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MINNOVA INC.

GEOPHYSICAL REPORT ON A POWER LINE EM EXPLORATION RESEARCH PROJECT

SENECA PROJECT
HARRISON HOT SPRINGS, BRITISH COLUMBIA

AUTHOR: Dennis V. Woods, Ph.D., P.Eng.
Consulting Geophysicist

DATE OF WORK: 10 February - 27 March 1992
DATE OF REPORT: 27 May 1992

DENNIS V. WOODS, Ph.D., P.Eng.
Consulting Geophysicist

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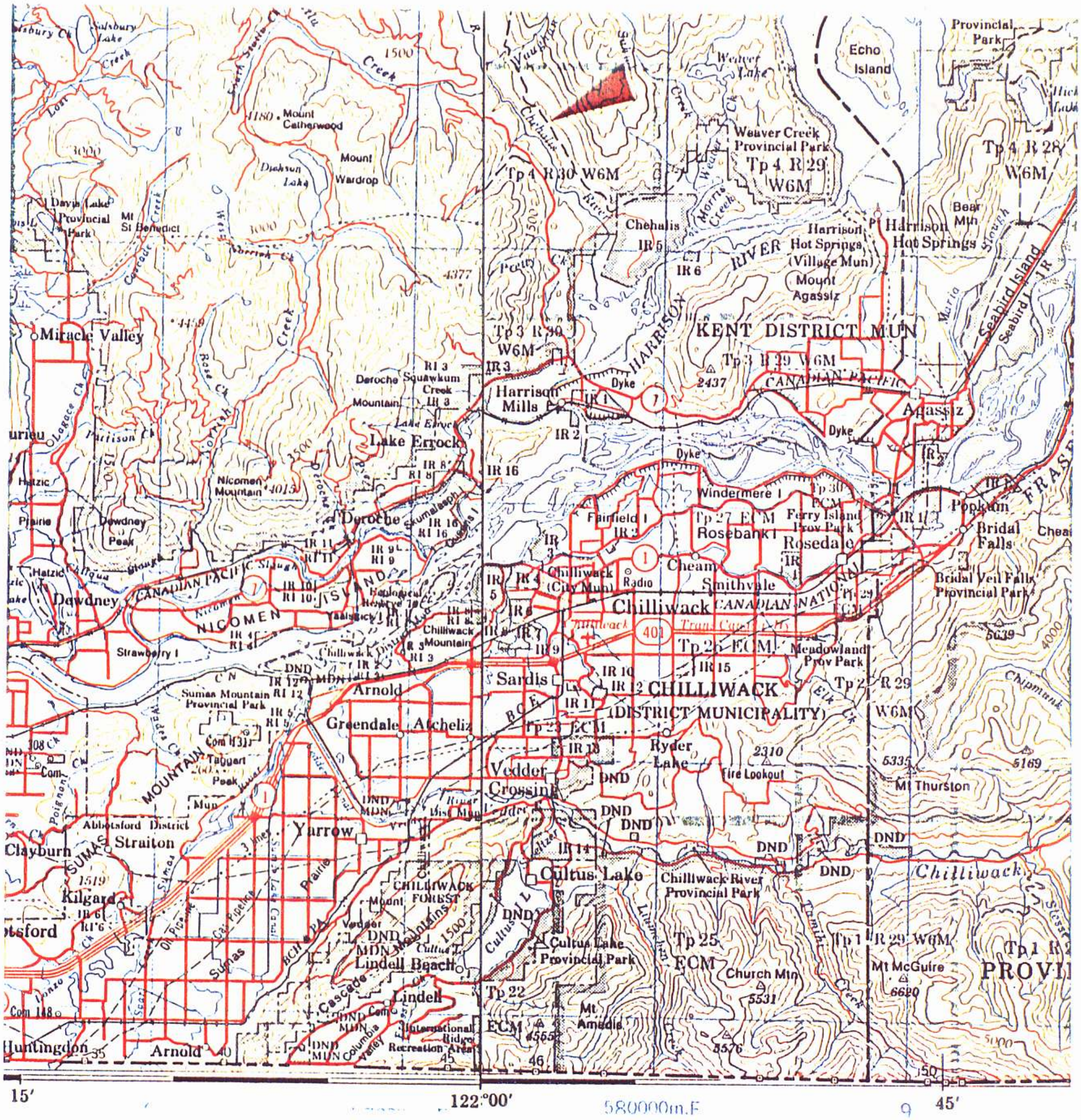
ILLUSTRATIONS



Mount Catherwood
Mount Wardrop
Weaver Creek Provincial Park
Echo Island
Harrison Hot Springs
Mount Agassiz
KENT DISTRICT MUN
Agassiz
Harrison Mills
Lake Errock
Deroche
Miracle Valley
Dewdney
NICOMEN
Chilliwack
Sardis
Arnold
Greendale
Atchelitz
CHILLIWACK (DISTRICT MUNICIPALITY)
Rosedale
Cheam
Popkum
Bridal Falls
Vedder Crossing
Ryder Lake
Mt Thurston
Yarrow
Straiton
Clayburn
Kilgard
Cultus Lake
Chilliwack River Provincial Park
Lindell Beach
Lindell
Church Mtn
Mt McGuire
Huntingdon
15′
122°00′
580000m.E
45′

2) installing an external metering system to the audio output circuitry, 3) modifying the gain circuitry and adding a 10 turn volume control and counter dial, and 4) adding a horizontal position level bubble. The unit was then tested in a 60 Hz environment in the Victoria area. Internal high-amplitude feedback oscillations were generated at even the lowest gain settings. To correct this problem, a new digital amplification and filtering system was designed and installed. This corrected the oscillation problem sufficiently so that 420 Hz and 660 Hz power line signals could be recorded, however the signal strengths were found to be very low at a remote test site north of Victoria.

The modified instrument was tested at the Seneca property in late March 1992. Signal strengths were found to be slightly greater than the Victoria test range, although not great enough to permit measurement using the field strength detection circuits. Increasing the gain resulted in feedback oscillations which could not be overcome. However, a clear audio signal could be detected at lower gain levels and, by rotating the unit, a null position could be determined quite accurately and read from the instrument's dip needle inclinometer. Hence, three short lines were surveyed using the instrument in the classic null-point dip angle mode. (The audio signals were also recorded on a portable magnetic cassette tape-recorder for later spectral analysis of the signals). Further details of the test survey are discussed in Appendix B.

TEST SURVEY RESULTS:

Three separate lines where surveyed (Figure 2): 1) line 1+00E over the Seneca Zone, 2) line 106+00E over a "dead zone", and 3) line 90+00E over the Fleetwood Zone. Each line was only 200 m long with readings every 25m along the line (i.e. 9 readings per line). With such a limited data set, it is difficult to be very precise about the success or failure of the method for locating EM conductors, however a few generalities can be made. The data are listed and plotted in Appendix B and shown in a composite plot in Figure 3. A modified form of the data is also plotted on response versus distance graphs shown in Figure 4.

There is some reassurance that the instrument is actually recording 60 Hz harmonics of the power line EM field. Firstly, the null position of the instrument could be determine to an accuracy of at least ±1° whereas station to station variations in dip angle are as great as 10°. Secondly, and most importantly, the overall data are entirely consistent with what is to be expected from basic theory. As shown in Figure 4, the average value of the horizontal to vertical component ratio (i.e. H_x/H_z = 1 / arctan(dip angle)) for each survey area is linear related to the distance from the power line. The slope of this line depends only on the mean apparent resistivity of the survey area, which calculates to about 300 ohm-m in the Seneca area. This agrees well with previous Pulse EM survey results (Woods, 1991a).

However, there are also some inexplicable features in the data plots shown in Figure 3, namely inconsistencies in the profiles between the

SENECA PROJECT
SCALE 1:20,000

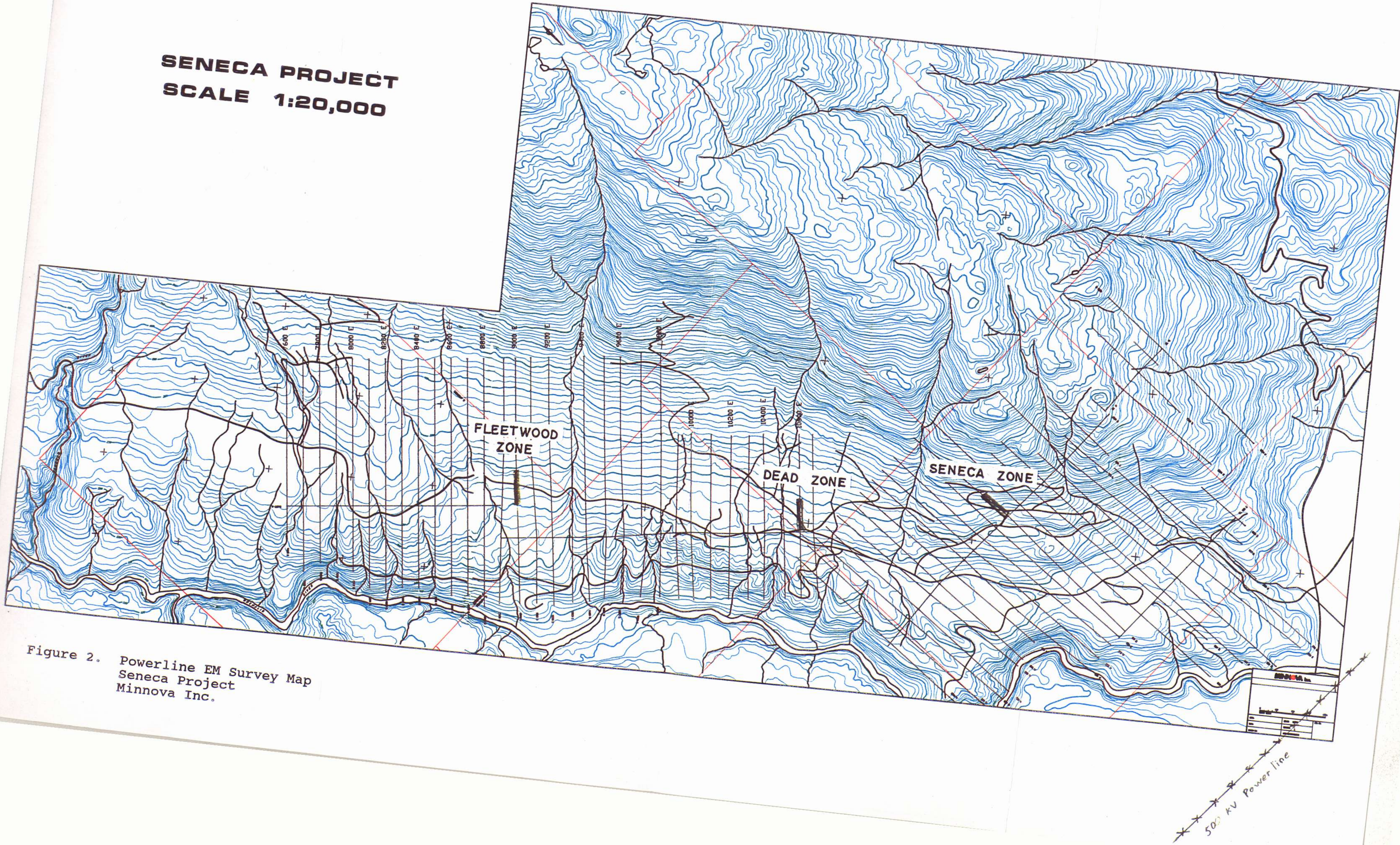


Figure 2. Powerline EM Survey Map
Seneca Project
Minnova Inc.

