Applied Foundation Testing

September 12, 2008

Report of Cross-Hole Sonic Logging
Test Shaft 3
Drilled Shaft Load Test Program
I-80 Bridge Project
Council Bluffs,
Pottawattamie County, Iowa
NHS-080-1(318)0-11-78
AFT Project No.: 108026

Authored By:

Date:

Michael K. Muchard, P.E.
Principal Geotechnical Engineer

For:
Mike Kemery
Longfellow Drilling
1209 County Highway J23
Clearfield, Iowa 50840
Ph: 641 336 2297
Fax: 641 336 2387

Report on Cross-hole Sonic Logging
In General Accordance with ASTM D 6760

General Information		
Date:	September 12, 2008	
AFT Project No.:	108026	
Project Description:	Drilled Shaft Load Test Program I-80 Bridge Project Council Bluffs, Pottawattamie County, Iowa NHS-080-1(318)0-11-78	
Client Name:	Longfellow Drilling	
Client Address:	1209 County Highway J23, Clearfield, Iowa 50840	
Client Contact:	Mike Kemery	
Test Date:	August 27, 2008	
Test Equipment Manufacturer/Model:	Olson Instruments, Model Freedom Data PC	
AFT Field Personnel:	Michael K. Muchard, P.E.	
AFT Responsible Engineer:	Michael K. Muchard, P.E.	

Shaft Information

Concrete Strength at Time of Test	Shaft Number	Diameter (in)	Length (ft)	Installation Date
4970 psi	TS-3	60	55'-11"	8/20/08

Plan Cut-Off Elevation (ft)	Top of Concrete Elevation (ft)
988.84	991.52

CSL Tube Type	Number of CSL Tubes			
PVC [ ]	1 [ ]	3 [ ]	5 [x]	7 [ ]
Steel [x]	2 [ ]	4 [ ]	6 [ ]	8 [ ]

Northernmost Tube	Numbering Direction
1	clockwise

Tube Stickup Above Concrete (ft)				
Tube 1	**Tube 2**	**Tube 3**	**Tube 4**	**Tube 5**
2.85	2.85	2.85	2.95	2.975

Tube Length (ft)				
Tube 1	**Tube 2**	**Tube 3**	**Tube 4**	**Tube 5**
58.675	58.675	58.625	58.625	58.775

Tube Pairs and Spacings (in)				
Tube Pair: 1-2	**Tube Pair: 2-3**	**Tube Pair: 3-4**	**Tube Pair: 4-5**	**Tube Pair: 5-1**
25.8	30.0	29.7	29.04	26.4
Tube Pair: 1-3	**Tube Pair: 1-4**	**Tube Pair: 2-4**	**Tube Pair: 2-5**	**Tube Pair: 3-5**
45.6	45.6	46.8	43.5	46.2

Construction Information*

Drilling Method

Wet [X] Natural/Water [ ] Bentonite [ ] Polymer [X]

Dry [ ] *please refer to Contractor for construction information

Temporary Casing

Yes [ ] Top Elev. (ft) [ ] Length (ft) [ ] Diameter (in) [ ]

No [X]

Permanent Casing

Yes [X] Top Elev. (ft) [991.52] Length (ft) [5.0] Diameter (in) [66.0]

No [ ]

Installation Records provided to AFT		Soil Boring provided to AFT	
Yes [X]	Attached [X]	Yes [X]	Attached [ ]
No [ ]		No [ ]	

Results

Ultrasonic Profiles Attached

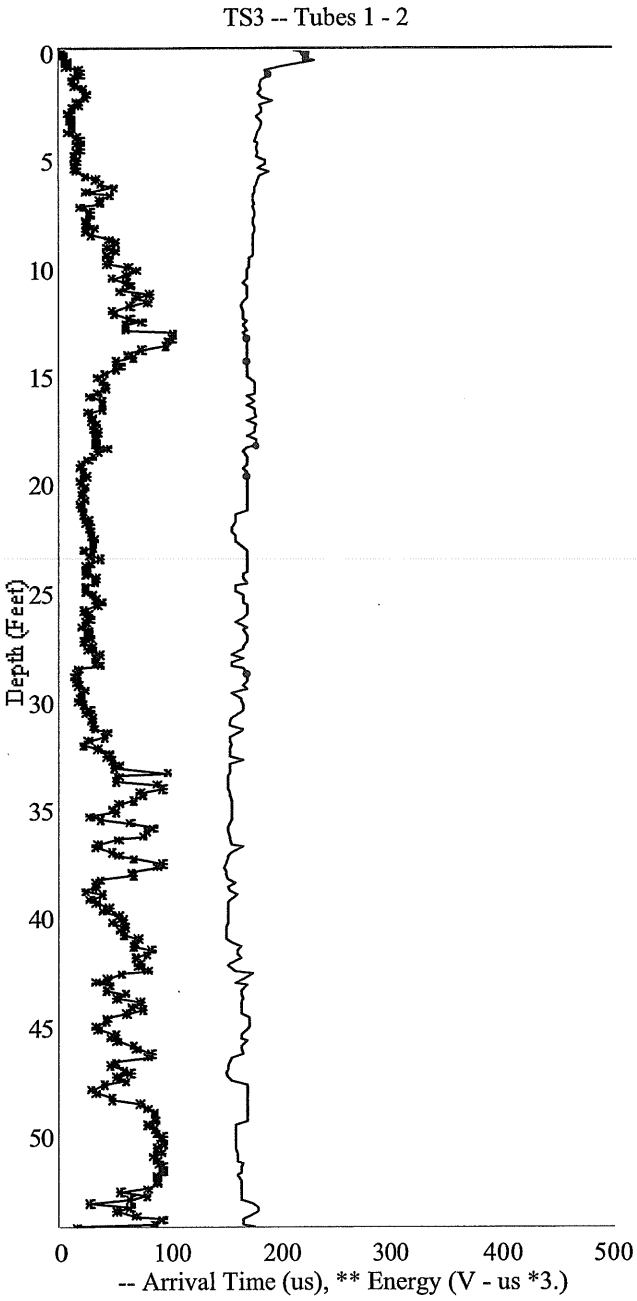
Energy , FAT [X] Velocity [X] Banded Time (waterfall) [X]

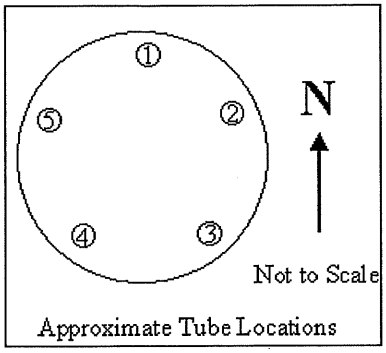
Velocity Deviations (depths referenced are below top of concrete)	
Tube Pair: 1-2	16 percent upper 1.5 ft
Tube Pair: 2-3	≤10 percent
Tube Pair: 3-4	≤10 percent
Tube Pair: 4-5	≤10 percent
Tube Pair: 5-1	≤10 percent
Tube Pair: 1-3	≤10 percent
Tube Pair: 1-4	≤10 percent
Tube Pair: 2-4	≤10 percent
Tube Pair: 2-5	≤10 percent
Tube Pair: 3-5	≤10 percent

CSL Interpretation
All tested tube pairs exhibited velocity reductions of less than 10 percent for the tested length of the shaft except the upper 1.5 feet in tube pair 1-2. This zone had velocity reductions of 16 percent. Signals in these areas had good energy, amplitude and slightly delayed but well defined arrival times. The wave velocity in this area was approximately 9,200 feet per second which is indicative of slightly reduced strength concrete. It is likely that further testing at a later date would show improvement in the CSL signals. It is also noted that the top of concrete did not show any visual problematic signs in this area. Also of interest is that this zone is located within the permanent casing. Based on our evaluation of this data we recommend the shaft concrete between the tubes be considered acceptable for the purposes of post grouting and load testing.

Limitations

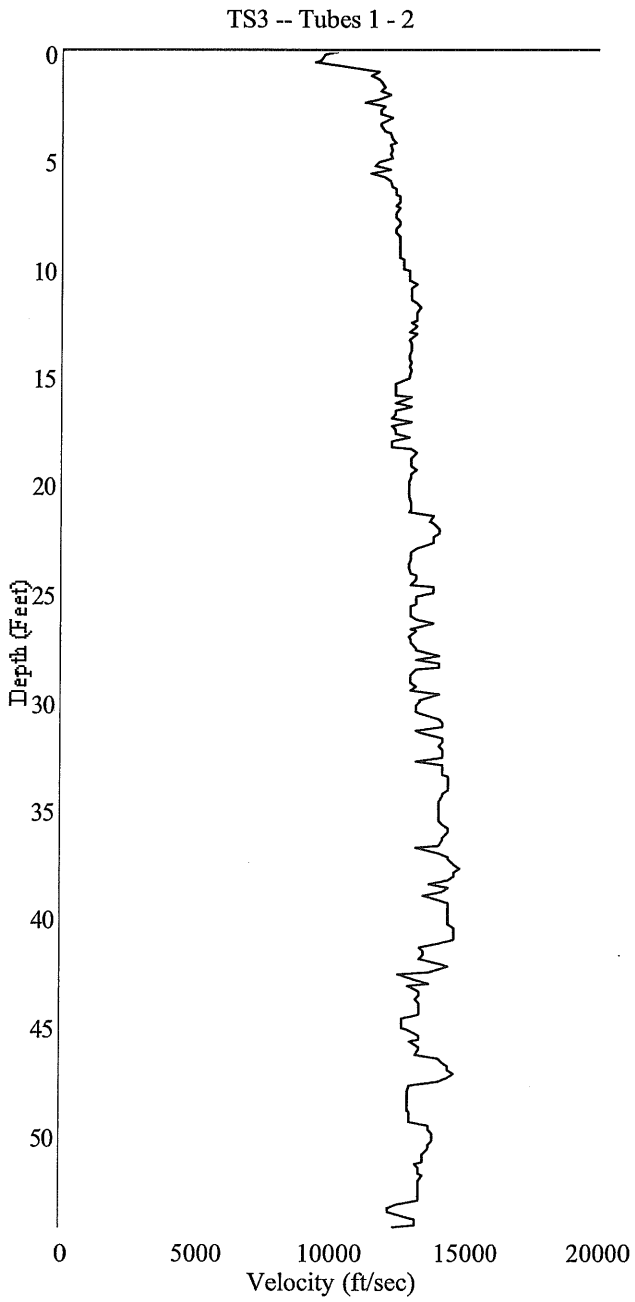
This report presents test measurements made by AFT. Interpretations were made based upon the measurements made by AFT with the latest techniques available and currently accepted standards of care recognized by Geotechnical Engineering professionals. AFT is an independent agency and is not the Geotechnical Engineer of Record. The Geotechnical Engineer of Record should ultimately make final recommendations for foundation design and construction.

