

**SEISMIC TESTING REPORT**

Queen Gulch

1 Mile Placer Lease #8563 to

NTS 115-0-14-h

Prepared for

Owner: Jack Worsell  
Gen Del  
Dawson City, Yukon  
and  
Fieldsman: Scott Cone  
Box 964  
Dawson City, Yukon  
YOB 1GO

~ ~ ~

Prepared by  
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(Phone/Fax 667-6193 [403])

May 31, 1991



120147

This report has been examined by  
the Geological Evaluation Unit under  
Section 41 Yukon Placer Mining Act  
and is recommended as allowable  
representation work in the amount  
of \$1,750.00

*Robert Dekker*

*for* Chief Geologist, Exploration and  
Geological Services Division, Northern  
Affairs Program for Commissioner of  
Yukon Territory.

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# ASSESSMENT REPORT

on May 31, 1991

Seismic Survey

on Queen Gulch

1 Mile Placer Lease #8563

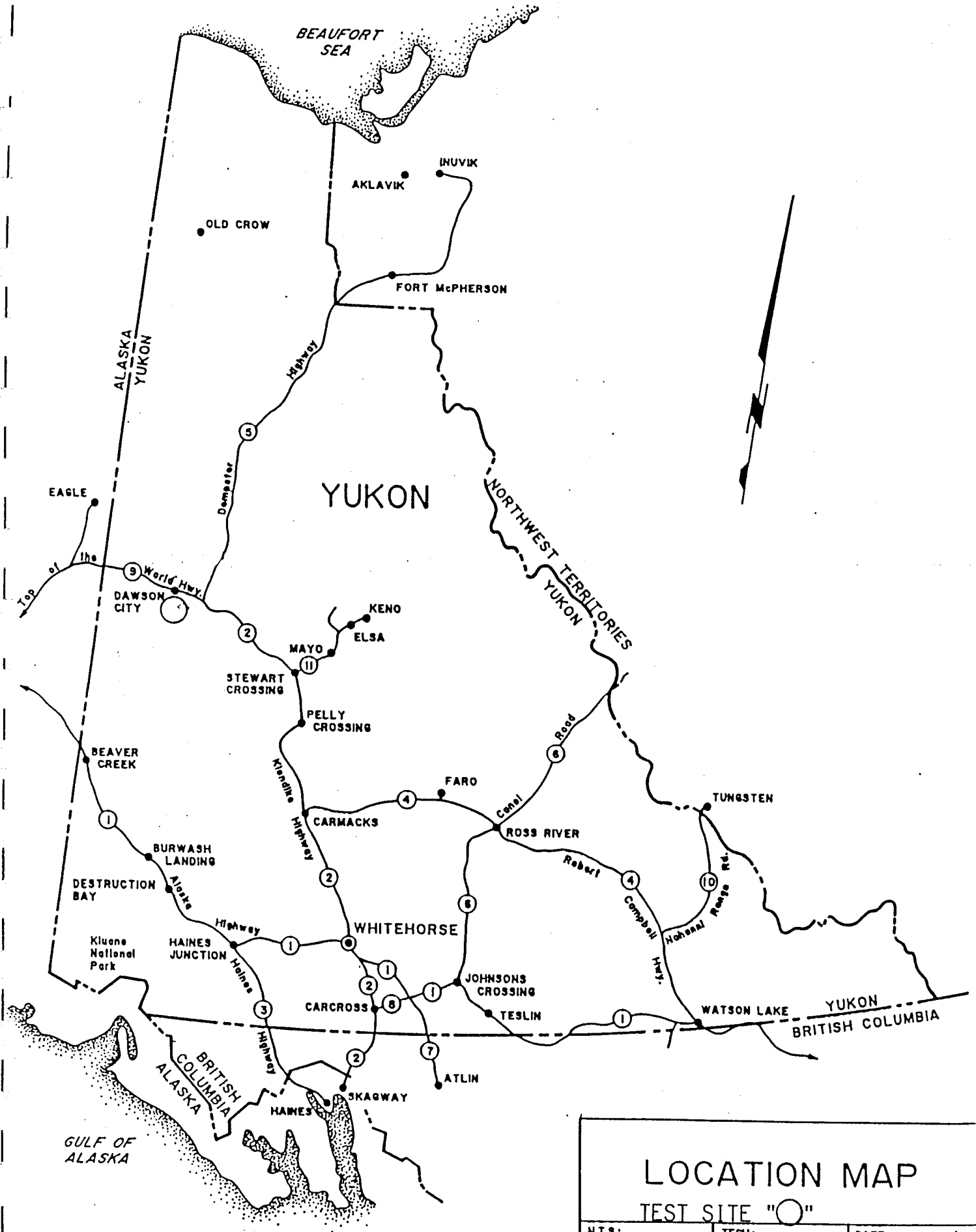
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## 1. INTRODUCTION

On May 31, 1991 a seismic survey was conducted on Placer Lease #8563 in Queen Gulch for the owner Jack Worsell by Fieldsman, Scott Cone.

Scott Cone, using a compass and hip chain, located five (5) test sites on the lease. Test sites were lengthwise in the deeper, middle of the property, flagged and labelled (See Fig.C)

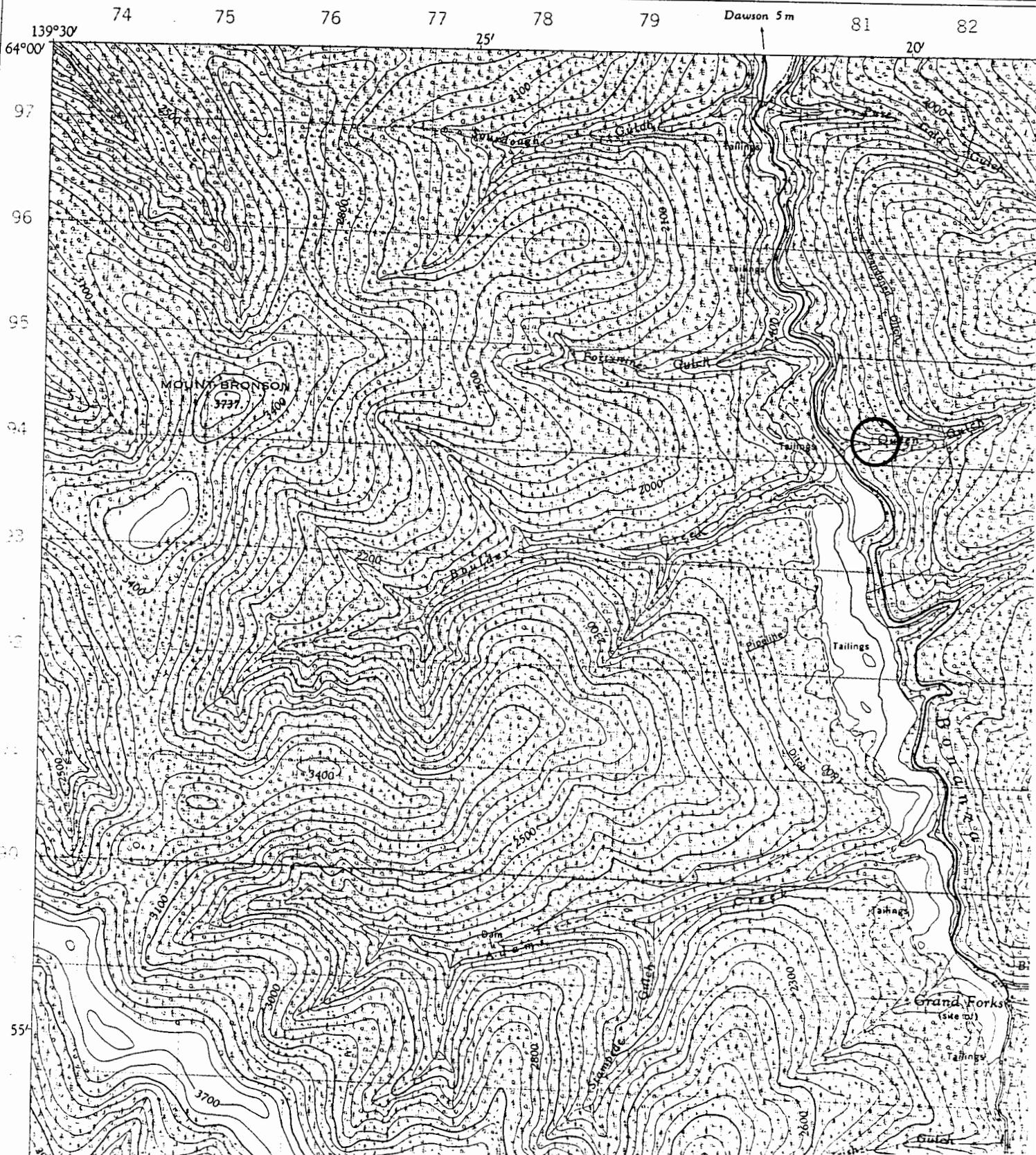
The seismic consultant, Ted Sandor, processed field recordings and interpreted the data received.