two frequencies. This is most marked on line 106+00E (the "dead zone") where an 8°-9° inflection anomaly occurs between stations 0+75N and 1+00N at 660 Hz, but between stations 1+50N and 1+75N at 420 Hz, a spatial shift of 75m. Although there may be some valid geologic reason for this behaviour, the spatial discrepancy does suggest that there is greater noise in the data than originally estimated. (A VLF-EM inflection anomaly also occurs at 2+00N on line 106+00E which suggests that there is some validity to the anomalous power line EM response).

A similar inconsistency is noted on line 1+00E over the Seneca Zone. A 10° inflection anomaly between 0+50N and 75+00N at 660 Hz is almost absent from the 420 Hz data. In addition, the profiles appear to deviate from each other toward the north end of the line, however these data are questionable since the dip angles were recorded at or just beyond the limits of the inclinometer.

Single-station dip angle inflections are typically due to narrow bands of induced EM current, such as along shallow, near-vertical conductive shear zones. A flat-lying conductive ore body buried at depth should respond with broad, dip angle maxima or minima over the edges of the body (see Figure 4 in Appendix A). Such anomalous responses would only be observable with multiple long lines of data, hence it cannot be concluded that the test surveys failed to indicate the presence of the Seneca or Fleetwood sulphide zones. However, it is interesting to note that a broad, dip angle maxima of low amplitude was recorded on both 420 Hz and 660 Hz over the Fleetwood Zone at about 3+00N on line 90+00E.

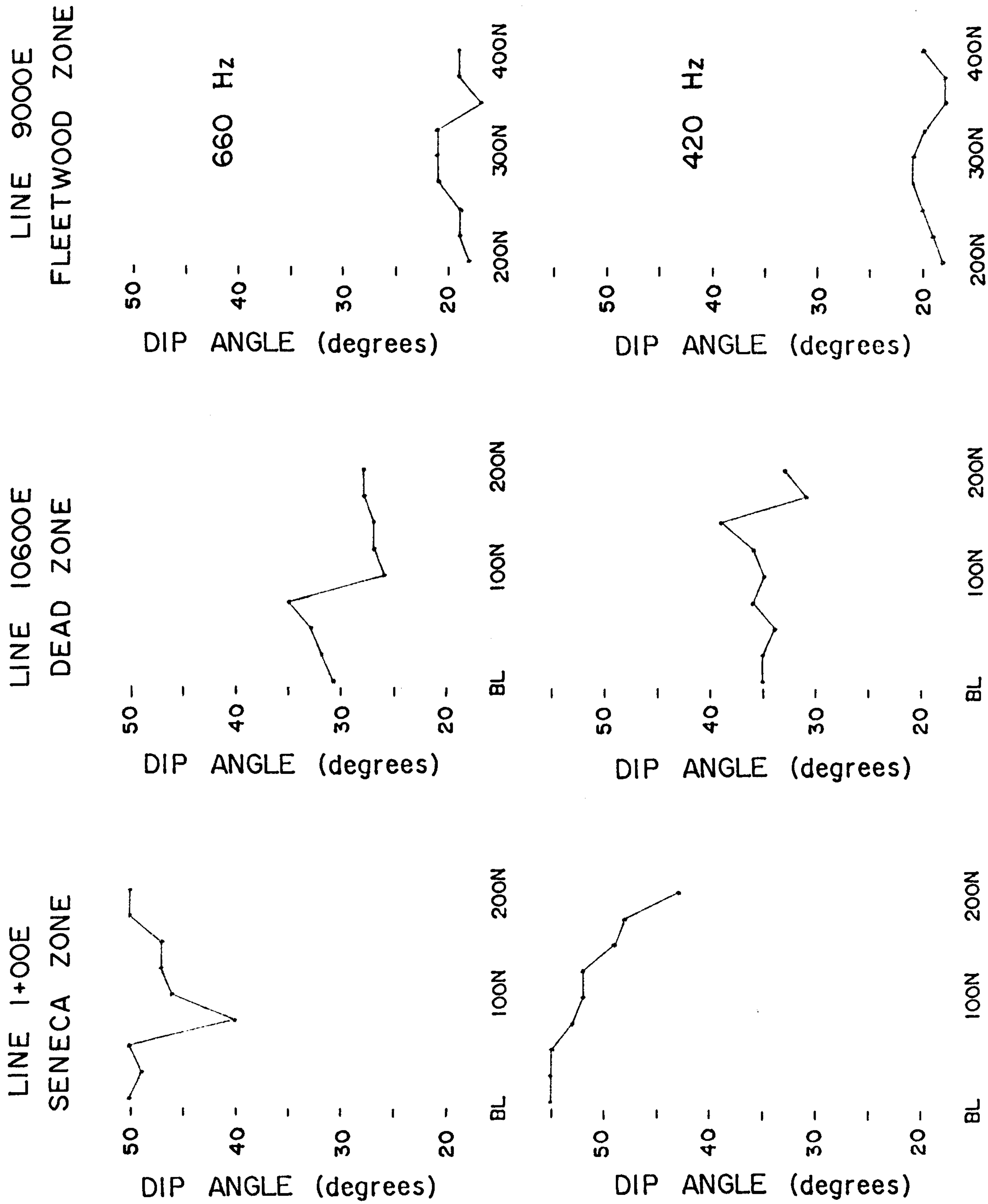
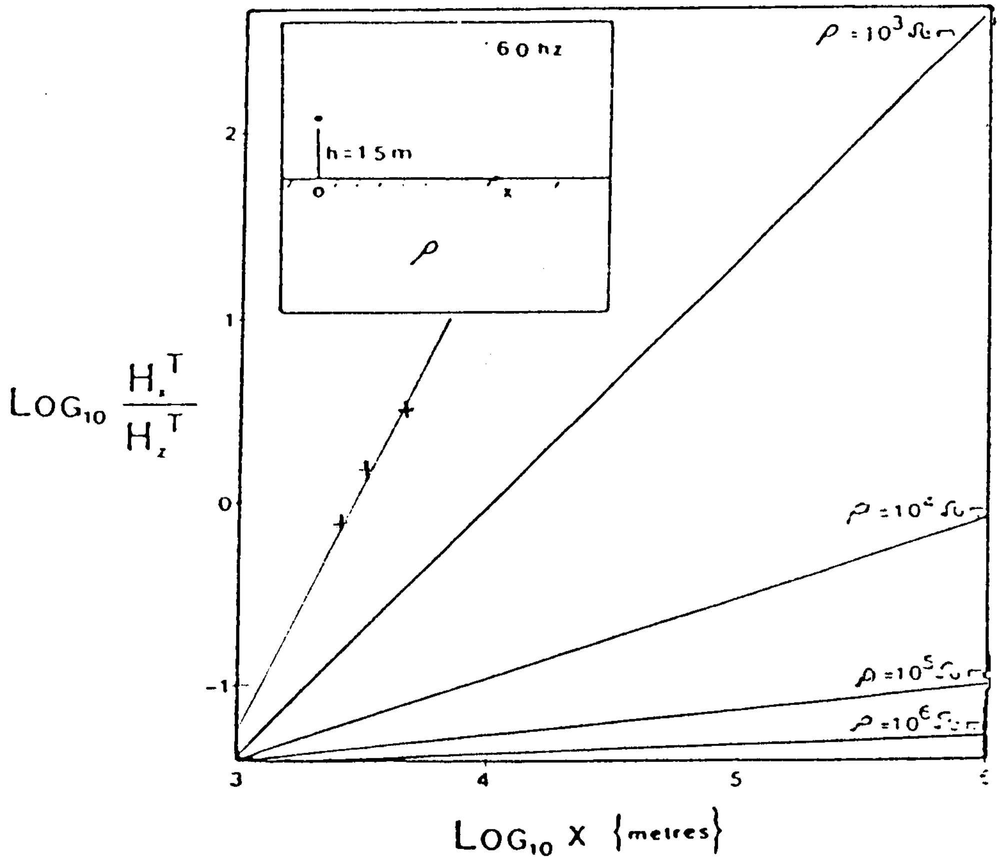


Figure 3. Powerline EM Dip Angle Survey Data
Seneca Project - Minnova Inc.