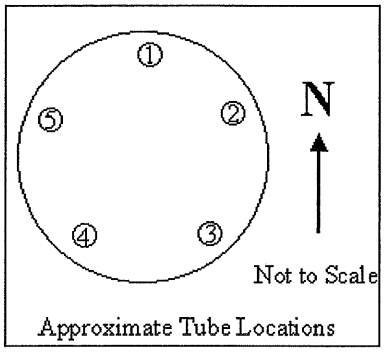




Tube Spacing :	25.80 inches
Signal Gain :	100
Threshold :	1.50
NSE:	1000

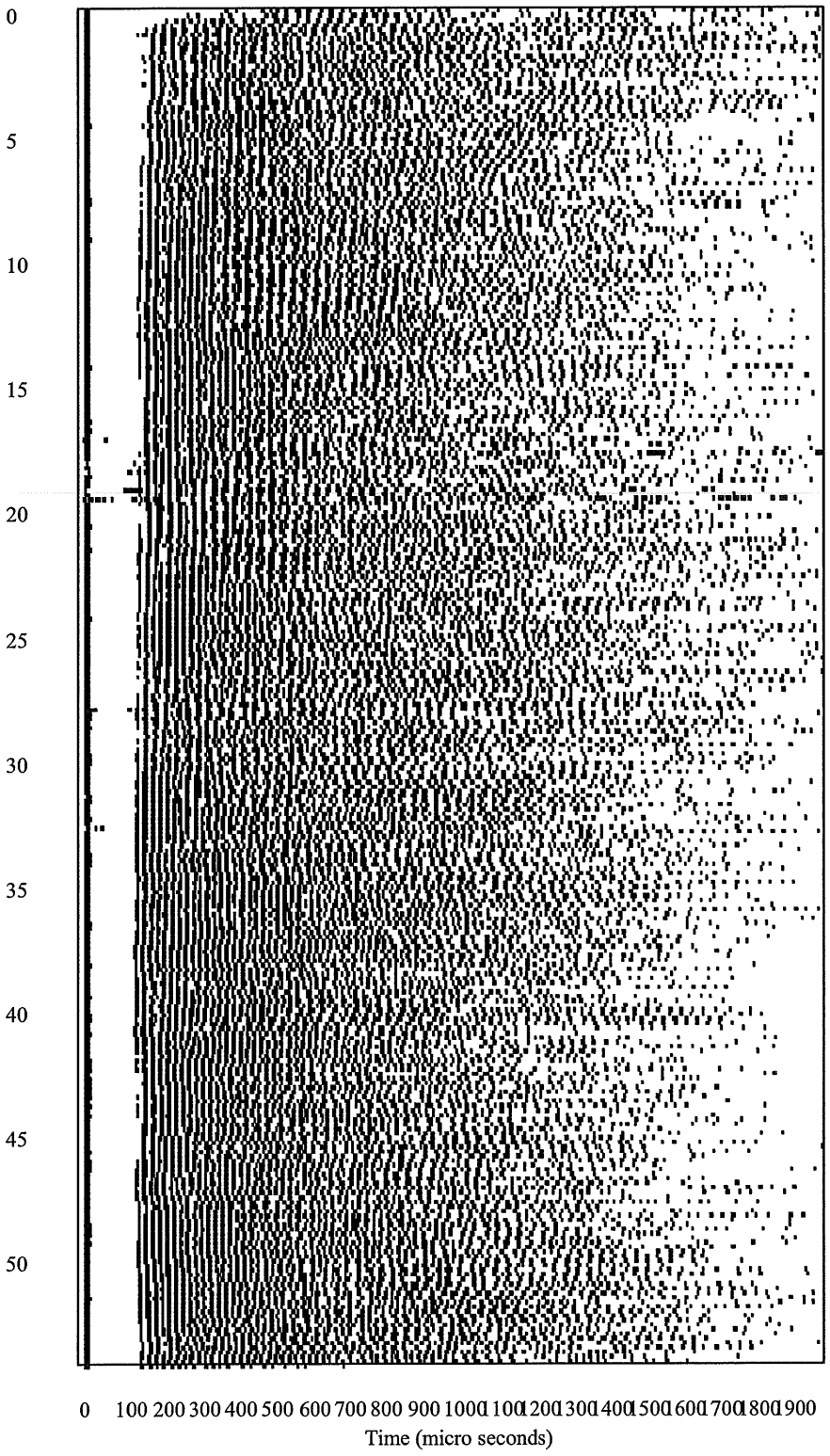
Figure 1





Tube Spacing :	25.80 inches
Signal Gain :	100
Threshold :	1.50
NSE:	1000

Figure 2



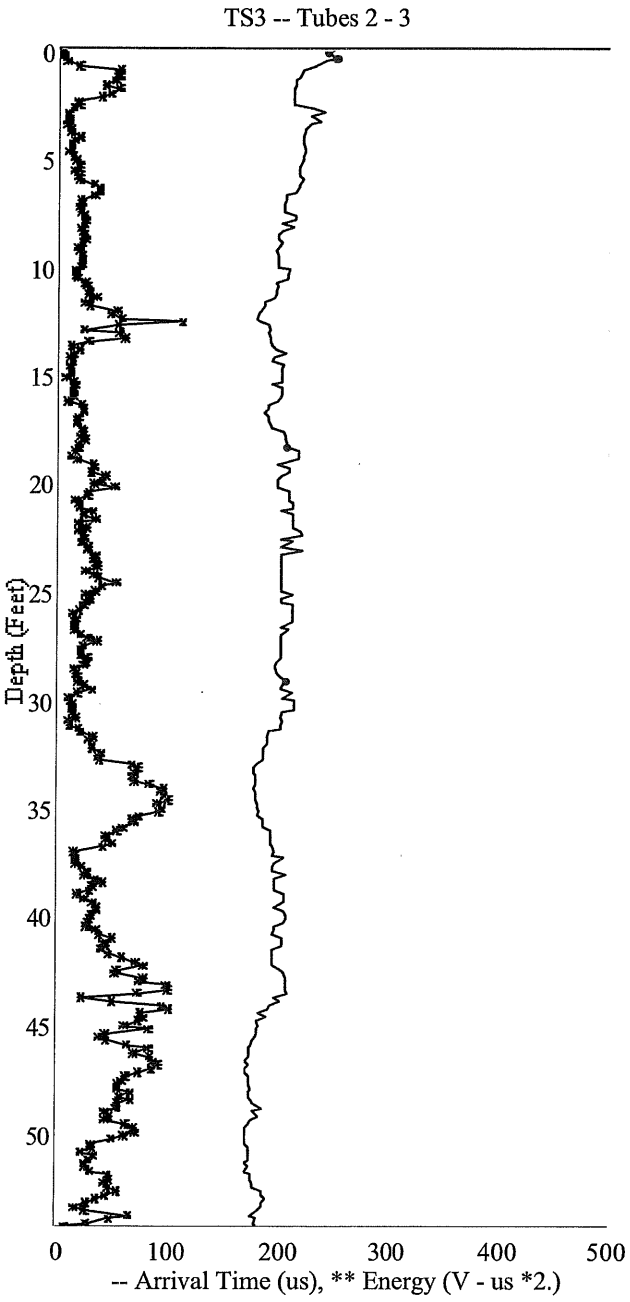
Shaft Name: TS3

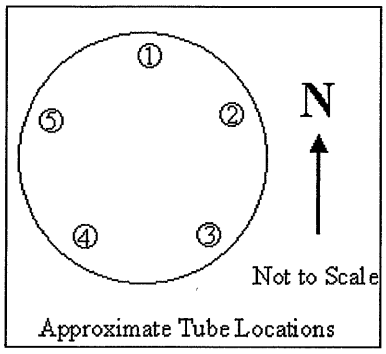
Tubepair: 1 - 2

Number of Tubes: 5

Tube Spacing: 25.8 inches

Figure 3





Tube Spacing :	30.00 inches
Signal Gain :	100
Threshold :	1.50
NSE:	1000

Figure 4

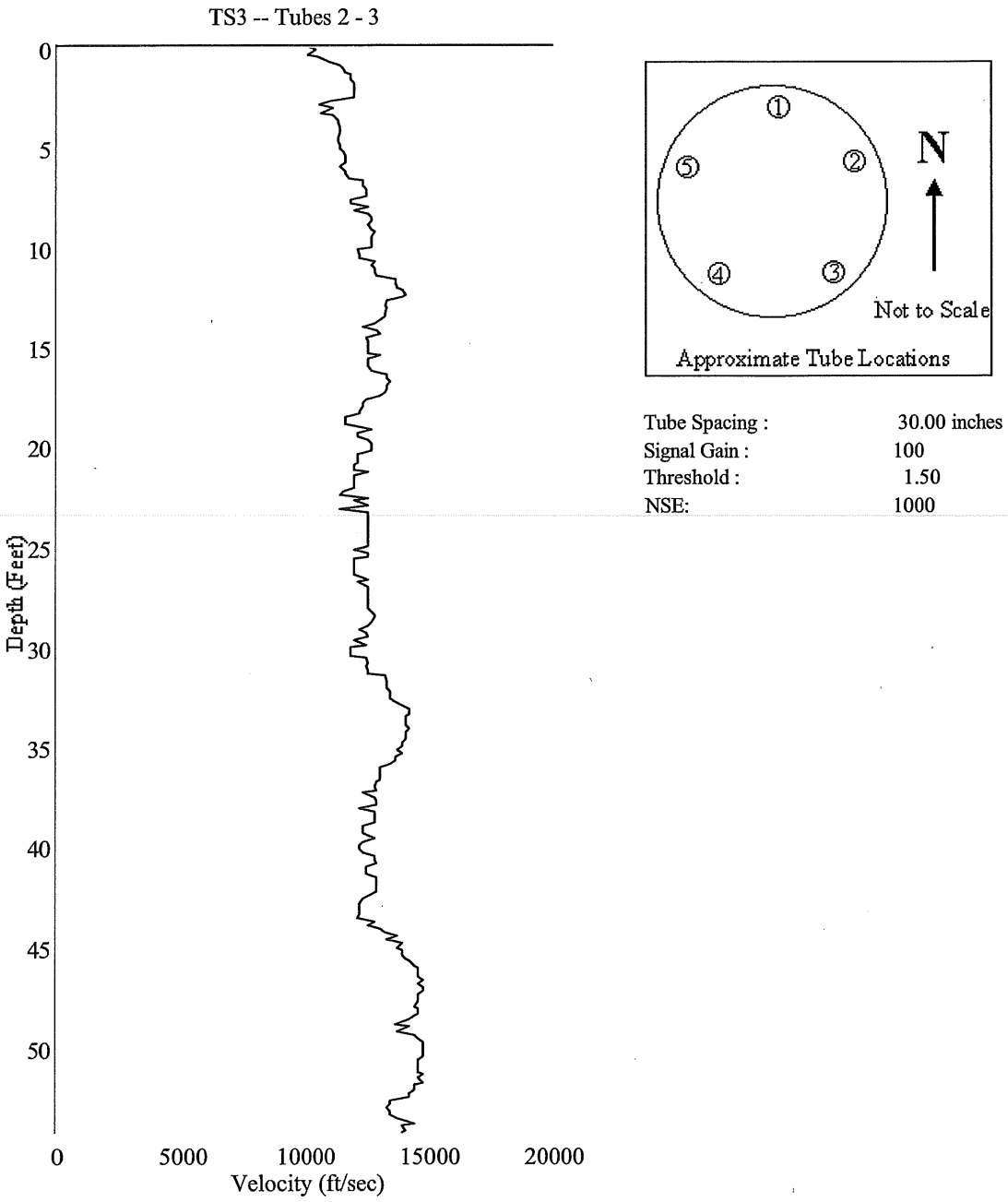
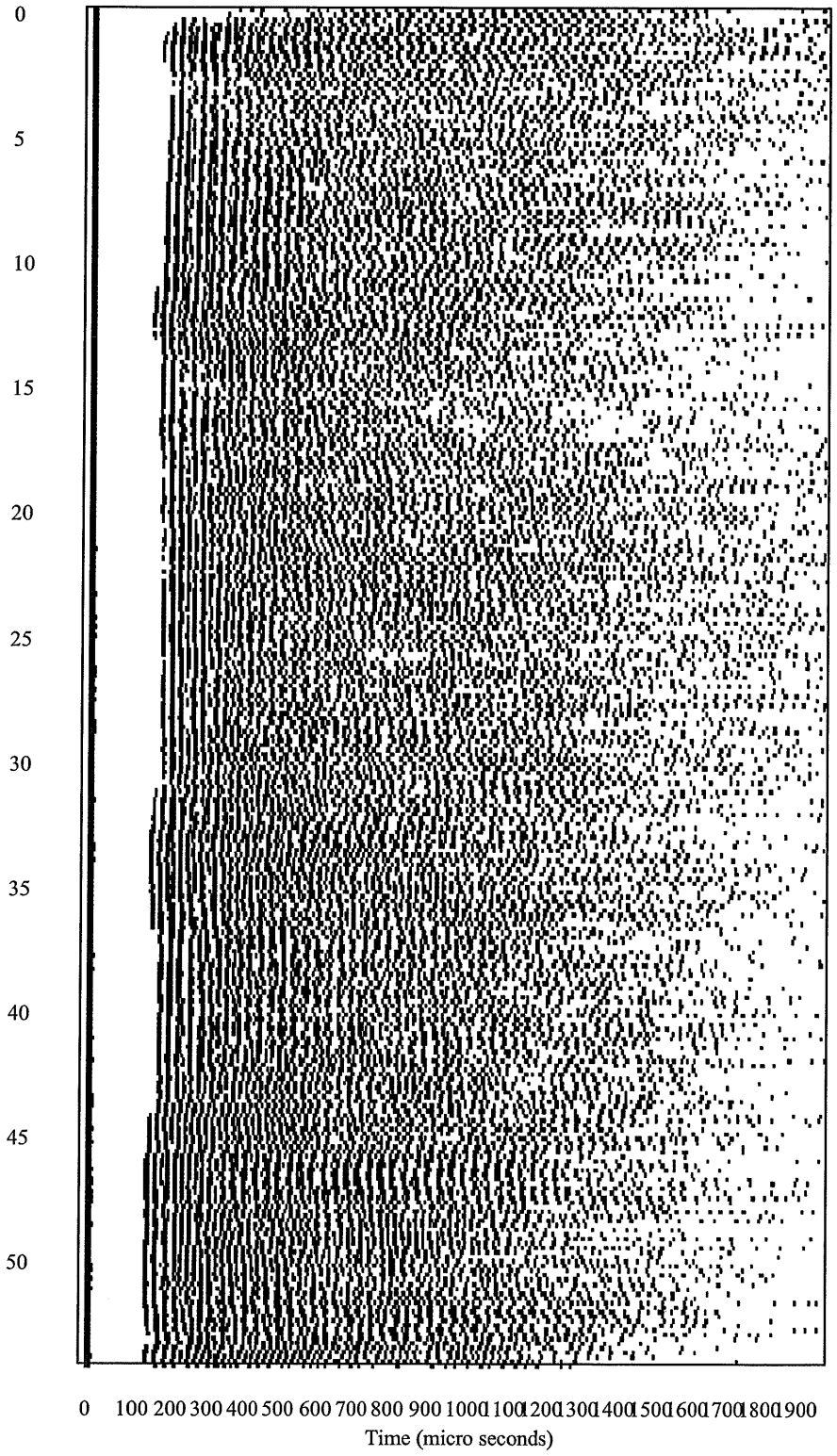

TS3 -- Tubes 2 - 3
0
5
10
15
20
25
30
35
40
45
50
Depth (Feet)
0
5000
10000
15000
20000
Velocity (ft/sec)
①
②
③
④
⑤
N
Not to Scale
Approximate Tube Locations
Tube Spacing : 30.00 inches
Signal Gain : 100
Threshold : 1.50
NSE: 1000