# LOCATION MAP

## TEST SITE "O"

N.T.S.: <i>1:150,000</i>	TECH: .....	DATE: <i>May 31/91</i>
SCALE: 1" = 12.5mi	DRAFTING: HAND-DRWN	FIGURE: A



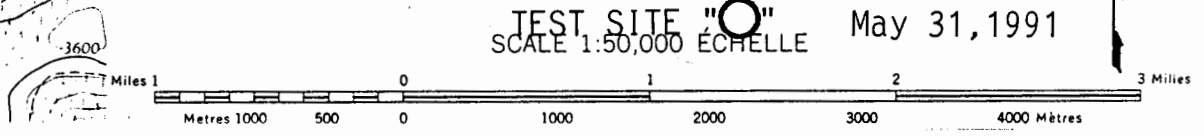
# GRAND FORKS YUKON TERRITORY

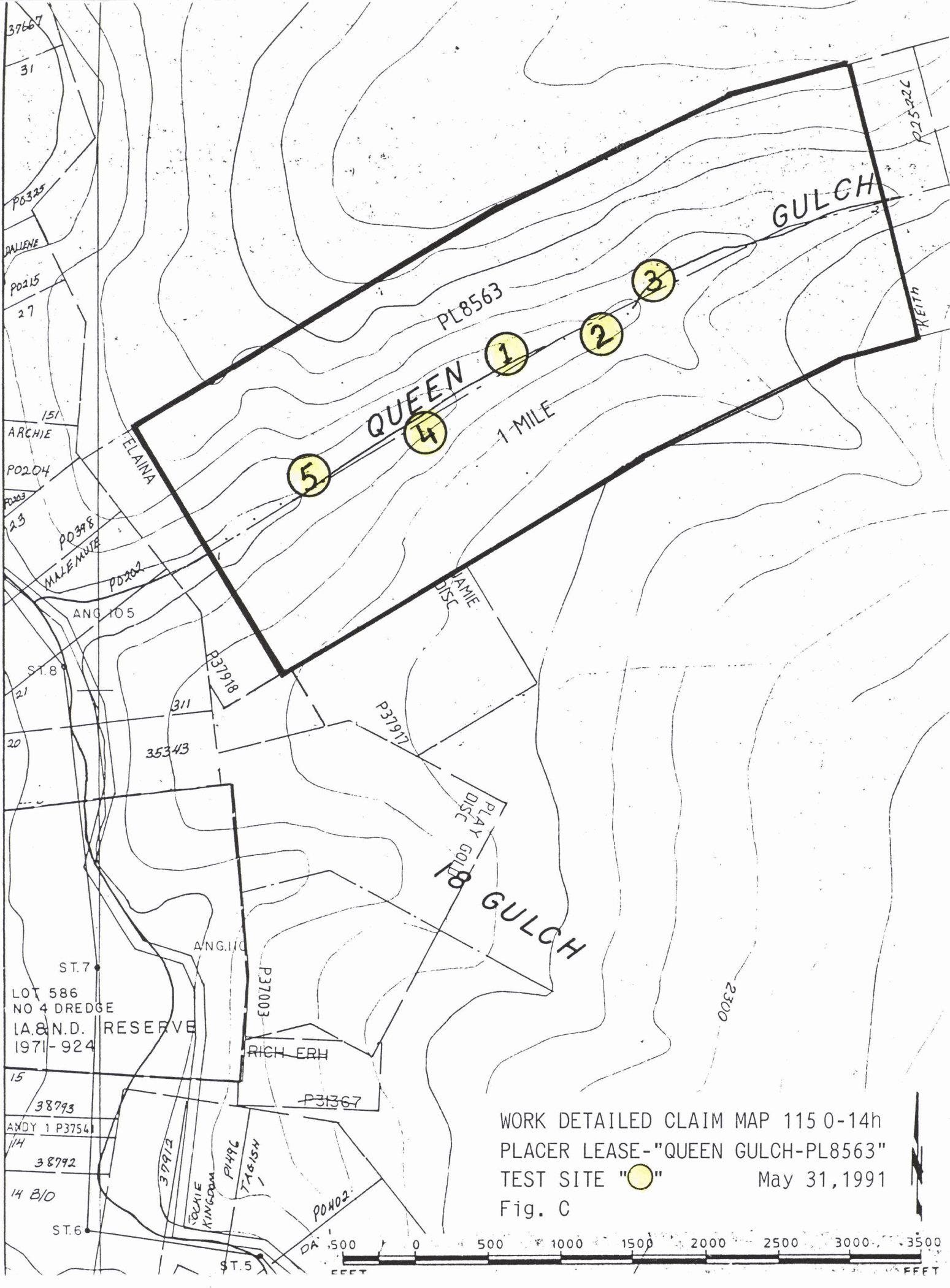
LOCATION MAP 115 O/14

Fig. B

TEST SITE "O"  
SCALE 1:50,000 ÉCHELLE

May 31, 1991





WORK DETAILED CLAIM MAP 115 0-14h  
 PLACER LEASE-"QUEEN GULCH-PL8563"  
 TEST SITE "●"  
 May 31, 1991  
 Fig. C

## 2. SURVEY

### 2.1 Location and Access

The 1 Mile Placer Lease #8563 is on Queen Gulch which drains into Bonanza Creek flowing from an easterly direction. Eight Miles to the north from the test site lies Dawson City.

Access to the test site was by 4x4 pickup on road. Testing was done on foot. (See Access Map)

### 2.2 Claim Information

<u>Name</u>	<u>Placer Claim Number</u>	<u>Owner</u>
N/A	PL8563	Jack Worsell

### 3. PERSONNEL

Scott Cone surveyed, marked, measured, expedited and carried out the field work.

Ted Sandor supervised the quality, directed the data processing and prepared the report.

#### 4. GEOLOGY

Metamorphic rocks southwest of the Tintina Trench:

"Klondike Schist": mainly buff weathering, light pale green quartz - muscovite - chlorite schist, and schistose, chlorotic quartzite, with all intermediate rock types also present - minor silvery muscovite schist, fine-grained quartz - biotite gneiss, thinly laminated quartz - graphite - sericite schist and quartzite.

## 5. INSTRUMENTATION

Directional Electret Microphone  
800 OHMS 30 - 18,000 Hz Response

Panasonic Magnetic Tape Recorder Model #RQ-L335  
Frequency Range: 180 - 7,000 Hz  
Tape Speed: 4.8 cm/s (1-7/8 I.P.S.)  
Track System: 2-track monaural, recording and playback  
16 ga. shotgun, 1-1/8 oz. shot, #7-1/2 shot

### Software:

Sound Filler St. Visual Sample Editor  
Requires TOS in ROM

This manual and the software described herein were copyrighted in 1987  
by Drumware Inc., Los Angeles, California, with all rights reserved.

Akai Professional S700 Digital Sampler  
12-Bit Sampling

Sampling Frequency: 4KHZ - 40 KHZ

Sampling Time: 8 Sec. - 08 Sec.

Frequency Response: 25 Hz - 16 KHz

Atari 520 St. Computer

Processor: MC6800, 32 Bit Internal,  
16-Bit External Architecture  
8 MHz clock frequency.

Memory: 524,288 Bytes of RAM; 196,608 Bytes of ROM

Keyboard: 94-key Intelligent keyboard, using 6301 Microprocessor

Storage Medium: 3-1/2 inch, Microfloppy disk;  
Single-Side, Double Density;  
135 Tracks per inch

### Data Transfer

Speed: 250 Kilobits per second

Atari Sc. 1224 RGB Colour Monitor

Seikosha SP-1600 Dot Matrix Printer

Printing Method: Impact Dot Matrix Bidirectional Logic  
Seeking Printing

Print Head: 9 Pins

## 6. THEORY

This report is intended as a guide to the application of seismic refraction and reflection techniques to shallow, subsurface exploration of engineering sites. Many civil engineers and geologists have some acquaintance with this basic geophysical tool, but few apply it frequently. The primary purpose of the report is to provide the reader with a working knowledge of the method, with a convenient reference, and further, with a basis to judge the applicability of the method and the results to his particular exploration problem.

Solid state electronics have improved the portability of engineering-type refraction and reflection instruments, but they operate fundamentally in the same way they did 50 years ago. The basic field practices and methods of interpreting the data have not changed with time, although specialized interpretational techniques have been proposed and developed for some difficult cases.

The conduct of refraction and reflection surveys and the interpretation of the data are well-established and reasonably straight forward, although they are not invariant. The user can change the field layout of his equipment and apply judgement and imagination in his handling of the raw data. In common with other indirect methods of subsurface exploration, there are no rigid inflexible approaches to making sense of the data, nor are there any handbooks that infallibly direct the engineer, geologist or geophysicist to the correct answer. The general case will require thought and care: ambiguities and uncertainties are not uncommon. Some foreknowledge of the site conditions and an understanding of what is geologically plausible will always assist in resolving the raw data into meaningful information.

Figure 1 shows a refraction survey. This method could be quite costly and require complicated data processing should multiple layers of soil and gravels be encountered.

## 6. THEORY CONTINUED

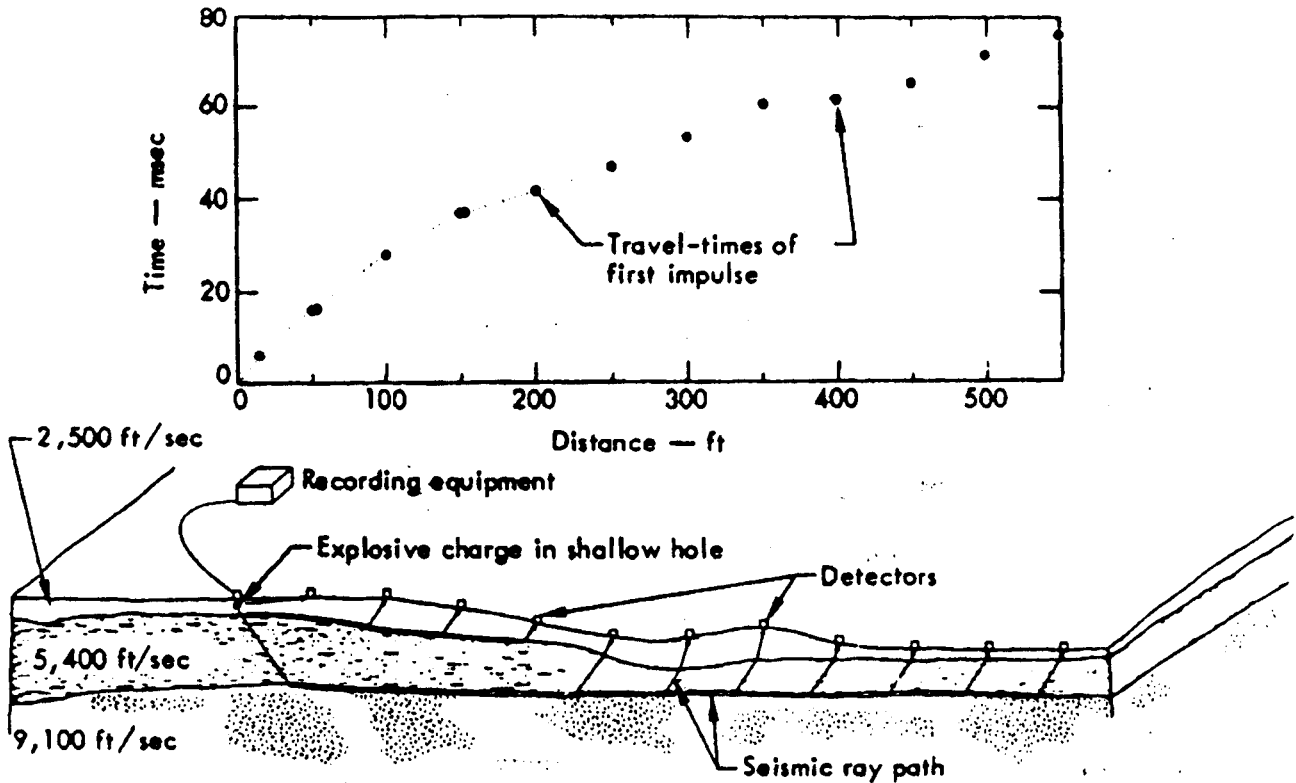


Figure 1. Schematic of Seismic Refraction Survey

There is a definite relation between reflected and refracted energy which could be observed in Figure 2B. Using this principle and Tables A1 and A2 calculation is simplified, for the sound in a reflected survey only has to go down, turn around at point of geophone or microphone without going along the higher velocity layers and then back up. Seismic waves will bounce off of most surface with a lot of amplitude but not necessarily with a wide range of frequencies. The reflected seismic waves returning to the geophone with the strongest amplitude and frequencies should come from the layer with the highest velocity change which, in most cases, should be bedrock (solid rock) or from a gravel layer directly beneath an organic surface cover.