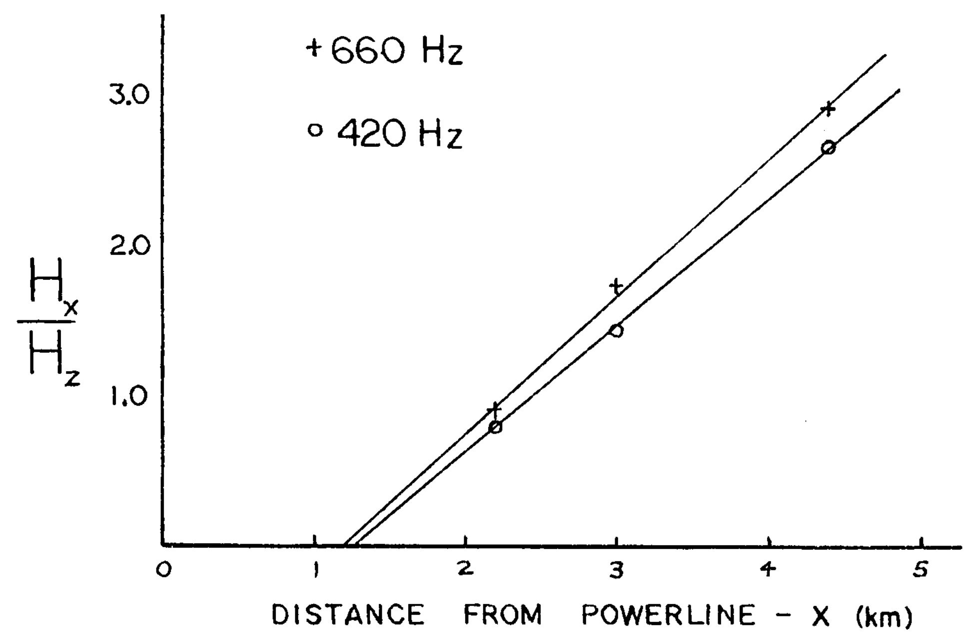


Figure 4. Powerline EM Response vs Distance Plots
Seneca Project - Minnova Inc.

CONCLUSIONS AND RECOMMENDATIONS:

The 60 Hz harmonic power line EM receiver developed by Mr. Jim Harrington of AGO Environmental Electronics Ltd. has been successfully utilized to collect a small data set in a test survey at the Seneca property. The survey results do not definitively confirm that the technique can be successfully utilized to explore for buried conductive sulphide mineral deposits. Additional survey data in the general vicinity of the known sulphide zones is required before the utility of the technique can be concluded. The fact that the instrument produces data which is entirely consistent with power line EM theory, and also appears to be indicating anomalous geologic structure at more than one location, implies that it can be used with the same degree of certainty as other more traditional EM methods (e.g. VLF-EM).

As reported by Mr. Harrington in Appendix B, improvements should be made to the instrument before any further surveying is carried out: 1) the dip angle inclinometer should be replaced with one which allows measurements of $\pm 90°$, 2) the gain should be increased so that the field strength meter can be made operational and hence facilitate separate measurement of the vertical and horizontal components, and 3) to avoid feedback oscillation problems inherent with increased system gain, the instrument should be repackaged to separate the receiver antenna from the electronics.

REFERENCES:

Woods, D.V.: Geophysical Report of a Surface and Borehole Pulse EM Survey, Seneca Project, Harrison Hot Springs, British Columbia; for Minnova Inc., Woods Geophysical Consulting, July 1991a.

Woods, D.V.: Geophysical Report on a Borehole Pulse EM Survey, DDH S9117, Seneca Project, Harrison Hot Springs, British Columbia; for Minnova Inc., Woods Geophysical Consulting, August 1991b.

Woods, D.V.: Unsolicited Research Proposal: Utilization of 500KV Power Lines as a Source Field for Electromagnetic Exploration, Seneca Project, Harrison Hot Springs, British Columbia; for Minnova Inc., Woods Geophysical Consulting, December 1991c.

APPENDIX A

MINNOVA INC.

UNSOLICITED RESEARCH PROPOSAL

UTILIZATION OF 500 KV POWER LINES AS A SOURCE FIELD FOR ELECTROMAGNETIC EXPLORATION

SENECA PROJECT
HARRISON HOT SPRINGS, BRITISH COLUMBIA

AUTHOR: Dennis V. Woods, Ph.D., P.Eng.
Consulting Geophysicist

DATE OF PROPOSAL: 16 December 1991

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SUMMARY:

It is proposed that a new EM method be tested at the Seneca property to explore for massive sulphide ore deposits. The method will utilize the strong electromagnetic fields generated by a 500 kV power line which traverses immediately south of the property. The research project consists of modifying EM instrumentation to record both the horizontal and vertical components of the higher harmonics of the power line EM field, a three-day trial survey on the Seneca property, and a detailed analysis of the results in a research report. Routine surveying may commence following completion of the research project. The research project will cost $6,000.00.

INTRODUCTION:

A major 500 kV power line (B.C. Hydro #5L82) is located less than 5 km from the Seneca property near Harrison Hot Springs. Exploration of the property for masaive sulphides using EM techniques is hampered by this power line due to it's overpowering electromagnetic noise (Woods, 1991a and 1991b). Some DEEPEM results were obtained by coordinating surveys with a specially arranged, temporary shutdown of the power line. This is a 2 or 3 times per year only occurrence in response to temporary importation of surplus power from Washington state during the spring salmon run on the Columbia River. However, line 5L82 is only shutdown if it conforms to the maintenance and testing schedule of B.C. Hydro, and even then the duration of the shutdown is only 24 hours on a weekend.

Frequency-domain EM methods such horizontal loop (e.g. Apex MaxMin) or Turam (e.g. Androtex Elfast) could be used to reduce the effect of power line noise. These systems are frequency tuned to avoid 60 Hz and higher harmonics, however the high amplitude noise signals from the 500 kV power lines will probably still have a detrimental affect on the survey data. In addition, the frequency-domain systems are affected by topography which will complicate interpretation of the results and may lead to erroneous identification of false anomalies. The pulse repetition rate and other design features of the Lamontagne UTEM time-domain EM system reportedly reduces 60 Hz and higher harmonic noise signals, however this system will also be affected by the severe power line noise experienced at Seneca.

An alternative, and cost effective method of acquiring definitive EM survey data over the Seneca property is to use the power line signal as the EM source and look for spatial variations of this field over the survey area. This technique is conceptually similar to VLF-EM: the major differences being the much lower operating frequencies and the fact that the magnetic component of the source field is vertical rather than horizontal. Both differences provide distinct advantages when exploring for flat-lying massive sulphide targets at depth.

The main difficulty of implementing the power line source EM technique is that there are no commercially available receivers - EM systems are designed to reduce power line noise rather than record it. The purpose of this proposed research project to modify an EM receiver to record 60 Hz and higher harmonic fields and to use this instrument to conduct an EM survey of the Seneca property for massive sulphide ore deposits.

THE POWER LINE EM METHOD:

Considerable previous research has been carried out on the practicality of using power lines as EM sources for the investigation of the resistivity structure of the earth. Most of this work was carried out in the early eighties at the Department of Geophysics and Astronomy, U.B.C. by graduate students D.C. McCollor and L.E. Fisk under the direction Profs. Bill Slawson and Tomiya Watanabe. They conducted theoretical and scale model analysis of the technique, investigated the characteristics of the power line EM field, built a receiving system, and carried out field tests at two different sites in British Columbia. One of the tests was conducted at the U.B.C. Research Forest between Alouette and Pitt Lakes, and actually used the same power line (B.C. Hydro #5L82) that passes by the Seneca property. The U.B.C. work is reported in McCollor, et al. (1982), McCollor, et al. (1983), Fisk (1984) and most recently in Slawson, et al. (1991). Copies of McCollor, et al. (1982) and Slawson, et al. (1991) are attached to this research proposal.

The main conclusions of this work, from a practical exploration point of view, are:

1) The strongest and most stable harmonic frequencies of the power line EM field are 60, 180, 300 and 420 Hz as shown in Figure 1. (An earlier investigation into the feasibility of using power lines as a

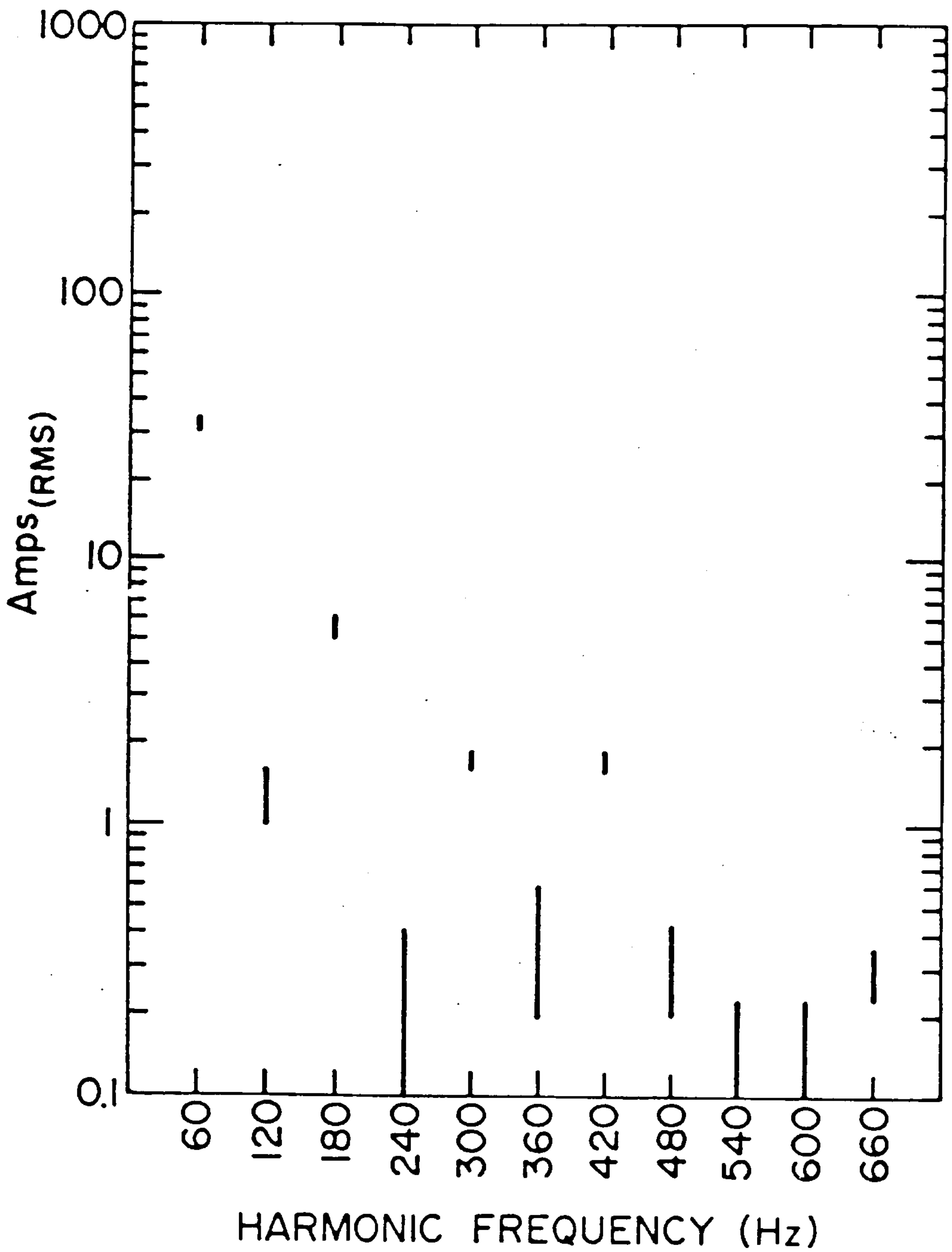

Figure 1 Signal spectrum of power line EM field (from McCollor, et al., 1983).

