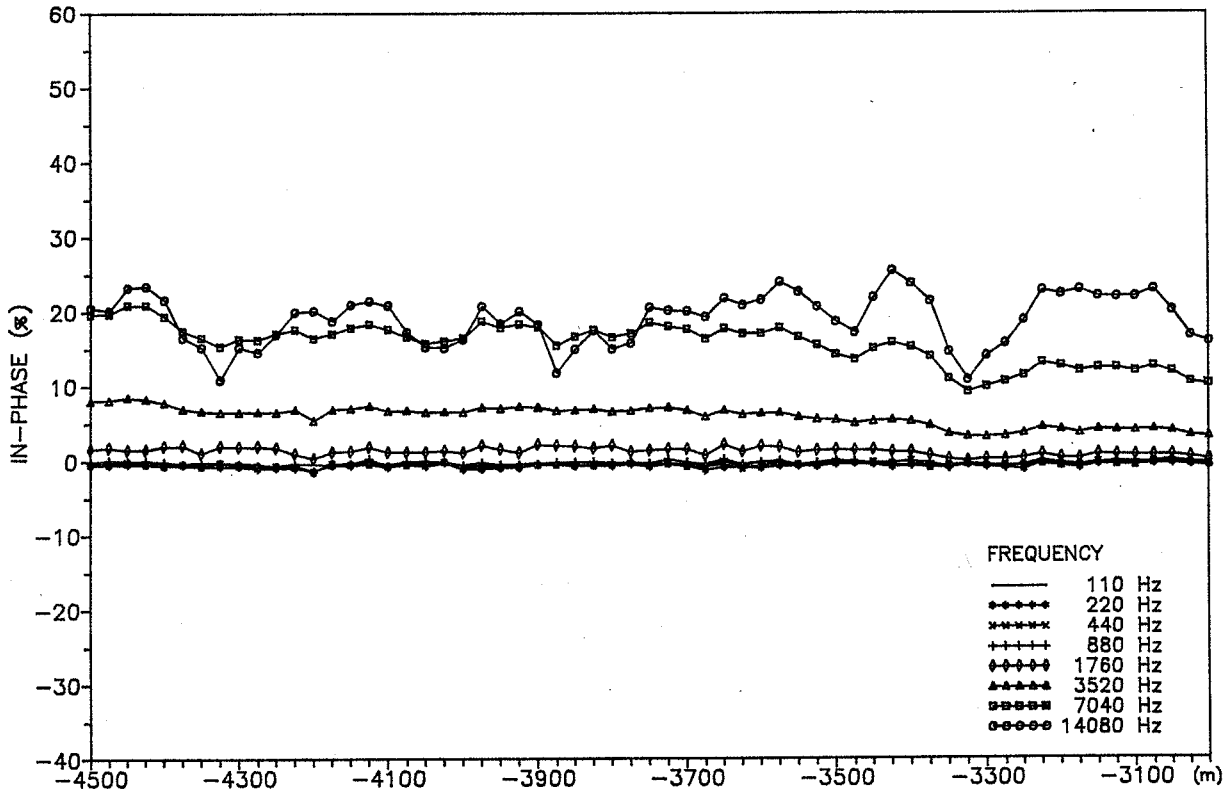
PROFILE BENNET LAKE ROAD PART A



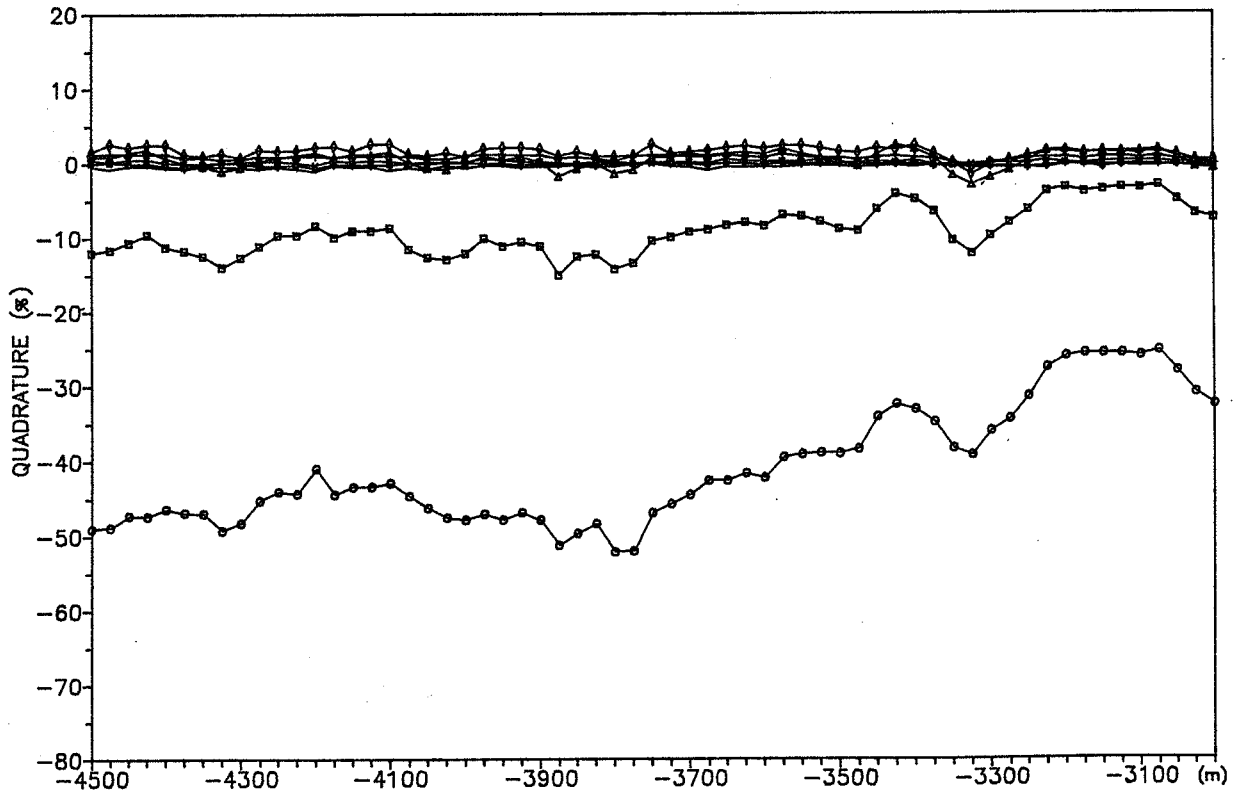
L = 100m



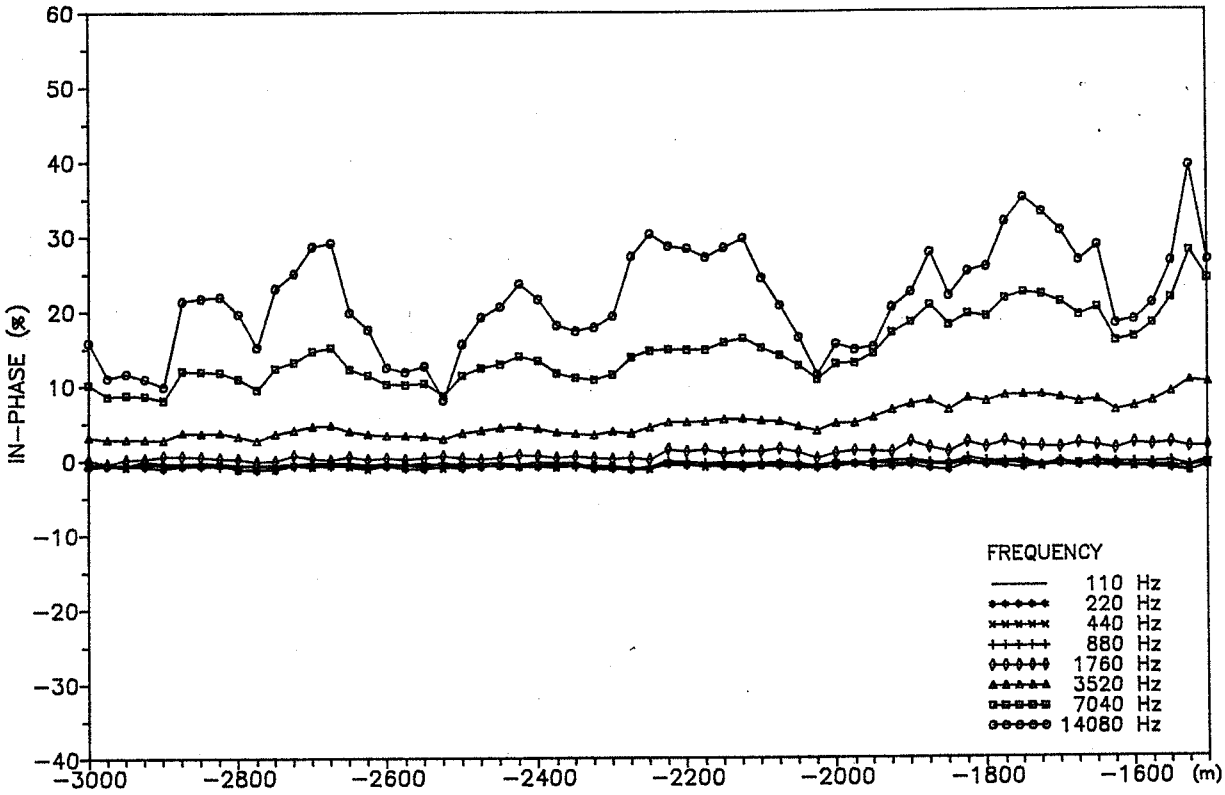
PROFILE BENNET LAKE ROAD PART B



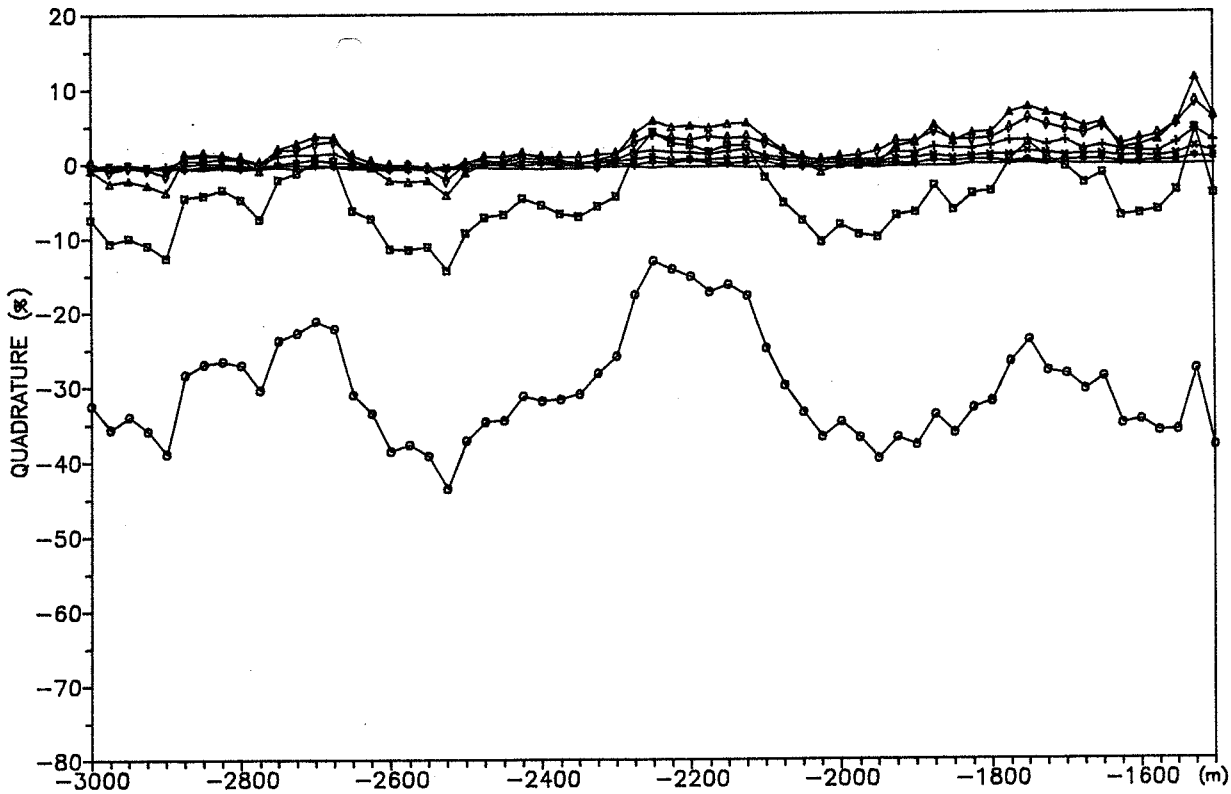
L = 100m



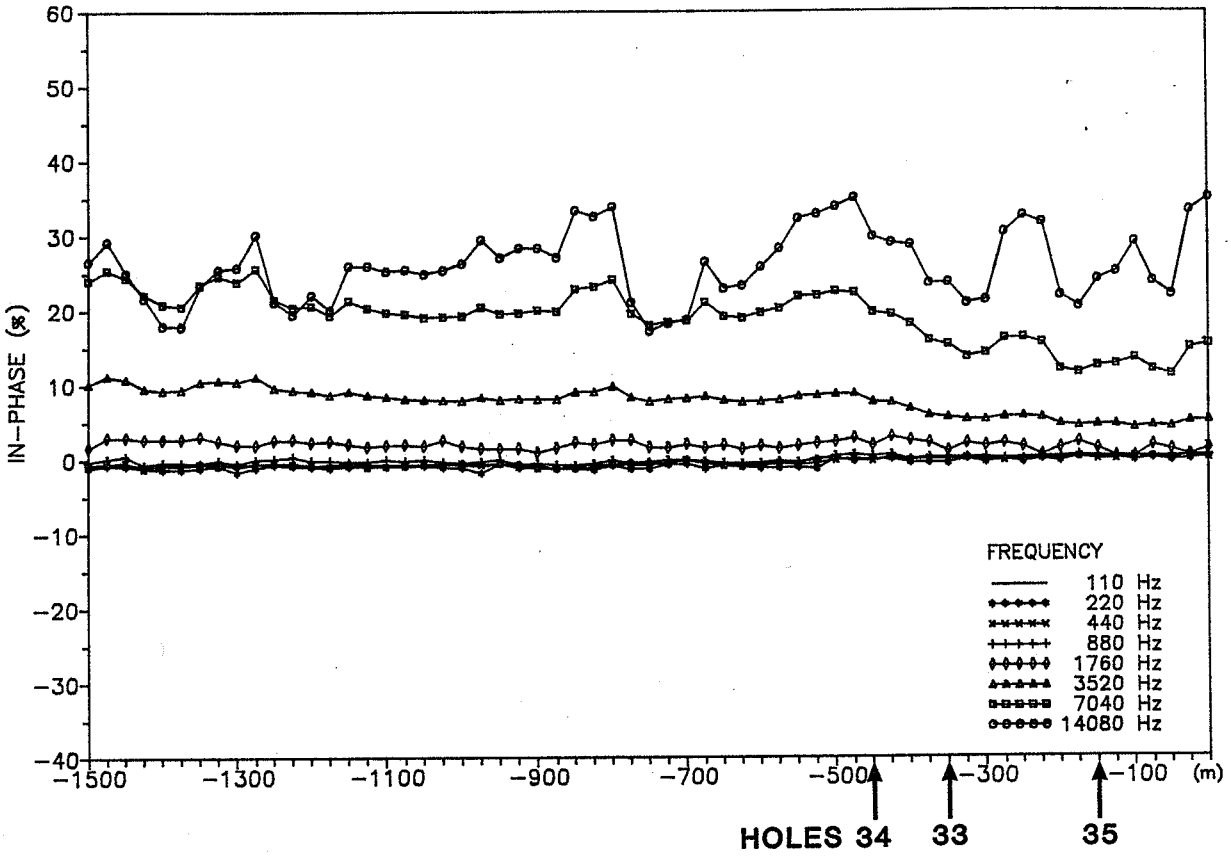
PROFILE BENNET LAKE ROAD PART C



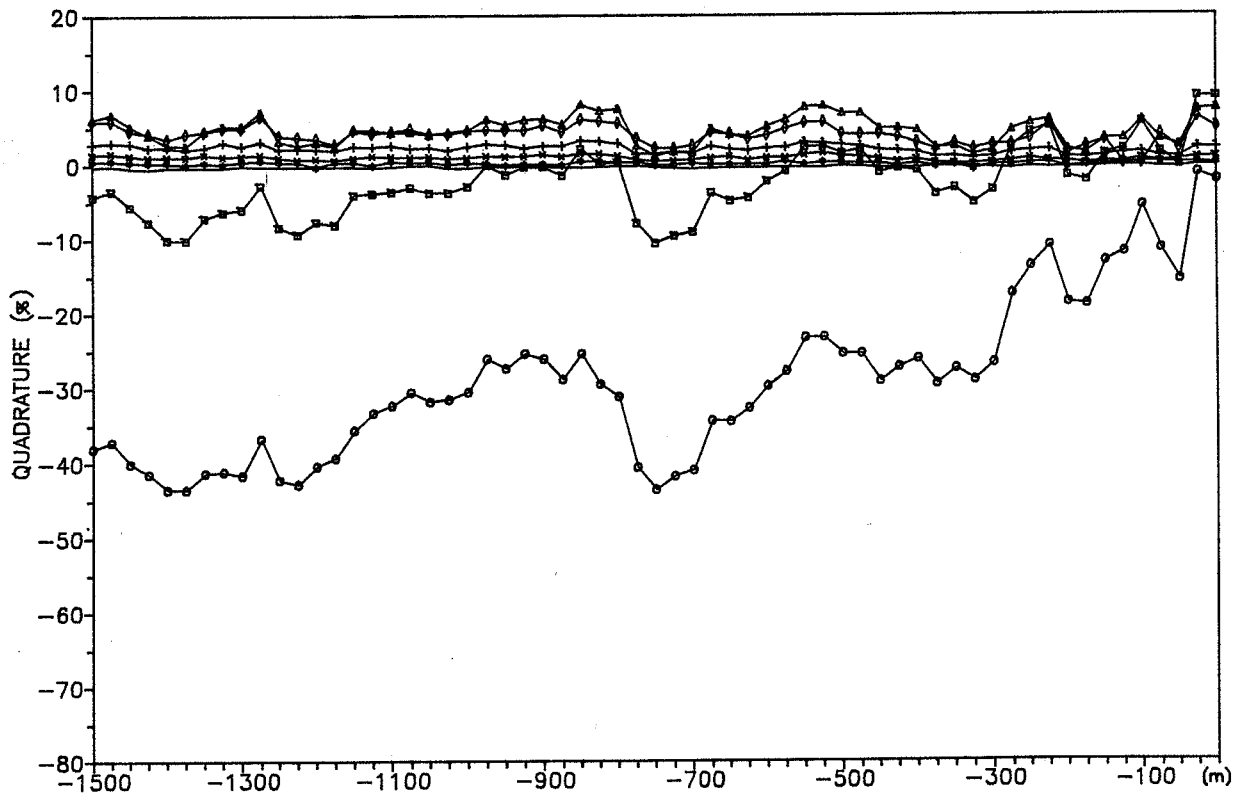
L = 100m



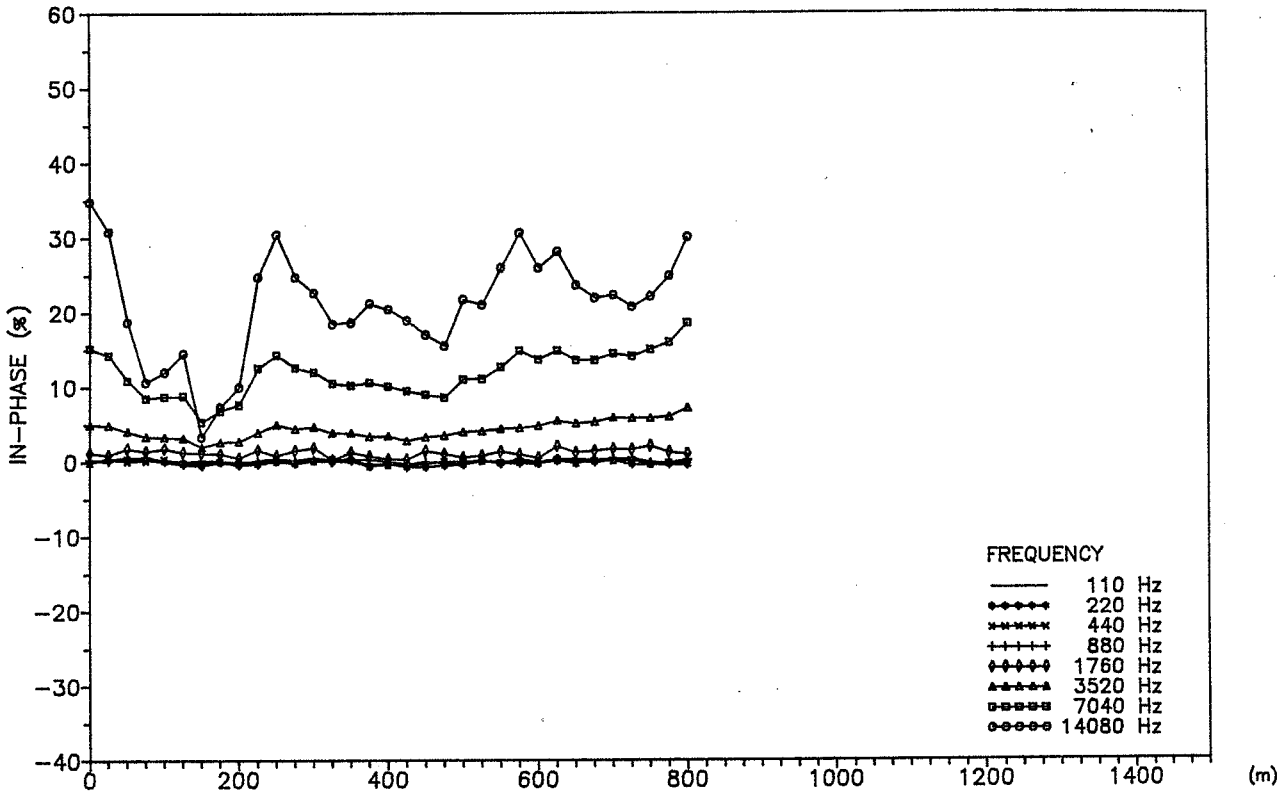
PROFILE BENNET LAKE ROAD PART D



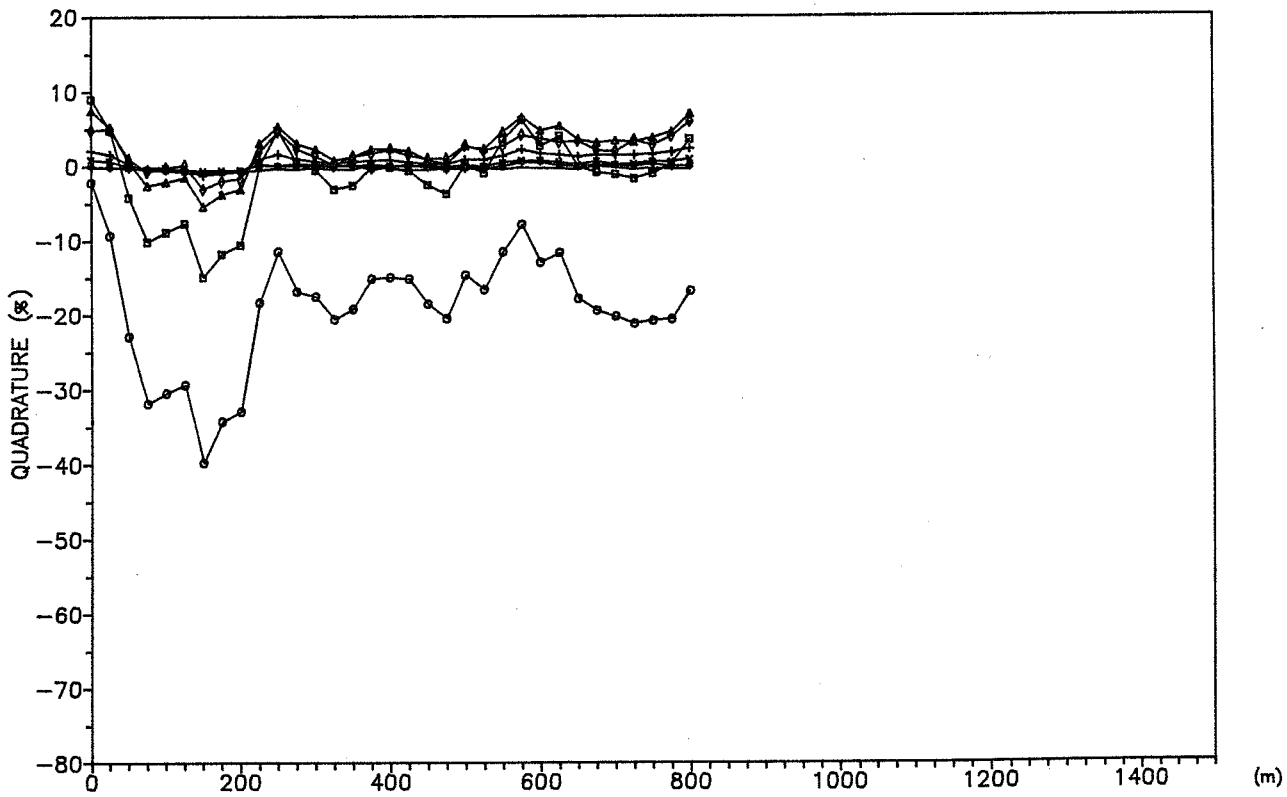
L = 100m

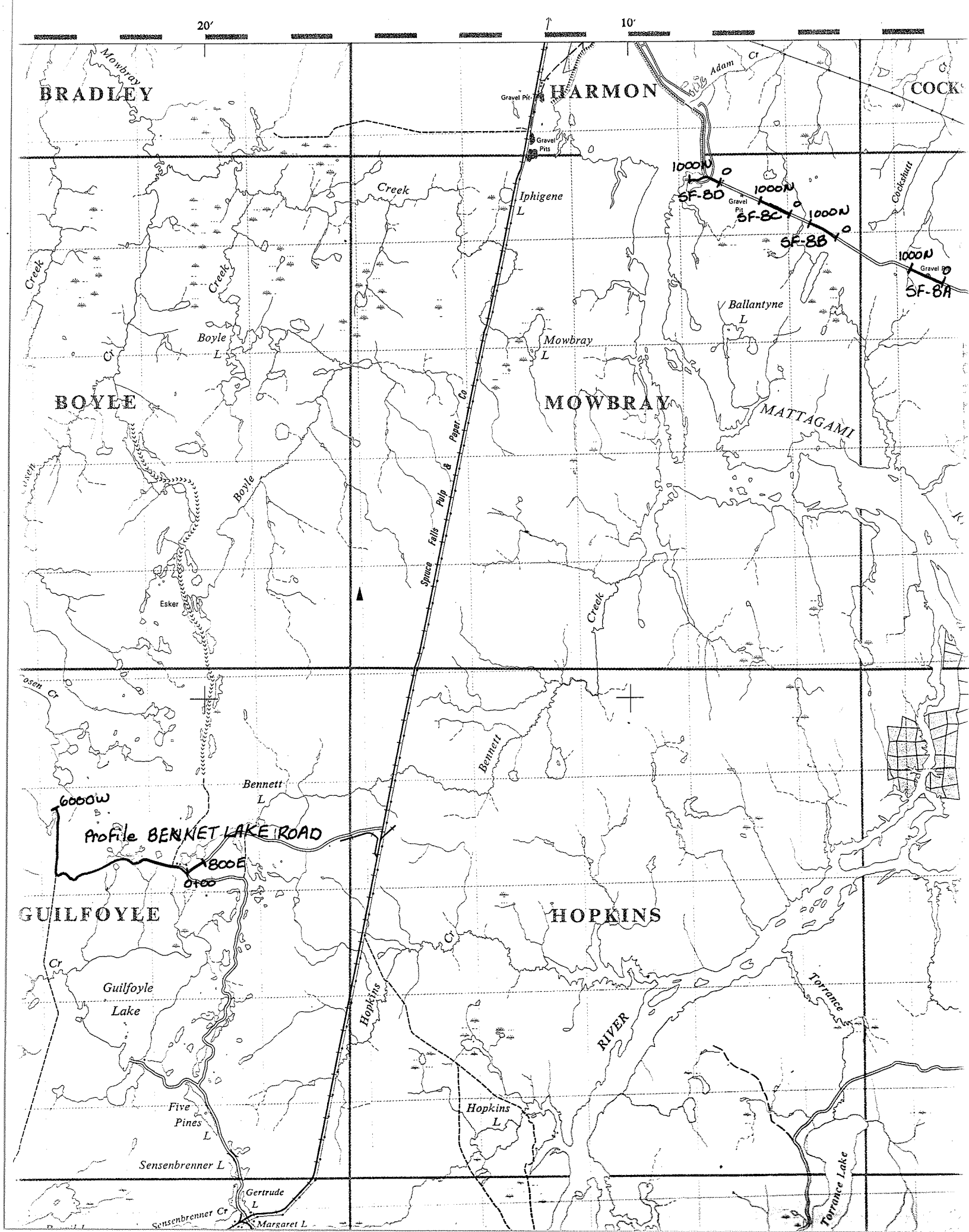


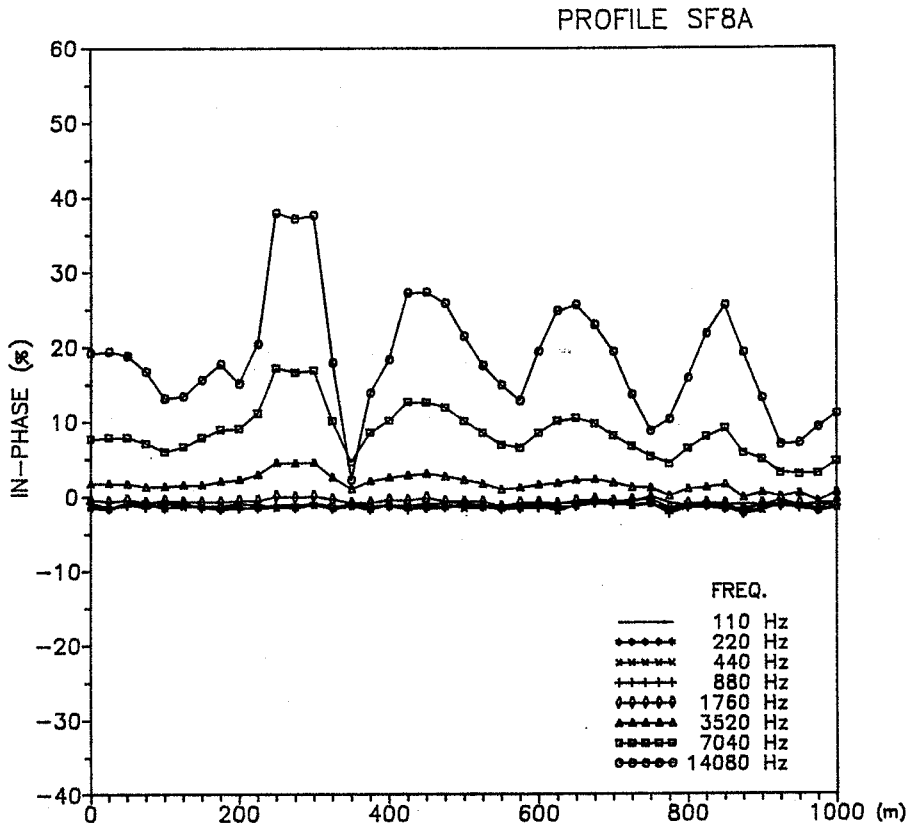
PROFILE BENNET LAKE ROAD PART E

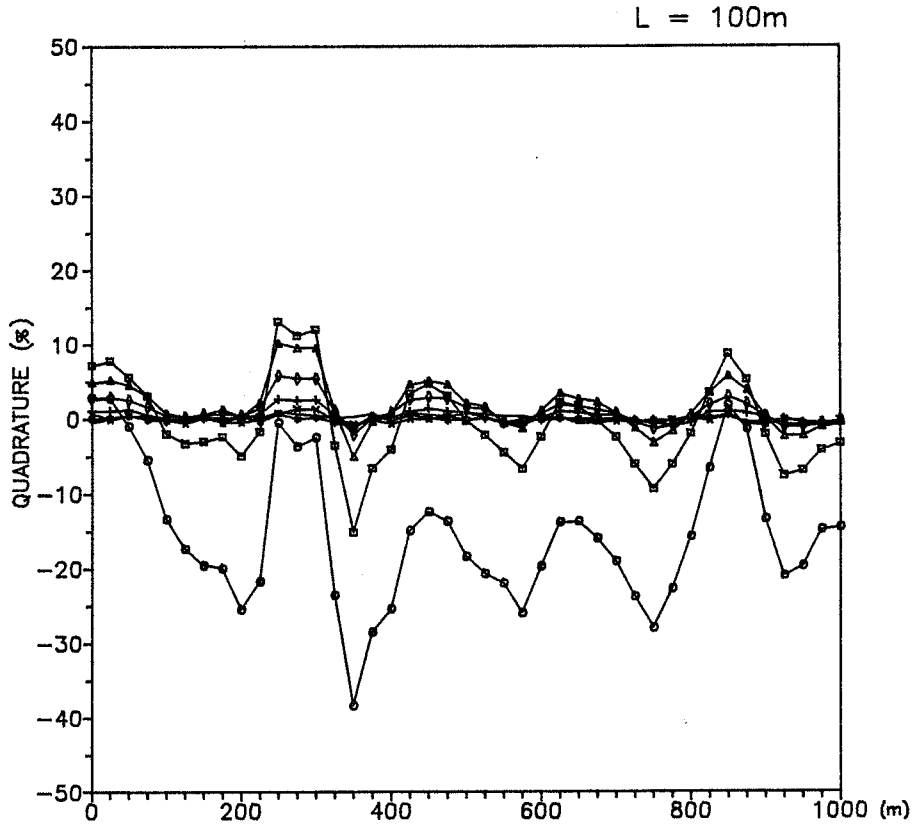


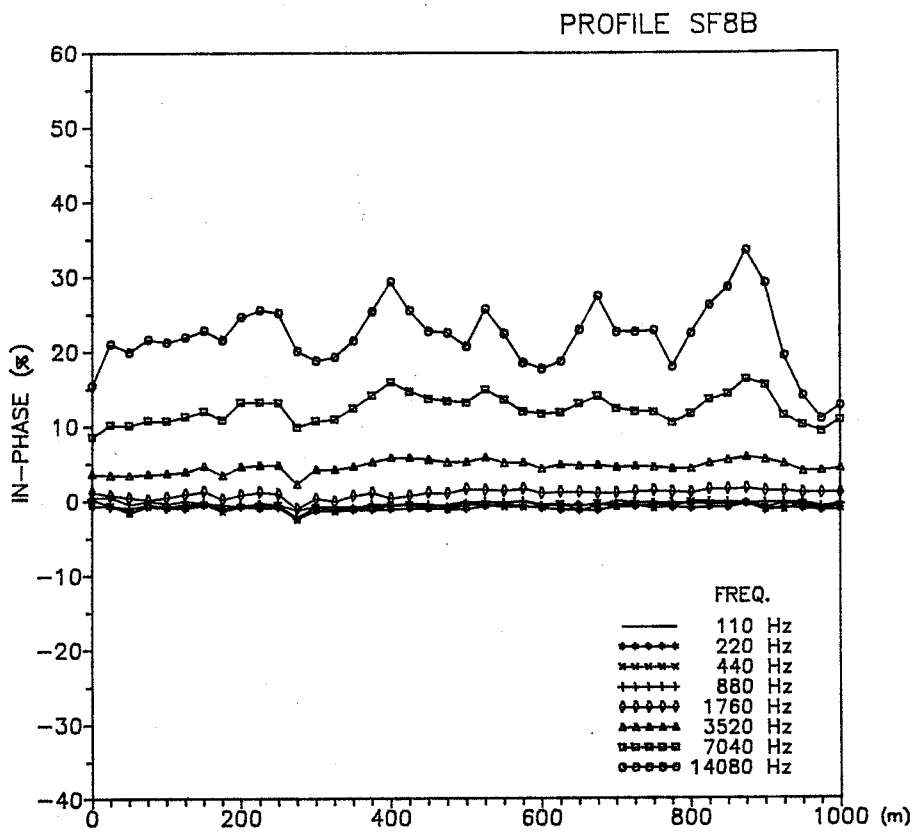
L = 100m

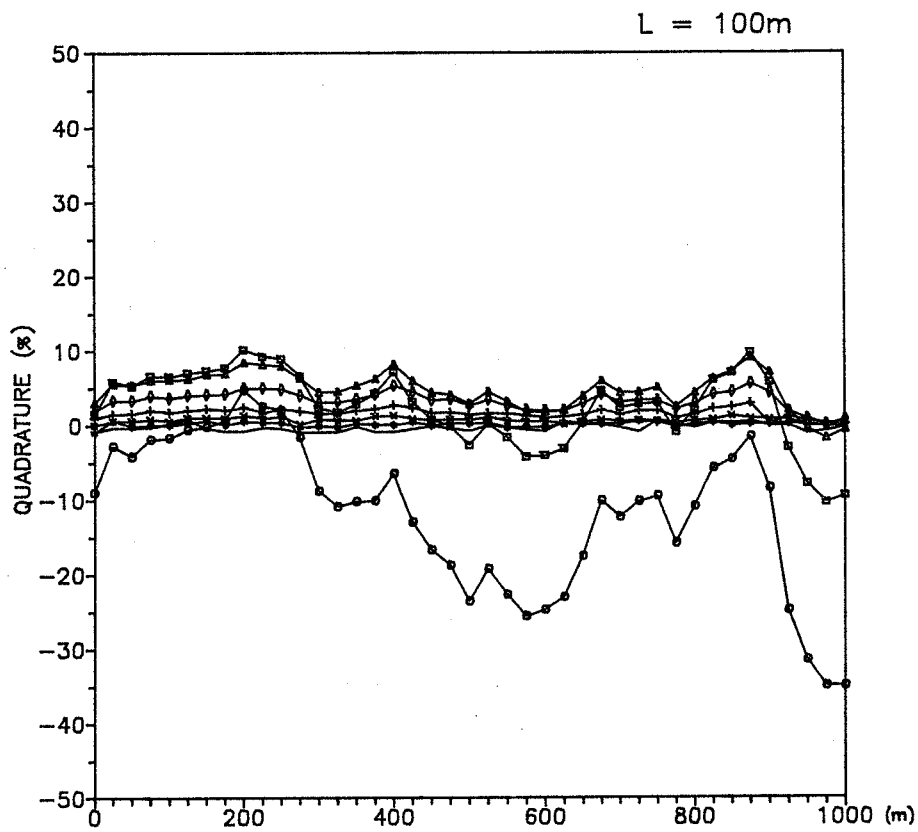


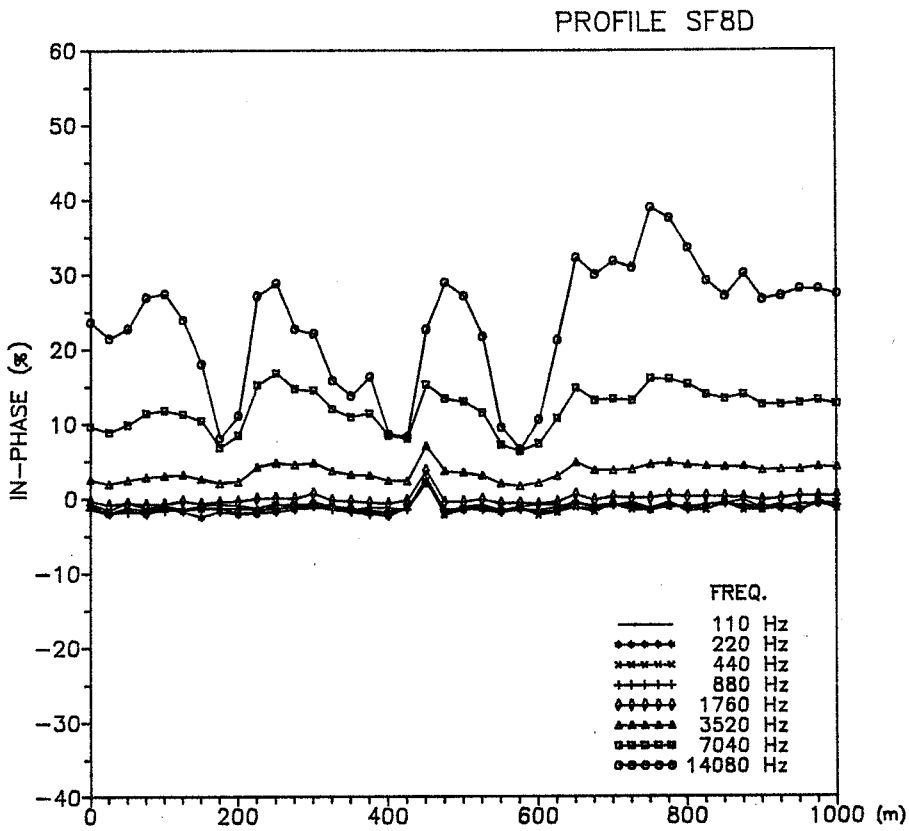

20′
10′
BRADLEY
HARMON
COCK
MOWBRAY
BOYLE
GUILFOYLE
HOPKINS
Mowbray
Adam Cr
Gravel Pit
Gravel Pits
Iphigene L
Creek
Boyle L
Boyle
Mowbray L
Ballantyne L
Cockshutt
MATTAGAMI
Spruce Falls Pulp & Paper Co.
Esker
Bennett L
Bennett
Hopkins
Cr
Guilfoyle Lake
Five Pines L
Sensenbrenner L
Gertrude L
Sensenbrenner Cr
Margaret L
Hopkins L
RIVER
Torrance
Torrance Lake
1000N
SF-8D
SF-8C
SF-8B
SF-8A
6000W
Profile BENNET LAKE ROAD
800E
0+00

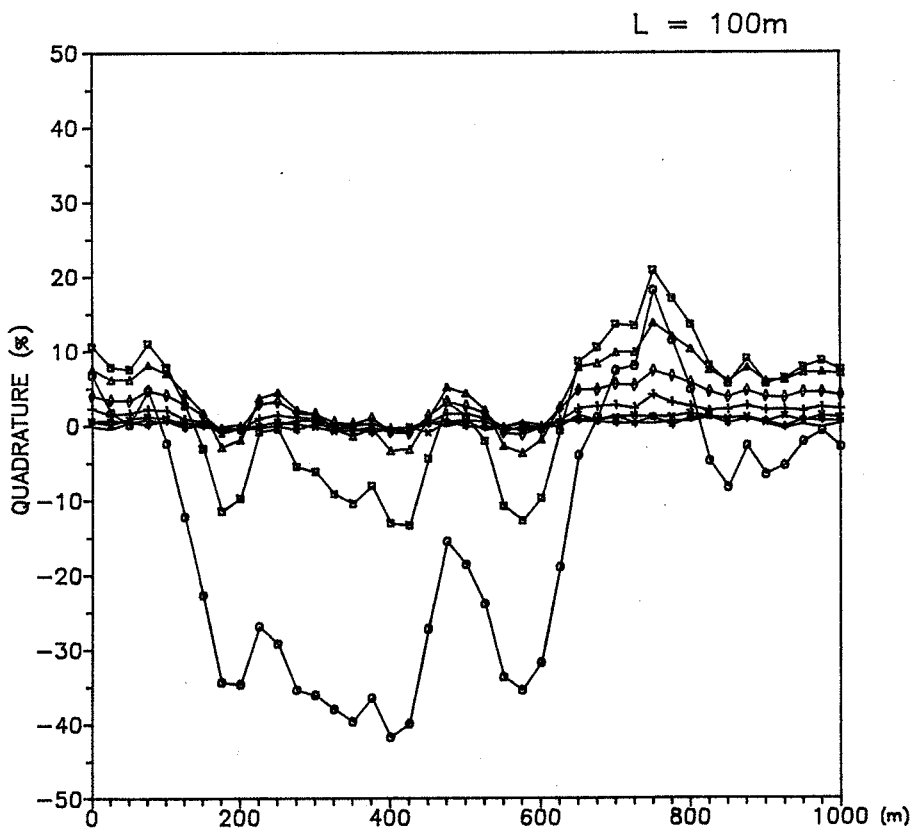

PROFILE SF8A
IN-PHASE (%)
60
50
40
30
20
10
0
-10
-20
-30
-40
0
200
400
600
800
1000 (m)
FREQ.
110 Hz
220 Hz
440 Hz
880 Hz
1760 Hz
3520 Hz
7040 Hz
14080 Hz


L = 100m
QUADRATURE (%)
50
40
30
20
10
0
-10
-20
-30
-40
-50
0
200
400
600
800
1000 (m)


PROFILE SF8B
IN-PHASE (%)
60
50
40
30
20
10
0
-10
-20
-30
-40
0
200
400
600
800
1000 (m)
FREQ.
110 Hz
220 Hz
440 Hz
880 Hz
1760 Hz
3520 Hz
