

Survey type:

Company: International Ocean Discovery Program

Well: Expedition 359, Site U1471E

Field: Maldives Monsoon & Sea Level

Country:

Run: 2

Date: 26-Nov-2015

Recorded by: C. Furman

Witnessed by: A. Slagle, T. Ludmann

Cover Page	1
Table of contents	2
Seismic Well Header	3
Downhole & Surface Equipment	4
Operation Time Breakdown	5
Survey Separator	6
Survey Information	7
Stack Summary Listing	8
Shot Summary Listing	9
Observer Note	10
Source Information Page (for GUN)	11
Source Geometry Sketch	12
Time Depth Plot	13
Velocity Plot	14
Processing Flow with Key Parameters	15
Processing Parameters	16
Raw Stack (Z)	18
Raw Stack (X)	19
Raw Stack (Y)	20
Raw Stack (Z) (Magnified)	21
VSP Downgoing	22
VSP Upgoing	23
VSP Waveshape decon downgoing	24
VSP Waveshape decon upgoing	25
VSP Corridor Stack (Input)	26
VSP Corridor Stack (output)	27
Source Sensor Signature	28
Surface Sensor QC Plot Page	29
Peak To Peak Plot (X)	30
Peak To Peak Plot (Y)	31
Peak To Peak Plot (Z)	32
Amplitude QC Plot (Surface)	33
Amplitude QC Plot (X)	34
Amplitude QC Plot (Y)	35
Amplitude QC Plot (Z)	36
Observer Note	37

**Well Information**

Well Type	RCB (9-7/8") Cored from 1030mbrf to TD
Rig / Platform Type	Drill Ship
Well Reference Azimuth (Magnetic, True, or Grid North)	Magnetic

**Elevation Information**

Water Depth	430.3m
Water Temperature	
Water Salinity	
Weathered Zone Depth	
Elevation Depth	

**Sea Condition**

Sea Condition	Light
Wave Height	0.2m
High Tide Level	
High Tide Time	
Low Tide Level	
Low Tide Time	

**Velocity Information**

Weathered Velocity	
Elevation Velocity	

**Downhole Equipment Information**

<b>Tool Type</b>	VSI
<b>Surface Equipment</b>	WSI, WSAM
<b>Combined Tool</b>	EDTC only
<b>Number of Shuttles</b>	1
<b>Nominal Receiver Spacing</b>	N/A
<b>Gimbaled (Y/N)</b>	Y
<b>Downhole Geophone Type</b>	GAC-D
<b>Sensitivity</b>	
<b>Natural Frequency</b>	
<b>Damping Factor</b>	
<b>DC Resistance</b>	
<b>Receiver #1</b>	VSIS-C w/ GAC-D
<b>Receiver #2</b>	
<b>Receiver #3</b>	
<b>Receiver #4</b>	
<b>Receiver #5</b>	
<b>Receiver #6</b>	
<b>Receiver #7</b>	
<b>Receiver #8</b>	

### Operational Time Breakdown

**3H 40M HRS –TOTAL OPERATING TIME**

**VSP**

**General Information**

<b>Survey Type</b>	Zero Offset VSP
<b>Surface Recording Length</b>	500.0 ms
<b>Surface Sampling Rate</b>	1.0 ms
<b>Downhole Recording Length</b>	3000.0 ms
<b>Downhole Sampling Rate</b>	1.0 ms
<b>Top of Survey</b>	663.0 m
<b>Bottom of Survey</b>	1035.2 m
<b>Number of Shots</b>	30
<b>Number of Downhole Traces</b>	30
<b>Number of Downhole Traces used for Processing</b>	11

**Stack Summary Listing (1/1) from VSI\_001\_Ggun250x1\_geo\_wavfield\_z.ldb**

Stack Number	Measured Depth [m]	True Vertical Depth [m]	Measured Time [s]	One-way Vertical Time [s]	Two-way Vertical Time [s]	Interval Velocity [m/s]	Average Velocity [m/s]	RMS Velocity [m/s]
	0	0	0	0	0			
						1607.1		
5	663.0	663.0	0.4098	0.4126	0.8251		1607.1	1607.1
						2303.3		
2	933.0	933.0	0.5268	0.5298	1.0595		1761.1	1784.7
						2590.6		
1	1035.2	1035.2	0.5662	0.5692	1.1384		1818.6	1851.9



**Shot Summary Listing (1/1)**

Measured Depth [m]	Tool Number	Stack Number	Relative Bearing [deg]	Caliper [in]	Anchoring force [kg]	Shot number
663.0	1	5	-13.6	21.2	921.9	21, 22, 29
933.0	1	2	-15.6	15.7	1027.4	9, 12, 13
1035.2	1	1	-15.2	8.4	997.6	2, 3, 5, 6, 7

