



## FOUNDATION TESTING & CONSULTING, LLC

*Knowledge To Build On*

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May 10, 2010

Mr. Ed Nickell  
Longfellow Drilling, Inc.  
1209 County Highway J23  
Clearfield, IA 50840-8814

Subject: CSL Report No. 1  
Survey of Test Shafts 3 and 4  
Broadway Viaduct Project  
Pottawattamie County, Iowa  
FTC Project Number 016-2010

Dear Mr. Nickell,

Foundation Testing and Consulting, LLC (FTC) is pleased to present the results of our evaluation of the CSL survey for the referenced shafts. The surveys were performed on May 10, 2010.

### Summary of Results

Based upon data collected during our CSL survey, we find that the full length of both shafts surveyed (Test Shafts 3 and 4) consist of good quality concrete with typical sonic velocities of approximately 13,000 feet per second. As such, no concrete coring or further investigation is recommended for these shafts.

### Shaft Dimensions

**Resubmit this page with  
the correct diameter and  
date cast**

Key shaft information is summarized in Table 1 below.

Table 1 – Shaft Data

Shaft Name	Shaft Diameter (inches)	Number of Tubes	Cast Date	Survey Date	*Measured Length (ft)	Plan Length (ft)
Test Shaft 3	66	5	5/6/10	5/10/10	75.1	75.0
Test Shaft 4	66	5	5/5/10	5/10/10	74.8	75.0

\* Calculated based on maximum length of access tubes inside shaft

### Survey Conditions

At the time of the survey, the weather was rainy with a temperate of approximately 50 degrees. We placed orange tape on the northernmost tube (tube 1) at each shaft with the remaining tubes numbered in a clockwise direction. Key aspects of the shaft survey conditions are summarized in Table 2.

Table 2 – Shaft Survey Conditions

Shaft Name	Range in Tube Spacing (in)	Average Tube Stick-up (in)	Location of Shaft Top Relative to Ground Surface	Adequate Water Filling of Access Tubes
Test Shaft 3	25.0 to 47.25	35.2	At grade*	yes
Test Shaft 4	25.5 to 47.5	62.25	At grade*	yes

The data were collected using the latest version of CSL equipment and software manufactured by Olson Instruments, Inc. Data were collected using a gain of 100 or 200 and a depth wheel setting of C (one data record for every 2.19 inches of shaft length). The data collection and analysis were performed by or under the direction of the undersigned.

### Survey Results

Plots were generated of the first arrival time (FAT), stacked arrival time (waterfall) and the signal energy versus depth for each tube pair combination (refer to printed plots included with this report). Note that data above top of shaft was deleted from the plots. The following condition rating criteria were applied during our evaluation of results:

Table 3 – Concrete Condition Rating Criteria

Concrete Condition Rating	Rating Symbol	Velocity Reduction	Indicative Results
Good	G	0 to 10%	Acceptable concrete
Questionable	Q	10 to 25%	Minor concrete contamination or intrusion. Questionable quality concrete.
Poor	P/D	>25%	Possible water or slurry contamination, soil intrusion and/or poor quality concrete.
Water	W	Velocity = 4760 to 5005 ft/sec	Water intrusion, of water filled gravel with few or no fines present.
No Signal	NS	No signal received	Soil intrusion or other severe defect absorbed the signal, tube debonding if near shaft top.

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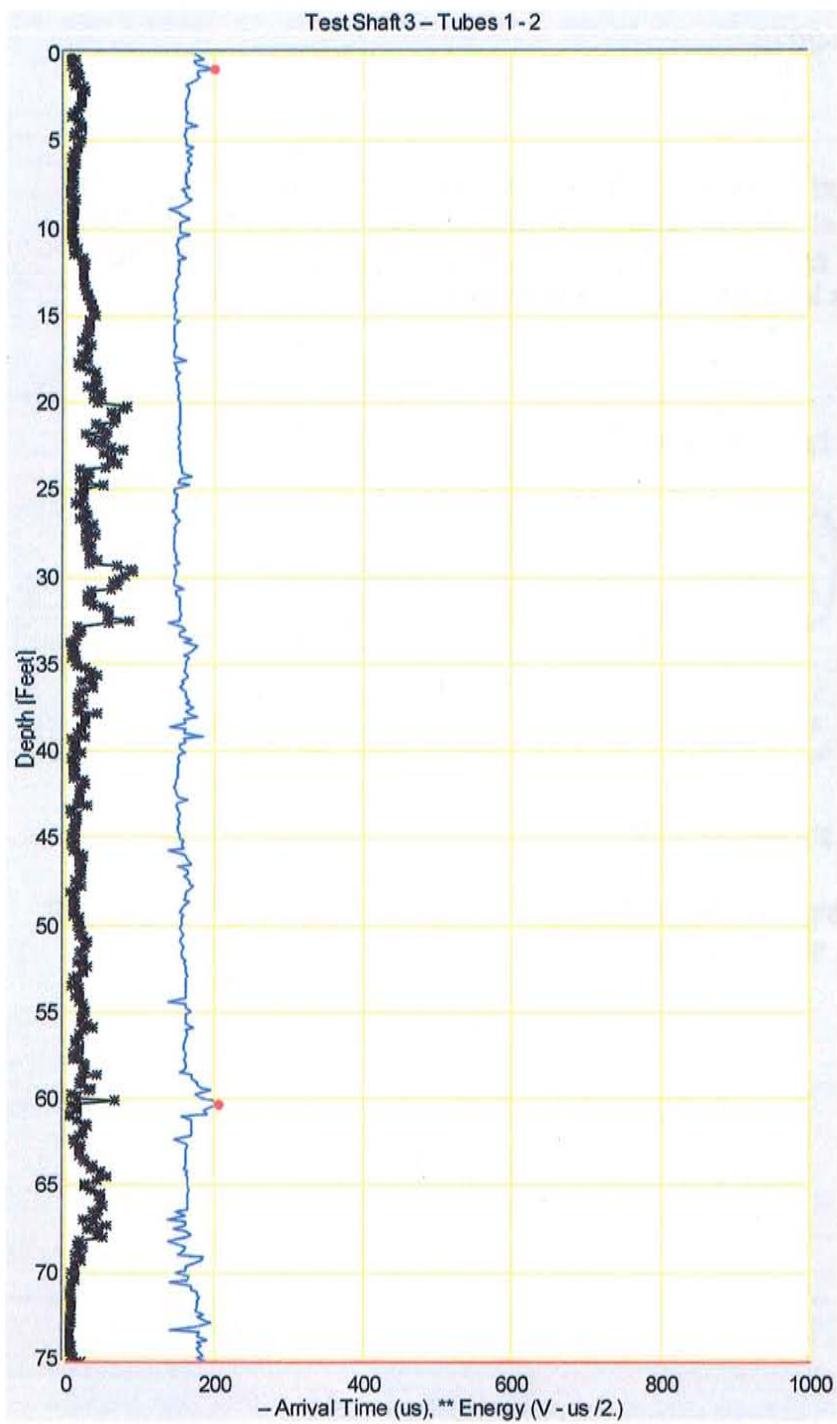
Please contact me if you have any questions.

Sincerely,



William C. Jones, P.E. – President, FTC

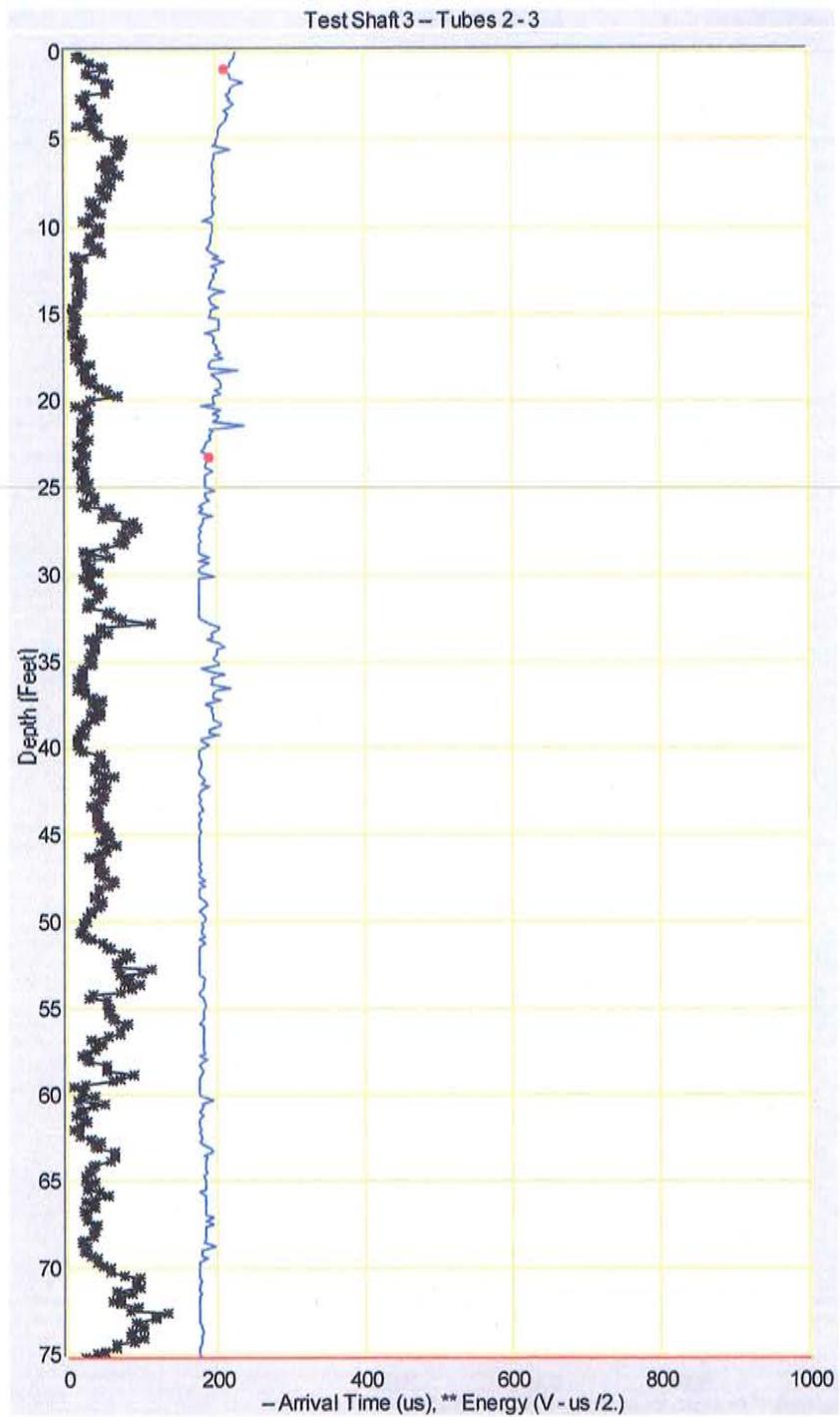
Attachment (40 Plots of signal energy, FAT and stacked arrival time versus depth for each tube pair for the shafts surveyed)