7040 Hz
14080 Hz


L = 100m
QUADRATURE (%)
50
40
30
20
10
0
-10
-20
-30
-40
-50
0
200
400
600
800
1000 (m)


PROFILE SF8D
IN-PHASE (%)
60
50
40
30
20
10
0
-10
-20
-30
-40
0
200
400
600
800
1000 (m)
FREQ.
110 Hz
220 Hz
440 Hz
880 Hz
1760 Hz
3520 Hz
7040 Hz
14080 Hz


L = 100m
QUADRATURE (%)
50
40
30
20
10
0
-10
-20
-30
-40
-50
0
200
400
600
800
1000 (m)

SHEET 42H/SW (SMOOTH ROCK)

Smoky Falls (7 profiles 1000 m long, 1 profile 1200 m long)

SF-1A, SF-1B, SF-1C (1200 m), SF-1D, SF-2A, SF-2B, SF-2C, SF-2D

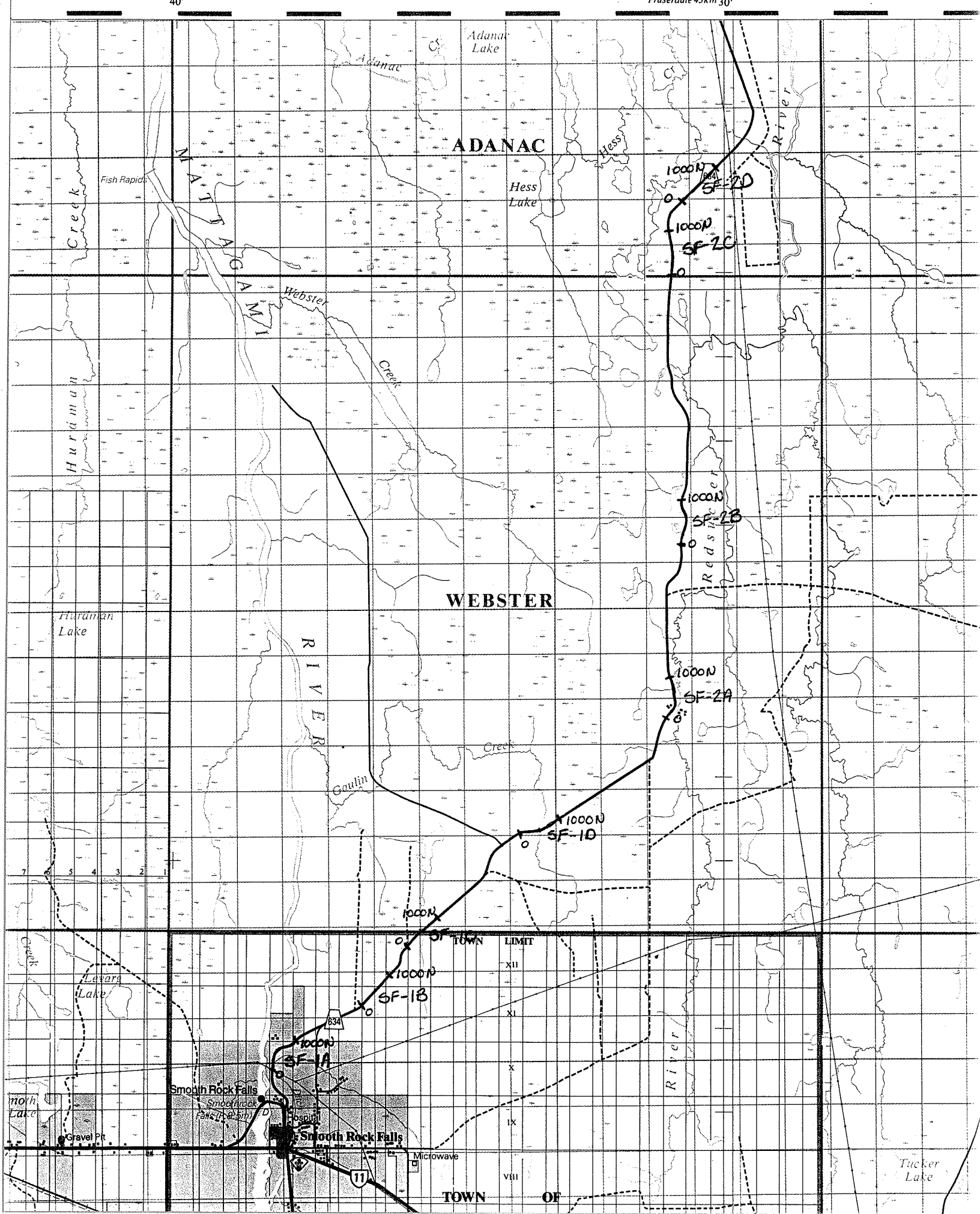
Smooth Rock Falls (4 profiles 1000 m long)

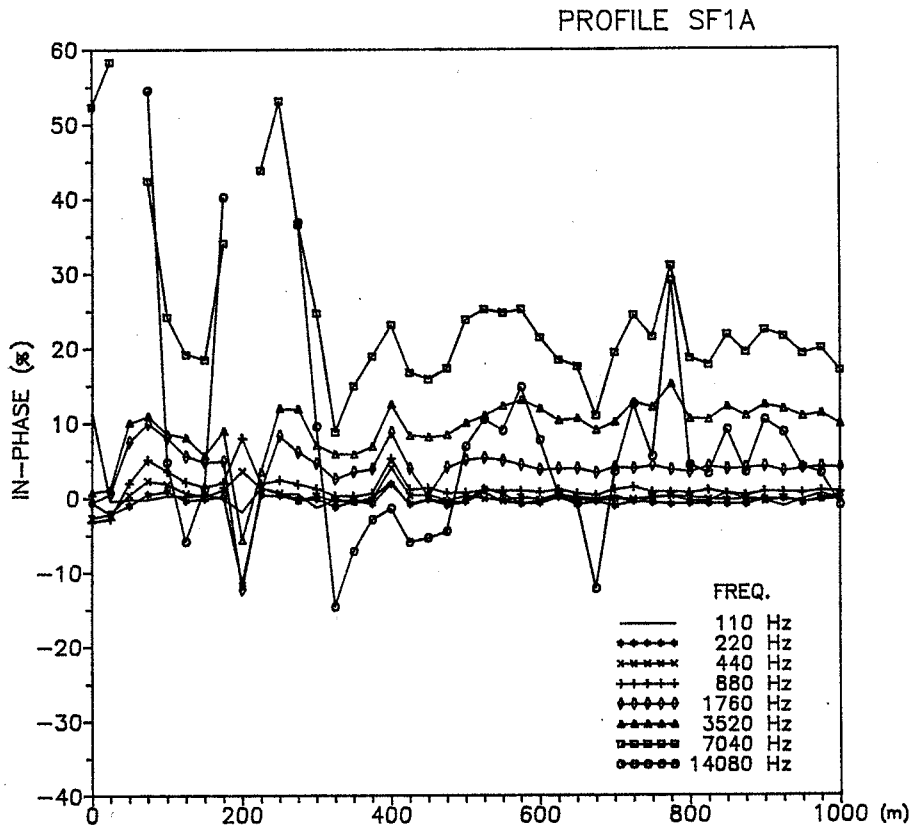
SRF-6A, SRF-6B, SRF-6C, SRF-6D

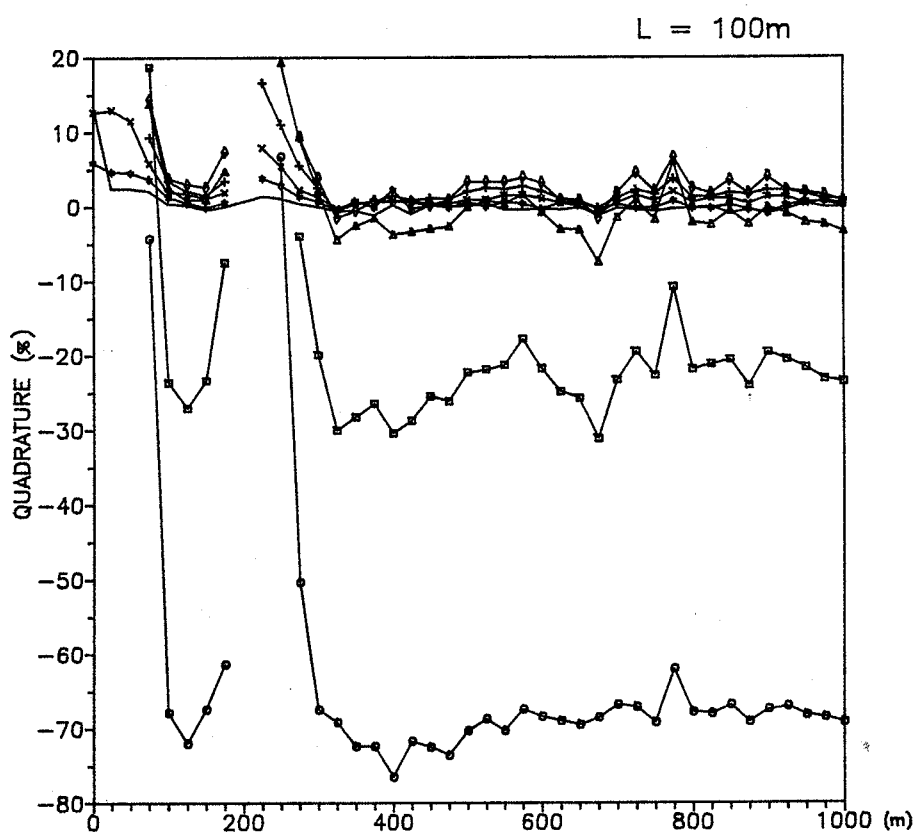
Timmins (1 profile 1000 m long)

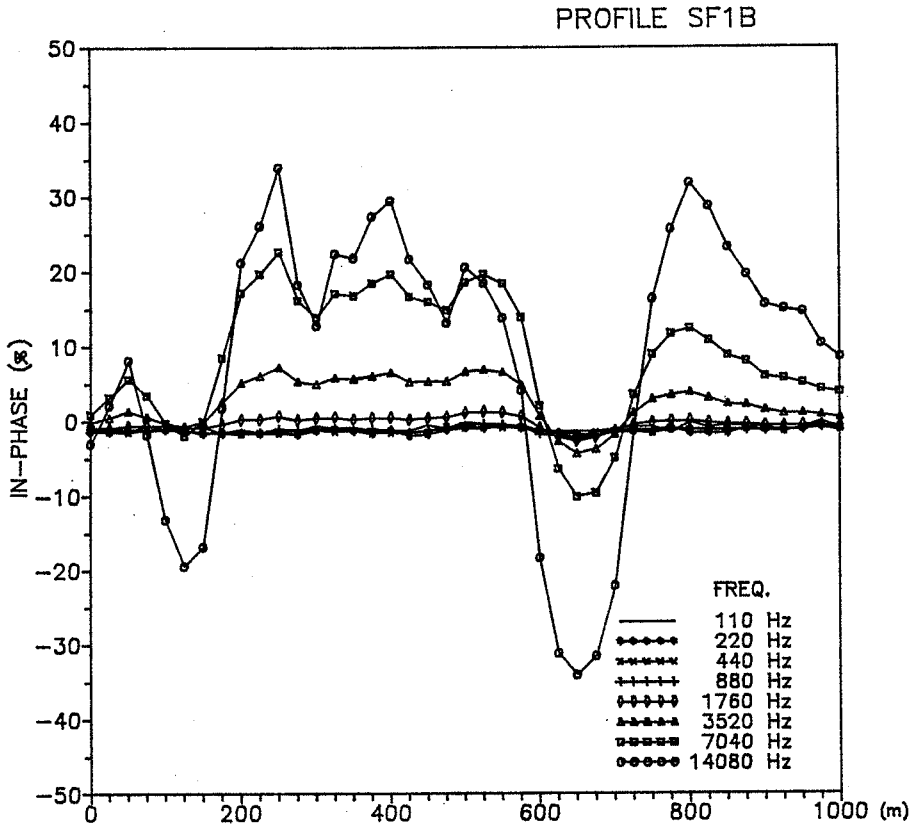
TIM-3A

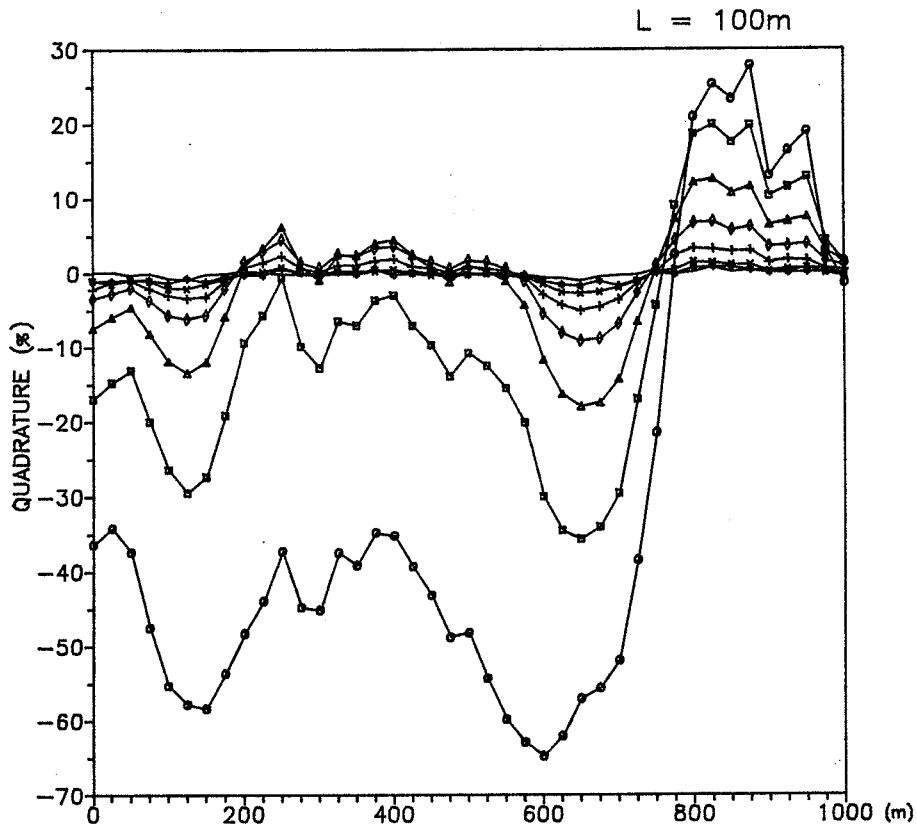
Total for the sheet 13,200 m.

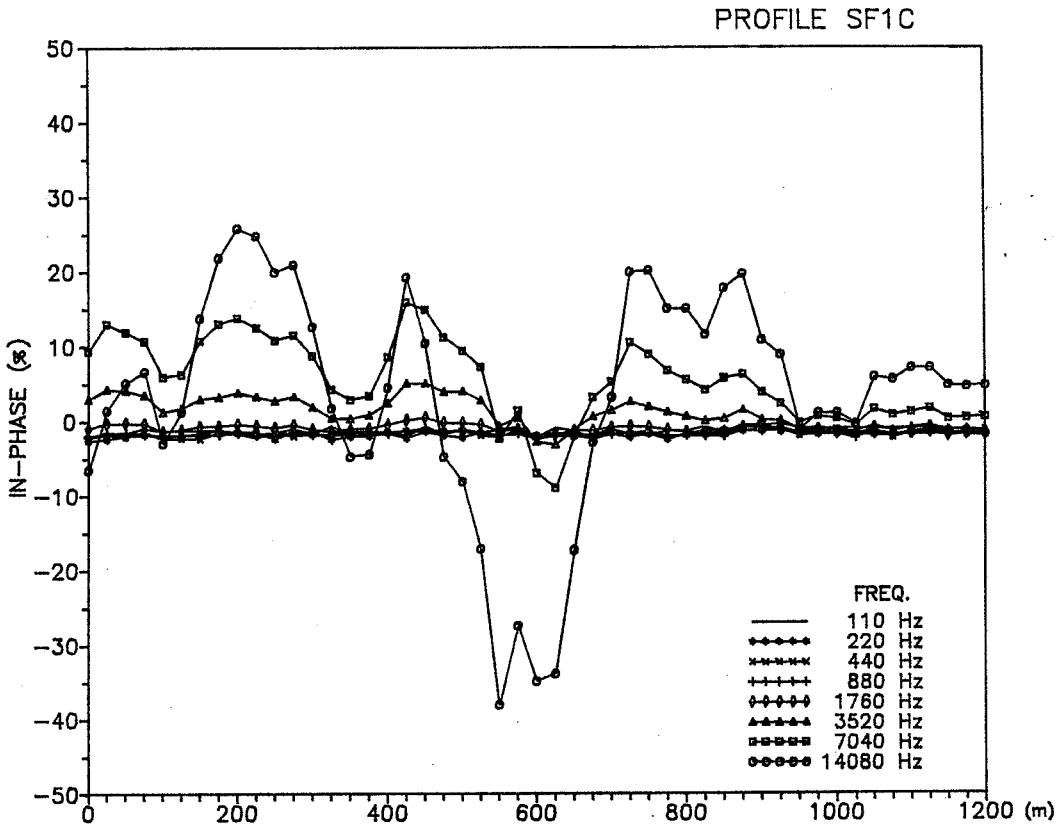

40'
Fraserdale 43km 30'
Adanac Lake
Adanac
ADANAC
Hess
Hess Lake
River
Fish Rapids
Creek
MATTAGAMI
Webster
Creek
Hardman
Hardman Lake
WEBSTER
RIVER
Redsh
Gaulin
Creek
1000N
SF-2D
1000N
SF-2C
1000N
SF-2B
1000N
SF-2A
1000N
SF-1D
1000N
SF-1C
1000N
SF-1B
1000N
SF-1A
TOWN LIMIT
XII
XI
X
IX
VIII
Levars Lake
634
Smooth Rock Falls
Smoothrock Falls (1.5km)
Hospital
Smooth Rock Falls
Gravel Pit
Microwave
11
TOWN OF
Tucker Lake
River

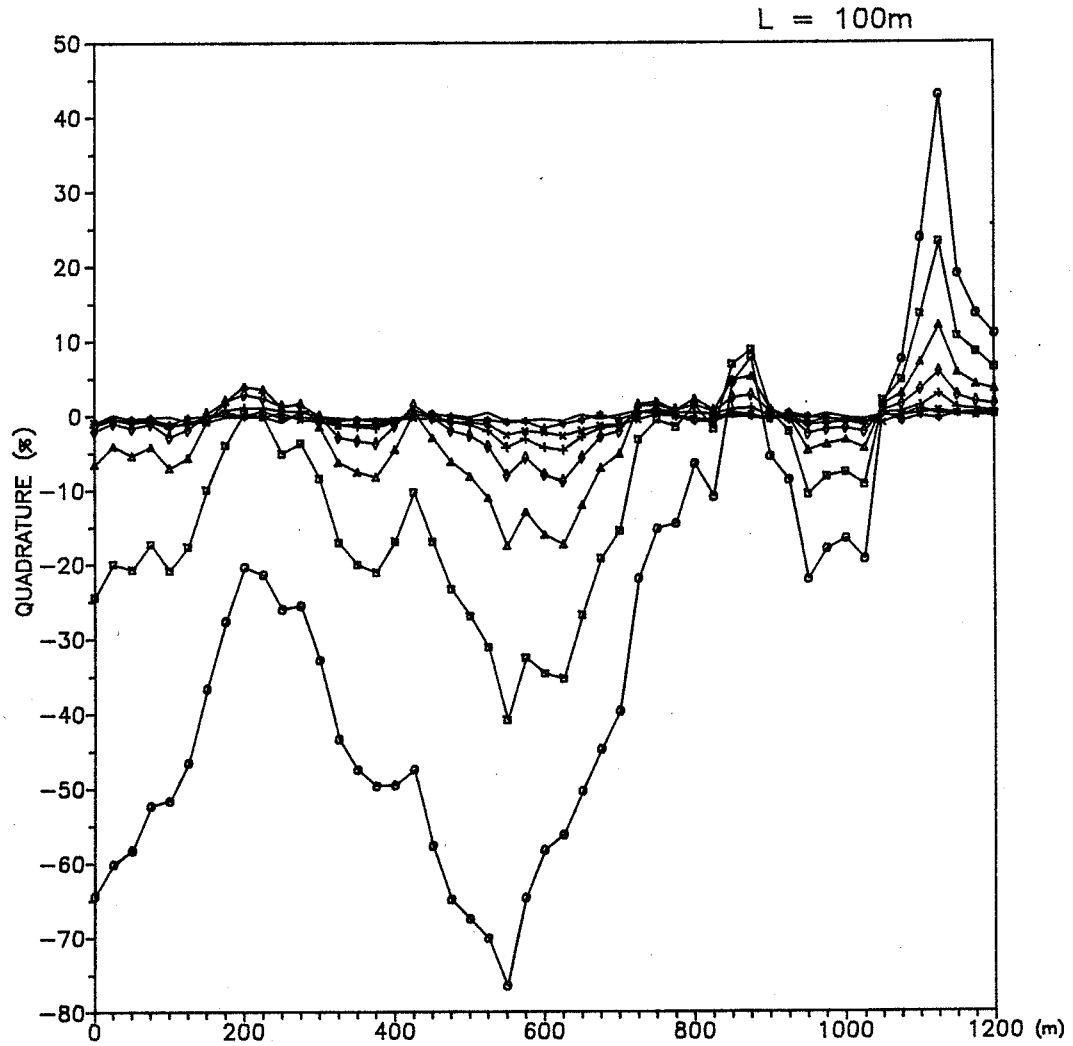

PROFILE SF1A
IN-PHASE (%)
60
50
40
30
20
10
0
-10
-20
-30
-40
0
200
400
600
800
1000 (m)
FREQ.
110 Hz
220 Hz
440 Hz
880 Hz
1760 Hz
3520 Hz
7040 Hz
14080 Hz

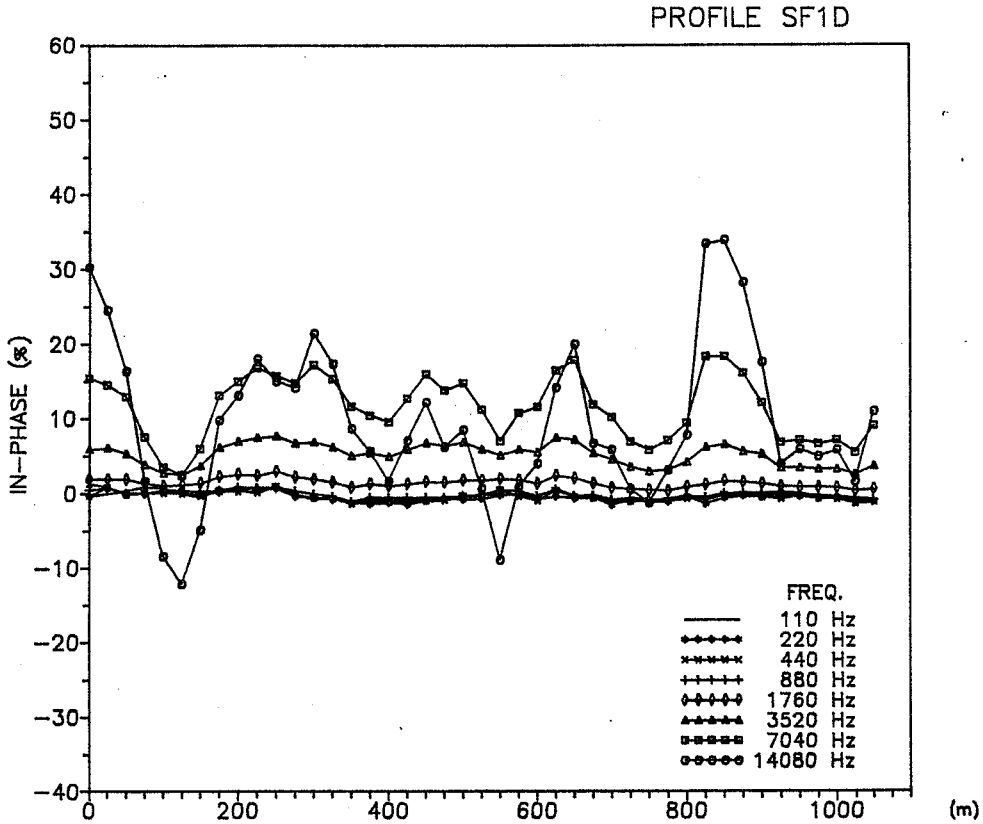

L = 100m
QUADRATURE (%)
20
10
0
-10
-20
-30
-40
-50
-60
-70
-80
0
200
400
600
800
1000 (m)