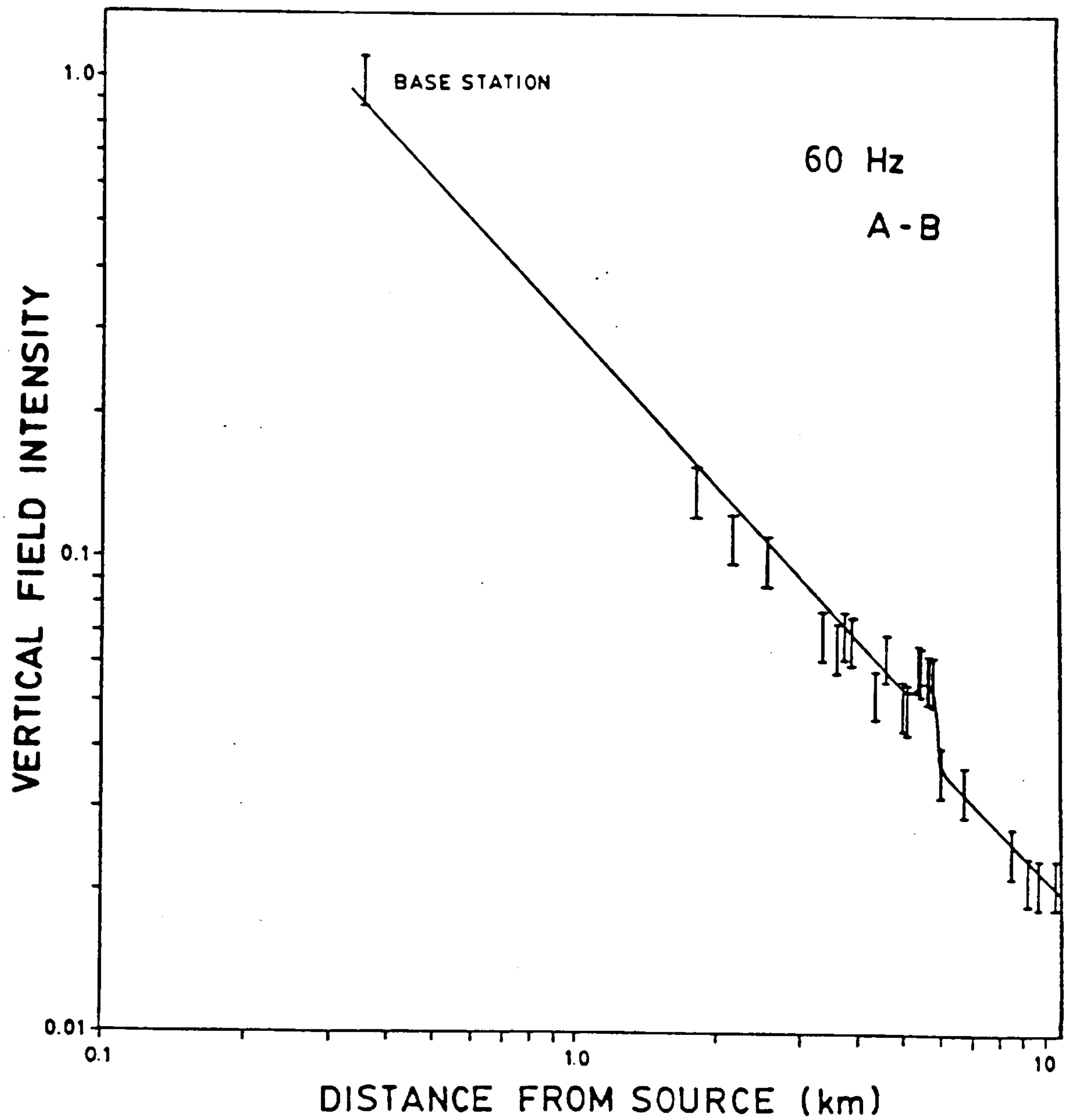

Figure 2 Power line field strength profiles (from McCollor, et al., 1983).

cross-over from near-field to far-field behaviour depends on frequency, but generally ranges from more than 10 km for 60 Hz to 2-3 km for the higher harmonics. Slawson, et al. (1991) show that the horizontal-to-vertical ratio also varies uniformly with distance from the power line depending on frequency (see Figure 3). This variation is of order 0.25 at 1 km to about 0.8 at 4 km. (These data were used in both studies to estimate the overall apparent resistivities of the test areas). For mineral exploration surveys of order 1 km in size, the uniform background variation of the power line field strength or component ratio will be easily separated from any anomalous response.

4) In both the McCollor, et al. (1983) and Slawson, et al. (1991) test surveys, anomalies in the generally smooth spatial variation of the power line fields were noted at specific locations. These anomalies were attributed to near-surface conductive features such as glacial deposits and lakes, however, due to the severe under-sampling in both surveys, it was impossible to be very definitive. A more recent airborne application of the power line EM method in northern Minnesota by Labson and Medberry (1989) successfully mapped conductors in Archean greenstone belts beneath thick glacial cover. Their results compare favourably with INPUT airborne data over the same area. These test surveys have successfully demonstrated the utility of the power line EM method in mapping anomalous conductive structures in the vicinity of power lines.

5) Fisk (1984) carried out an analogue scale model study of the response from a shallow, flat-lying conductive prism. The model represents a 20 mho/m conductive body measuring 210 m x 180 m x 20 m

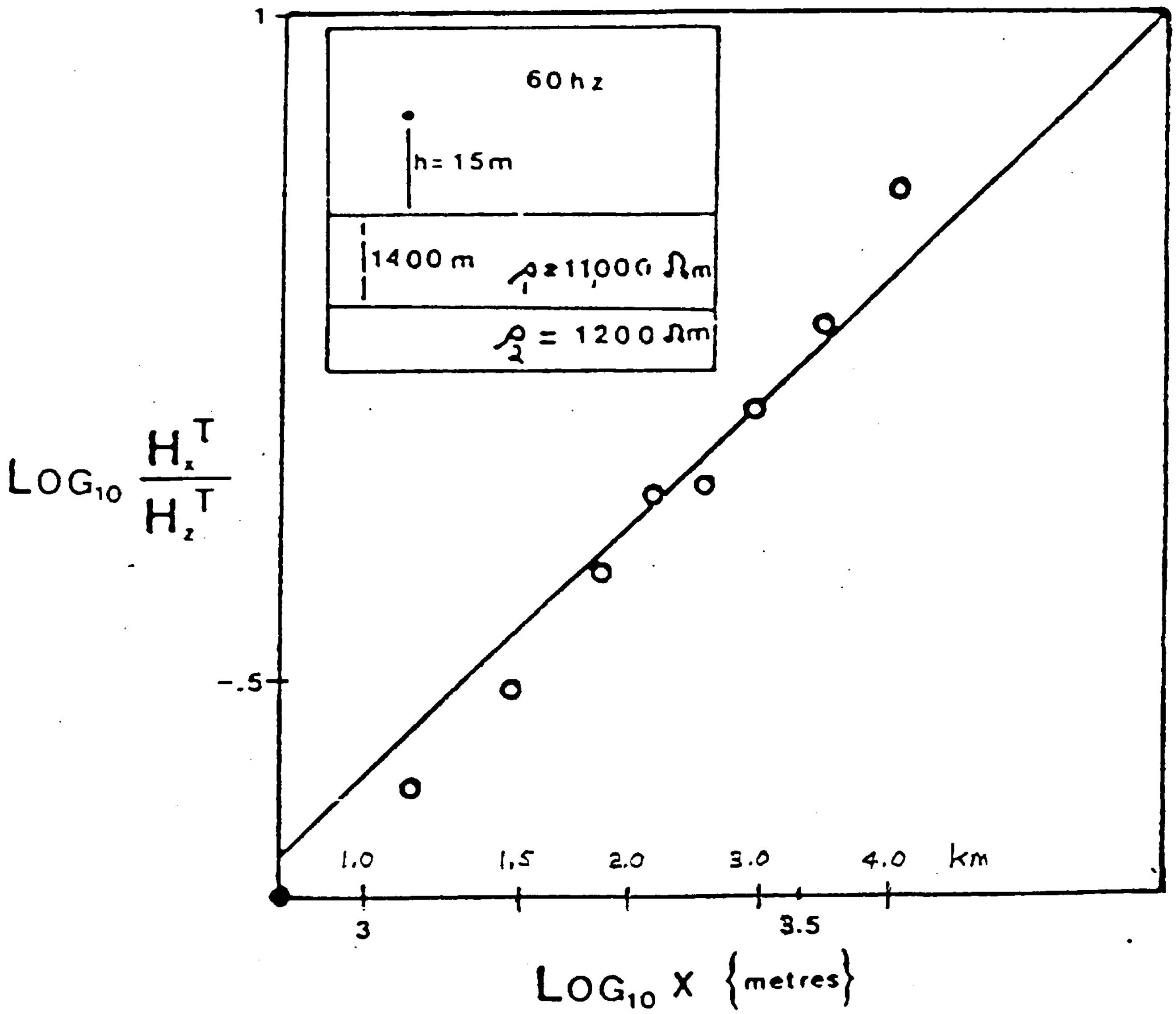

Figure 3 Horizontal-to-vertical component ratios versus distance from a power line (from Slawson, et al., 1991).

embedded in a 275 ohm-m half-space (the overall apparent resistivity in the Seneca area was estimated by Woods (1991a) to be 200 to 300 ohm-m) using a 60 Hz power line source field. As shown by the model profile in Figure 4, the edges of the conductive block are well resolved by the horizontal-to-vertical component ratio.