Figure 5



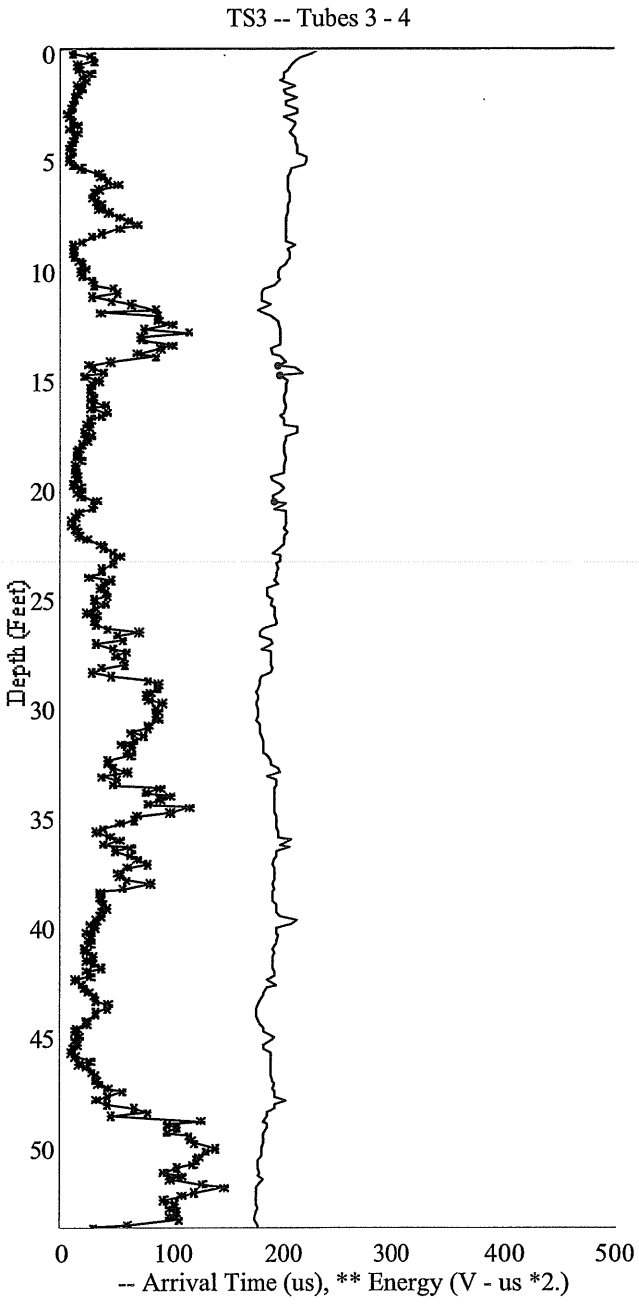
Shaft Name: TS3

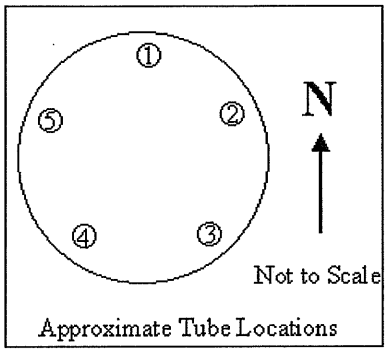
Tubepair: 2 - 3

Number of Tubes: 5

Tube Spacing: 30. inches

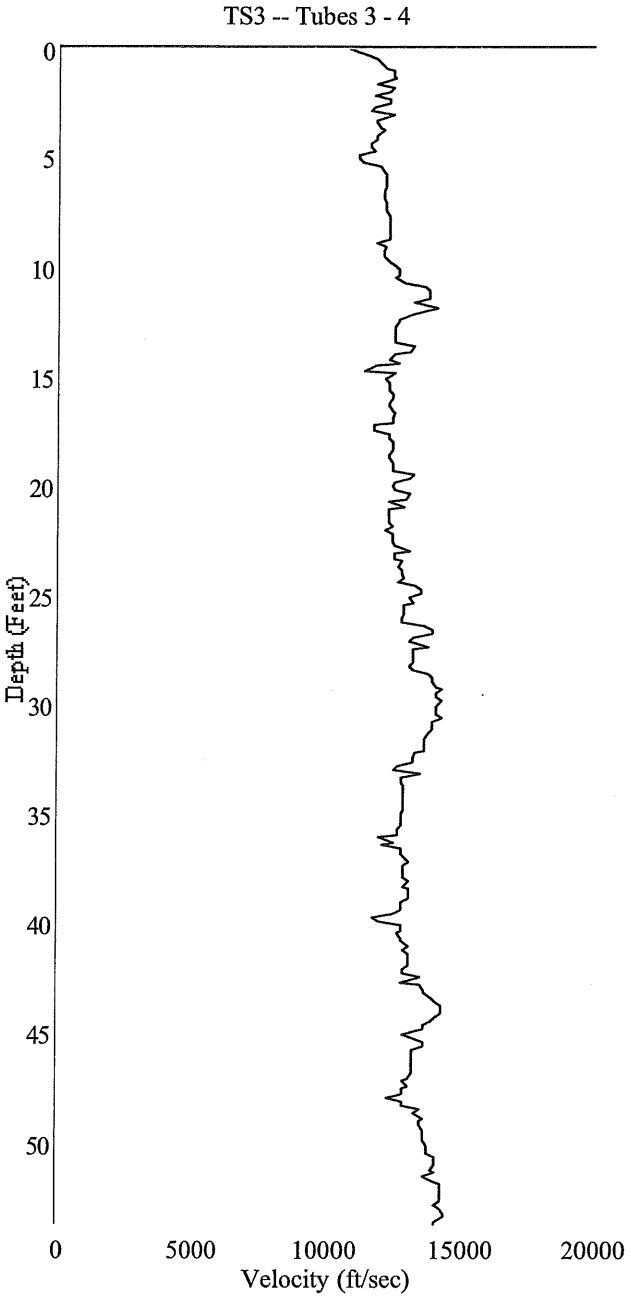
Figure 6

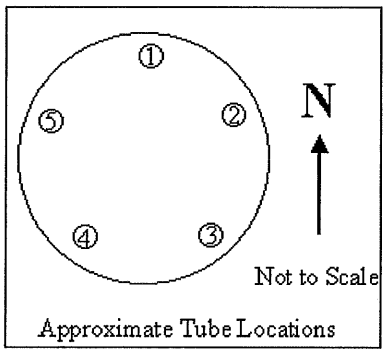




Tube Spacing :	29.70 inches
Signal Gain :	100
Threshold :	1.50
NSE:	1000

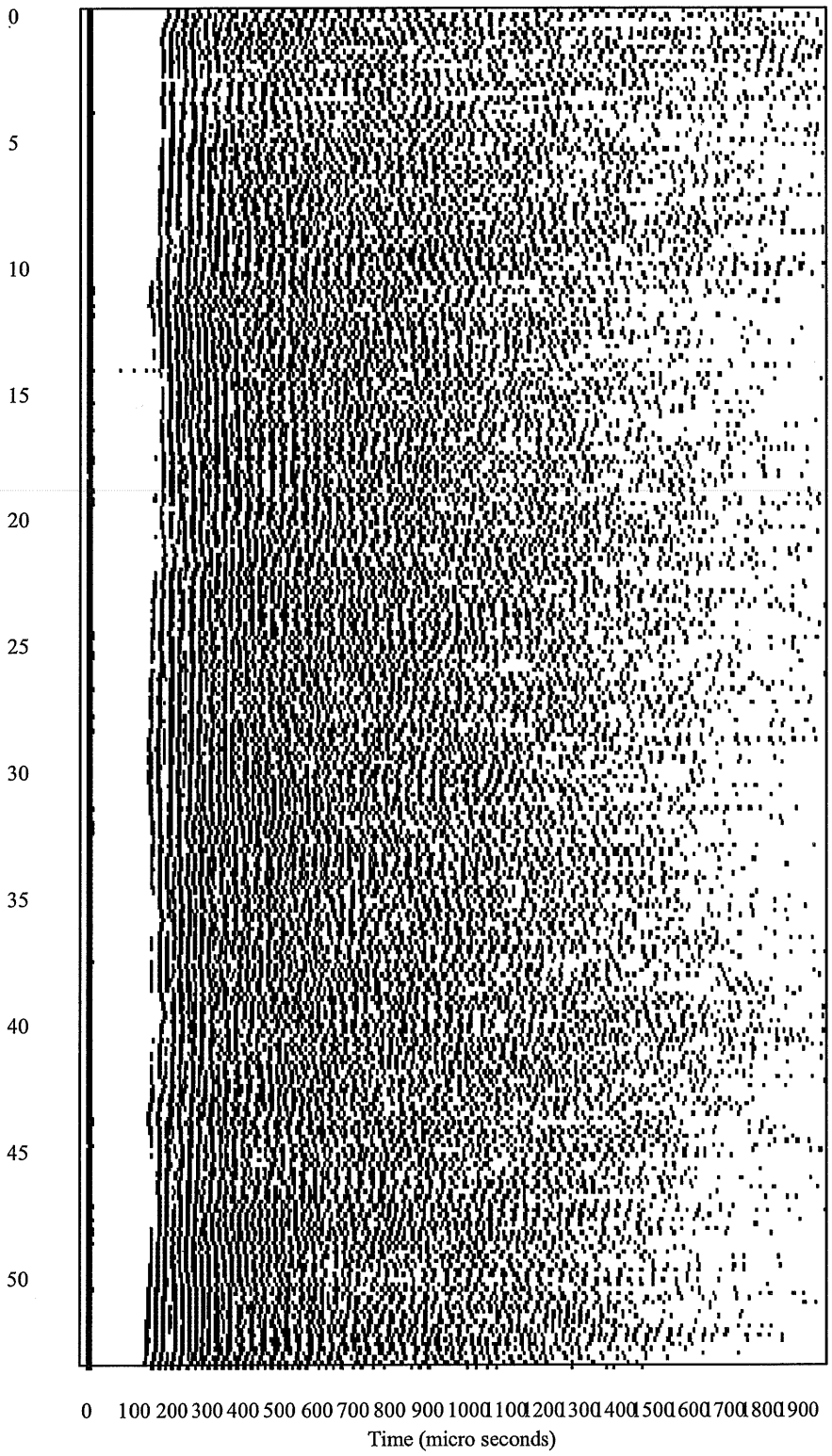
Figure 7





Tube Spacing :	29.70 inches
Signal Gain :	100
Threshold :	1.50
NSE:	1000

Figure 8



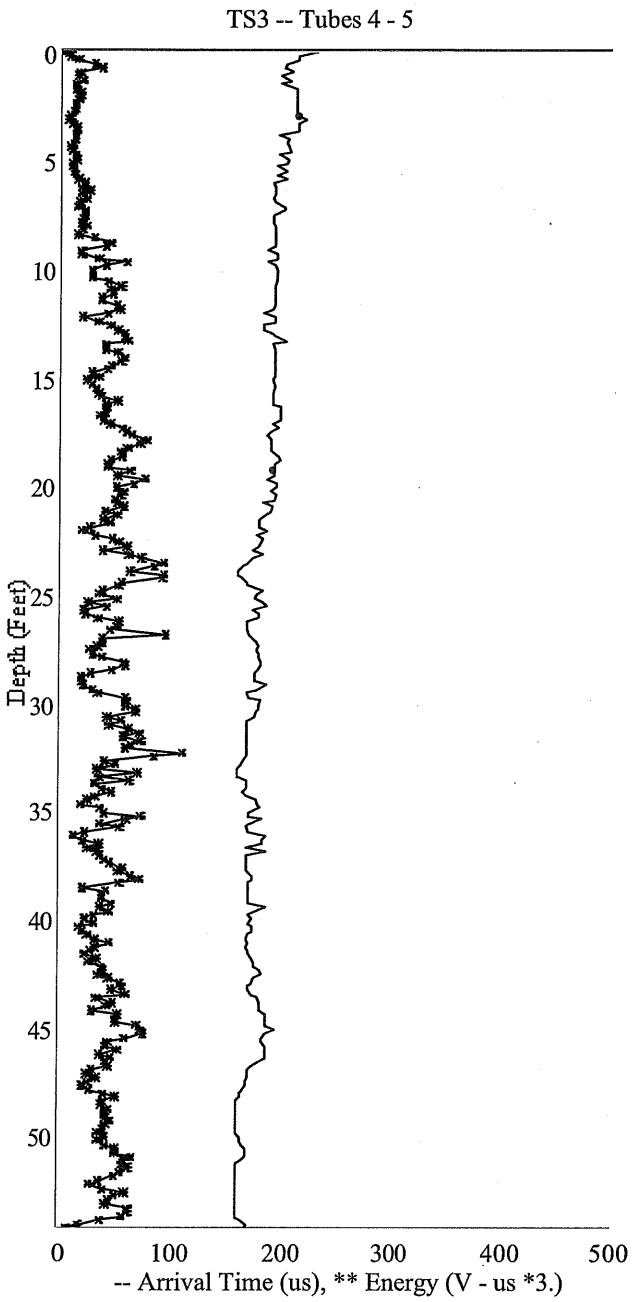
Shaft Name: TS3

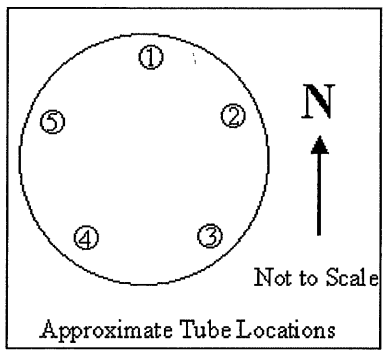
Tubepair: 3 - 4

Number of Tubes: 5

Tube Spacing: 29.7 inches

Figure 9





Tube Spacing :	29.04 inches
Signal Gain :	100
Threshold :	1.50
NSE:	1000

Figure 10

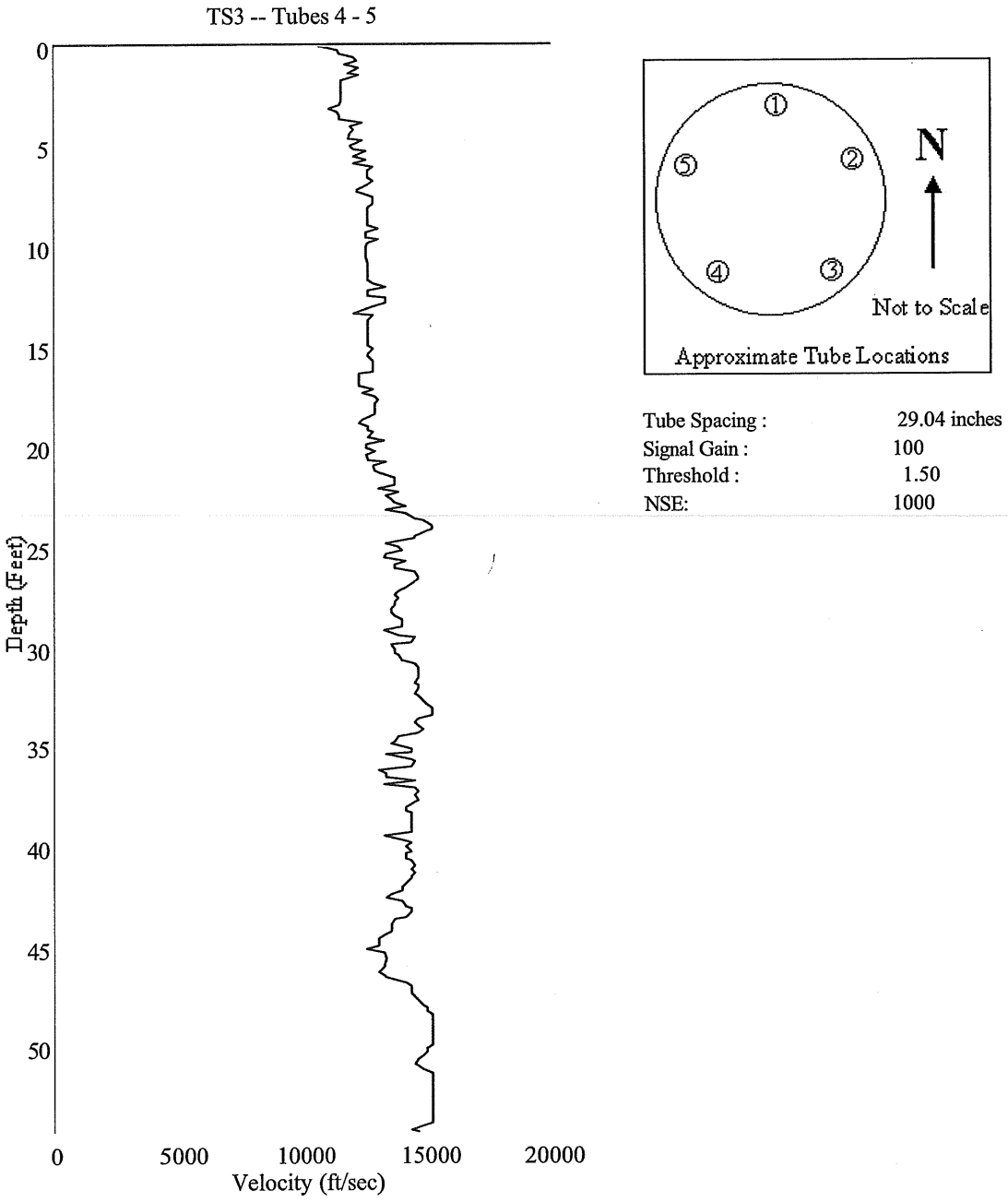
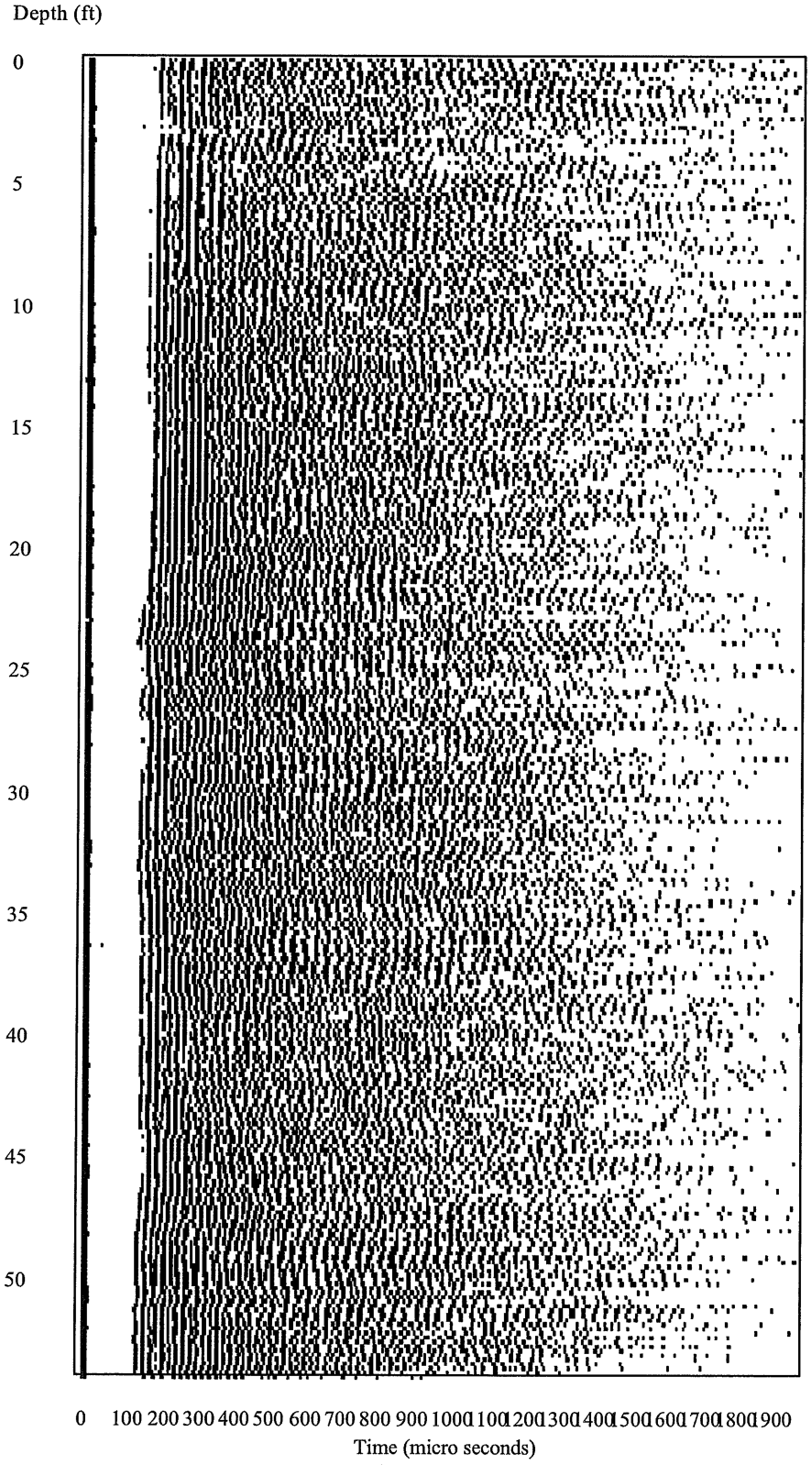

TS3 -- Tubes 4 - 5
0
5
10
15
20
25
30
35
40
45
50
Depth (Feet)
0
5000
10000
15000
20000
Velocity (ft/sec)
①
②
③
④
⑤
N
Not to Scale
Approximate Tube Locations
Tube Spacing : 29.04 inches
Signal Gain : 100
Threshold : 1.50
NSE: 1000

