



September 28, 2018

**ZHA**

6300 West Bay Parkway, Suite 5052  
Panama City, Florida 32409

**Attention:** Mr. David Scruggs, RLA

**Subject:** Concrete Thickness Testing  
NWFL BEACHES INTERNATIONAL AIRPORT - TERMINAL EXTENSION  
Bay County, Florida  
NOVA Project Number 10111-1018122

Dear Mr. Scruggs:

NOVA Engineering and Environmental LLC (NOVA) is providing this letter to present the results of the concrete thickness testing for the above referenced project. The authorized services were performed as outlined in NOVA Proposal Number 011-10186676, dated September 7, 2018. This letter briefly presents our findings.

On September 12, 2018, personnel with our firm traveled to the project site and completed the geophysical survey which included Ground Penetrating Radar (GPR) testing to estimate the thickness of the existing concrete pavement. For this evaluation, a GSSI SIR-4000 data collection unit with an external 400 MHz antenna was used to estimate the on grade slab thickness.

GPR testing was performed at a total of five (5) grid lines across the client identified area of interest identified as Scan 006 through Scan 010, were performed. GPR output data was recorded at each of the lines. Select GPR data files for typical observations were processed for reporting purposes and are included in the Appendix of this report. See the attached GPR Location Plan for the approximate locations of our GPR scan lines.

The ground penetrating radar (GPR) method uses electromagnetic pulses, emitted at regular intervals by an antenna to map subsurface features and discrete objects. The electromagnetic pulses are reflected where changes in electrical properties (dielectric constant) occur. In the case of collecting GPR data on soil and pavement surfaces, this may occur due to the presence of utility conduits, groundwater, or changes in the soil strata. The reflected electromagnetic energy is received by an antenna, converted into an electrical signal, and recorded by the GPR unit. The data is processed, viewed, and printed in real time. The result is a cross-section of the subsurface directly beneath the path of the antenna. For more information regarding the GPR method and the equipment used, please refer to the manufacturer website: [www.geophysical.com](http://www.geophysical.com). The table below summarizes the slab thickness results of our GPR testing.


Table 1 – Summary of GPR Data

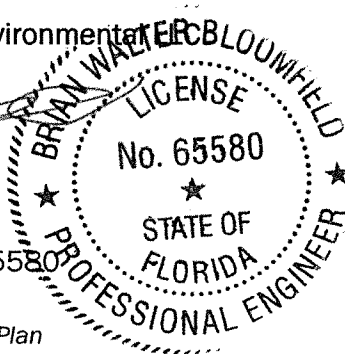
Scan No.	Scan Direction	Average Concrete Thickness (in.)	Thickened Edge (in.)	Asphalt (in.)
006	West to East	23	30	9
007	East to West	22	30	8
008	North to South	22	NA	NA
009	South to North	22	NA	NA
010	North to South	22	NA	NA

On September 24, 2018, personnel with our firm traveled back to the project site and performed two (2) depth checks shown on the attached GPR Location Plan. Based upon the results of this additional testing, the thickness at Depth Check 1 and 2 appeared to be within 1-inch of GPR observations near the same location. Based upon our testing method, we estimate the thickness of concrete provided above is within approximately  $\pm 2$  inches of actual site conditions. If a higher degree of accuracy is required, then we recommend additional concrete cores be obtained. The depth checks were performed with a hammer drill using a  $\frac{3}{4}$ -inch drill bit with a length of 37-inches. Upon the completion of our testing the concrete was patched using epoxy.

We appreciate your selection of NOVA and the opportunity to be of service on this project. If you have any questions, or if we may be of further assistance, please do not hesitate to contact us.