**Observer's Note (1/1)**

Well depth [m]	Time	Shot Type	Shot#	Stack#	Source	Remarks
1035.2	08:48:07	SHOT	1	1	Ggun250x1	Noisy
1035.2	08:48:27	SHOT	2	1	Ggun250x1	
1035.2	08:48:45	SHOT	3	1	Ggun250x1	
1035.2	08:49:03	SHOT	4	1	Ggun250x1	Not selected?
1035.2	08:49:22	SHOT	5	1	Ggun250x1	
1035.2	08:49:40	SHOT	6	1	Ggun250x1	
1035.2	08:49:58	SHOT	7	1	Ggun250x1	
933.0	09:03:19	SHOT	8	2	Ggun250x1	Couple failure
933.0	09:04:12	SHOT	9	2	Ggun250x1	
933.0	09:04:30	SHOT	10	2	Ggun250x1	Garbage
933.0	09:04:48	SHOT	11	2	Ggun250x1	Late Arrival
933.0	09:05:07	SHOT	12	2	Ggun250x1	
933.0	09:05:25	SHOT	13	2	Ggun250x1	
933.0	09:05:43	SHOT	14	2	Ggun250x1	Junk
933.0	09:06:01	SHOT	15	2	Ggun250x1	Junk
933.0	09:06:19	SHOT	16	2	Ggun250x1	Losing formation couple
882.0	09:15:30	SHOT	17	3	Ggun250x1	Bad Coupling
882.0	09:16:27	SHOT	18	3	Ggun250x1	Bad Coupling
691.9	09:34:26	SHOT	19	4	Ggun250x1	Poor Couple
691.9	09:34:45	SHOT	20	4	Ggun250x1	Formation Collapsing
663.0	09:46:37	SHOT	21	5	Ggun250x1	
663.0	09:46:55	SHOT	22	5	Ggun250x1	
663.0	09:47:13	SHOT	23	5	Ggun250x1	Noise
663.0	09:47:31	SHOT	24	5	Ggun250x1	Noisy
663.0	09:47:49	SHOT	25	5	Ggun250x1	Noise
663.0	09:48:10	SHOT	26	5	Ggun250x1	Junk
663.0	09:48:28	SHOT	27	5	Ggun250x1	Noise
663.0	09:48:46	SHOT	28	5	Ggun250x1	Noise
663.0	09:49:04	SHOT	29	5	Ggun250x1	Noise late in the train
663.0	09:49:56	SHOT	30	5	Ggun250x1	Junk

**Source Configuration (Air Gun)**

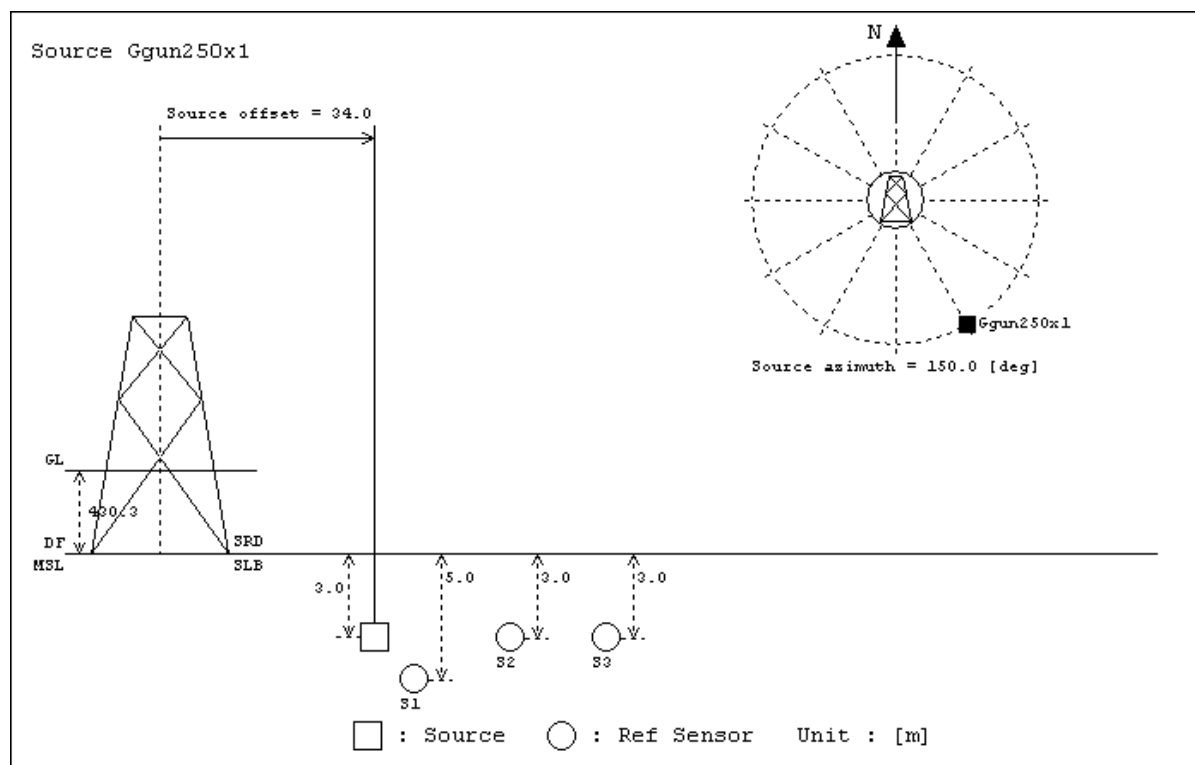
<b>Source Location</b> (Rig, Boat, Pit, Borehole)	#3 Crane (Port Aft) of Rig
<b>Source Group ID</b> (A, B, C, ...)	Ggun250x1
<b>Source Offset</b> (for fixed offset)	34m
<b>Source Azimuth</b> (for fixed offset)	140 deg
<b>Source Depth from Surface</b>	3m
<b>Source Depth from Logging Zero</b>	14m

