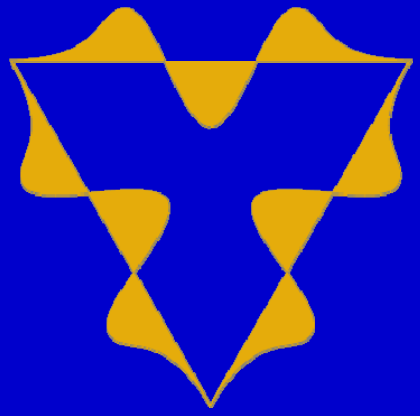


CREWES

ACQUISITION AND PRELIMINARY ANALYSIS OF THE CASTLE MOUNTAIN SHALLOW VSP DATASET

By

JOE WONG, HENRY BLAND, KEVIN HALL, SOO MIYONG, AND ROBERT STEWART

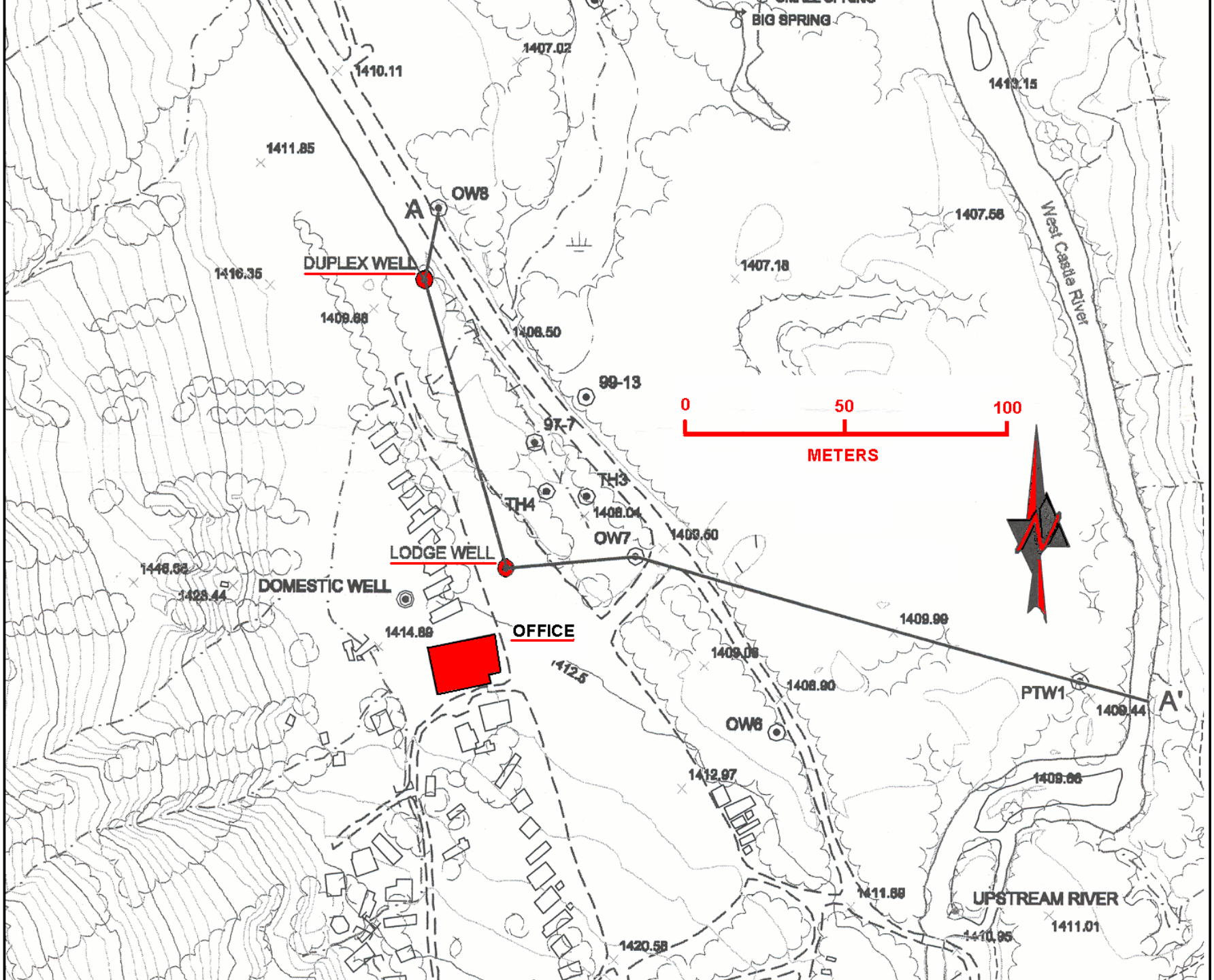
OUTLINE OF PRESENTATION

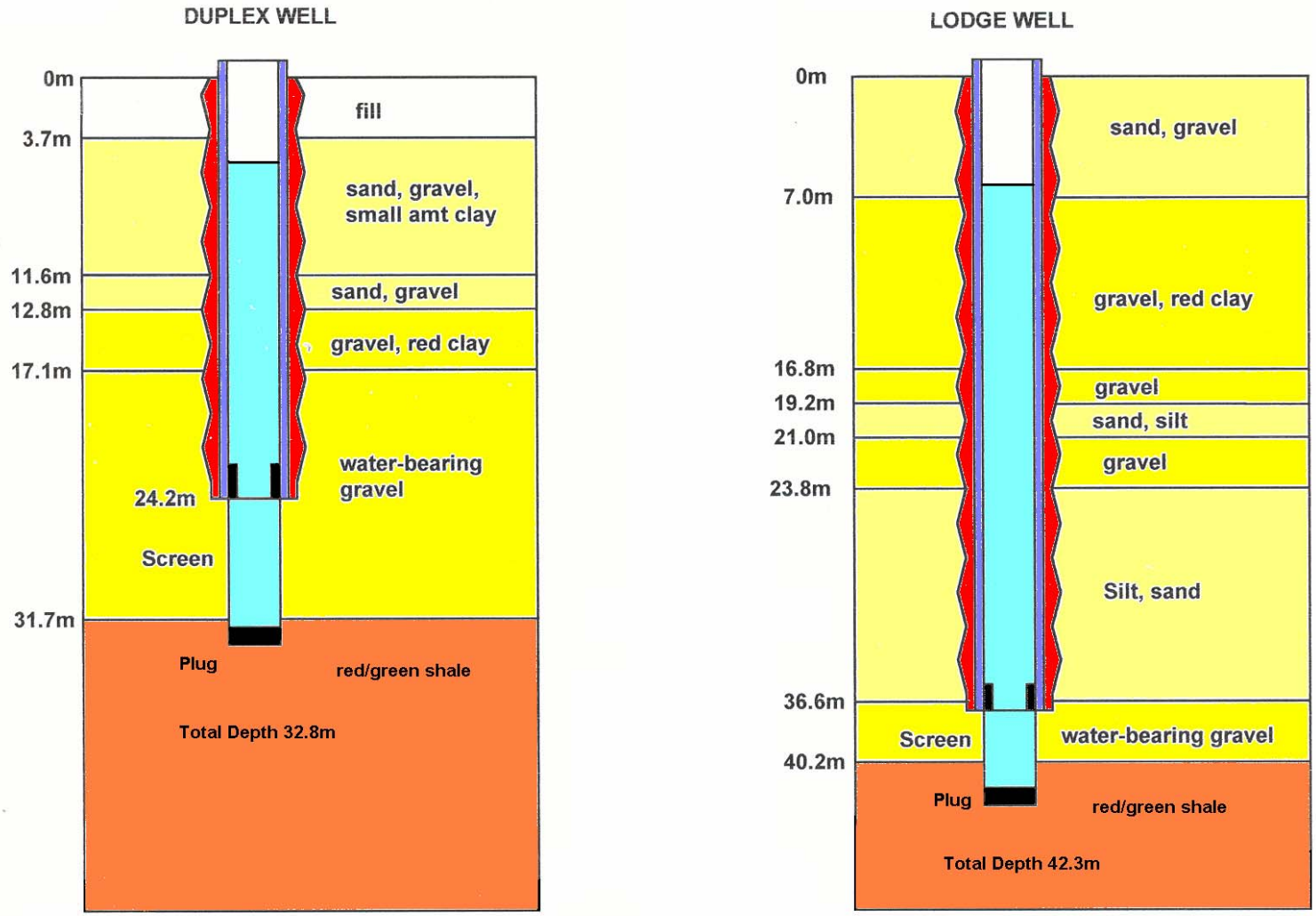
- *INTRODUCTION*
- *INSTRUMENTATION*
- *FIELD ACQUISITION*
- *RESULTS*
- *CONCLUSION*

INTRODUCTION

PURPOSE :

- ***Test a downhole 3C clamping geophone and hydrophone array by collecting a shallow VSP dataset.***
- ***Teach students to basic field procedures for VSP acquisition.***


BIG SPRING
1407.02
1410.11
1411.85
1413.15
A
OW8
DUPLEX WELL
1416.35
1409.88
1408.50
1407.56
1407.18
West Castia River
99-13
97-7
TH3
TH4
1408.04
OW7
1409.60
LODGE WELL
1446.52
1428.44
DOMESTIC WELL
1414.89
OFFICE
1412.5
1409.99
1409.06
1408.90
PTW1
1409.44
A'
OW6
1412.97
1409.86
1411.88
UPSTREAM RIVER
1411.01
1410.95
1420.58
0
50
100
METERS