## 6. THEORY CONTINUED

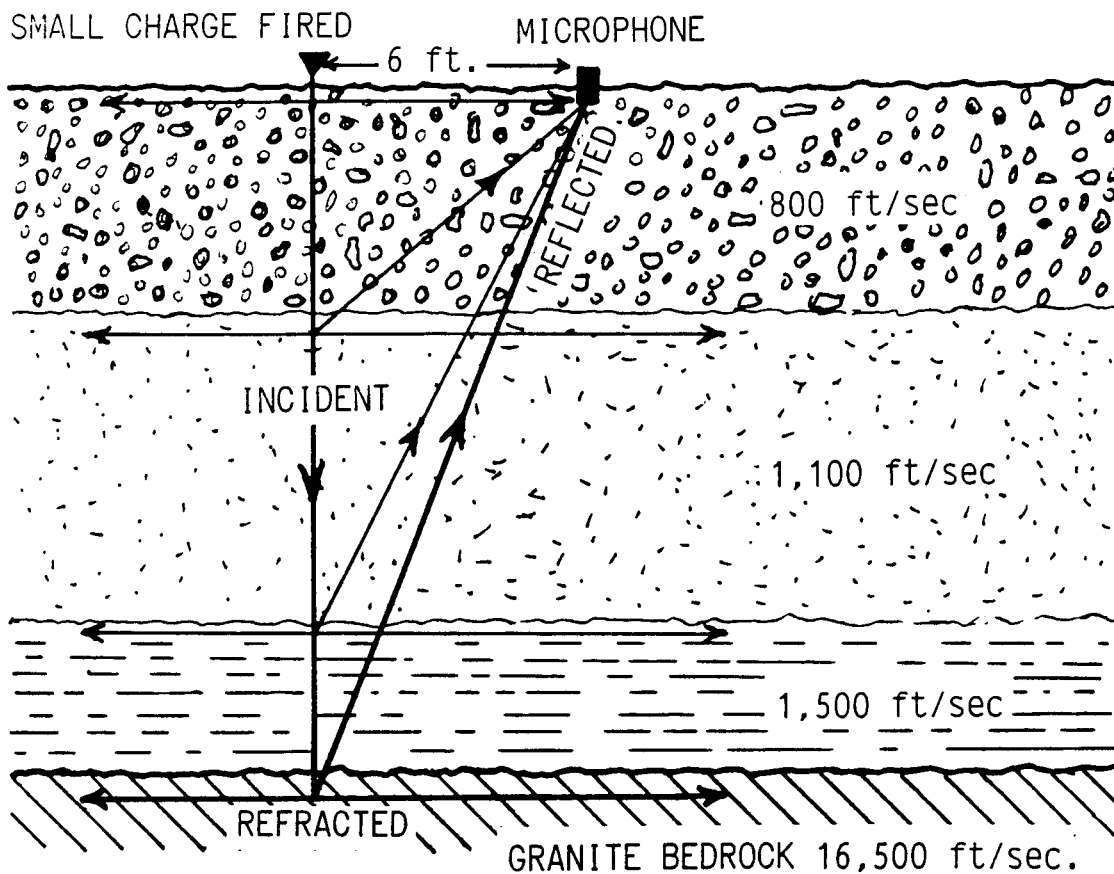


Figure 2. Schematic of Seismic Reflection Survey

The thicker line representing the reflected seismic wave from the bedrock to the microphone should be the wave with the highest amplitudes and the widest range of frequencies in Figure 2. The six foot distance from microphone to charge is to prevent damage to the delicate recording equipment. The error of this footage can usually be made up by averaging the total of the velocities a little higher to simplify interpretation. In this case "1,200 ft/sec." will be close enough.

## 6. THEORY CONTINUED

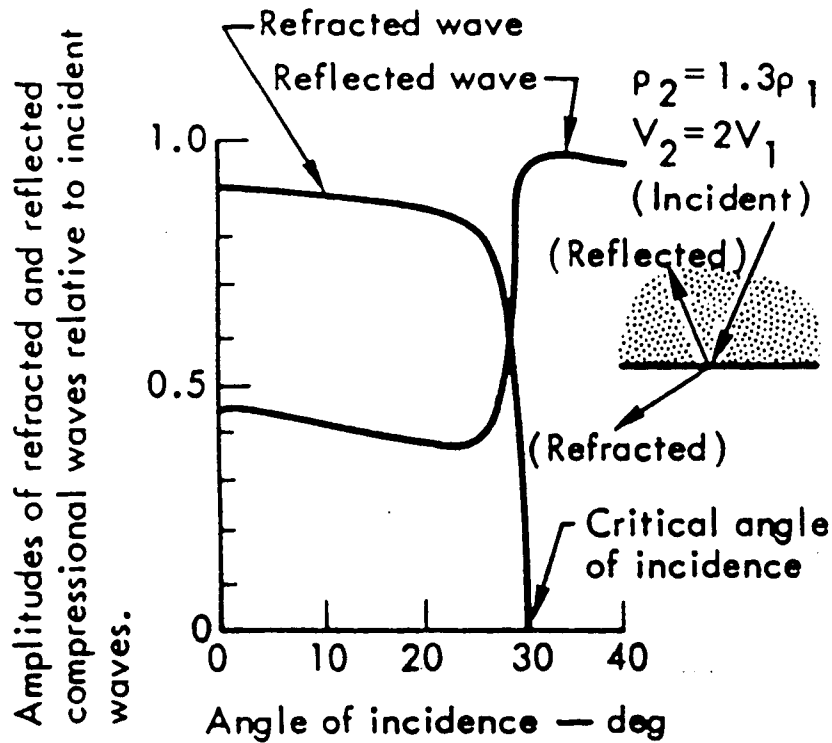


Fig. 2b. Amplitudes of reflected and refracted compressional waves relative to incident waves as a function of angle of incidence.

Figure 2b Amplitudes of Reflected/  
Refracted Compressional Waves

It may seem anomalous in Figure 2b that the sum of the amplitudes of the reflected and refracted pulses is greater than that of the incident wave (i.e., greater than 1.0). However, the energy of a pulse is proportional to the square of its amplitude, and the sum of the energies of the reflected and refracted waves is equal to the energy of the incident wave.

Table A1. Speed of propagation of seismic waves in subsurface materials.

MATERIALS	FEET PER SECOND	MATERIALS	FEET PER SECOND
<b>TOP SOILS:</b>		<b>GRANITE:</b>	
LIGHT AND DRY	600 TO 900	SIERRA NEVADA RANGE, CALIFORNIA (IN ROAD CUTS)	
MOIST, LOAMY OR SILTY	1,000 TO 1,300	FRIABLE AND HIGHLY DECOMPOSED	1,540
CLAYEY	1,300 TO 2,000	BADLY FRACTURED AND PARTLY DECOMPOSED	2,200
RED CLAY IN COLORADO (A)	1,630	SOFTENED AND PARTLY DECOMPOSED BUT SLIGHTLY SEAMED	10,500
SEMI-CONSOLIDATED SANDY CLAY (B)	1,250 TO 2,150	SOLID AND MONOLITHIC 70 FEET DEEP	18,500
WET LOAM (B)	2,500	NEW HAMPSHIRE (C) (COMPARISON OF VELOCITIES WITH DRILLING LOGS)	
CLAY, DENSE AND WET - DEPENDING ON DEPTH	3,000 TO 5,900	BADLY BROKEN AND WEATHERED; FREQUENTLY ONLY CHIPS AND FRAGMENTS RECOVERED. SEGMENTS OF CORE LONGER, BUT WEATHERING HAD PENETRATED ABOUT 1/4 INCH ON EACH SIDE OF THE JOINT PLANES ON WHICH A FILM OF RESIDUAL CLAY HAD FORMED	3,000 TO 8,000
RUBBLE, OR GRAVEL (B)	1,970 TO 2,600	JOINT PLANES SHOW BUT LITTLE SIGN OF WEATHERING, EVEN THOUGH THEY ARE OPEN	10,000 TO 13,000
CEMENTED SAND (B)	2,800 TO 3,200	ENTIRELY UNWEATHERED AND UNSEAMED	16,000 TO 20,000
SAND CLAY (B)	3,200 TO 3,800	GRANODIORITE (B)	15,000
CEMENTED SAND CLAY (B)	3,800 TO 4,200	BASALT-CANAL ZONE-WEATHERED AND FRACTURED	9,000 TO 14,000
WATER SATURATED SAND (B)	4,600	LIMESTONE, DOLOMITE, METAMORPHIC ROCKS, MASSIVE ROCKS (B)	16,400 TO 20,200
SAND (B)	4,600 TO 8,400	DIABASE, IN BED OF BROAD RIVER, SOUTH CAROLINA	19,700
CLAY, CLAYEY SANDSTONE (B)	5,900	GREENSTONE, TIGHT SEAMED-CALIFORNIA (A)	16,100
GLACIAL TILL UPPER SUSQUEHANNA (C)	5,600 TO 7,400	GREENSTONE, SLIGHTLY SEAMED-CALIFORNIA	13,300
GLACIAL MORaine DEPOSIT, DRY-CALIFORNIA (A)	2,500 TO 5,000		
GLACIAL MORaine DEPOSIT, SATURATED-CALIFORNIA	5,000 TO 7,000		
CEMENTED LAVA AGGLOMERATE, CALIFORNIA (A)	5,000 TO 6,000		
LOOSE ROCK-TALUS	1,250 TO 2,500		
WEATHERED AND FRACTURED ROCK	1,500 TO 10,000		
<b>SHALES:</b>			
OLENTANGY RIVER, OHIO	9,000 TO 11,000		
UPPER SUSQUEHANNA (C)	10,200 TO 12,800		
PANAMA CANAL ZONE	7,000 TO 8,000		
MANCOS, COLORADO (A)	2,600 TO 2,900		
ROMNEY SHALE-SHENNANDOAH RIVER - WEATHERED	4,000 TO 6,500		
ROMNEY SHALE-SHENNANDOAH RIVER - GOOD	12,000		
JOHN MARSHALL DAM SITE	2,900 TO 4,250		
PHYLITE-YORK, PA. (D)	10,000 TO 11,000		
<b>SANDSTONE:</b> (B)			
DEVONIAN-UPPER SUSQUEHANNA (C)	14,000		
CANAL ZONE, PACIFIC END	7,000 TO 9,000		
COLORADO, DENSE, HARD, AND CONTINUOUS WITH FEW SEAMS (A)	7,250		
COLORADO, CONTAINING WEATHERED SEAMS AND SOFT AREAS, (A)	4,725		
SMOXY HILL RIVER KANSAS SANDSTONE CONGLOMERATE (B)	6,000 TO 7,500		
	8,000		
<b>CHALK:</b>			
FORT RANDALL DAMSITE - ABOVE WATER TABLE	6,300 TO 7,000		
FORT RANDALL DAMSITE - BELOW WATER TABLE	8,000		
		<b>NOTE:</b>	
		(A) Reported by G. A. Williams, U. S. Bureau of Public Roads	
		(B) From Report of Imperial Geophysical Experimental Survey in Australia	
		(C) Reported by A. E. Wood, Corps of Engineers	
		(D) Reported by L. T. Abele, Corps of Engineers	