Figure 11



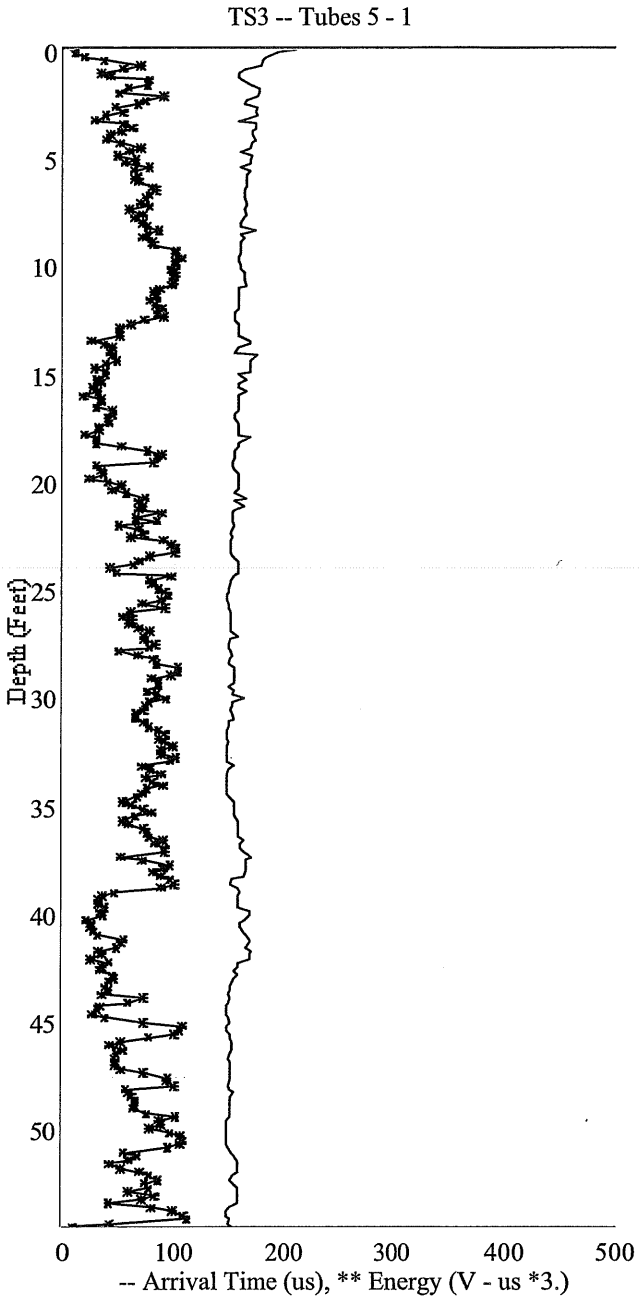
Shaft Name: TS3

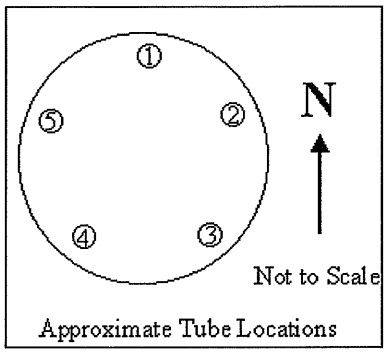
Tubepair: 4 - 5

Number of Tubes: 5

Tube Spacing: 29.04 inches

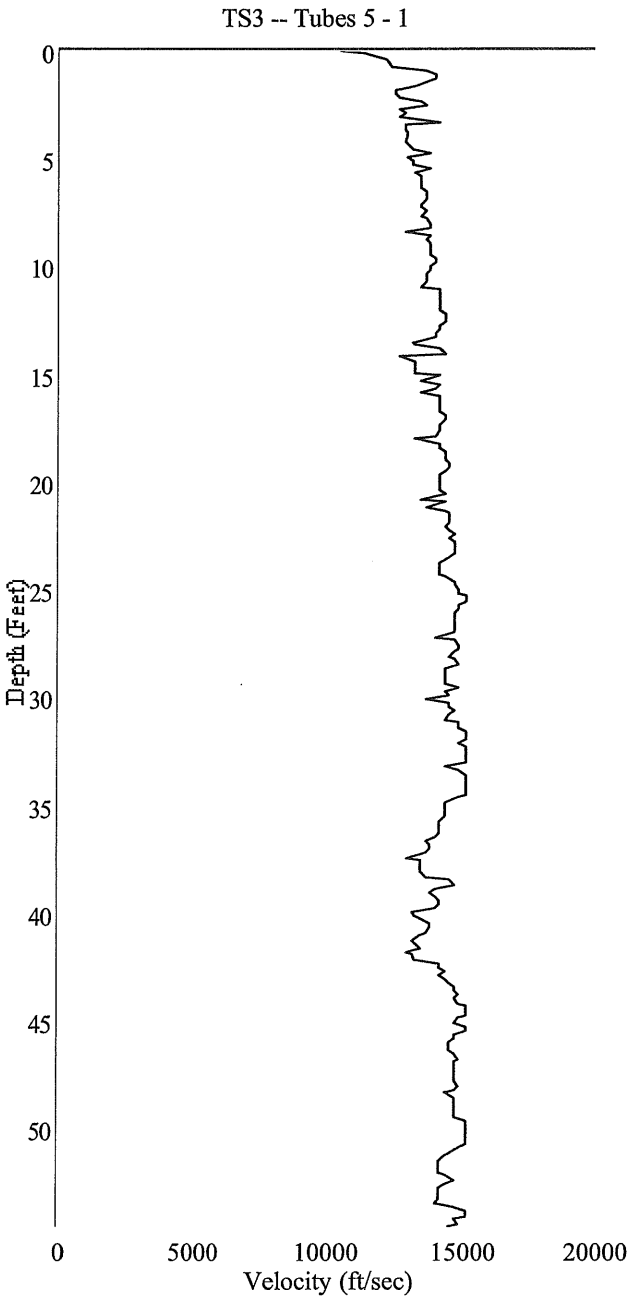
Figure 12

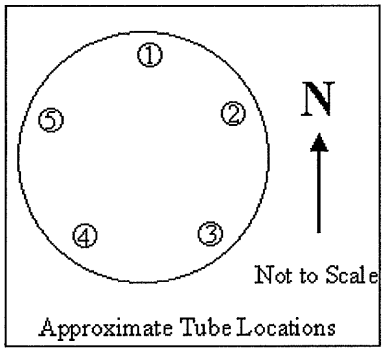




Tube Spacing :	26.40 inches
Signal Gain :	100
Threshold :	1.50
NSE:	1000

Figure 13





Tube Spacing :	26.40 inches
Signal Gain :	100
Threshold :	1.50
NSE:	1000

Figure 14

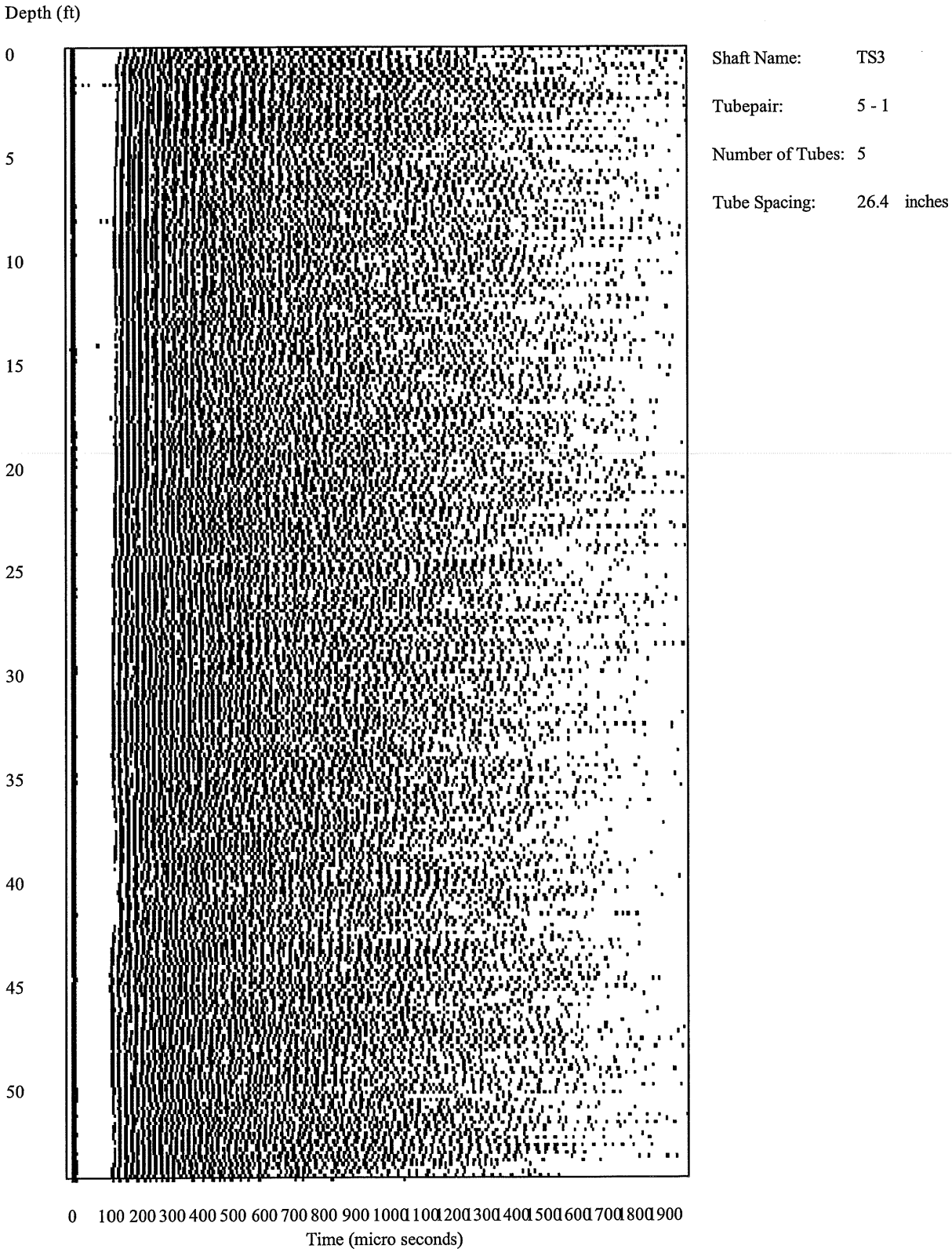
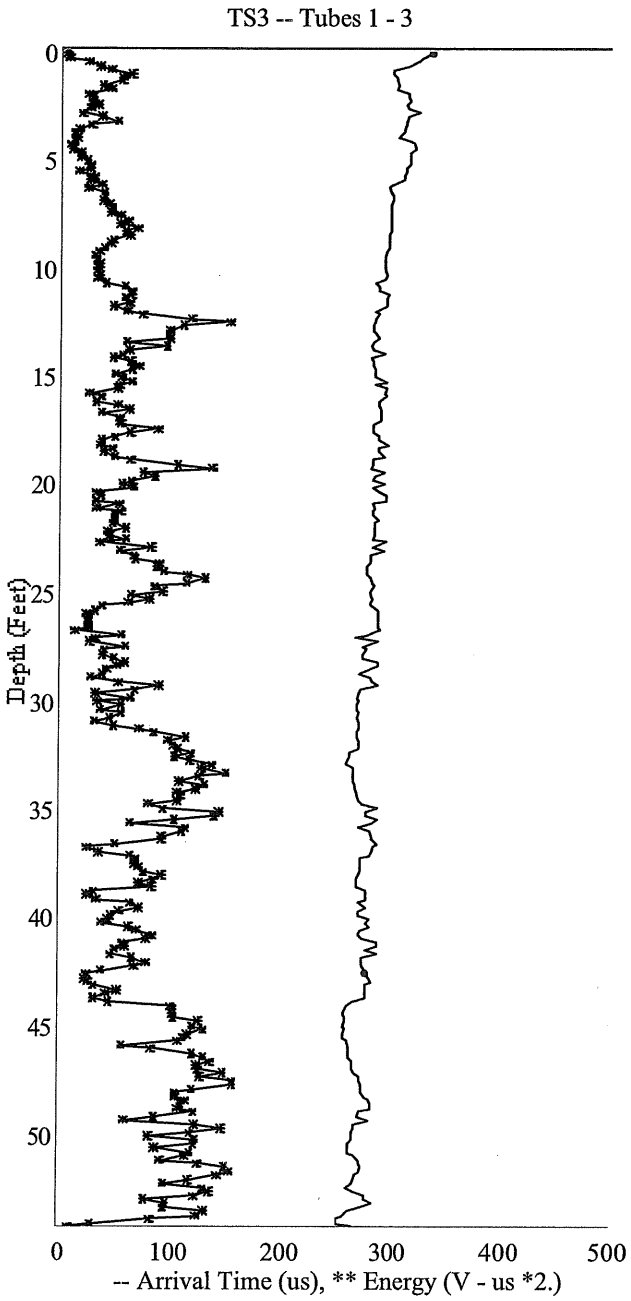
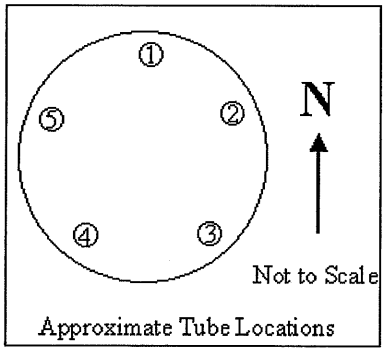

Depth (ft)
0
5
10
15
20
25
30
35
40