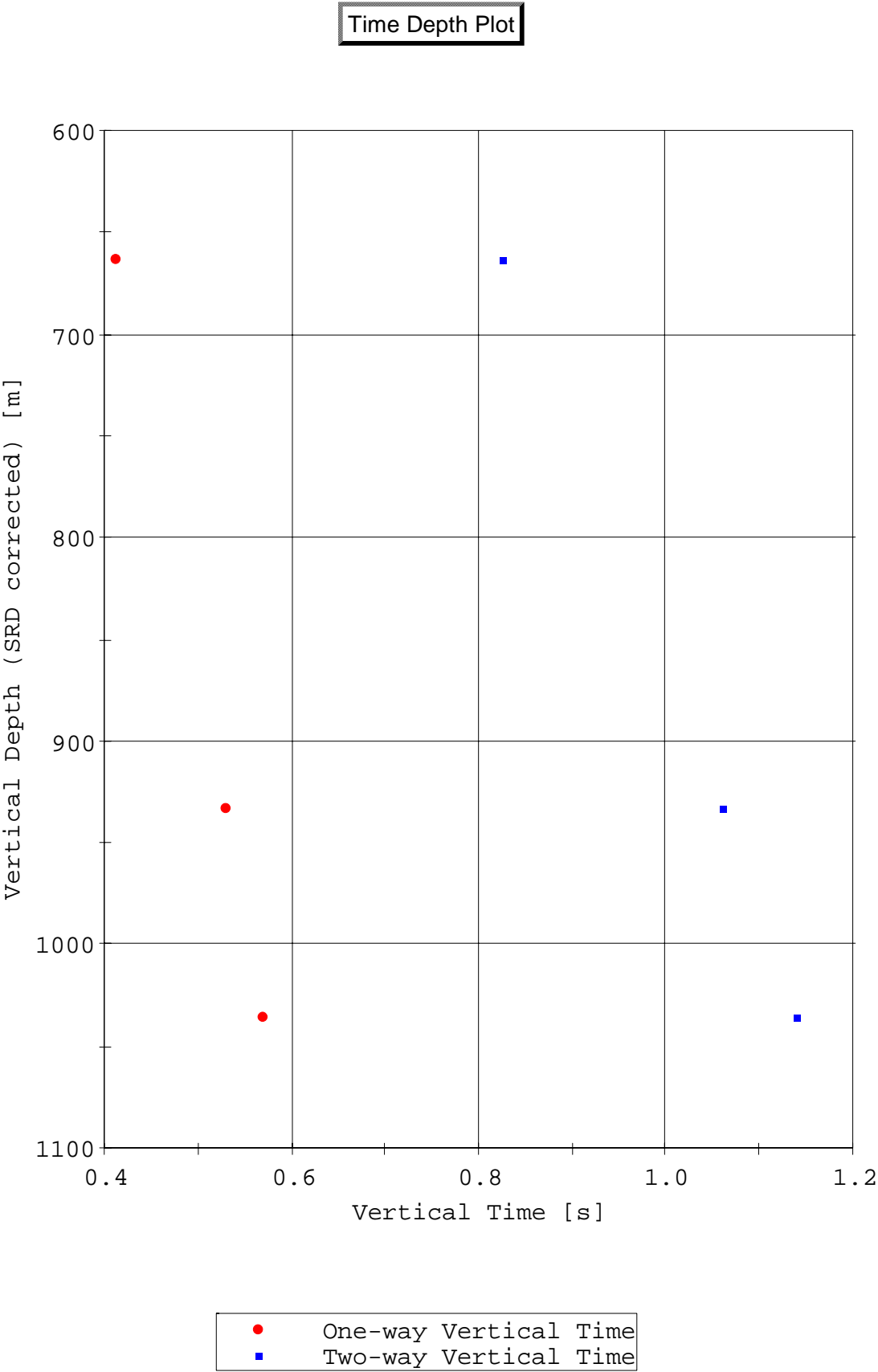
<b>Gun Controller Type</b>	WSI
<b>Gun Controller Model Name</b>	WSI
<b>Gun Controller Serial Number</b>	864
<b>Gun Type</b>	G-Gun
<b>Gun Serial Number(s)</b>	
<b>Gun Configuration</b> (3 Gun Cluster, Gun Array, etc.)	Horizontal Array of 2, but only one gun used
<b>Gun Chamber Volumes</b>	250 cu. in. per gun
<b>Gun Pit/Borehole Information</b>	Suspended below bouy in ocean
<b>Compressor Type</b>	Rig Air
<b>Compressor Flow Rate</b>	N/A
<b>Air Regulator Pressure</b>	1800 PSI

**Surface Sensor Configuration**

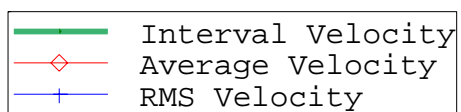
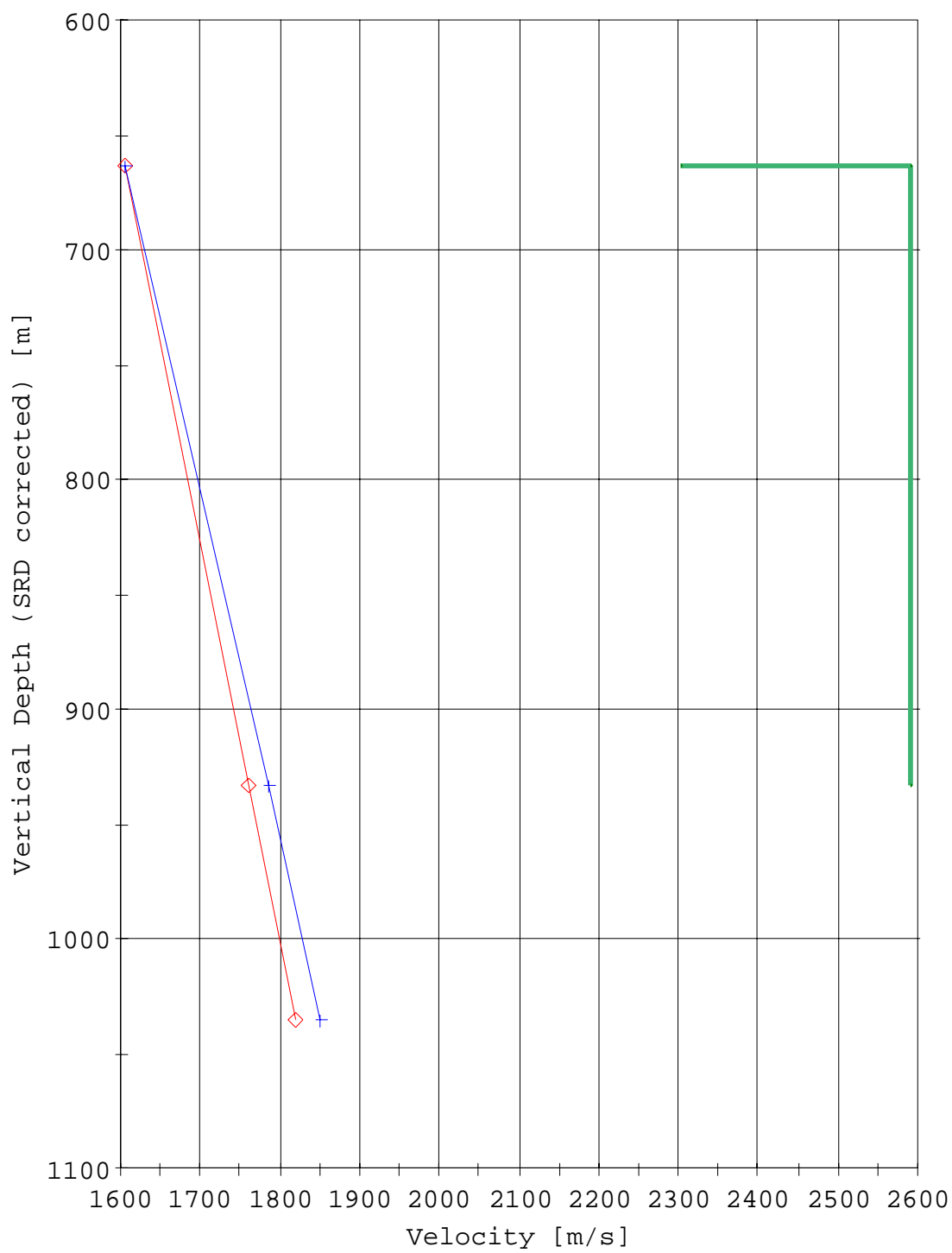
<b>Number of Surface Reference Sensors</b>	1
<b>Surface Recording Length</b>	500 mS
<b>Surface Sampling Rate</b>	1 mS
<b>Sensor Type (S1)</b>	MP-24H
<b>Sensor Type (S2)</b>	
<b>Sensor Type (S3)</b>	
<b>Sensor Depth from Surface (S1)</b>	5m
<b>Sensor Depth from Surface (S2)</b>	
<b>Sensor Depth from Surface (S3)</b>	
<b>Sensor Depth from Logging Zero (S1)</b>	16m
<b>Sensor Depth from Logging Zero (S2)</b>	
<b>Sensor Depth from Logging Zero (S3)</b>	
<b>Sensor Offset from Source (S1)</b>	0m (directly suspended below gun)
<b>Sensor Offset from Source (S2)</b>	
<b>Sensor Offset from Source (S3)</b>	