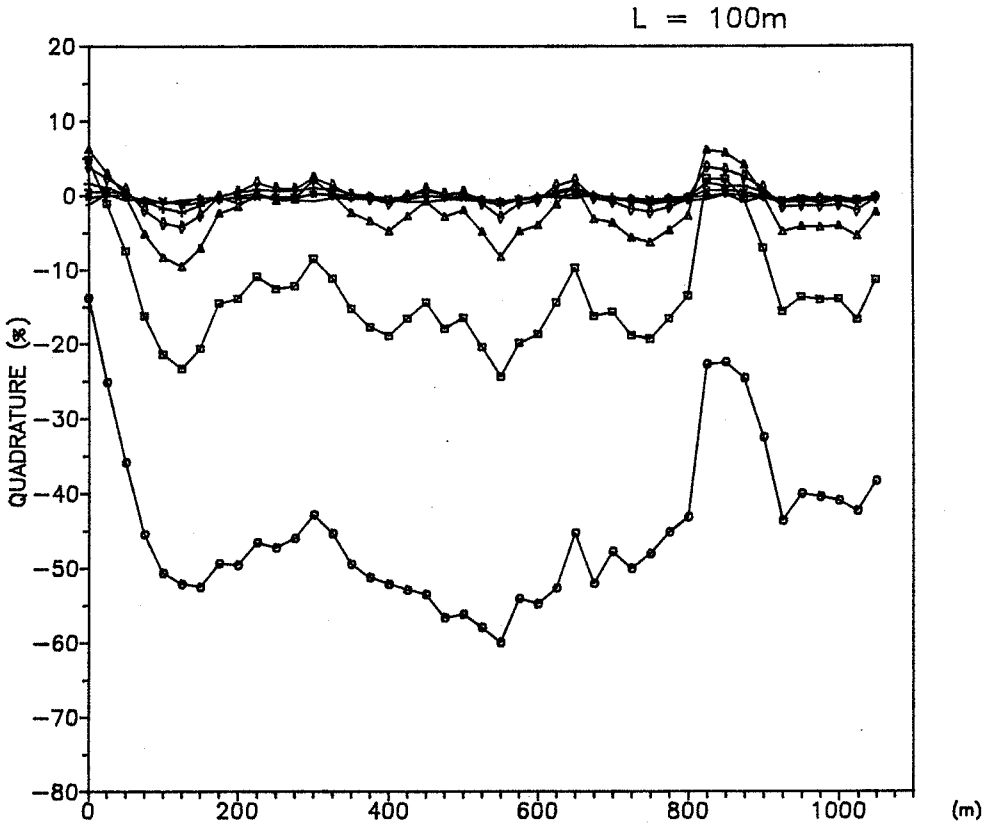

PROFILE SF1B
IN-PHASE (%)
50
40
30
20
10
0
-10
-20
-30
-40
-50
0
200
400
600
800
1000 (m)
FREQ.
110 Hz
220 Hz
440 Hz
880 Hz
1760 Hz
3520 Hz
7040 Hz
14080 Hz

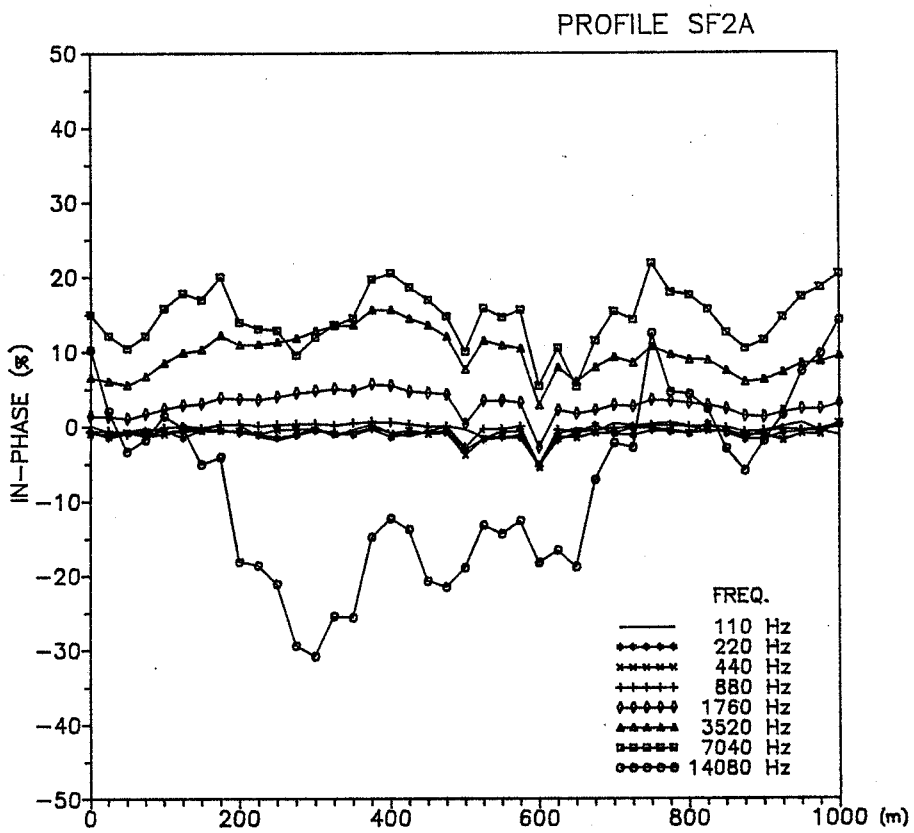

L = 100m
QUADRATURE (%)
30
20
10
0
-10
-20
-30
-40
-50
-60
-70
0
200
400
600
800
1000 (m)

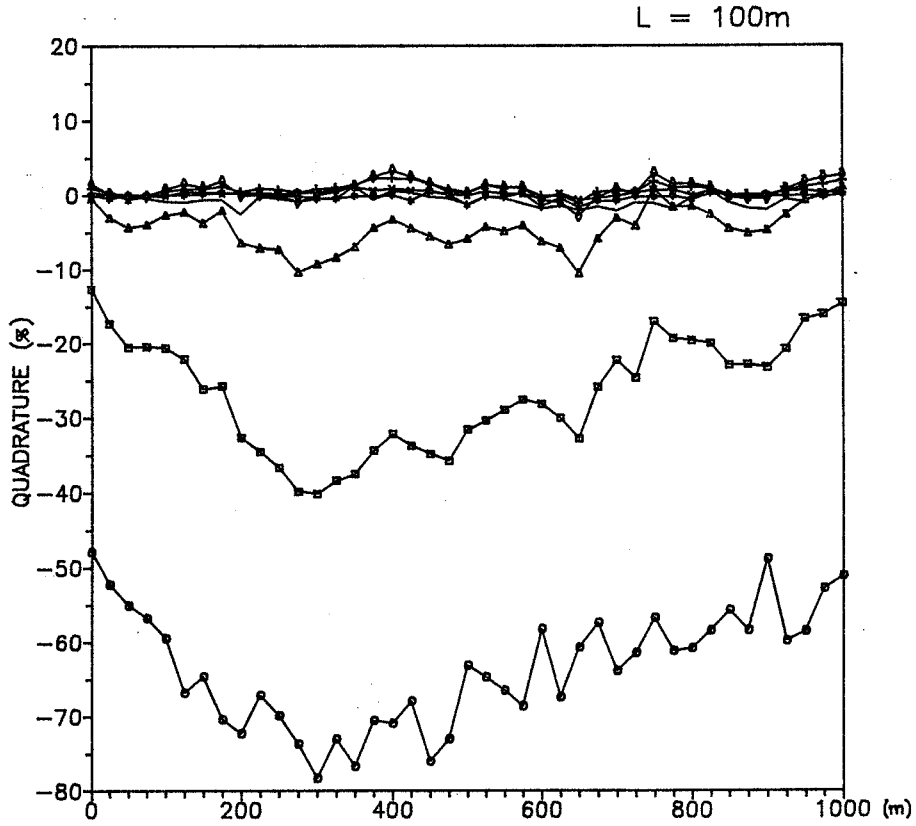

PROFILE SF1C
IN-PHASE (%)
50
40
30
20
10
0
-10
-20
-30
-40
-50
0
200
400
600
800
1000
1200 (m)
FREQ.
110 Hz
220 Hz
440 Hz
880 Hz
1760 Hz
3520 Hz
7040 Hz
14080 Hz

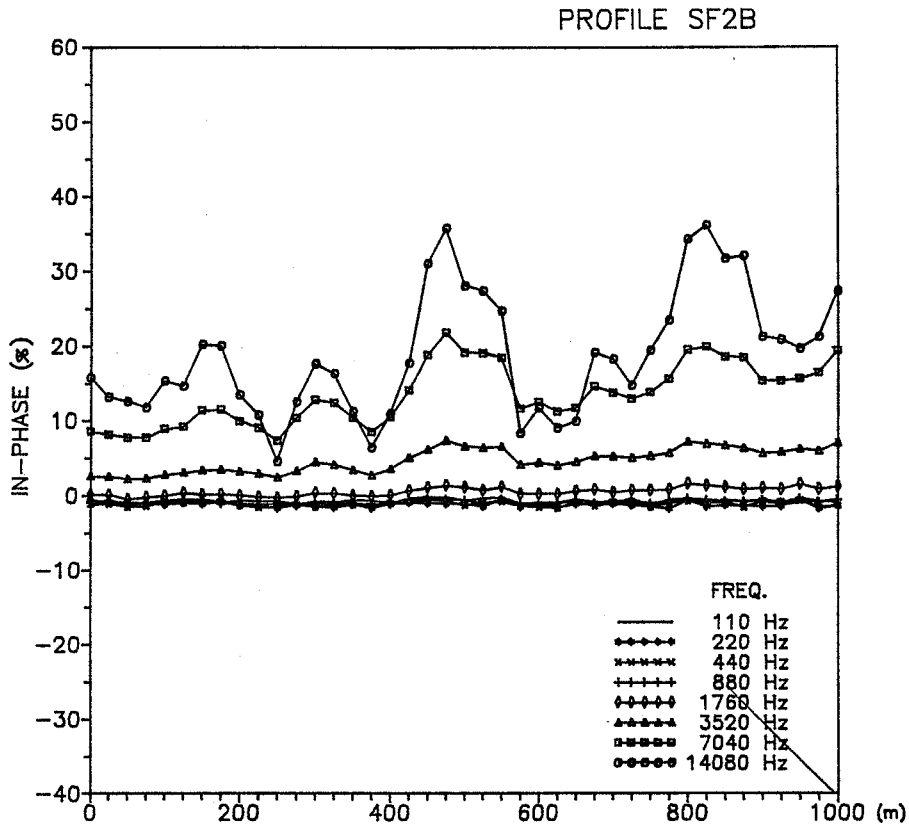

L = 100m
QUADRATURE (%)
50
40
30
20
10
0
-10
-20
-30
-40
-50
-60
-70
-80
0
200
400
600
800
1000
1200 (m)

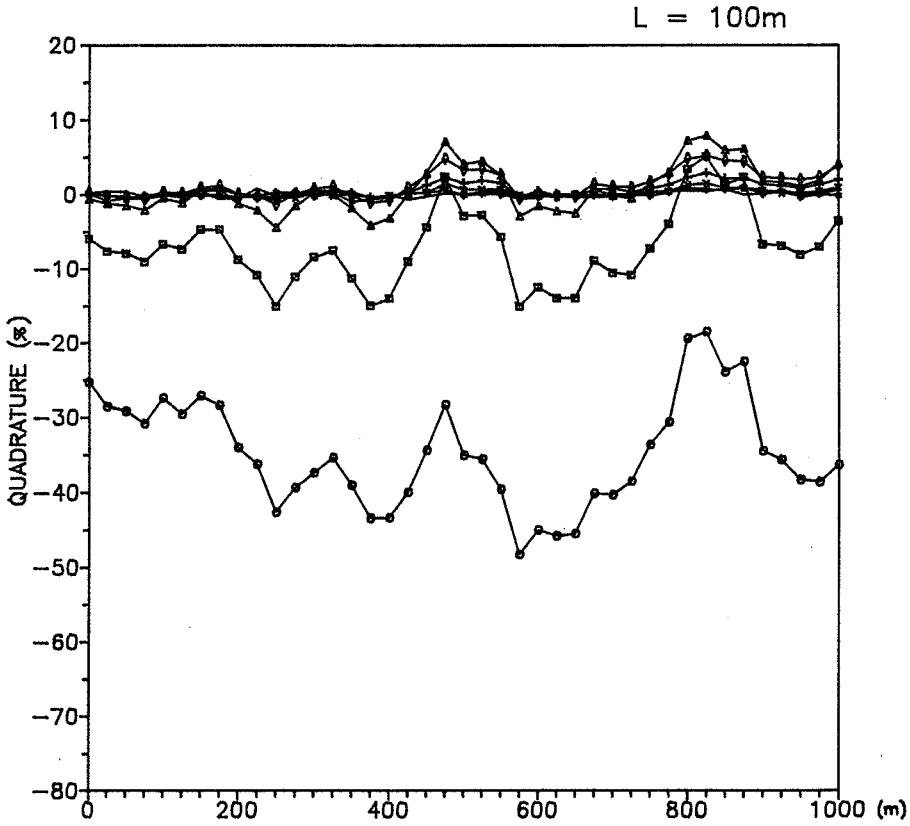

PROFILE SF1D
IN-PHASE (%)
60
50
40
30
20
10
0
-10
-20
-30
-40
0
200
400
600
800
1000
(m)
FREQ.
110 Hz
220 Hz
440 Hz
880 Hz
1760 Hz
3520 Hz
7040 Hz
14080 Hz

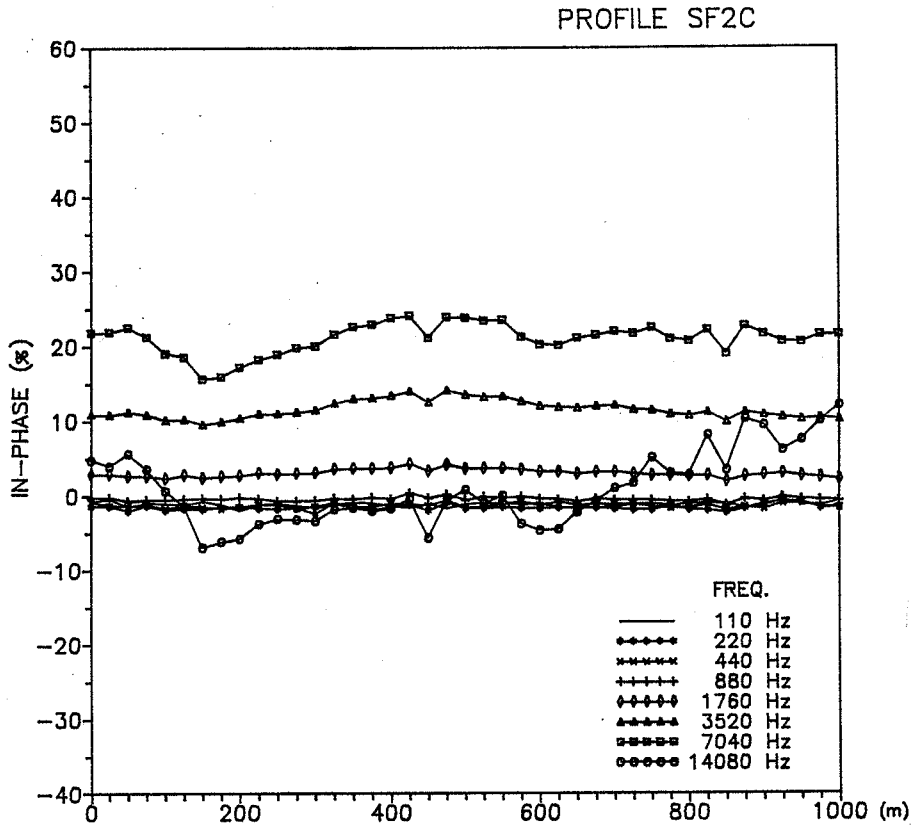

L = 100m
QUADRATURE (%)
20
10
0
-10
-20
-30
-40
-50
-60
-70
-80
0
200
400
600
800
1000
(m)

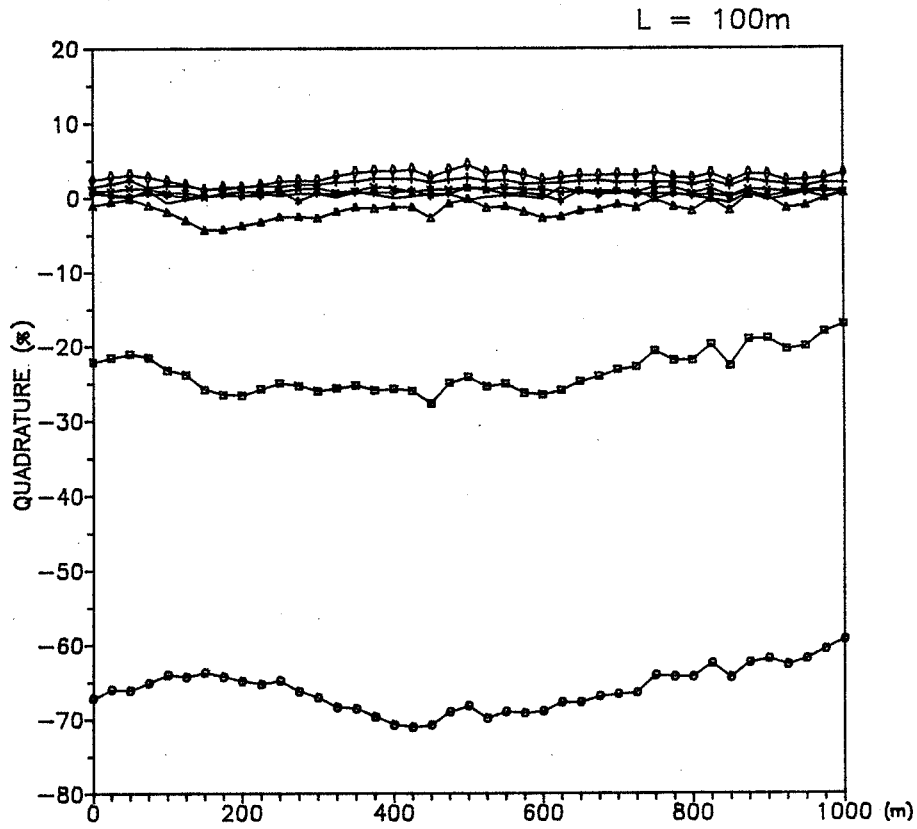

PROFILE SF2A
IN-PHASE (%)
50
40
30
20
10
0
-10
-20
-30
-40
-50
0
200
400
600
800
1000 (m)
FREQ.
110 Hz
220 Hz
440 Hz
880 Hz
1760 Hz
3520 Hz
7040 Hz
14080 Hz

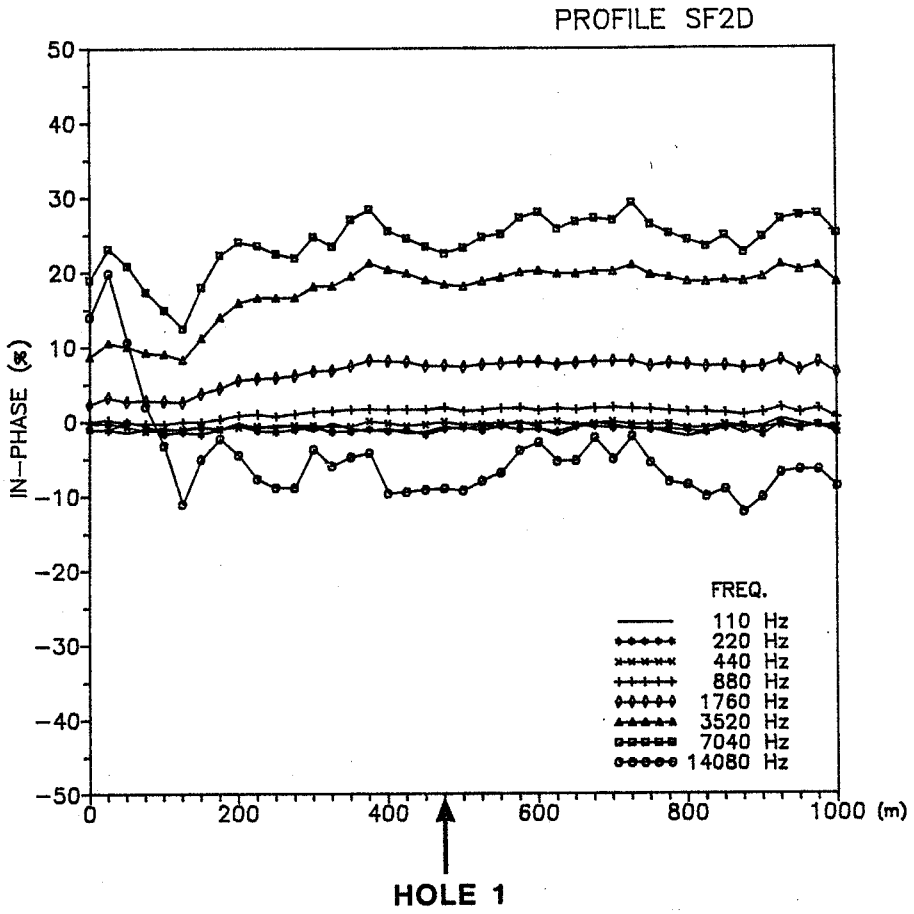

L = 100m
QUADRATURE (%)
20
10
0
-10
-20
-30
-40
-50
-60
-70
-80
0
200
400
600
800
1000 (m)

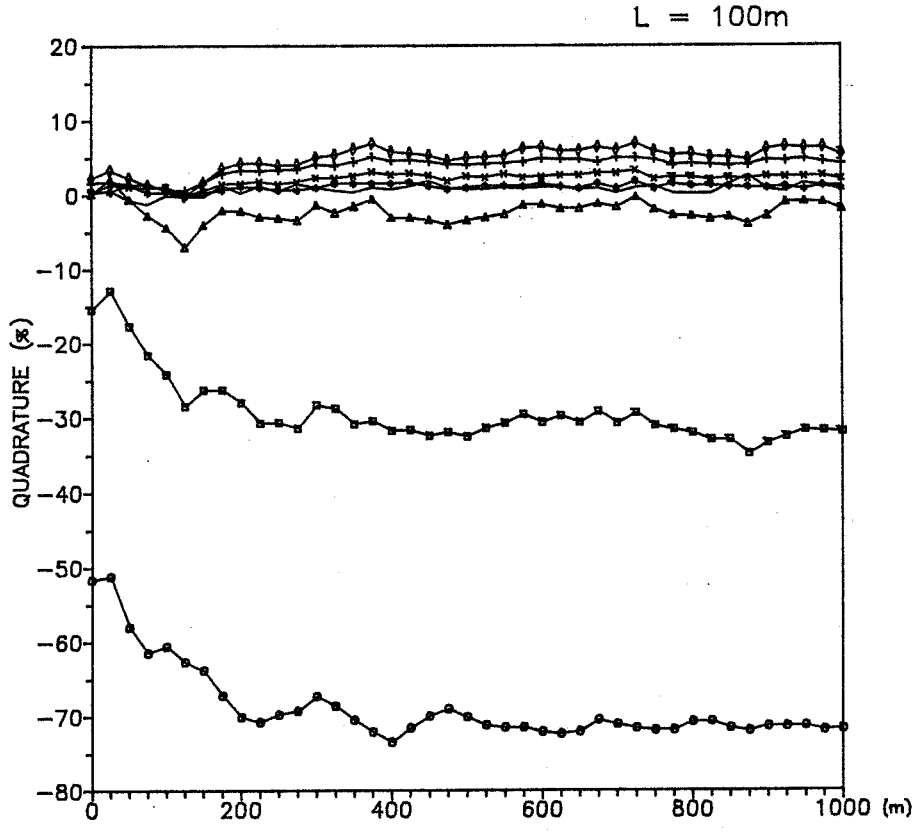

PROFILE SF2B
IN-PHASE (%)
60
50
40
30
20
10
0
-10
-20
-30
-40
0
200
400
600
800
1000 (m)
FREQ.
110 Hz
220 Hz
440 Hz
880 Hz
1760 Hz
3520 Hz
7040 Hz
14080 Hz

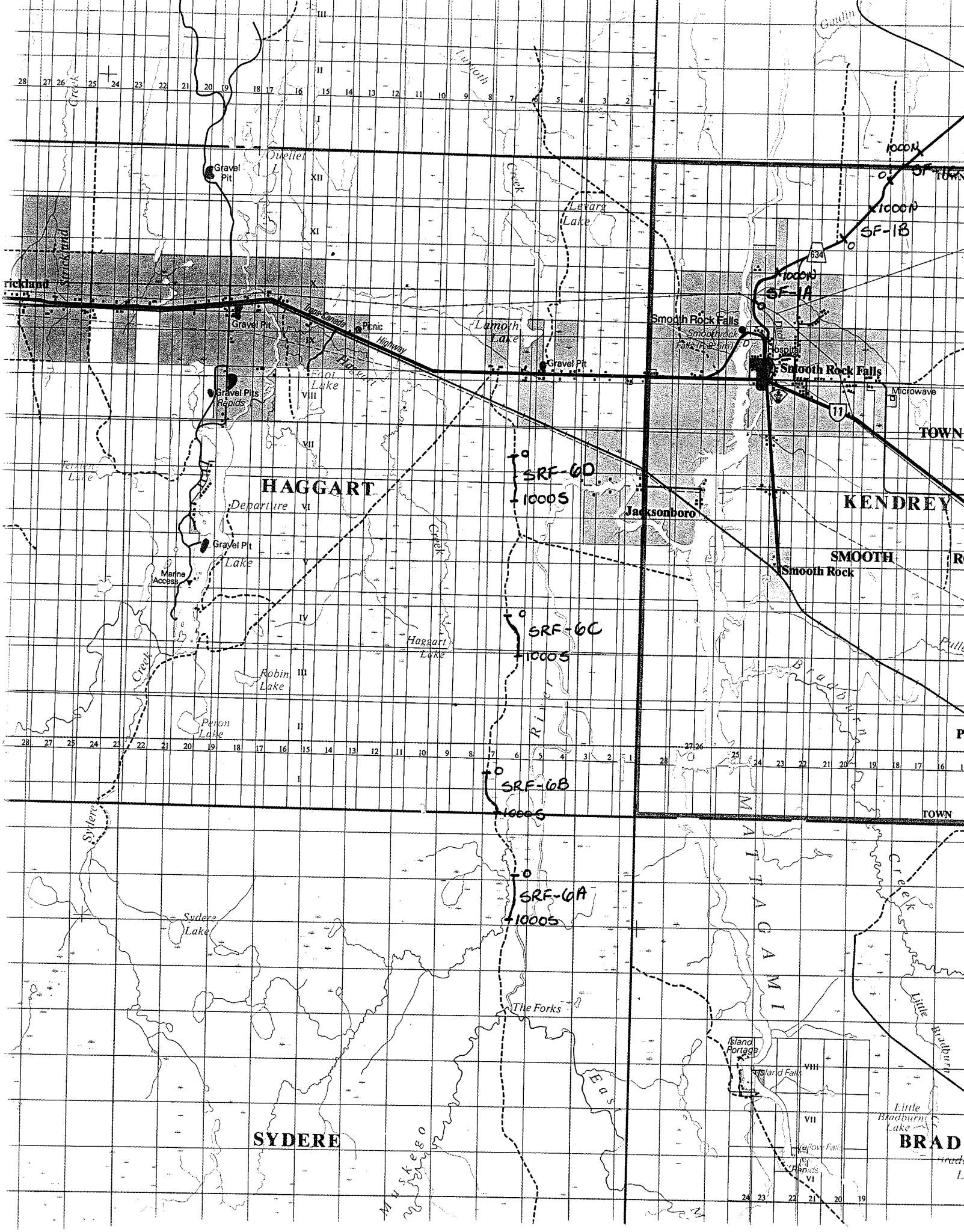

L = 100m
QUADRATURE (%)
20
10
0
-10
-20
-30
-40
-50
-60
-70
-80
0
200
400
600
800
1000 (m)

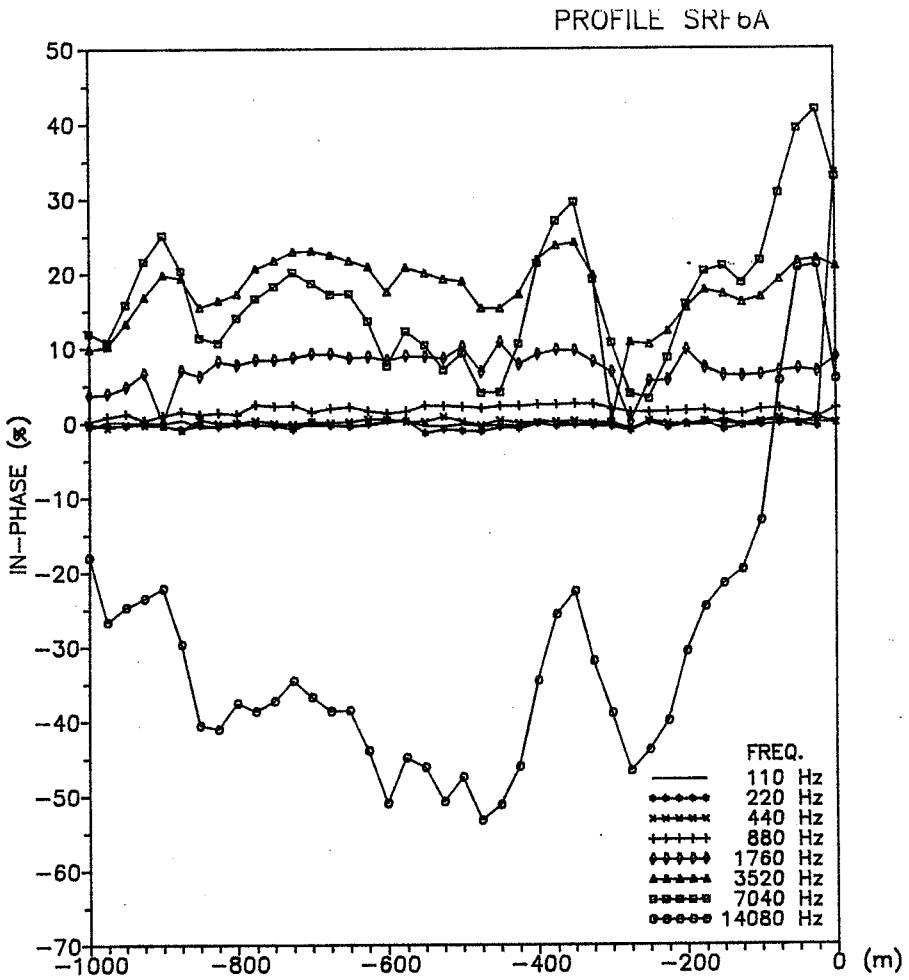

PROFILE SF2C
IN-PHASE (%)
60
50
40
30
20
10
0
-10
-20
-30
-40
0
200
400
600
800
1000 (m)
FREQ.
110 Hz
220 Hz
440 Hz
880 Hz
1760 Hz
3520 Hz
7040 Hz
14080 Hz

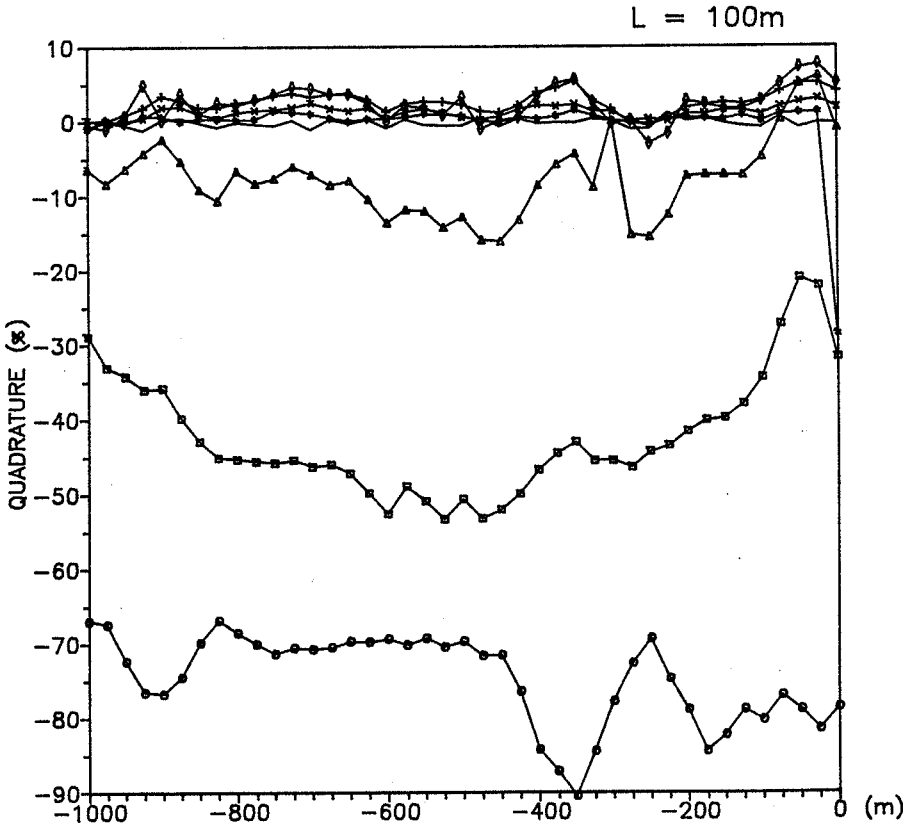

L = 100m
QUADRATURE (%)
20
10
0
-10
-20
-30
-40
-50
-60
-70
-80
0
200
400
600
800
1000 (m)

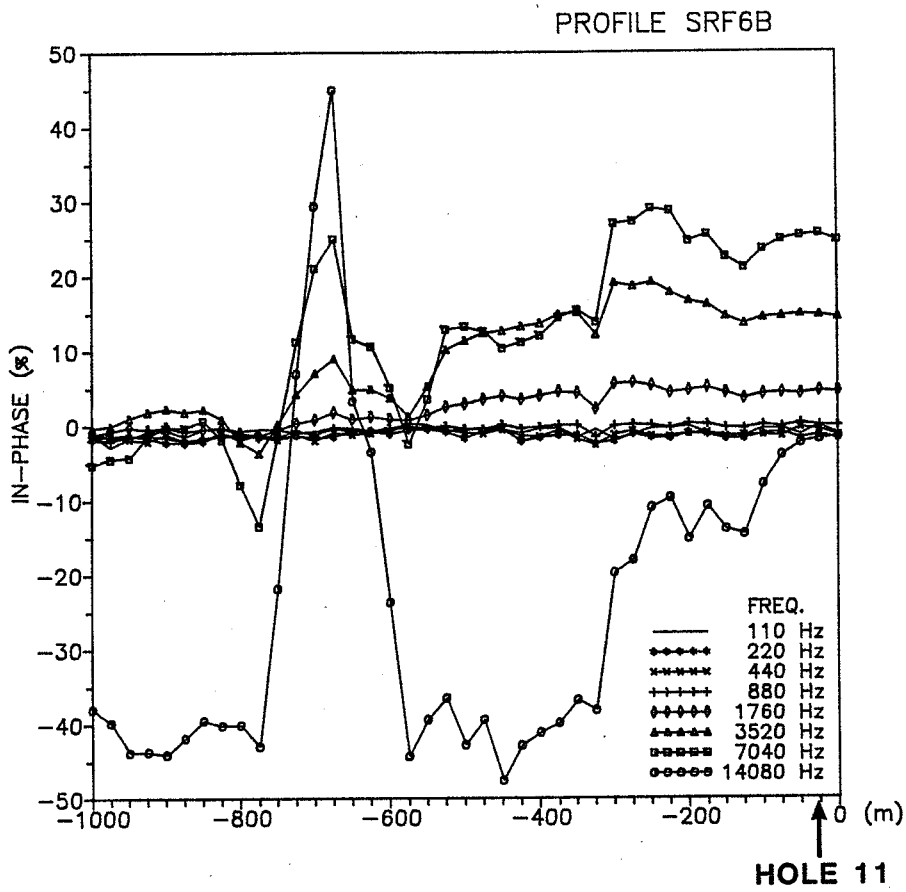

PROFILE SF2D
IN-PHASE (%)
50
40
30
20
10
0
-10
-20
-30
-40
-50
0
200
400
600
800
1000 (m)
FREQ.
110 Hz
220 Hz
440 Hz
880 Hz
1760 Hz
3520 Hz
7040 Hz
14080 Hz
HOLE 1