RESEARCH PROPOSAL:

The proposed research project is in two phases: 1) instrumental development and testing, 2) field trials at the Seneca property.

The first phase will be carried out by Mr. Jim Harrison of AGO Environmental Electronics in Victoria. Mr. Harrison is an geophysics electronic technologist with some 20 years experience with Crone Geophysics in Toronto and with his own company in Victoria. He has a McPhar model 660 VHEM receiver which can be modified to record signal strengths at power line harmonics in both the vertical and horizontal modes (a copy of his proposal letter is attached). This phase will require about one month to complete and will cost up to $2,000.00 for parts and labour.

The second phase will be carried out by Mr. Harrison and the author. The proposed field trials will be carried out in an area selected by Minnova personnel. The field trails should require three days to complete at a cost of $750.00 per day, plus one mobilization-demobilization day at $800.00. Several lines of data will be collected during the course of the test survey. I will require two

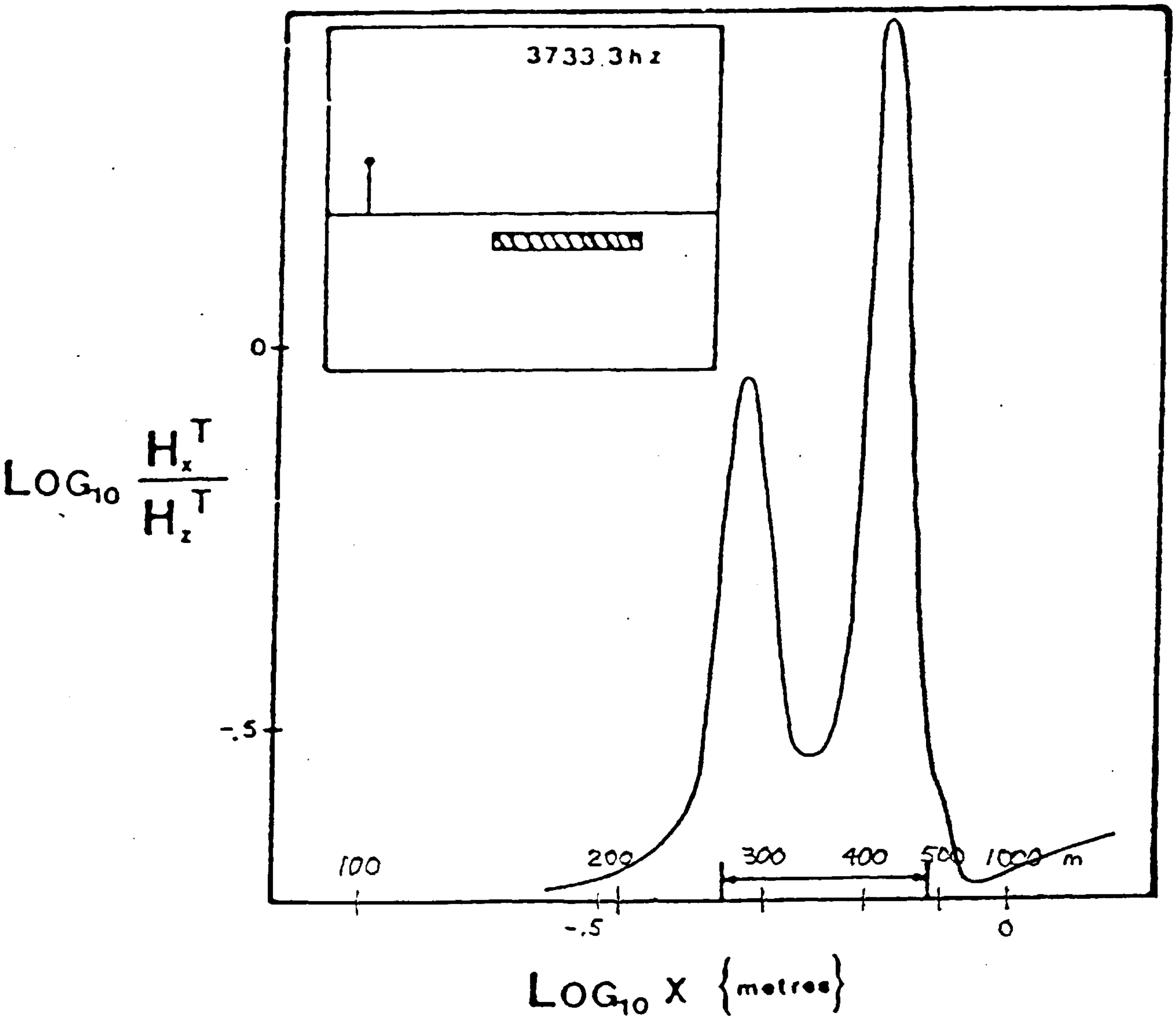

Figure 4 Scale model results plotted as horizontal-to-vertical component ratios versus distance (from Slawson, et al., 1991).

additional days at my consulting rate of $475.00 per day to analyze the data and prepare a final report on the project.

Following successful completion of the research project, and at the discretion of Minnova, modifications to the instrumentation or to the survey procedure can be made, and/or routine surveying of the Seneca property can commence. A subsequent, separate research project may be required if extensive modifications are necessary to optimize the technique (e.g. Harrison's stage two). Routine surveys will be carried out at a normal geophysical contracting rate. This will probably be in the same range as VLF-EM surveying since only a single operator is required (e.g. $500-700 per day or $150-250 per km).

BUDGET:

Phase 1 - Instrumental development and testing

Parts and Labour	$2,000.00

Phase 2 - Field trials at the Seneca property

Personnel, transportation, and all expenses		
Mobilization and demobilization		800.00
Field trials (3 days @ $750.00 per day)		2,250.00
Analysis and reporting		950.00

	Total	6,000.00

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Woods, D.V.: Geophysical Report on a Borehole Pulse EM Survey, DDH S9117, Seneca Project, Harrison Hot Springs, British Columbia; for Minnova Inc., Woods Geophysical Consulting, August 1991b.

O.
G. NVIRONMENTAL
LECTRONICS LTD.
A.

823 Old Esquimalt Rd.
Victoria, B.C.
Canada V9A 4W9
(604) 386-4015

Mr. Dennis Woods MSc.
2539 140 TH St.
Surrey, B.C.
V4A 4H9

Oct. 29/91

Dear Mr. Woods:

Further to our conversation yesterday, please find listed the proposed series of steps for the 60 Hertz harmonic measuring system.

After having reviewed the literature supplied, I would suggest that we modify an existing McPhar model 660 VHEM receiver, which is presently available from our equipment inventory. This unit will give us a good base to undertake the initial evaluation of a 60 hertz harmonics survey without having to spend a great deal of time developing a basic EM receiver. The present unit measures two mid harmonic frequencies; 630 Hz. (10.5) and 2430 Hz. (40.5). It makes use of a combination of dip angle, adjustable audio tone, and phase adjustment (in and out of phase). The unit is set up in a similar manner to the Crone or Saber VLF receiver. Its dimensions are as follows: 21.5" high, 2" thick and 6" wide. The unit is powered by two 9 volt transistor batteries and is outfitted with carrying straps. To allow for a three axis measuring system, several modifications will be required and they should be undertaken in stages.

First Stage:
----

1. Add a bulls-eye for horizontal leveling.

2. Evaluate the circuitry, modify and install a 10 turn volume control with counter dial.

3. Evaluate the audio output circuitry and install an external metering system to measure the percentage of relative field strength. A portable frequency counter may be connected occassionally to test the frequencies received.

4. Set up the two tuned circuits to receive odd harmonics eg. 660 Hz. (11) and 1740 Hz. (29) or other selected frequencies within the unit's range. It may be possible to tune the unit in such a way that the measurement of 4 or more harmonic frequenceis could be taken.

5. Preliminary systems trial at the Victoria test range.

Stage Two:
----

1. After evaluation of stage one, set unit to optimum frequencies.

2. Evaluate a method to inject a sample of the source frequency into the available In/out phase adjustment circuitry. This would allow for percentage in and out of phase measurements.

Cost to be determined.

If further detail is required please call. Hope to hear from you soon.

Yours Truly
James Harrington

APPENDIX B

O. G. A. NVIRONMENTAL LECTRONICS LTD.

823 Old Esquimalt Rd.
Victoria, B.C.
Canada V9A 4W9
(604) 386-4015

March 30/92

Mr. Dennis Woods MSc.
2539 140 TH St.
Surrey, B.C.
V4A 4H9

Dear Mr. Woods:

The following is a summery of the project, 60 Hertz harmonic measuring system.

The McPhar VHEM was modified, making use of a combination of dip angle, adjustable audio tone, and relative field strength. The unit is set up in a similar manner to the Crone or Saber VLF receiver. Its dimensions are as follows: 21.5" high, 2" thick and 6" wide. The unit is powered by two 9 volt transistor batteries. To allow for a two axis measuring system, an additional bulls-eye level was added for the "X" axis. The present +- 50 deg. dip angle meter is used for the "Y" axis and null point measurement.

Summery of project:

The existing McPhar model 660 VHEM receiver was modified as originally listed.

Part 1:

1. Add a bulls-eye for horizontal leveling.

2. Evaluate the circuitry, modify and install a 10 turn volume control with counter dial.

3. Evaluate the audio output circuitry and install an external metering system to measure the percentage of relative field strength.