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Plot 1 of 40

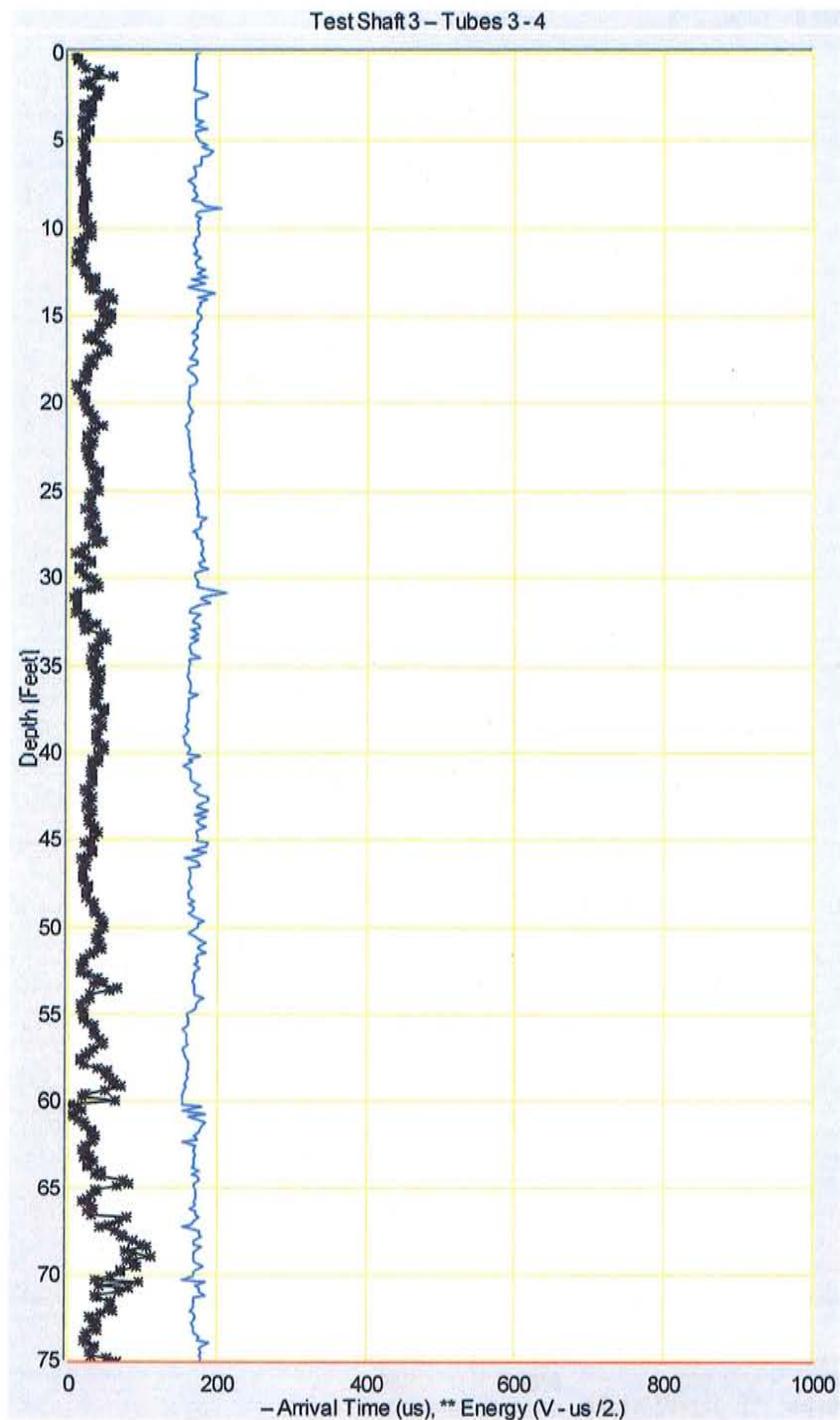




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Plot 2 of 40

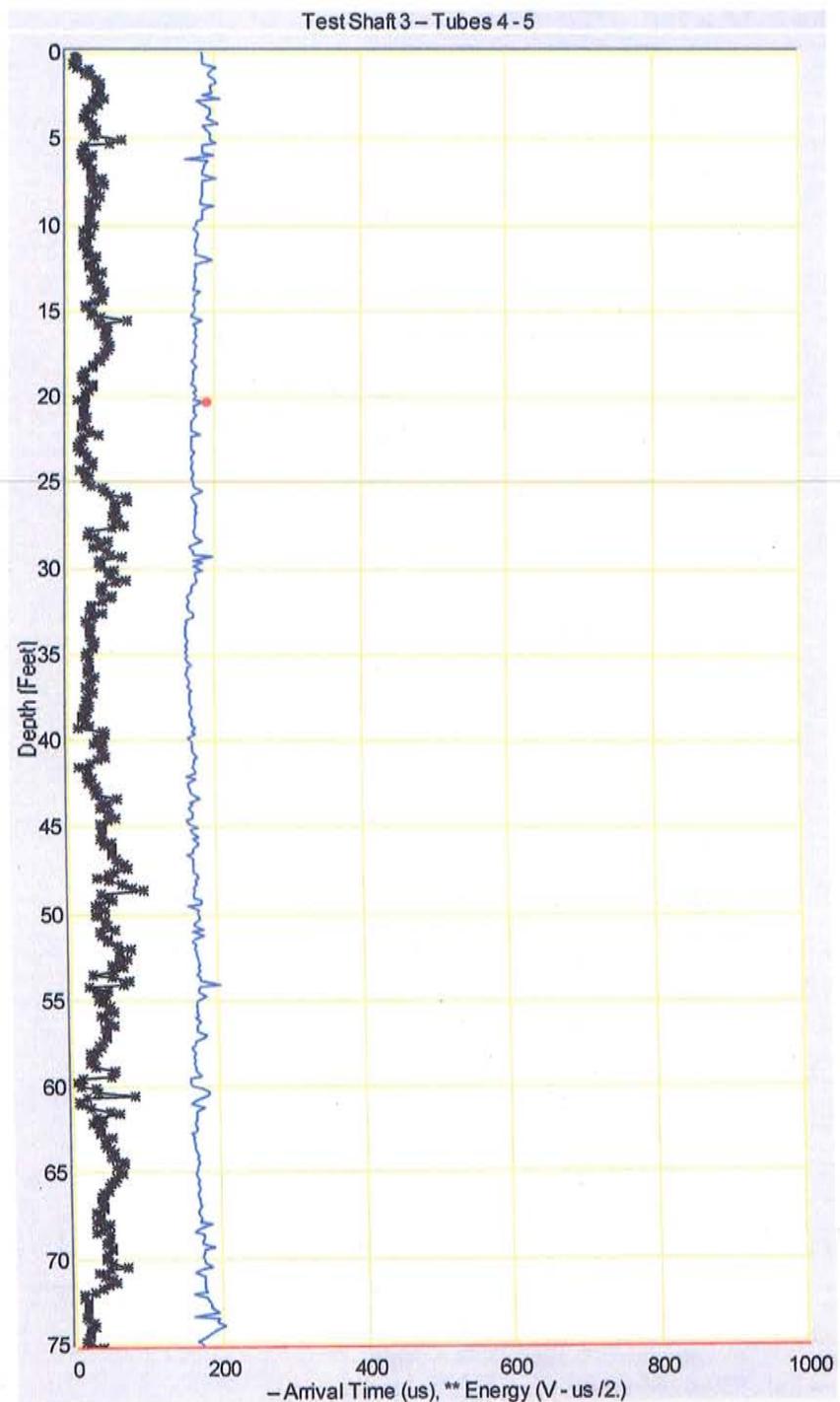




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Plot 3 of 40

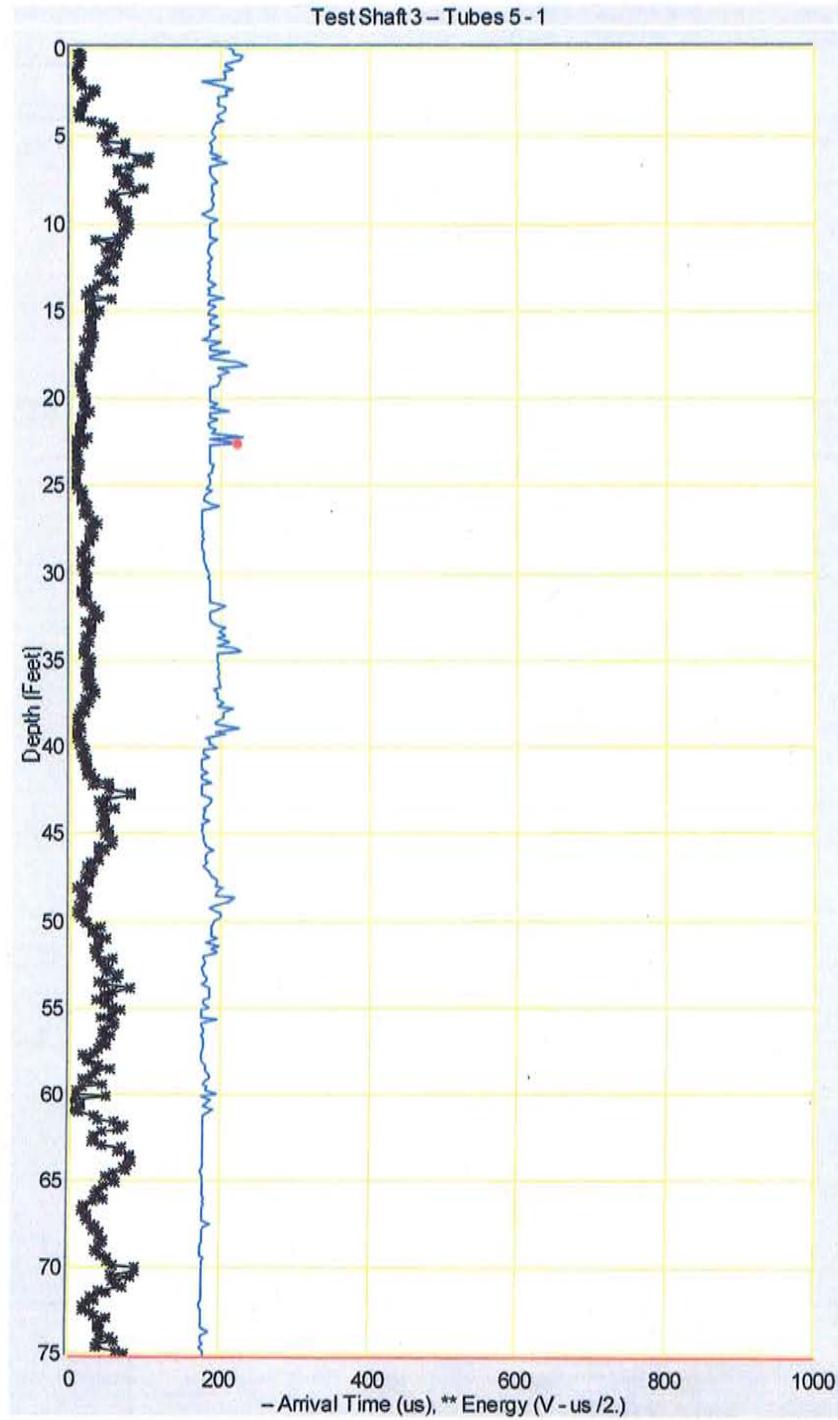




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Plot 4 of 40

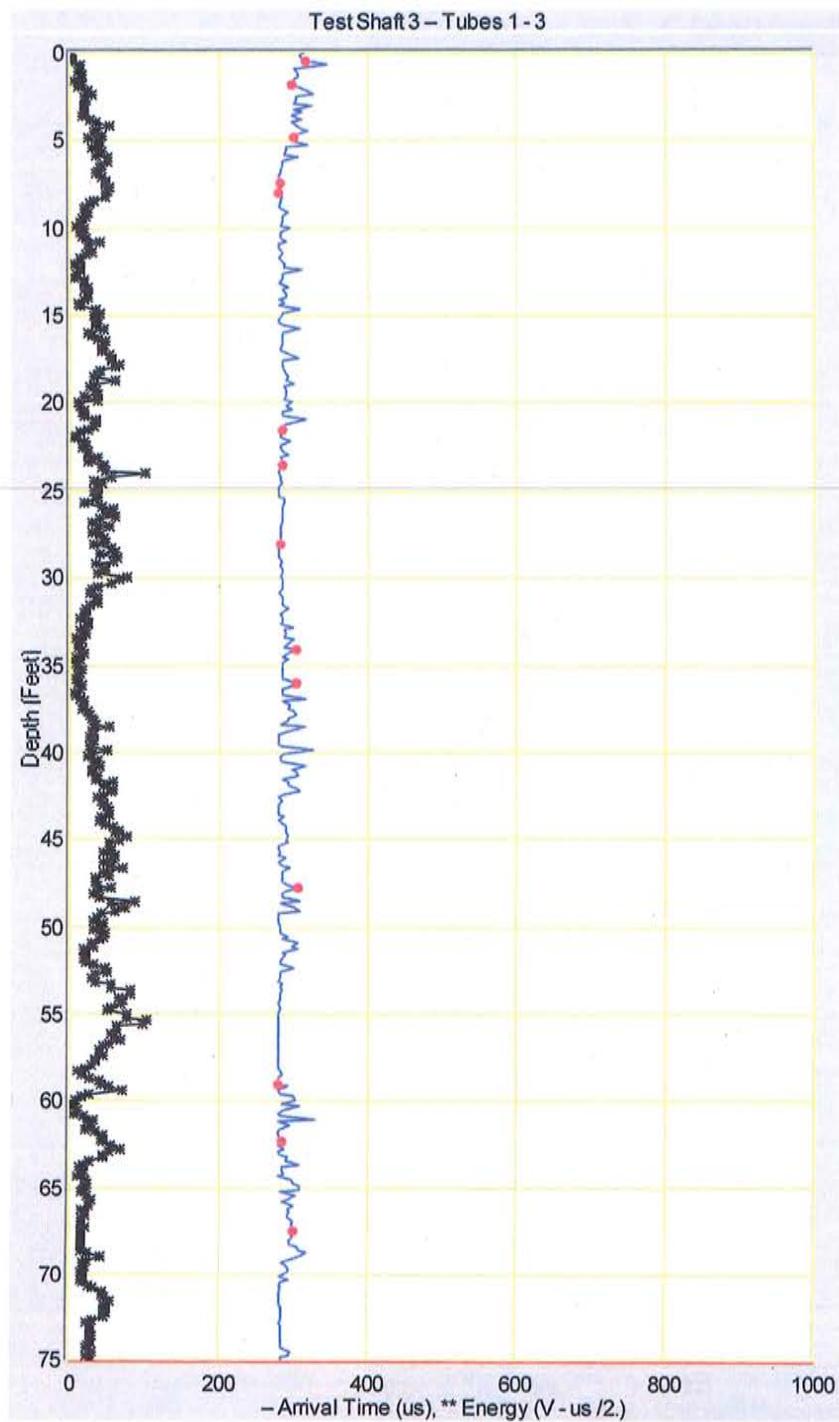




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Plot 5 of 40

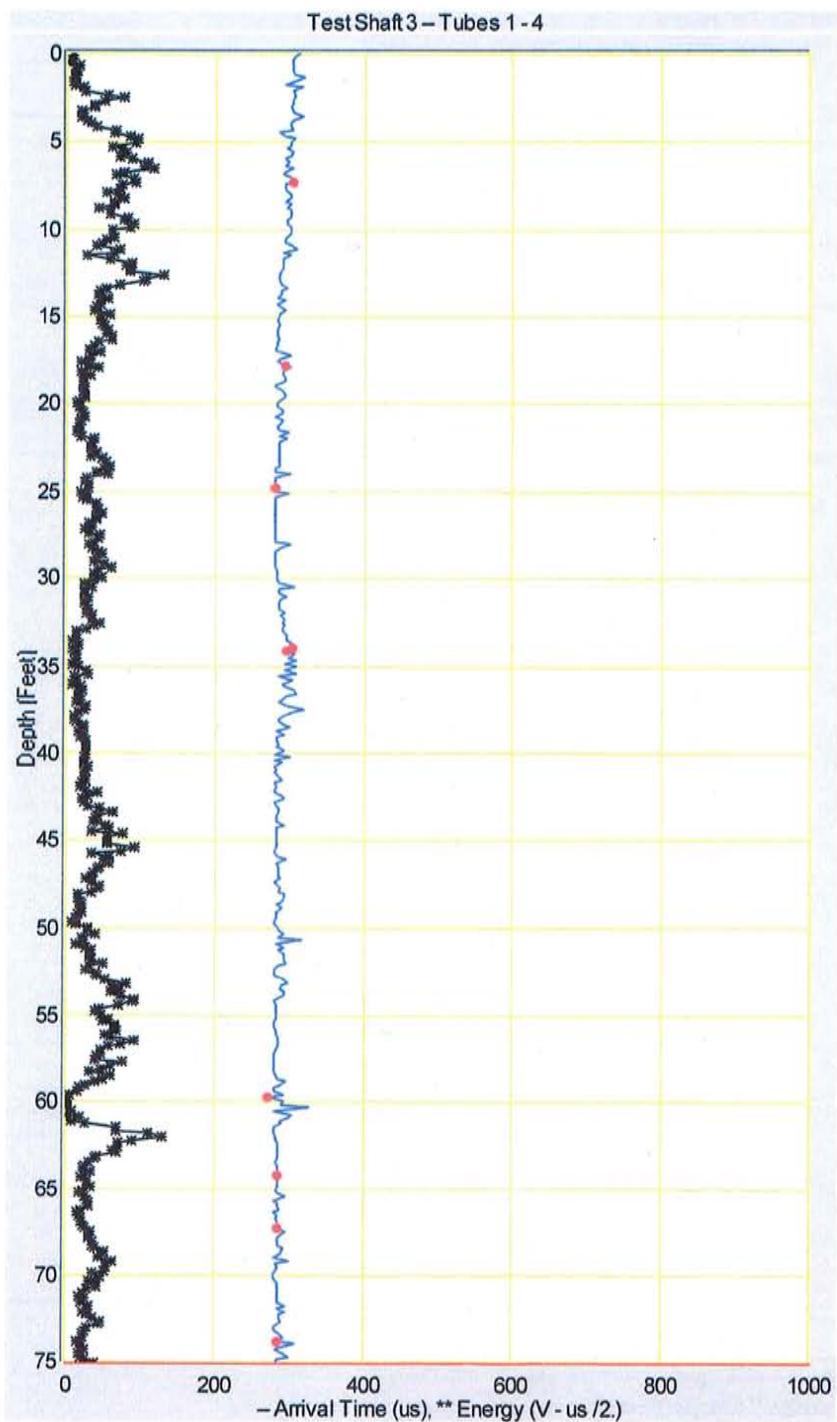




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Plot 6 of 40

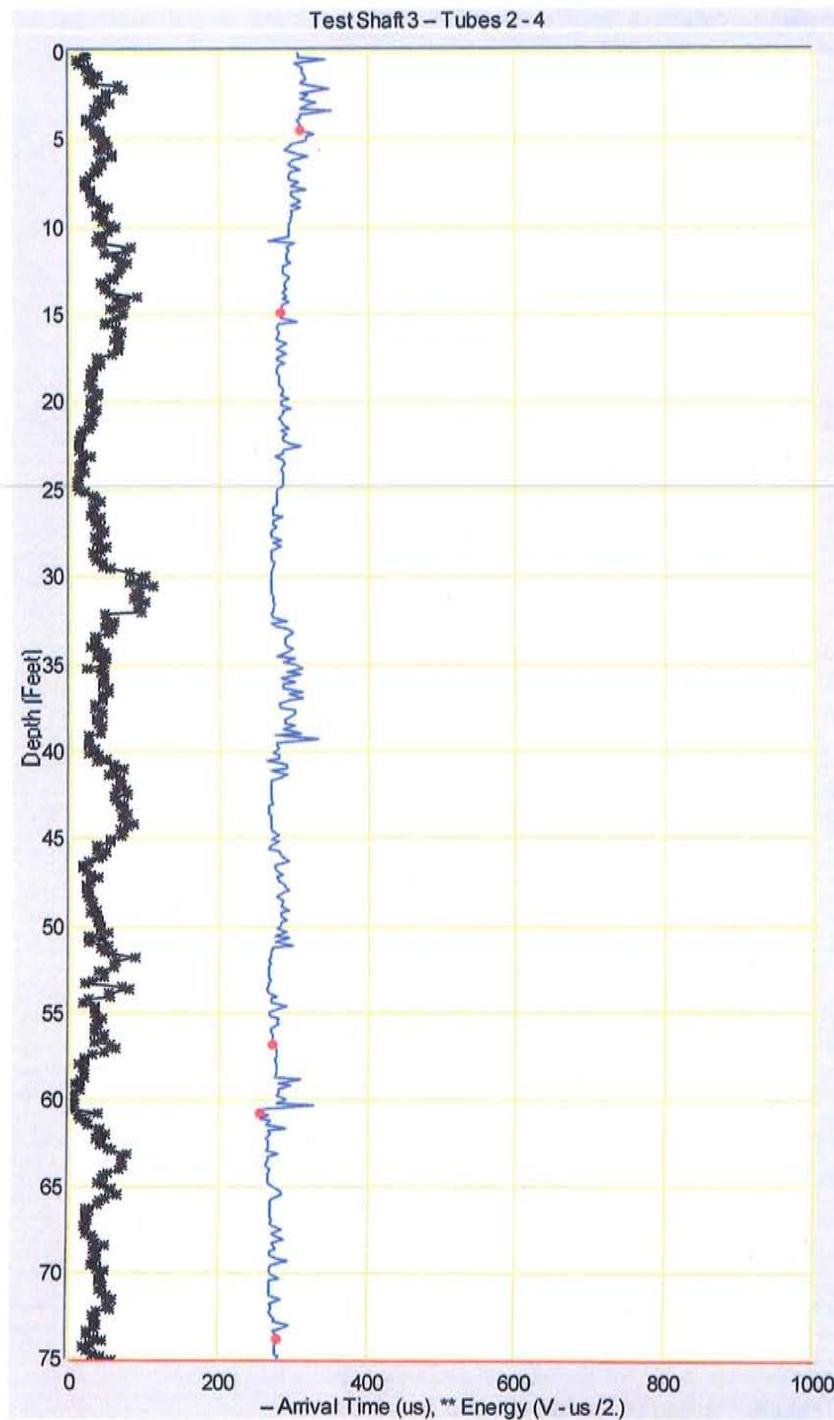