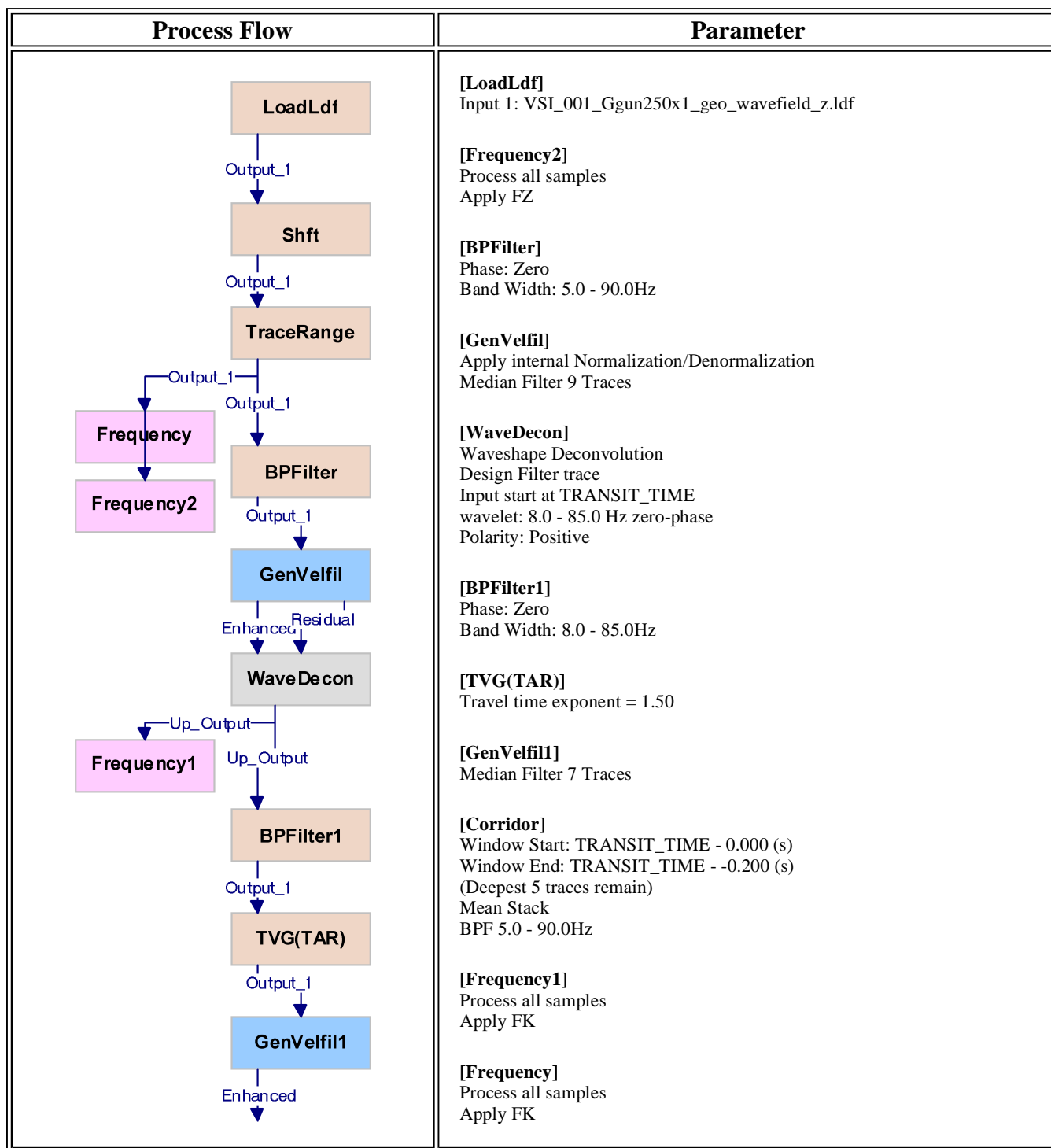
## Source Geometry Sketch





## Velocity Plot





[LoadLdf]