DUPLEX WELL
0m
3.7m
11.6m
12.8m
17.1m
24.2m
Screen
31.7m
fill
sand, gravel, small amt clay
sand, gravel
gravel, red clay
water-bearing gravel
Plug
red/green shale
Total Depth 32.8m
LODGE WELL
0m
7.0m
16.8m
19.2m
21.0m
23.8m
36.6m
Screen
40.2m
sand, gravel
gravel, red clay
gravel
sand, silt
gravel
Silt, sand
water-bearing gravel
Plug
red/green shale
Total Depth 42.3m

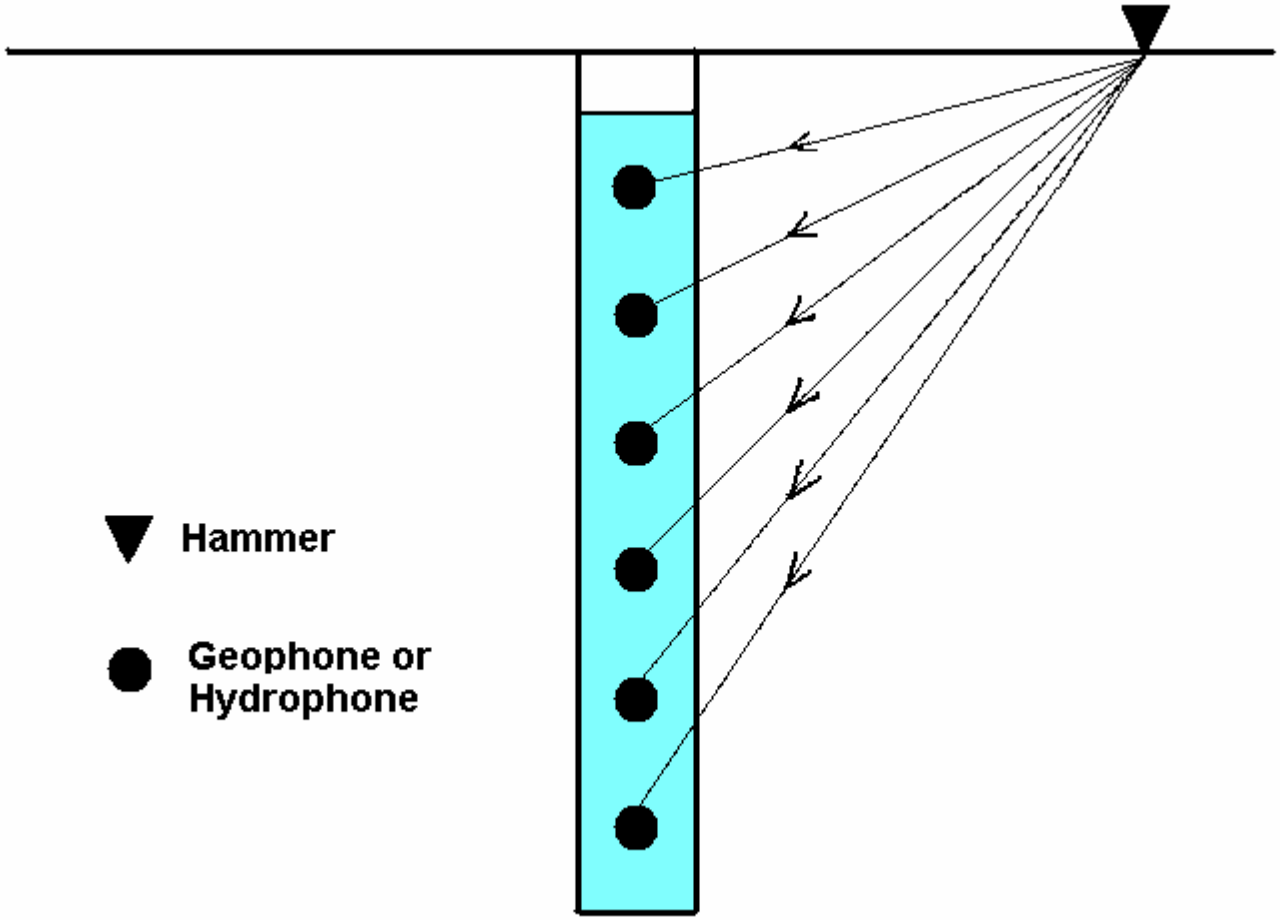