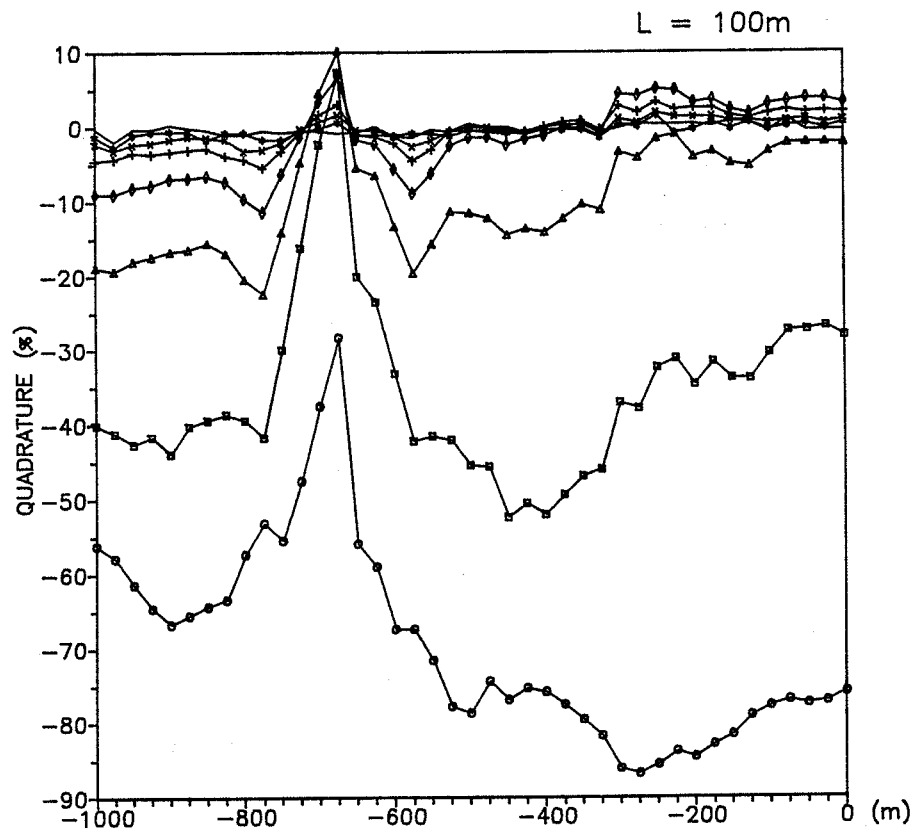

L = 100m
QUADRATURE (%)
20
10
0
-10
-20
-30
-40
-50
-60
-70
-80
0
200
400
600
800
1000 (m)

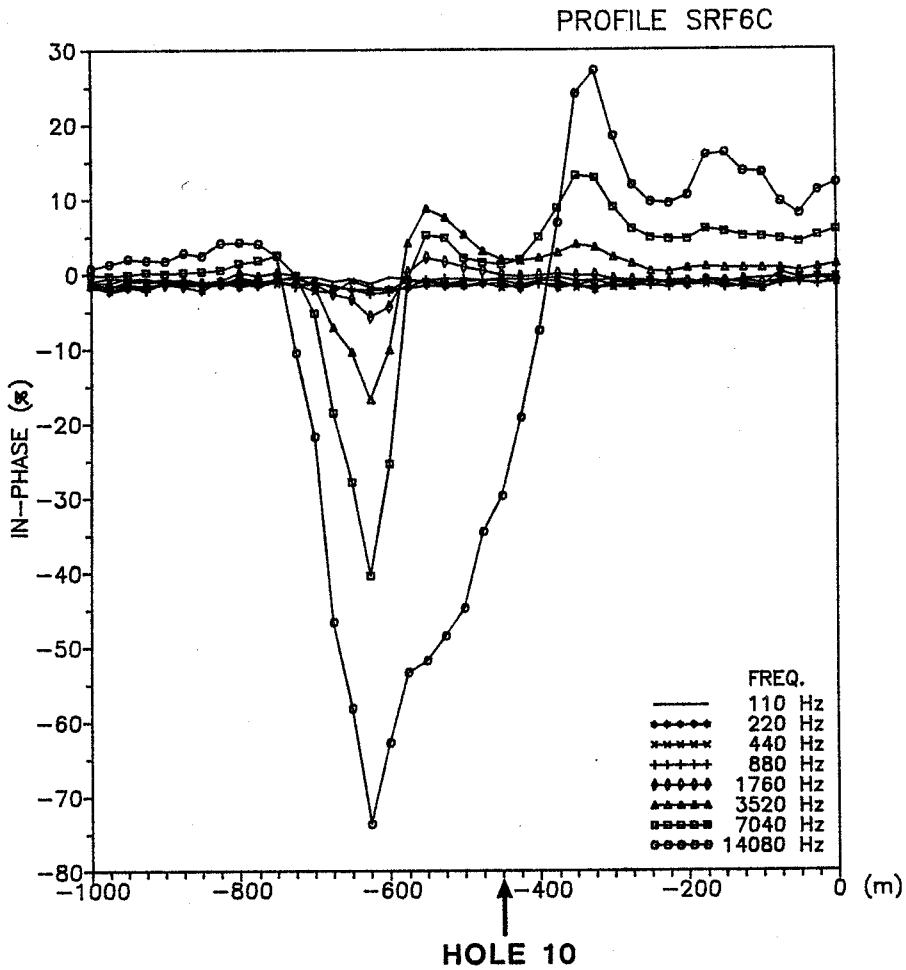

Gravel Pit
Ouellet
Levard Lake
Strickland
Gravel Pit
Picnic
Highway
Lamoth Lake
Smooth Rock Falls
Smooth Rock Falls Hospital
Smooth Rock Falls
Microwave
Gravel Pits
Rapids
Foot Lake
Gravel Pit
TOWN
HAGGART
Departure
Jacksonboro
KENDREY
SMOOTH
Smooth Rock
Gravel Pit
Lake
Marine Access
Haggart Lake
Robin Lake
Peron Lake
Sydere Lake
The Forks
Island Portage
Island Falls
Little Bradburn Lake
SYDERE
BRAD
1000N
SF-1B
SF-1A
SRF-6D
1000S
SRF-6C
1000S
SRF-6B
1000S
SRF-6A
1000S

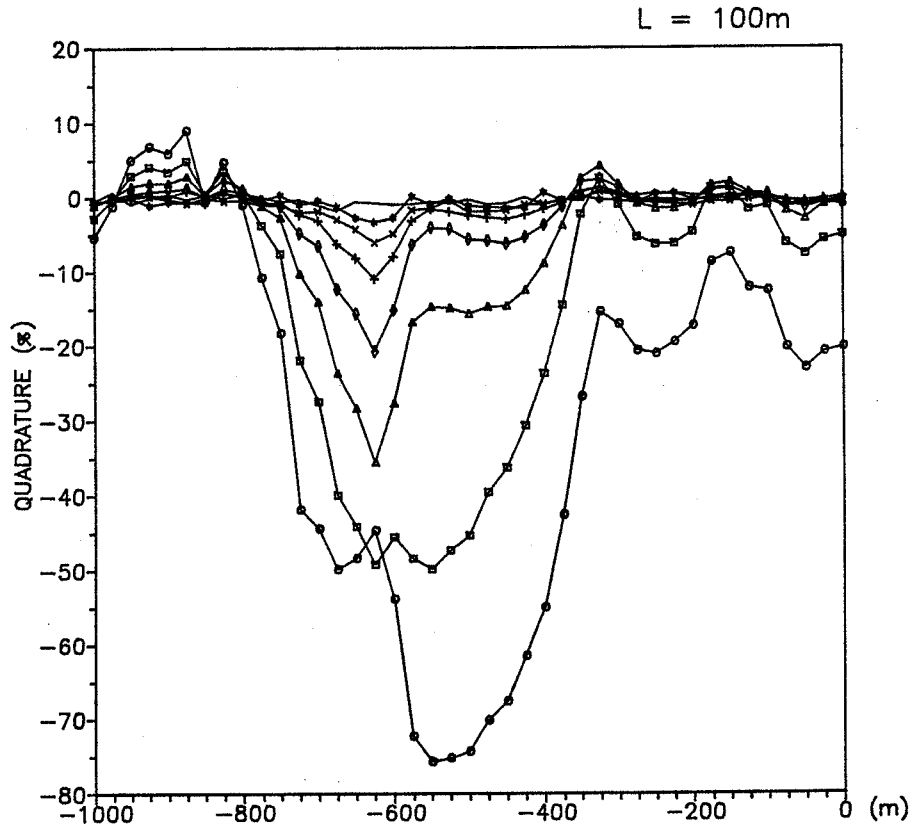

PROFILE SRF6A
IN-PHASE (%)
50
40
30
20
10
0
-10
-20
-30
-40
-50
-60
-70
-1000
-800
-600
-400
-200
0
(m)
FREQ.
110 Hz
220 Hz
440 Hz
880 Hz
1760 Hz
3520 Hz
7040 Hz
14080 Hz


L = 100m
QUADRATURE (%)
10
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
-1000
-800
-600
-400
-200
0
(m)

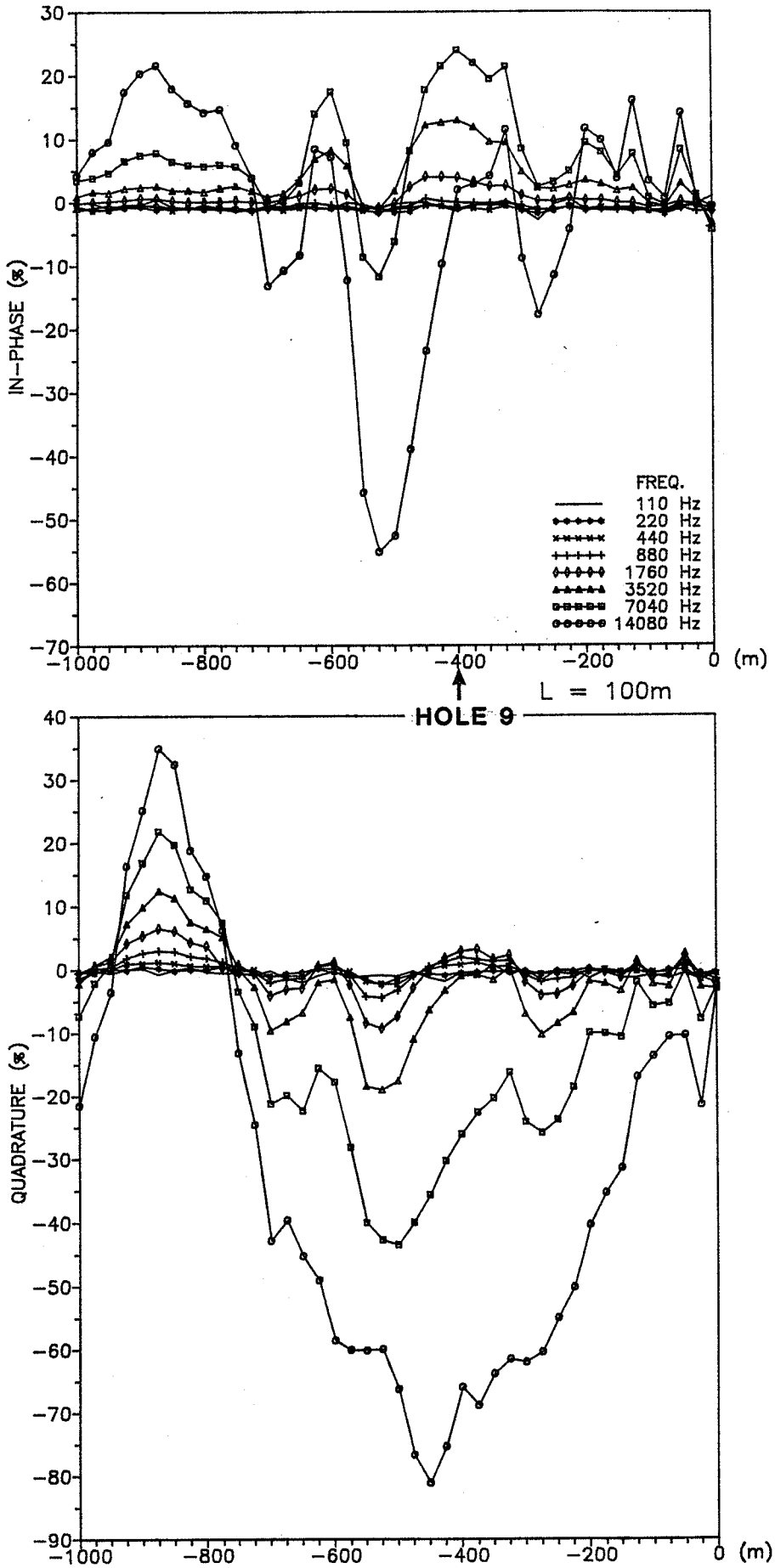

PROFILE SRF6B
IN-PHASE (%)
50
40
30
20
10
0
-10
-20
-30
-40
-50
-1000
-800
-600
-400
-200
0 (m)
FREQ.
110 Hz
220 Hz
440 Hz
880 Hz
1760 Hz
3520 Hz
7040 Hz
14080 Hz
HOLE 11

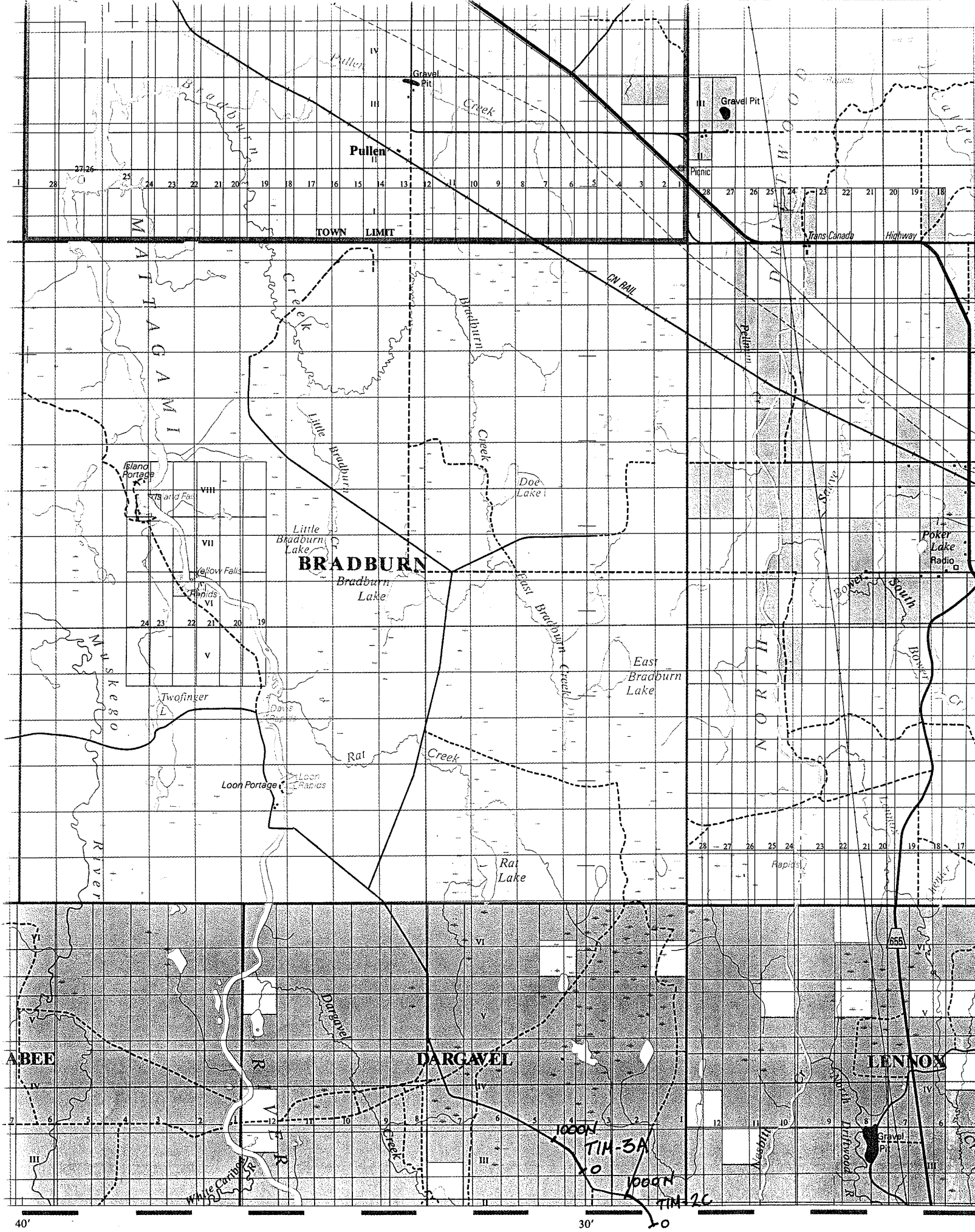

L = 100m
QUADRATURE (%)
10
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
-1000
-800
-600
-400
-200
0 (m)

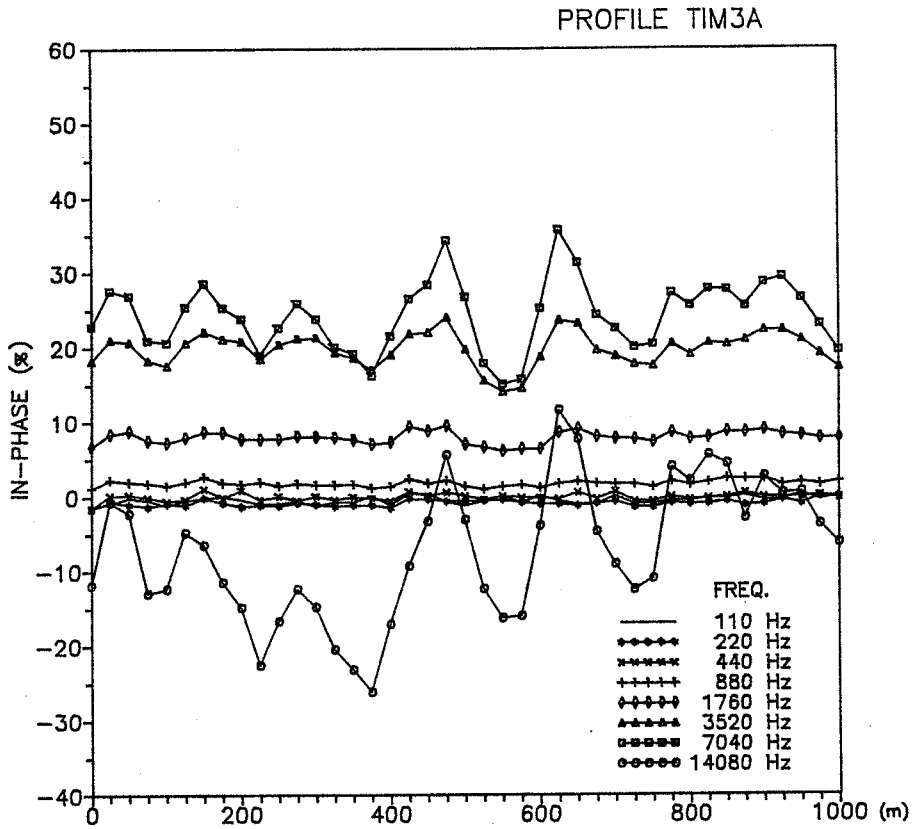

PROFILE SRF6C
IN-PHASE (%)
30
20
10
0
-10
-20
-30
-40
-50
-60
-70
-80
-1000
-800
-600
-400
-200
0 (m)
FREQ.
110 Hz
220 Hz
440 Hz
880 Hz
1760 Hz
3520 Hz
7040 Hz
14080 Hz
HOLE 10

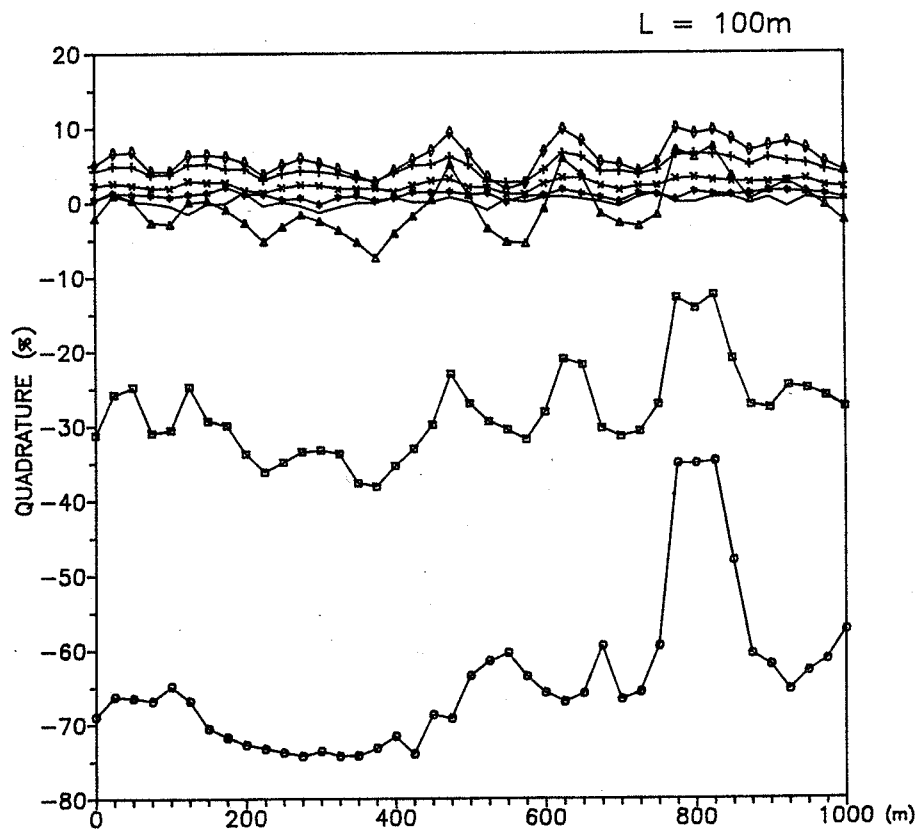

L = 100m
QUADRATURE (%)
20
10
0
-10
-20
-30
-40
-50
-60
-70
-80
-1000
-800
-600
-400
-200
0 (m)

PROFILE SRF6D




Pullen
Gravel Pit
Pullen Creek
Bradburn
TOWN LIMIT
Picnic
Trans Canada Highway
CN RAIL
MATTAGAMI
Creek
Bradburn
Little Bradburn Creek
Doe Lake
Island Portage
Island Falls
Little Bradburn Lake
BRADBURN
Bradburn Lake
Yellow Falls
Rapids
East Bradburn Creek
East Bradburn Lake
Twofinger L.
Muskego River
Rat Creek
Loon Portage
Loon Rapids
Rat Lake
Poker Lake
Radio
Bower Creek
South Bower Cr.
NORTH DRIFTWOOD
Rapids
Dargavel
ABEE
DARGAVEL
LENNOX
White Carribou R.
Creek
Aubin
North Driftwood R.
Gravel Pit
655
1000N
TIM-3A
1000N
TIM-2C
40'
30'


PROFILE TIM3A
IN-PHASE (%)
60
50
40
30
20
10
0
-10
-20
-30
-40
0
200
400
600
800
1000 (m)
FREQ.
110 Hz
220 Hz
440 Hz
880 Hz
1760 Hz
3520 Hz
7040 Hz
14080 Hz

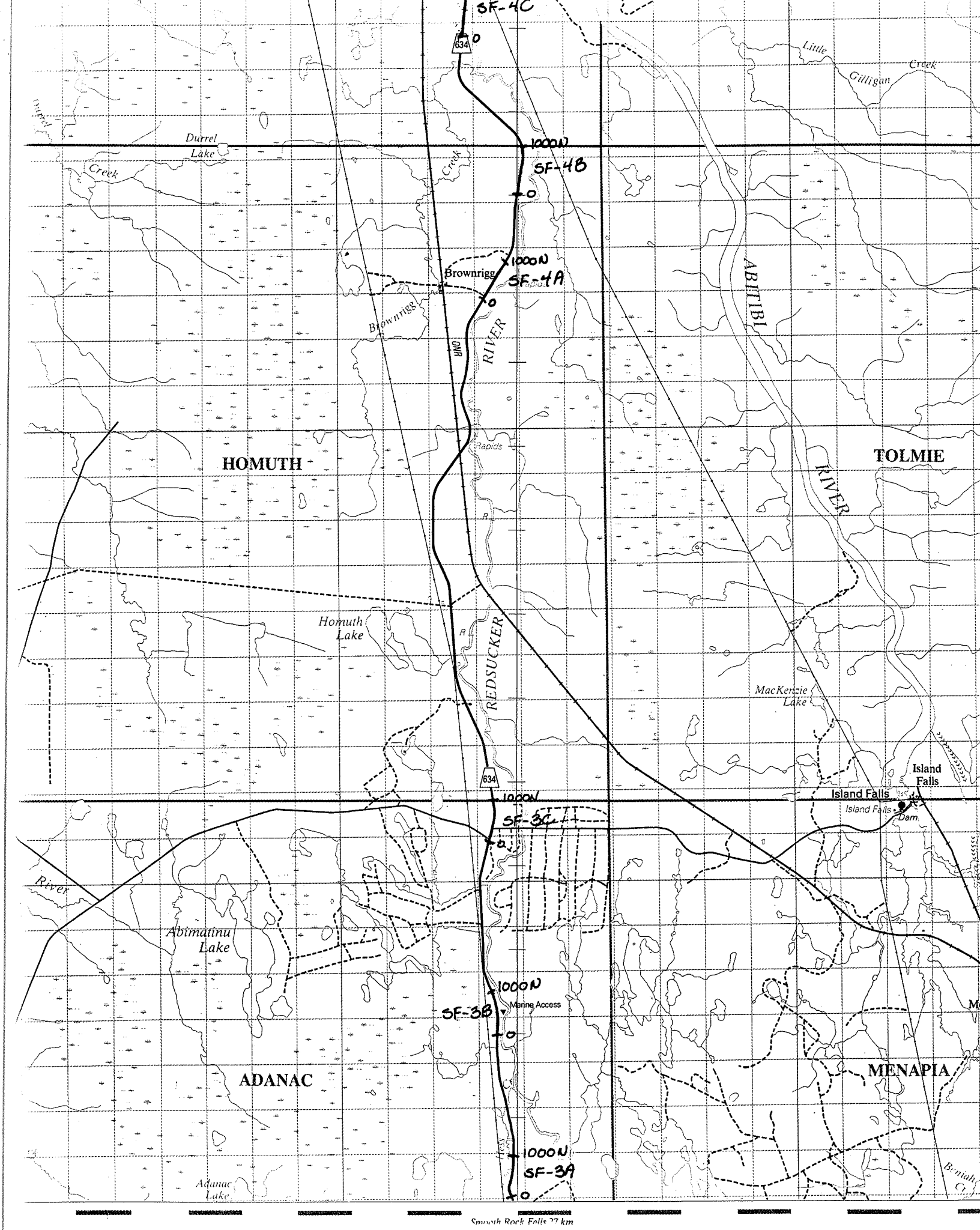

L = 100m
QUADRATURE (%)
20
10
0
-10
-20
-30
-40
-50
-60
-70
-80
0
200
400
600
800
1000 (m)

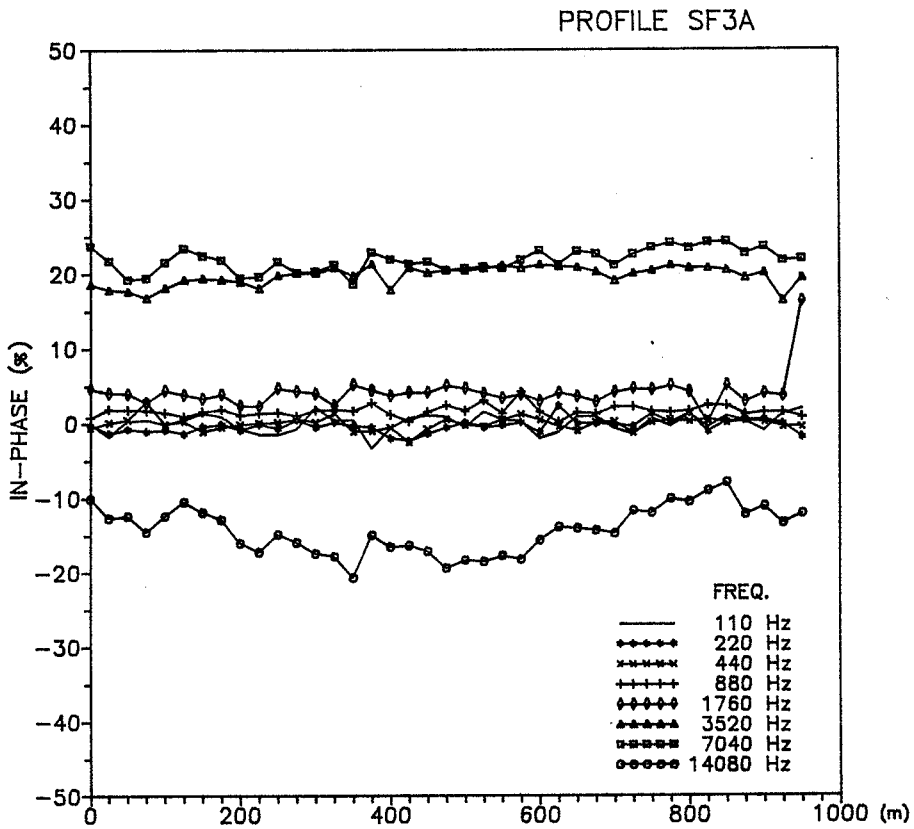
SHEET 42H/NW (ISLAND FALLS)

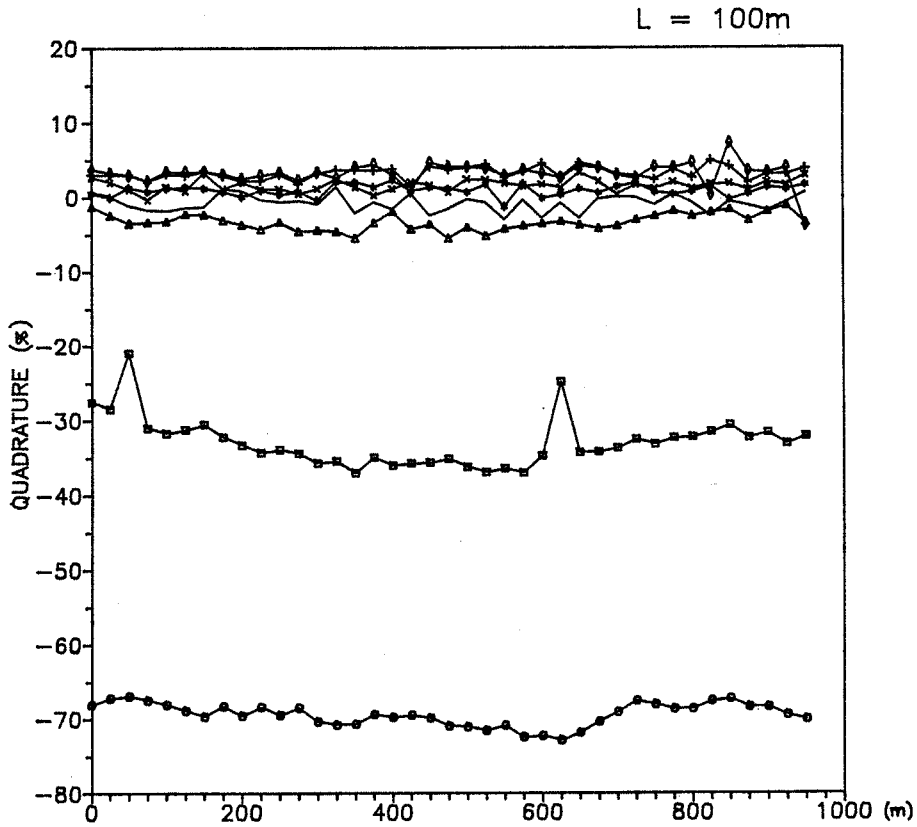
Smoky Falls (14 profiles 1000 m long, 1 profile 1200 m long)

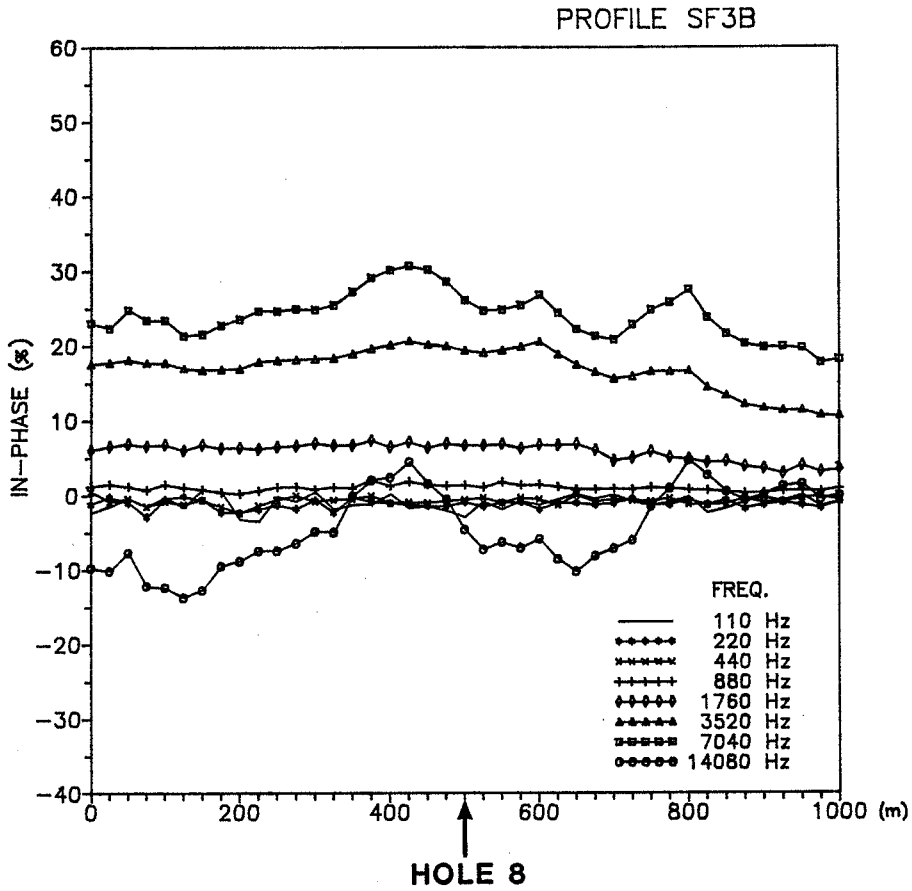
SF-3A, SF-3B, SF-3C, SF-4A, SF-4B, SF-4C, SF-5A (1200 m), SF-5B, SF-5C, SF-6A, SF-6B, SF-6C, SF-7A, SF-7B, SF-7C

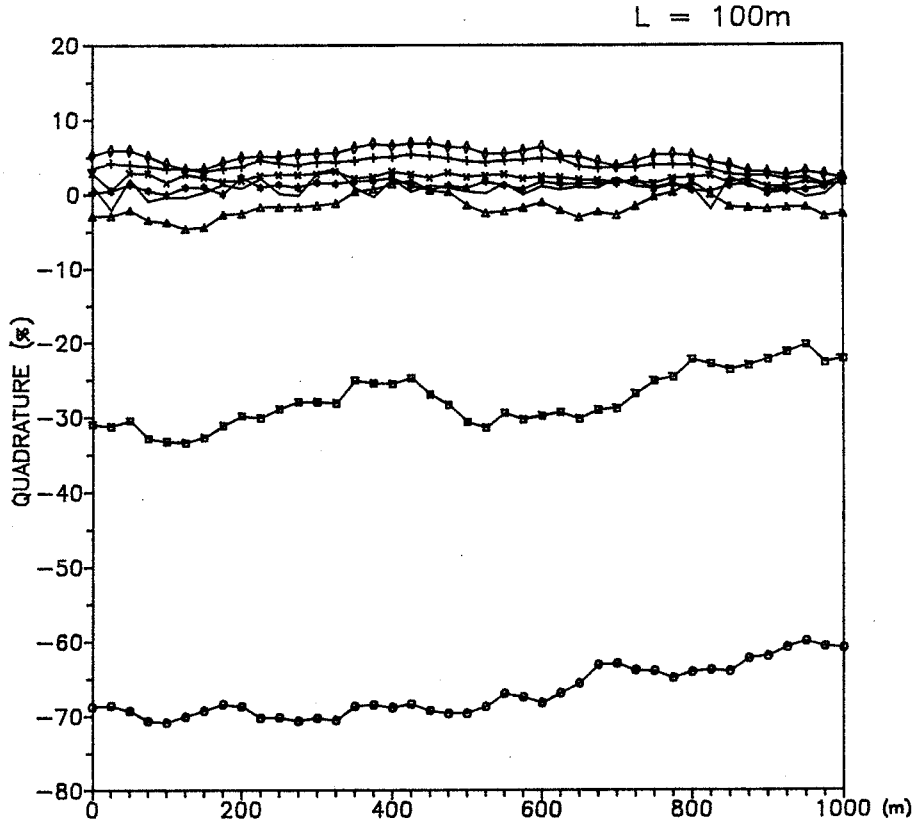
Total for the sheet 15,200 m.