FileLoadLdf Parameters

Input 1: VSI\_001\_Ggun250x1\_geo\_wavefield\_z.ldf

[Shft]

Shift Parameters

Shift: + TT\_SRD to TT Difference - 0 s

Update selected headers

[TraceRange]

Trace Range Set Manual Parameters

Trace Range Set Parameters

Remove Bad Trace

[Frequency2]

Spectral Analyser Parameters

Process all samples

Depth/Offset header = CABLE\_LENGTH

Output is Frequency Domain

Compute Amplitude spectrum in dB

[BPFfilter]

BPF Parameters

Butterworth Filter, Zero Phase

Characteristic: 5.000 Hz to 90.000 Hz Order 3

[GenVelFil]

Mean/Median Generalized Velocity Filter Parameters

Align events using times of TRANSIT\_TIME x 1.000

Compute both enhanced and residual output

Apply internal Normalization/Denormalization based on RMS of time window

From TRANSIT\_TIME - 0.020 s

Windown length = 0.500 s

Median Stacking

Stacking window (traces): 9

Stacking window (samples): 1

Source and receiver coordinates Parameters

Source Offset: SOURCE\_LINE\_POSITION\_RHO

Source Depth: SOURCE\_LINE\_POSITION\_Z

Receiver Offset: RECEIVER\_LINE\_POSITION\_RHO

Receiver Depth: RECEIVER\_LINE\_POSITION\_Z

[WaveDecon]

Waveshaping deconvolution Parameters

Design Filter trace by trace

Filter input start at TRANSIT\_TIME - 0.080 s

Filter input window: 1.000 s

Filter Length is filter input window

Desired wavelet created by filtered unit impulse from 8.000 Hz to 85.000 Hz , zero-phase

Positive wavelet polarity

Wavelet delay time = Filter Length / 2

White noise (%): 5.000

Waveshaping optimization Parameters

[BPFfilter1]

BPF Parameters

Butterworth Filter, Zero Phase

Characteristic: 8.000 Hz to 85.000 Hz Order 3

[TVG(TAR)]

Time-Varying Gain Parameters



```
Window start at TRANSIT_TIME - 0.000000
Window length = 2.999000
Travel time exponent = 1.500000
Exponential Weighting = 0.000000
```

[GenVelfill]

```
Mean/Median Generalized Velocity Filter Parameters
Align events using times of TRANSIT_TIME x -1.000
Compute both enhanced and residual output
Median Stacking
Stacking window (traces): 7
Stacking window (samples): 1
Source and receiver coordinates Parameters
Source Offset: SOURCE_LINE_POSITION_RHO
Source Depth: SOURCE_LINE_POSITION_Z
Receiver Offset: RECEIVER_LINE_POSITION_RHO
Receiver Depth: RECEIVER_LINE_POSITION_Z
```

[Corridor]

```
Corridor stack Parameters
Mute before TRANSIT_TIME - 0 s
Mute after TRANSIT_TIME - -0.200 s
All traces except the deepest (traces): 5
Depth header: RECEIVER_POSITION_Z
Mean stack
Apply +TT with TRANSIT_TIME
Replicate corridor stack x 10
Apply BPF on resulting corridor stack
BPF Parameters
Butterworth Filter, Zero Phase
Characteristic: 5.000 Hz to 90.000 Hz Order 3
```

[Frequency]

```
Spectral Analyser Parameters
Process all samples
Depth/Offset header = CABLE_LENGTH
Output is FK Domain
Compute Amplitude spectrum in dB
```

[Frequency]

```
Spectral Analyser Parameters
Process all samples
Depth/Offset header = CABLE_LENGTH
Output is FK Domain
Compute Amplitude spectrum in dB
```

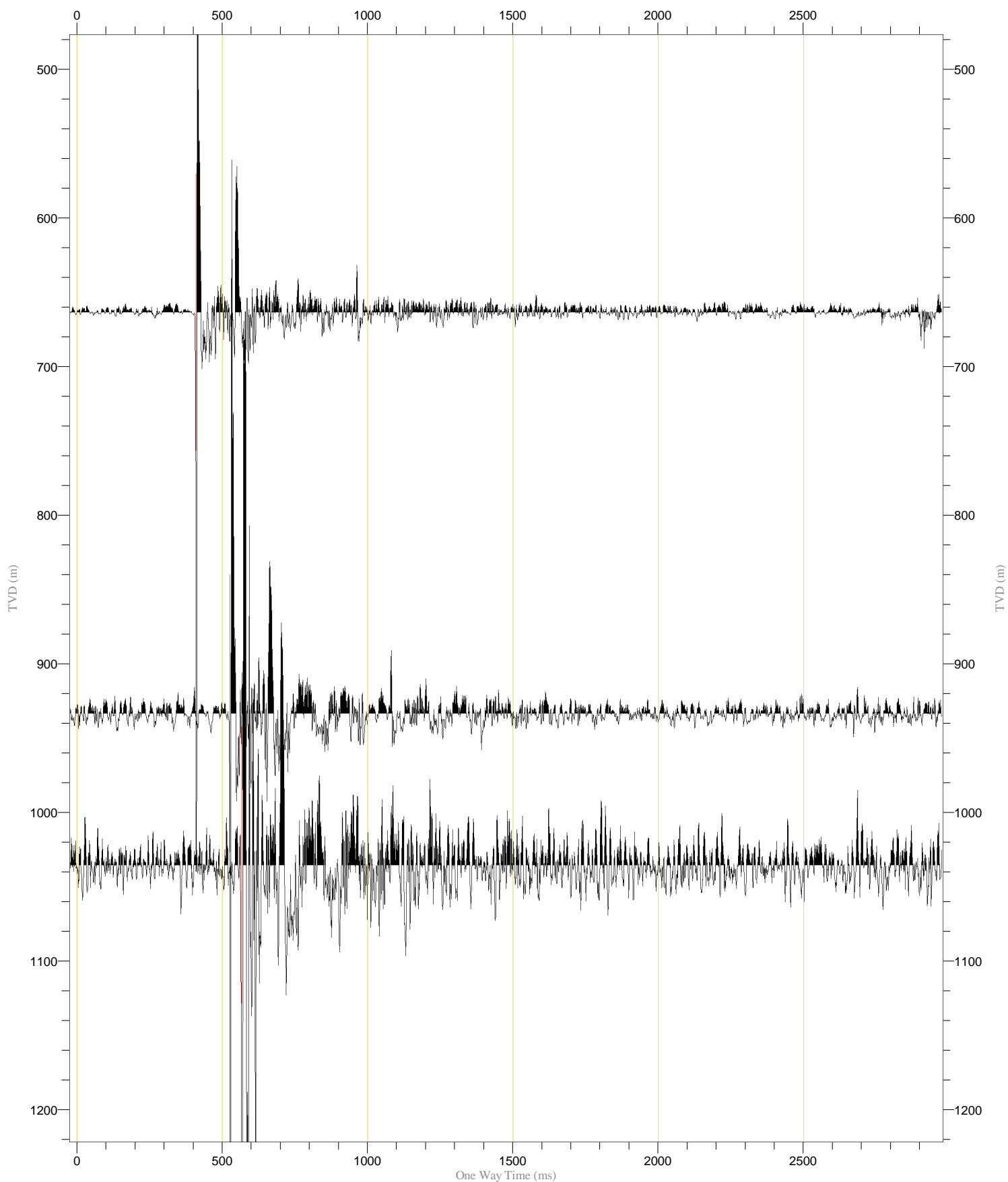
Raw Stack (Z)