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Plot 7 of 40

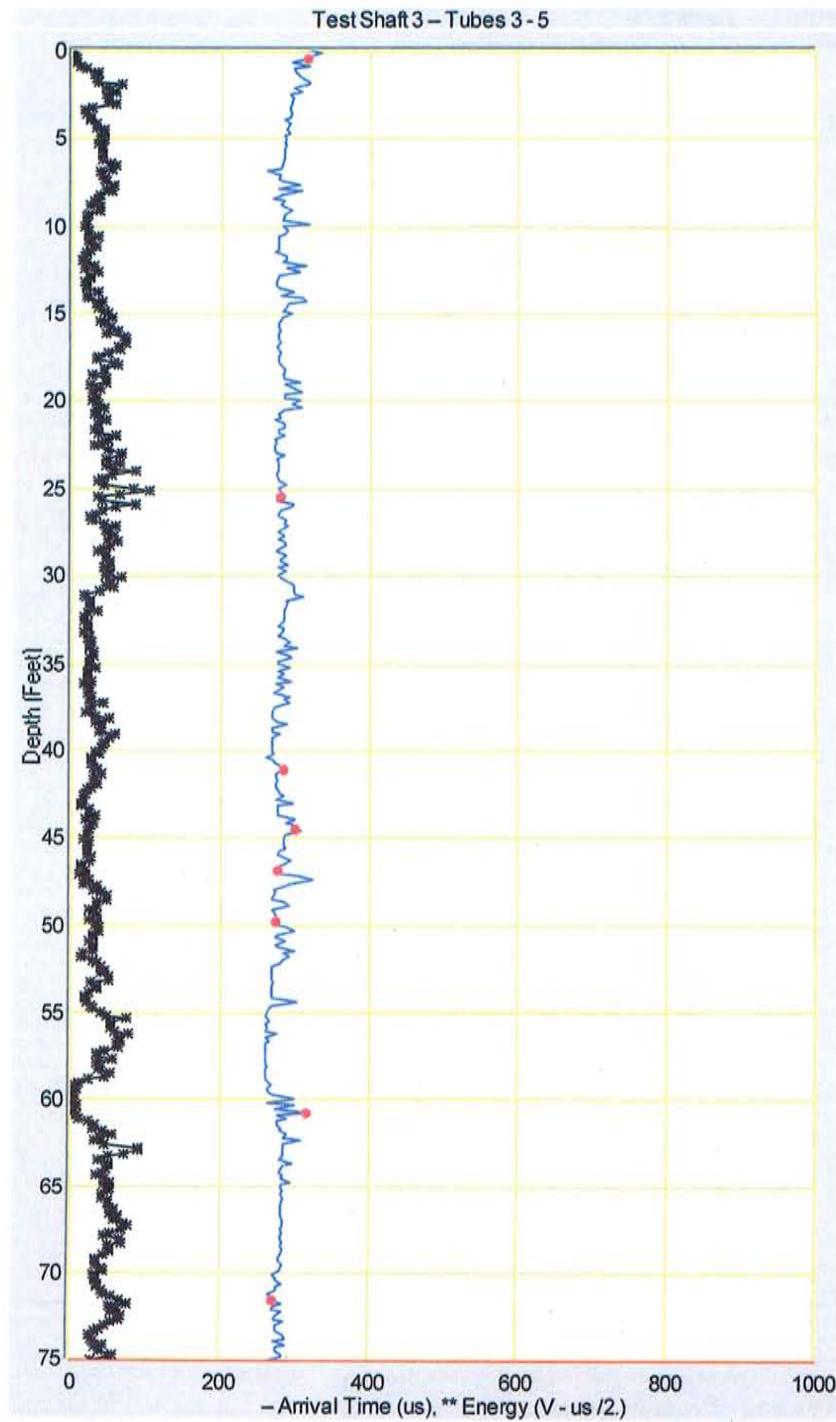




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Plot 8 of 40

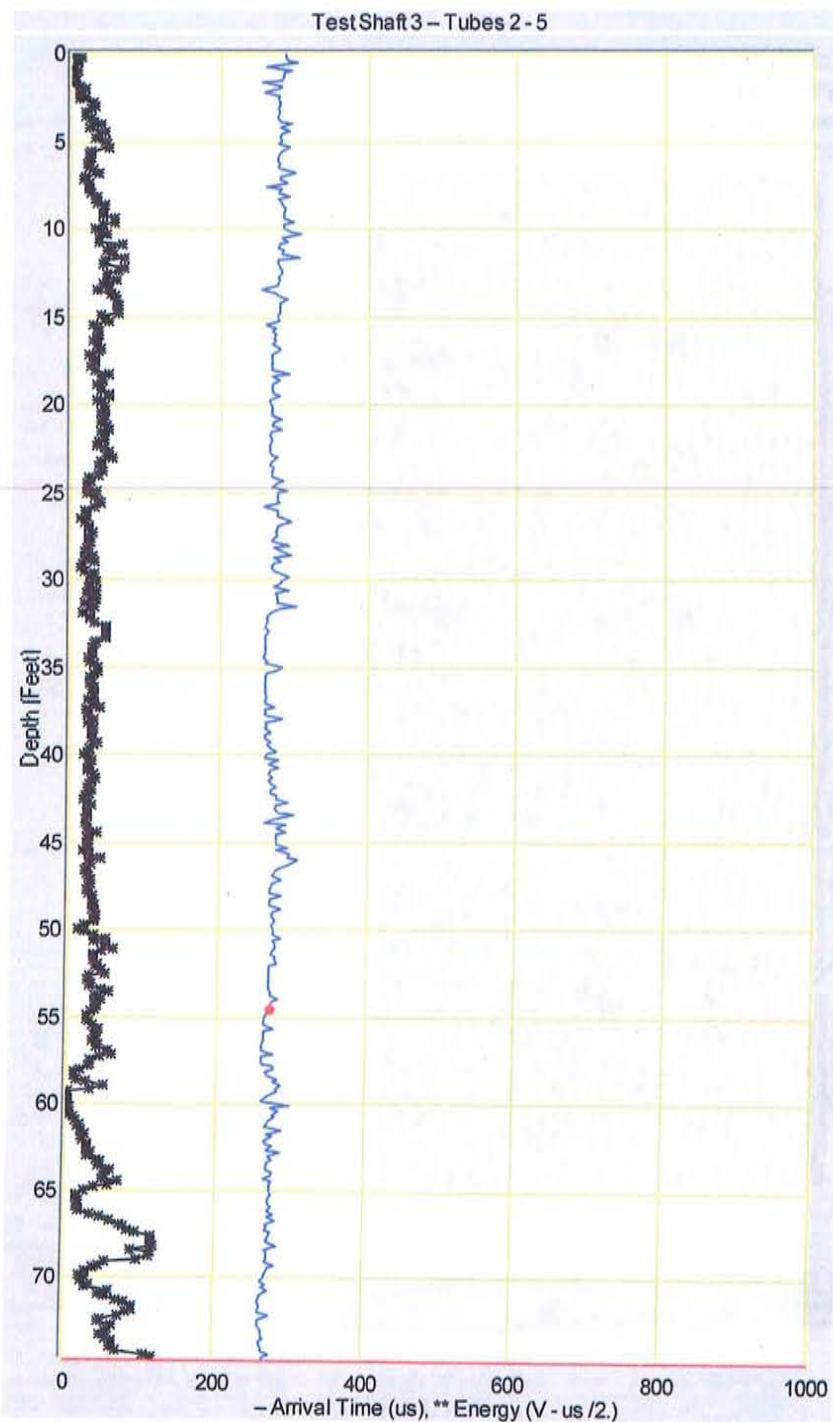




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Plot 9 of 40

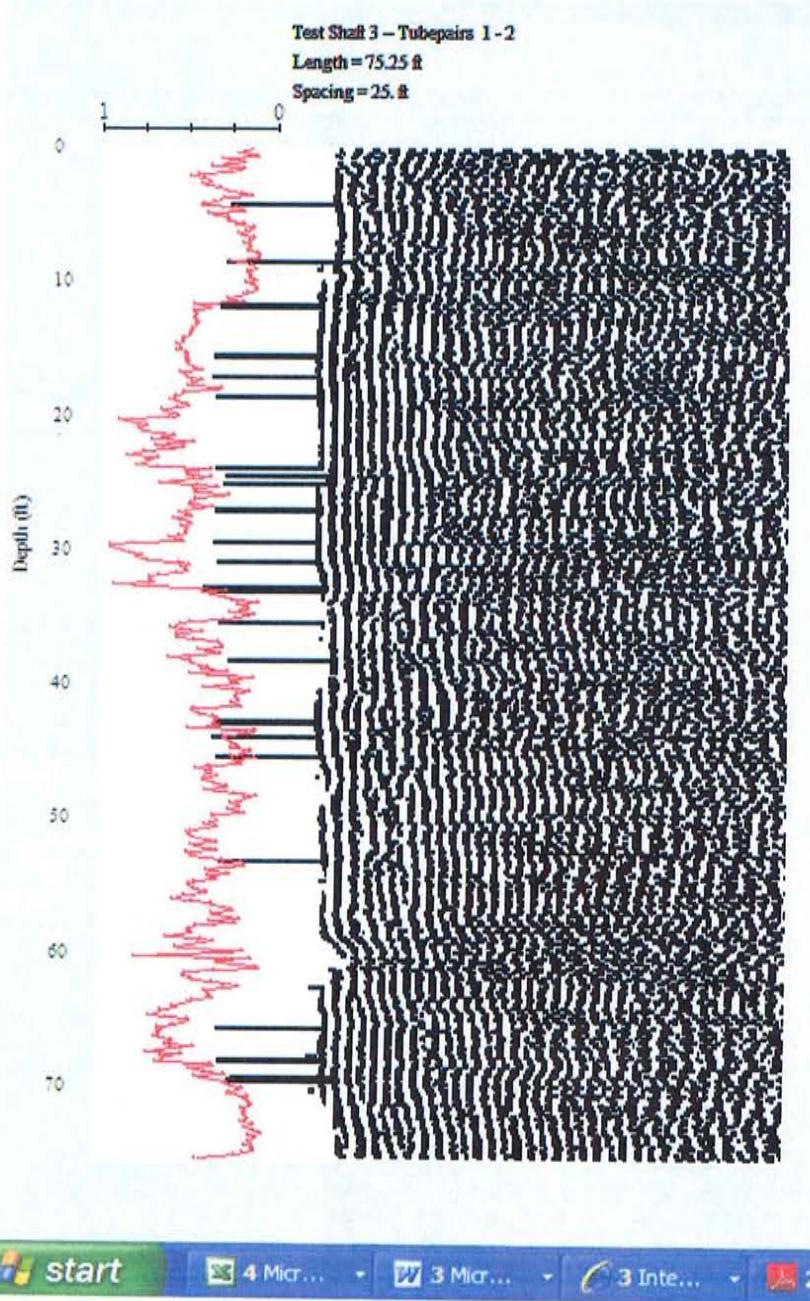




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Plot 10 of 40

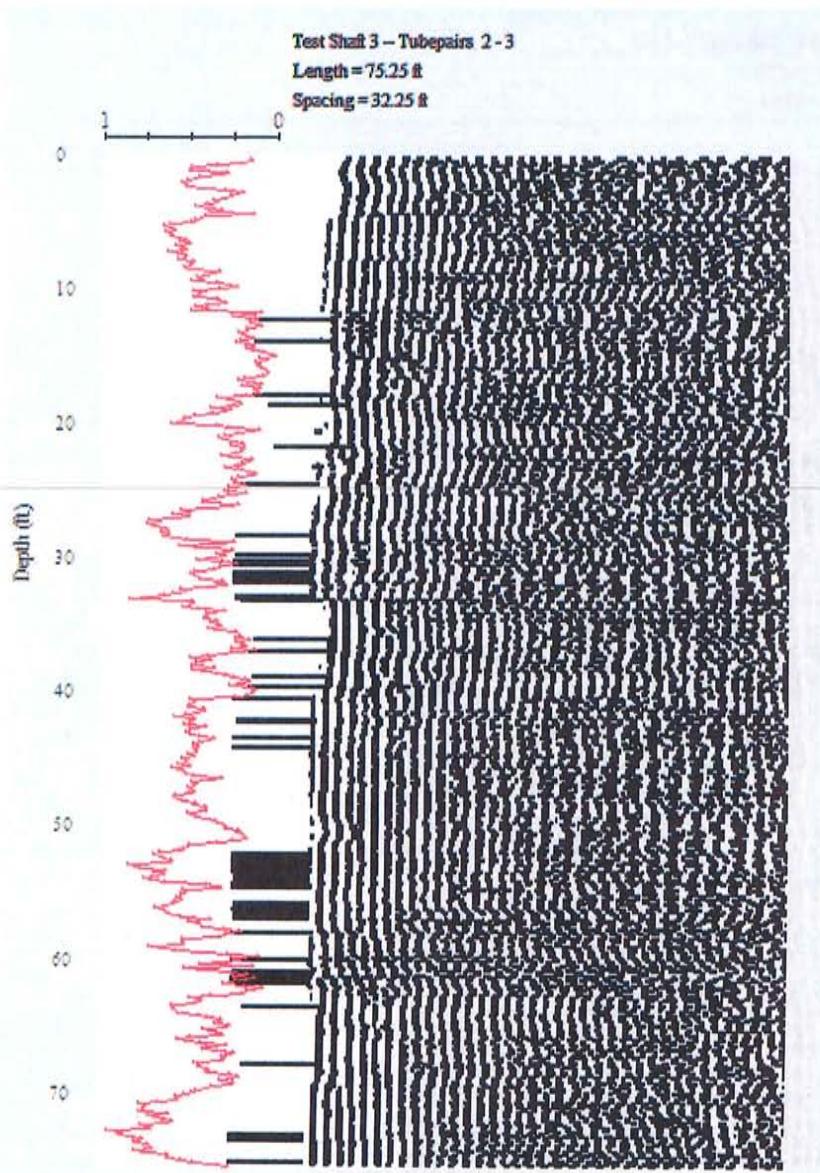




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Plot 11 of 40

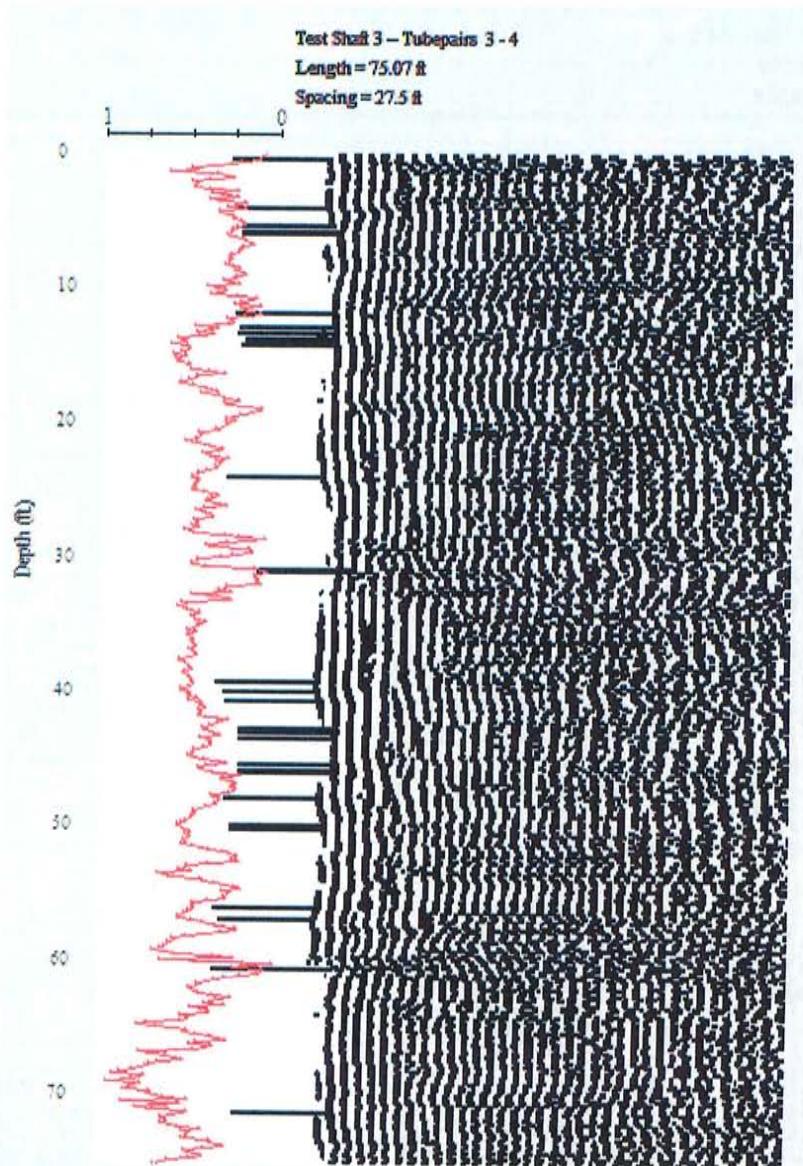




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Plot 12 of 40

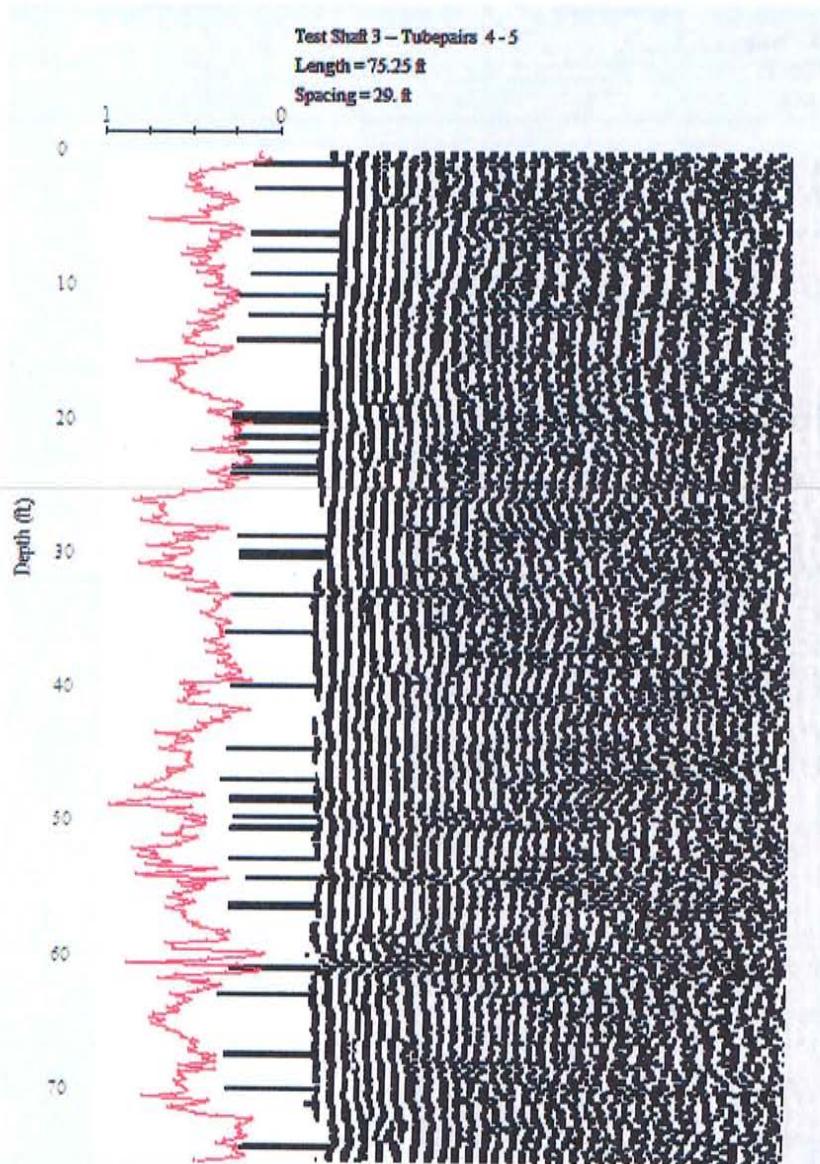




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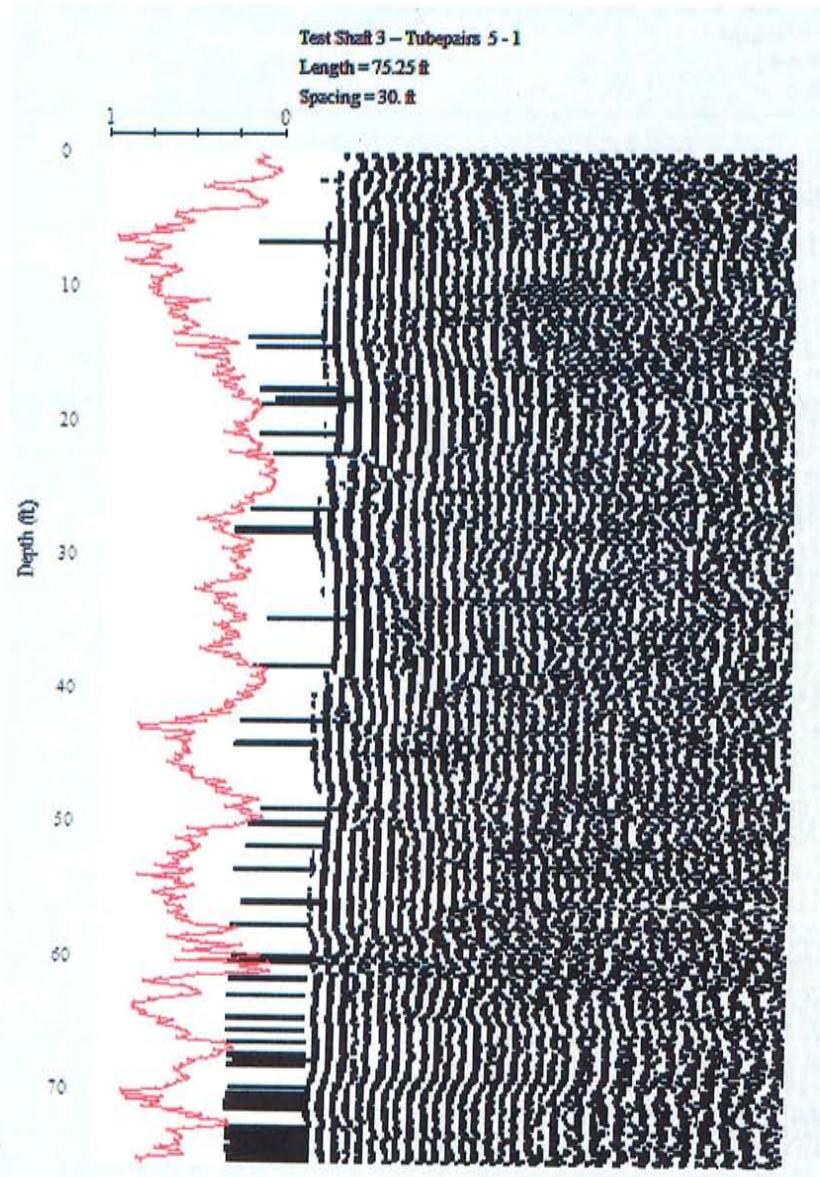