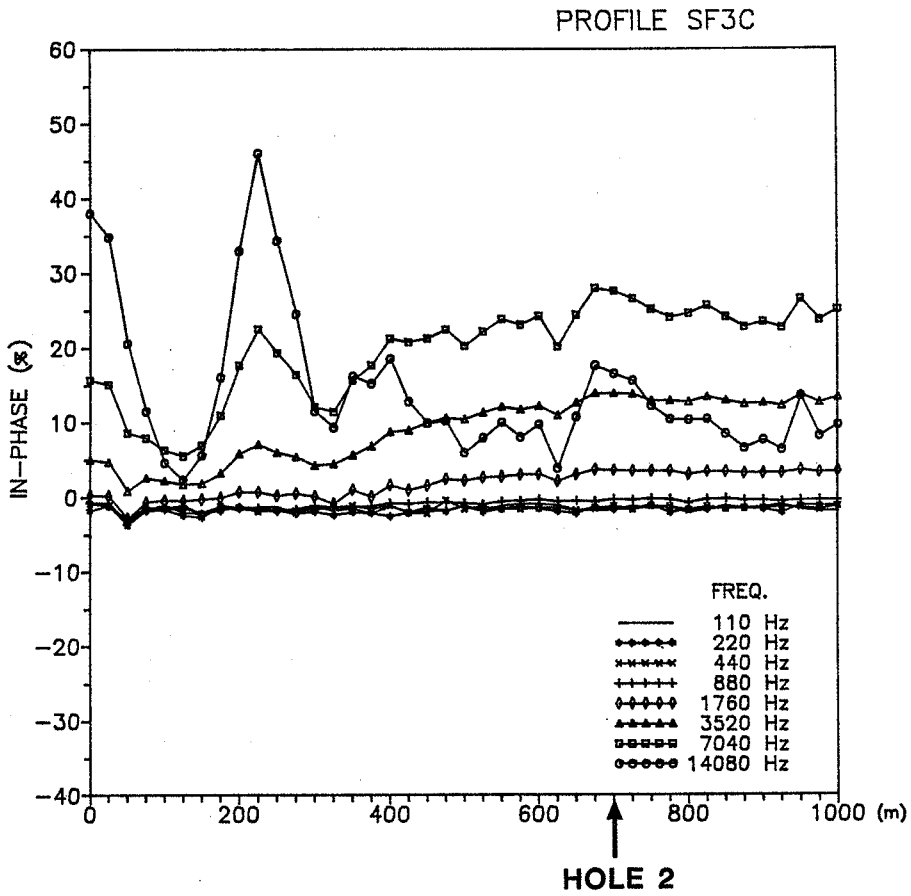

SF-4C
634
0
Little
Gilligan
Creek
Durrel
Lake
Creek
1000N
SF-4B
0
Creek
1000N
Brownrigg
SF-4A
0
Brownrigg
ABITIBI
RIVER
ONR
Rapids
HOMUTH
TOLMIE
RIVER
R
Homuth
Lake
R
REDSUCKER
MacKenzie
Lake
Island
Falls
634
1000N
Island Falls
Island Falls
Dam
SF-3C
0
River
Abimatinu
Lake
1000N
Marine Access
SF-3B
0
ADANAC
MENAPIA
1000N
SF-3A
0
Adanac
Lake
Smooth Rock Falls 27 km

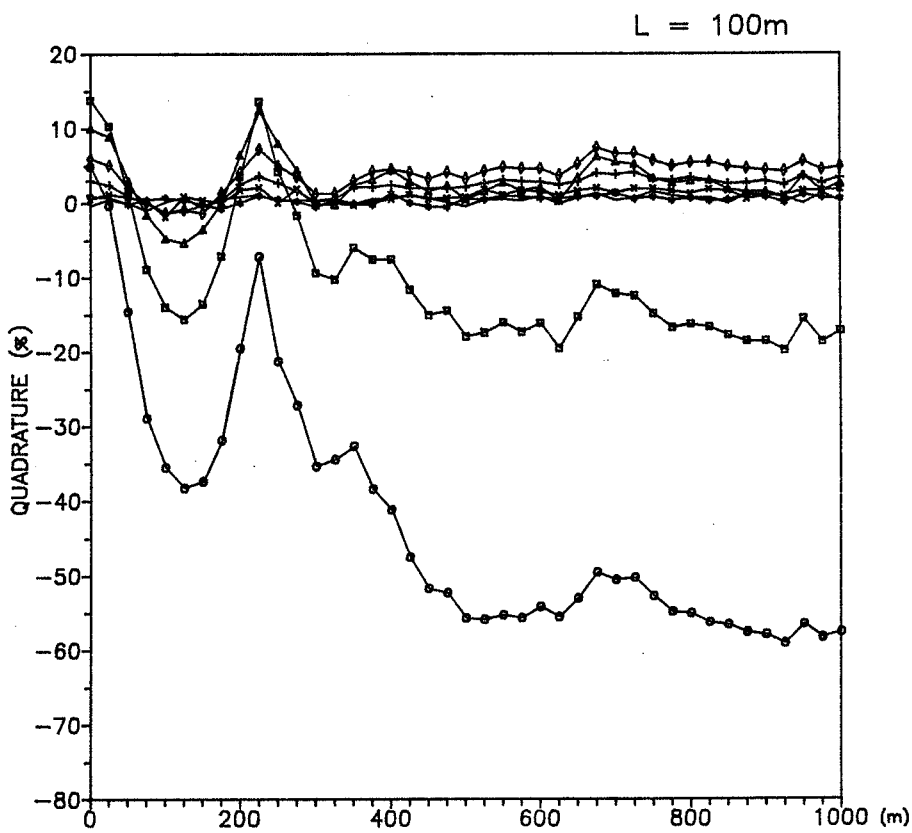

PROFILE SF3A
IN-PHASE (%)
50
40
30
20
10
0
-10
-20
-30
-40
-50
0
200
400
600
800
1000 (m)
FREQ.
110 Hz
220 Hz
440 Hz
880 Hz
1760 Hz
3520 Hz
7040 Hz
14080 Hz

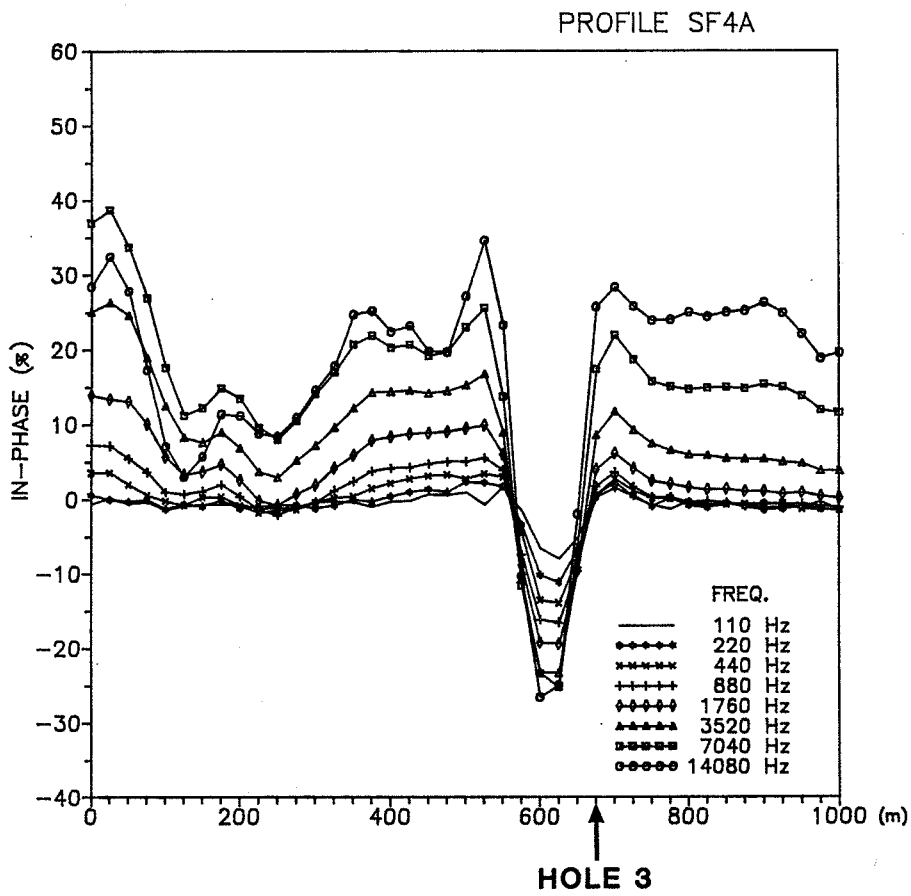

L = 100m
QUADRATURE (%)
20
10
0
-10
-20
-30
-40
-50
-60
-70
-80
0
200
400
600
800
1000 (m)

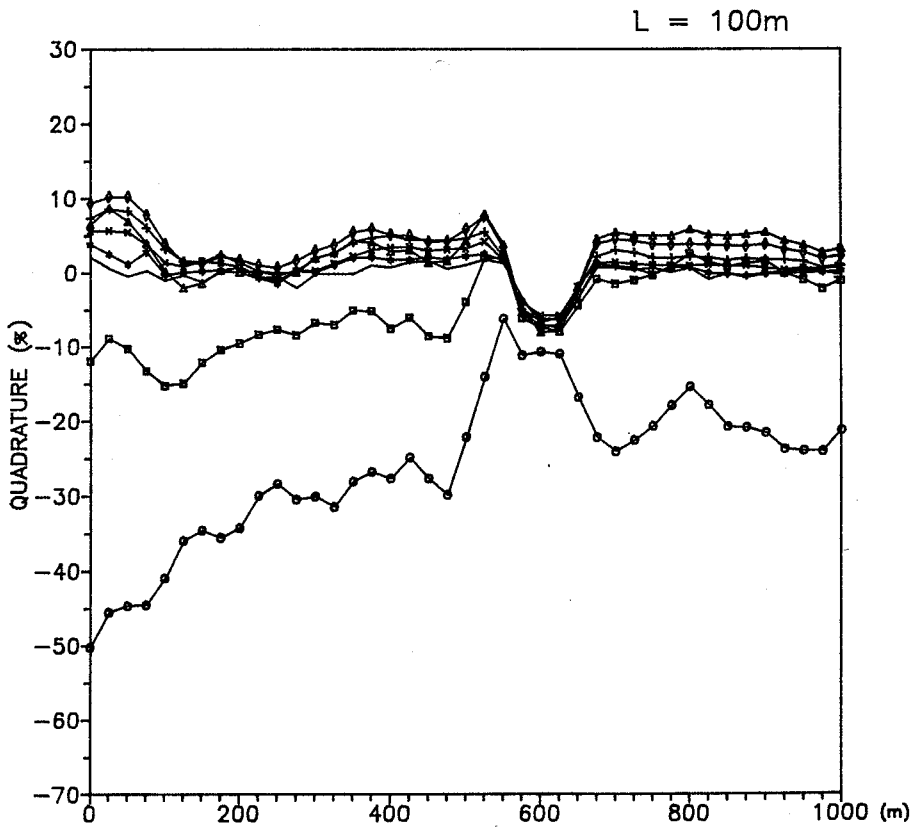

PROFILE SF3B
IN-PHASE (%)
60
50
40
30
20
10
0
-10
-20
-30
-40
0
200
400
600
800
1000 (m)
FREQ.
110 Hz
220 Hz
440 Hz
880 Hz
1760 Hz
3520 Hz
7040 Hz
14080 Hz
HOLE 8

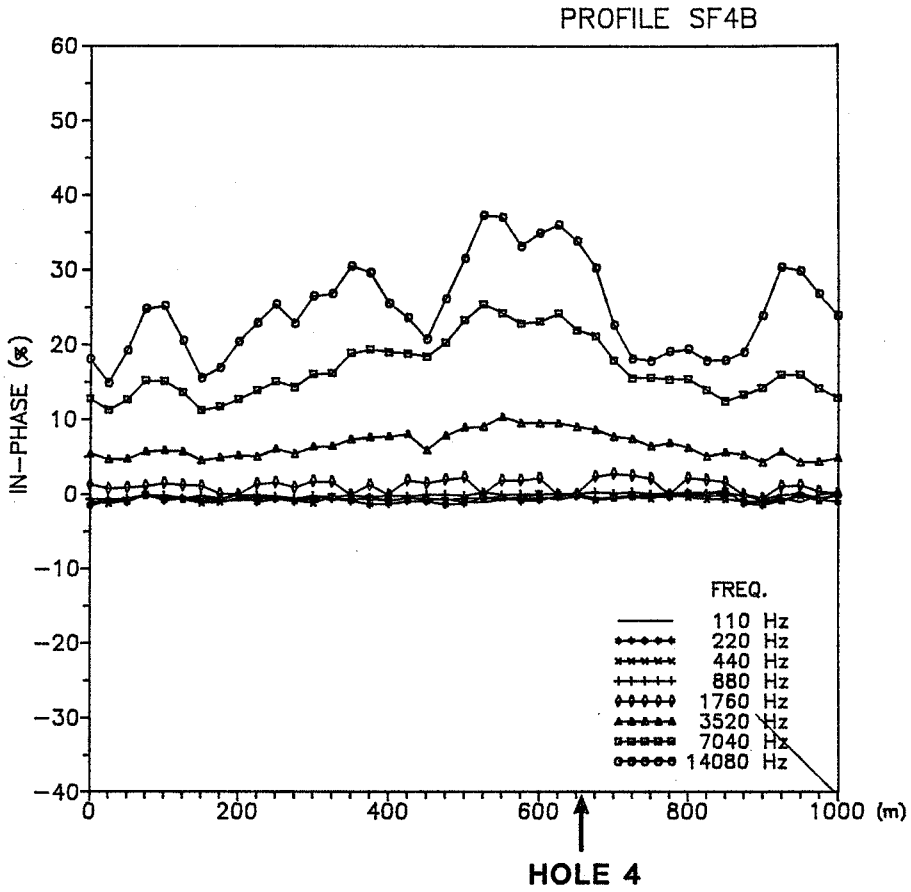

L = 100m
QUADRATURE (%)
20
10
0
-10
-20
-30
-40
-50
-60
-70
-80
0
200
400
600
800
1000 (m)

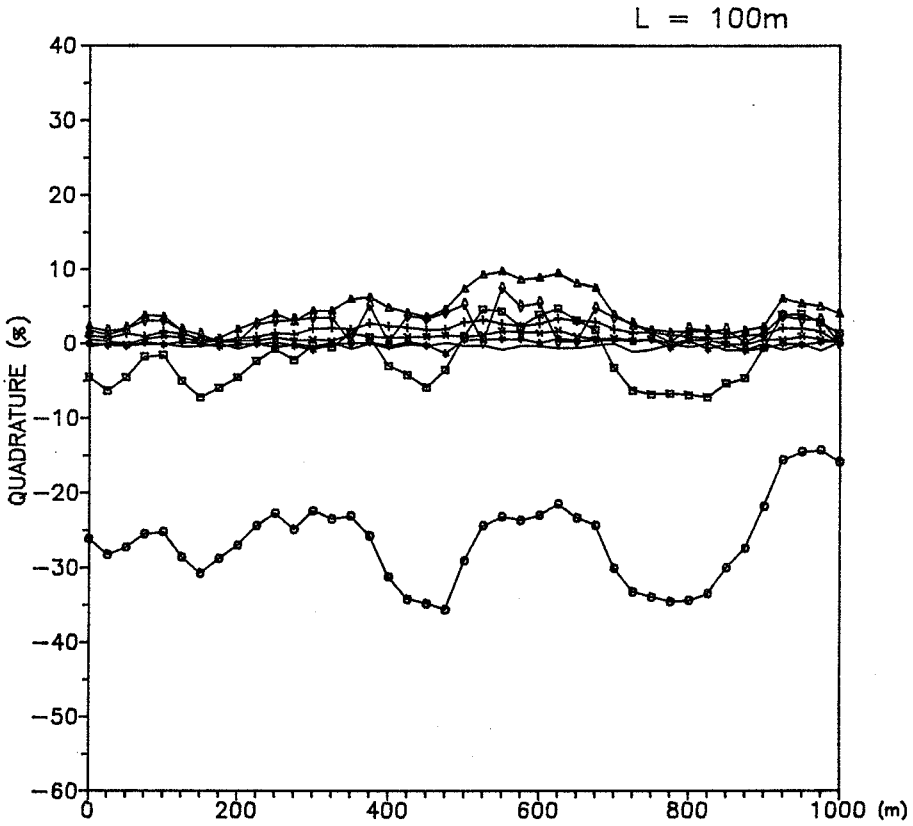

PROFILE SF3C
IN-PHASE (%)
60
50
40
30
20
10
0
-10
-20
-30
-40
0
200
400
600
800
1000 (m)
FREQ.
110 Hz
220 Hz
440 Hz
880 Hz
1760 Hz
3520 Hz
7040 Hz
14080 Hz
HOLE 2

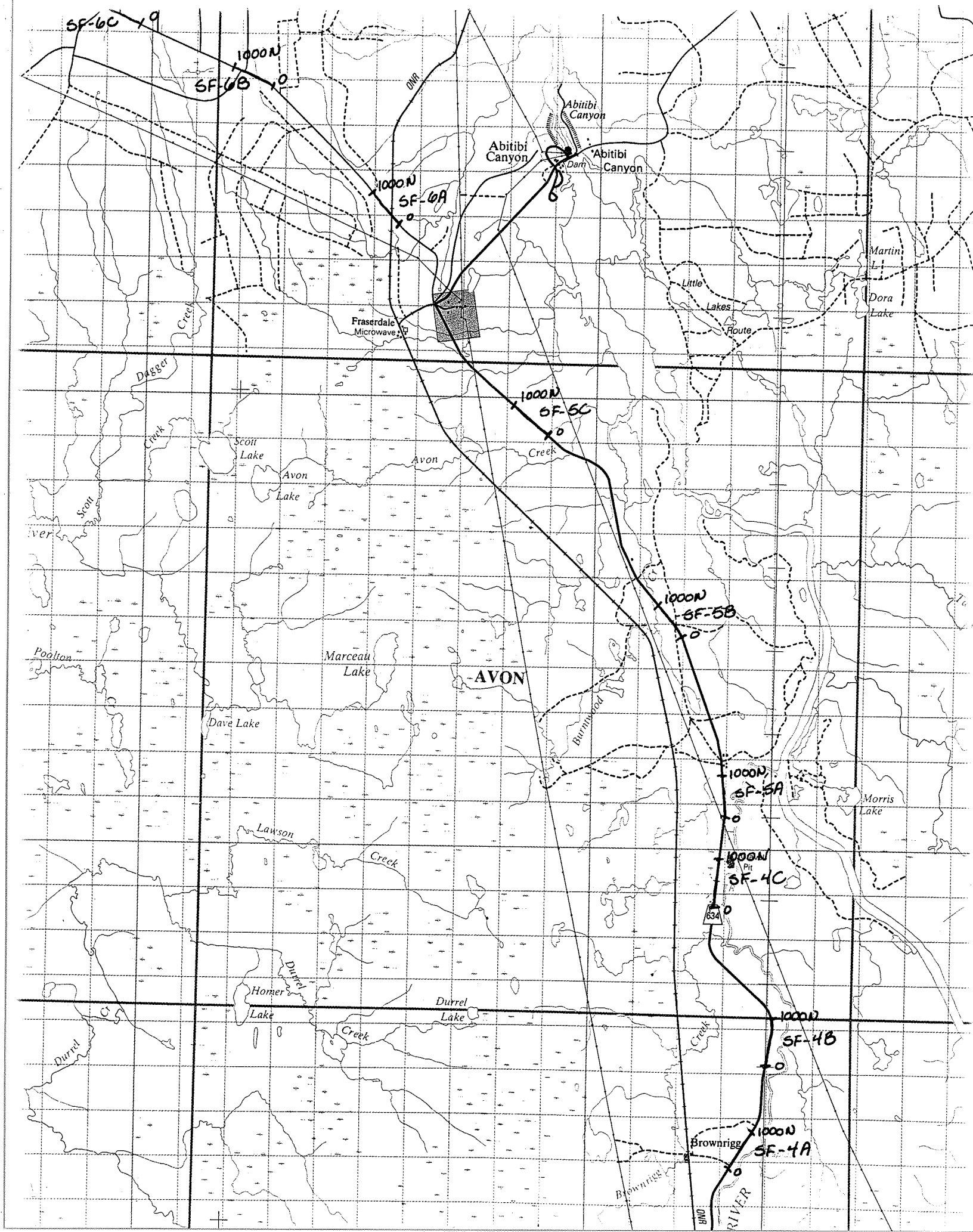

L = 100m
QUADRATURE (%)
20
10
0
-10
-20
-30
-40
-50
-60
-70
-80
0
200
400
600
800
1000 (m)

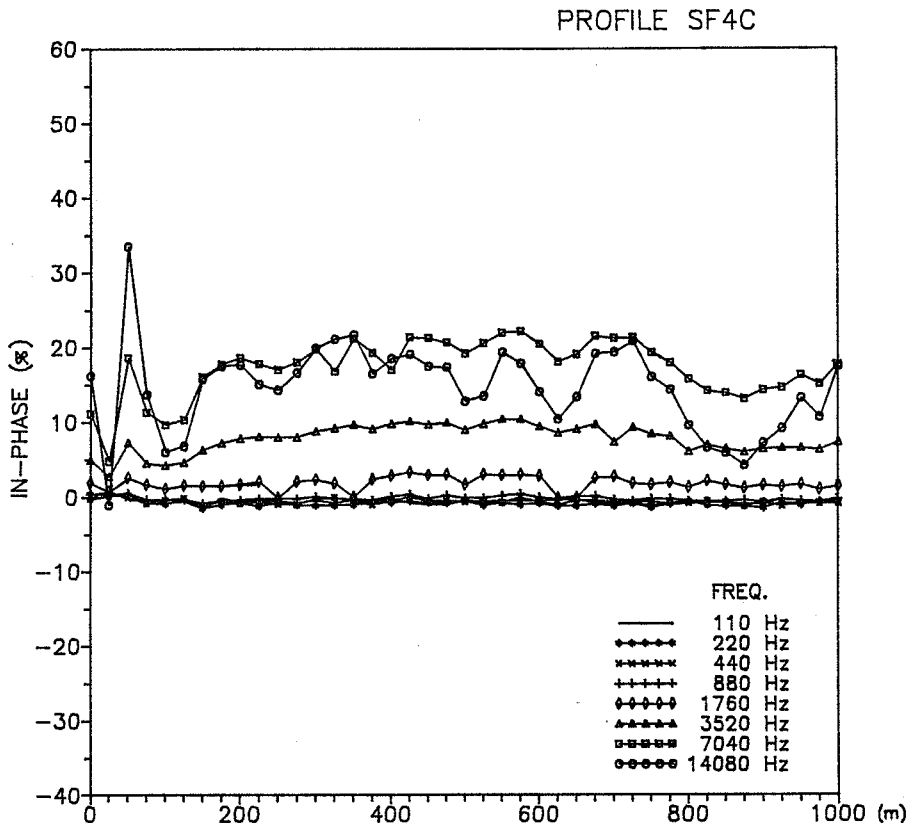

PROFILE SF4A
IN-PHASE (%)
60
50
40
30
20
10
0
-10
-20
-30
-40
0
200
400
600
800
1000 (m)
FREQ.
110 Hz
220 Hz
440 Hz
880 Hz
1760 Hz
3520 Hz
7040 Hz
14080 Hz
HOLE 3

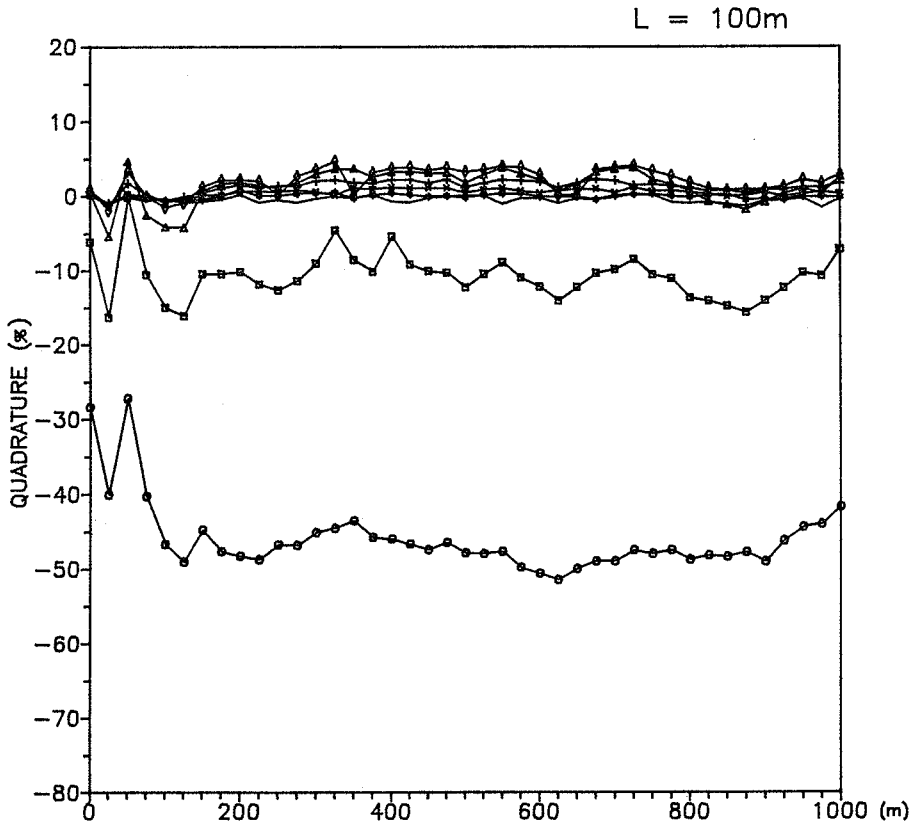

L = 100m
QUADRATURE (%)
30
20
10
0
-10
-20
-30
-40
-50
-60
-70
0
200
400
600
800
1000 (m)

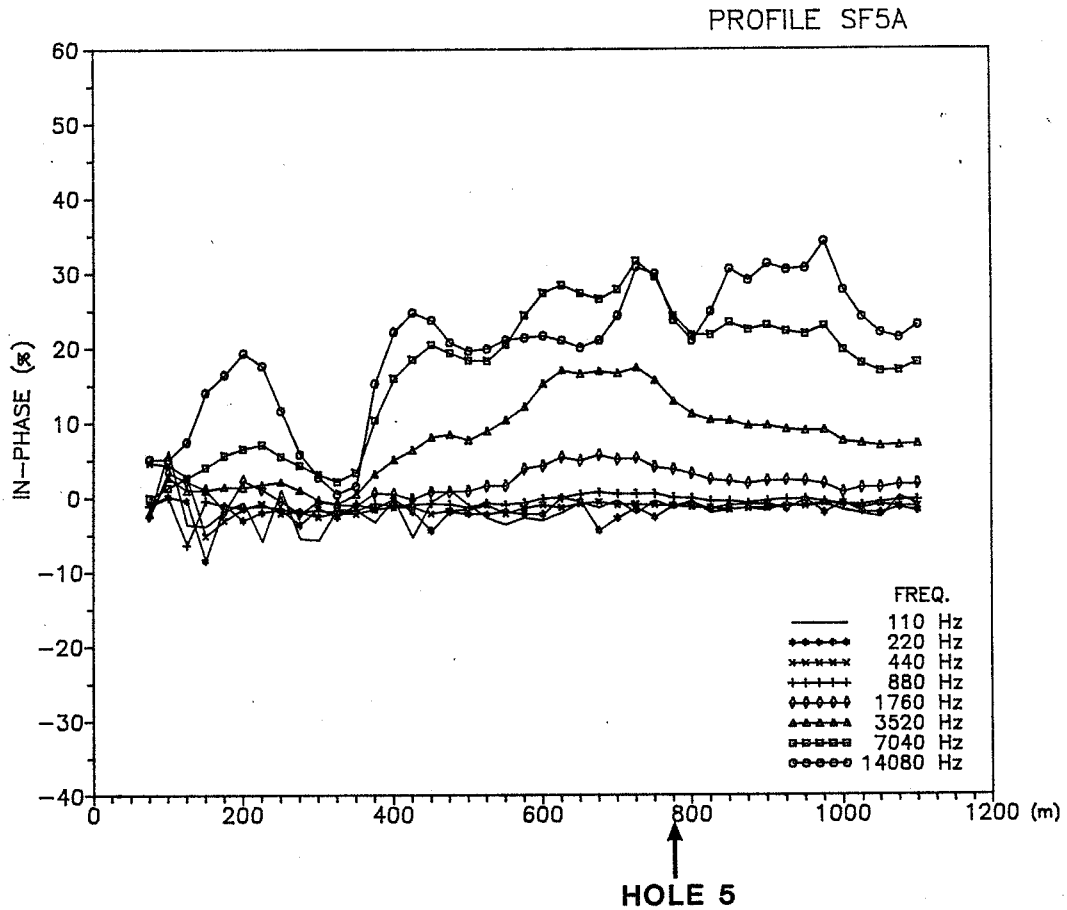

PROFILE SF4B
IN-PHASE (%)
60
50
40
30
20
10
0
-10
-20
-30
-40
0
200
400
600
800
1000 (m)
FREQ.
110 Hz
220 Hz
440 Hz
880 Hz
1760 Hz
3520 Hz
7040 Hz
14080 Hz
HOLE 4

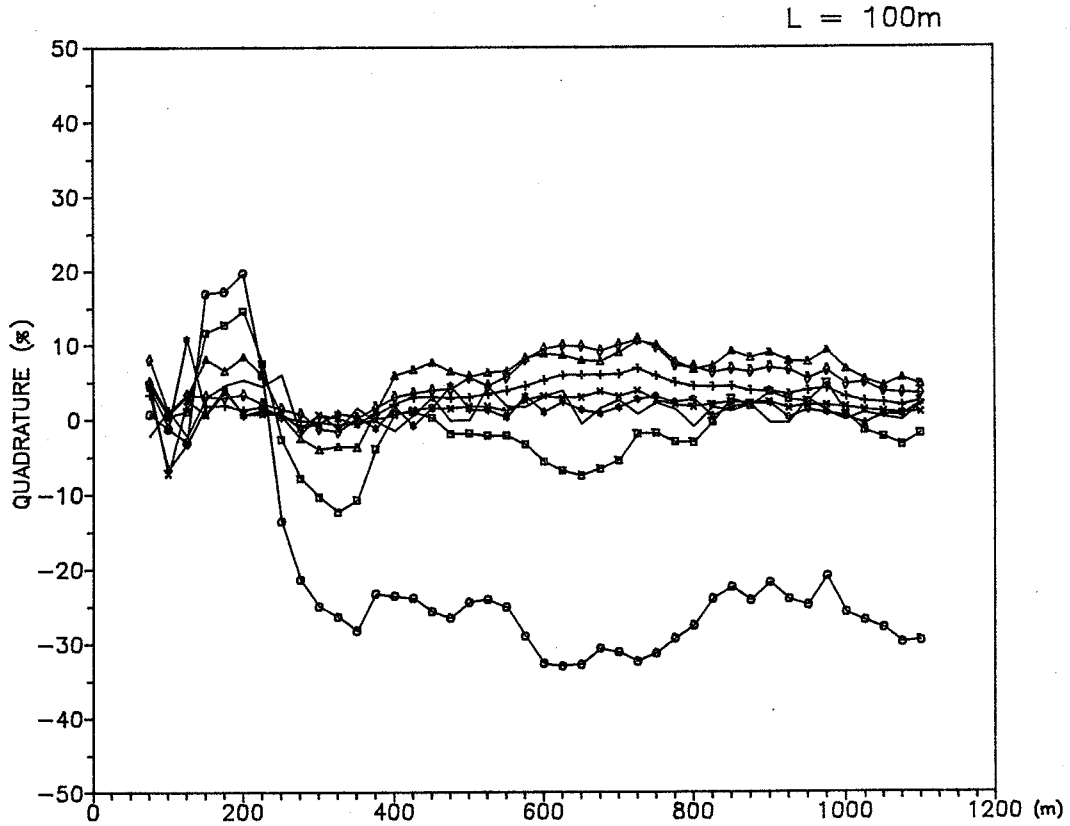

L = 100m
QUADRATURE (%)
40
30
20
10
0
-10
-20
-30
-40
-50
-60
0
200
400
600
800
1000 (m)

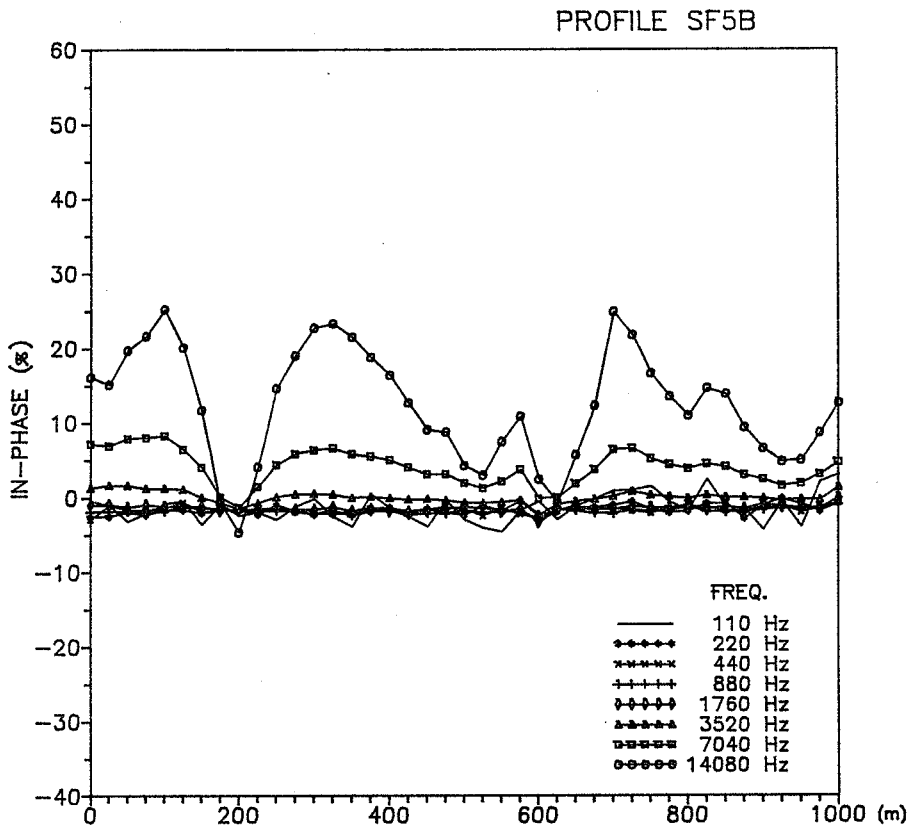

SF-6C
1000N
SF-6B
0
ONR
Abitibi Canyon
Abitibi Canyon
Abitibi Canyon
Dam
1000N
SF-6A
0
Martin L.
Little Lakes Route
Dora Lake
Fraserdale Microwave
Dagger Creek
1000N
SF-5C
0
Scott Lake
Avon Lake
Avon Creek
Scott
1000N
SF-5B
0
Poolton
Marceau Lake
AVON
Dave Lake
Burnwood
1000N
SF-5A
0
Morris Lake
Lawson Creek
1000N
Pit
SF-4C
634
0
Homer Lake
Durrel Lake
Durrel Creek
Durrel
1000N
SF-4B
0
Brownrigg
1000N
SF-4A
0
Brownrigg Creek
ONR
RIVER