Sincerely,  
NOVA Engineering and Environmental

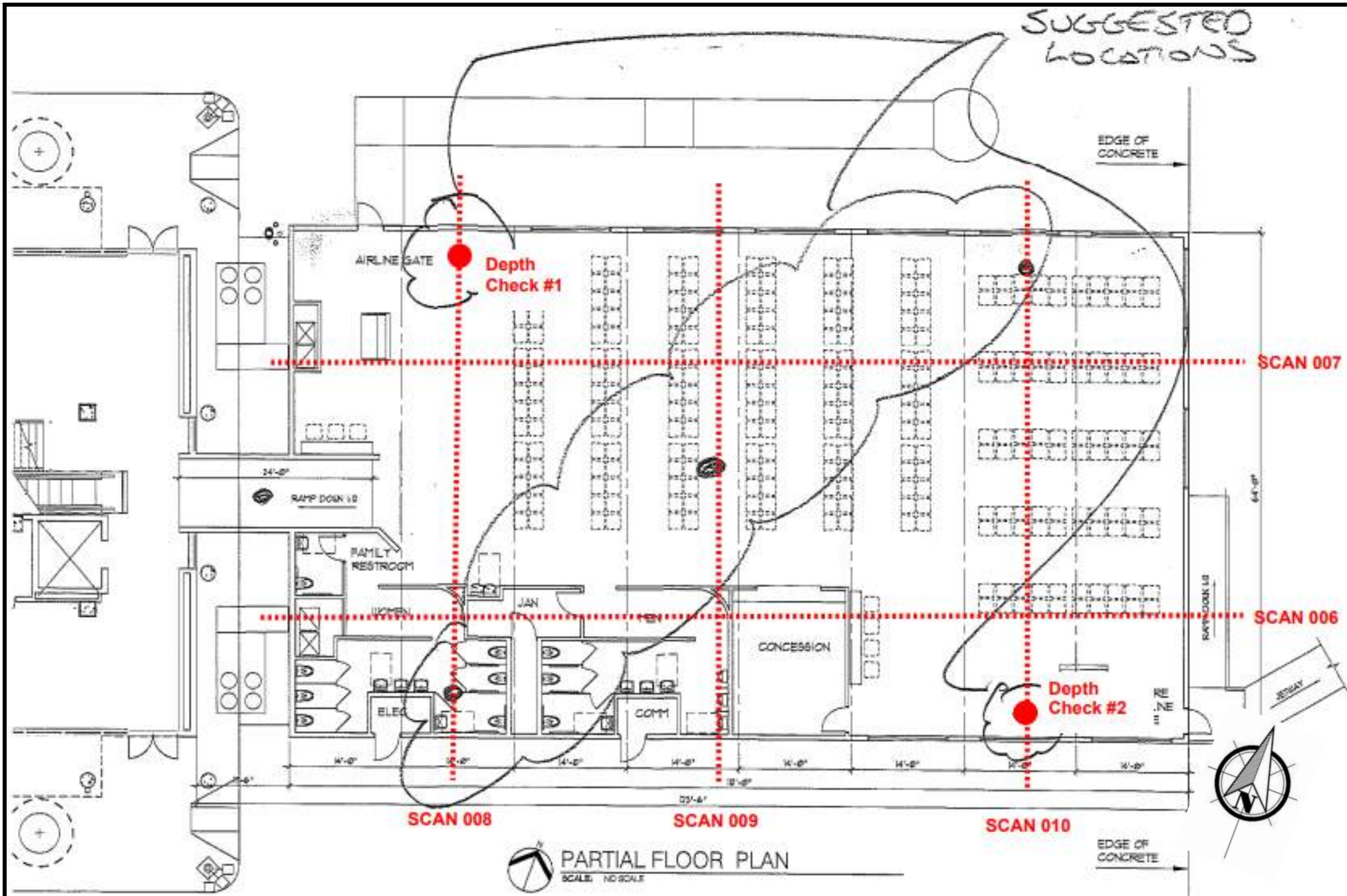
  
Brian W. Bloomfield, P.E.  
Branch Manager  
Florida Registration No. 65580



  
Andre Kniazeff, P.E.  
Geotechnical Service Line Leader  
Florida Registration No. 81315

Attachments: GPR Location Plan  
GPR Survey

# APPENDIX



Scale: Not To Scale  
 Date Drawn: September 27, 2018  
 Drawn By: J. Prout  
 Checked By: B. Bloomfield

**NOVA**  
 17612 Ashley Drive  
 Panama City Beach, Florida 32413  
 850.249.NOVA(6682) ♦ 850.249.6683

**GPR LOCATION PLAN**  
 NWFL Beaches International Airport - Terminal Extension  
 Bay County, Florida  
 NOVA Project Number 10111-1018122

**Header File Parameters**

Original File Name	
Created	Sep, 12 2018, 13:27:20
Modified	Sep, 27 2018, 13:07:44
Number of Channels	1
Horizontal Parameters	
Scans / Sec	333.00
Scans / Unit (ft)	18.00