Table A2. Approximate range of velocities of longitudinal waves for representative materials found in the earth's crust.<sup>a</sup>

<i>A. Classification According to Material</i>			
<i>Material</i>	<i>Velocity*</i>		
	<i>Ft./Sec.</i>		<i>M./Sec.</i>
Weathered surface material .....	1,000— 2,000		305— 610
Gravel, rubble, or sand (dry) .....	1,500— 3,000		468— 915
Sand (wet) .....	2,000— 6,000		610— 1,830
Clay .....	3,000— 9,000		915— 2,750
Water (depending on temperature and salt content) .....	4,700— 5,500		1,430— 1,680
Sea water .....	4,800— 5,000		1,460— 1,530
Sandstone .....	6,000—13,000		1,830— 3,970
Shale .....	9,000—14,000		2,750— 4,270
Chalk .....	6,000—13,000		1,830— 3,970
Limestone .....	7,000—20,000		2,140— 6,100
Salt .....	14,000—17,000		4,270— 5,190
Granite .....	15,000—19,000		4,580— 5,800
Metamorphic rocks .....	10,000—23,000		3,050— 7,020
Ice .....	12,050		

<i>B. Classification According to Geologic Age</i>			
<i>Age</i>	<i>Type of Rock</i>	<i>Velocity</i>	
		<i>Ft./Sec.</i>	<i>M./Sec.</i>
Quaternary	Sediments (various degrees of consolidation) .....	1,000— 7,500	305— 2,290
Tertiary	Consolidated Sediments ..	5,000—14,000	1,530— 4,270
Mesozoic	Consolidated Sediments ..	6,000—19,500	1,830— 5,950
Paleozoic	Consolidated Sediments ..	6,500—19,500	1,980— 5,950
Archeozoic	Various .....	12,500—23,000	3,810— 7,020

<i>C. Classification According to Depth †</i>			
	0—2000 ft. (0—600 M.)	2000—3000 ft. (600—900 M.)	3000—4000 ft. (900—1200 M.)
	<i>Ft./Sec.</i>	<i>Ft./Sec.</i>	<i>Ft./Sec.</i>
Devonian .....	13,300	13,400	13,500
Pennsylvanian .....	9,500	11,200	11,700
Permian .....	8,500	10,000	.....
Cretaceous .....	7,400	9,300	10,700
Eocene .....	7,100	9,000	10,100
Pleistocene-to-Oligocene	6,500	7,200	8,100

\* The higher values in a given range are usually obtained at depth.

† Data from B. B. Weatherby and L. Y. Faust, *Bull. Amer. Assoc. Petrol. Geologists*, 19 (1926) 1.

<sup>a</sup> Reprinted from pg. 660 of Jakosky<sup>2</sup>.

## 7. METHOD

After the grid pattern is established on a given claim by the owner or party in charge, we mark each test with flagging. We clean loose debris to allow firm soil contact with the microphone. We then cover the microphone to lessen the surface noise. A small charge is fired (usually a 16 gauge shotgun) to generate a seismic wave six feet from the microphone. The wave going into the ground and the reflected signal coming out is recorded on a magnetic tape recorder. We also do a field test on a nearby area with similar conditions where bedrock depth is known by drilling or excavation to determine the velocity of the gravels.

## 8. DATA PROCESSING AND PRESENTATION

The recording is sent back to base camp and is transferred into the Akai S700 Digital Sampler by means of a coaxial cable with 6.3 mm phone plug jack. The Akai is coupled with the Atari 520 St. computer with Midi Interface. Other peripherals are connected with various other interface connections.

The seismic recording is now analyzed in various formats and then the best choice is printed out on a Seikosha SP-1600 Dot Matrix Printer. A report on the testing and the interpretation of the data is made out to finalize the survey, along with copies of the original Fourier Transform for 3-D wave form analysis.

## 9. INTERPRETATION

In tests conducted in the past on Hunker Creek and the Klondike River, we determined that those frozen gravels had a velocity of 1500 ft/sec. (1.5 ft/ms). Based on this calculation the following formula is used:

Reflected milliseconds x 1.5 divided by 2 = feet to bedrock or the layer of interest.

### TEST 1

Twenty-three milliseconds show the broadest frequency range. Bedrock should be 17 feet deep.

### TEST 2

At 10 milliseconds there is a strong return signal indicating a major stratum change at 7 feet, but the broadest frequencies indicate bedrock at 20 milliseconds, 15 feet deep.

### TEST 3

Twenty milliseconds indicate bedrock at 15 feet deep.

### TEST 4

Going west from Test 1, 25 milliseconds shows bedrock to be 18 feet deep.

### TEST 5

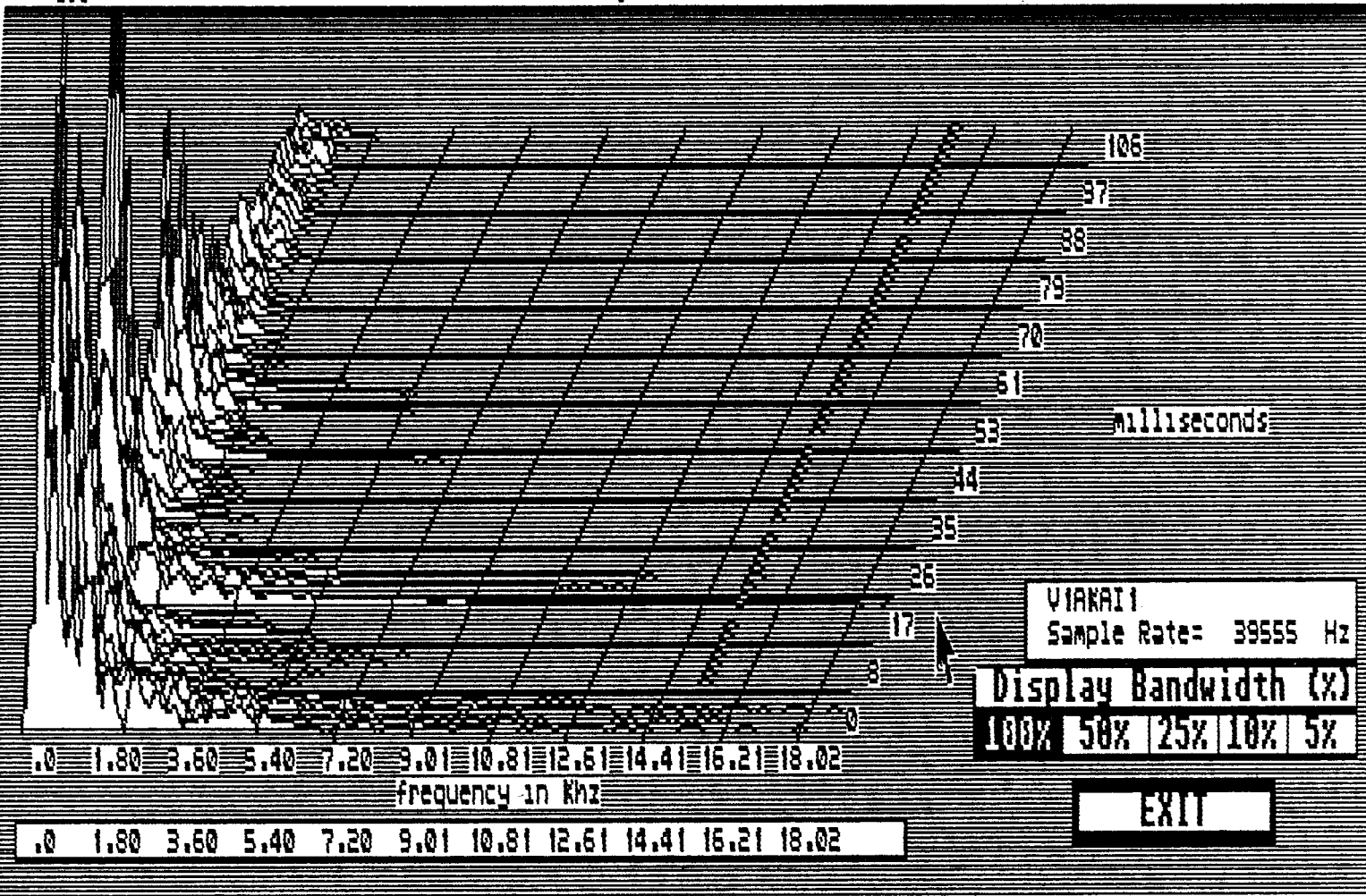
Going further west or downstream, the bedrock seems to be getting deeper. Thirty milliseconds indicate bedrock at 22 feet.