INSTRUMENTATION AND ACQUISITION

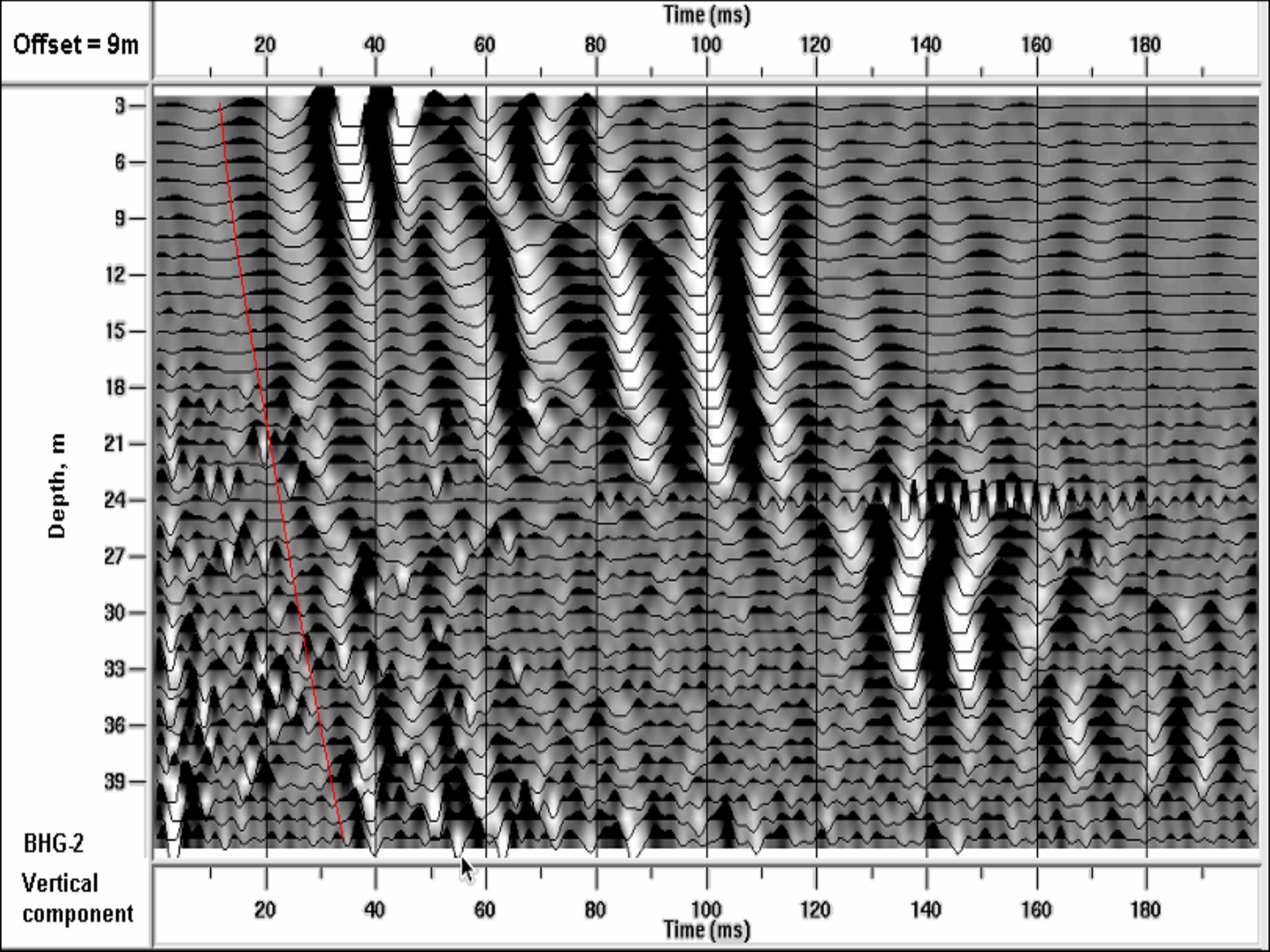
http://www.geostuff.com

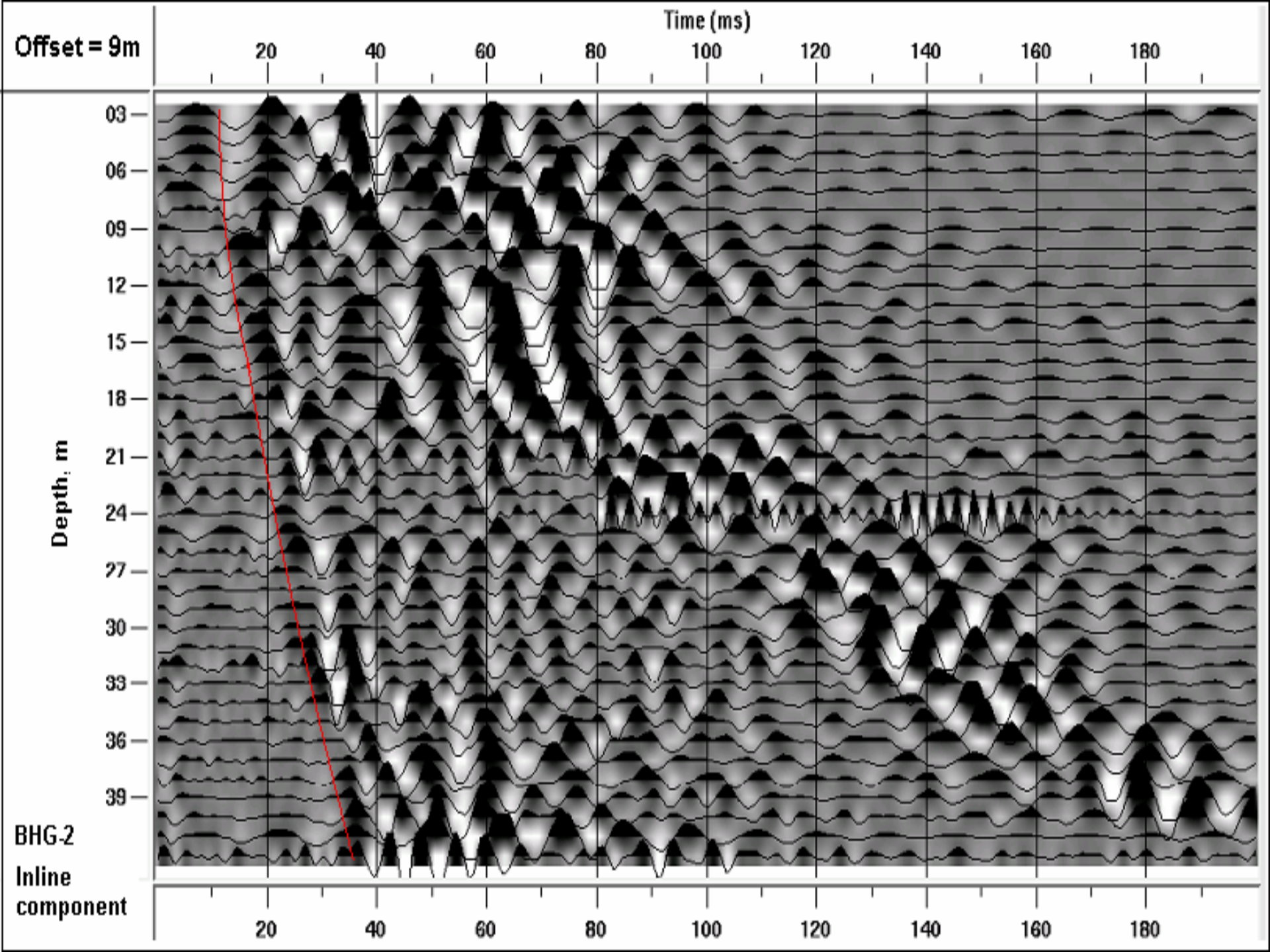

95 7 7

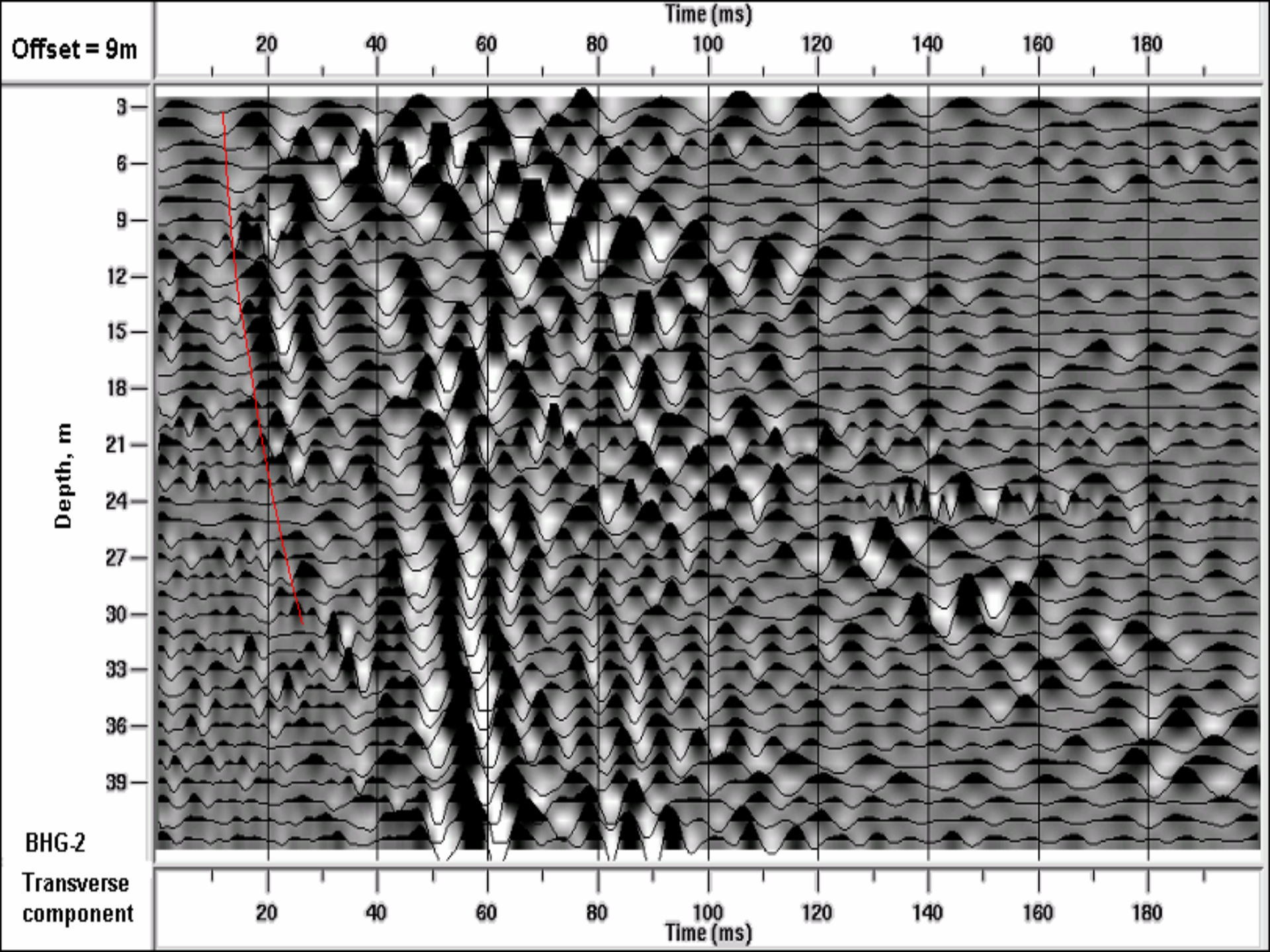
FIELD RESULTS

FIXED SOURCE OFFSET VERTICAL SESIMIC PROFILE

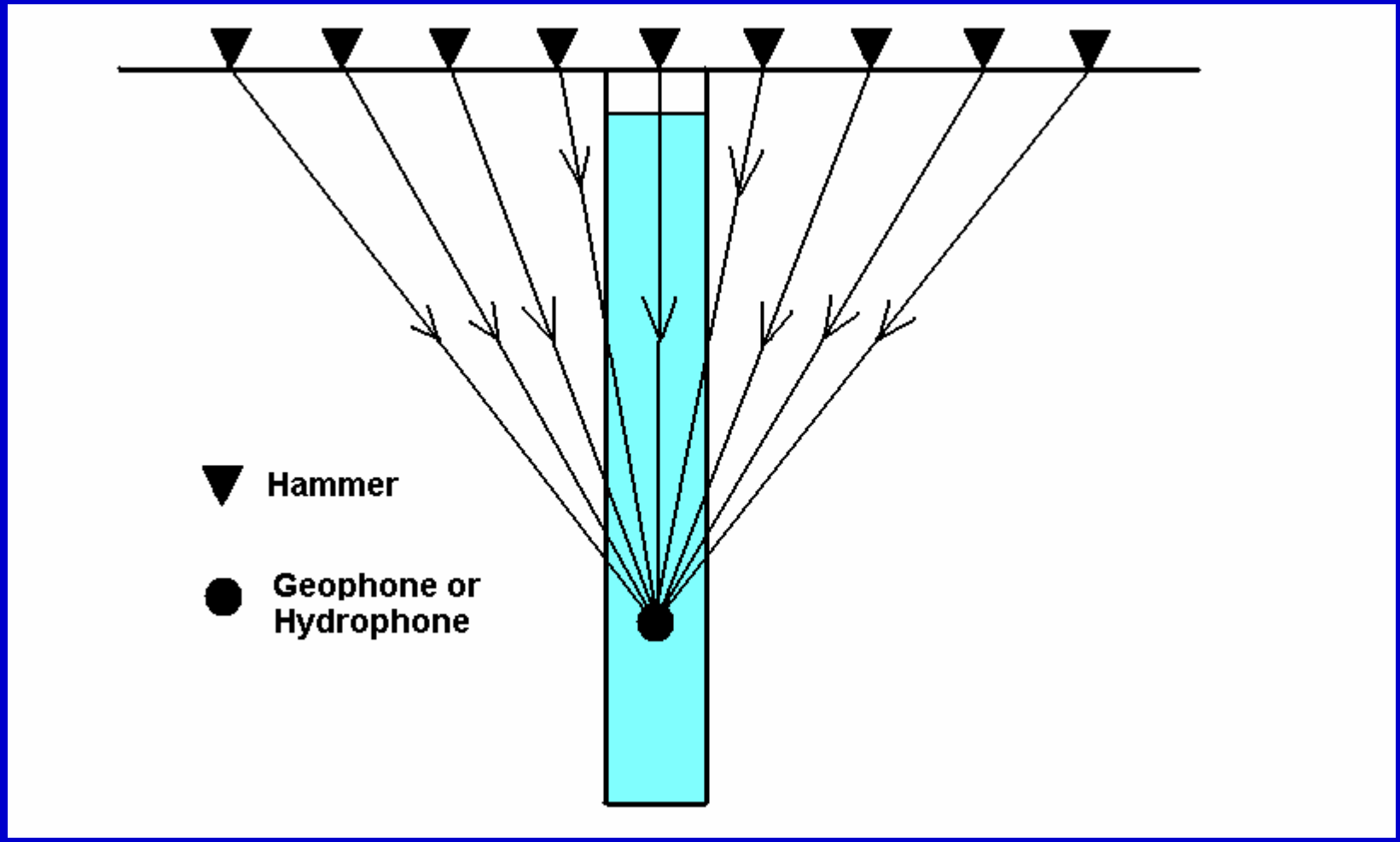


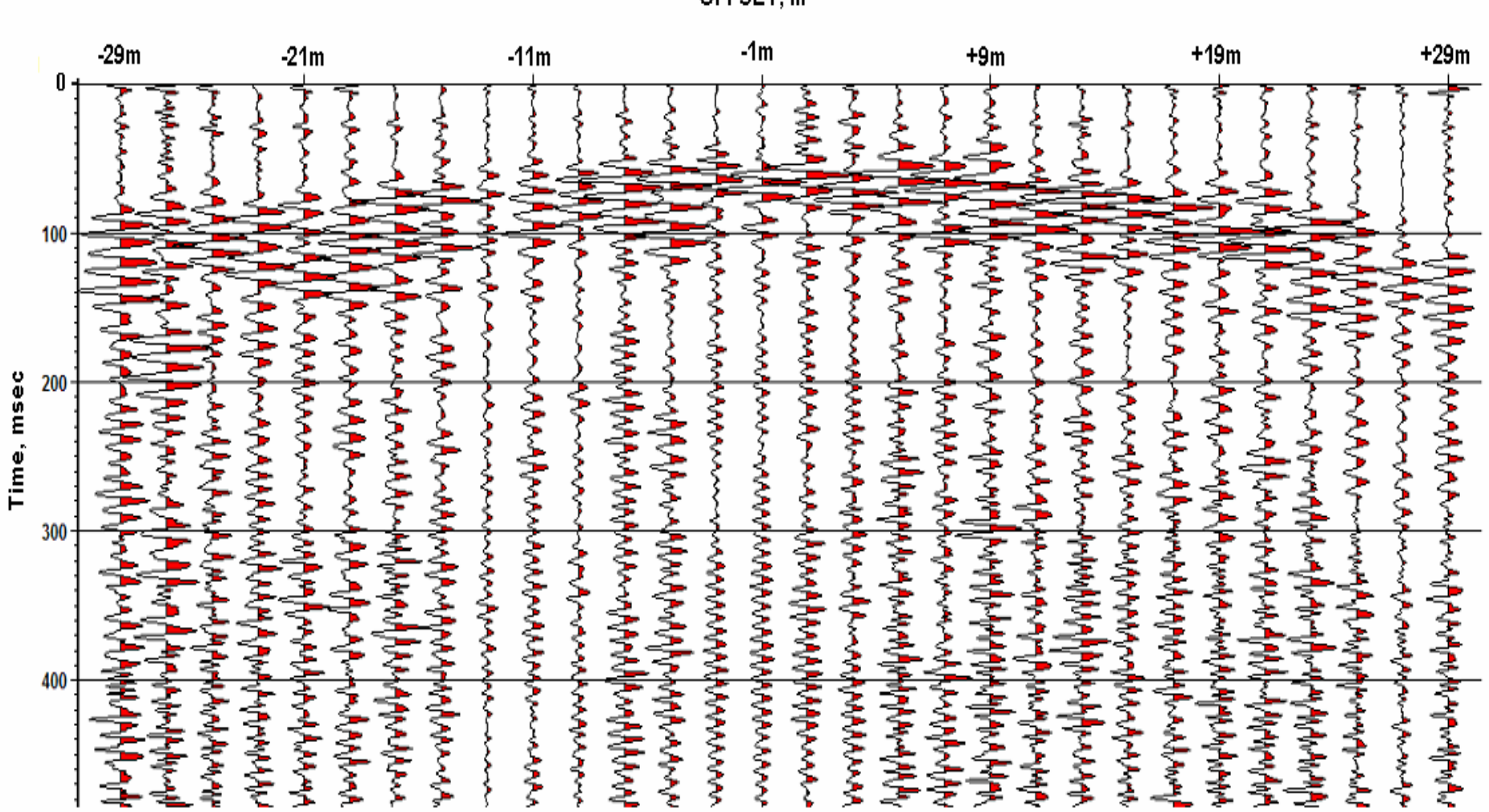

Offset = 9m
Time (ms)
20
40
60
80
100
120
140