Units / Mark (ft)	100.00
Vertical Parameters	
Samps / Scan	512
Bits / Sample	32
Dielectric Constant	4.05
Channel Information	
Channel	1
Antenna Type	50400S
Antenna Serial #	0
Position (ns)	0.00
Range (ns)	27.25
Top Surface (ft)	0.67
Depth (ft)	6.67

**Processing History****Position Correction**

Shift (nS)	-13.05
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**Amplitude Offset Removal****Position Correction**

Shift (nS)	-2.72
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**Range Gain**

# Of Points	4
Gain 1	6.00
Gain 2	61.00
Gain 3	61.00
Gain 4	66.00

**FIR Filters**

Design	BOXCAR
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**Vertical (MHz)**

High Pass	100
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Design	BOXCAR
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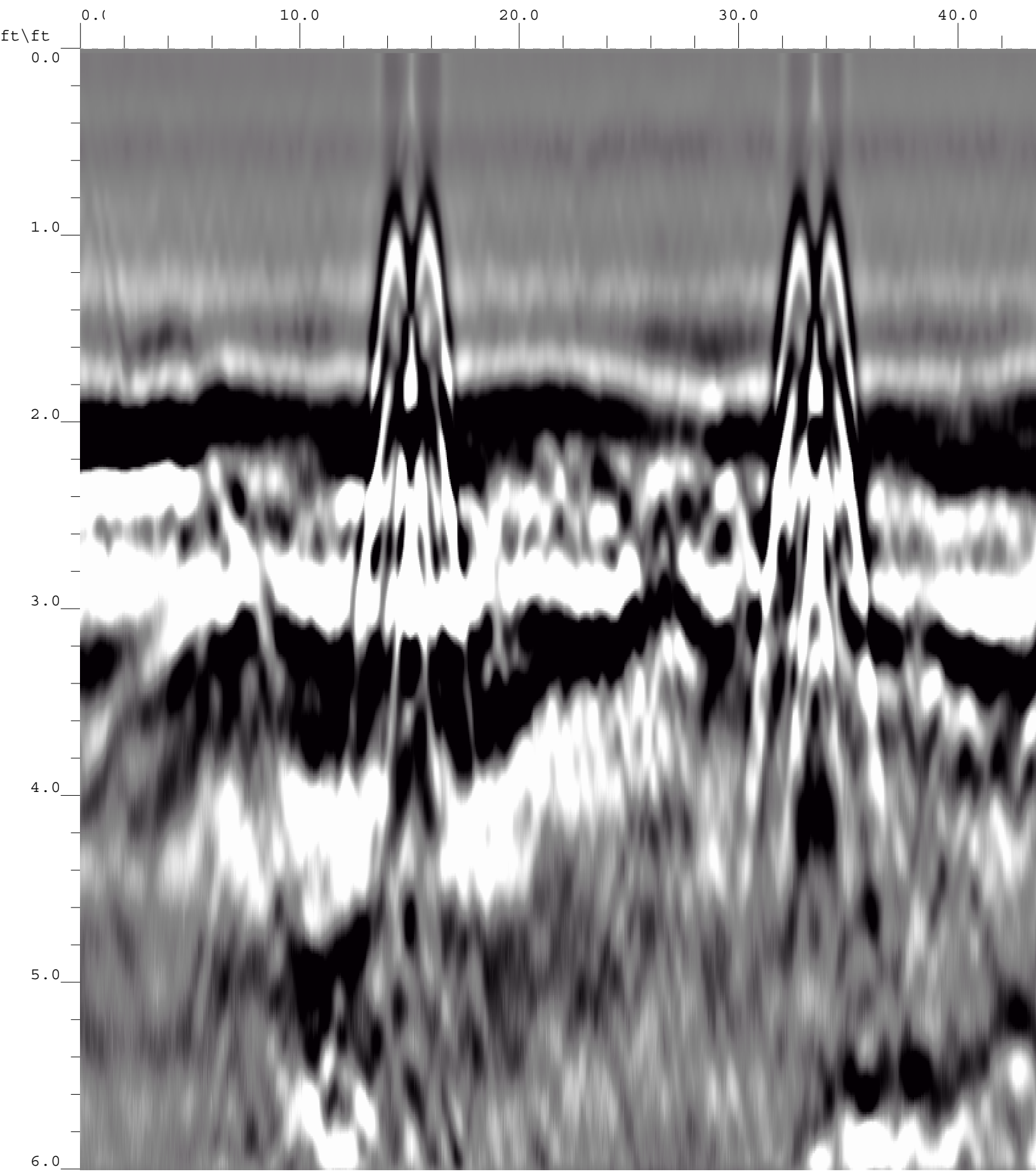
**Vertical (MHz)**