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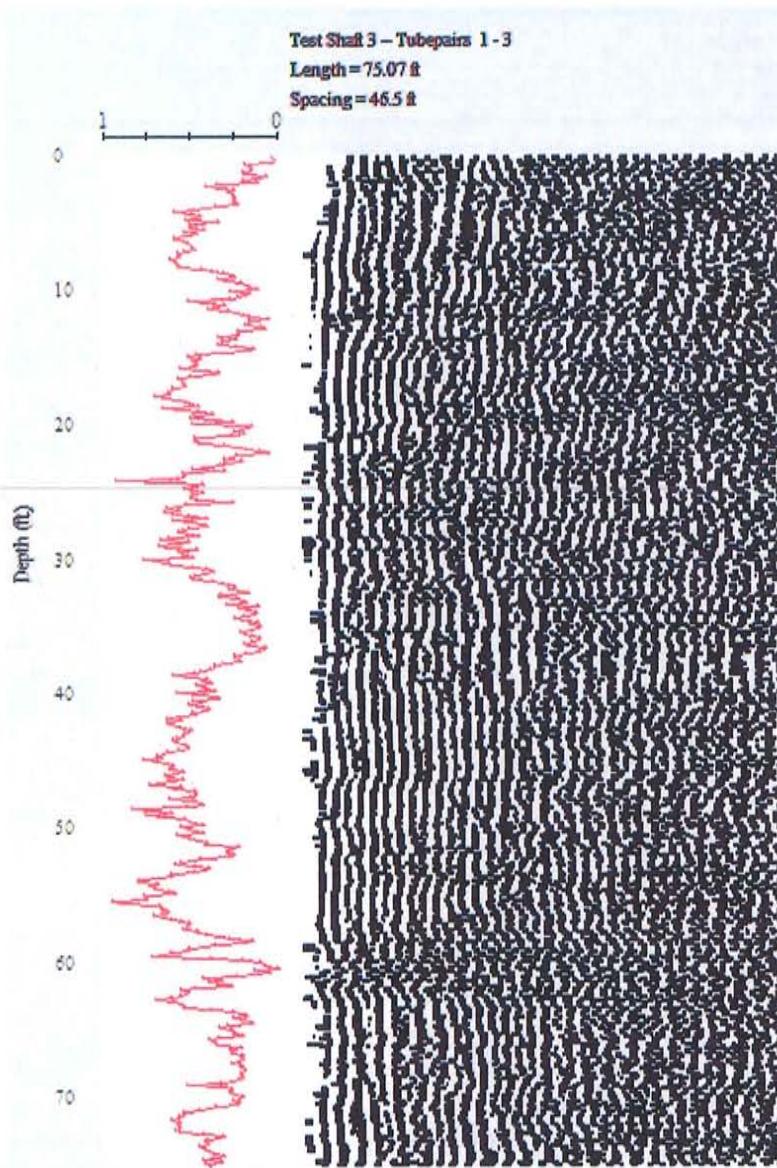
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Plot 15 of 40

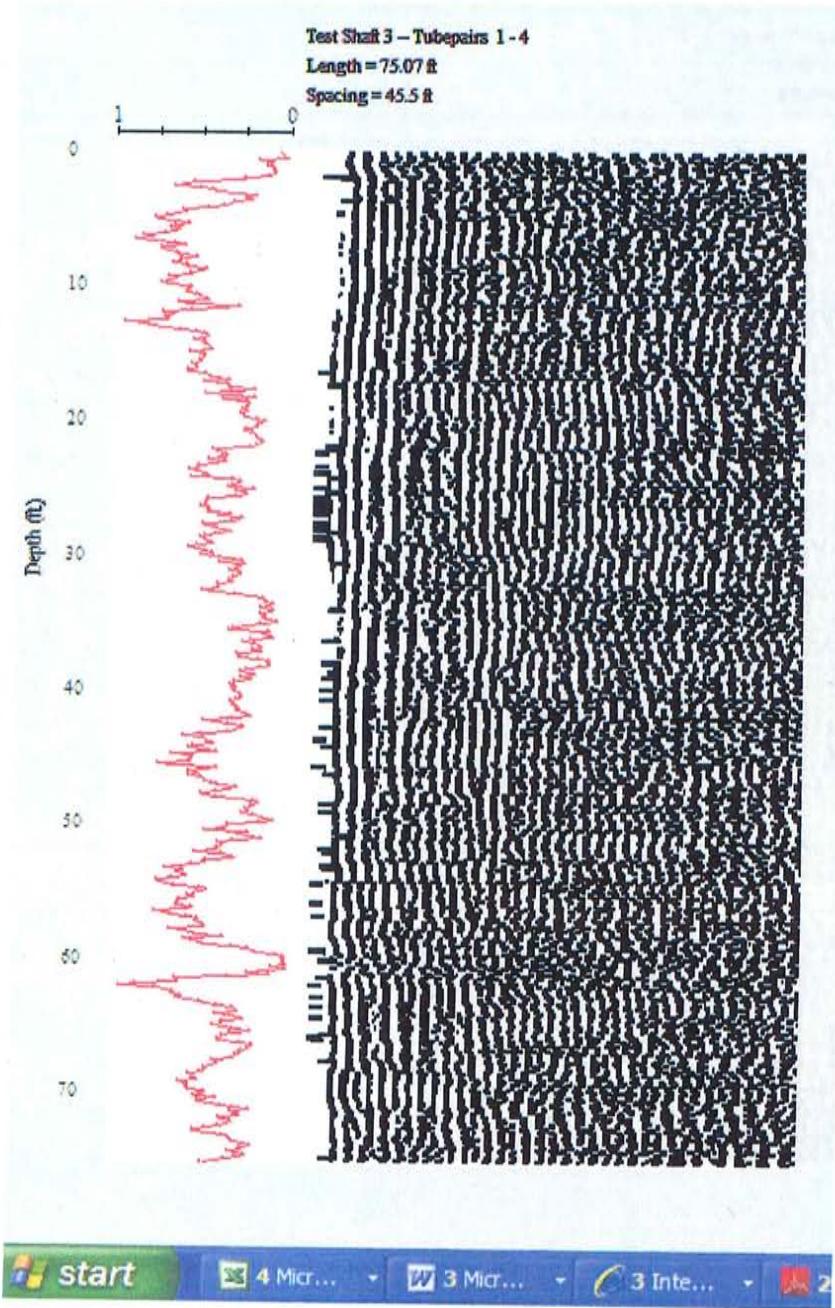




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Plot 16 of 40



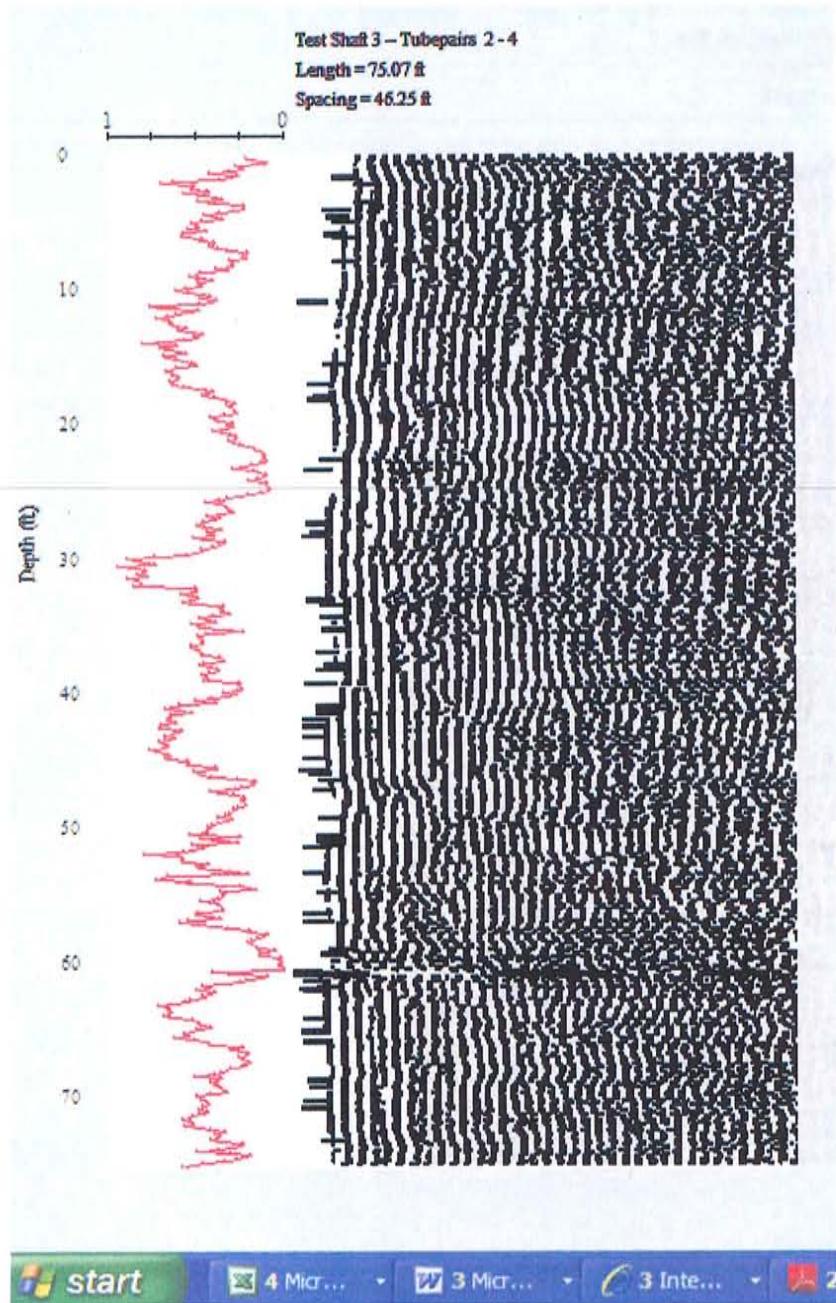


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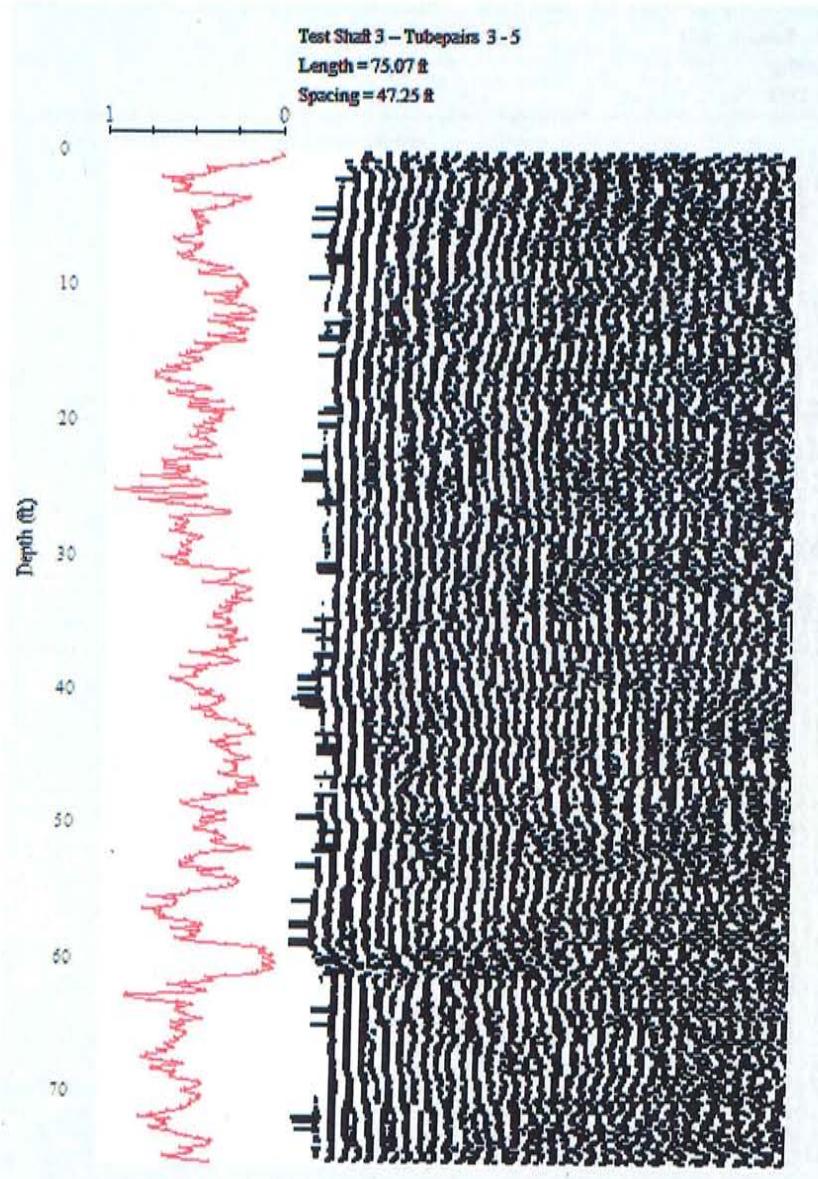
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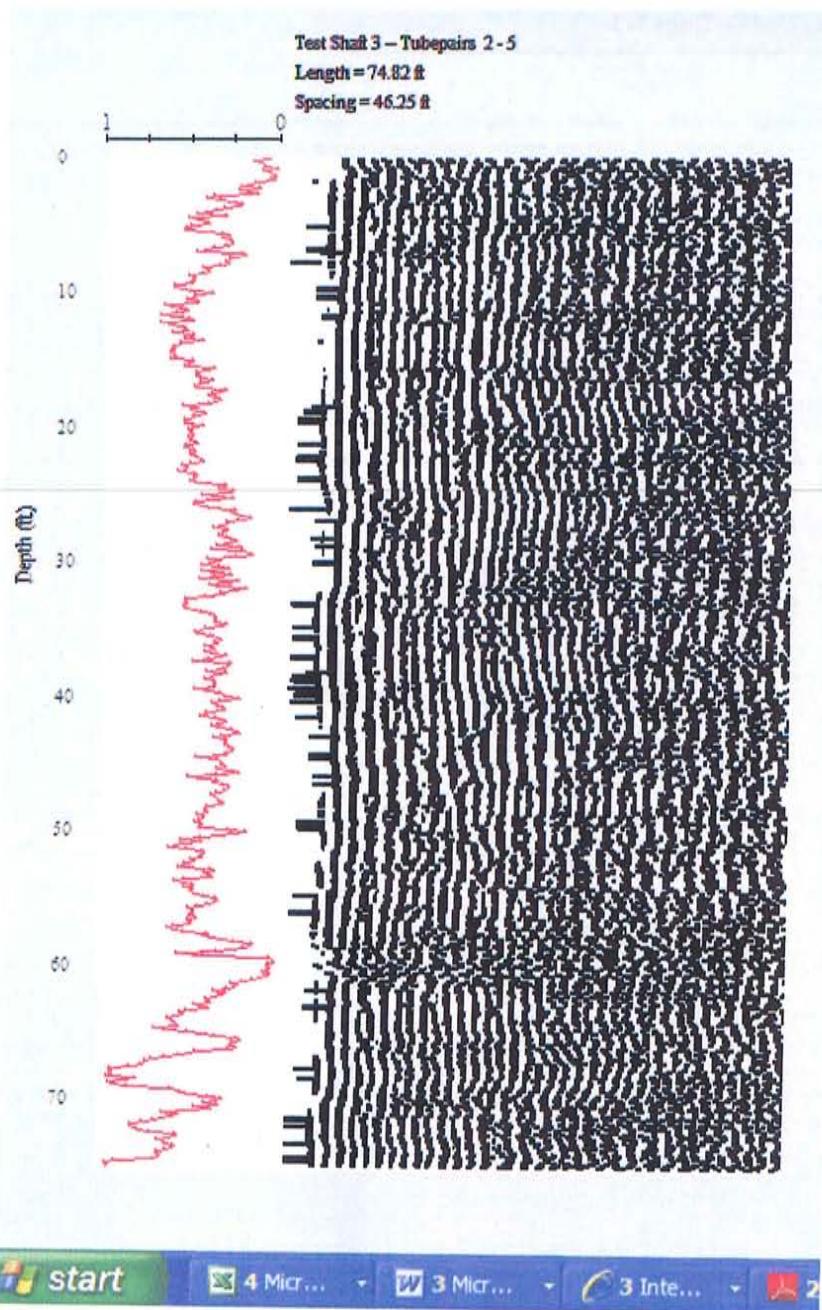
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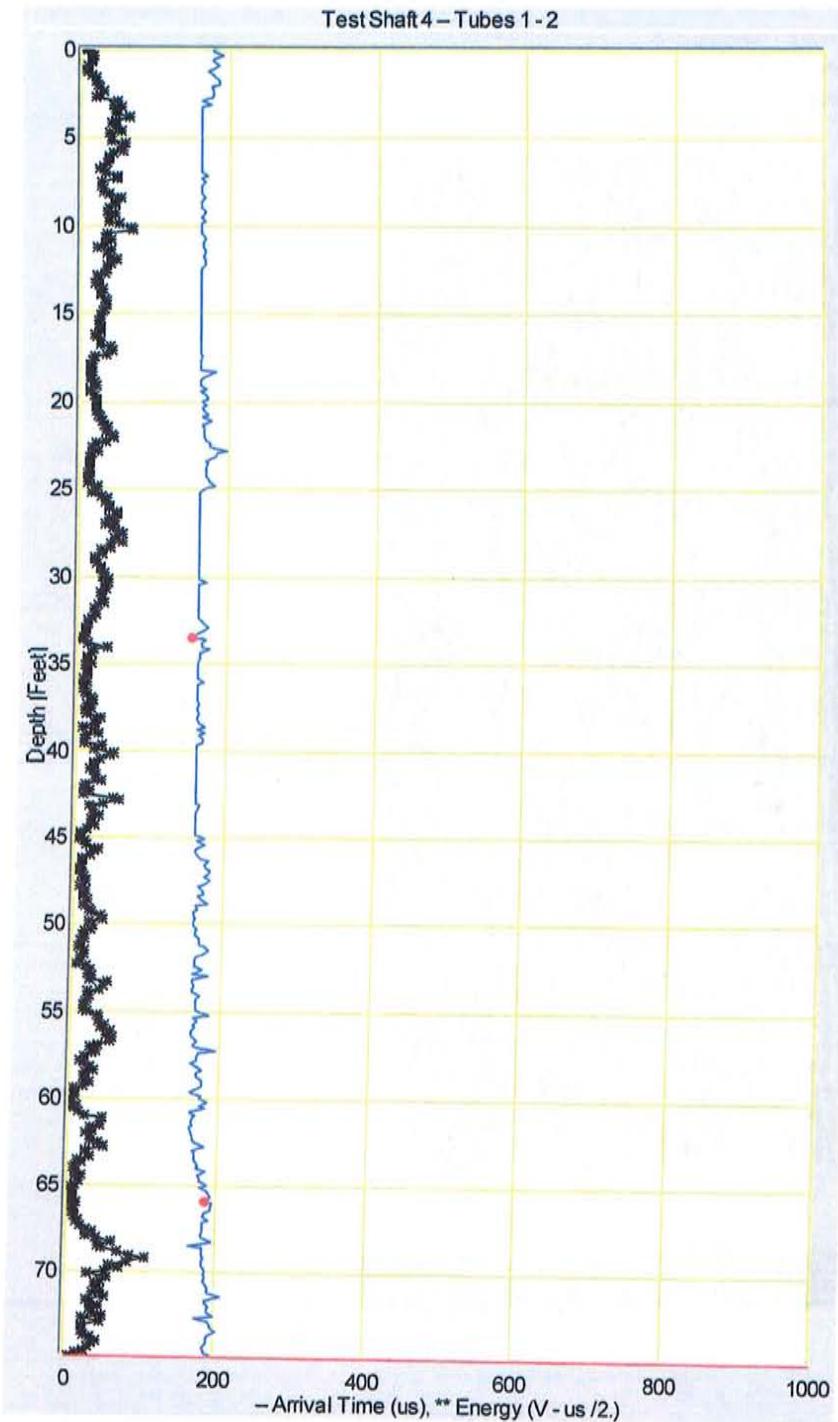
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Plot 20 of 40