160
180
Depth, m
3
6
9
12
15
18
21
24
27
30
33
36
39
BHG-2
Vertical component
Time (ms)


Offset = 9m
Time (ms)
20
40
60
80
100
120
140
160
180
03
06
09
12
15
18
21
24
27
30
33
36
39
Depth, m
BHG-2
Inline component

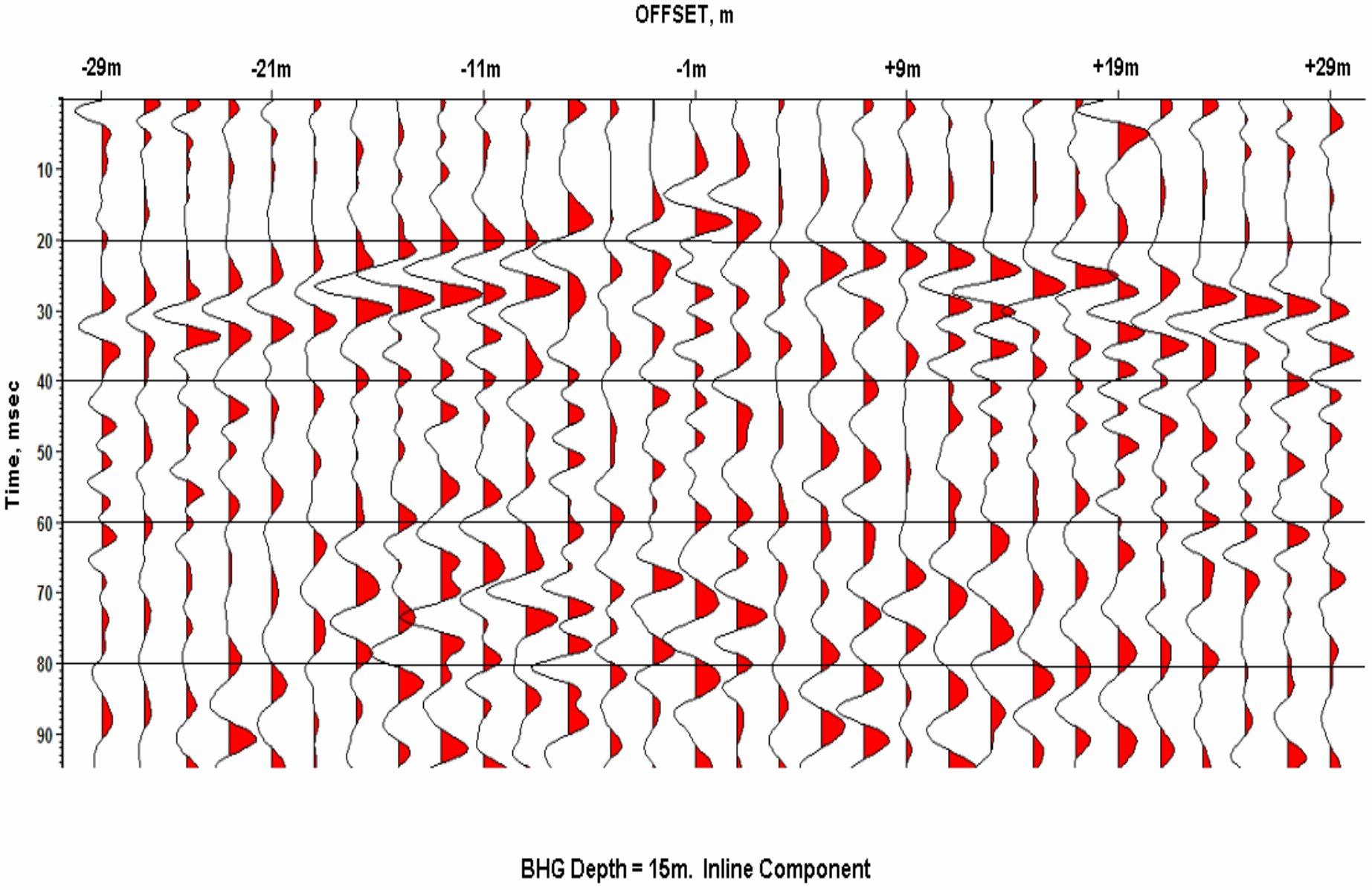

Offset = 9m
Time (ms)
20
40
60
80
100
120
140
160
180
Depth, m
3
6
9
12
15
18
21
24
27
30
33
36
39
BHG-2
Transverse component
Time (ms)