Normalization Trace by Trace (250%)

Polarity Normal

One Way Time (ms)

Scaling 5.7 cm/sec, 1/3420



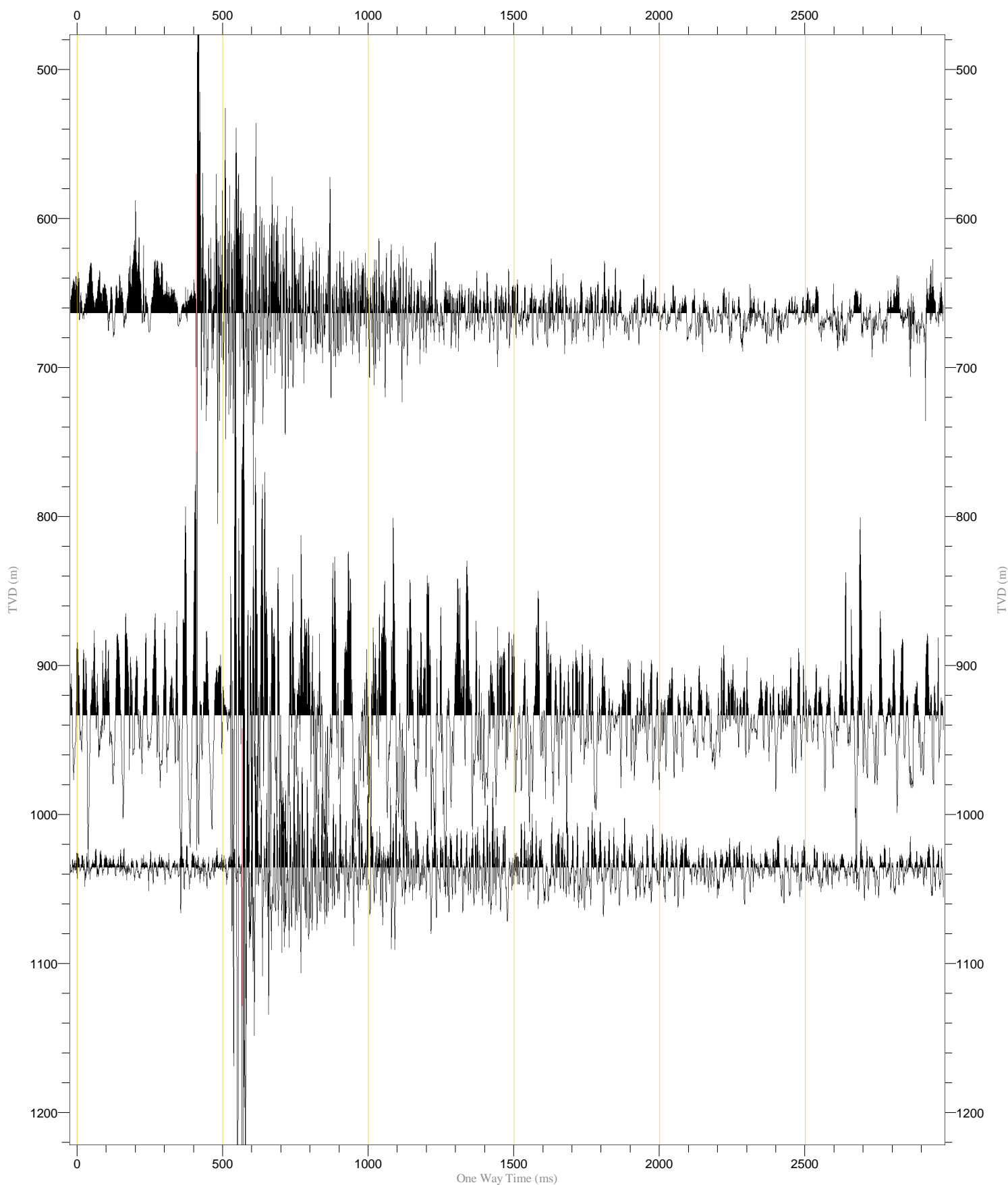
Raw Stack (X)

Normalization Trace by Trace (250%)

Polarity Normal

One Way Time (ms)