45
50
0 100 200 300 400 500 600 700 800 900 1000 1100 1200 1300 1400 1500 1600 1700 1800 1900
Time (micro seconds)
Shaft Name: TS3
Tubepair: 5 - 1
Number of Tubes: 5
Tube Spacing: 26.4 inches

Figure 15





Tube Spacing :	45.60 inches
Signal Gain :	400
Threshold :	1.50
NSE:	1000

Figure 16

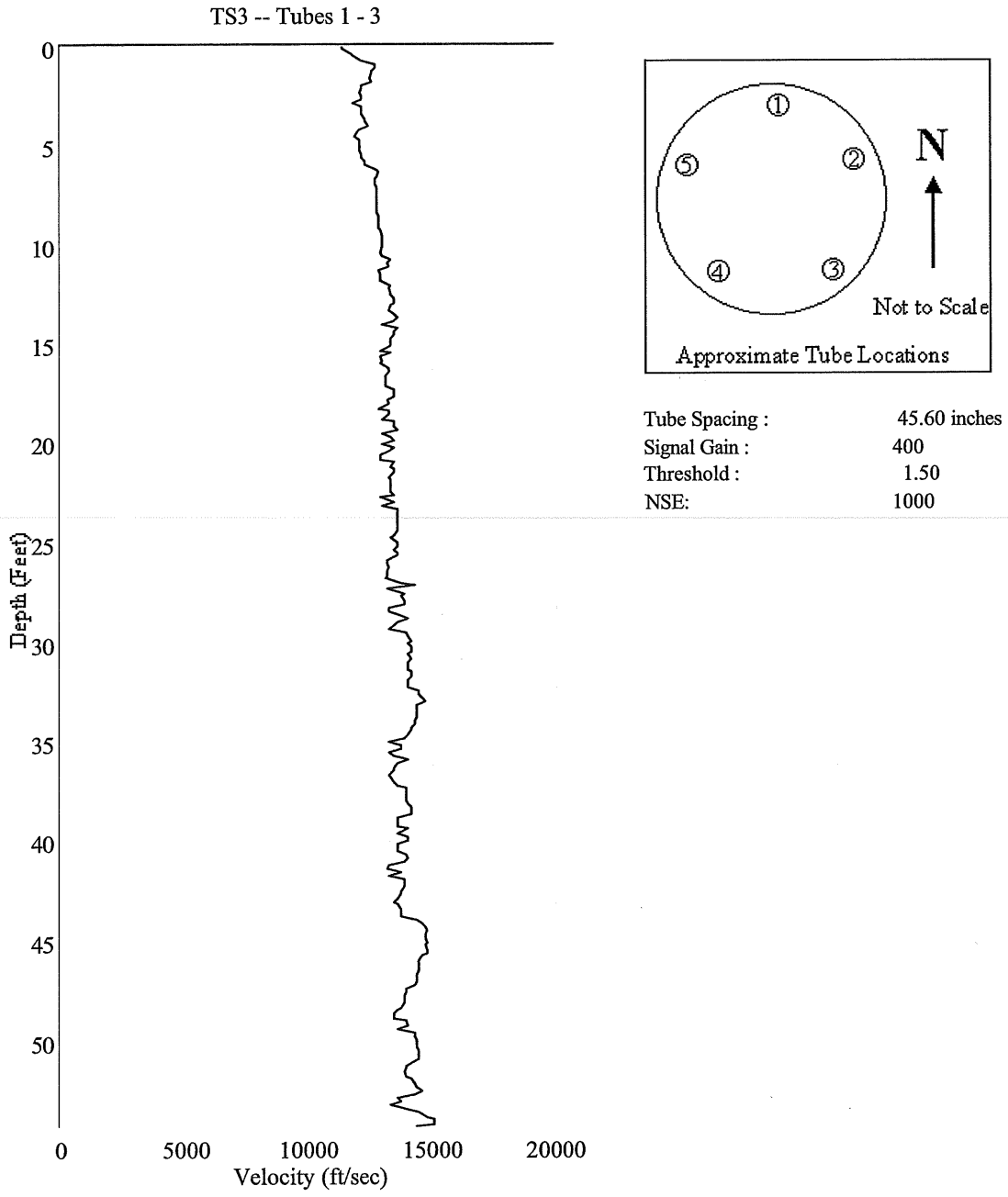
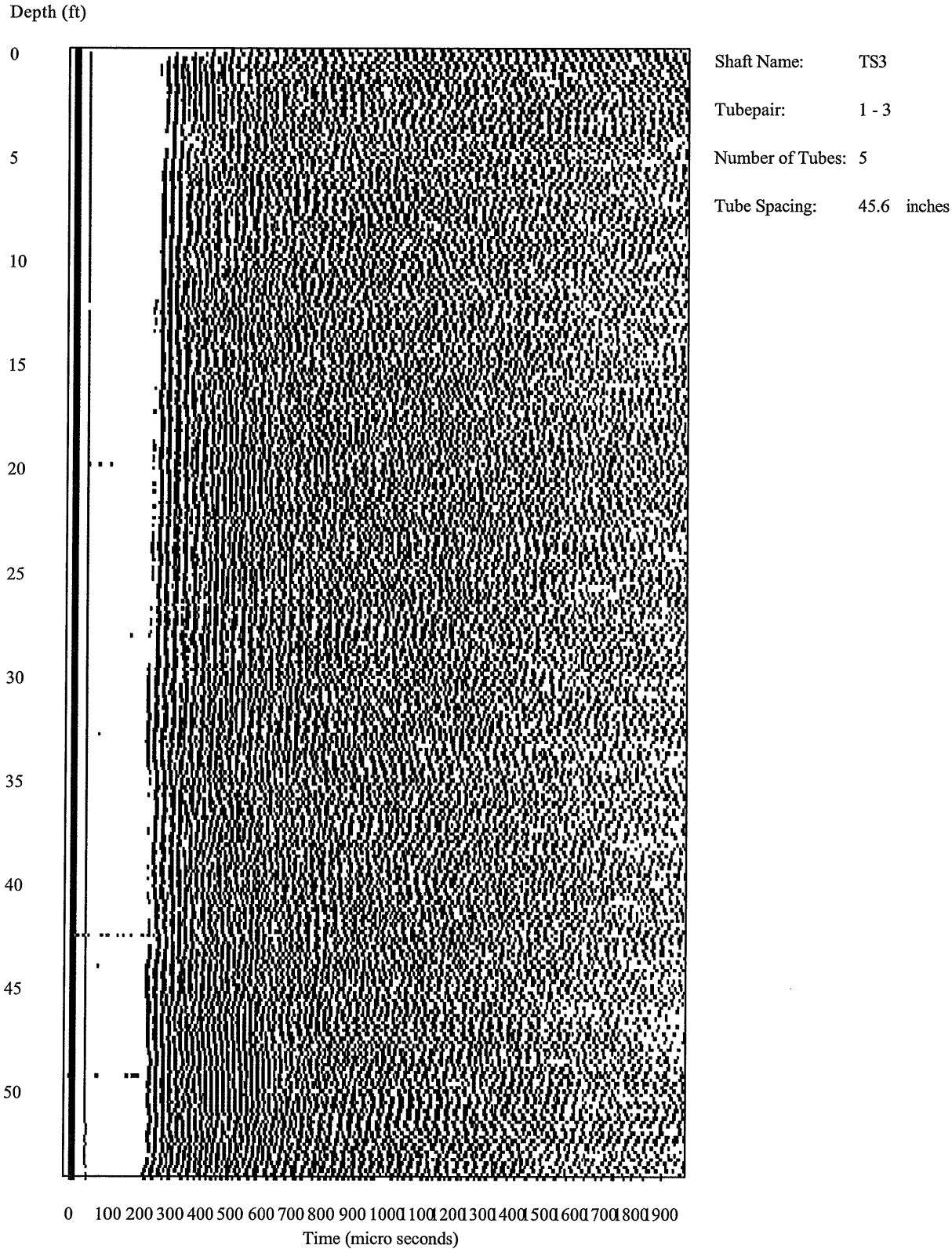

TS3 -- Tubes 1 - 3
0
5
10
15
20
25
30
35
40
45
50
Depth (Feet)
0
5000
10000
15000
20000
Velocity (ft/sec)
①
②
③
④
⑤
N
Not to Scale
Approximate Tube Locations
Tube Spacing : 45.60 inches
Signal Gain : 400
Threshold : 1.50
NSE: 1000