Low Pass	805
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**Samples**

Start	1
End	461

**Background Removal**



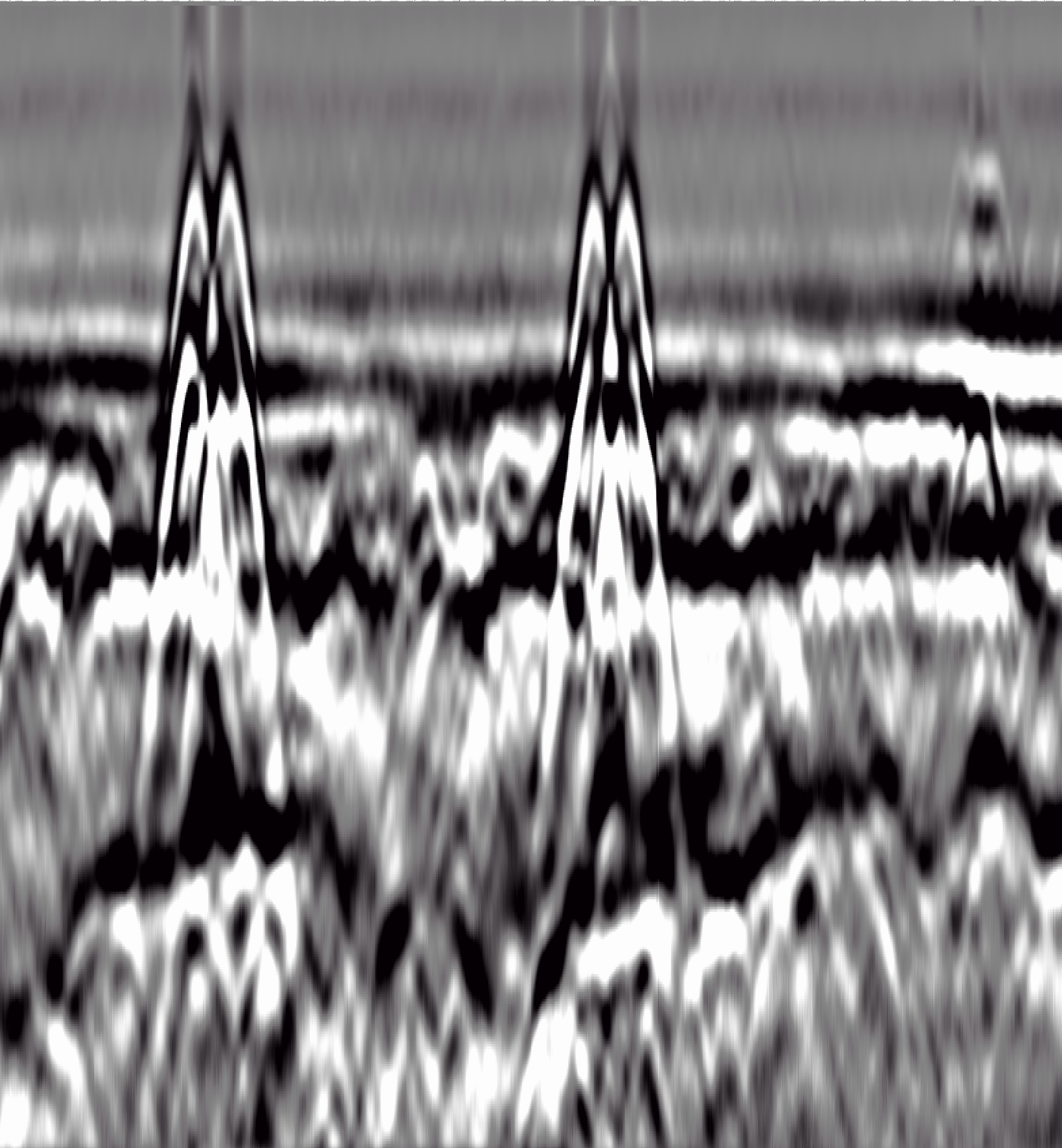
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60.0