Scaling 5.7 cm/sec, 1/3420



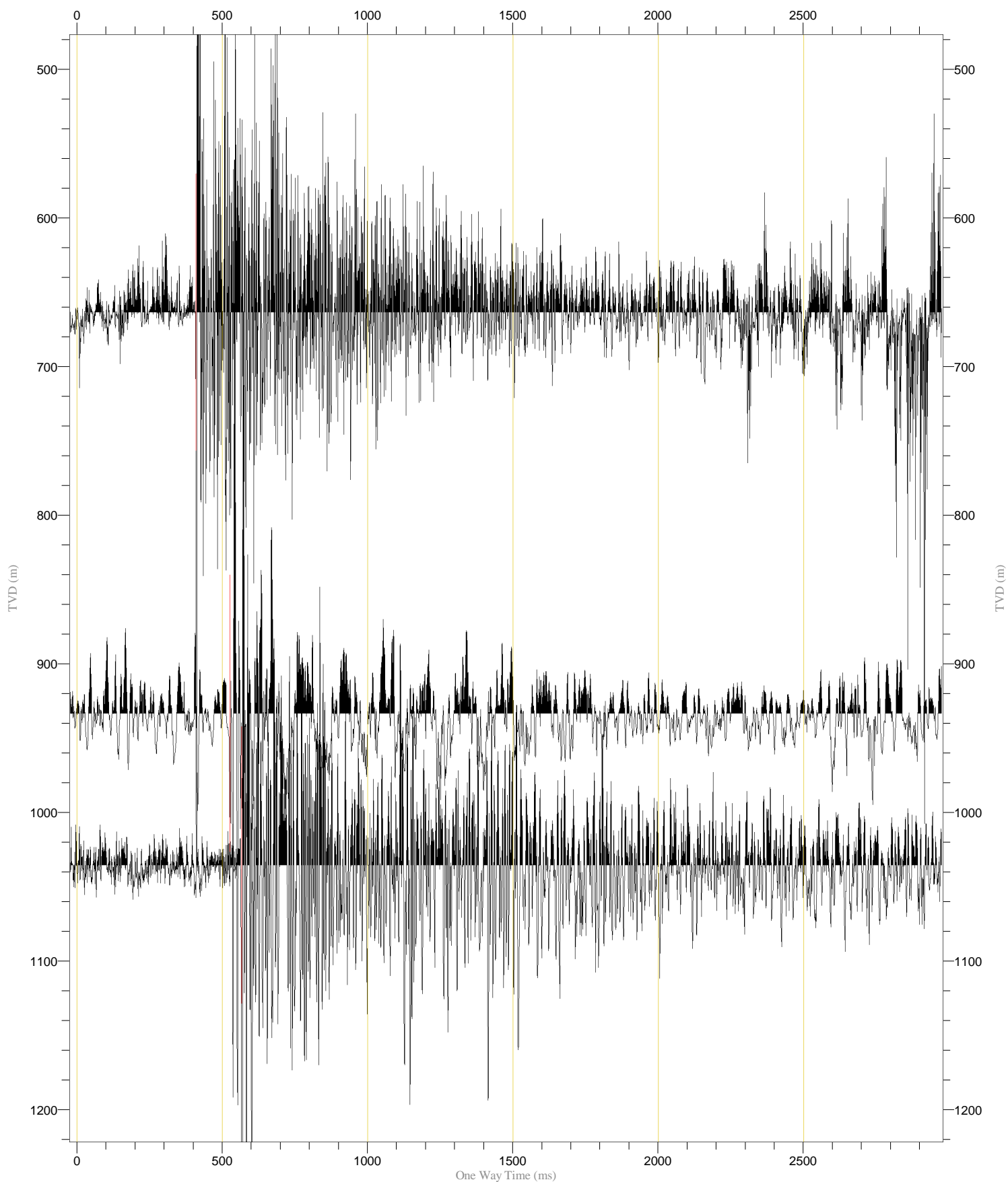
Raw Stack (Y)

Normalization Trace by Trace (250%)

Polarity Normal

One Way Time (ms)