Figure 17



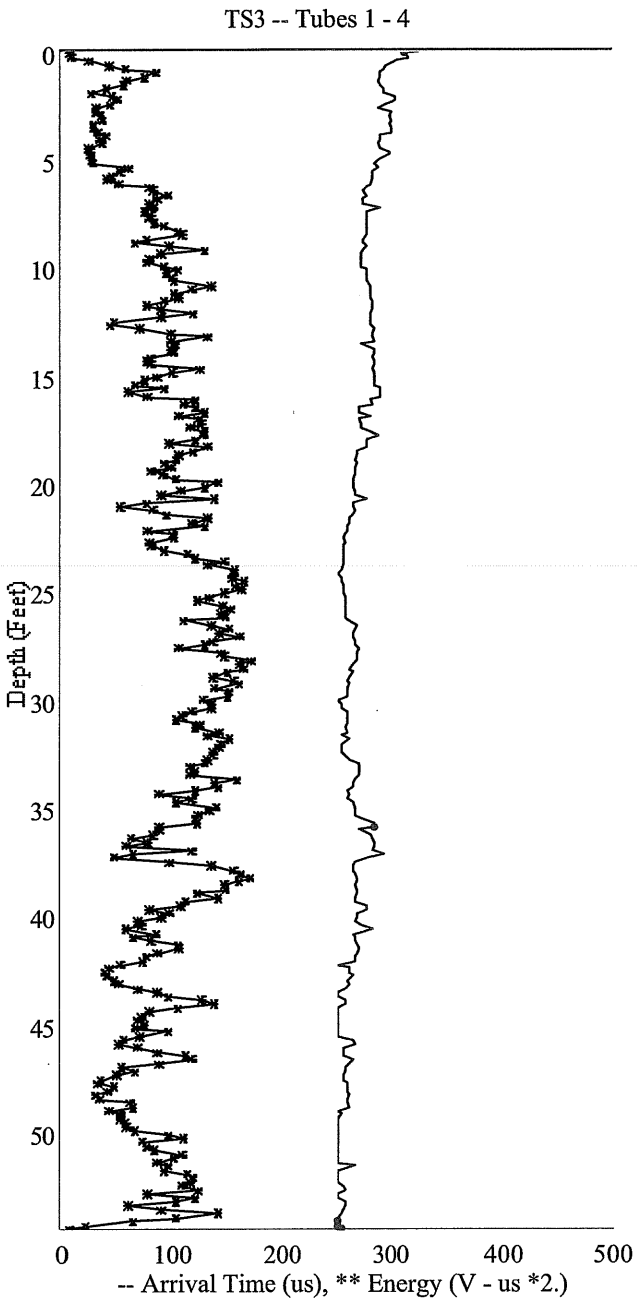
Shaft Name: TS3

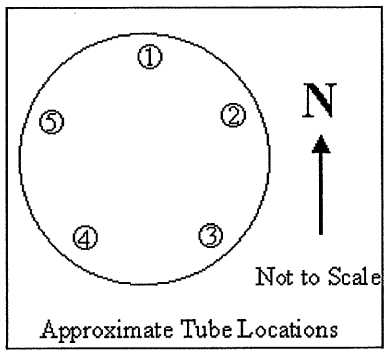
Tubepair: 1 - 3

Number of Tubes: 5

Tube Spacing: 45.6 inches

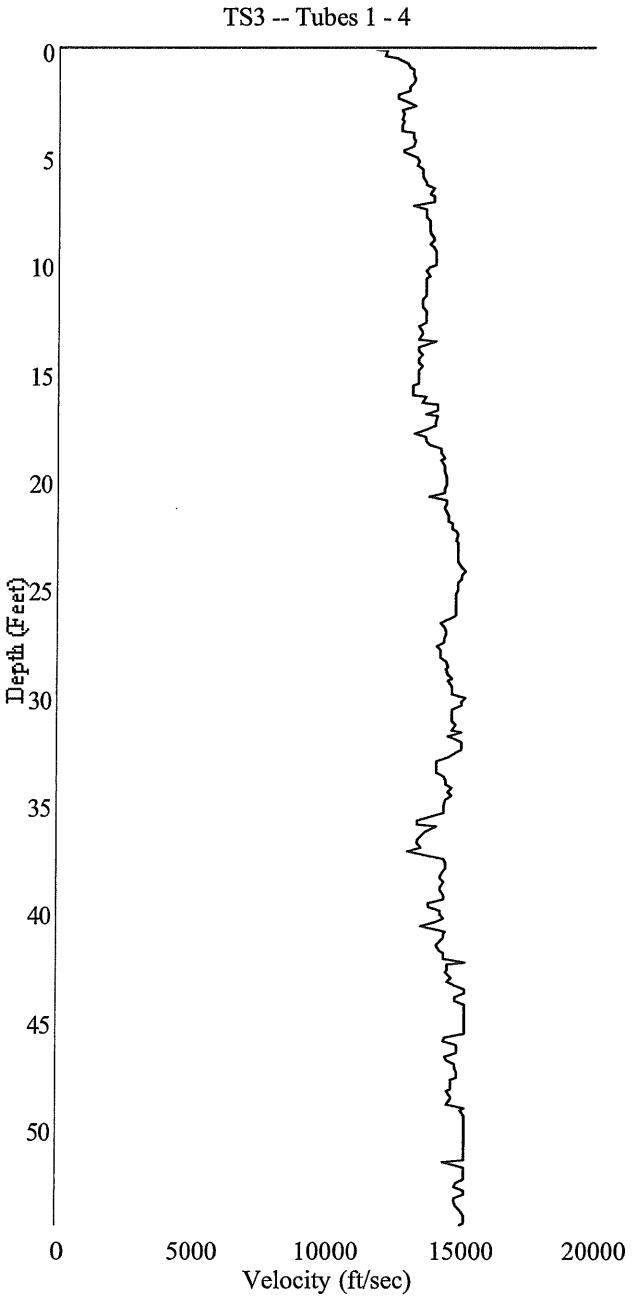
Figure 18

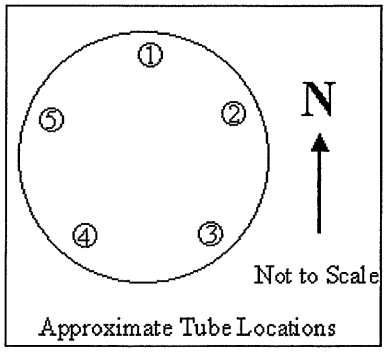




Tube Spacing :	45.60 inches
Signal Gain :	400
Threshold :	1.50
NSE:	1000

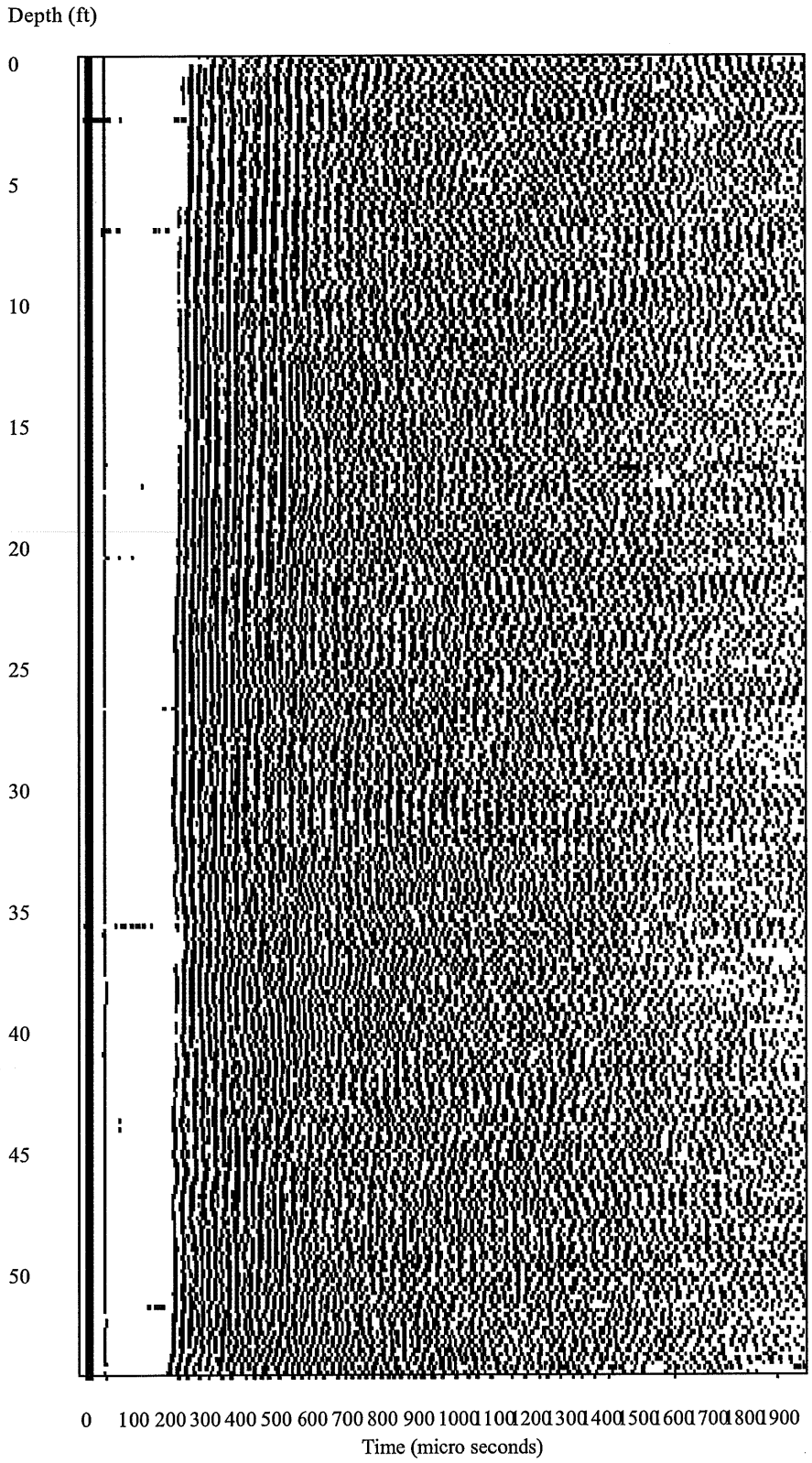
Figure 19





Tube Spacing :	45.60 inches
Signal Gain :	400
Threshold :	1.50
NSE:	1000

Figure 20



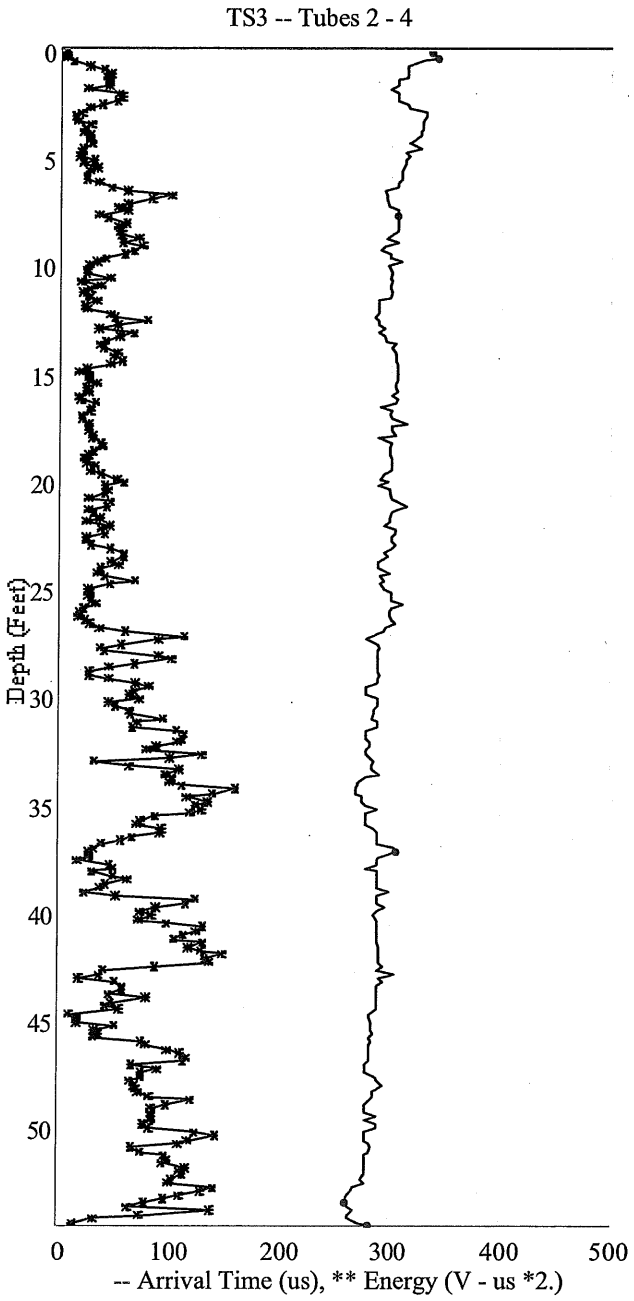
Shaft Name: TS3

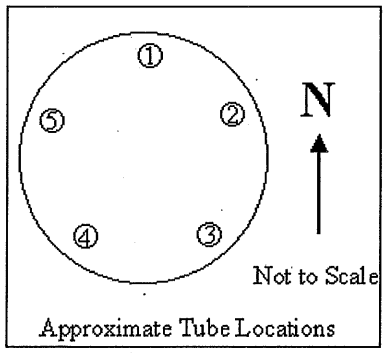
Tubepair: 1 - 4

Number of Tubes: 5

Tube Spacing: 45.6 inches

Figure 21





Tube Spacing :	46.80 inches
Signal Gain :	400
Threshold :	1.50
NSE:	1000

Figure 22

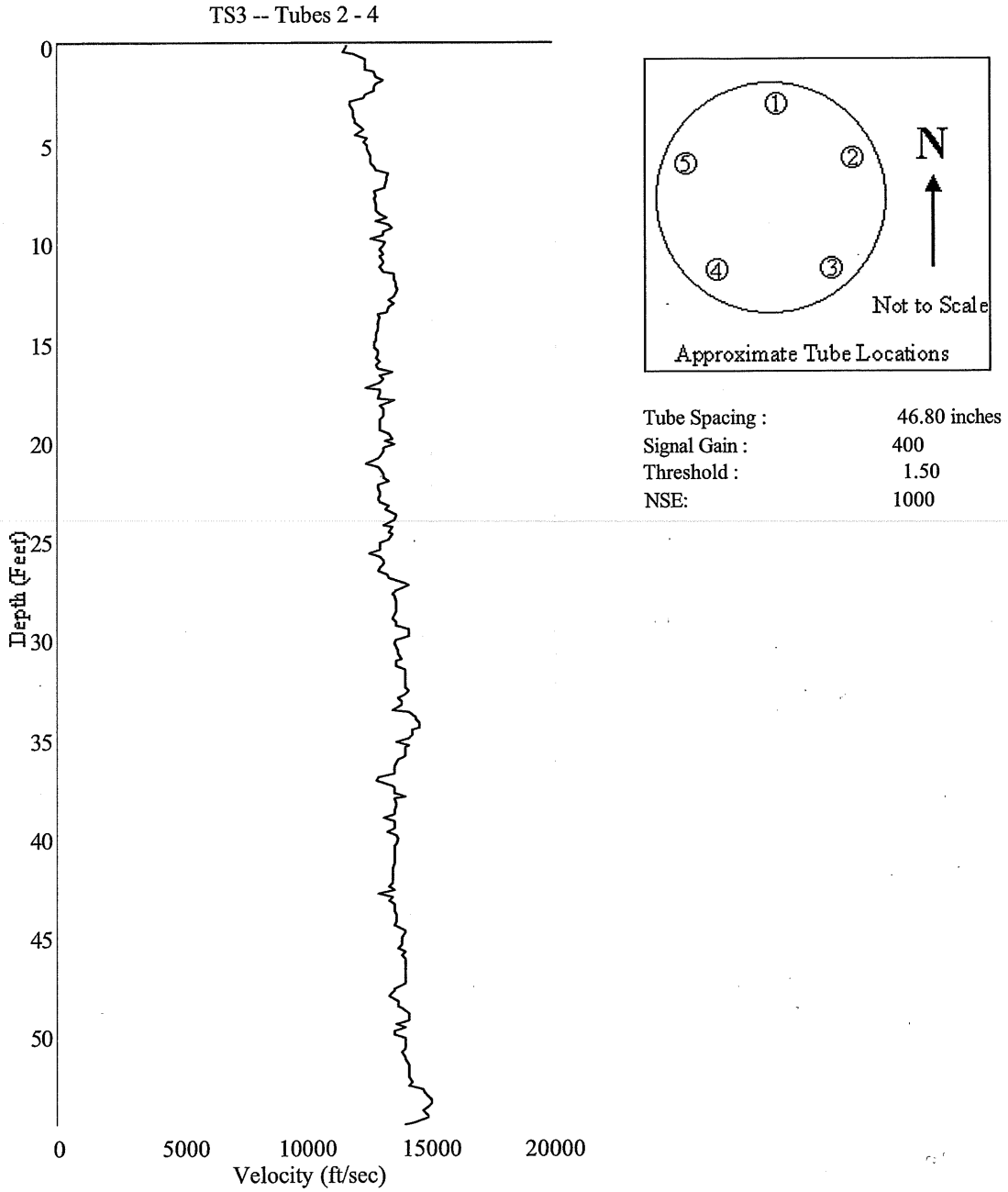
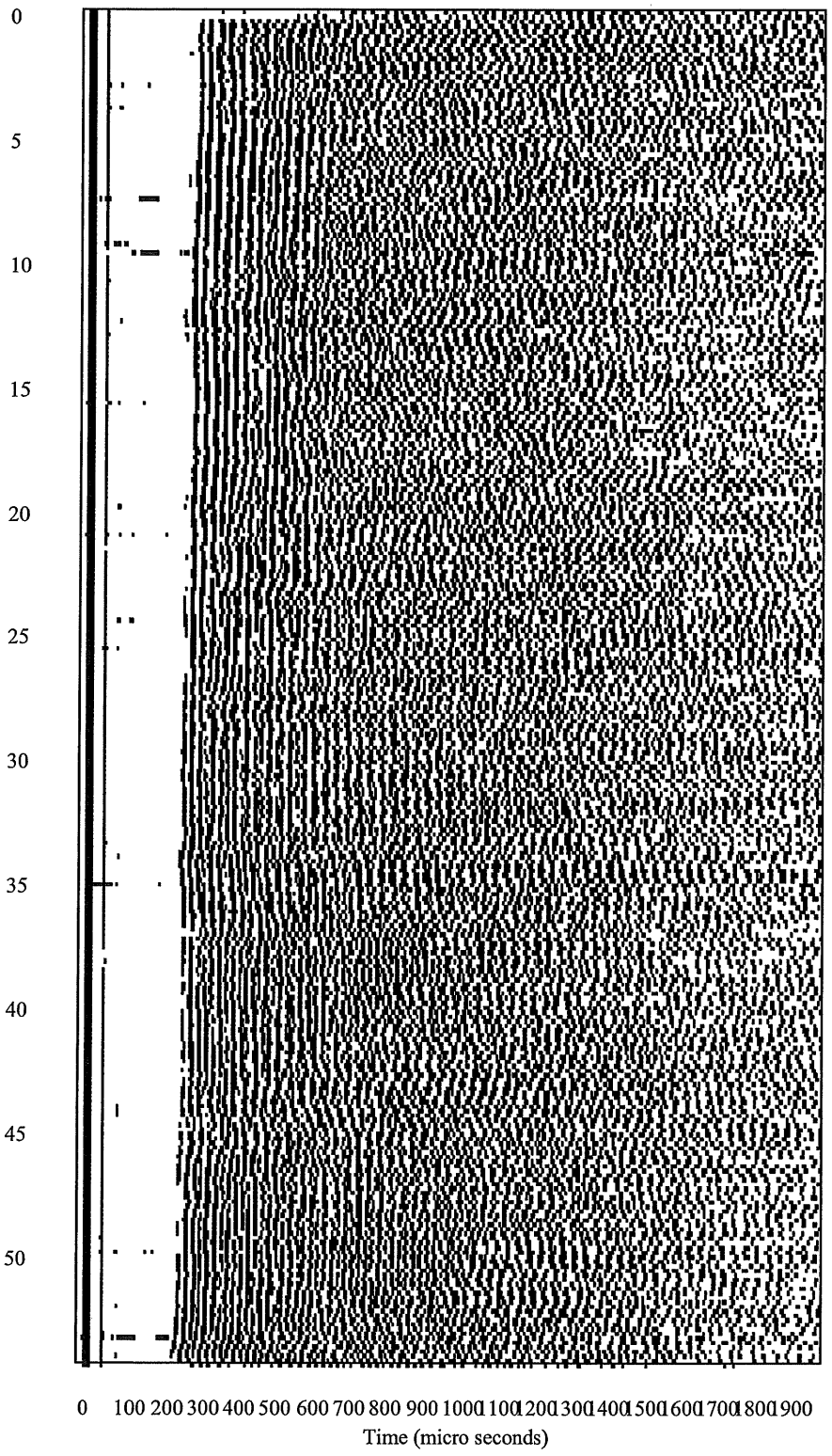

TS3 -- Tubes 2 - 4
0
5
10
15
20
25
30
35
40
45
50
Depth (Feet)
0
5000
10000
15000
20000
Velocity (ft/sec)
①
②
③
④
⑤
N
Not to Scale
Approximate Tube Locations
Tube Spacing : 46.80 inches
Signal Gain : 400
Threshold : 1.50
NSE: 1000