4. Set up the two tuned circuits to receive odd harmonics eg. 660 Hz.(11) and 420 Hz.

5. Preliminary systems trial at the Victoria test range indicated that the unit would not give sufficient results. Oscillation problems at low level gain settings required a complete redesign of the amplifier and filtering system.

6. The original electronics system was removed and a combination of passive and active digital filtering were designed and installed. After several attempts an operational unit developed which could null out both by audio and field strength. Also included was the capability to record the audio output on a magnetic tape for later evaluation possibly with a Spectrum analyzer.

Suggestions:

- The system as it is presently arranged would require further development in order to get the field strength meter operational. (more gain)

7. The system was again tested at the Victoria test range and again almost no signal was indicated. The system functioned well near our office possibly due to the presents of a near by Hydro substation.

Part 2: Field test.

1. The system was then taken to the Clients property to determine if there would be enough signal available and to if the unit could detect the presents of conductors.

2. First indications were that the signal levels were slightly higher than the Victoria test range but not of a sufficient level to trigger the field strength detection circuits. We attempted to increase the systems overall gain, but this caused systems oscillation. We found that the audio system had enough output to allow us to run the test lines using the audio null and magnetic recorder.

3. We started with line 100 East and shortly found that the +- 50 deg. dip angle meter was being over-ranged on low frequency. This was probably due to the elevation above the power line. A +- 90 deg. dip angle meter is required to maintain the null point on scale. A possible Fraser Filtered anomaly was indicated with the 660 Hz signal centered at 1+12 North.

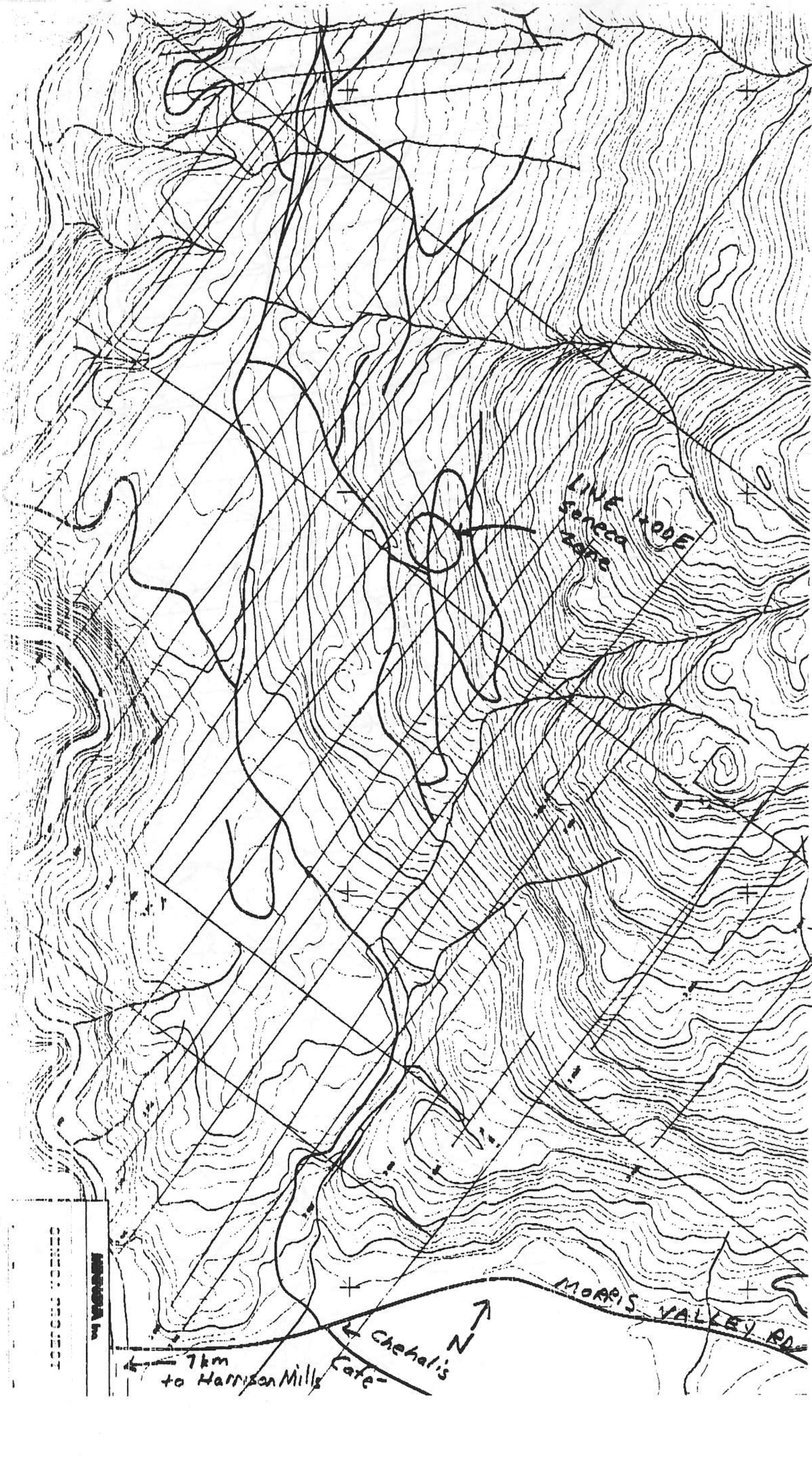
4. Line 106 East (dead zone) indicated a possible high and low frequency Fraser Filtered anomalies but with a significant spacial separation along the line in comparison to line 090E.

5. Line 090 East (Fleetwood) the audio signal was significantly lower on this line. A possible Fraser Filtered anomaly was indicated on both high and low frequency. The anomaly seems to be related to the tested sulfide zone drilled at 3+00 North at 80 deg. dip to the south along the line. High frequency was centered at 2+62 North and low frequency was centered at 2+37 North.

It was also determined that the motor in the tape deck was creating EM noise. We tried to null out the tape deck while taking its audio reading.

Conclusion:

The system seems to indicate null anomalies, related to known conductors on the test lines. The signal levels are substantially lower than what had been expected. There for the receiver would require further development before general surveys could be conducted with it.



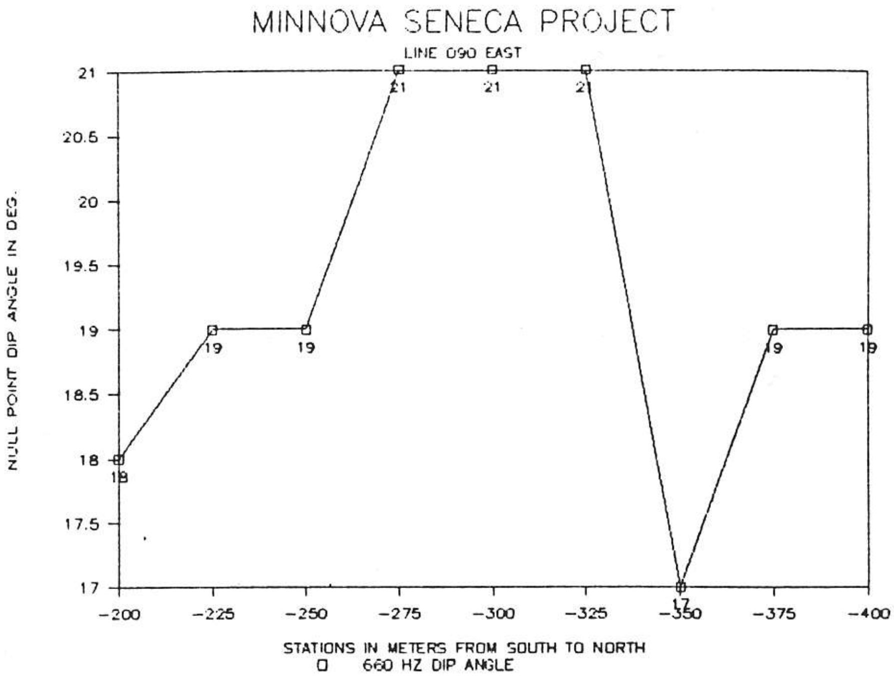
LINE 1+00E
Seneca zone
MORRIS VALLEY RD
N
Chehalis Cafe
7km to Harrison Mills

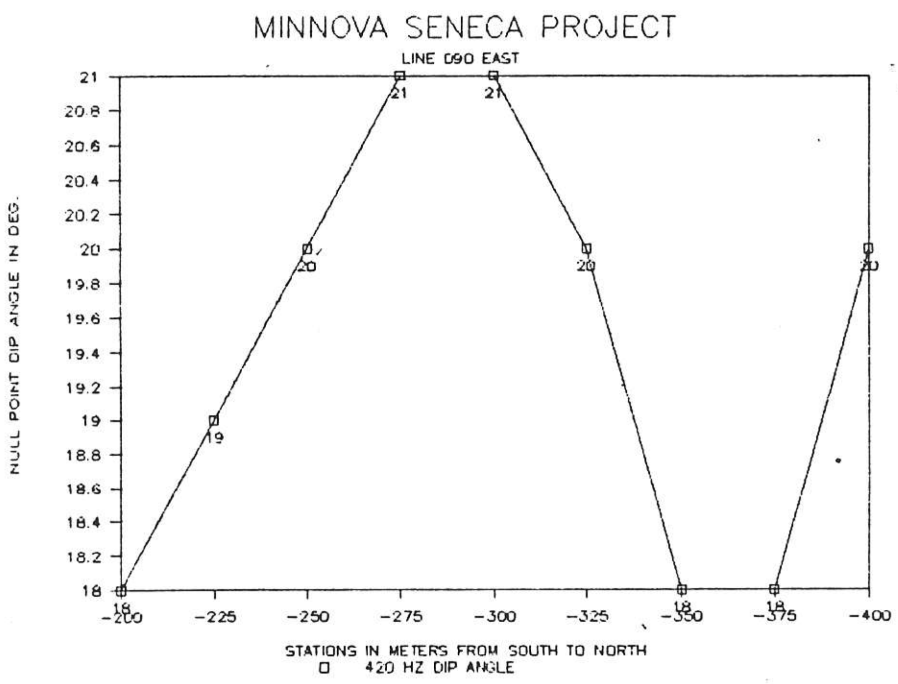
GRID NAME: Minnova, Seneca Project Harmonics test
LINE NO.- 90 East 660 hz