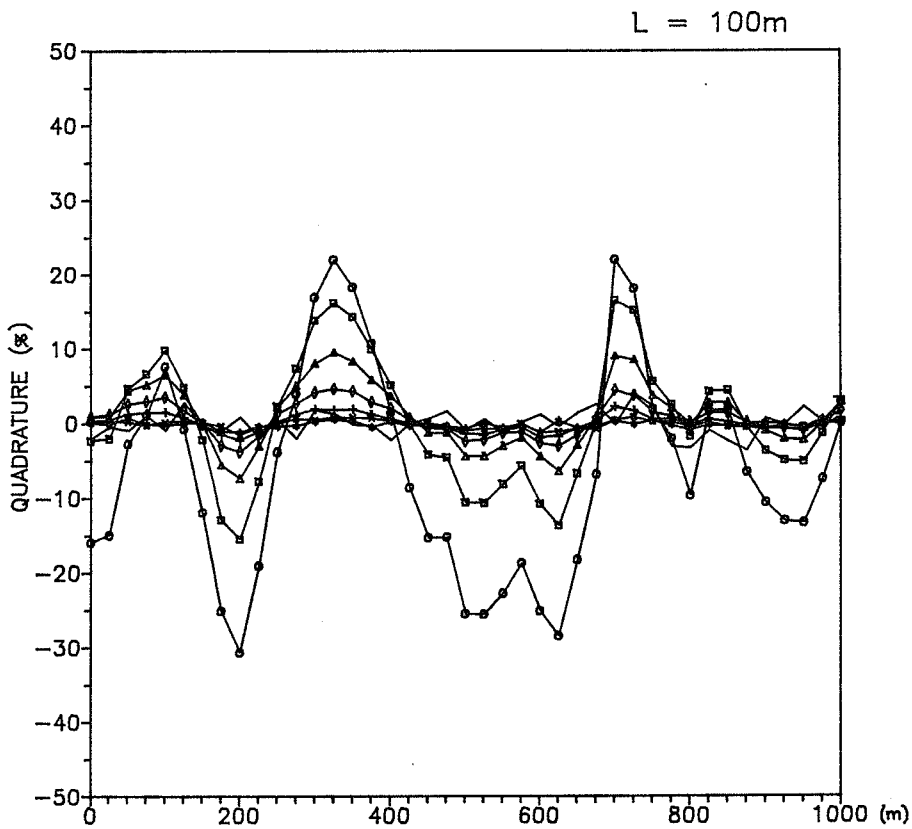

PROFILE SF4C
IN-PHASE (%)
60
50
40
30
20
10
0
-10
-20
-30
-40
0
200
400
600
800
1000 (m)
FREQ.
110 Hz
220 Hz
440 Hz
880 Hz
1760 Hz
3520 Hz
7040 Hz
14080 Hz

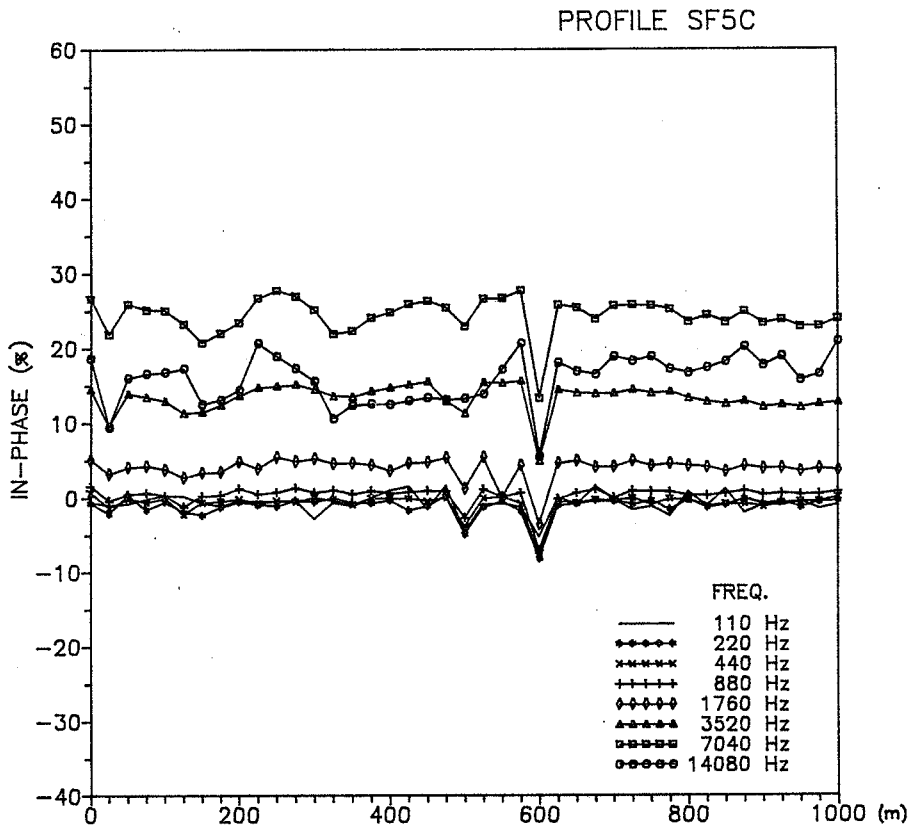

L = 100m
QUADRATURE (%)
20
10
0
-10
-20
-30
-40
-50
-60
-70
-80
0
200
400
600
800
1000 (m)

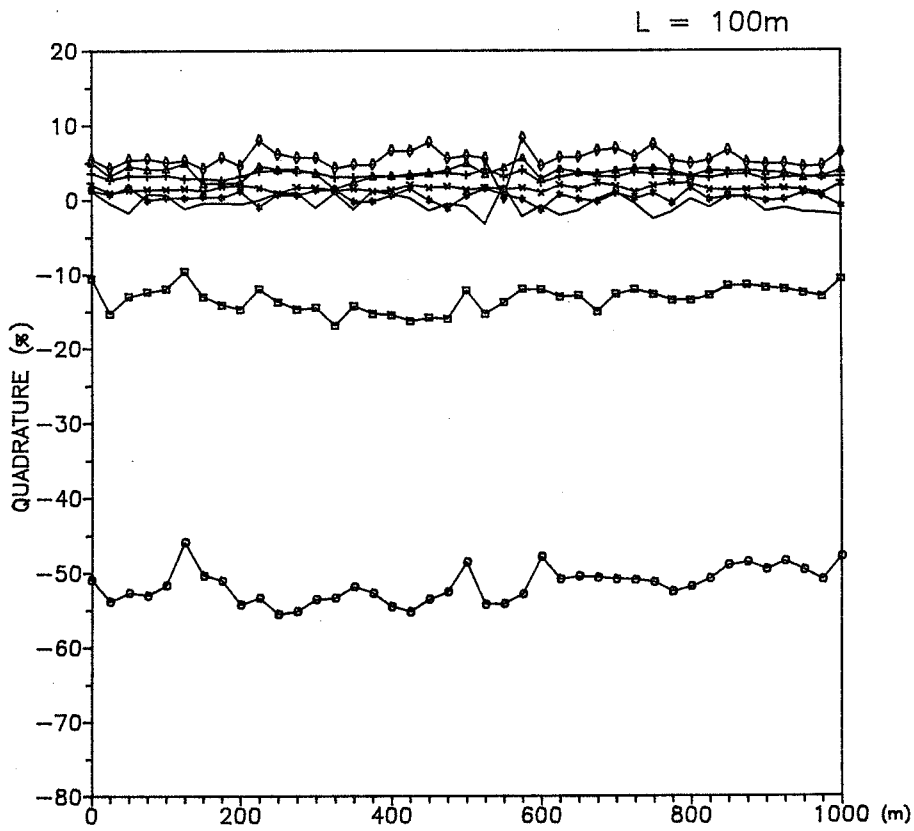

PROFILE SF5A
IN-PHASE (%)
60
50
40
30
20
10
0
-10
-20
-30
-40
0
200
400
600
800
1000
1200 (m)
FREQ.
110 Hz
220 Hz
440 Hz
880 Hz
1760 Hz
3520 Hz
7040 Hz
14080 Hz
HOLE 5

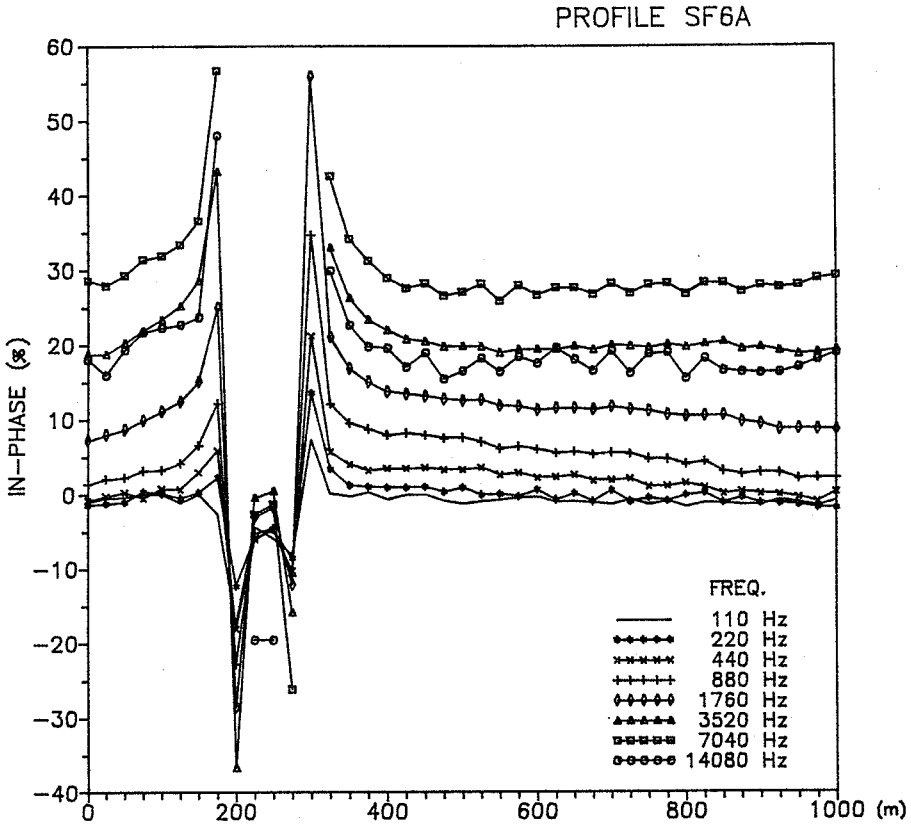

L = 100m
QUADRATURE (%)
50
40
30
20
10
0
-10
-20
-30
-40
-50
0
200
400
600
800
1000
1200 (m)

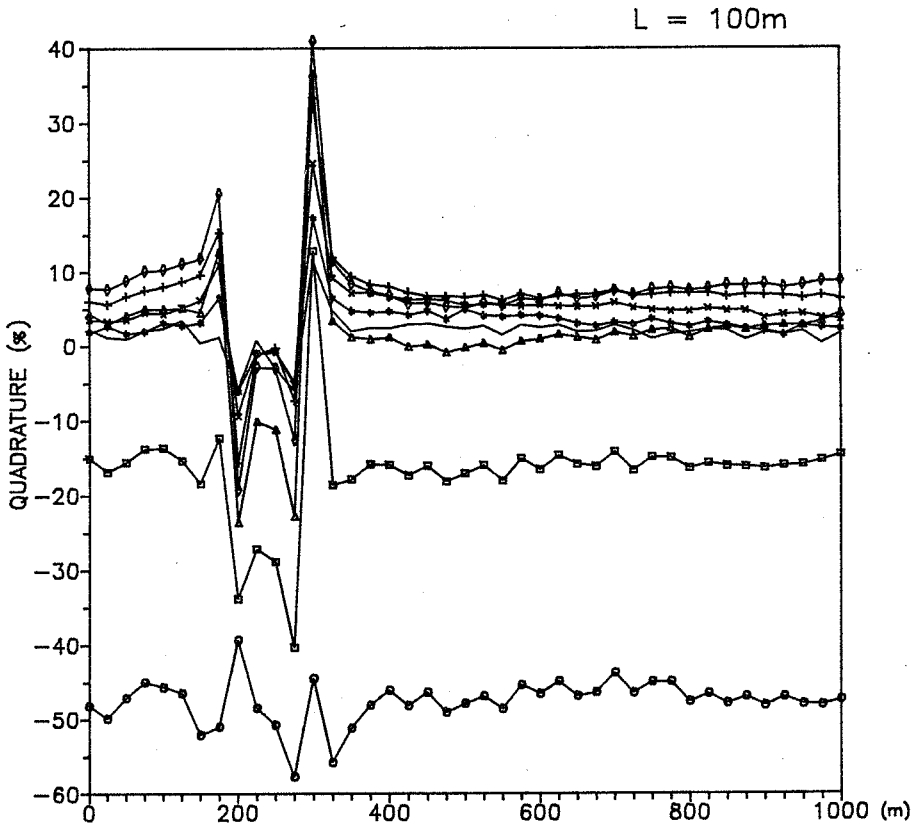

PROFILE SF5B
IN-PHASE (%)
60
50
40
30
20
10
0
-10
-20
-30
-40
0
200
400
600
800
1000 (m)
FREQ.
110 Hz
220 Hz
440 Hz
880 Hz
1760 Hz
3520 Hz
7040 Hz
14080 Hz

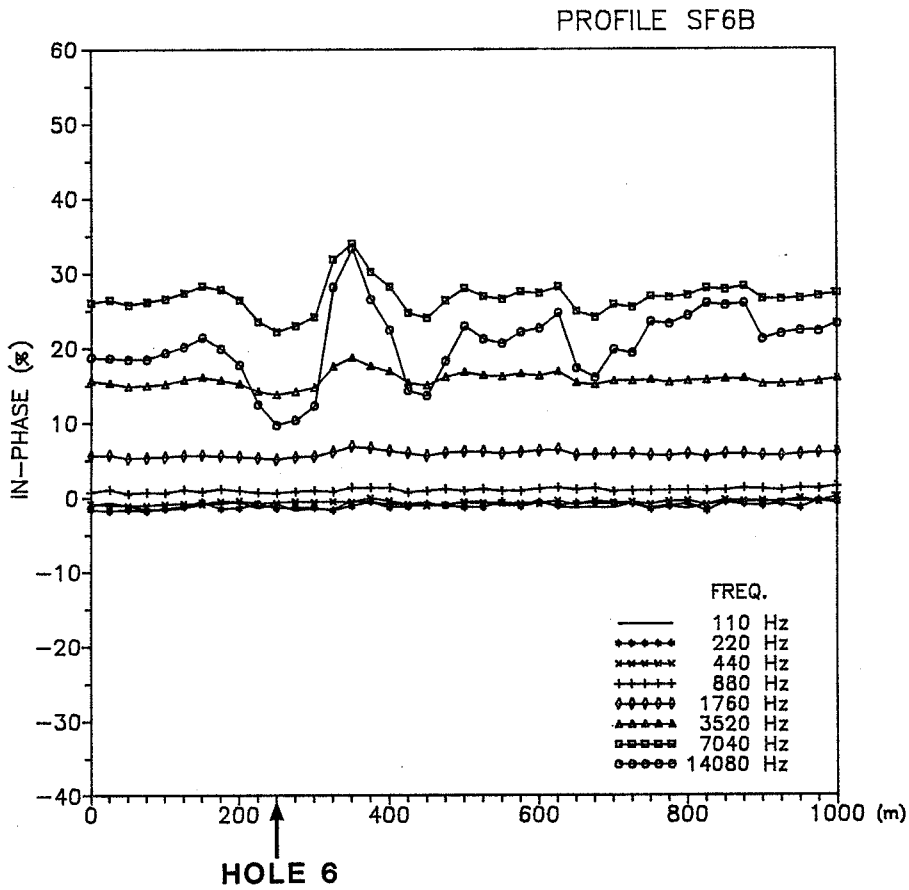

L = 100m
QUADRATURE (%)
50
40
30
20
10
0
-10
-20
-30
-40
-50
0
200
400
600
800
1000 (m)

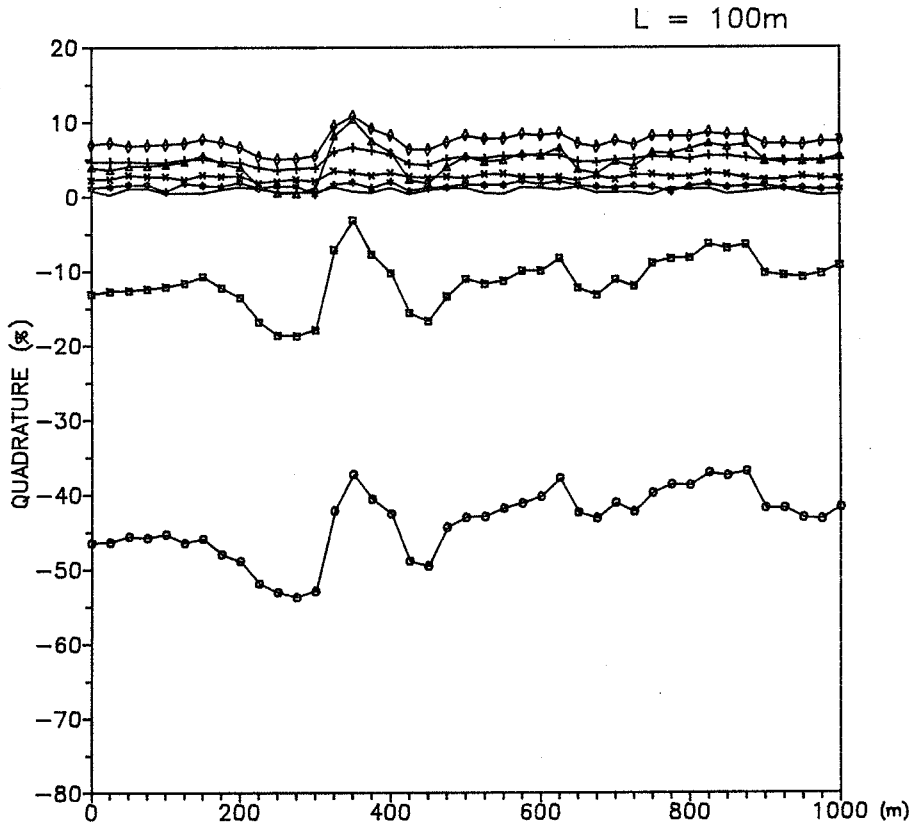

PROFILE SF5C
IN-PHASE (%)
60
50
40
30
20
10
0
-10
-20
-30
-40
0
200
400
600
800
1000 (m)
FREQ.
110 Hz
220 Hz
440 Hz
880 Hz
1760 Hz
3520 Hz
7040 Hz
14080 Hz

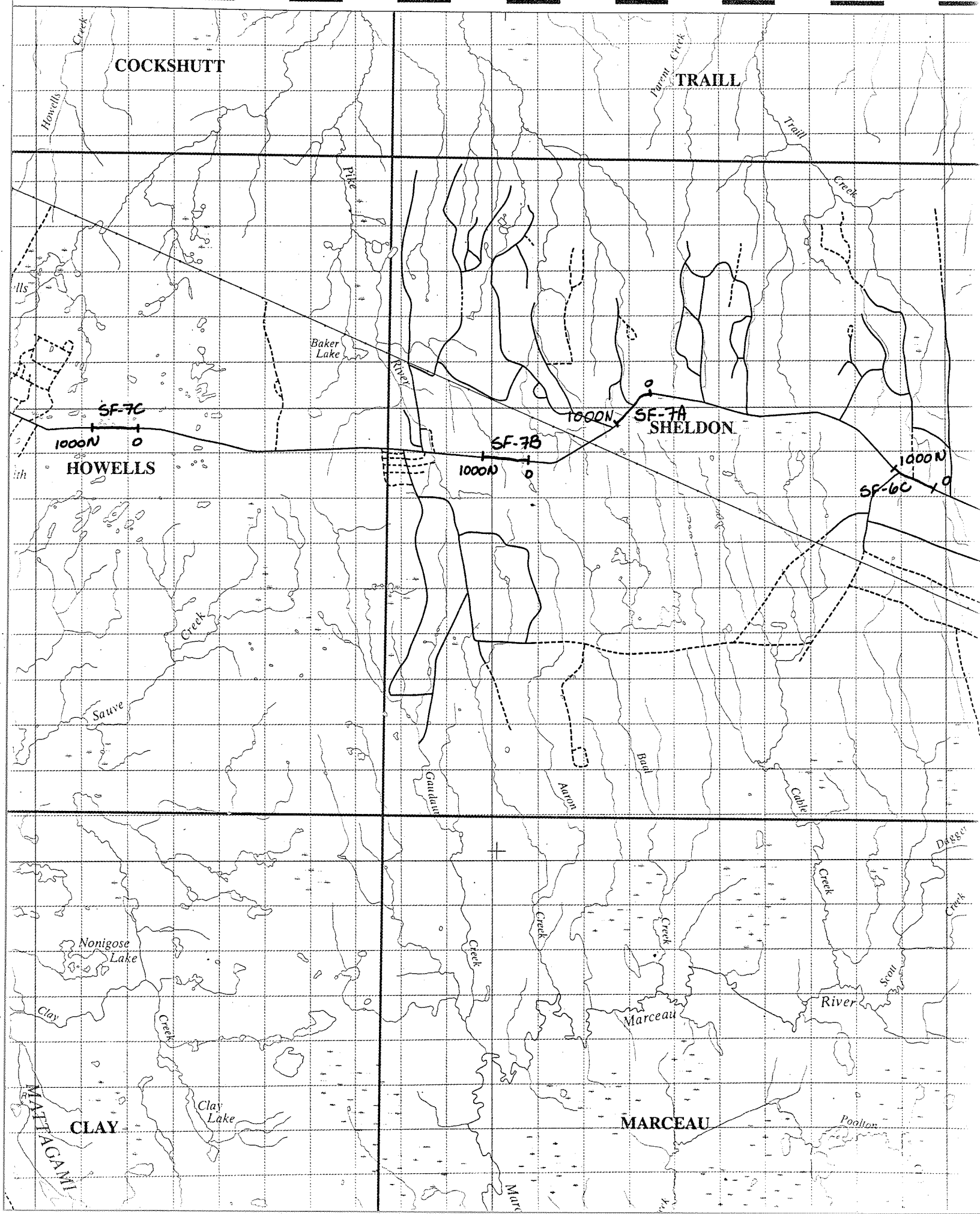

L = 100m
QUADRATURE (%)
20
10
0
-10
-20
-30
-40
-50
-60
-70
-80
0
200
400
600
800
1000 (m)

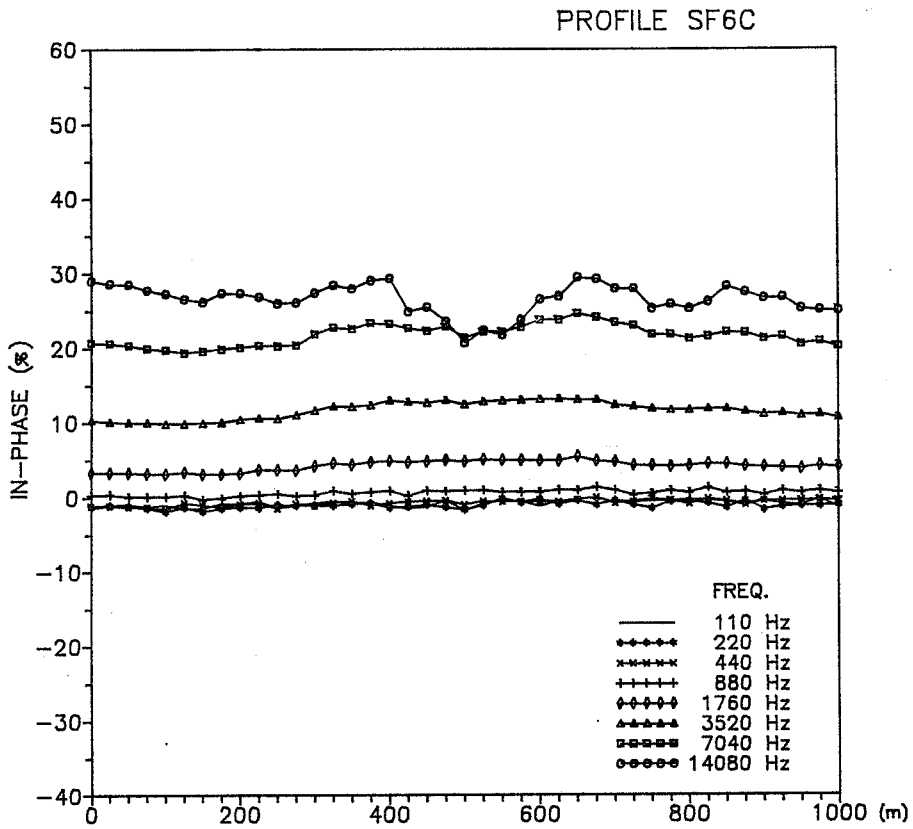

PROFILE SF6A
IN-PHASE (%)
60
50
40
30
20
10
0
-10
-20
-30
-40
0
200
400
600
800
1000 (m)
FREQ.
110 Hz
220 Hz
440 Hz
880 Hz
1760 Hz
3520 Hz
7040 Hz
14080 Hz

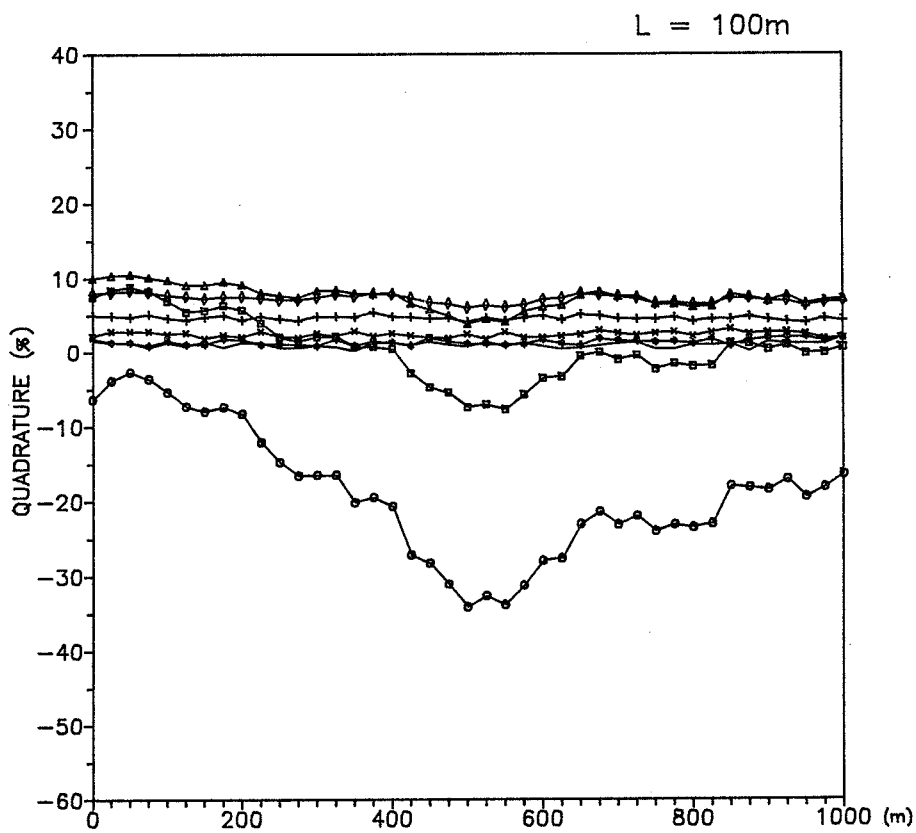

L = 100m
QUADRATURE (%)
40
30
20
10
0
-10
-20
-30
-40
-50
-60
0
200
400
600
800
1000 (m)

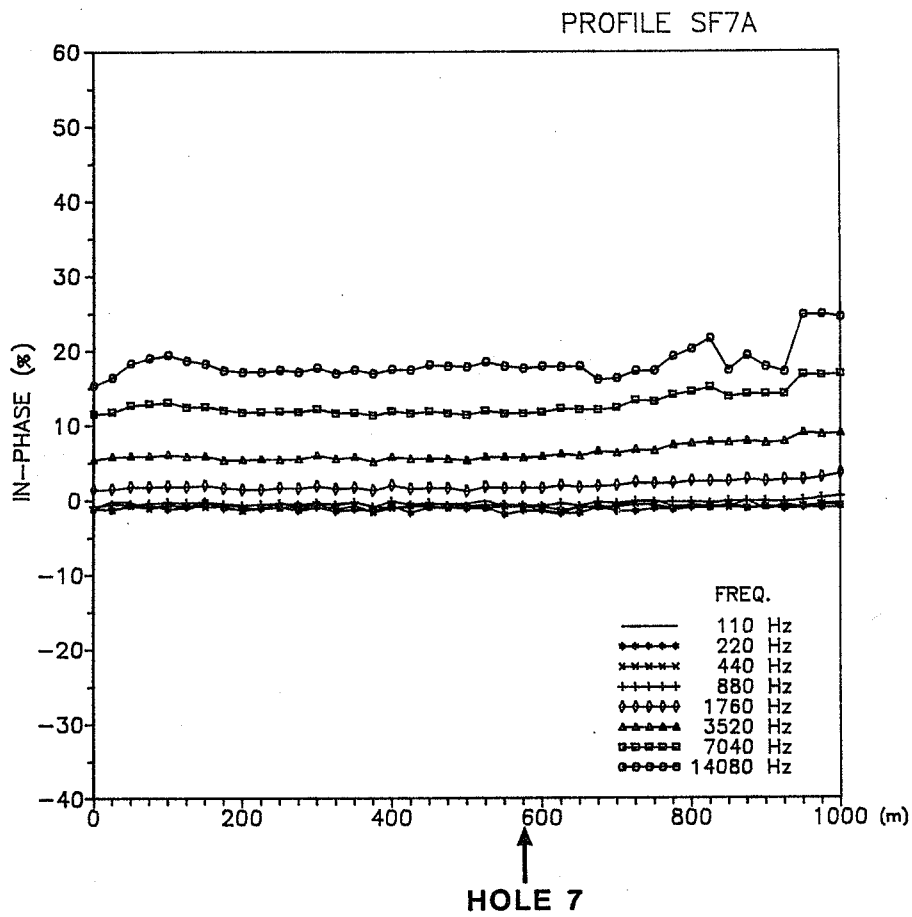

PROFILE SF6B
IN-PHASE (%)
60
50
40
30
20
10
0
-10
-20
-30
-40
0
200
400
600
800
1000 (m)
FREQ.
110 Hz
220 Hz
440 Hz
880 Hz
1760 Hz
3520 Hz
7040 Hz
14080 Hz
HOLE 6

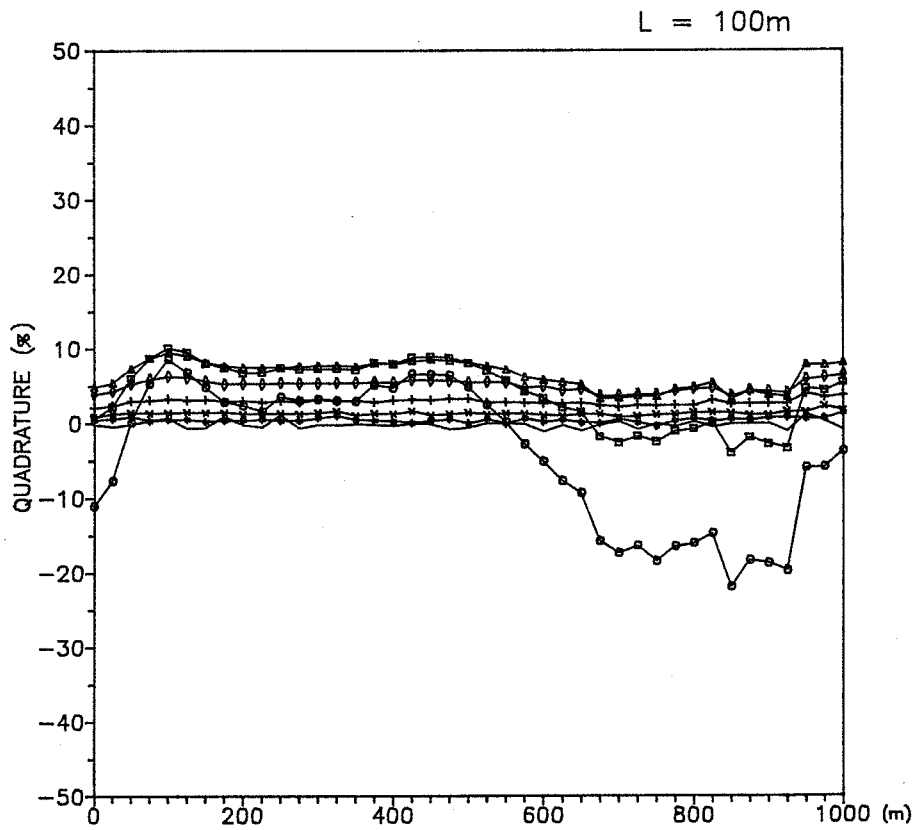

L = 100m
QUADRATURE (%)
20
10
0
-10
-20
-30
-40
-50
-60
-70
-80
0
200
400
600
800
1000 (m)