FIXED RECEIVER WALK-AWAY PROFILE

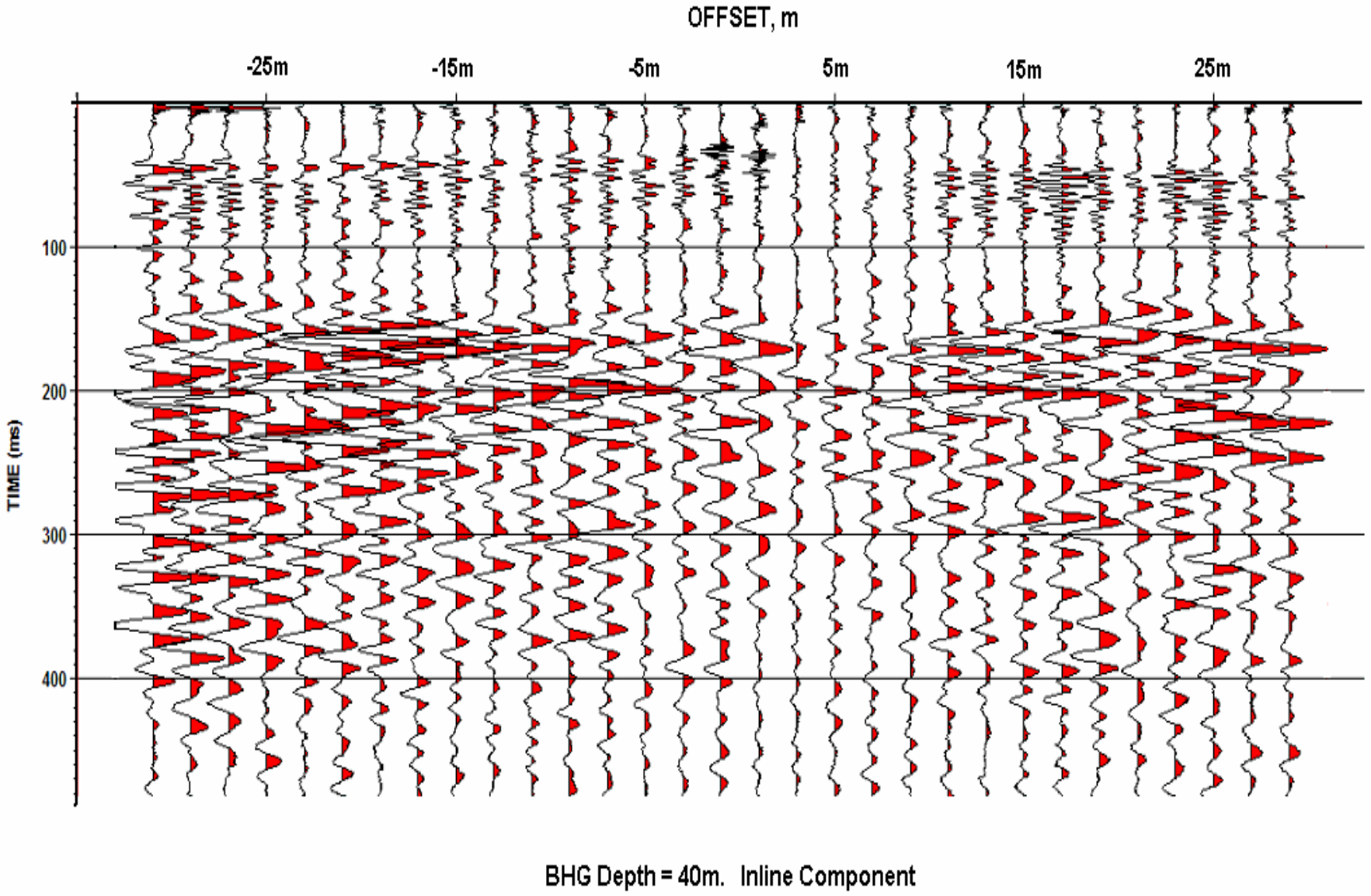




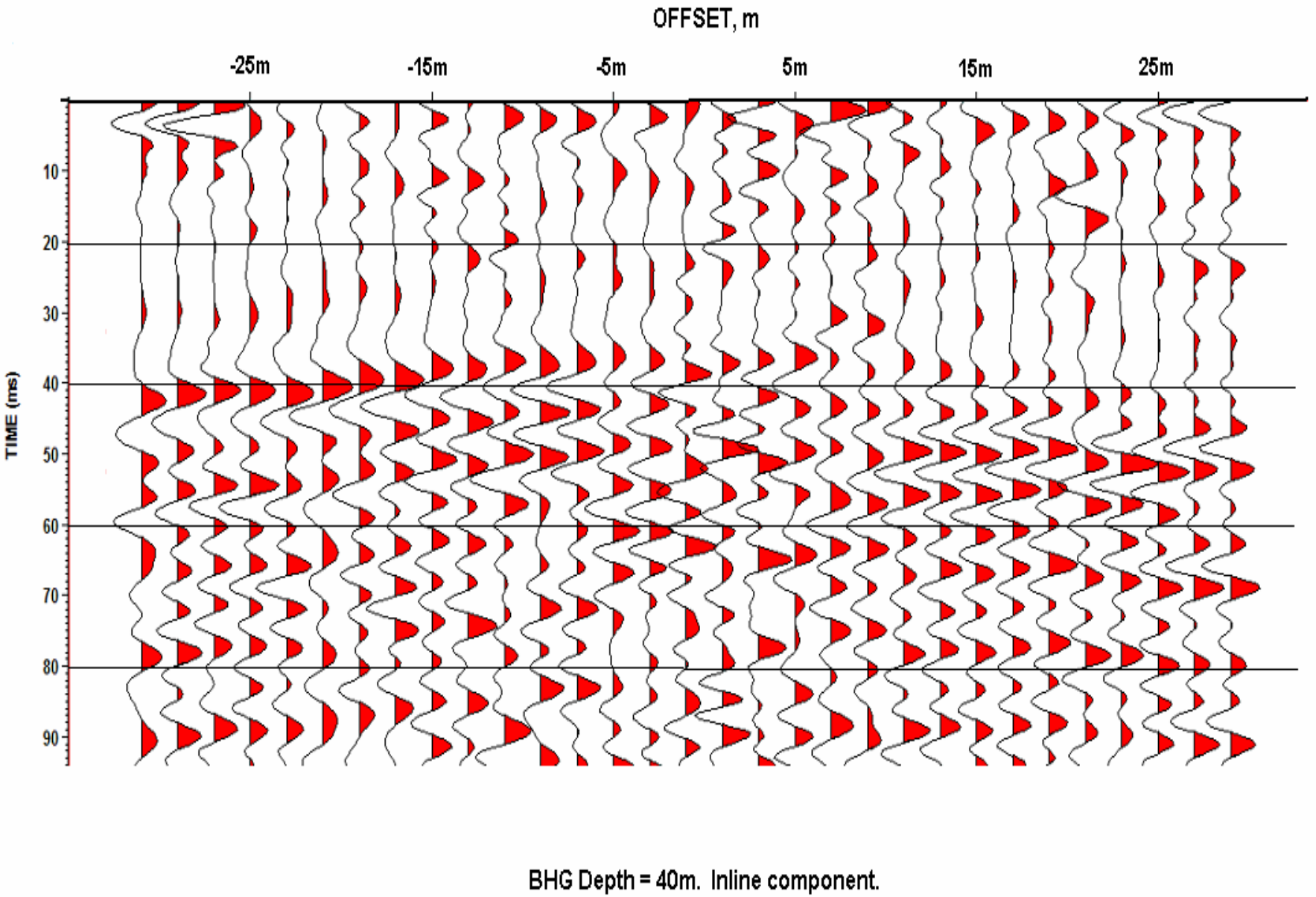
BHG Depth = 15m. Transverse Component.