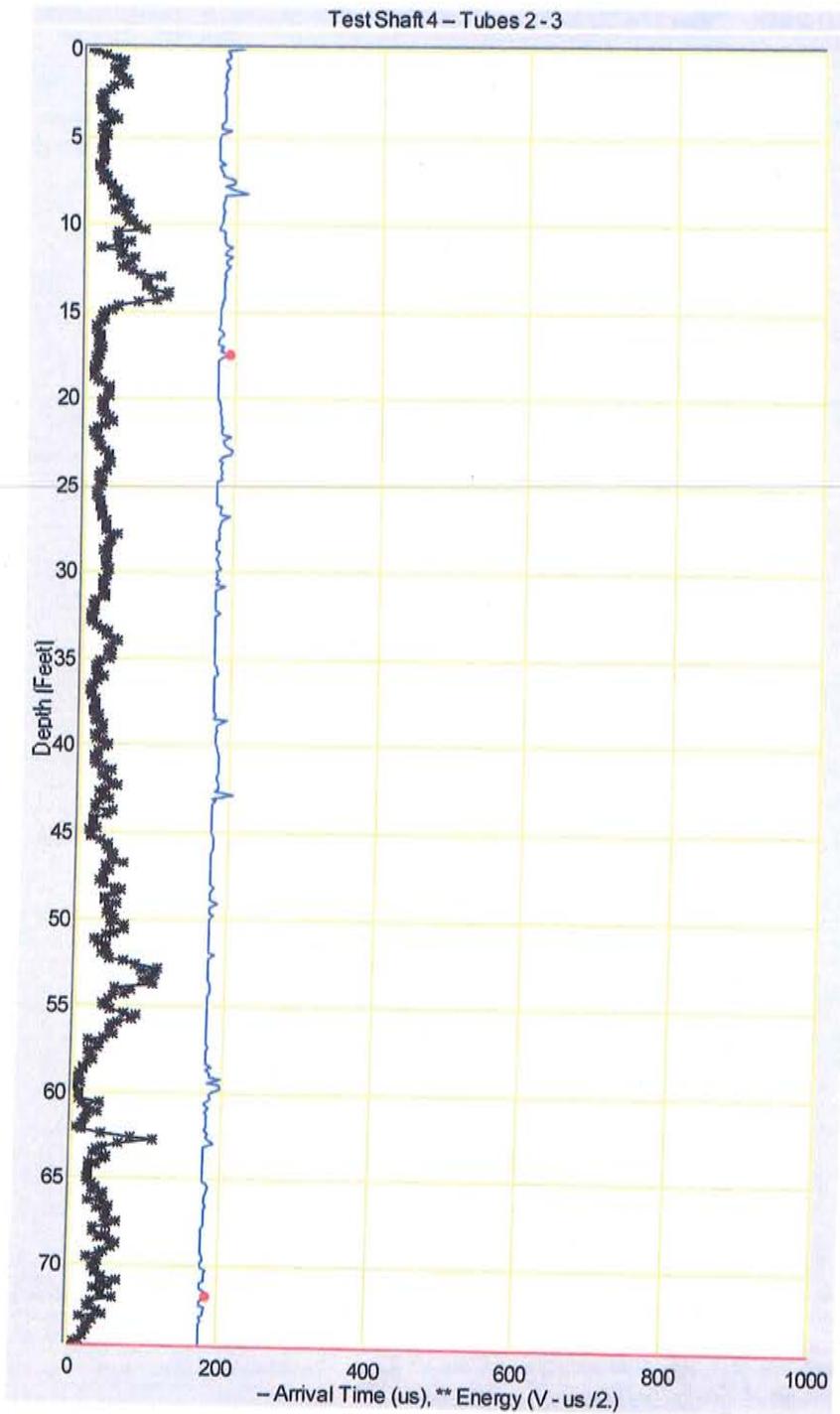




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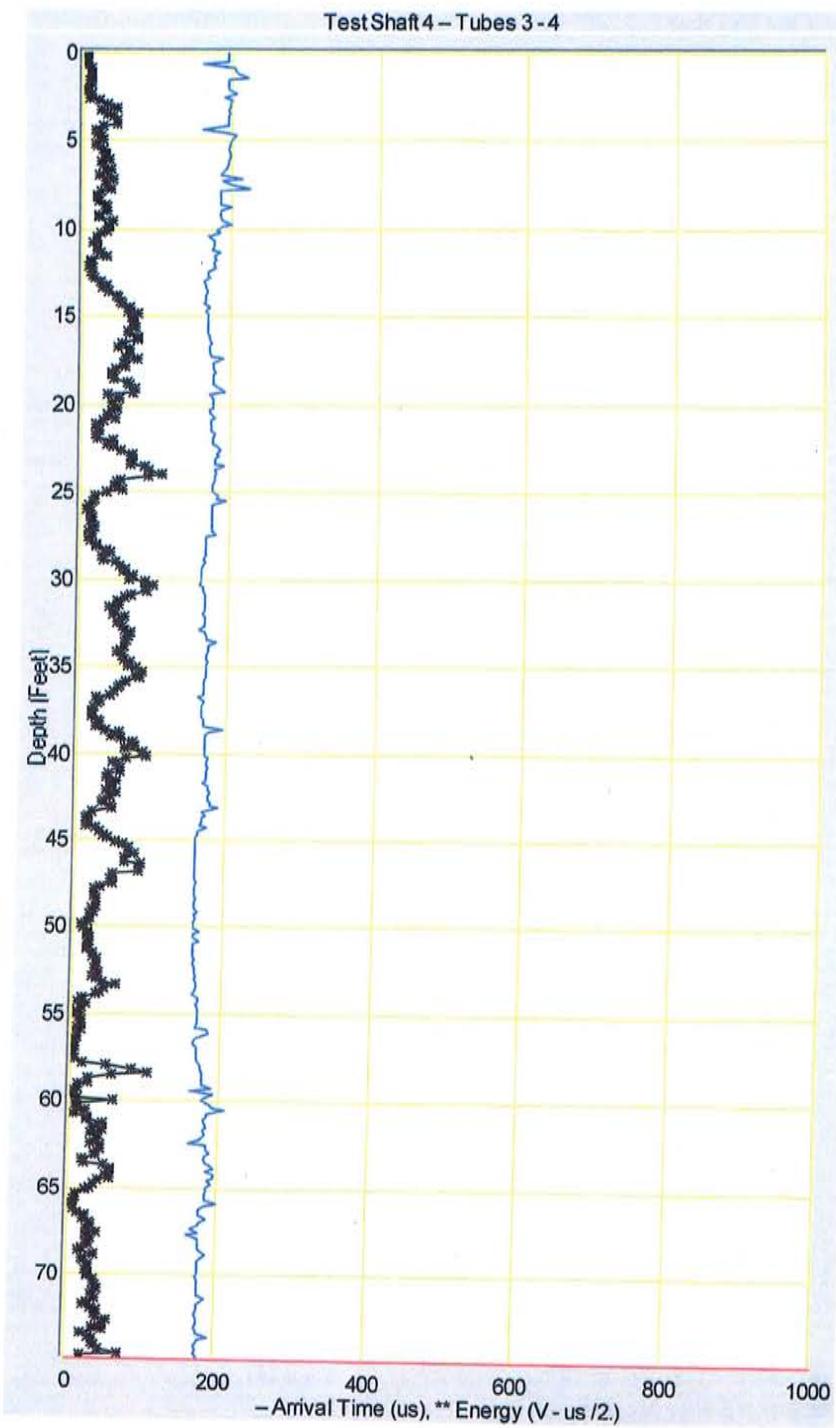




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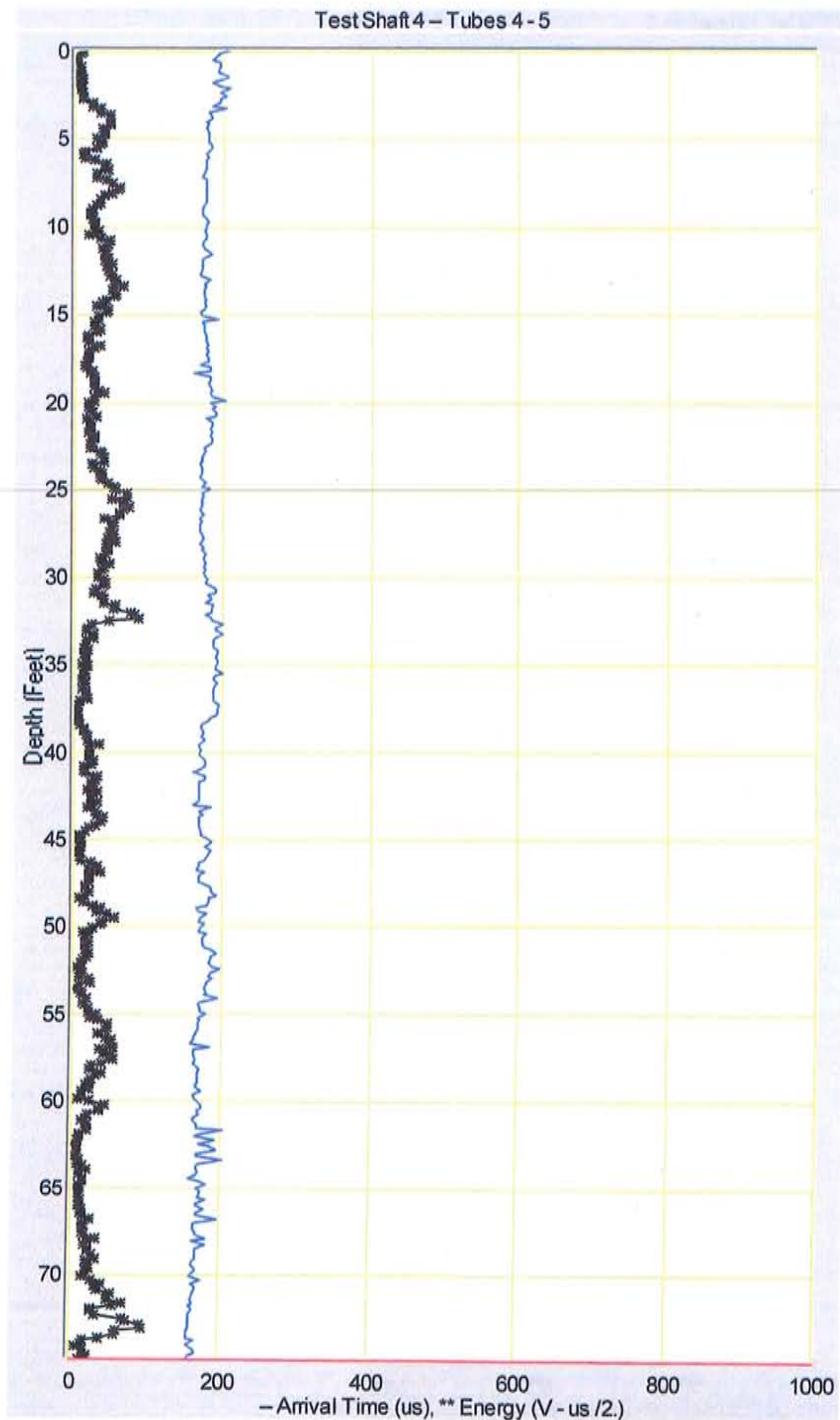




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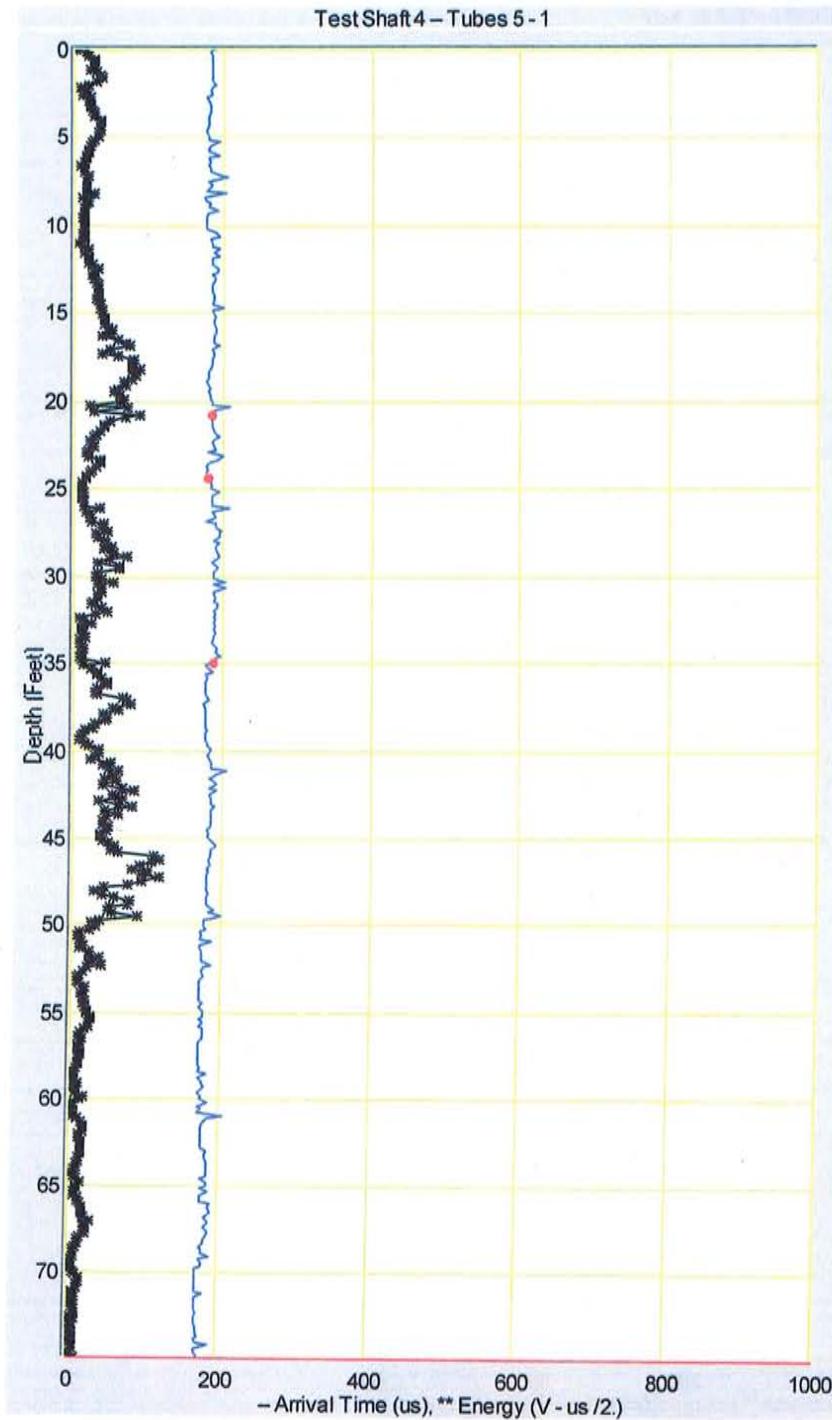