70.0

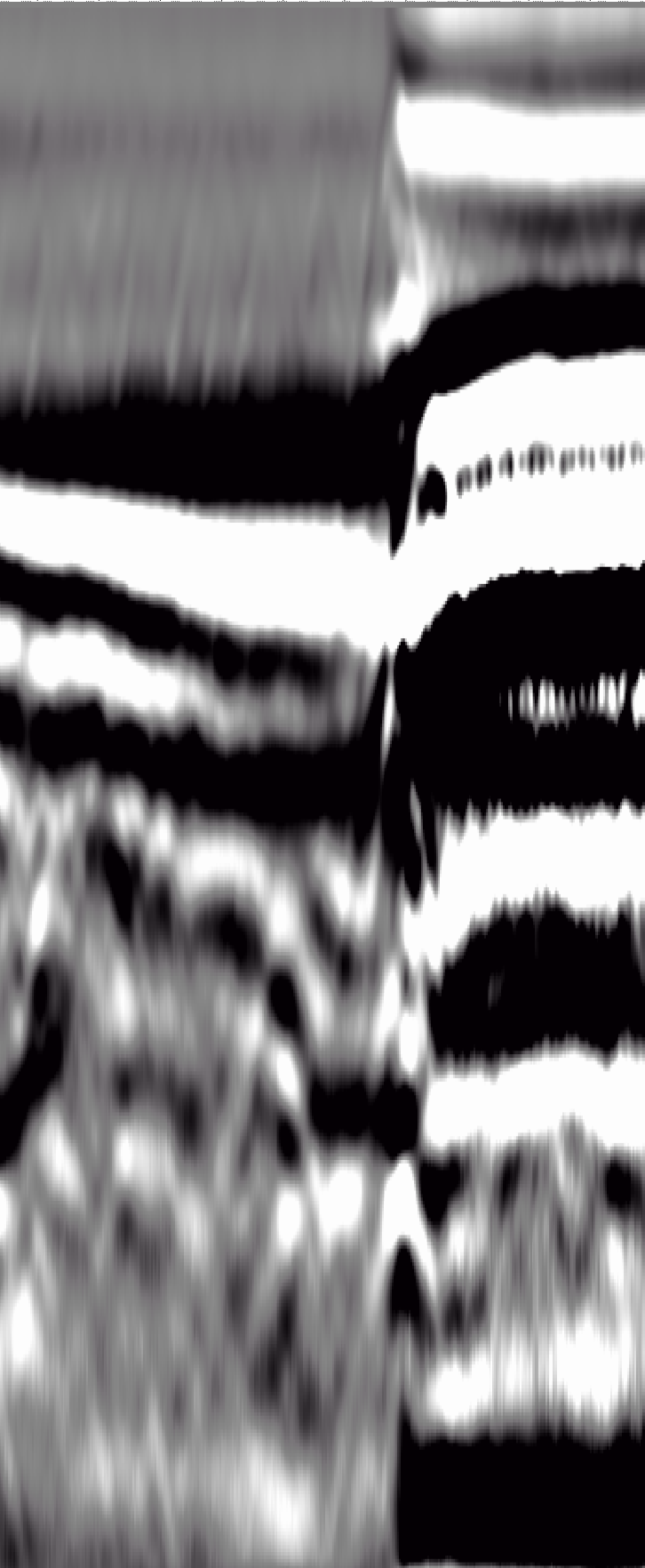
80.0

90.0



100.0

110.0





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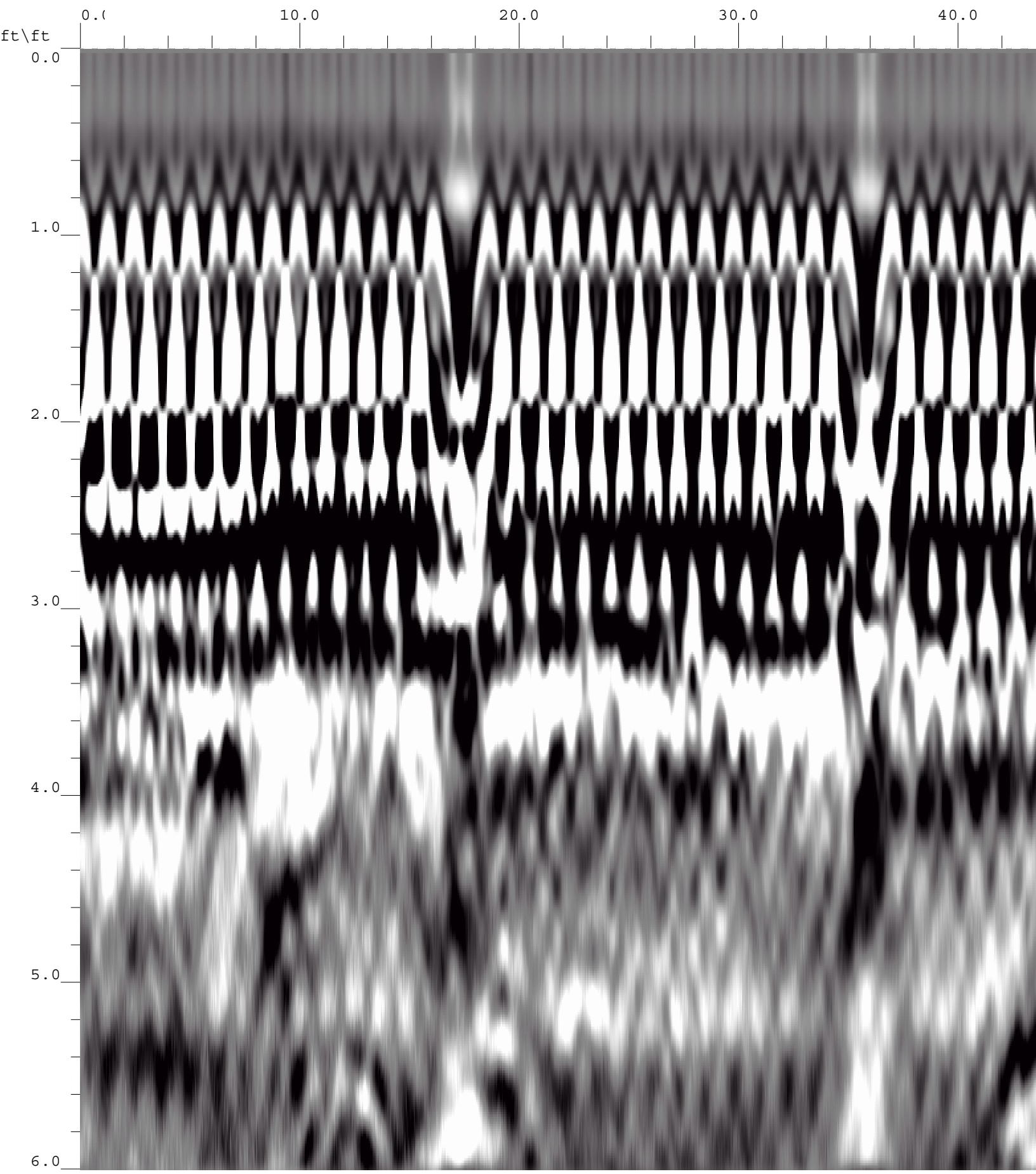
**Vertical (MHz)**