Figure 23



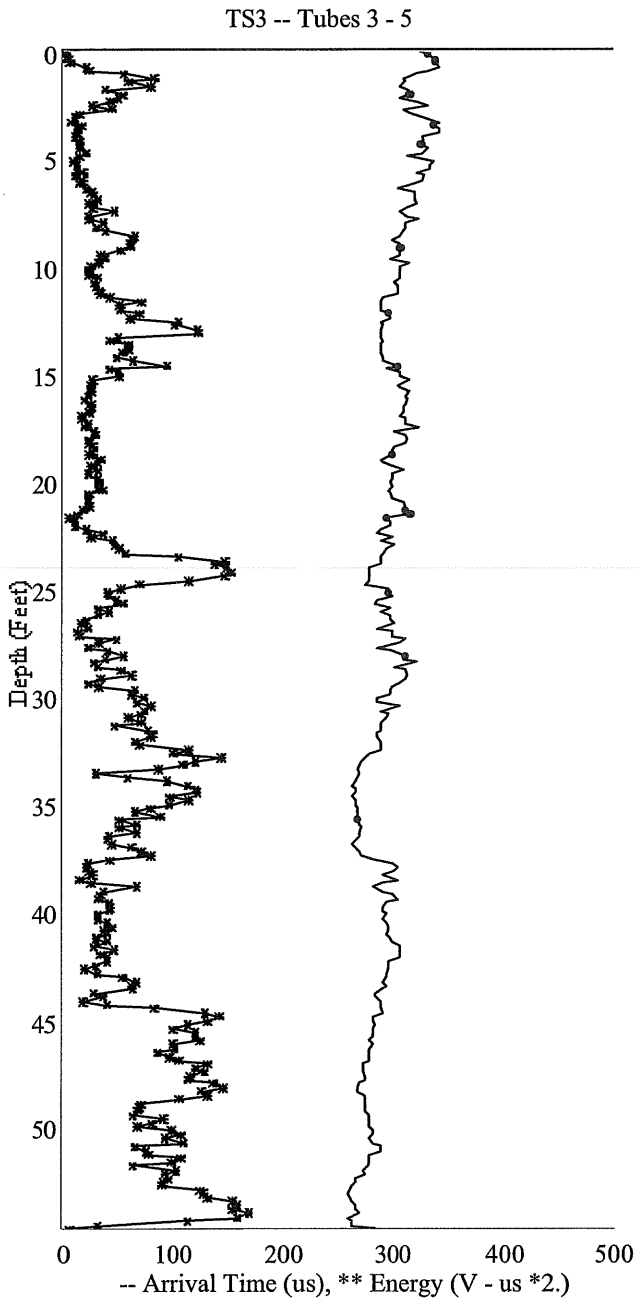
Shaft Name: TS3

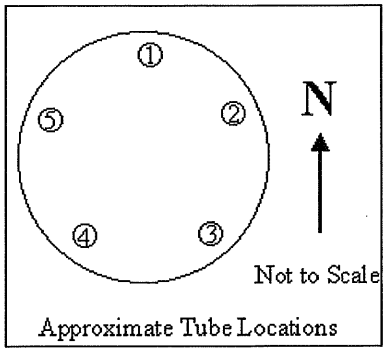
Tubepair: 2 - 4

Number of Tubes: 5

Tube Spacing: 46.8 inches

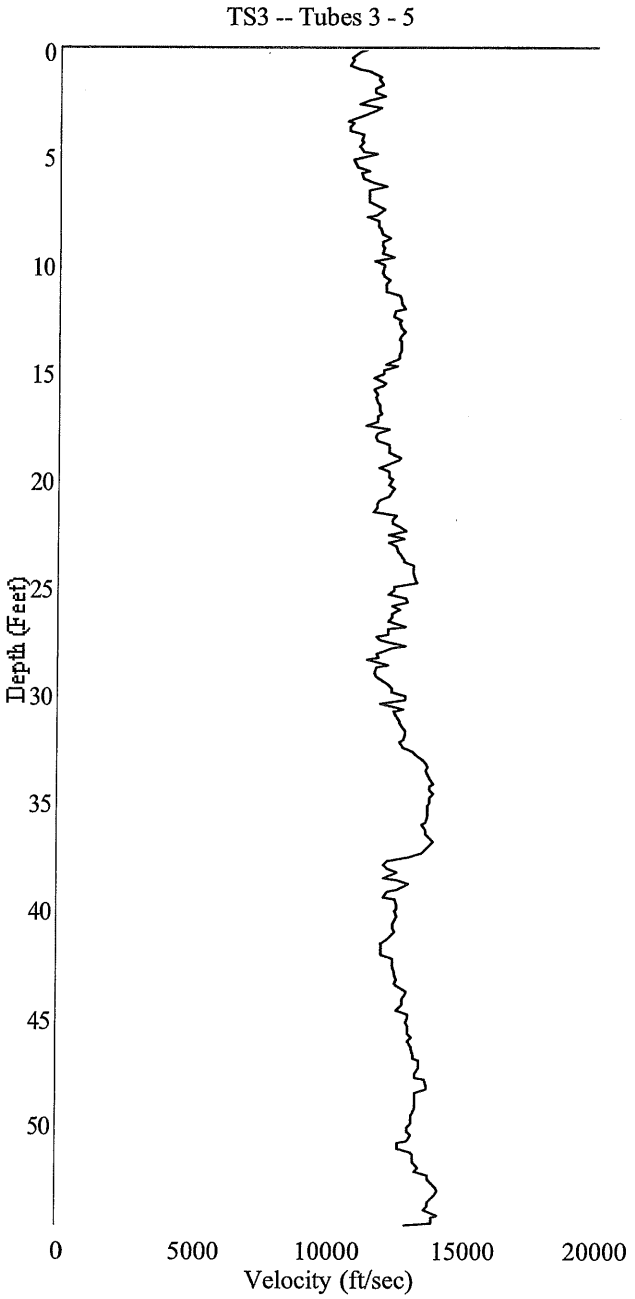
Figure 24

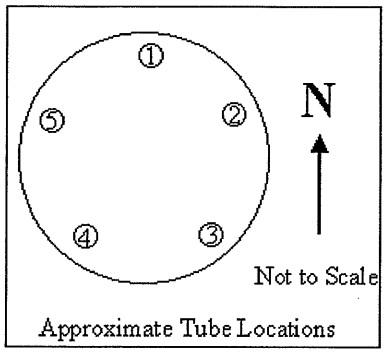




Tube Spacing :	43.50 inches
Signal Gain :	400
Threshold :	1.50
NSE:	1000

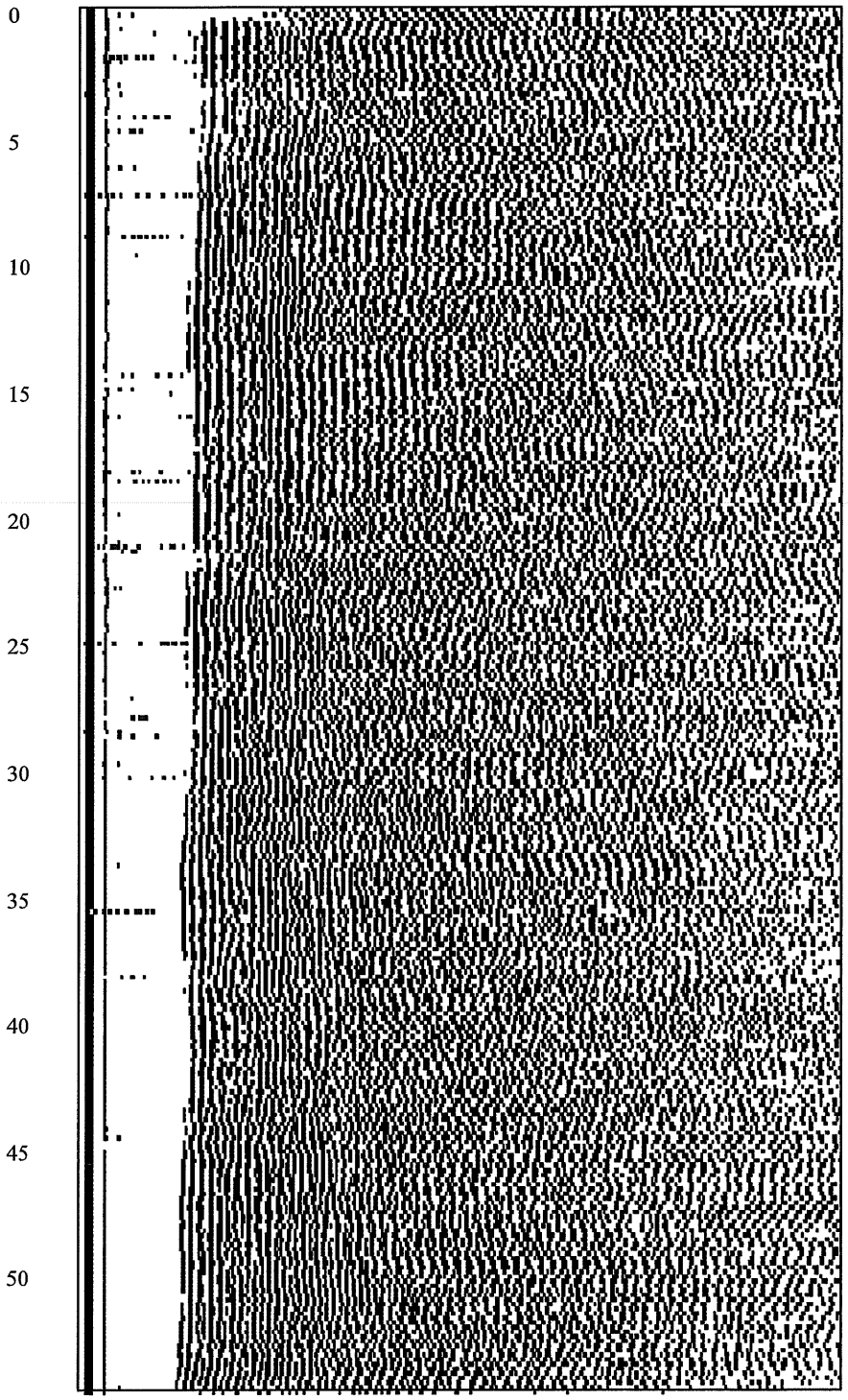
Figure 25





Tube Spacing :	43.50 inches
Signal Gain :	400
Threshold :	1.50
NSE:	1000

Figure 26



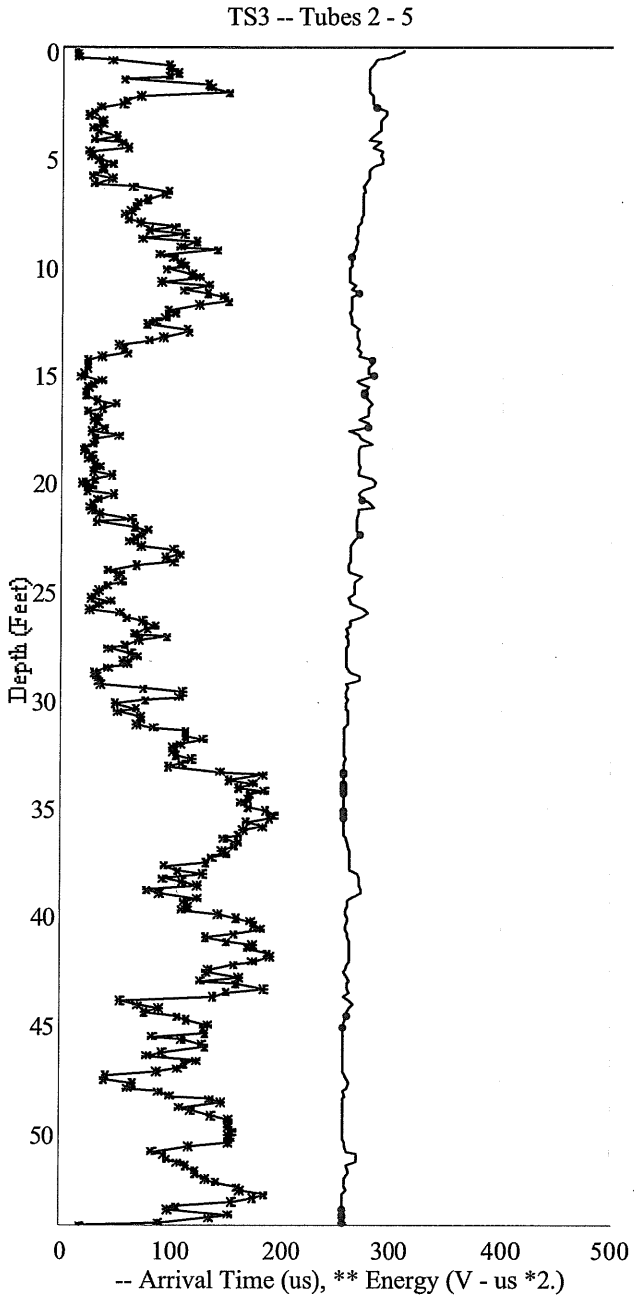
Shaft Name: TS3

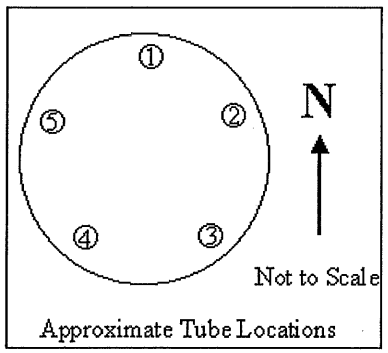