## 10. CONCLUSION

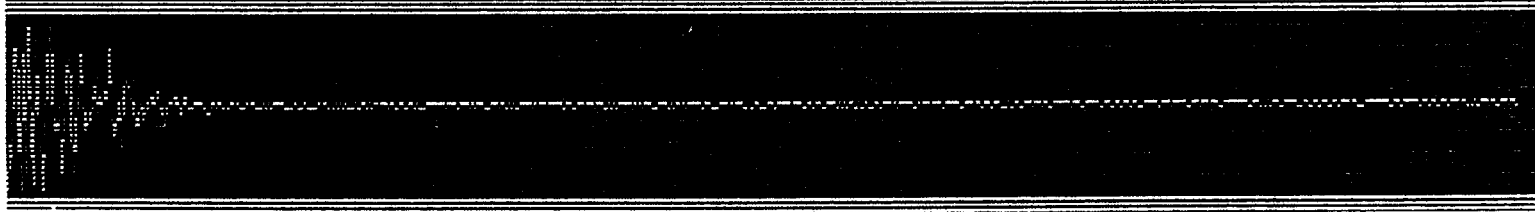
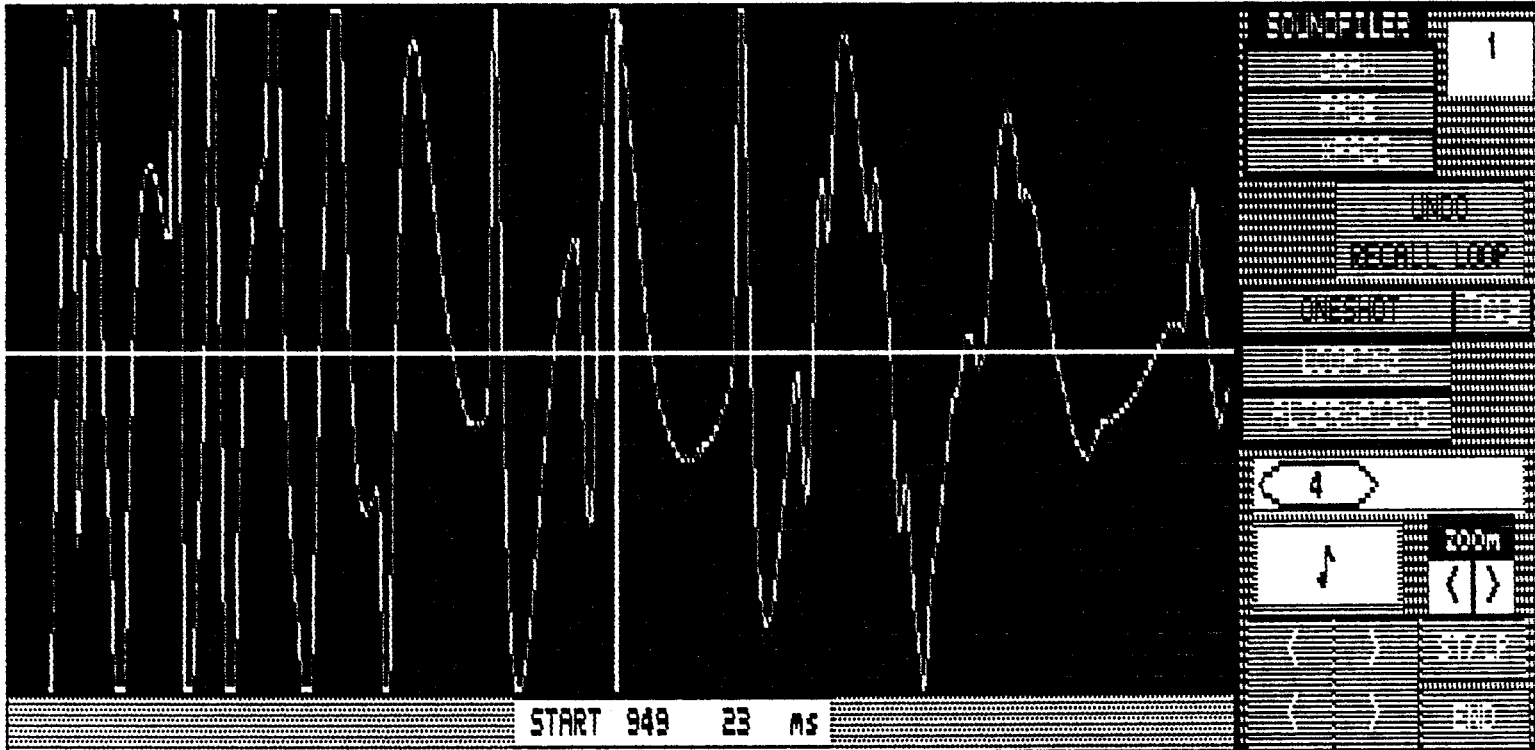
For the many varying soil conditions in different geographical locations could alter the final results. For this fact, an actual excavation on one of the test sites is strongly recommended. The most shallow reading test site is the best suited for this purpose. More accurate results can be achieved in this manner.

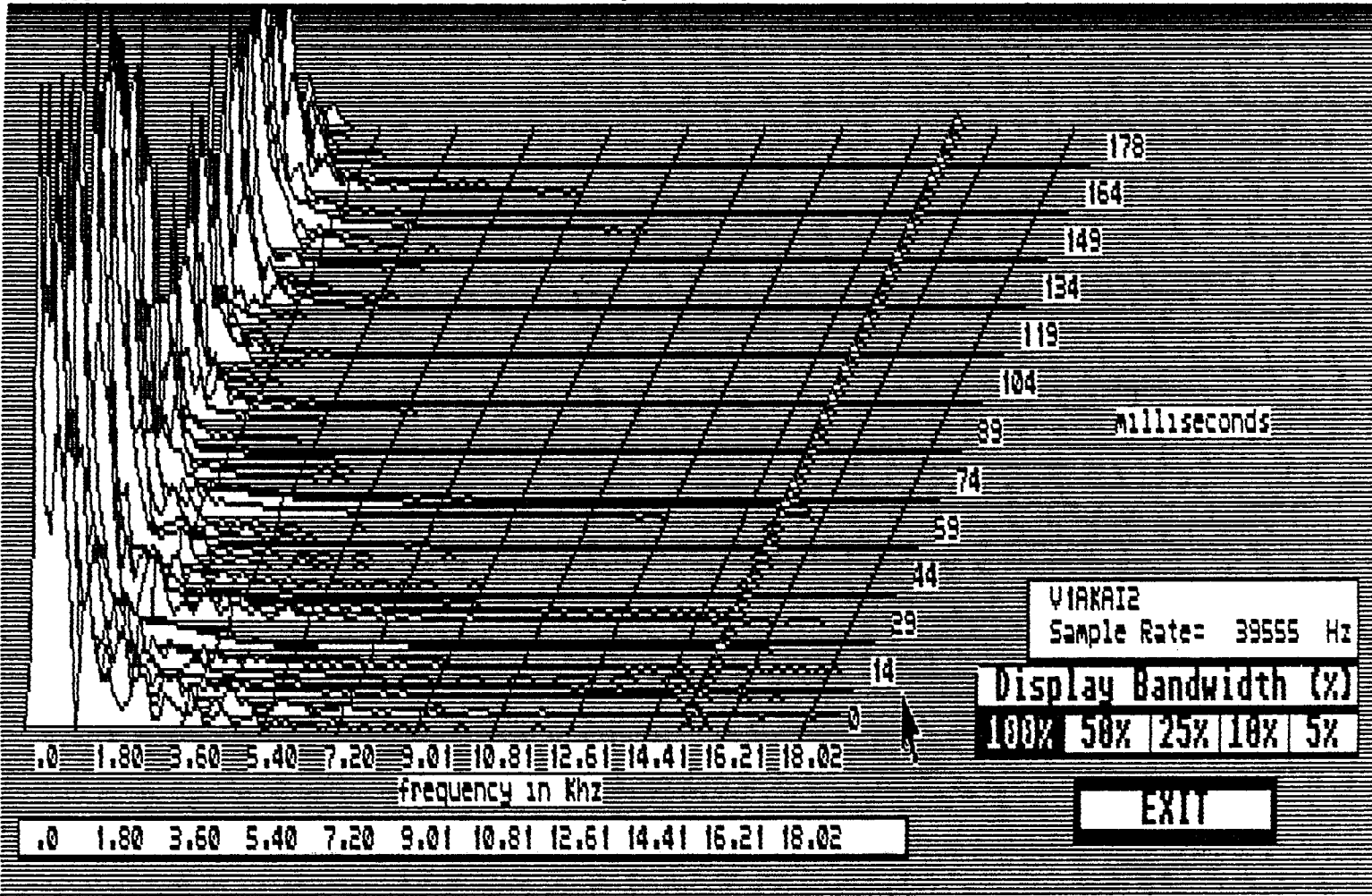
## 11. RECOMMENDATION

This type of reflected seismic testing is ideal in shallow placer ground. Without drilling or excavating near the test sites to establish velocity, the contour of the subsurface profile could still be charted in a cross test of a given valley. Old stream beds are possible to locate this way, giving a target area for a drill. A re-analysis of the seismic data after a drill log can make these tests surprisingly accurate. A tighter grid pattern in the future may be of great value in a drilling or mining strategy program.