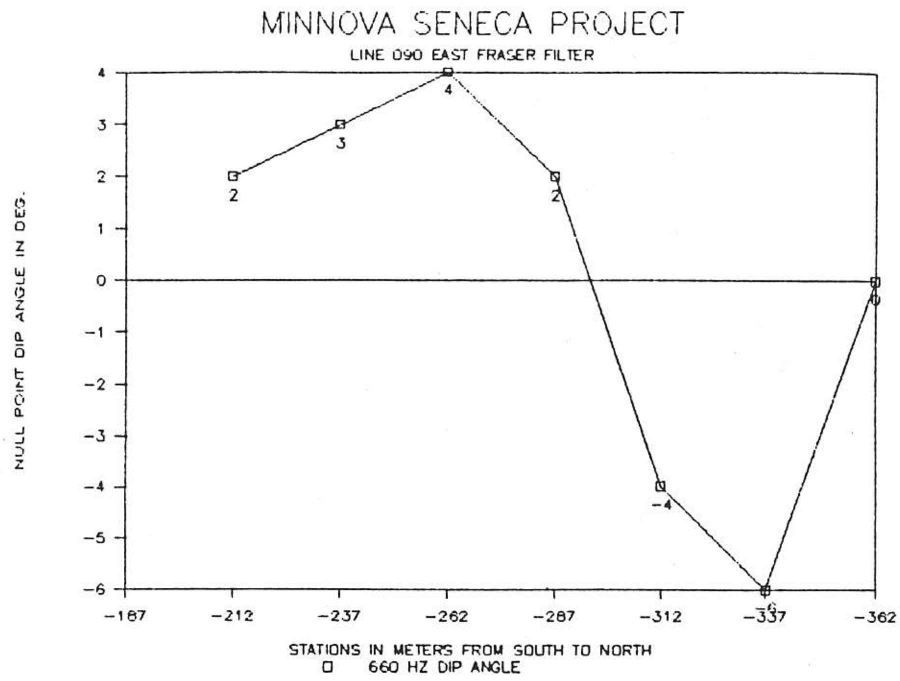
STATION	DIP	PHASE	FS	RAD		STATI	DIP	SUM DIP	FR FILT
-175						-175	18		
-200	18				-187	-200	18	36	
-225	19				-212	-225	19	37	2
-250	19				-237	-250	19	38	3
-275	21				-262	-275	21	40	4
-300	21				-287	-300	21	42	2
-325	21				-312	-325	21	42	-4
-350	17				-337	-350	17	38	-6
-375	19				-362	-375	19	36	0
-400	19				-387	-400	19	38	ERR
					ERR				

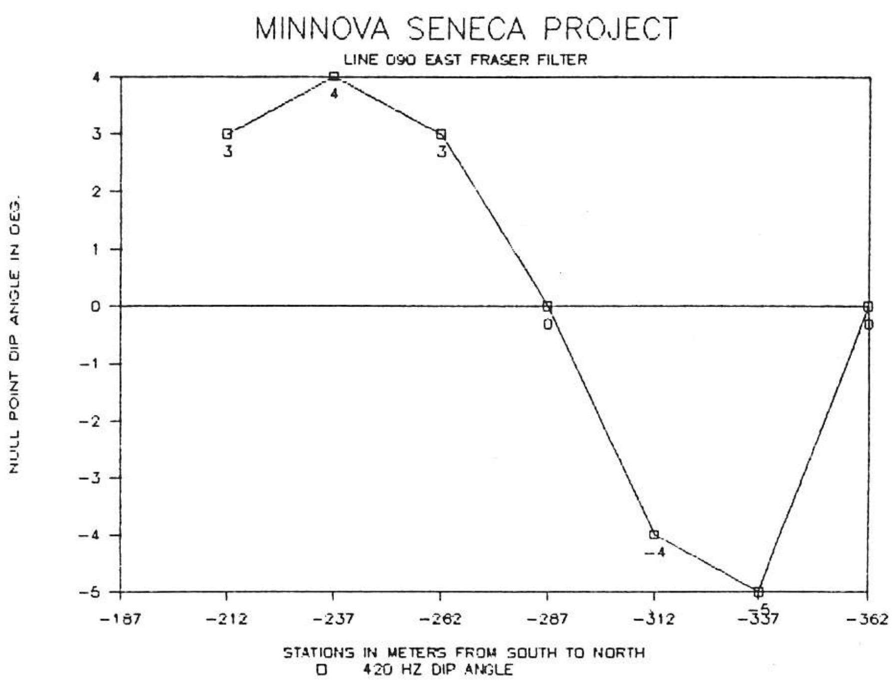
GRID NAME: Minnova, Seneca Project Harmonics test
LINE NO.- 90 East 420 hz

STATION	DIP	PHASE	FS	RAD		STATI	DIP	SUM DIP	FR FILT
-175						-175	18		
-200	18				-187	-200	18	36	
-225	19				-212	-225	19	37	3
-250	20				-237	-250	20	39	4
-275	21				-262	-275	21	41	3
-300	21				-287	-300	21	42	0
-325	20				-312	-325	20	41	-4
-350	18				-337	-350	18	38	-5
-375	18				-362	-375	18	36	0
-400	20				-387	-400	20	38	ERR
					ERR				


MINNOVA SENECA PROJECT
LINE 090 EAST
NULL POINT DIP ANGLE IN DEG.
21
20.5
20
19.5
19
18.5
18
17.5
17
-200
-225
-250
-275
-300
-325
-350
-375
-400
STATIONS IN METERS FROM SOUTH TO NORTH
660 HZ DIP ANGLE


MINNOVA SENECA PROJECT
LINE 090 EAST
NULL POINT DIP ANGLE IN DEG.
21
20.8
20.6
20.4
20.2
20
19.8
19.6
19.4
19.2
19
18.8
18.6
18.4
18.2
18
-200
-225
-250
-275
-300
-325
-350
-375
-400
STATIONS IN METERS FROM SOUTH TO NORTH
420 HZ DIP ANGLE


MINNOVA SENECA PROJECT
LINE 090 EAST FRASER FILTER
NULL POINT DIP ANGLE IN DEG.
STATIONS IN METERS FROM SOUTH TO NORTH
660 HZ DIP ANGLE

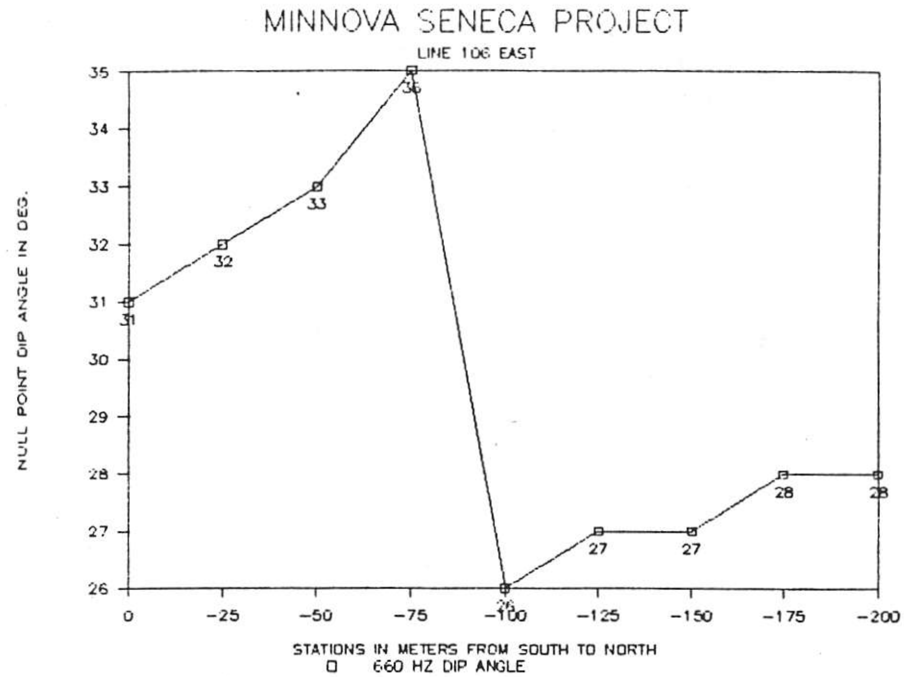

MINNOVA SENECA PROJECT
LINE 090 EAST FRASER FILTER
NULL POINT DIP ANGLE IN DEG.
STATIONS IN METERS FROM SOUTH TO NORTH
420 HZ DIP ANGLE

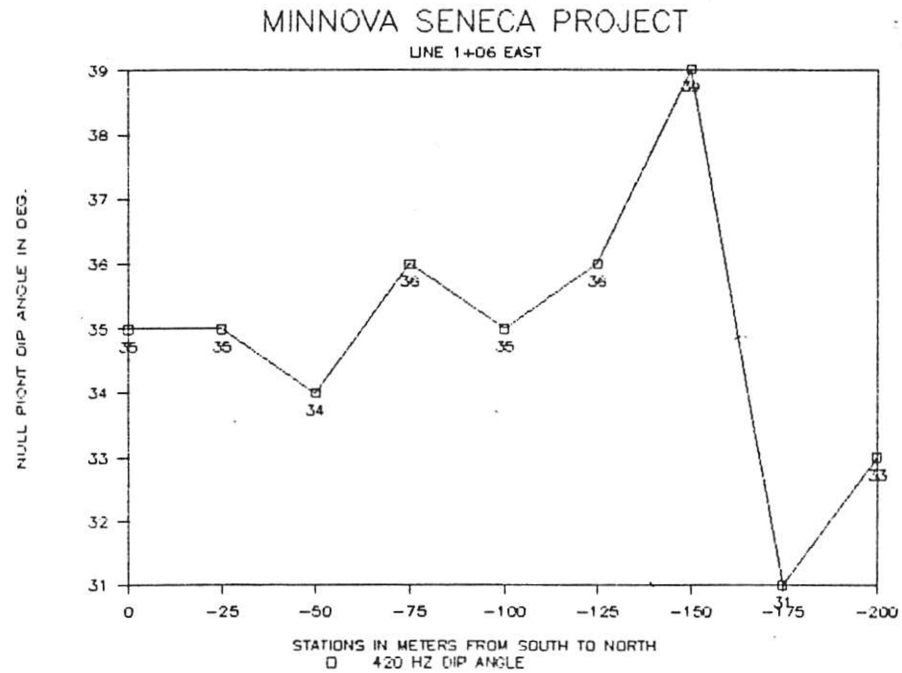
0 GRID NAME: Minnova, Seneca Project Harmonics test
LINE NO.- 106 East 660 hz