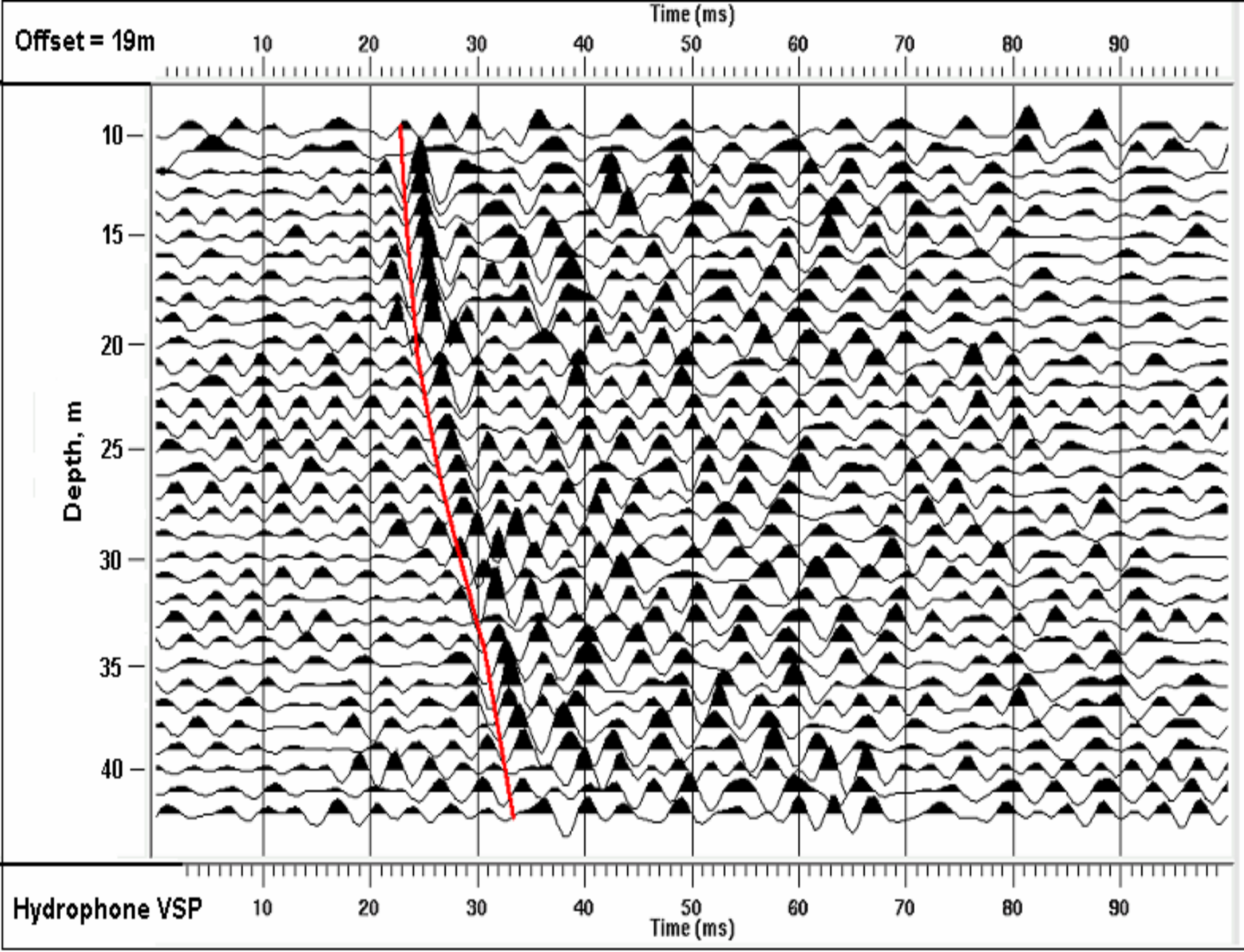
BHG Depth = 15m. Inline Component

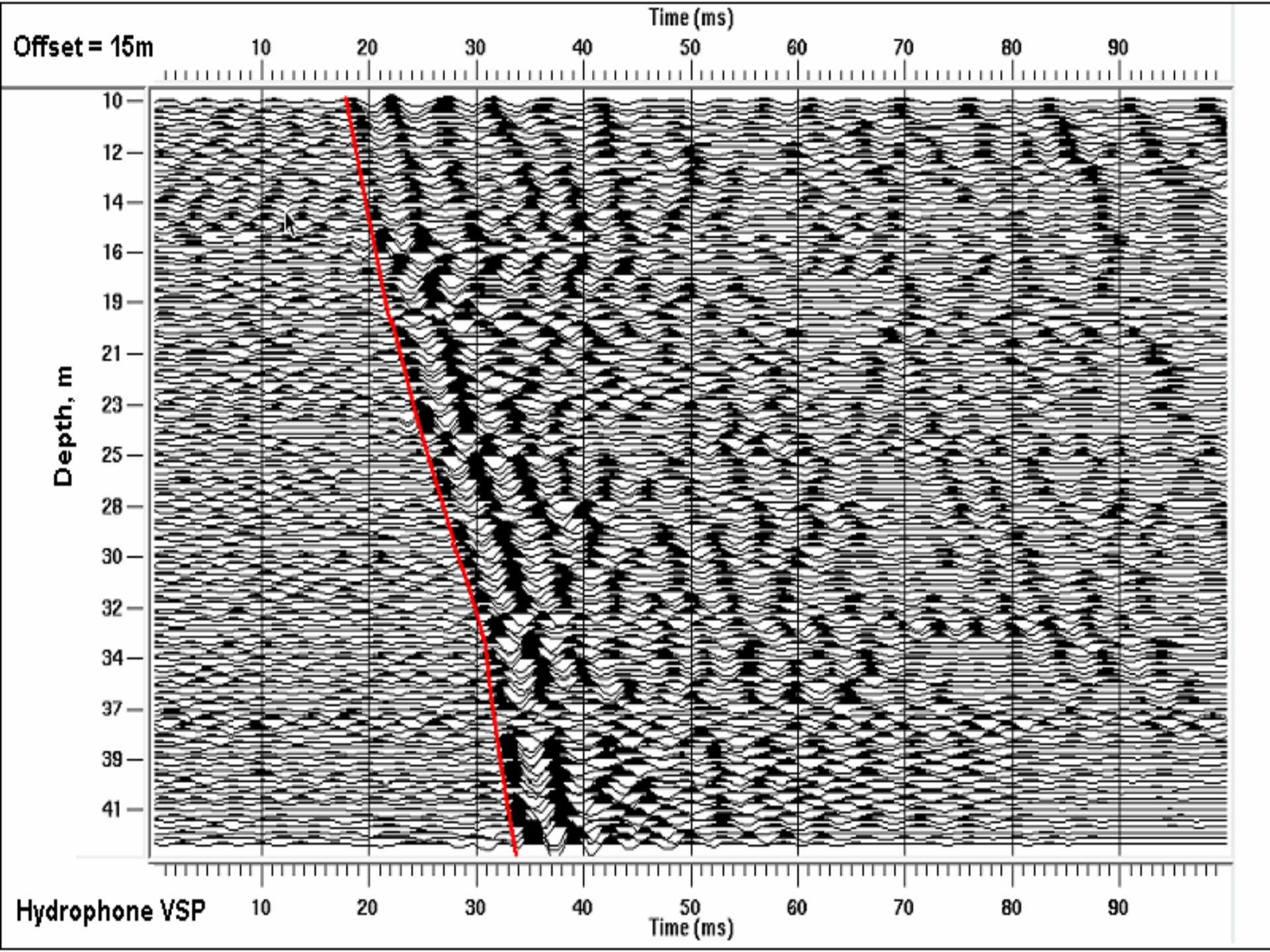


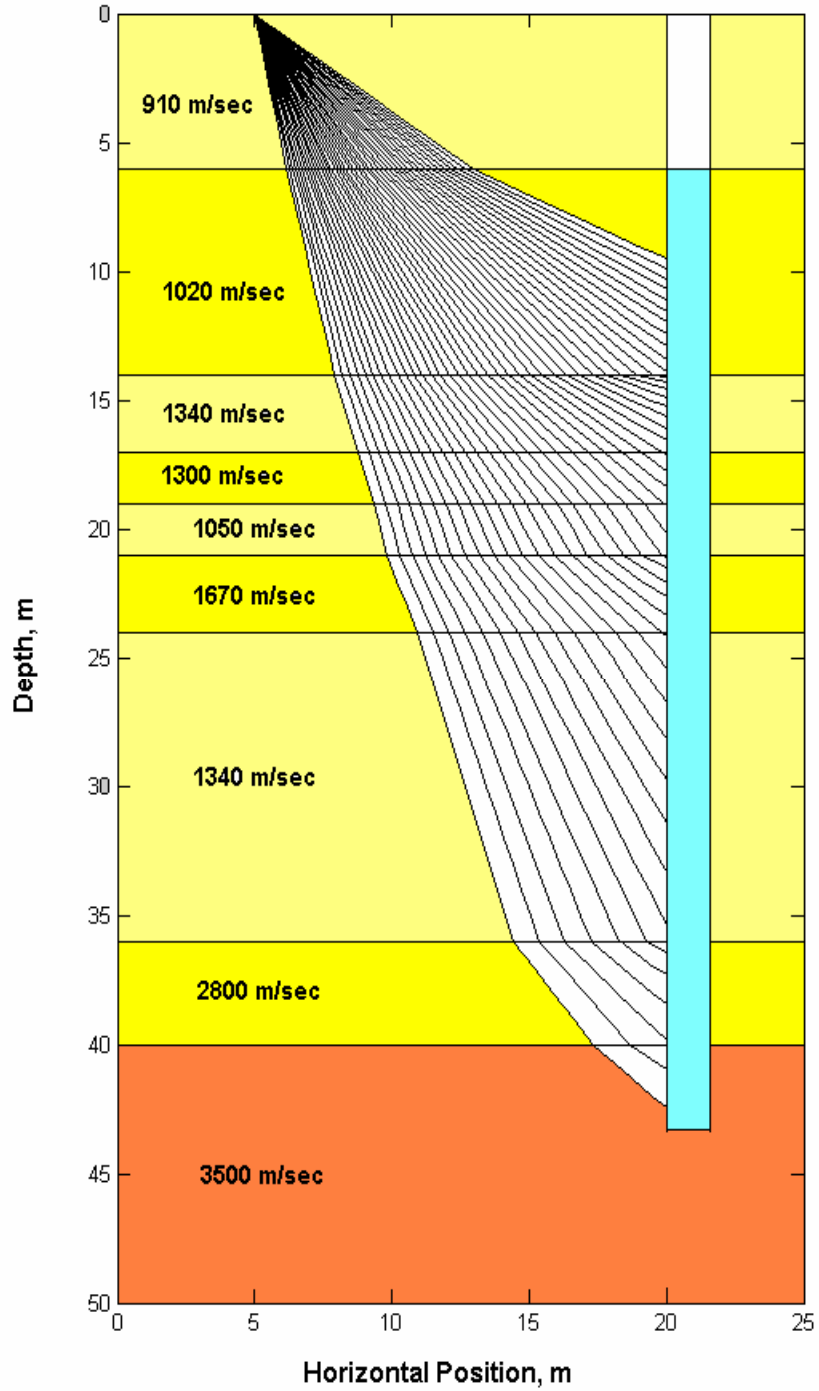
BHG Depth = 40m. Inline Component