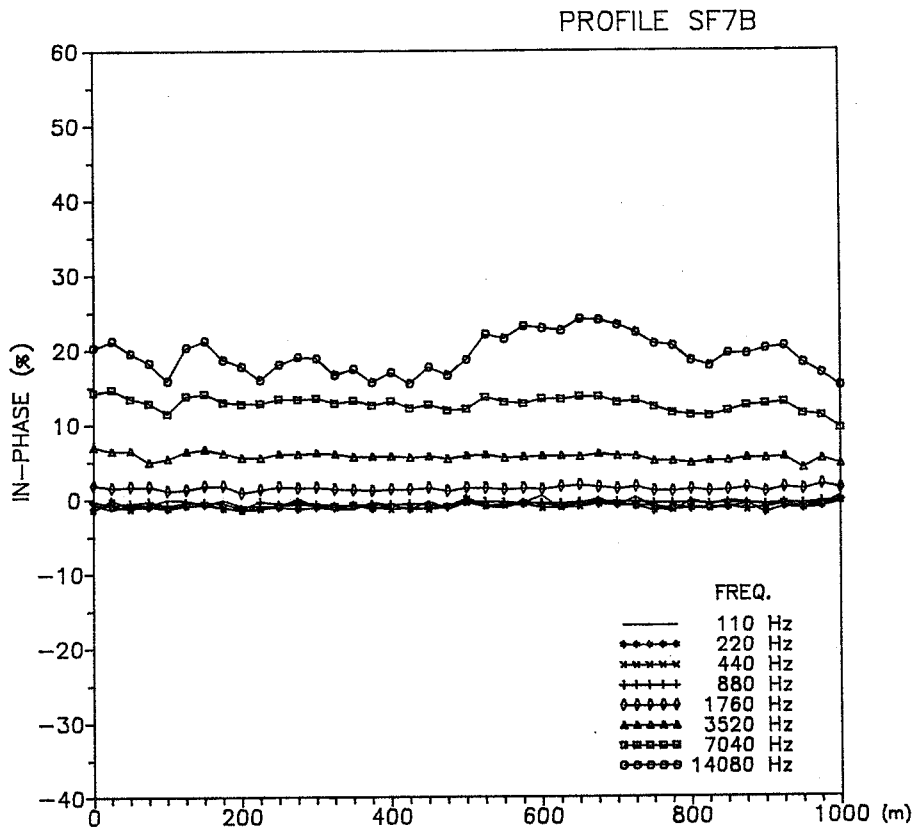

COCKSHUTT
TRAILL
HOWELLS
SHELDON
CLAY
MARCEAU
SF-7C
1000N
0
SF-7B
1000N
0
SF-7A
1000N
0
SF-6C
1000N
0
Baker Lake
Nonigose Lake
Clay Lake
Howells Creek
Parent Creek
Traill Creek
Pike River
Sauve Creek
Gaudaut Creek
Aaron Creek
Bad Creek
Cable Creek
Dagger Creek
Scott River
Marceau
Clay Creek
MATTAGAMI
Poolton

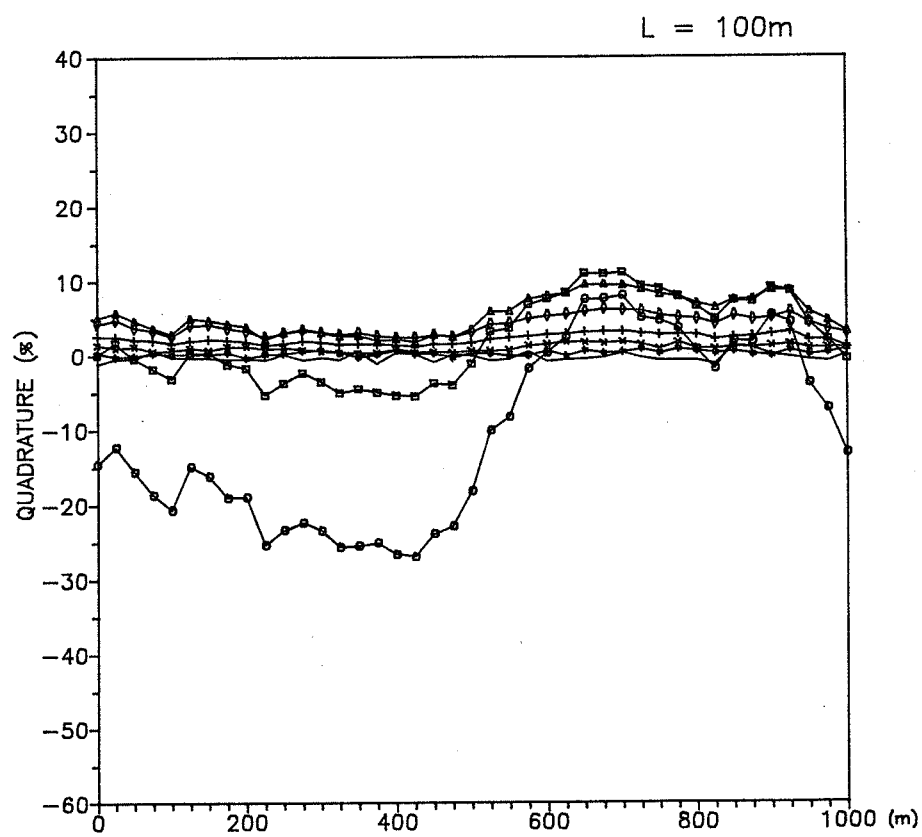

PROFILE SF6C
IN-PHASE (%)
60
50
40
30
20
10
0
-10
-20
-30
-40
0
200
400
600
800
1000 (m)
FREQ.
110 Hz
220 Hz
440 Hz
880 Hz
1760 Hz
3520 Hz
7040 Hz
14080 Hz

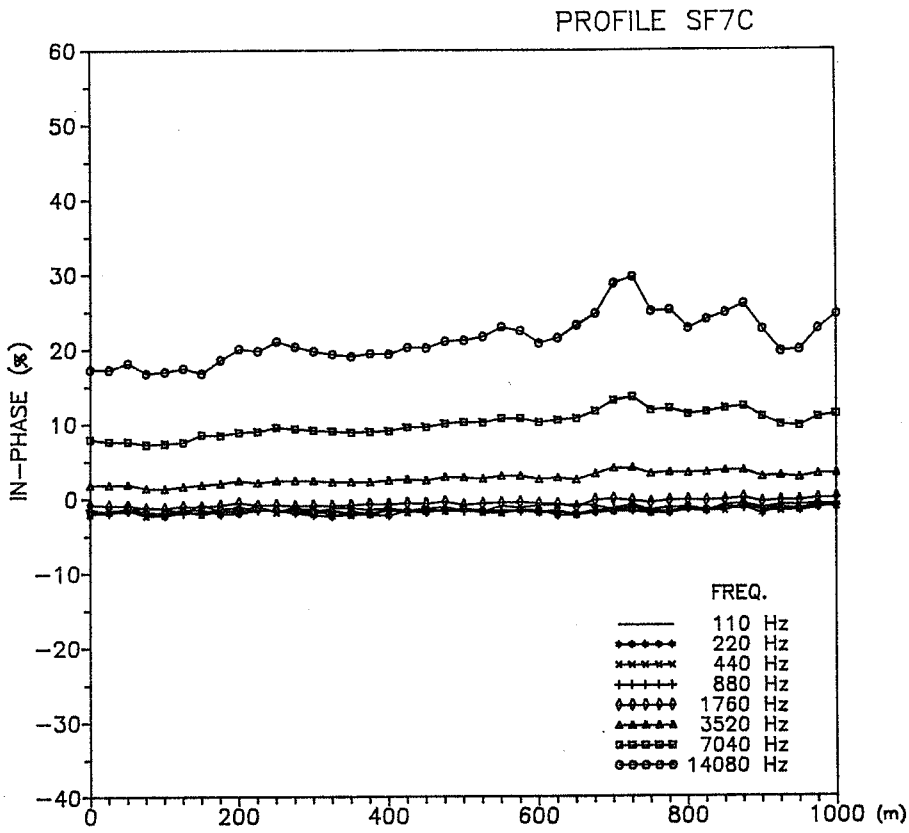

L = 100m
QUADRATURE (%)
40
30
20
10
0
-10
-20
-30
-40
-50
-60
0
200
400
600
800
1000 (m)

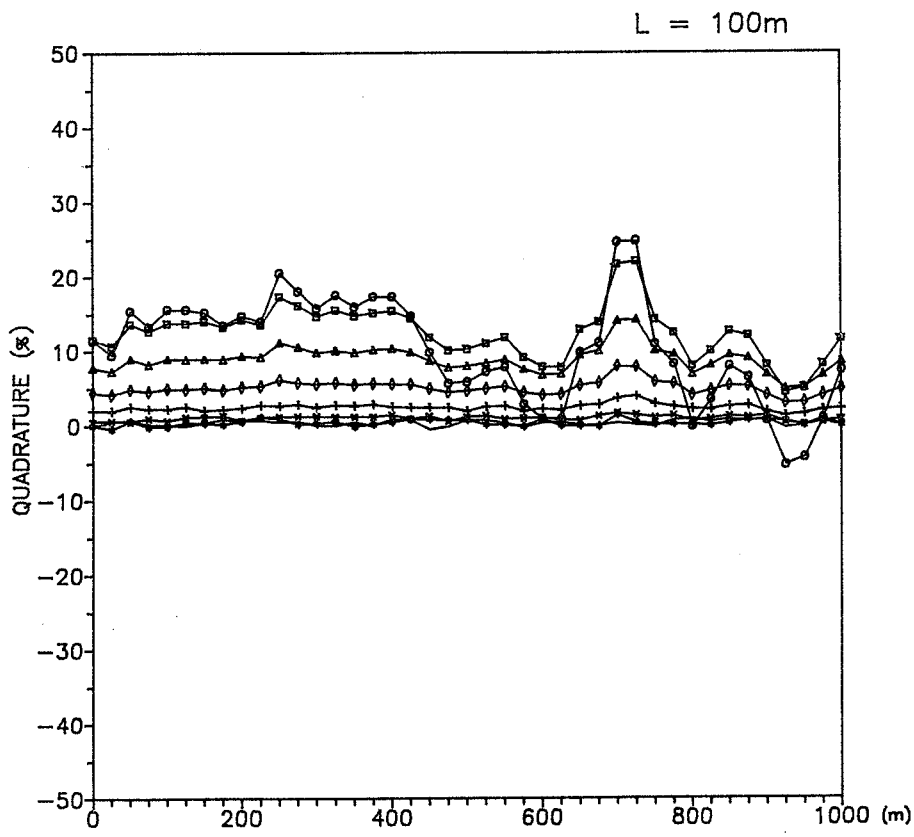

PROFILE SF7A
IN-PHASE (%)
60
50
40
30
20
10
0
-10
-20
-30
-40
0
200
400
600
800
1000 (m)
FREQ.
110 Hz
220 Hz
440 Hz
880 Hz
1760 Hz
3520 Hz
7040 Hz
14080 Hz
HOLE 7


L = 100m
QUADRATURE (%)
50
40
30
20
10
0
-10
-20
-30
-40
-50
0
200
400
600
800
1000 (m)


PROFILE SF7B
IN-PHASE (%)
60
50
40
30
20
10
0
-10
-20
-30
-40
0
200
400
600
800
1000 (m)
FREQ.
110 Hz
220 Hz
440 Hz
880 Hz
1760 Hz
3520 Hz
7040 Hz
14080 Hz


L = 100m
QUADRATURE (%)
40
30
20
10
0
-10
-20
-30
-40
-50
-60
0
200
400
600
800
1000 (m)


PROFILE SF7C
IN-PHASE (%)
60
50
40
30
20
10
0
-10
-20
-30
-40
0
200
400
600
800
1000 (m)
FREQ.
110 Hz
220 Hz
440 Hz
880 Hz
1760 Hz
3520 Hz
7040 Hz
14080 Hz


L = 100m
QUADRATURE (%)
50
40
30
20
10
0
-10
-20
-30
-40
-50
0
200
400
600
800
1000 (m)

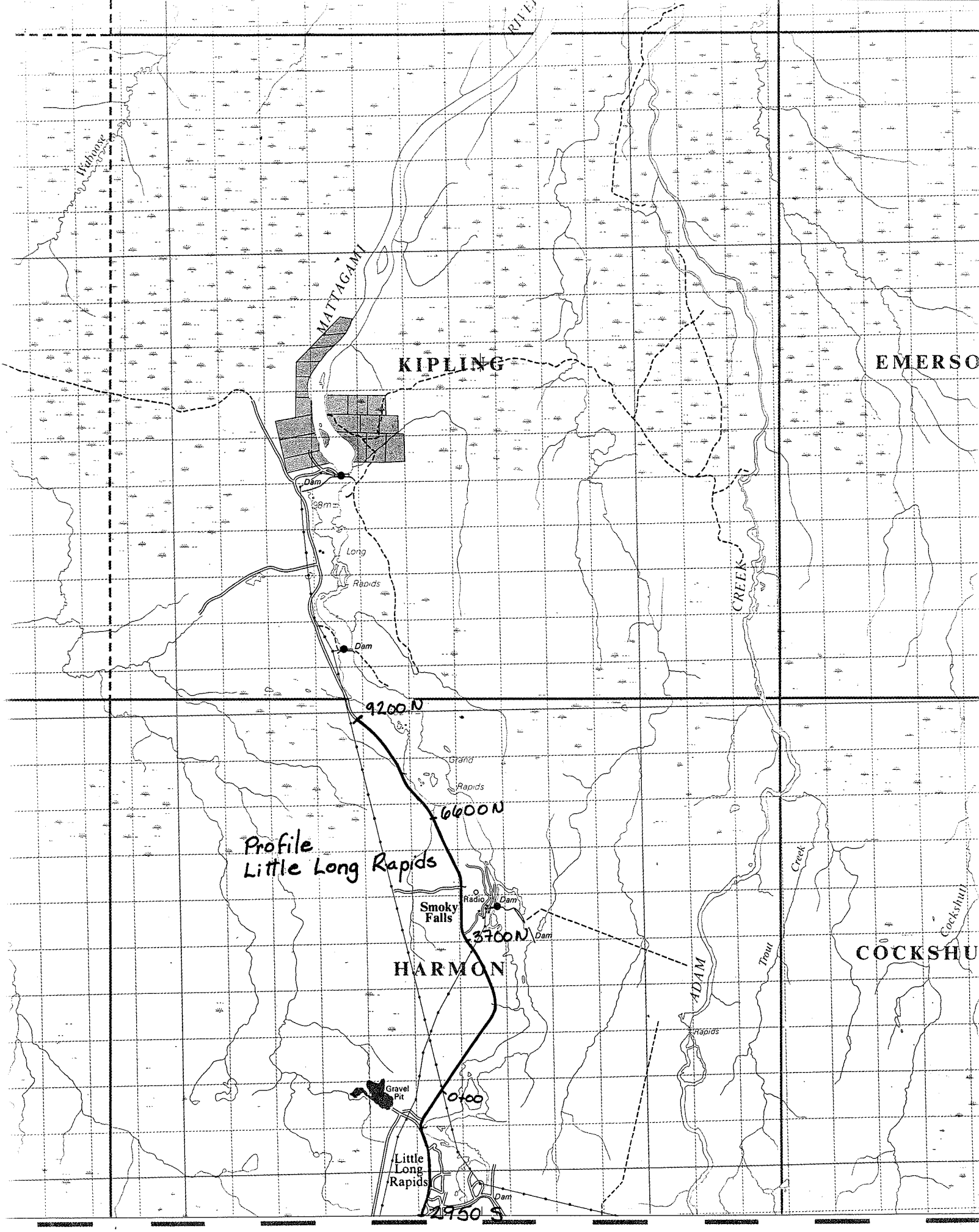
SHEET 42J/SE (SMOKY FALLS)

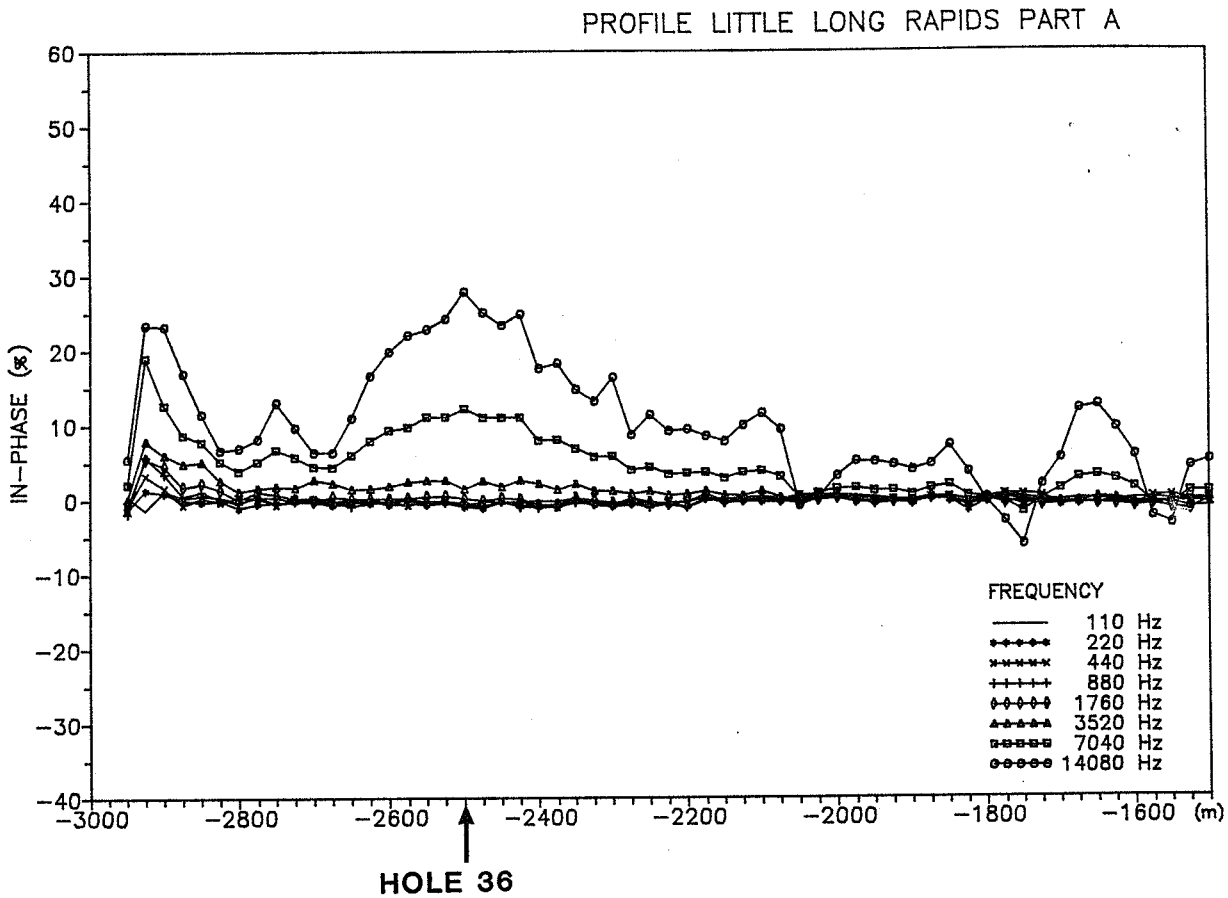
Little Long Rapids (8 profiles)

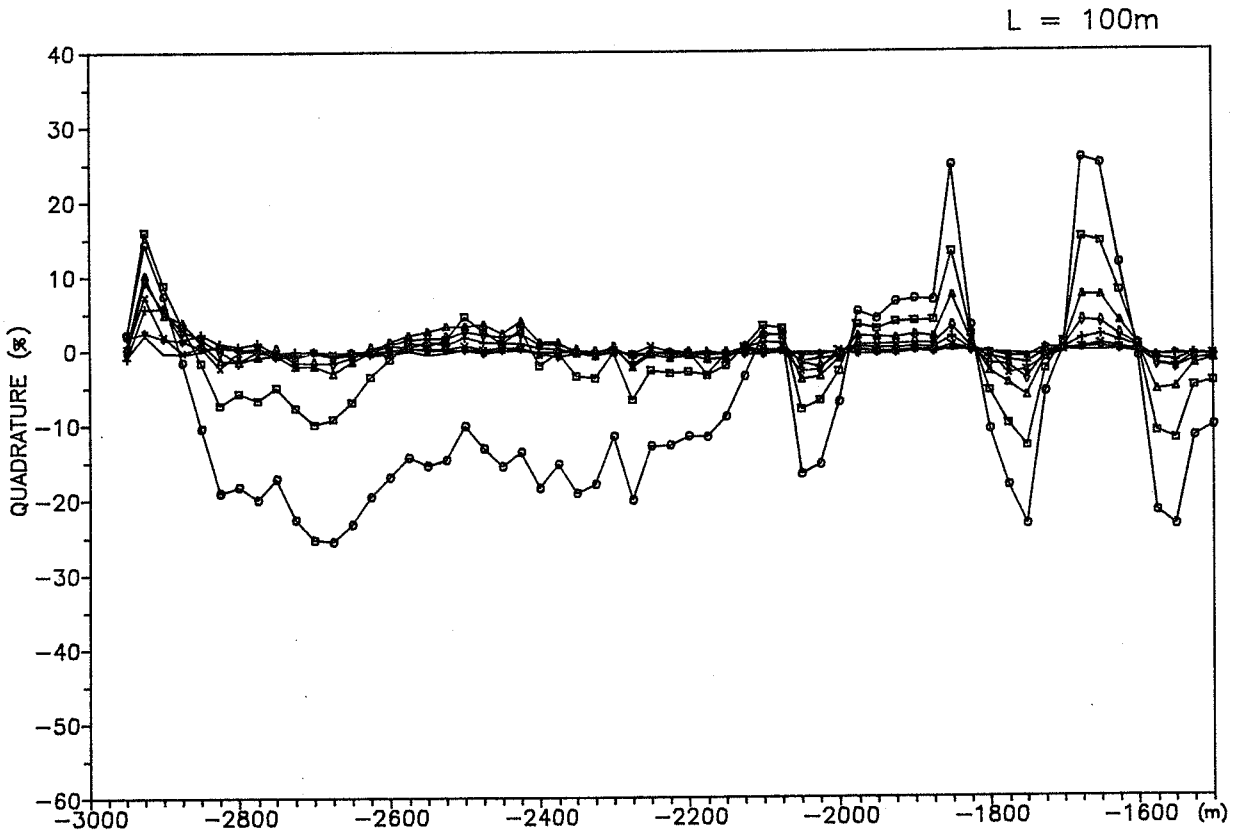
Parts A, B, C, D, E, F, G (each 1500 m long)

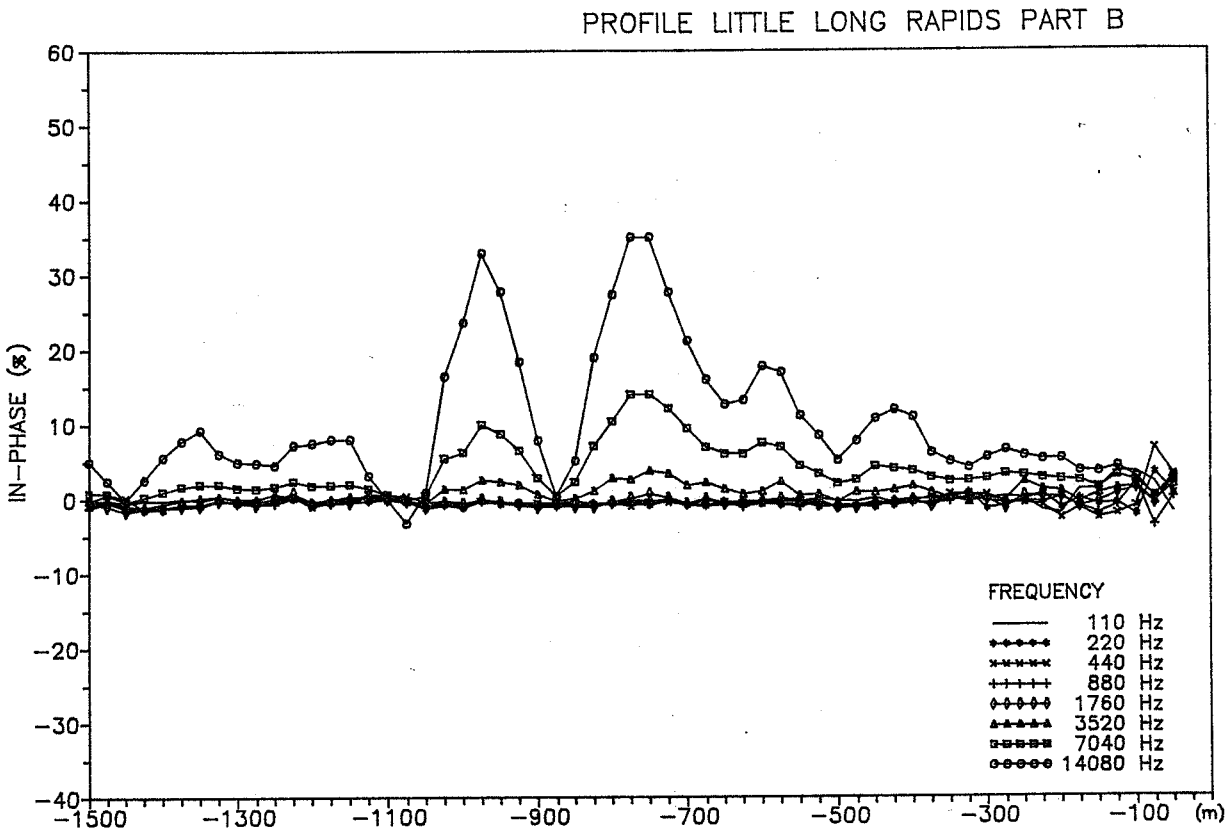
Part H (1600 m long)

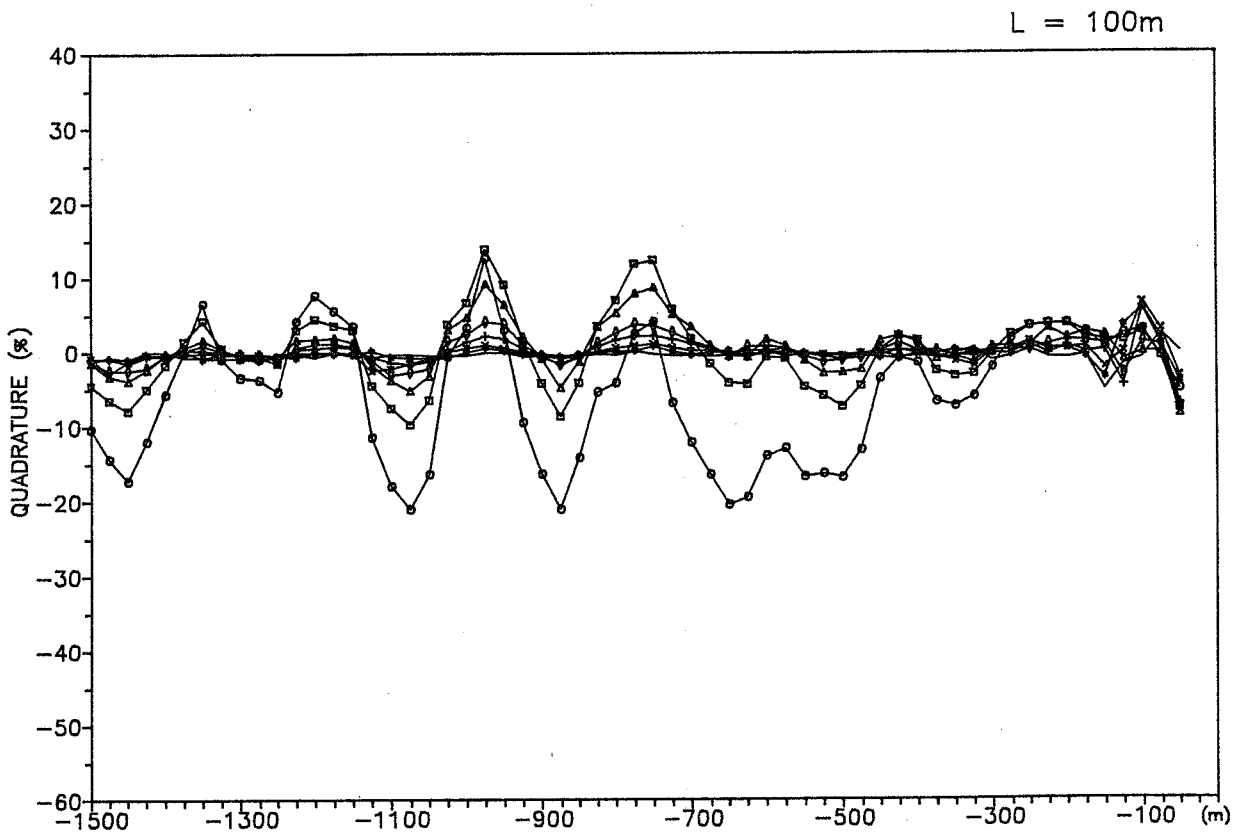
Total for the sheet 12,100 m.

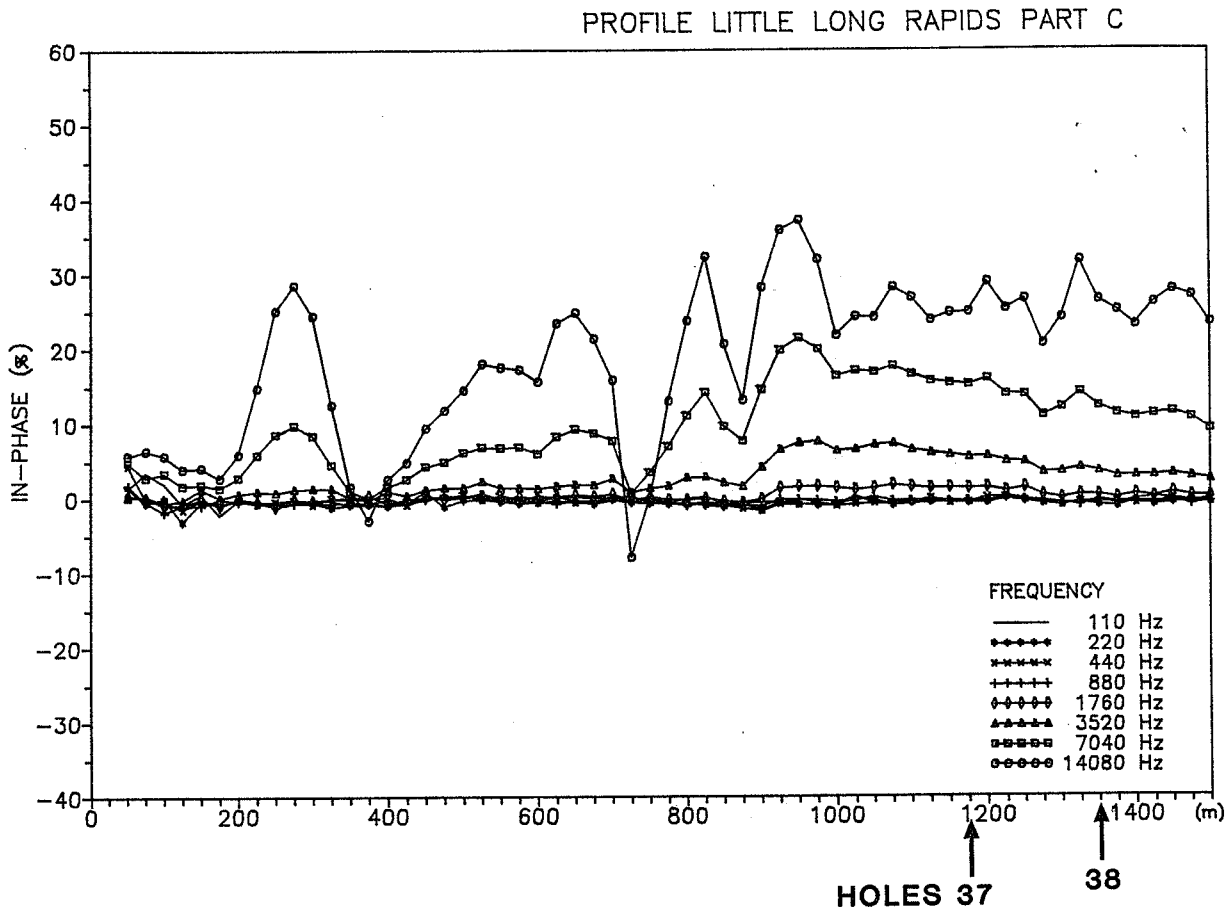

Wahoose
MATTAGAMI
KIPLING
EMERSO
Dam
Long
Rapids
CREEK
Dam
9200 N
Grand
Rapids
6600 N
Profile
Little Long Rapids
Radio
Smoky
Falls
Dam
3700 N
Dam
HARMON
ADAM
Trout
Creek
Cockshutt
COCKSHU
Rapids
Gravel
Pit
0+00
Little
Long
Rapids
Dam
2950 S

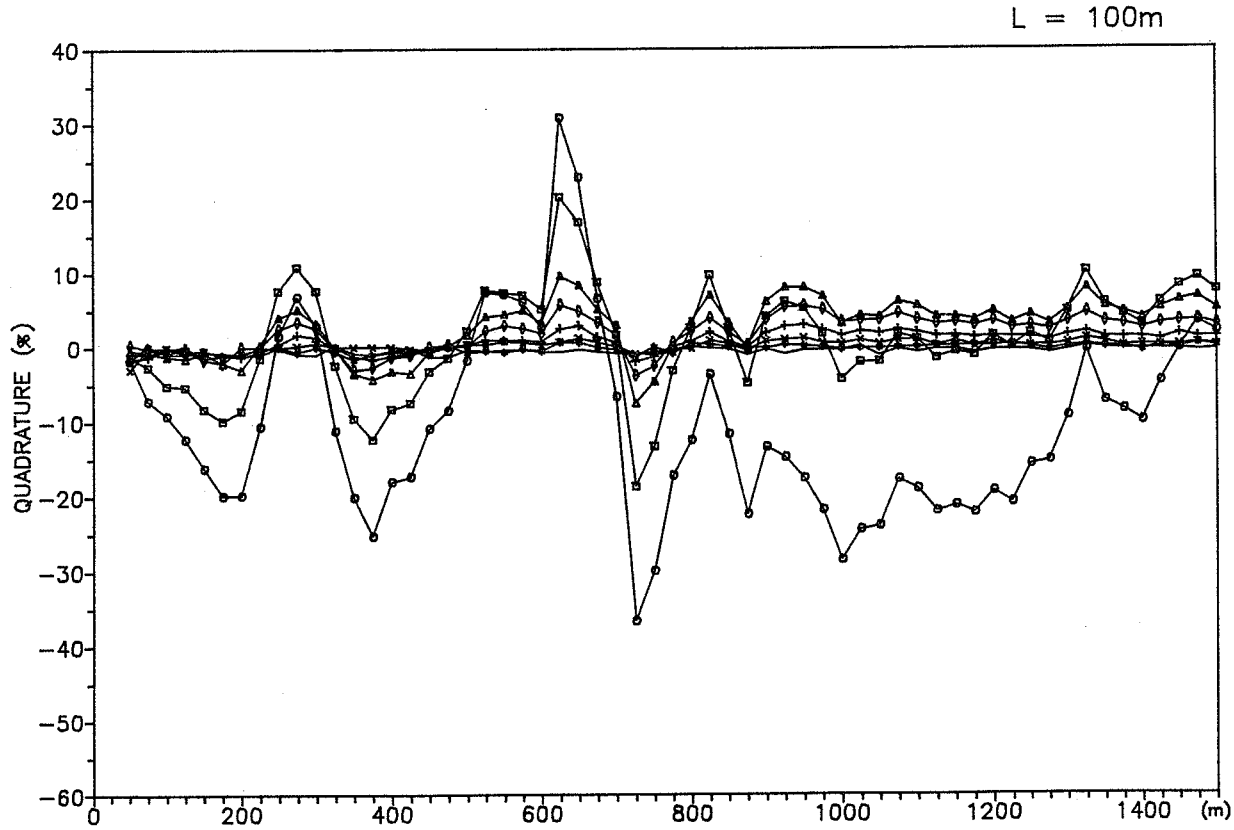

PROFILE LITTLE LONG RAPIDS PART A
IN-PHASE (%)
60
50
40
30
20
10
0
-10
-20
-30
-40
-3000
-2800
-2600
-2400
-2200
-2000
-1800
-1600
(m)
FREQUENCY
110 Hz
220 Hz
440 Hz
880 Hz
1760 Hz
3520 Hz
7040 Hz
14080 Hz
HOLE 36