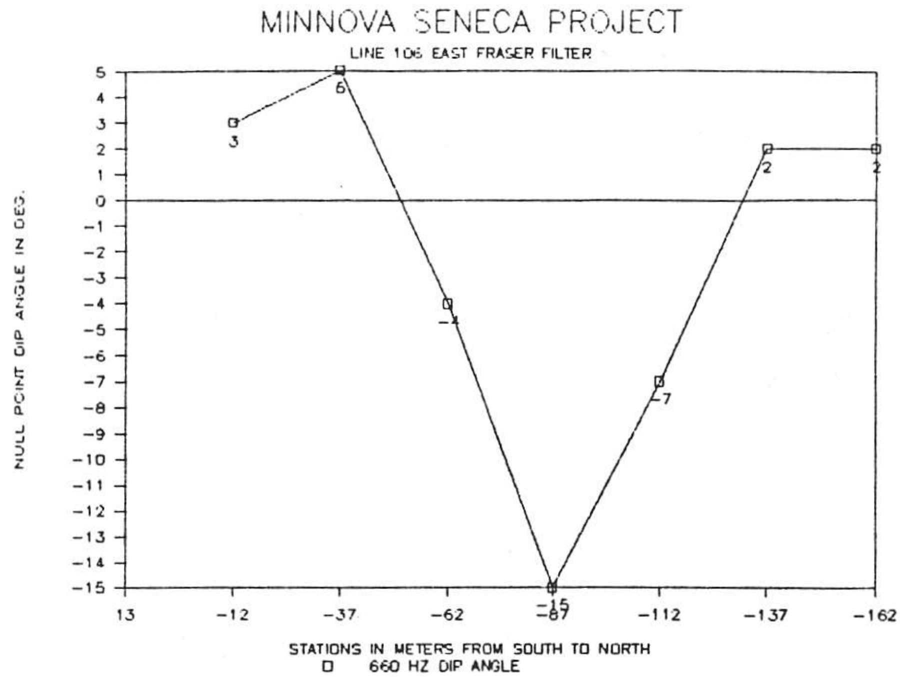
STATION	DIP	PHASE	FS	RAD		STATI	DIP	SUM DIP	FR FILT
25						25	31		
0	31				13	0	31	62	
-25	32				-12	-25	32	63	3
-50	33				-37	-50	33	65	5
-75	35				-62	-75	35	68	-4
-100	26				-87	-100	26	61	-15
-125	27				-112	-125	27	53	7
-150	27				-137	-150	27	54	2
-175	28				-162	-175	28	55	2
-200	28				-187	-200	28	56	ERR
					ERR				

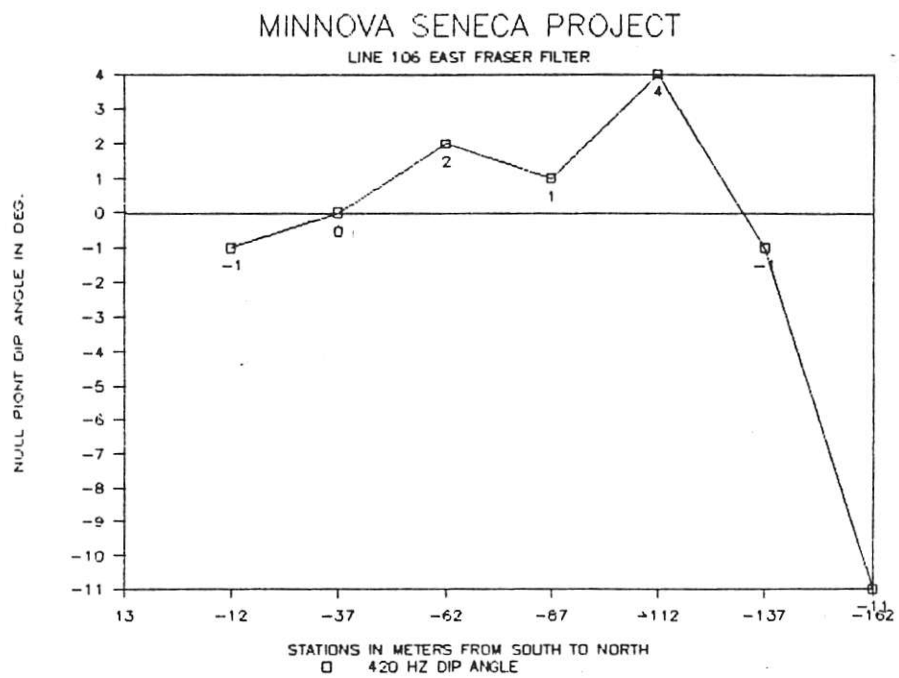
GRID NAME: Minnova, Seneca Project Harmonics test
LINE NO.- 106 East 420 hz

STATION	DIP	PHASE	FS	RAD		STATI	DIP	SUM DIP	FR FILT
25						25	35		
0	35				13	0	35	70	
-25	35				-12	-25	35	70	-1
-50	34				-37	-50	34	69	0
-75	36				-62	-75	36	70	2
-100	35				-87	-100	35	71	1
-125	36				-112	-125	36	71	4
-150	39				-137	-150	39	75	-1
-175	31				-162	-175	31	70	-11
-200	33				-187	-200	33	64	ERR
					ERR				


MINNOVA SENECA PROJECT
LINE 106 EAST
NULL POINT DIP ANGLE IN DEG.
STATIONS IN METERS FROM SOUTH TO NORTH
660 HZ DIP ANGLE


MINNOVA SENECA PROJECT
LINE 1+06 EAST
NULL PIONT DIP ANGLE IN DEG.
STATIONS IN METERS FROM SOUTH TO NORTH
420 HZ DIP ANGLE


MINNOVA SENECA PROJECT
LINE 106 EAST FRASER FILTER
NULL POINT DIP ANGLE IN DEG.
STATIONS IN METERS FROM SOUTH TO NORTH
660 HZ DIP ANGLE


MINNOVA SENECA PROJECT
LINE 106 EAST FRASER FILTER
NULL PIONT DIP ANGLE IN DEG.
STATIONS IN METERS FROM SOUTH TO NORTH
420 HZ DIP ANGLE

0 GRID NAME: Minnova, Seneca Project Harmonics test
LINE NO. - 100 East 660 hz

STATION	DIP	PHASE	FS	RAD
25				
0	50			
-25	49			
-50	50			
-75	40			
-100	46			
-125	47			
-150	47			
-175	50			
-200	50			

	STATI	DIP	SUM DIP	FR FILT
	25	50		
13	0	50	100	
-12	-25	49	99	-1-
-37	-50	50	99	-9
-62	-75	40	90	-13
-87	-100	46	86	3
-112	-125	47	93	8
-137	-150	47	94	4
-162	-175	50	97	6
-187	-200	50	100	ERR
ERR				

0 GRID NAME: Minnova, Seneca Project Harmonics test
LINE NO. - 100 East 420 hz

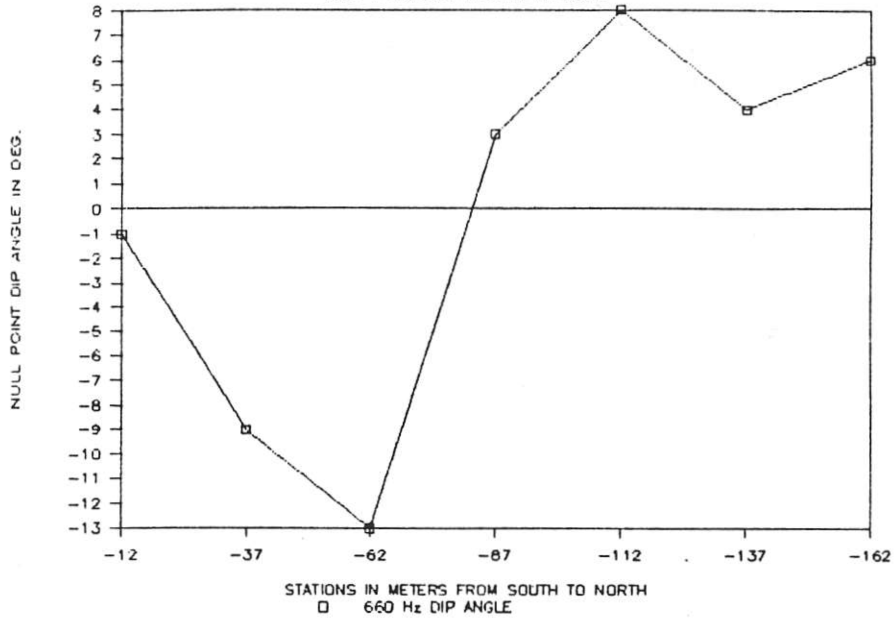
STATION	DIP	PHASE	FS	RAD
25				
0	55			
-25	55			
-50	55			
-75	53			
-100	52			
-125	52			
-150	49			
-175	48			
-200	43			

	STATI	DIP	SUM DIP	FR FILT
	25	55		
13	0	55	110	
-12	-25	55	110	0
-37	-50	55	110	-2
-62	-75	53	108	-5
-87	-100	52	105	-4
-112	-125	52	104	-4
-137	-150	49	101	-7
-162	-175	48	97	-10
-187	-200	43	91	ERR
ERR				

off scale on dip ∢ @ 50°

MINNOVA SENECA·PROJECT

LINE 1+00 EAST FRASER FILTERED



MINNOVA SENECA PROJECT

LINE 100 EAST FRASER FILTER