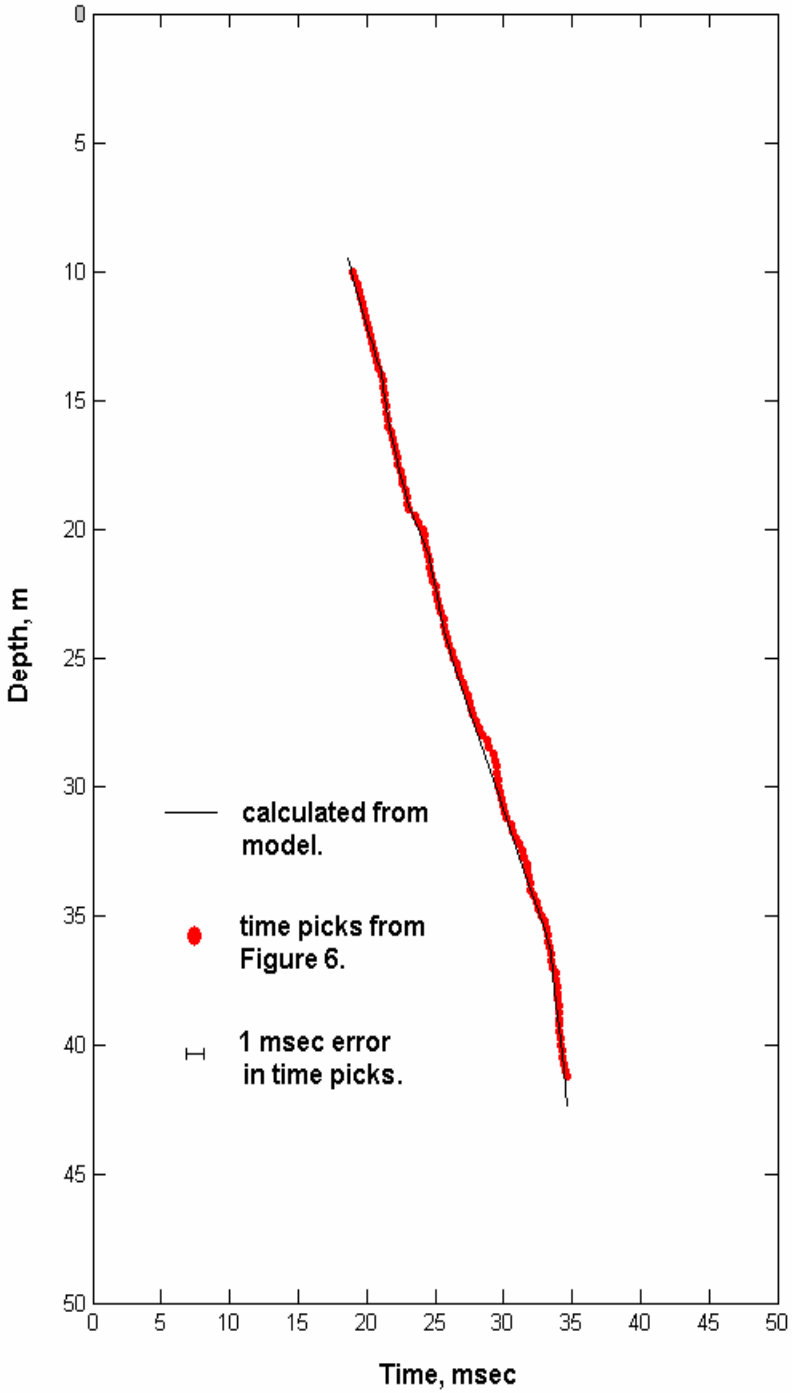


BHG Depth = 40m. Inline component.

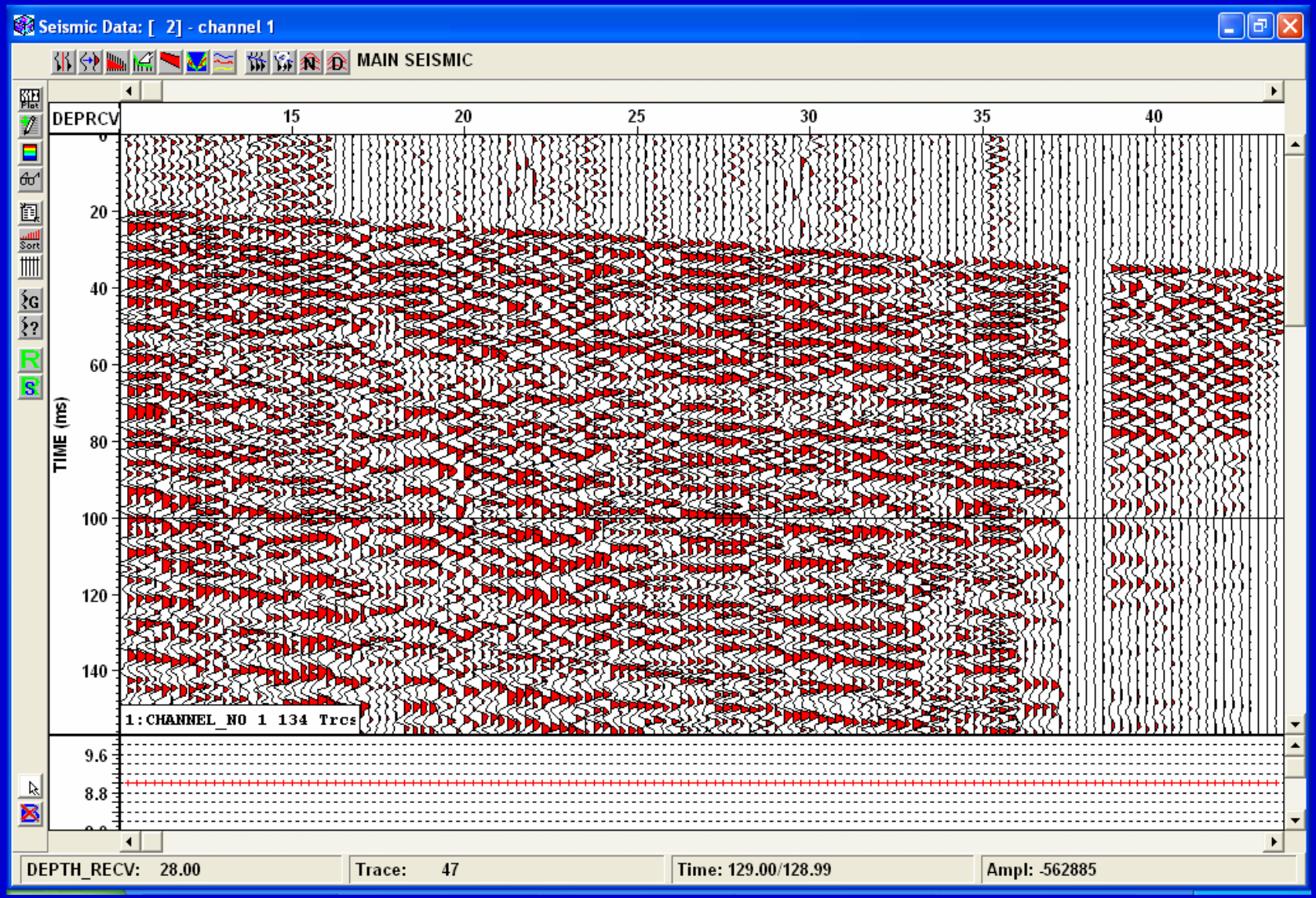

Offset = 19m
Time (ms)
10
20
30
40
50
60
70
80
90
Depth, m
10
15
20
25
30
35
40
Hydrophone VSP
Time (ms)