Low Pass	805
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**Samples**

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End	461

**Background Removal**



50.0

60.0

70.0

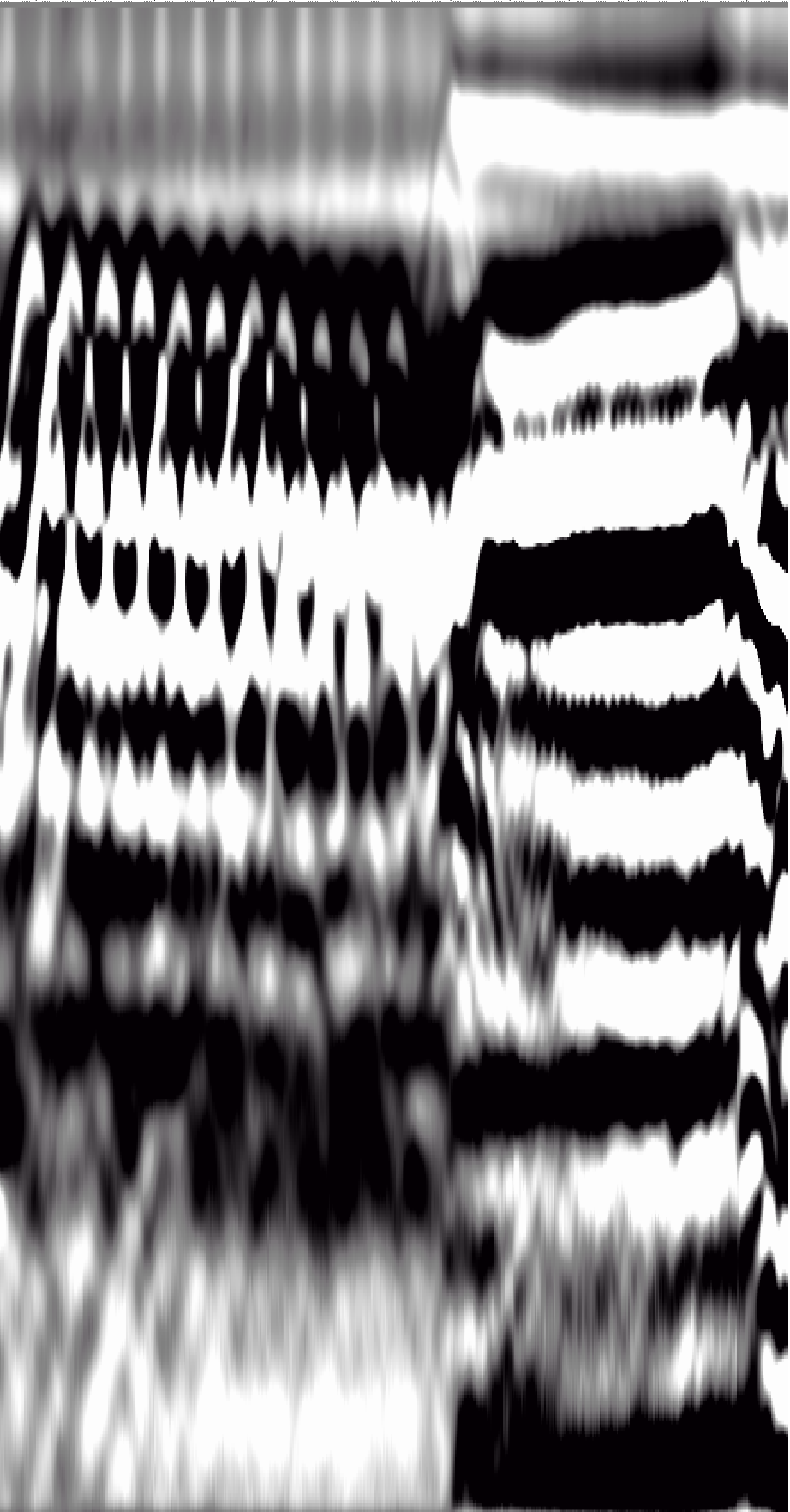
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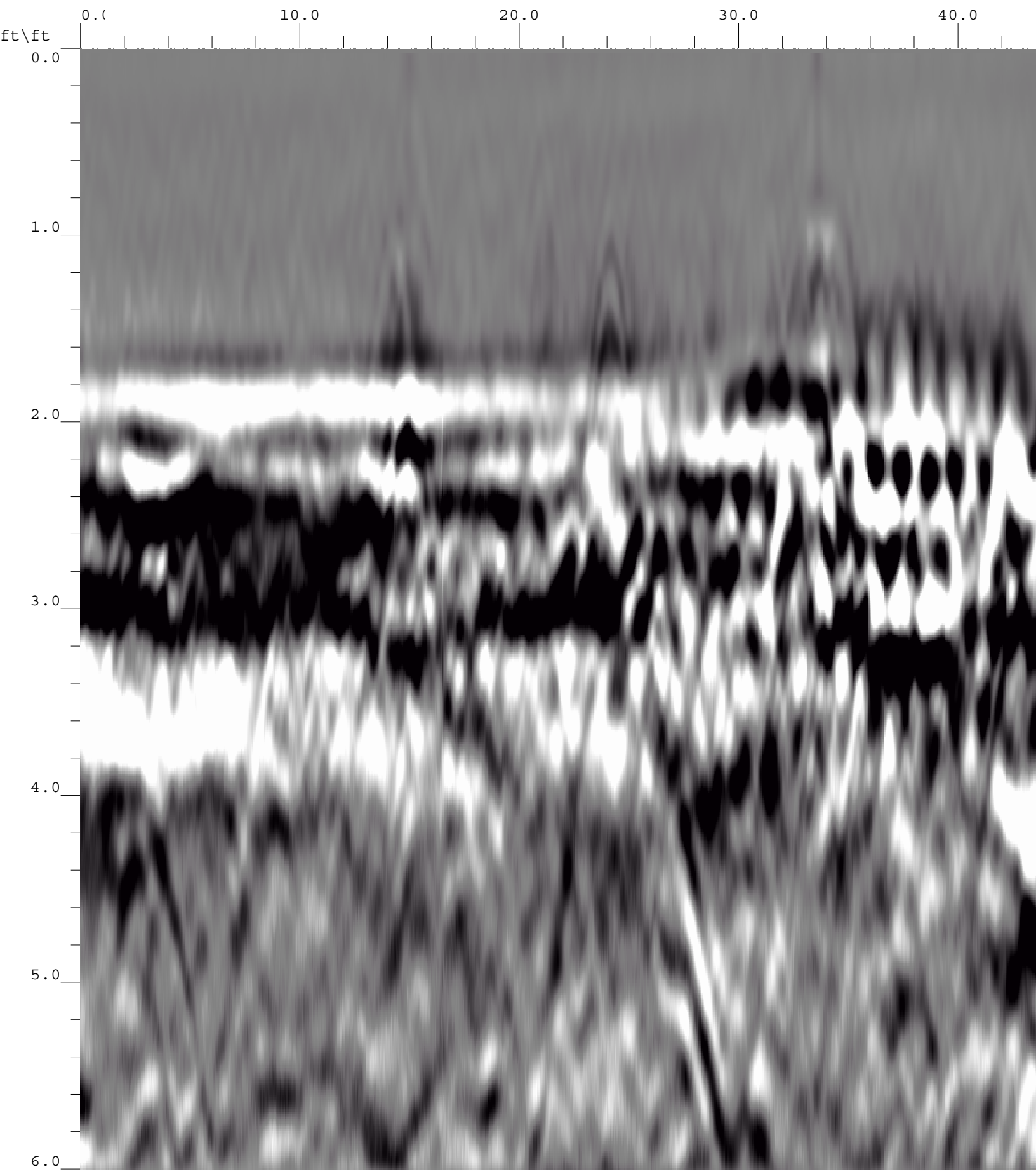
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End	461