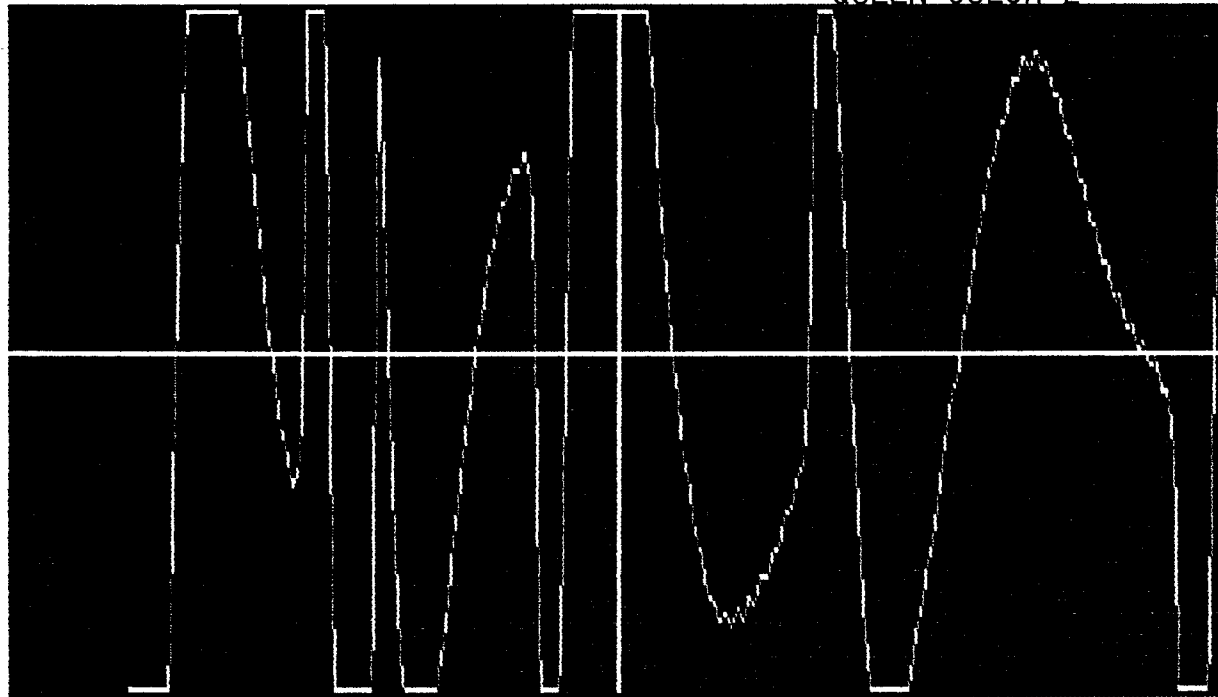


File Akai Voice Have ♪ QUEEN GULCH 1





File Akai Voice Wave ♪ QUEEN GULCH 2



START 410 10 MS

SOUNDFILE 2

UNDO

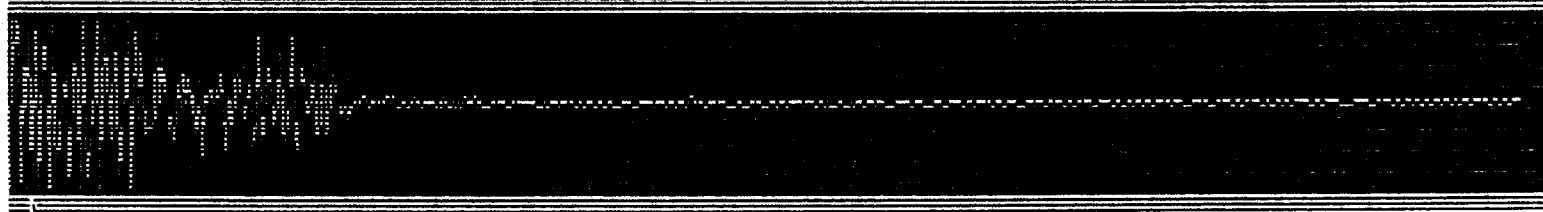
RECALL LOOP