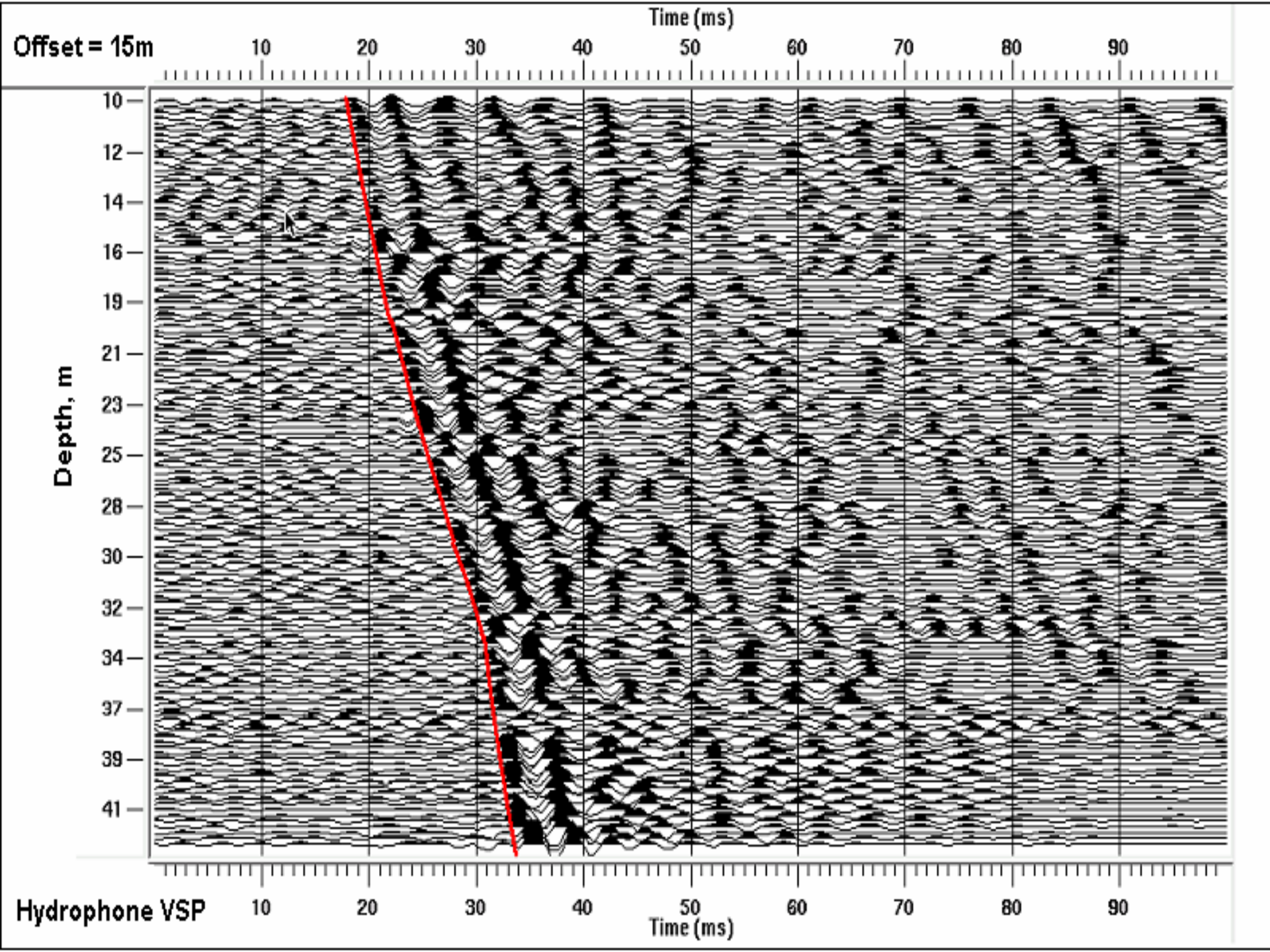

Time (ms)
Offset = 15m
10
20
30
40
50
60
70
80
90
Depth, m
10
12
14
16
19
21
23
25
28
30
32
34
37
39
41
Hydrophone VSP
Time (ms)


910 m/sec
1020 m/sec
1340 m/sec
1300 m/sec
1050 m/sec
1670 m/sec
1340 m/sec
2800 m/sec
3500 m/sec
Depth, m
Horizontal Position, m
0
5
10
15
20
25
30
35
40
45
50


calculated from model.
time picks from Figure 6.
1 msec error in time picks.
Depth, m
Time, msec
0
5
10
15
20
25
30
35
40
45
50

Raw hydrophone data (AGC)

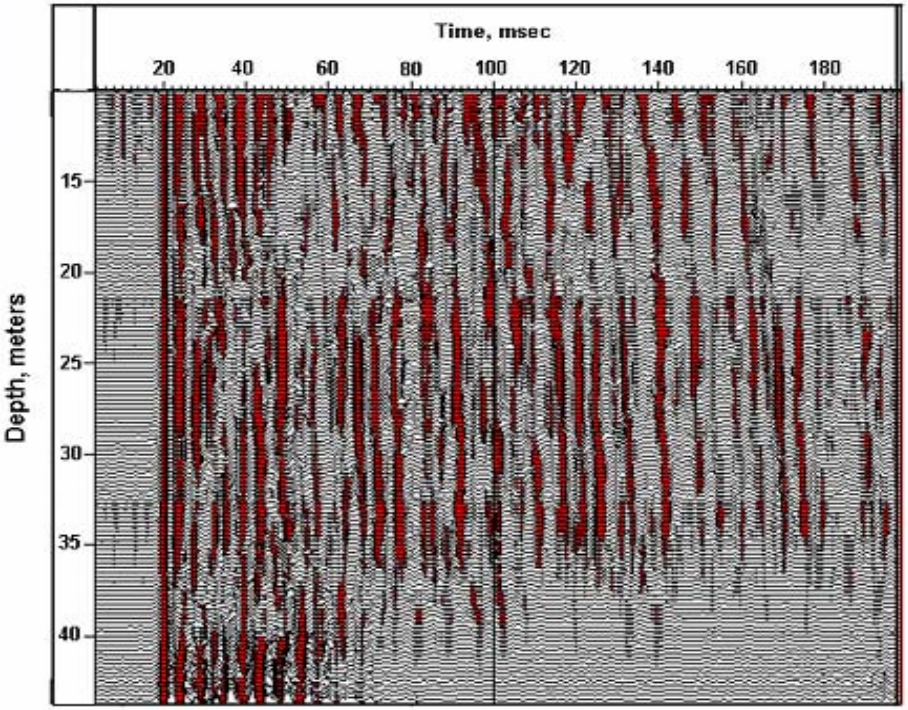



Time (ms)
Offset = 15m
10
20
30
40
50
60
70
80
90
Depth, m
10
12
14
16
19
21
23
25
28
30
32
34
37
39
41
Hydrophone VSP
Time (ms)

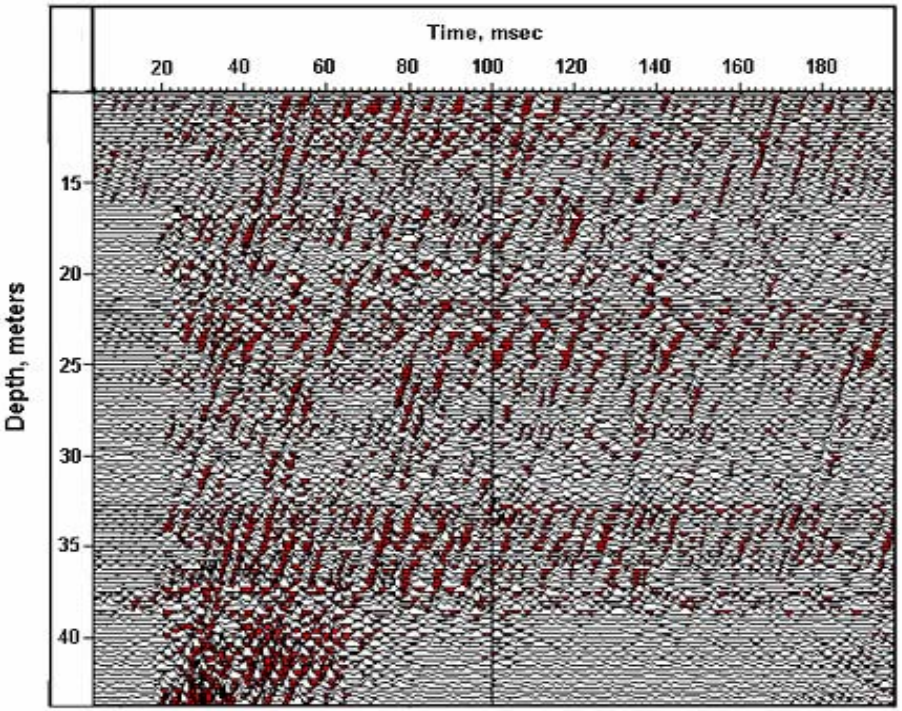
Wavefield Separation :

(a) alignment of raw data to first arrivals;
(b) AGC;
(c) removal of first arrivals vai 15-trace median filter;
(d) FK filter to enhance upgoing wavefield.

Down-going events aligned to first arrivals.



Up-going events aligned to first arrivals.



CONCLUSIONS

- *At this site, a hammer was an effect source for shallow VSP.*
- *The BHG-2 triaxial geophone gave good P and S arrivals.*
- *Hydrophones produced good P-wave first arrivals.*
- *Velocities (unconsolidated overburden) are:*
  1000 to 1600 m/sec for P-waves;
  350 to 400 m/sec for S-waves.

ACKNOWLEDGEMENTS

We thank the Castle Mountain Ski Resort for access to their property and water wells.

GEDCO for VISTA software

JODEX Applied Geoscience Limited provided essential support field equipment for the shallow VSP experiment.