**Background Removal**

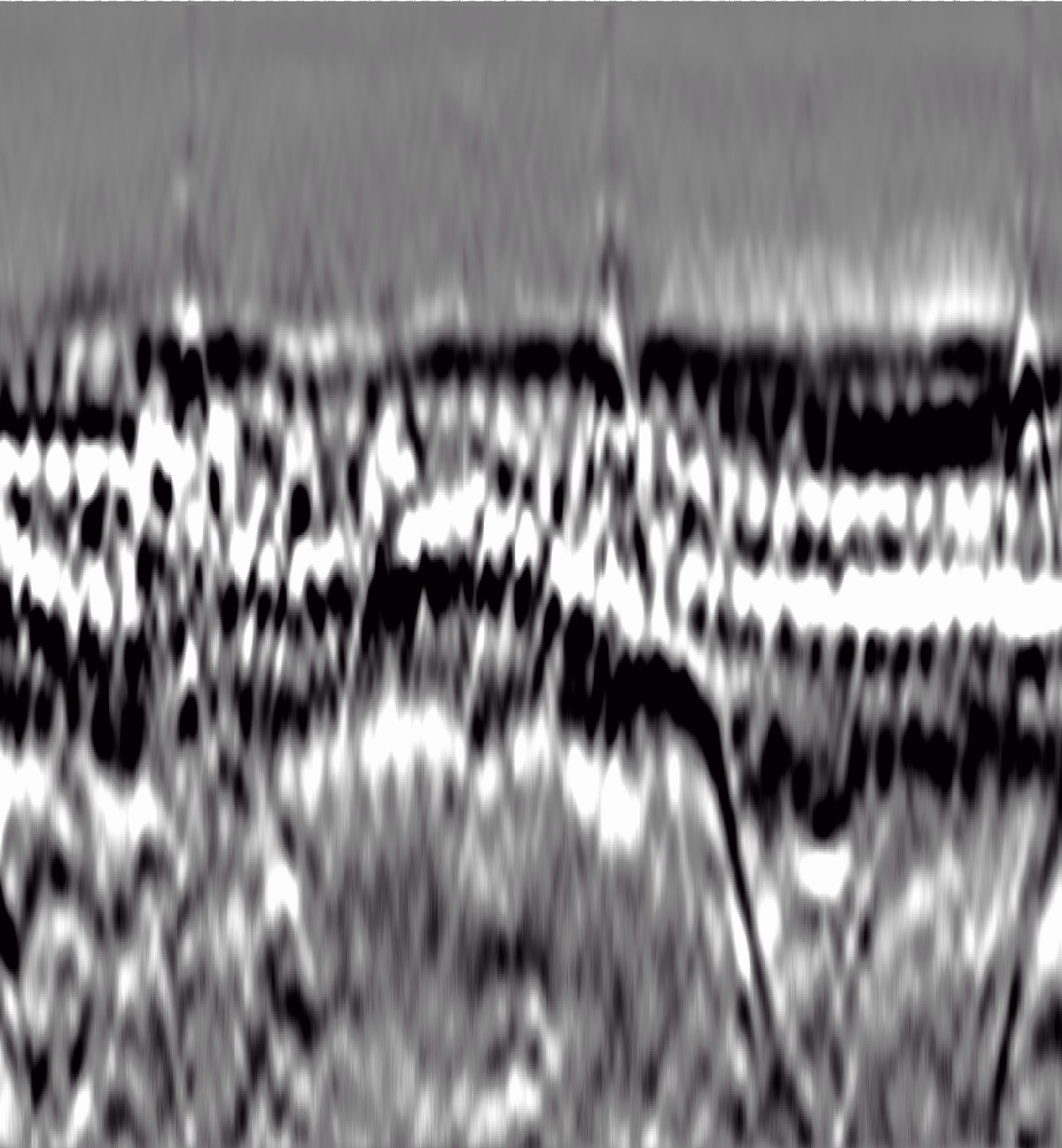


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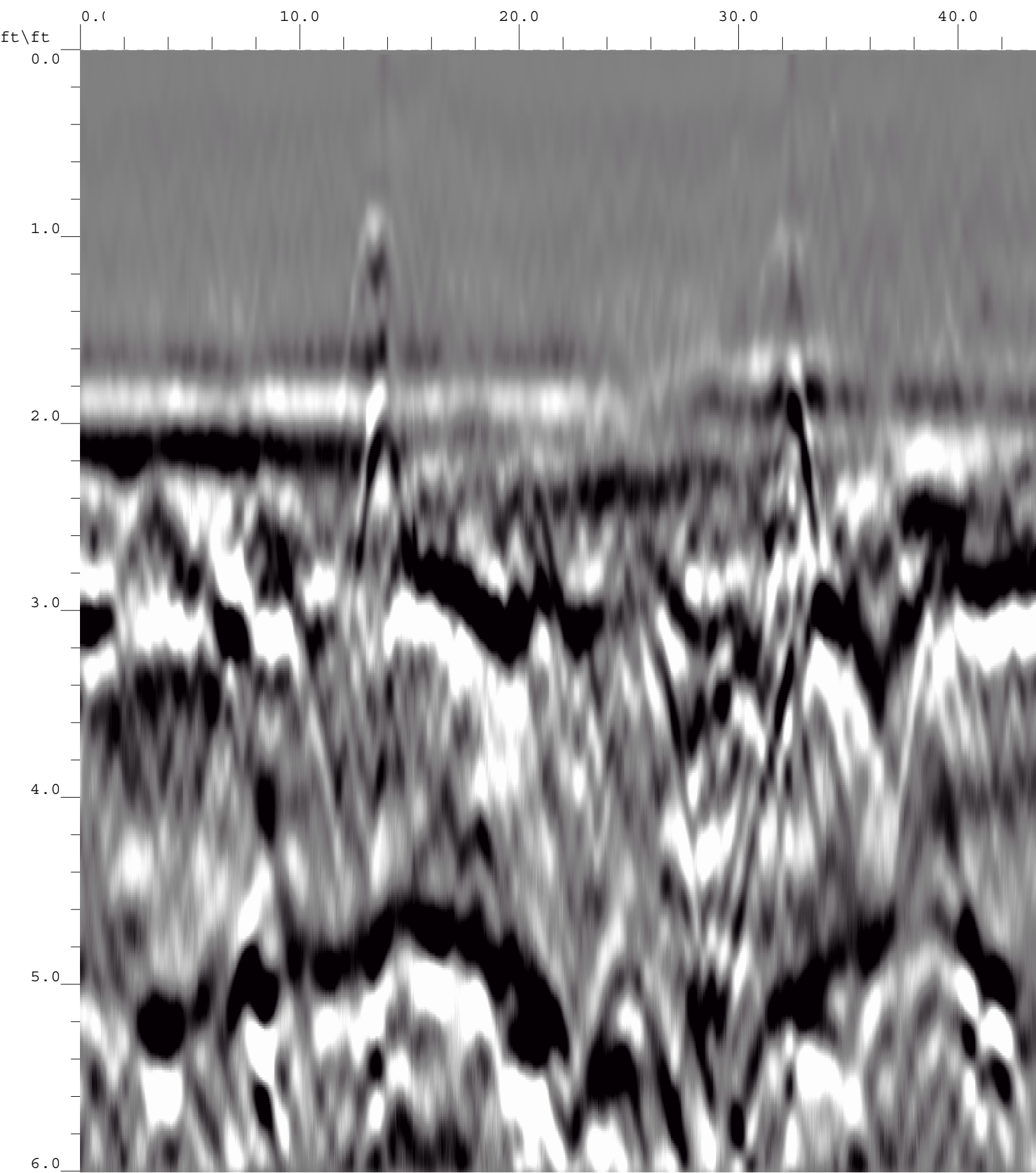
Low Pass	805
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**Background Removal**