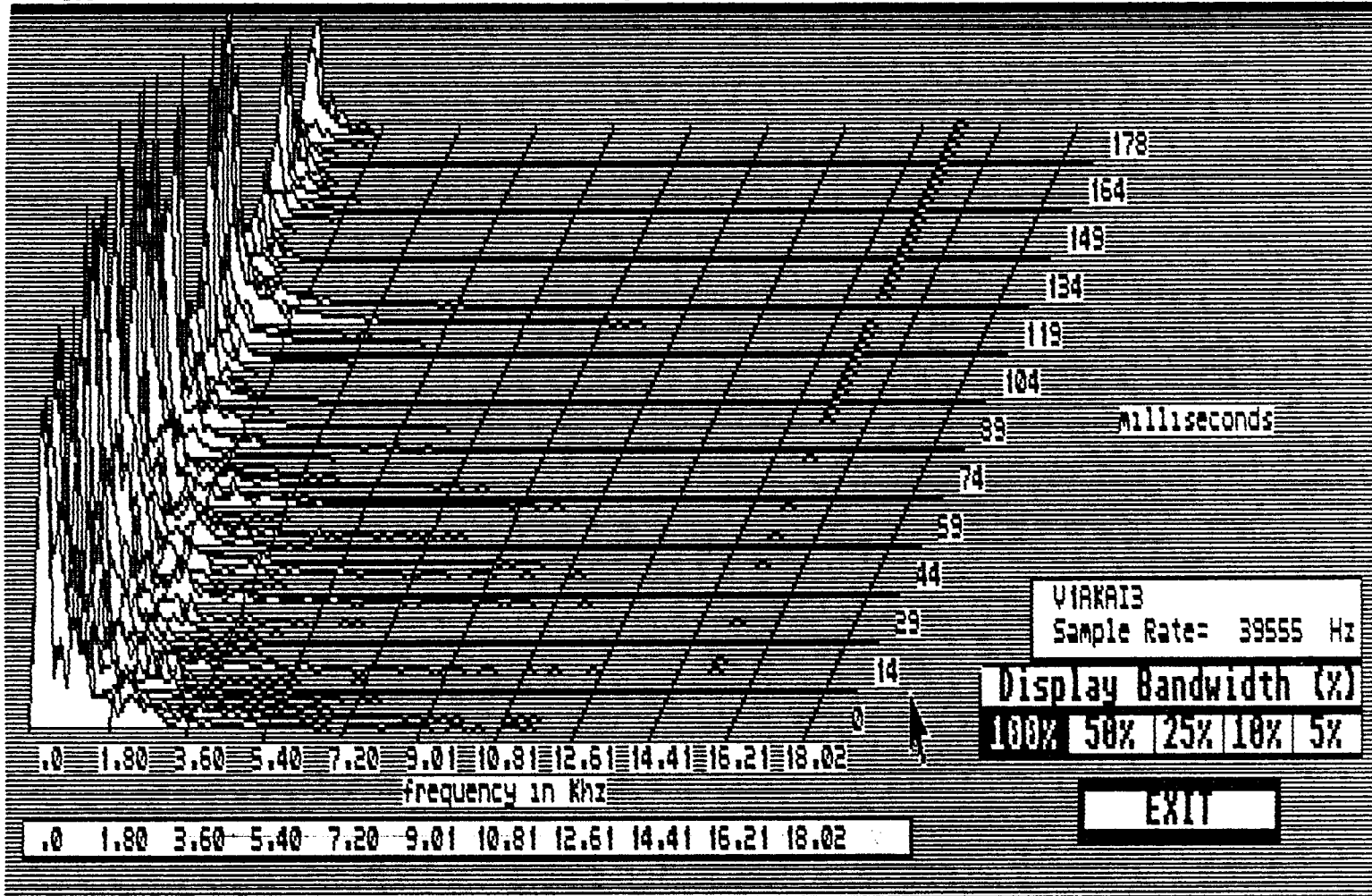
2

♪ ZOOM < >

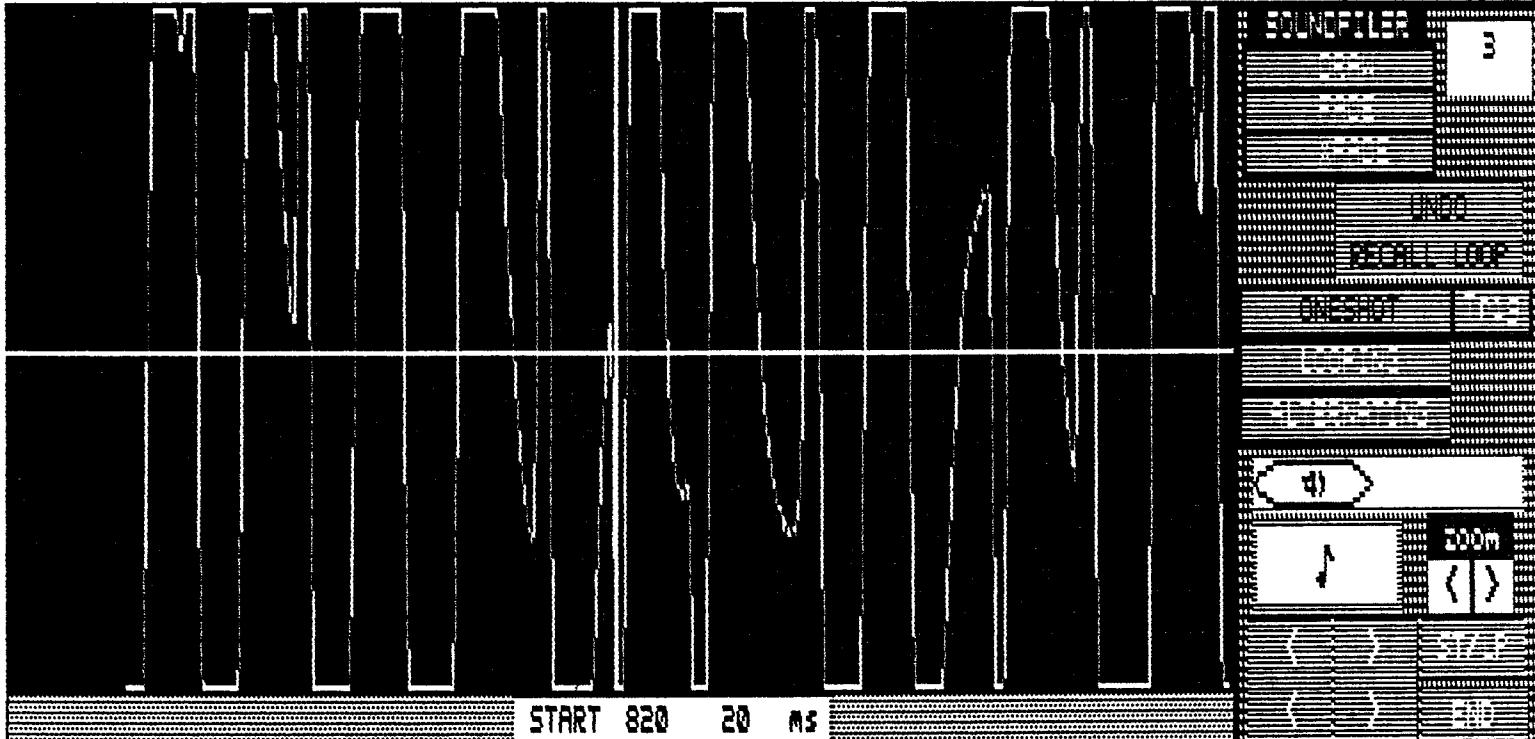
( ) SIZE

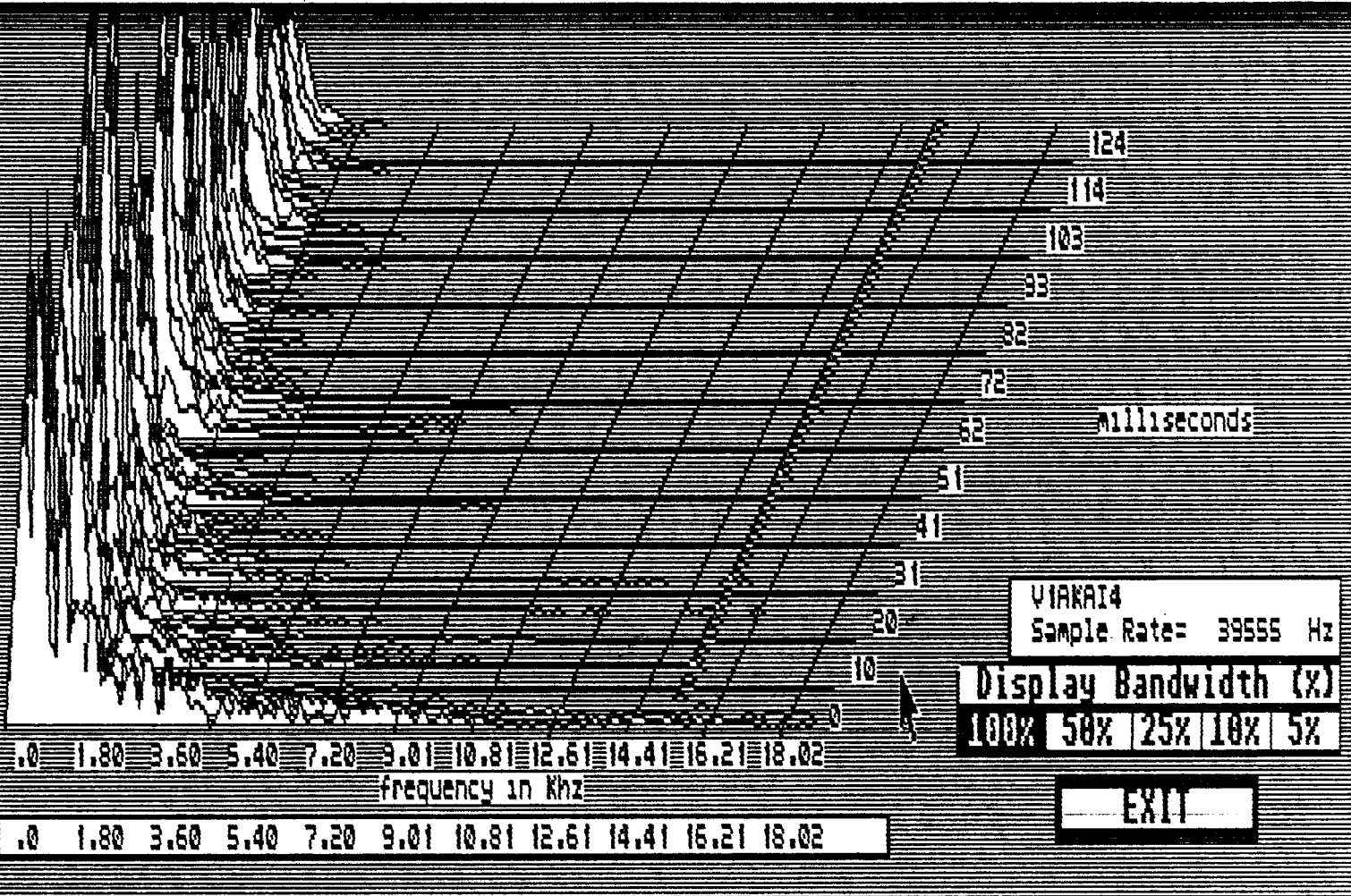
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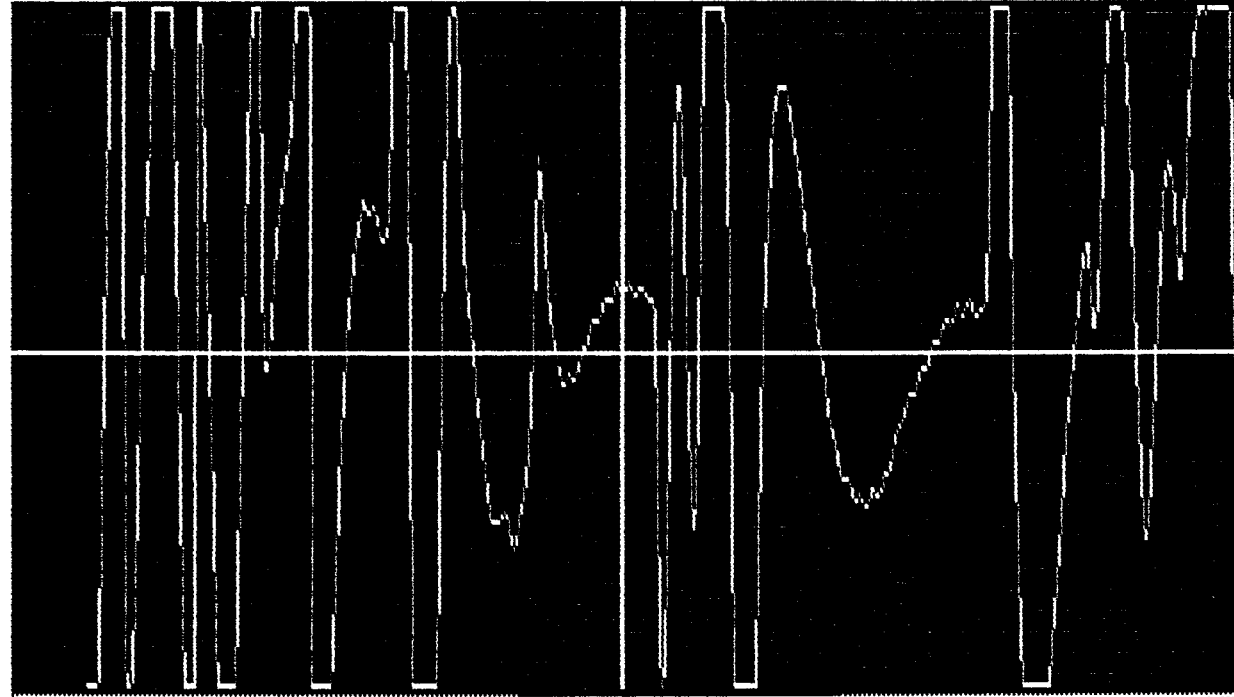