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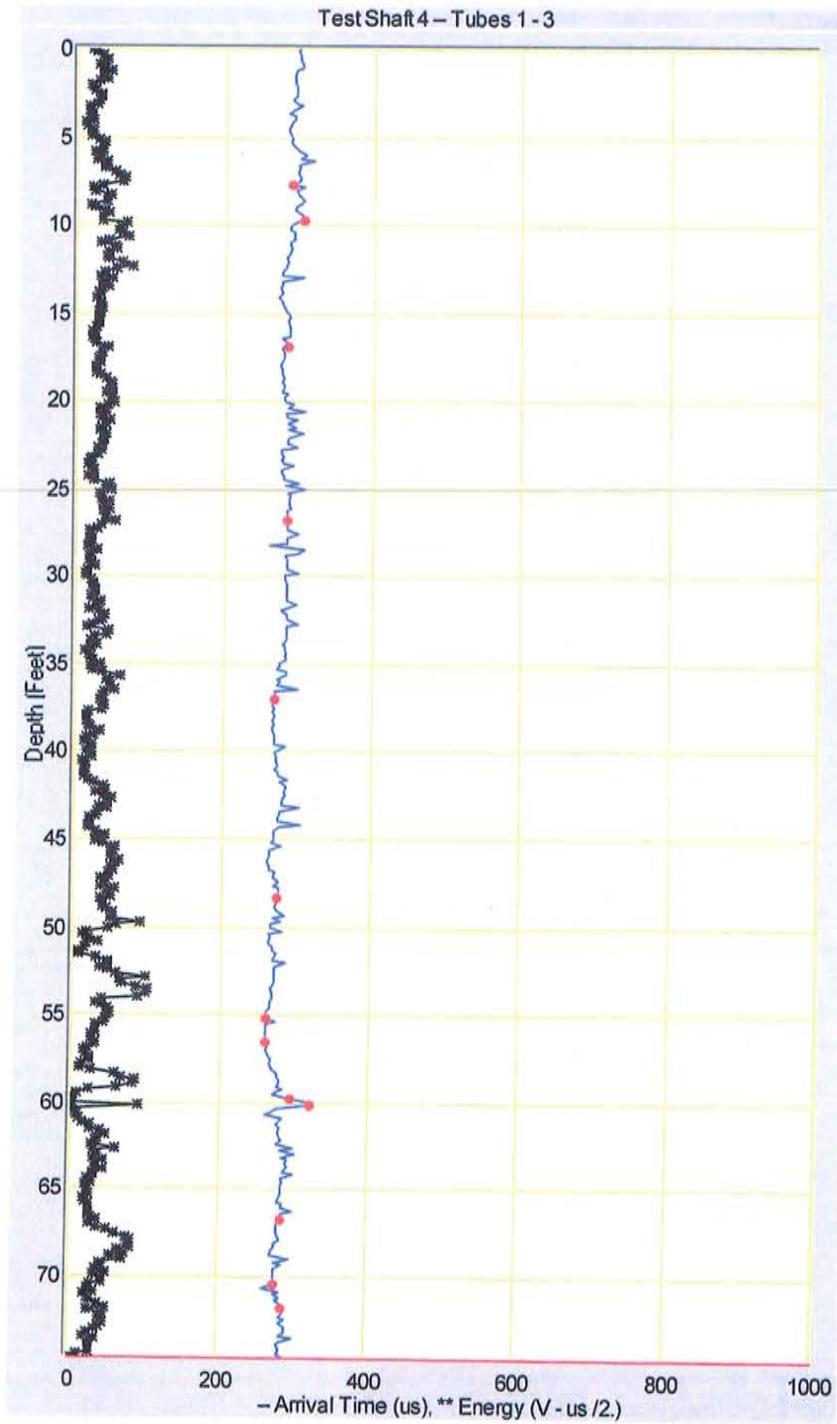




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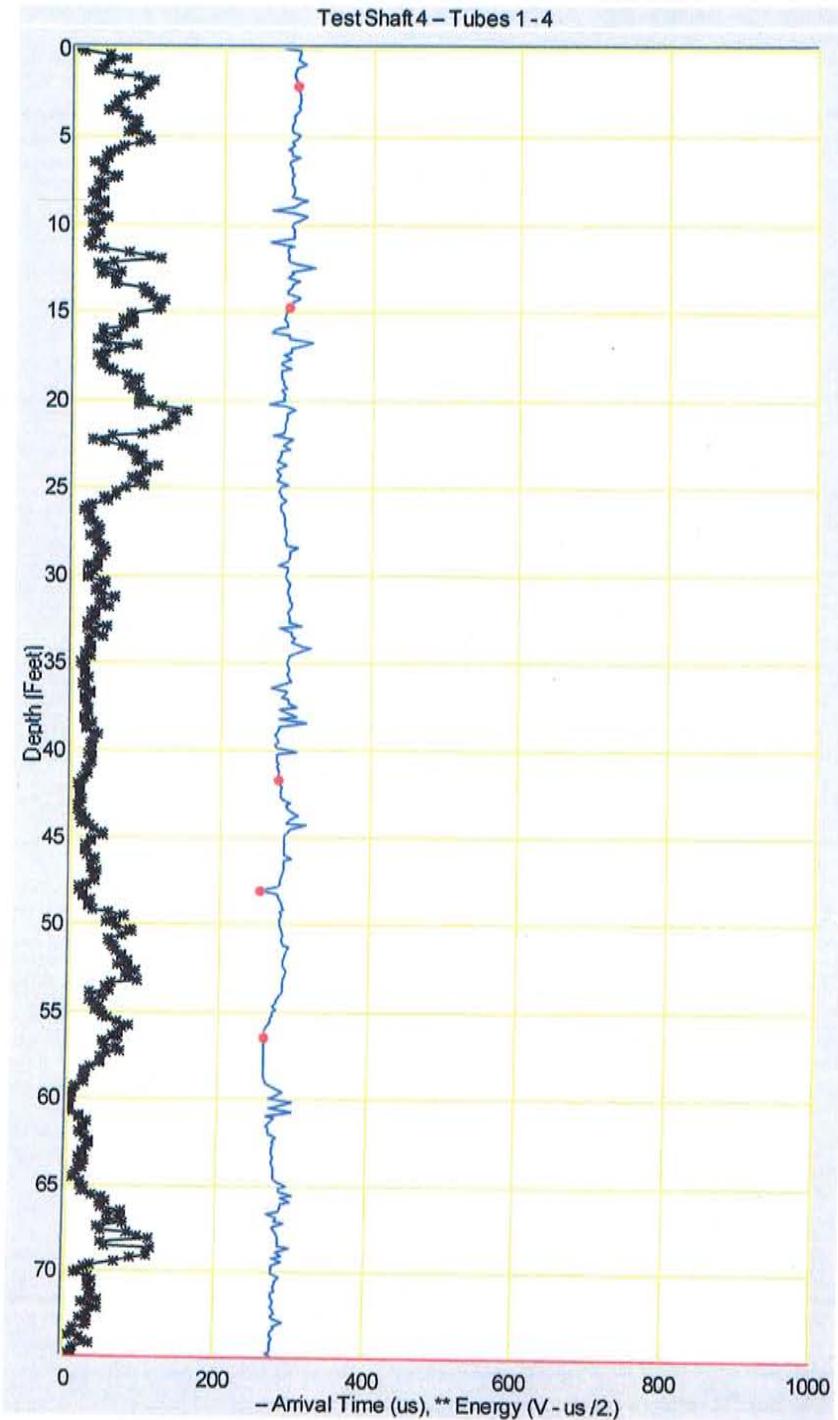




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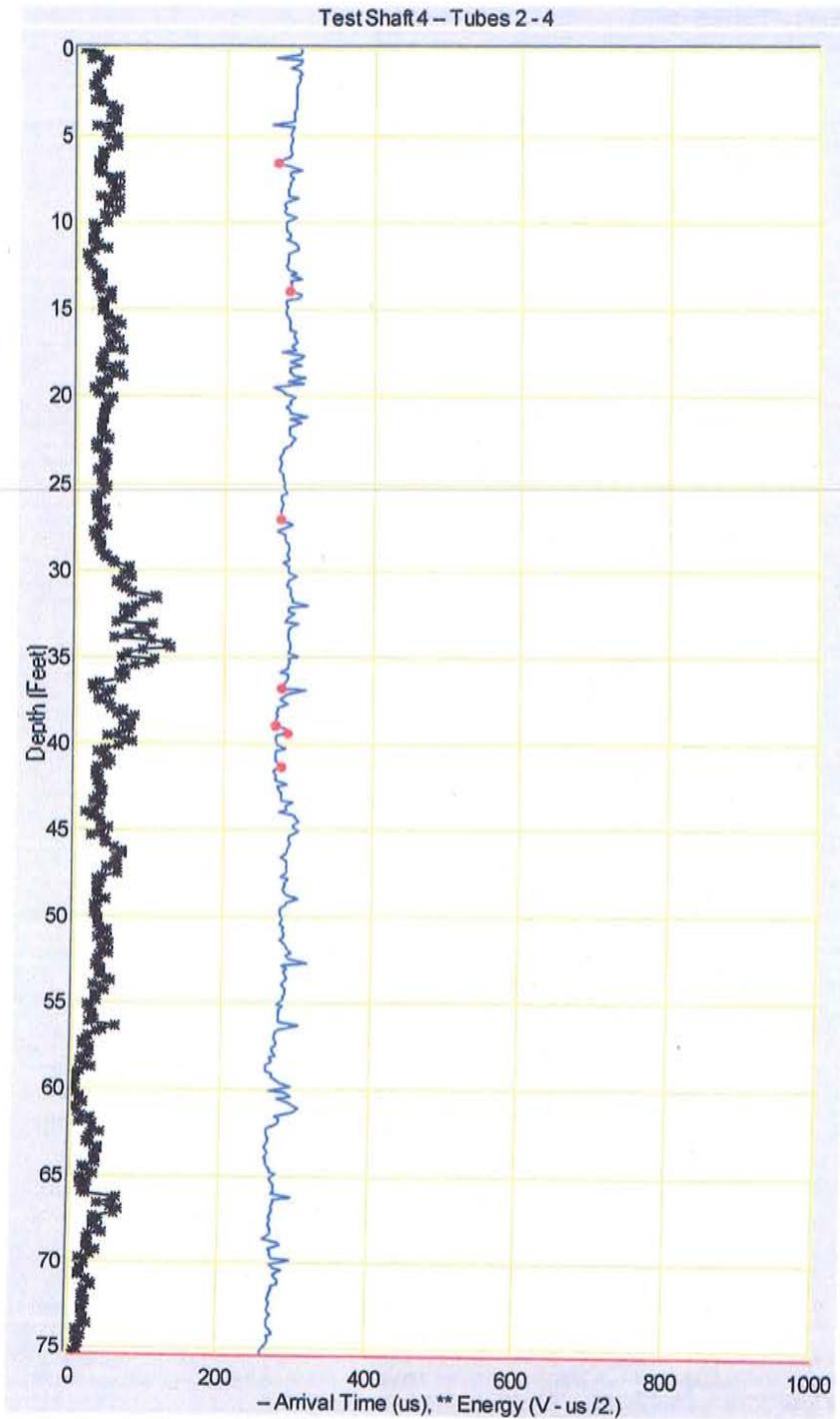




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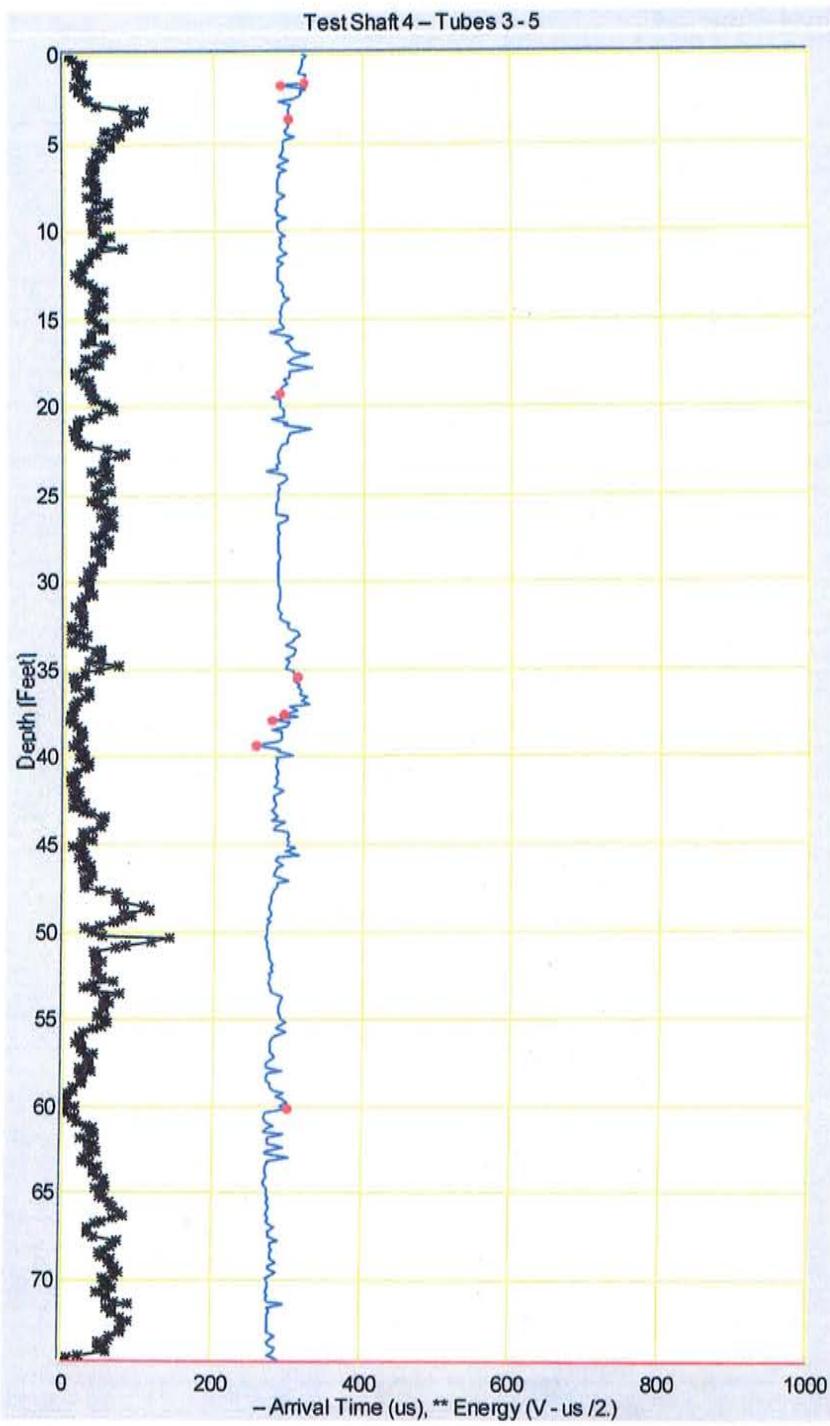




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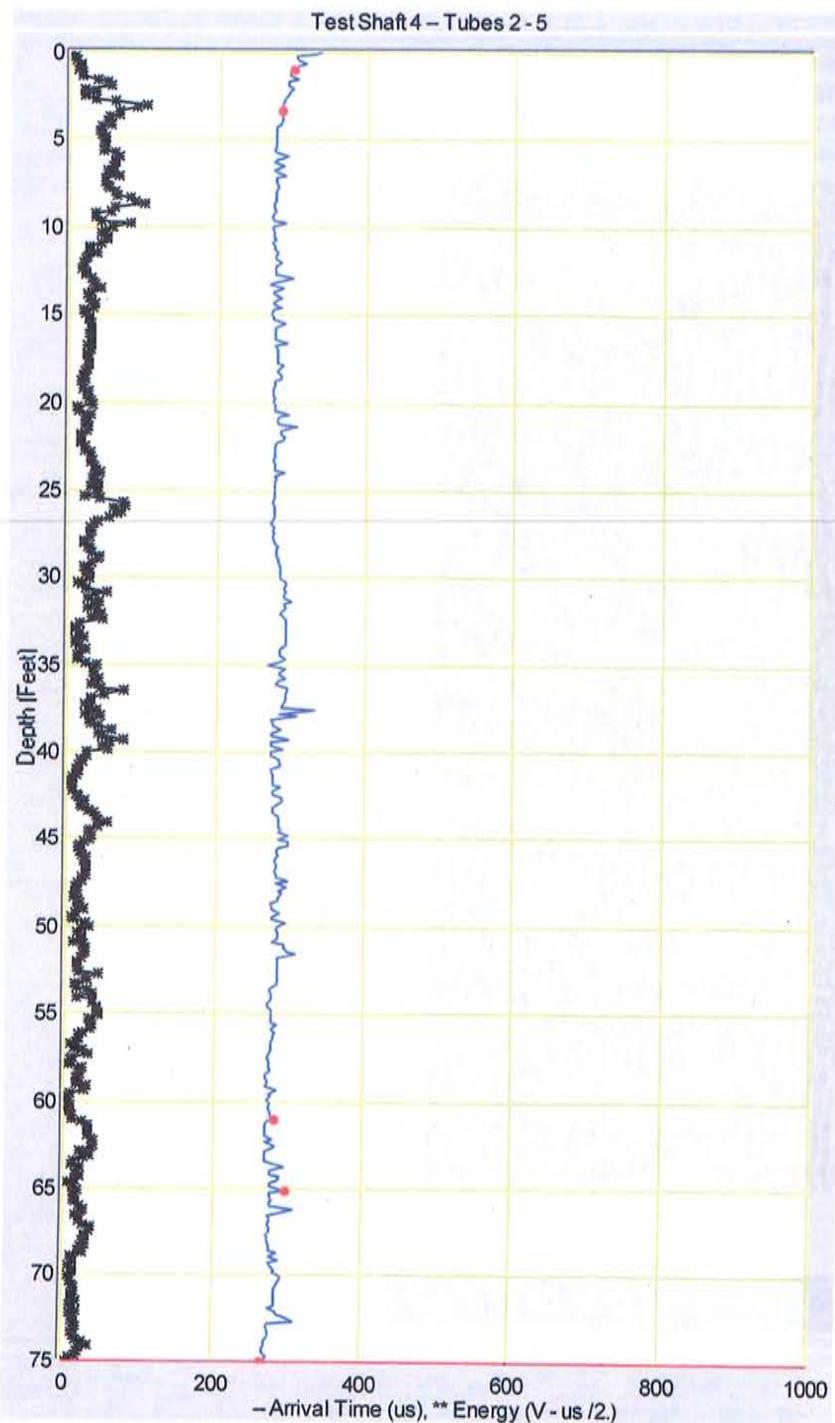