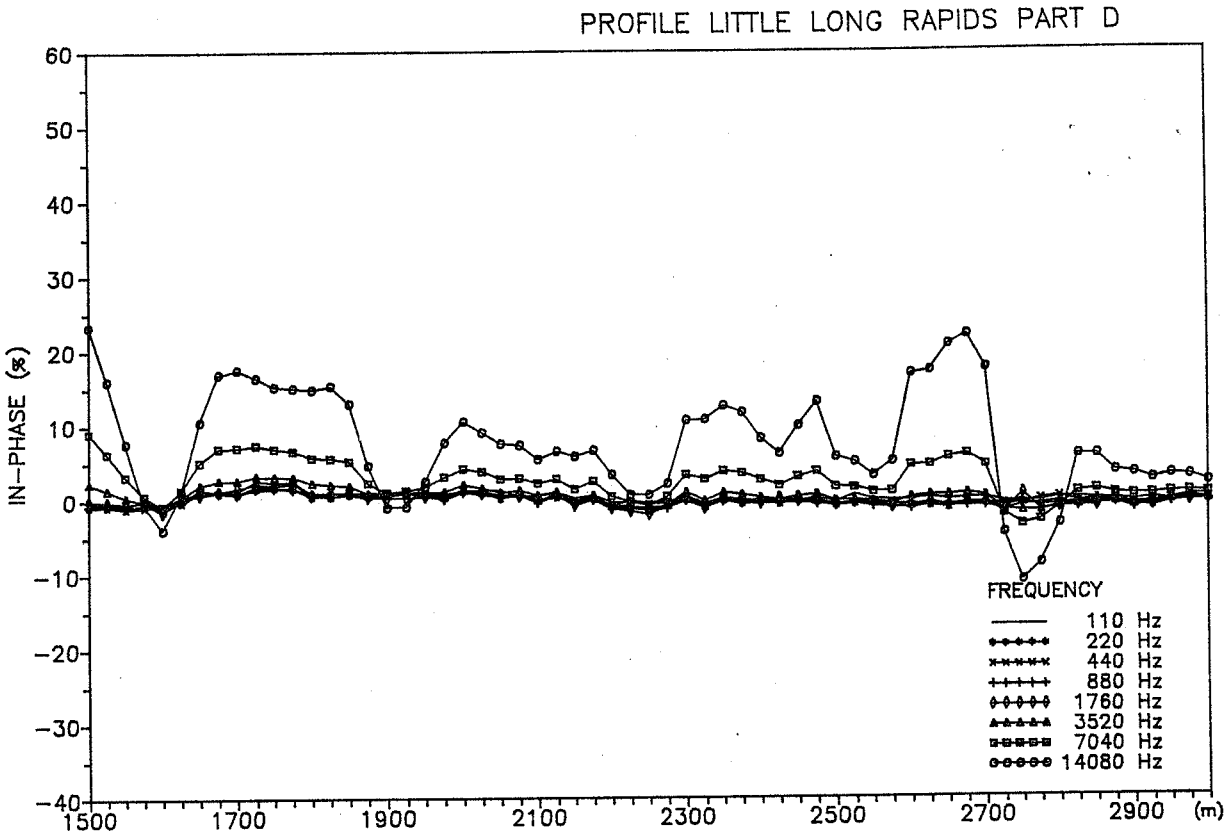

L = 100m
QUADRATURE (%)
40
30
20
10
0
-10
-20
-30
-40
-50
-60
-3000
-2800
-2600
-2400
-2200
-2000
-1800
-1600
(m)

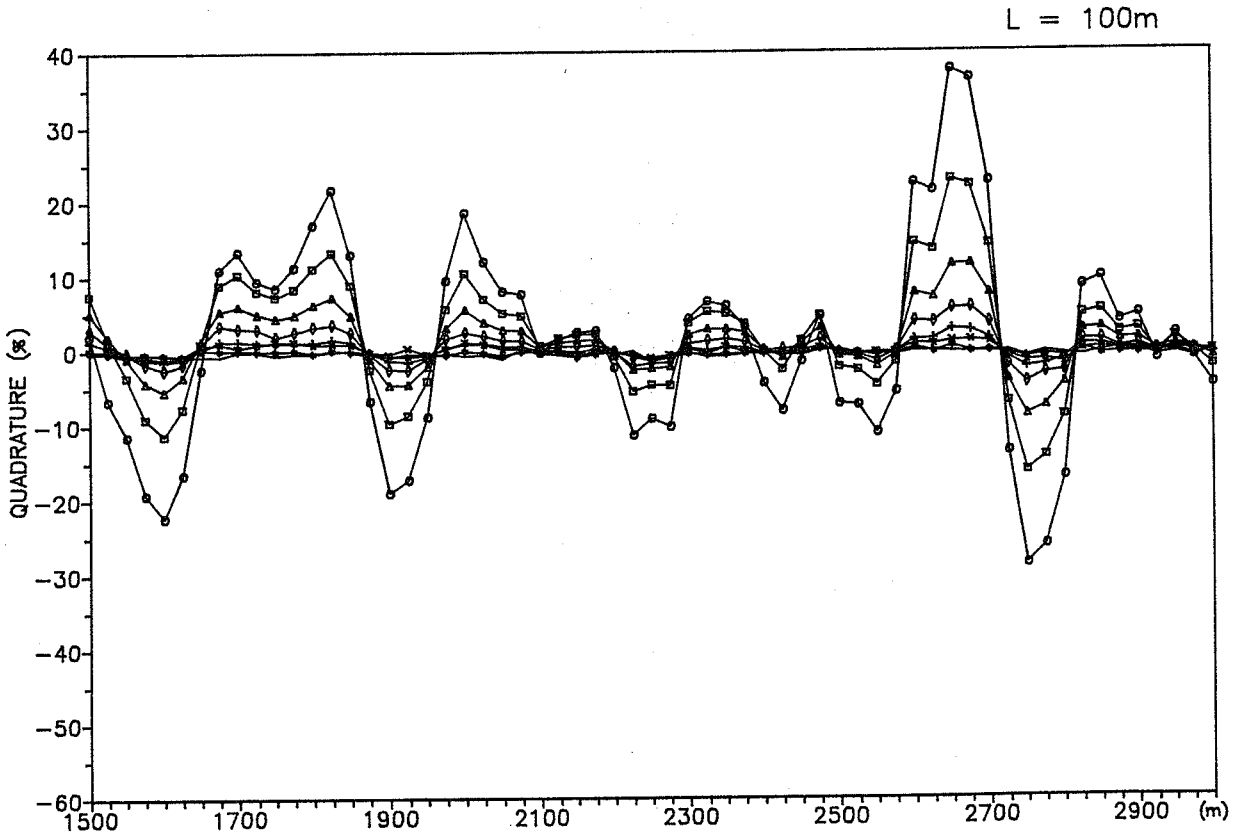

PROFILE LITTLE LONG RAPIDS PART B
IN-PHASE (%)
60
50
40
30
20
10
0
-10
-20
-30
-40
-1500
-1300
-1100
-900
-700
-500
-300
-100
(m)
FREQUENCY
110 Hz
220 Hz
440 Hz
880 Hz
1760 Hz
3520 Hz
7040 Hz
14080 Hz


L = 100m
QUADRATURE (%)
40
30
20
10
0
-10
-20
-30
-40
-50
-60
-1500
-1300
-1100
-900
-700
-500
-300
-100
(m)

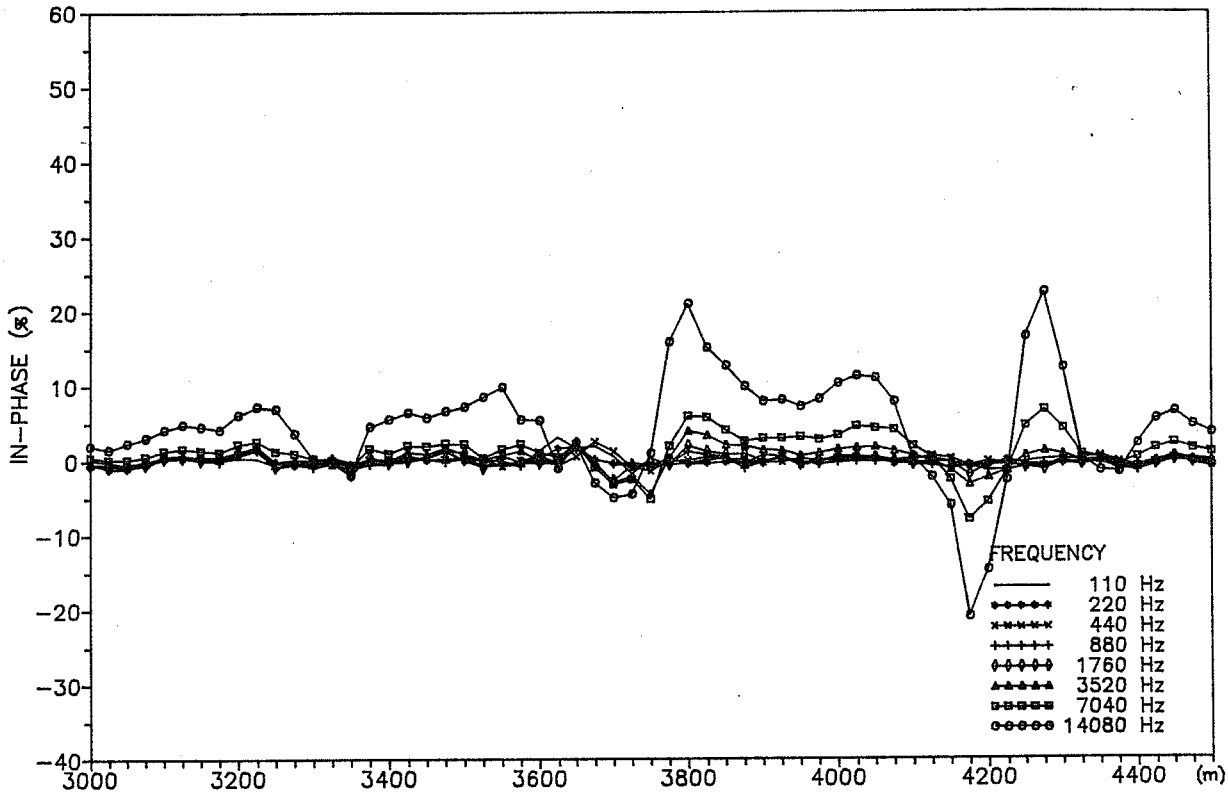

PROFILE LITTLE LONG RAPIDS PART C
IN-PHASE (%)
60
50
40
30
20
10
0
-10
-20
-30
-40
0
200
400
600
800
1000
1200
1400
(m)
FREQUENCY
110 Hz
220 Hz
440 Hz
880 Hz
1760 Hz
3520 Hz
7040 Hz
14080 Hz
HOLES 37
38


L = 100m
QUADRATURE (%)
40
30
20
10
0
-10
-20
-30
-40
-50
-60
0
200
400
600
800
1000
1200
1400
(m)

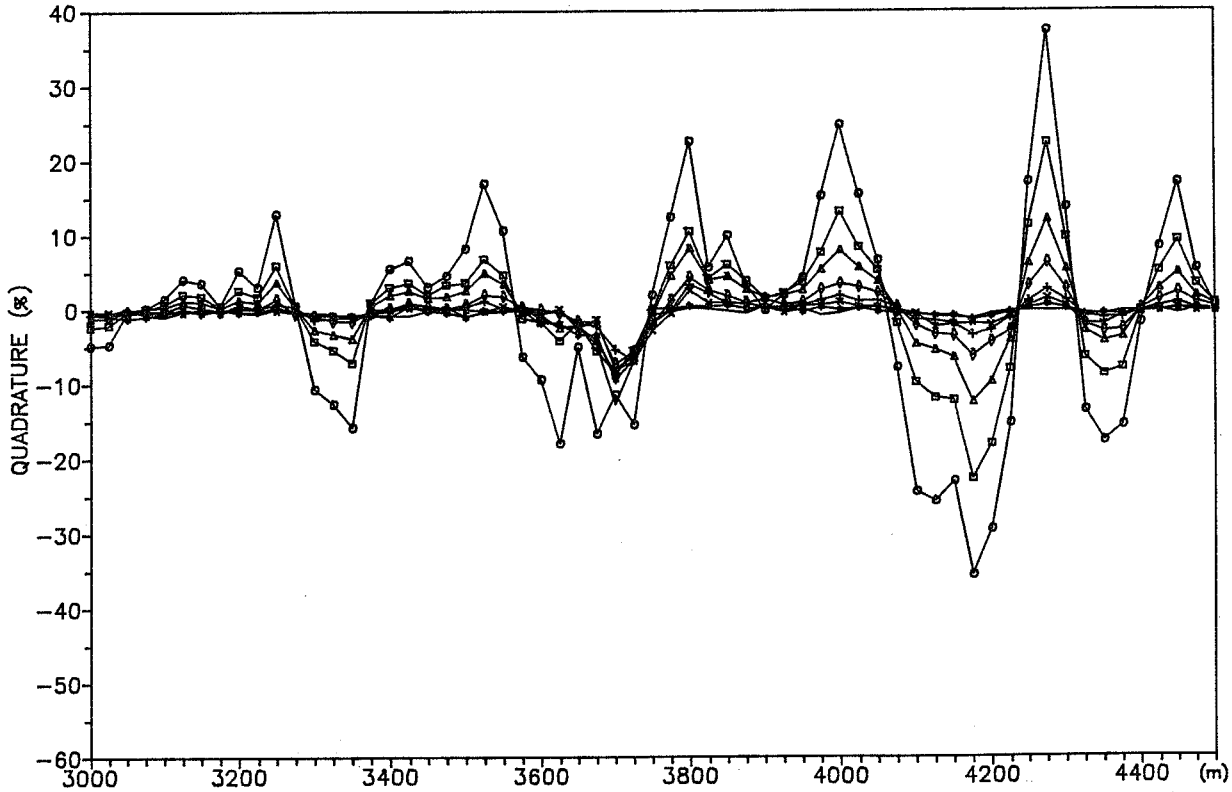

PROFILE LITTLE LONG RAPIDS PART D
IN-PHASE (%)
60
50
40
30
20
10
0
-10
-20
-30
-40
1500
1700
1900
2100
2300
2500
2700
2900
(m)
FREQUENCY
110 Hz
220 Hz
440 Hz
880 Hz
1760 Hz
3520 Hz
7040 Hz
14080 Hz


L = 100m
QUADRATURE (%)
40
30
20
10
0
-10
-20
-30
-40
-50
-60
1500
1700
1900
2100
2300
2500
2700
2900
(m)

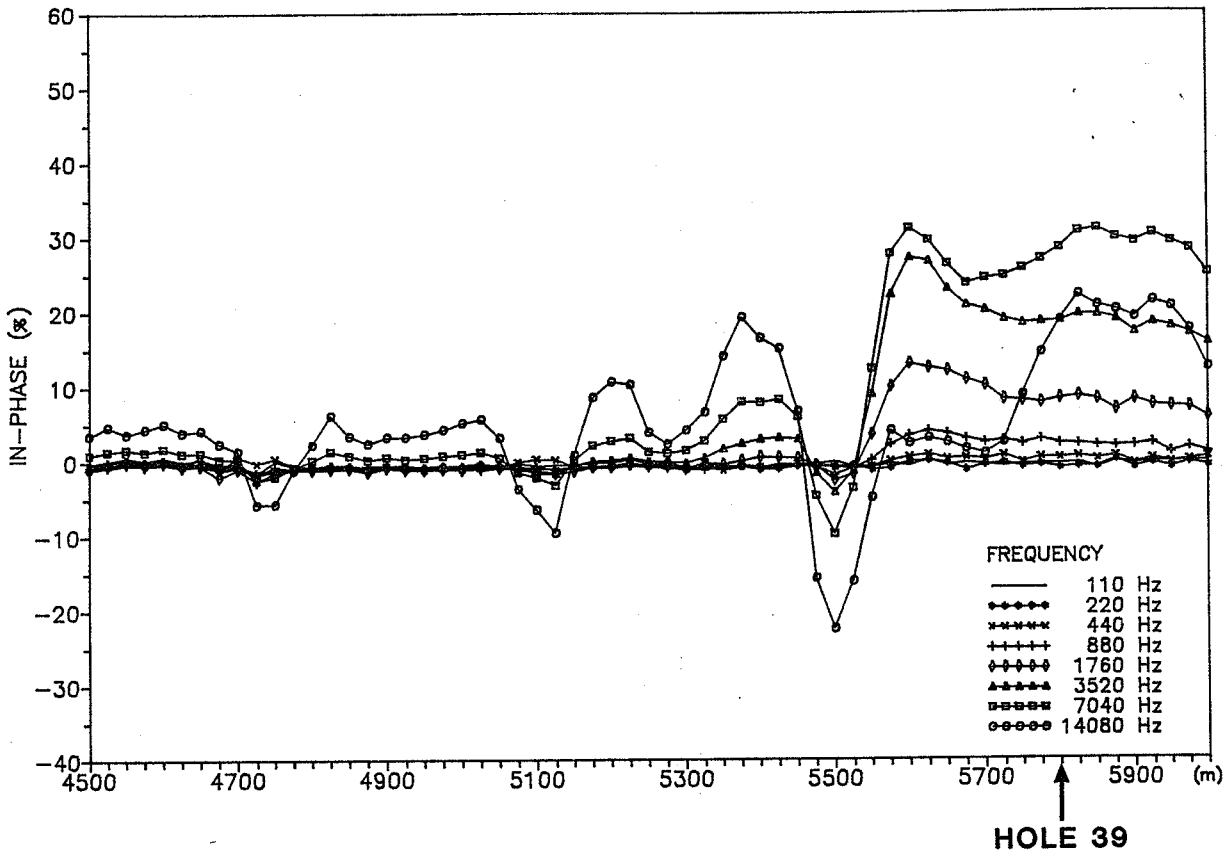
PROFILE LITTLE LONG RAPIDS PART E



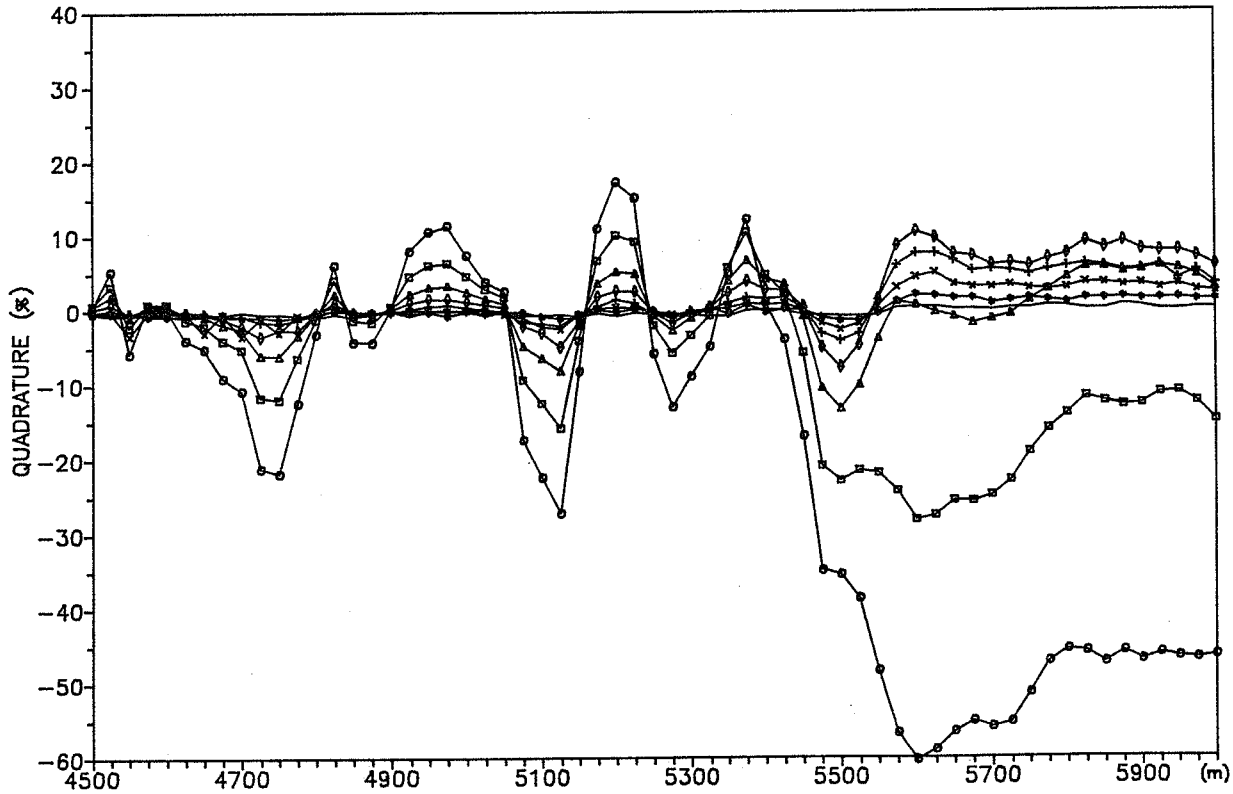
L = 100m

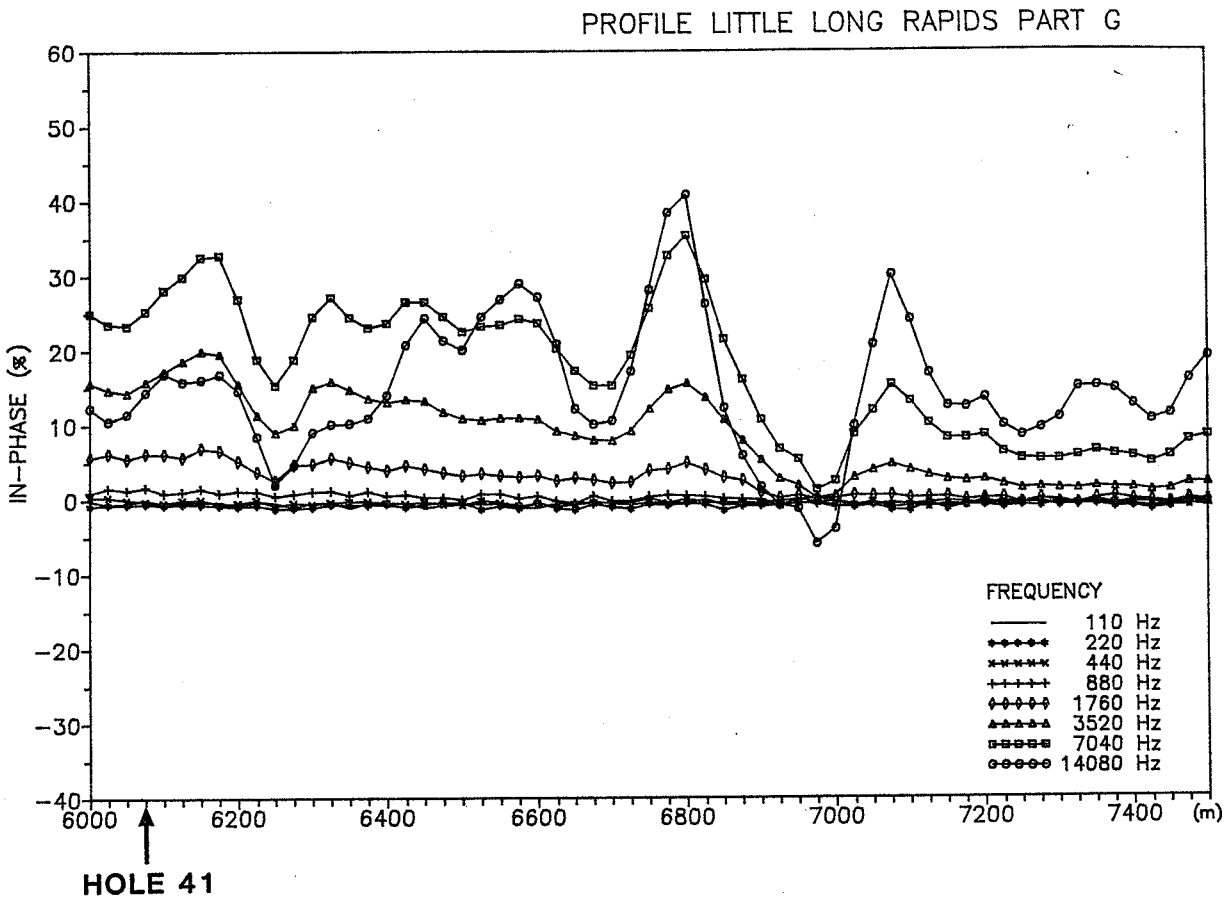


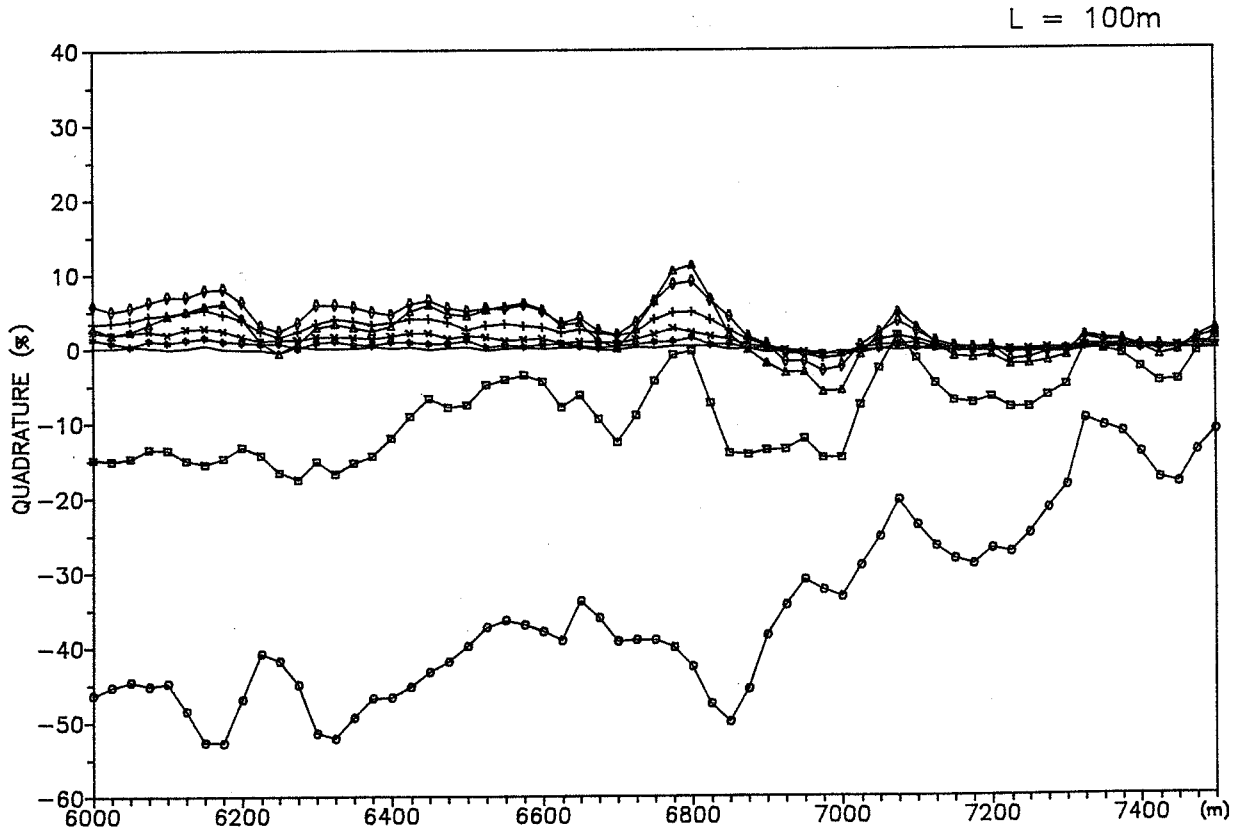
PROFILE LITTLE LONG RAPIDS PART F

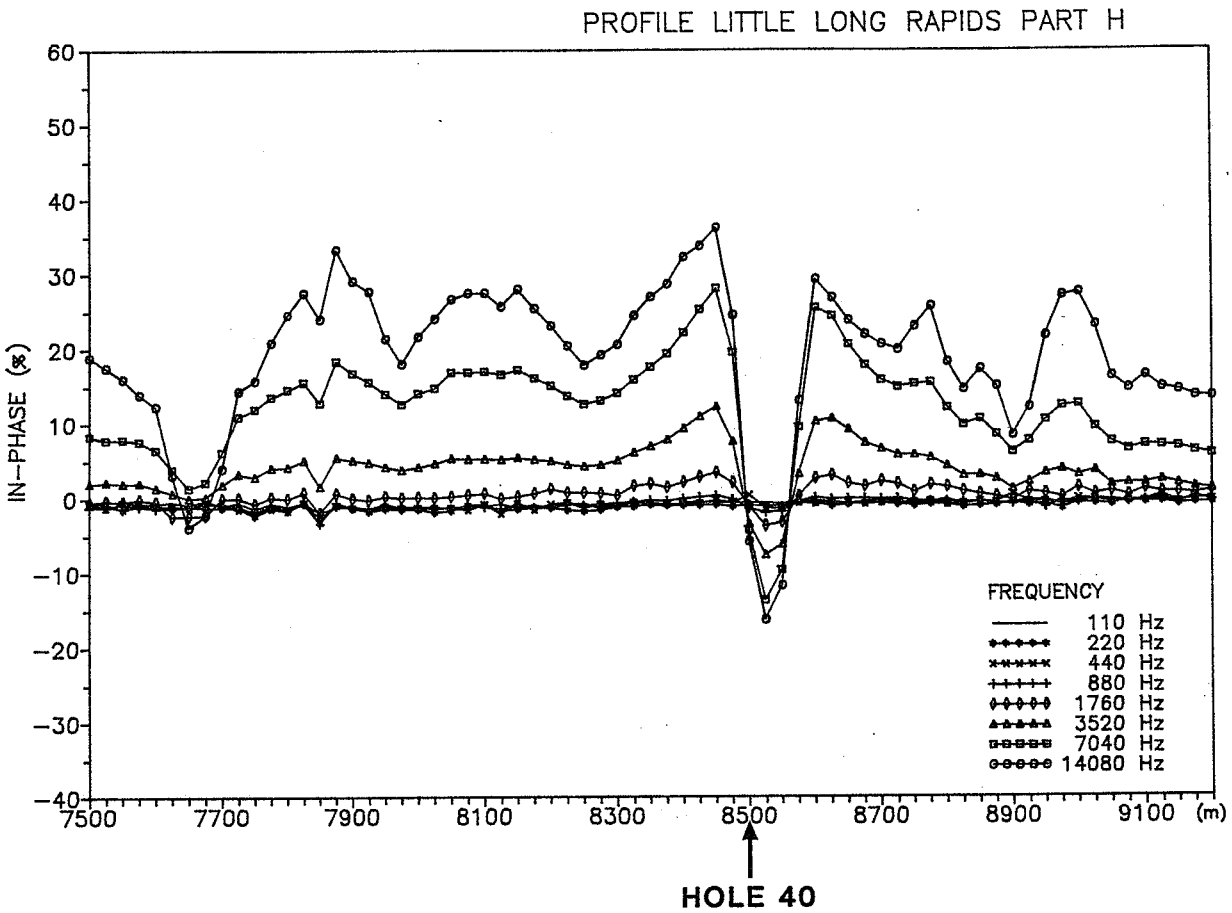


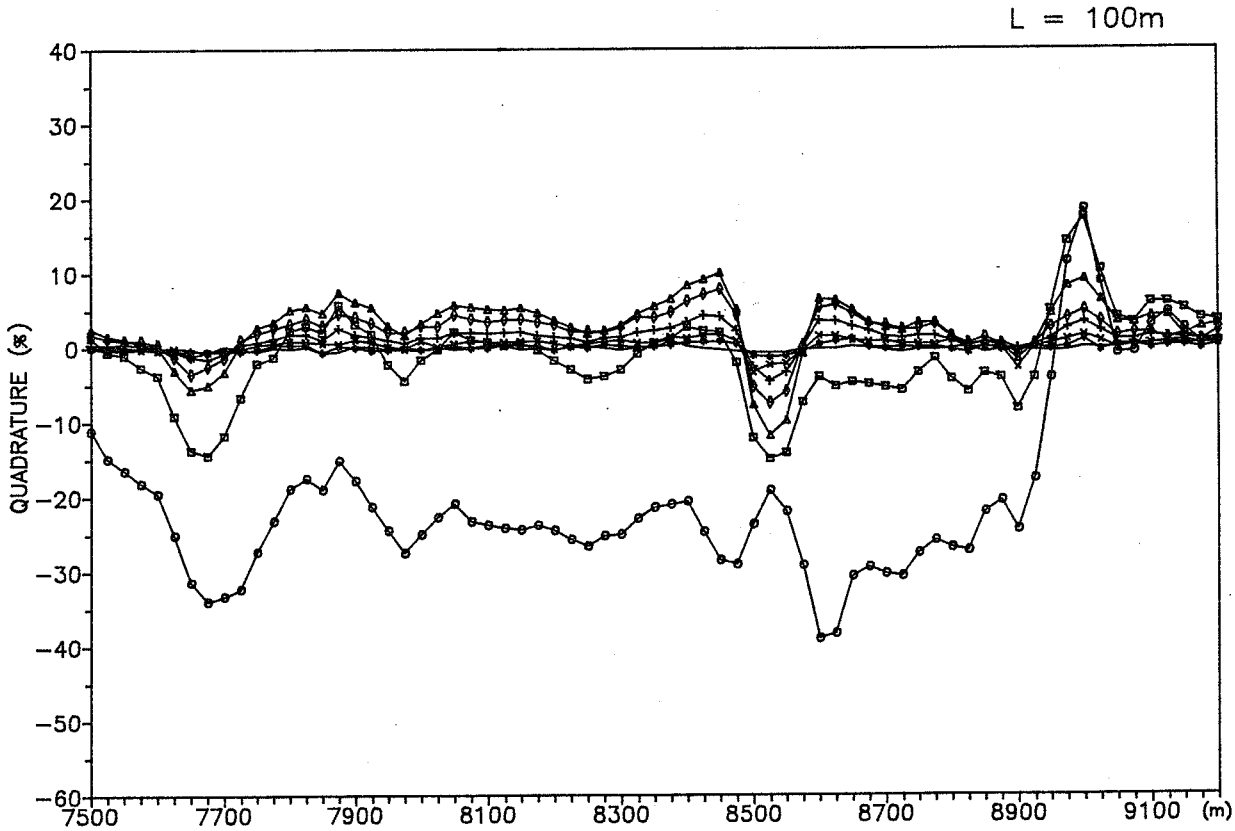
L = 100m




PROFILE LITTLE LONG RAPIDS PART G
IN-PHASE (%)
60
50
40
30
20
10
0
-10
-20
-30
-40
6000
6200
6400
6600
6800
7000
7200
7400
(m)
FREQUENCY
110 Hz
220 Hz
440 Hz
880 Hz
1760 Hz
3520 Hz
7040 Hz
14080 Hz
HOLE 41


L = 100m
QUADRATURE (%)
40
30
20
10
0
-10
-20
-30
-40
-50
-60
6000
6200
6400
6600
6800
7000
7200
7400
(m)


PROFILE LITTLE LONG RAPIDS PART H
IN-PHASE (%)
60
50
40
30
20
10
0
-10
-20
-30
-40
7500
7700
7900
8100
8300
8500
8700
8900
9100
(m)
FREQUENCY
110 Hz
220 Hz
440 Hz
880 Hz
1760 Hz
3520 Hz
7040 Hz
14080 Hz
HOLE 40


L = 100m
QUADRATURE (%)
40
30
20
10
0
-10
-20
-30
-40
-50
-60
7500
7700
7900
8100
8300
8500
8700
8900
9100
(m)