VIARAI4  
 Sample Rate= 39555 Hz  
 Display Bandwidth (%)  
 100% 50% 25% 10% 5%

EXIT

File Akai Voice Wave ♪ QUEEN GULCH 4



START 672 16 ms

SOUNDFILER 4

UNIT

ORIGINAL LOOP

ON EFFECT

3

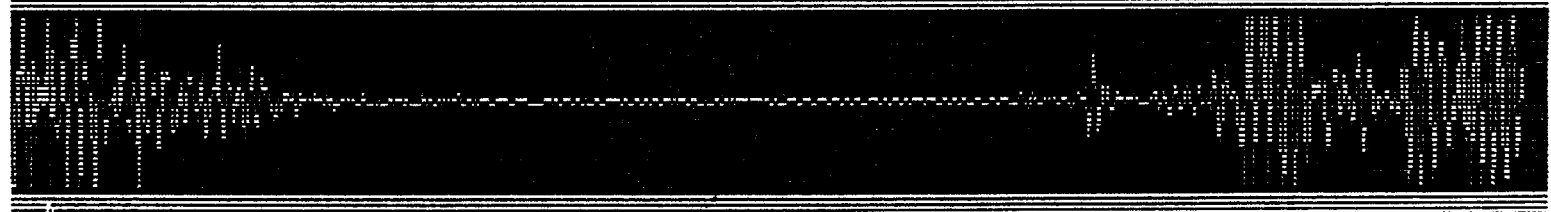
Zoom

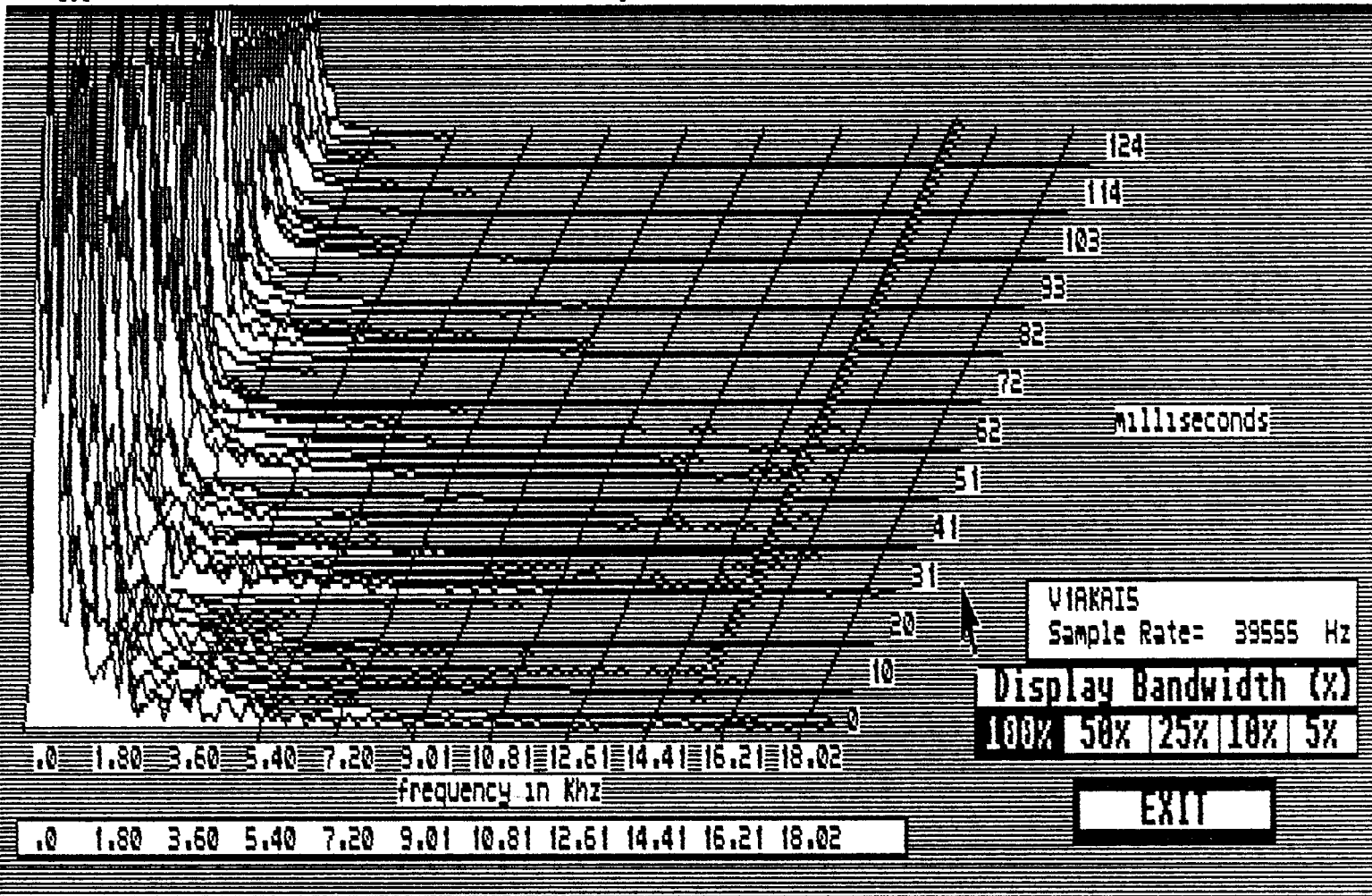
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⏴ ⏵

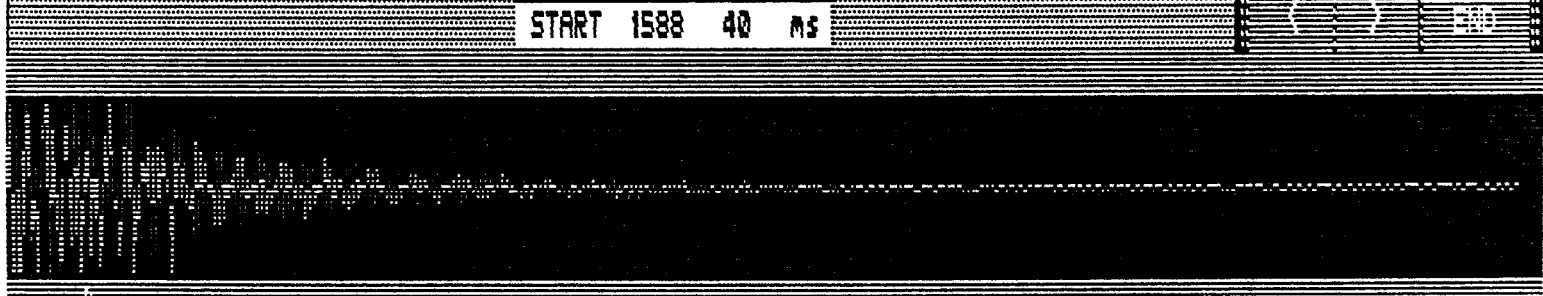
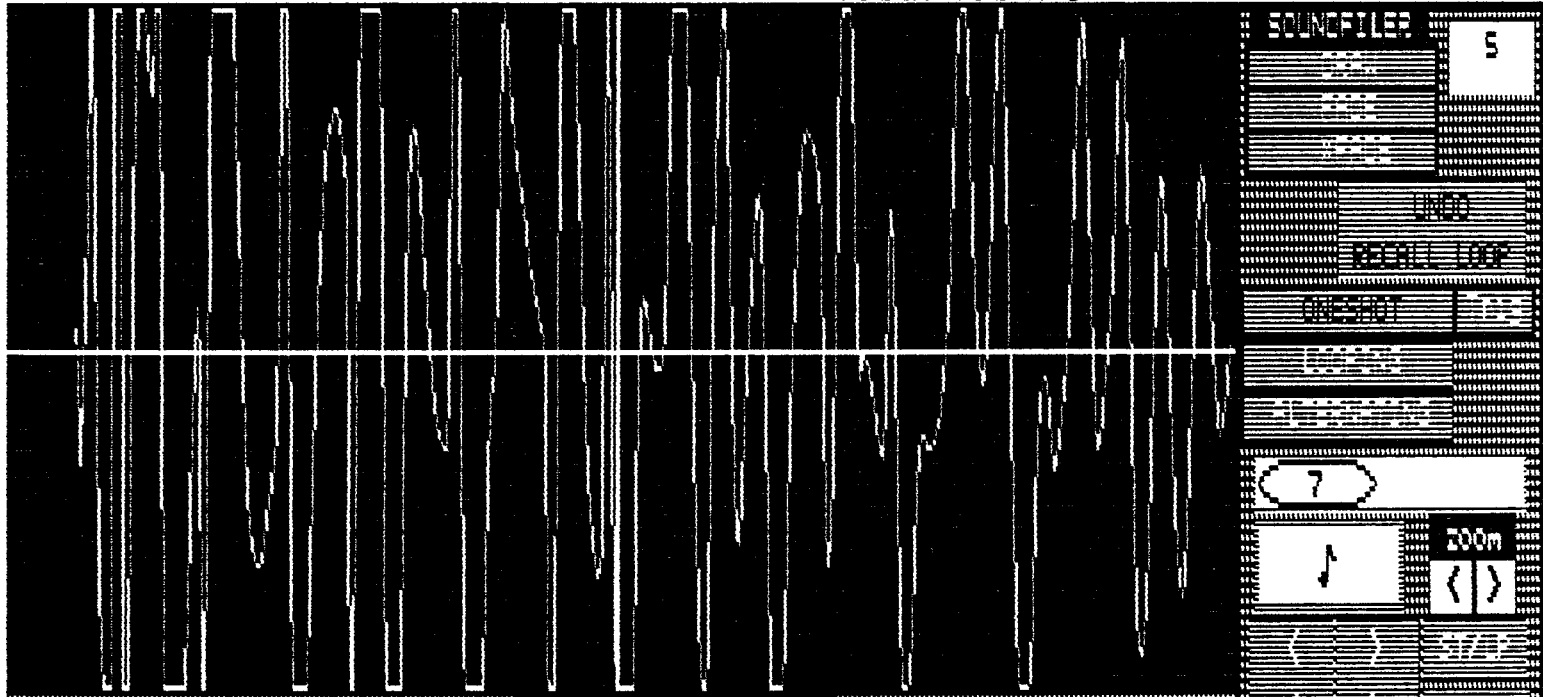
STOP

END





File Akai Voice Wave ♪ QUEEN GULCH 5



## 12. STATEMENT OF ASSESSMENT COSTS

For seismic survey conducted on Queen Gulch on Placer Lease #PL8563.

### Seismic Test

\$250 per test x 5 shots = \$1,250

Includes:

Seismic consultant  
Assistant for field and expediting  
Computer and printer time  
Computer and program time  
Computer down-loading (off-loading/data dumping)  
Seismic interpretation  
Equipment - ATV, axe, hip chain with thread,  
flagging tape, marker etc.  
Transportation  
Food and camping supplies  
Accommodations (hotel, tent or camper)  
Test shots where applicable (for calibration)

### Report Preparation

Report writing, drafting,  
map and figure preparation,  
photocopying and binding = 500

Total Cost = \$1,750

## CERTIFICATION

I, Ted Sandor, of Whitehorse, Yukon Territory certify that:

1. I hold a Gas and Arc Welding diploma from Northern Alberta Institute of Technology, Edmonton, Alberta, and have been practising continuously since mid seventies in Ardco Industries on oil field and seismic related equipment.
2. I am a journeyman welder, licensed to practise in Alberta. The geophysical technology came from extensive field work in the oil patch, and the very need to satisfy my own mining strategy since 1978.
3. The geophysical field work was conducted with assistance that may change from test to test. The report preparation and interpretation is done by me personally to keep up the highest quality of this report.
4. I have based conclusions and recommendations contained in this report on my knowledge of geophysics, my previous experience and the results of the field work conducted on the property.
5. Directly or indirectly I hold no interest in this property other than professional fees, nor do I expect any interest in the property or any other of the owner's holdings.
6. The accuracy of the final results depends more on the calibration of the recording device and the computers than on the qualification of the operator.

*Whitehorse, Yukon Territory  
May 31, 1991*

  
Ted Sandor, Seismic Consultant

### 13. REFERENCES

1. M.B. Dobrin, Introduction to Geophysical Prospecting (McGraw-Hill, New York. 1960)
2. J.J. Jakosky, Exploration Geophysics. (Trija Publishing Co., Newport Beach, California. 1957)
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4. 1984 Open File, R.L. Debicki, Bedrock Geology and Mineralization of the Klondike Area (West), 1150/14,15 and 116B/2,3.
5. J.K. Mortensen, Geochemistry of the Klondike District, West Central Revised, 1990.