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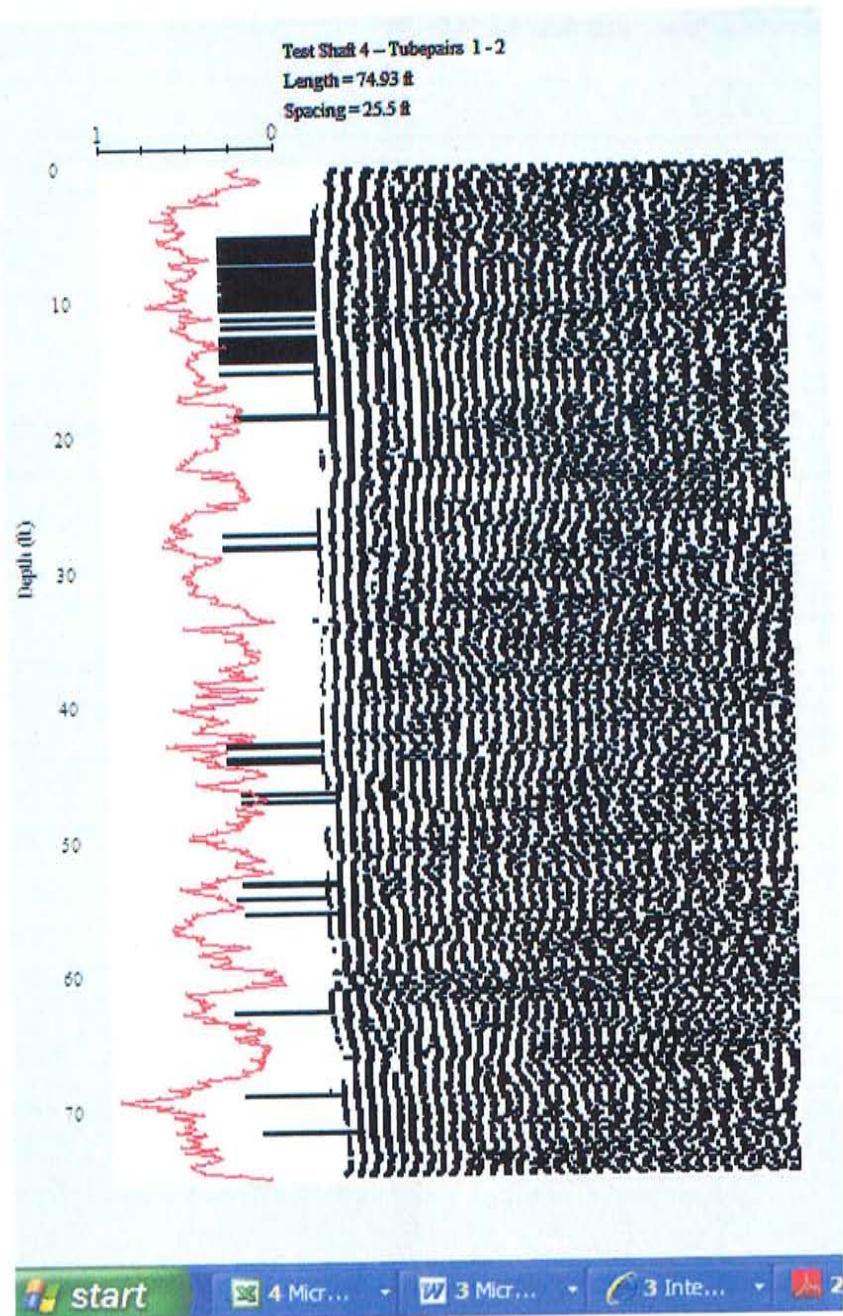




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start



4 Micr...



3 Micr...



3 Inte...

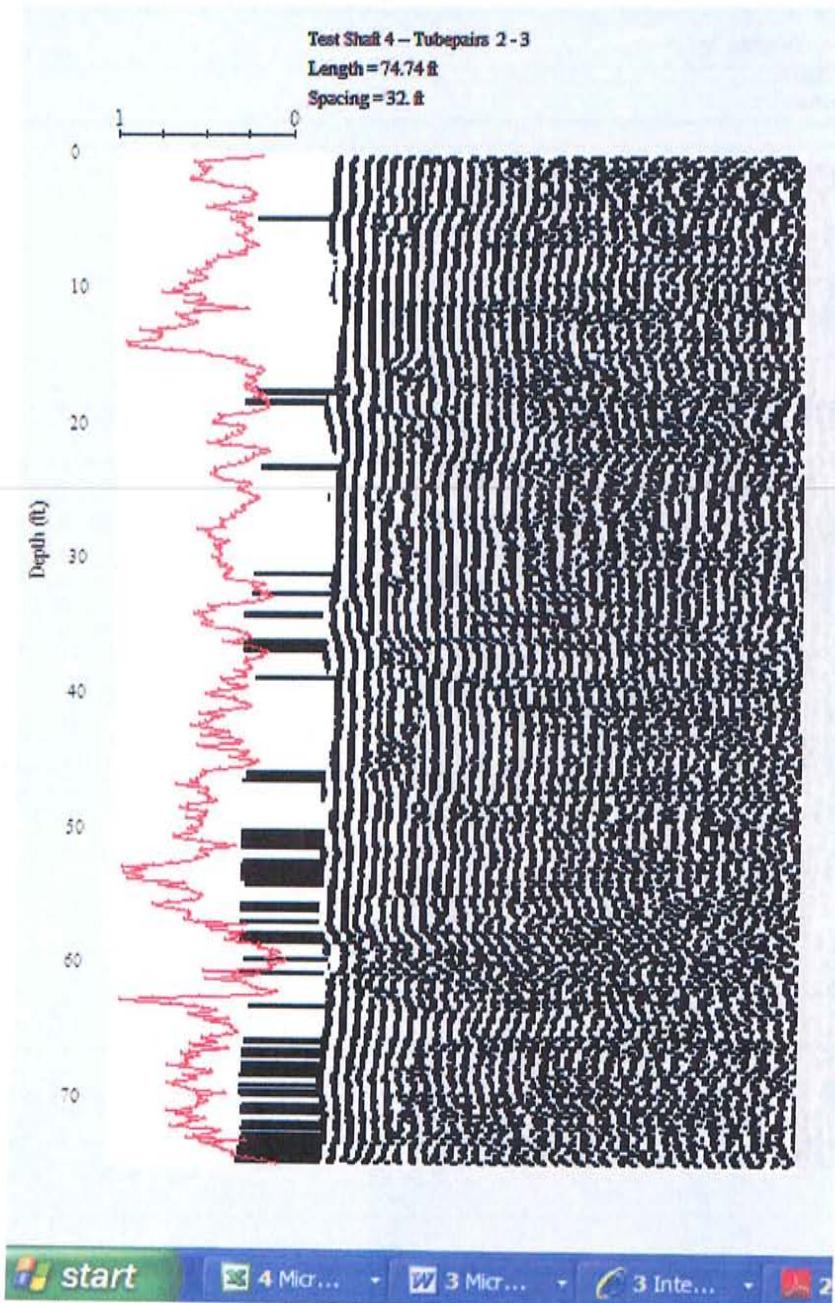


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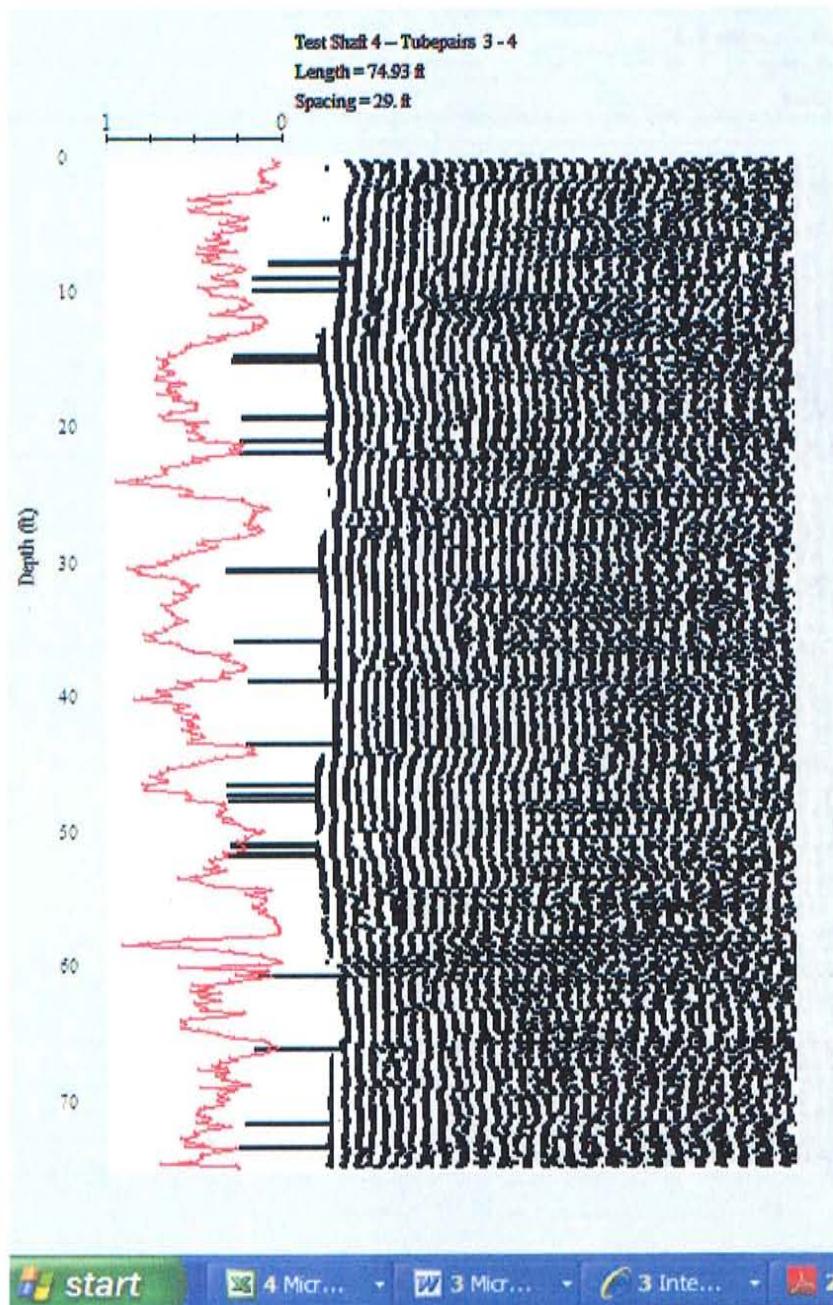




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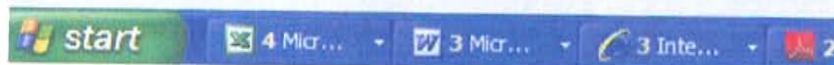
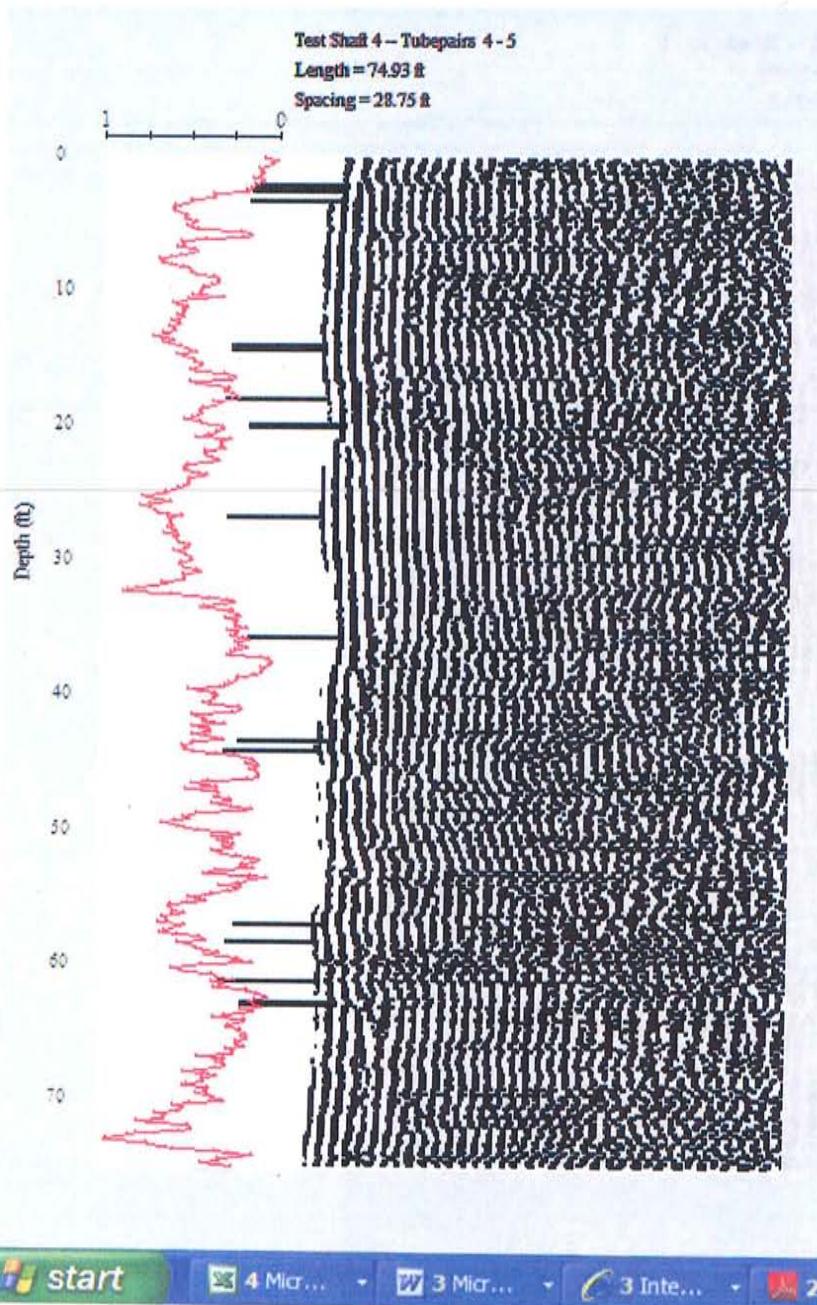




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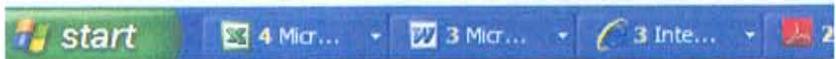
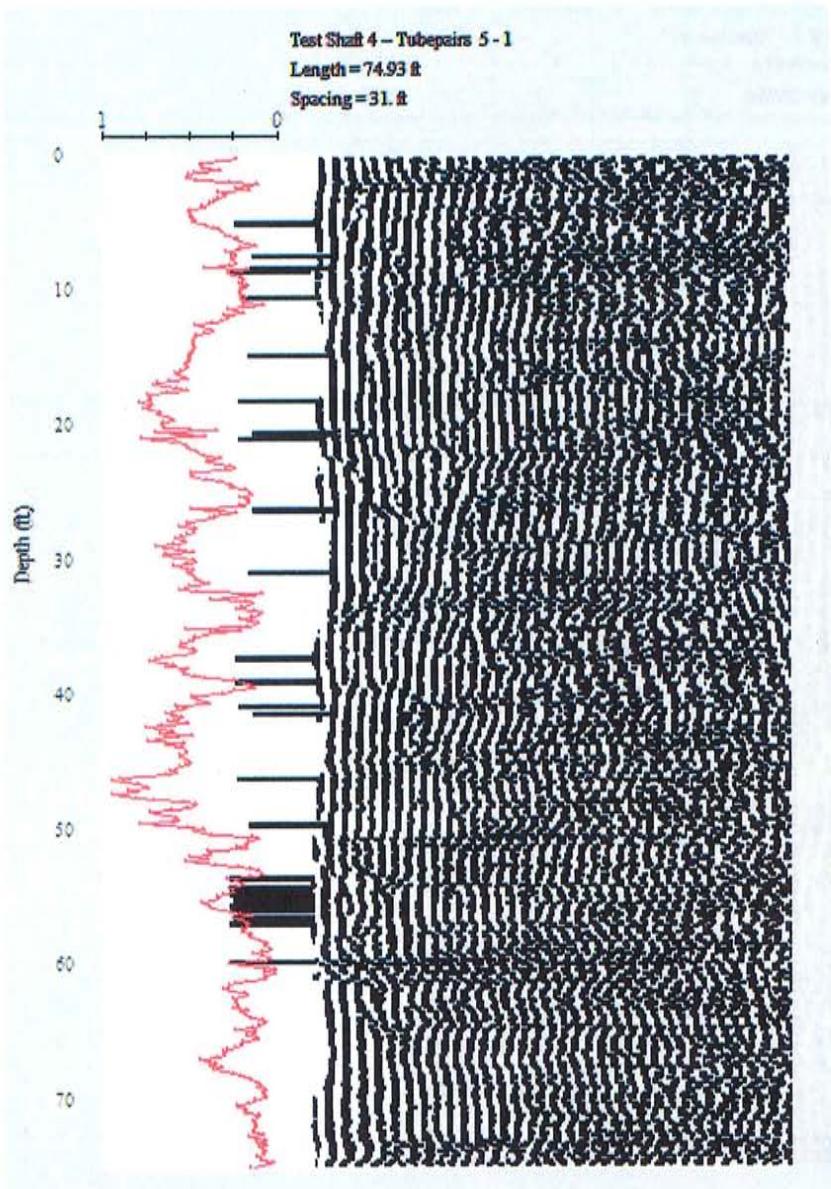