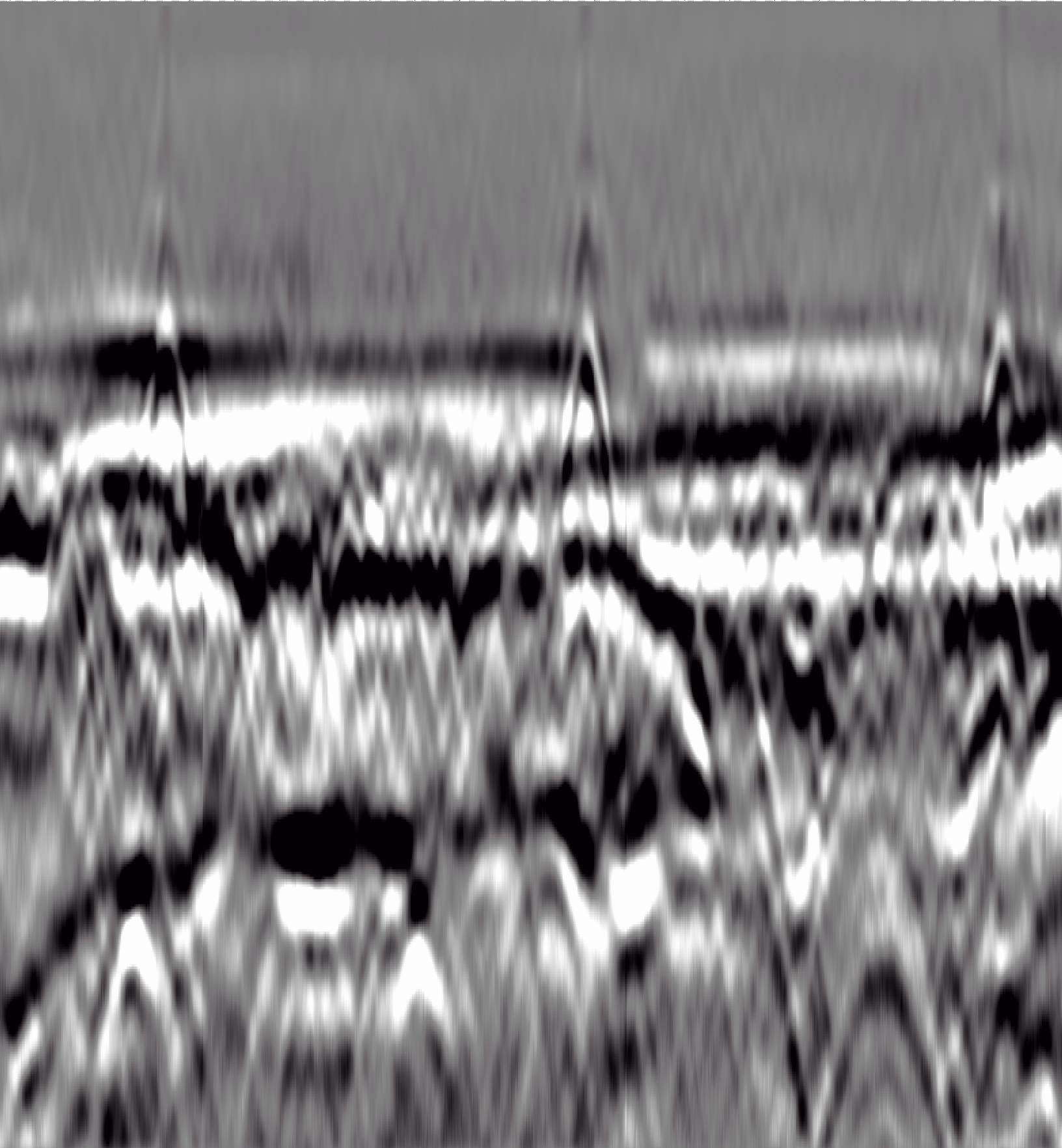


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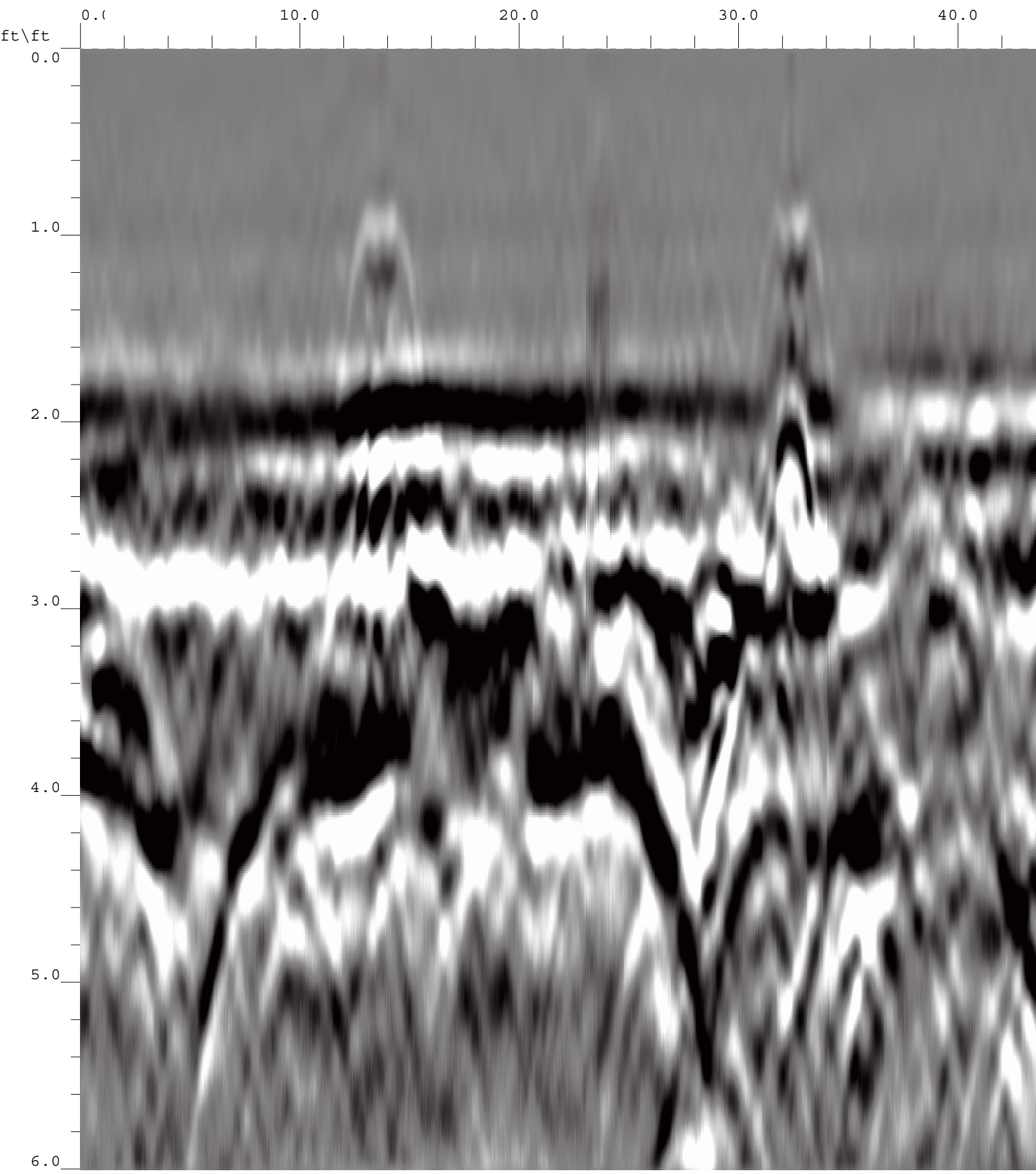
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