Tubepair: 3 - 5

Number of Tubes: 5

Tube Spacing: 43.5 inches

Figure 27





Tube Spacing :	46.20 inches
Signal Gain :	400
Threshold :	1.50
NSE:	1000

Figure 28

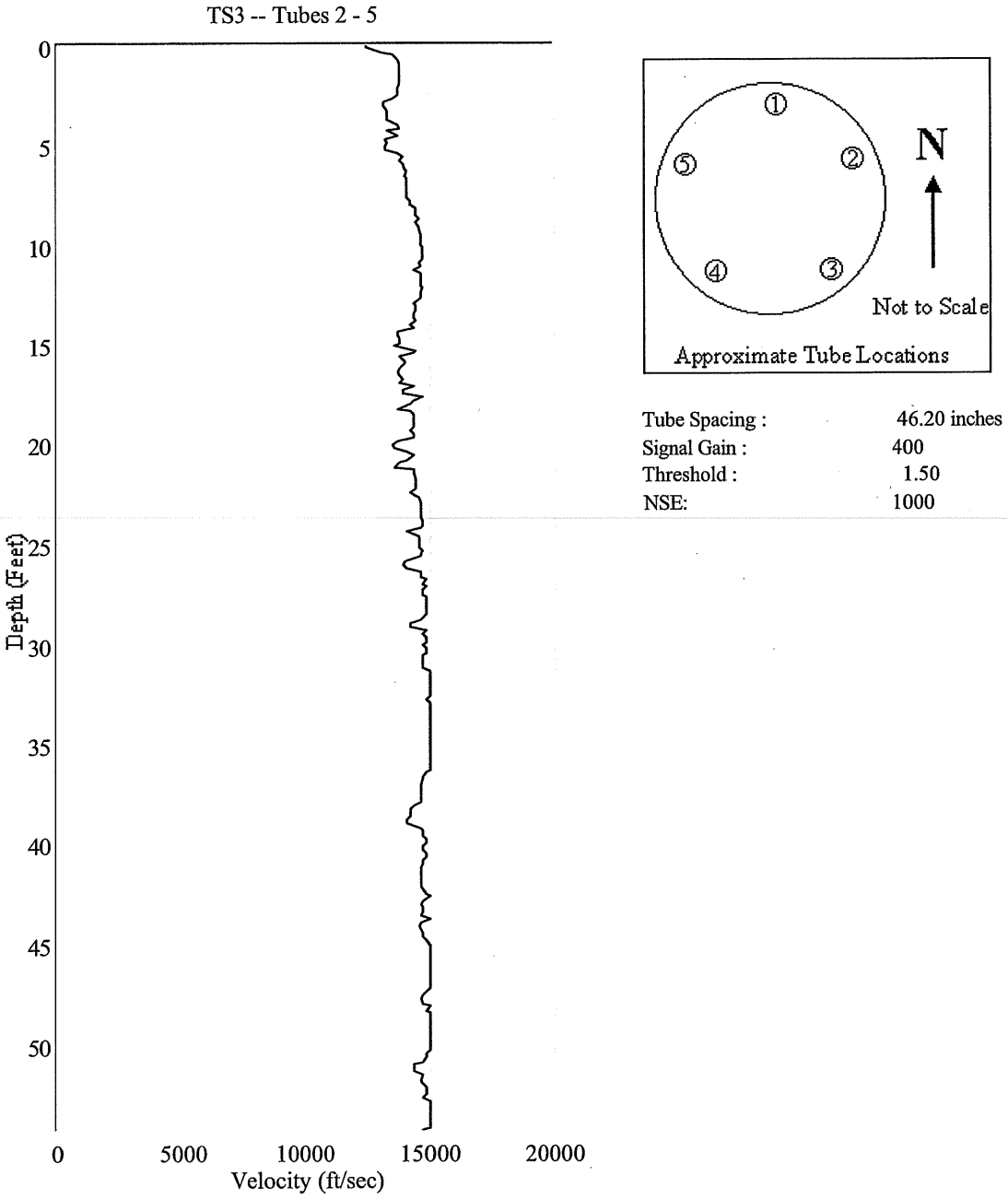
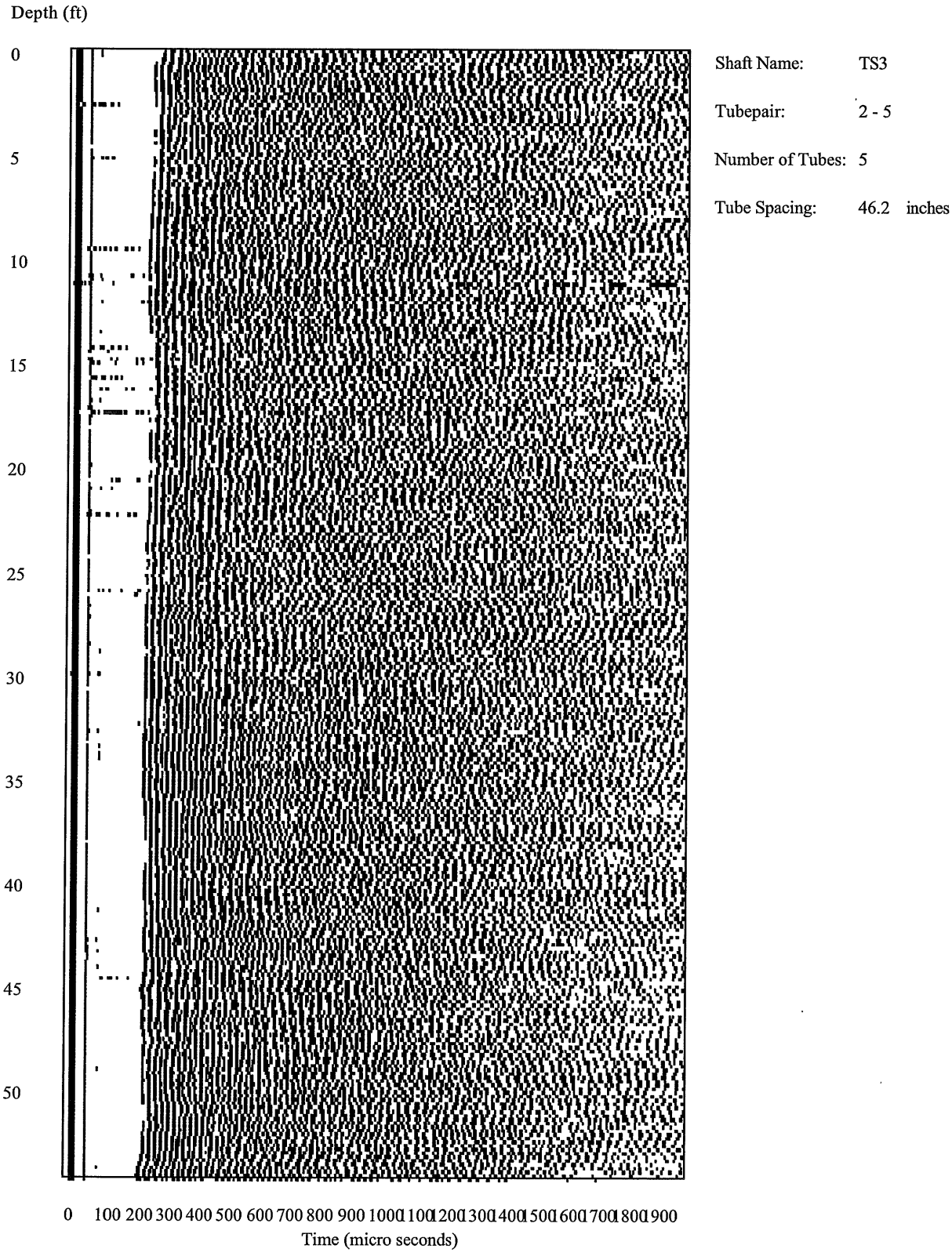

TS3 -- Tubes 2 - 5
0
5
10
15
20
25
30
35
40
45
50
Depth (Feet)
0
5000
10000
15000
20000
Velocity (ft/sec)
①
②
③
④
⑤
N
Not to Scale
Approximate Tube Locations
Tube Spacing : 46.20 inches
Signal Gain : 400
Threshold : 1.50
NSE: 1000

Figure 29



Shaft Name: TS3

Tubepair: 2 - 5

Number of Tubes: 5

Tube Spacing: 46.2 inches

Figure 30