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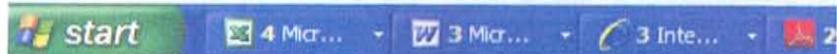
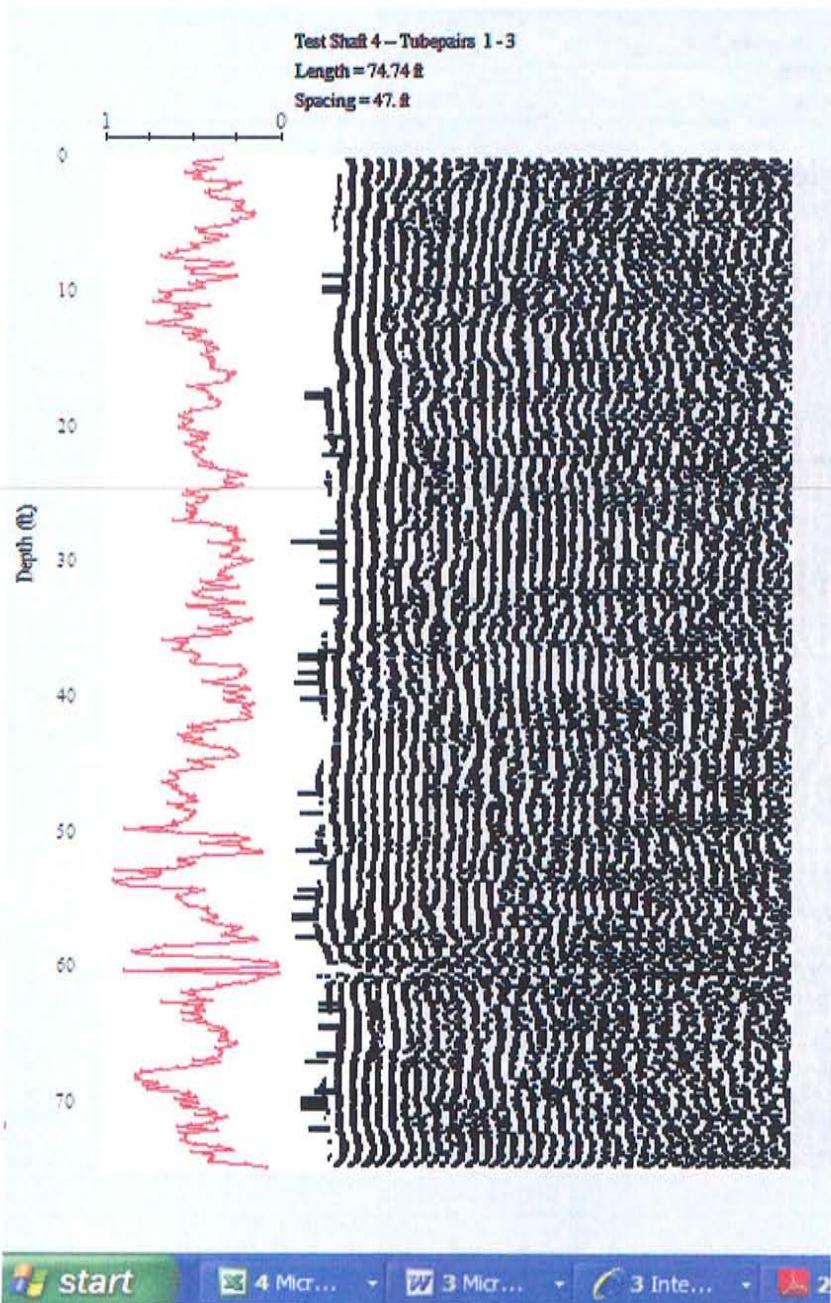
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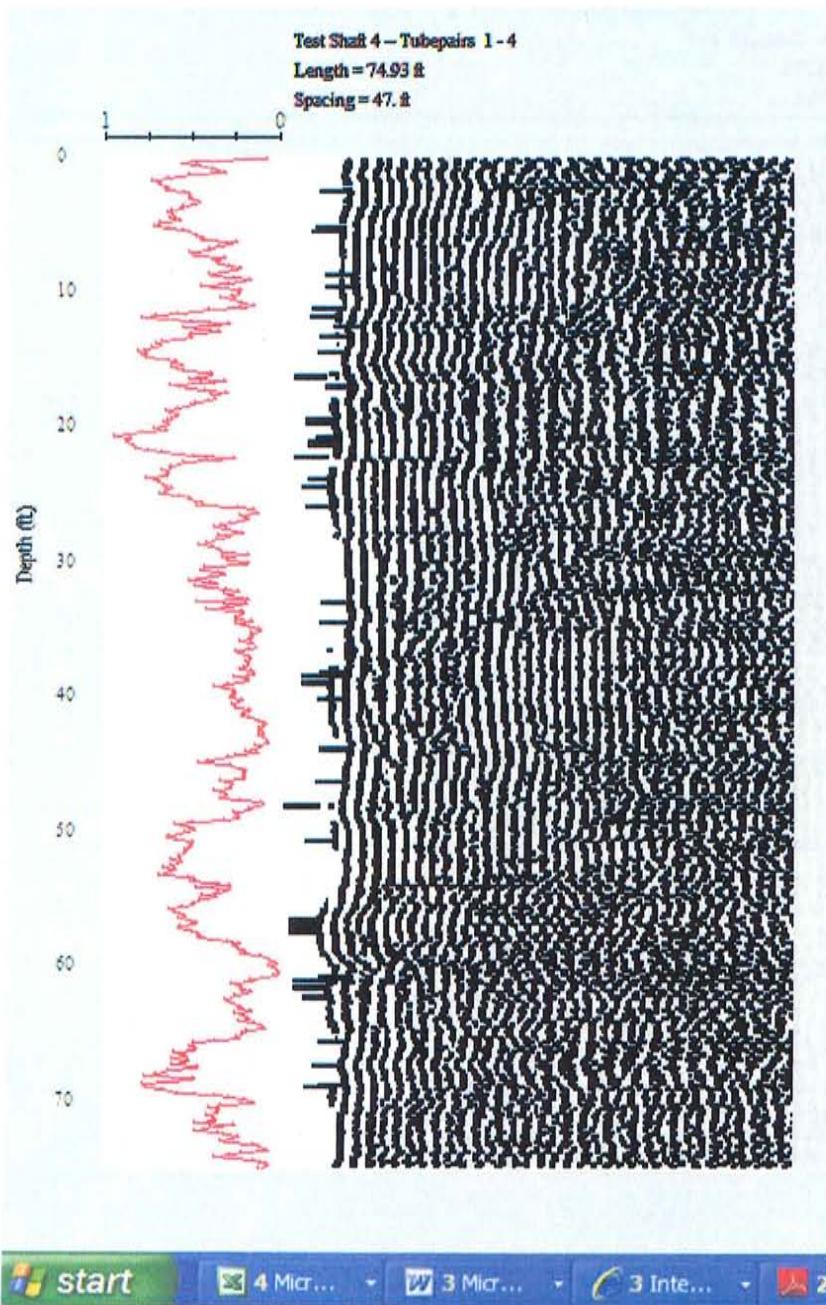
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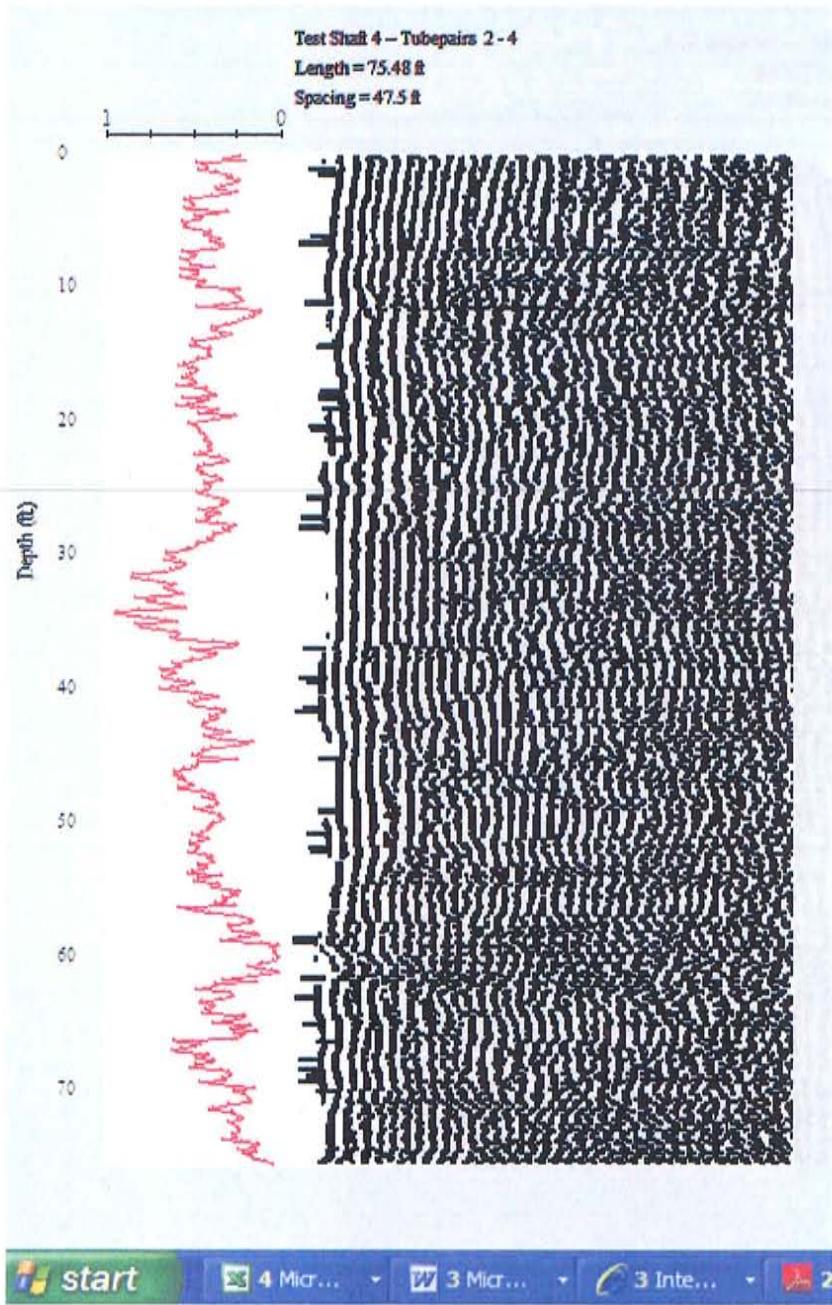
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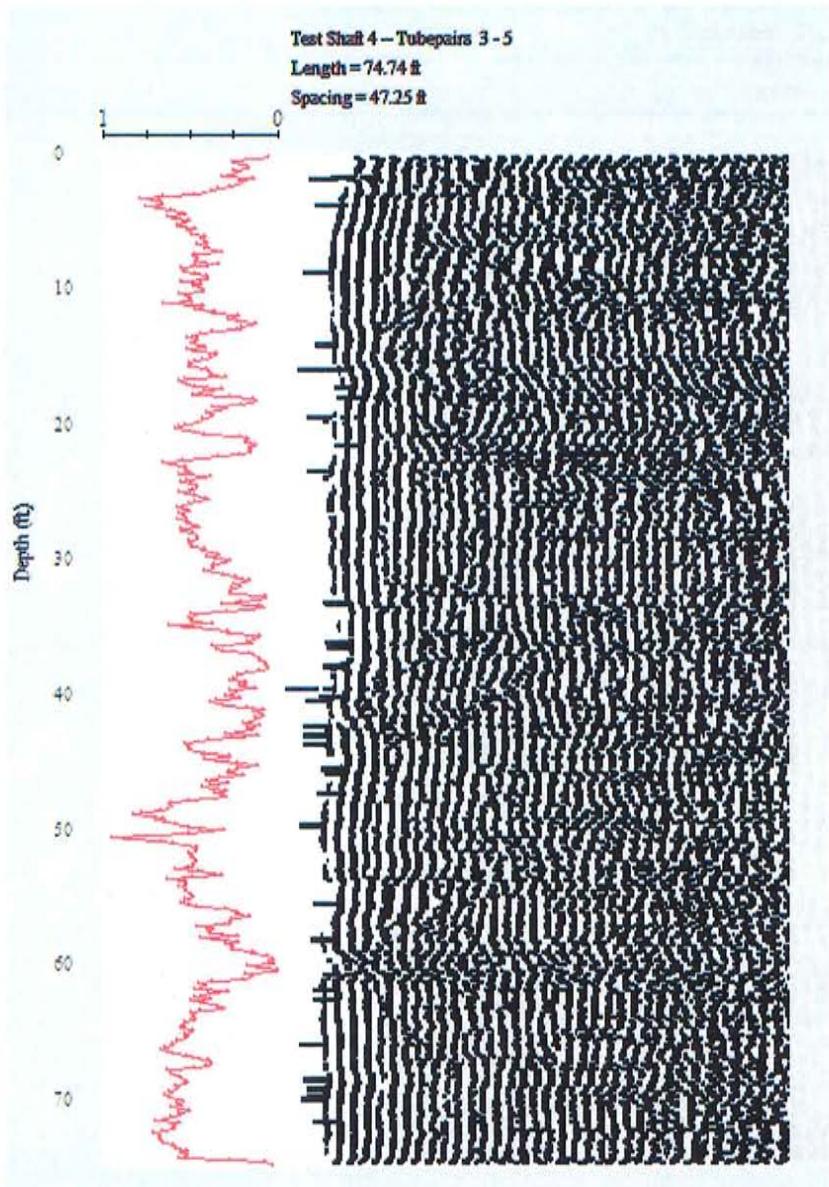
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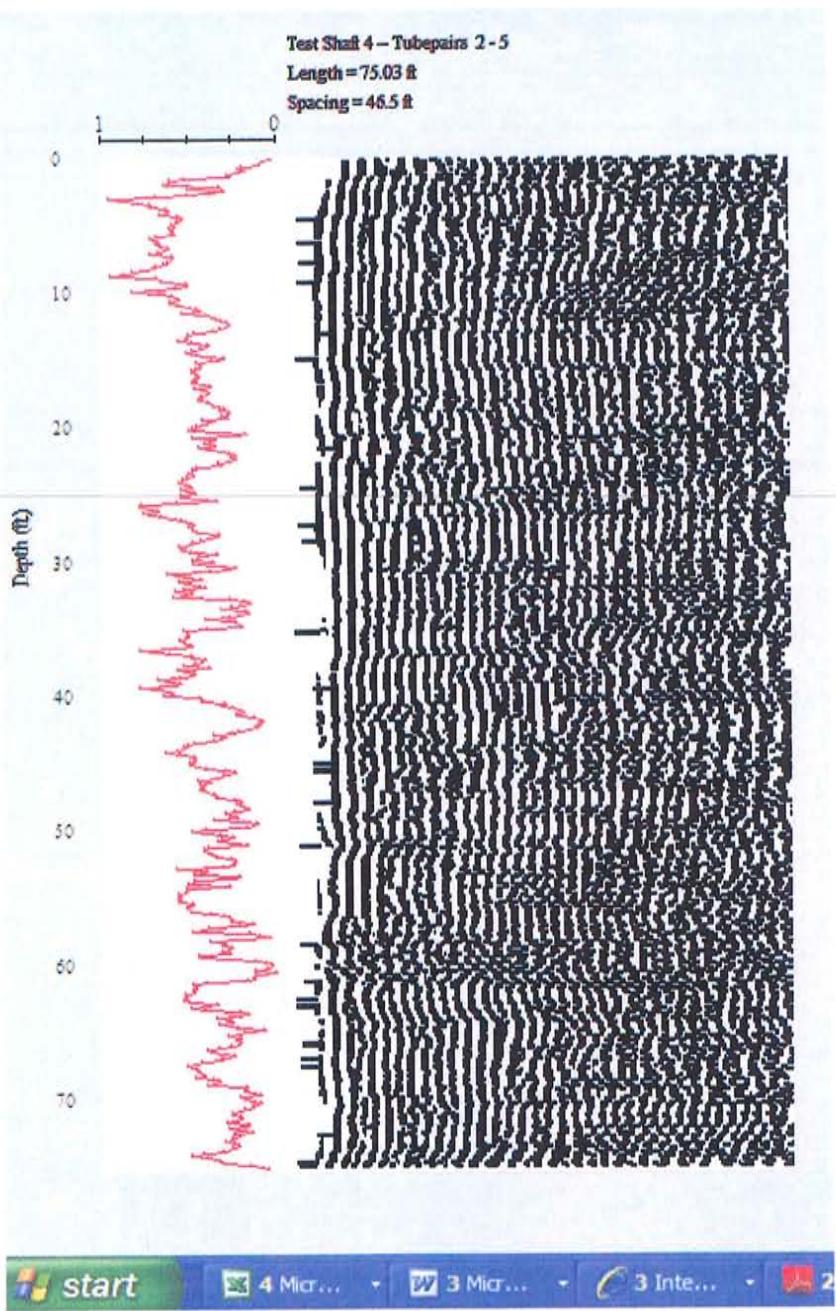




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