Scaling 5.7 cm/sec, 1/3420



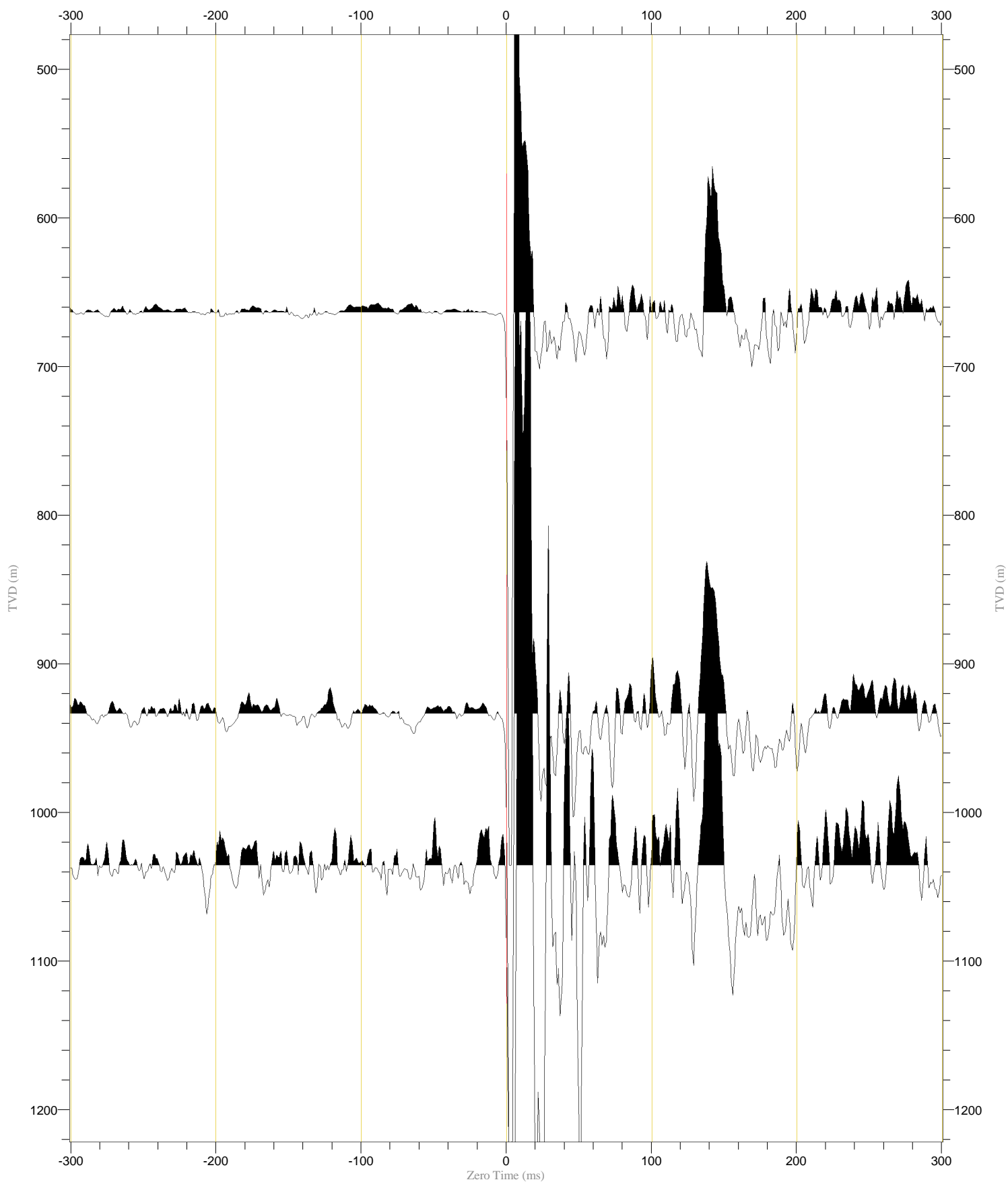
Raw Stack (Z) (Magnified)

Normalization Trace by Trace (250%)

Polarity Normal

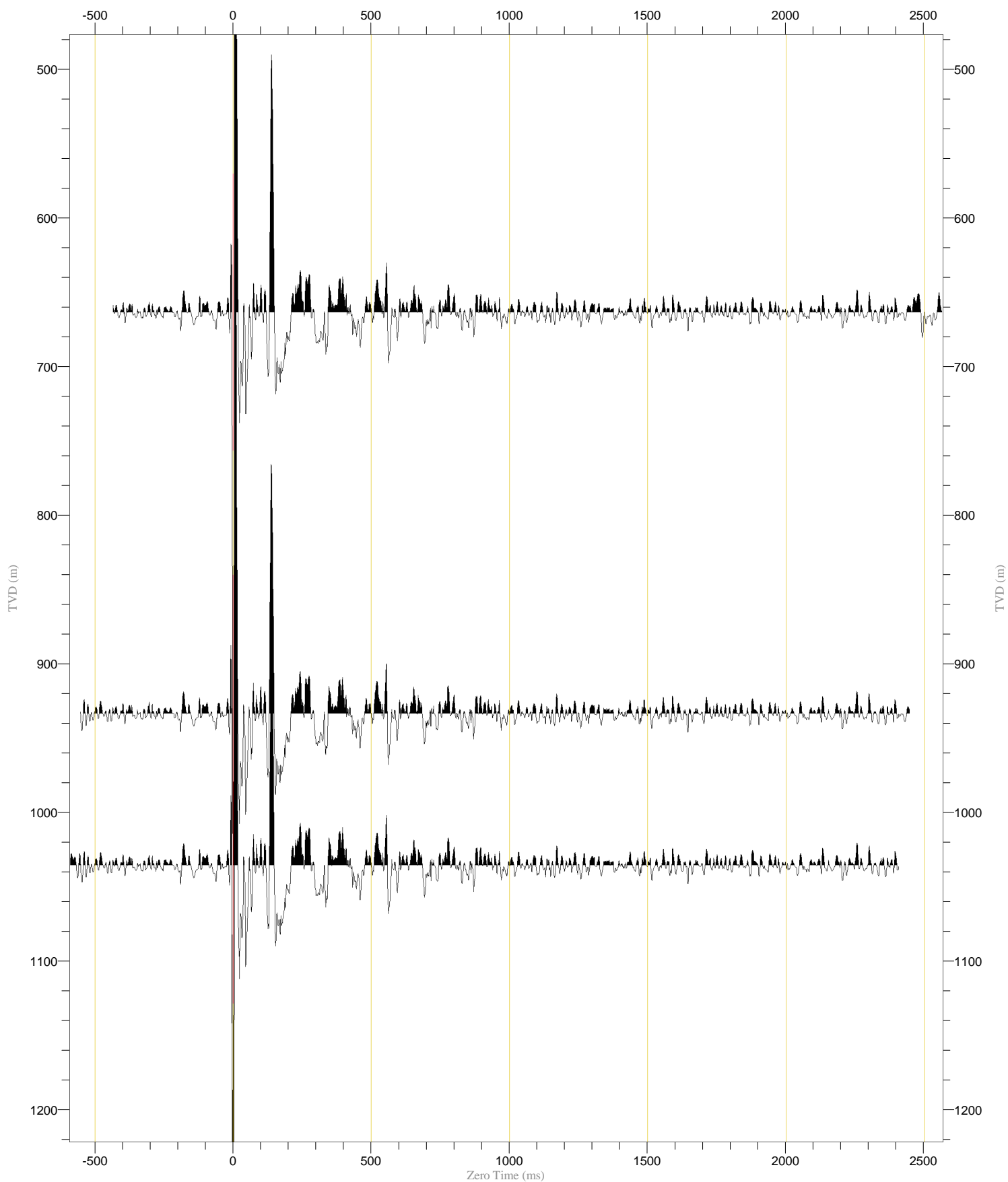
Zero Time (ms)

Scaling 28.5 cm/sec, 1/3420



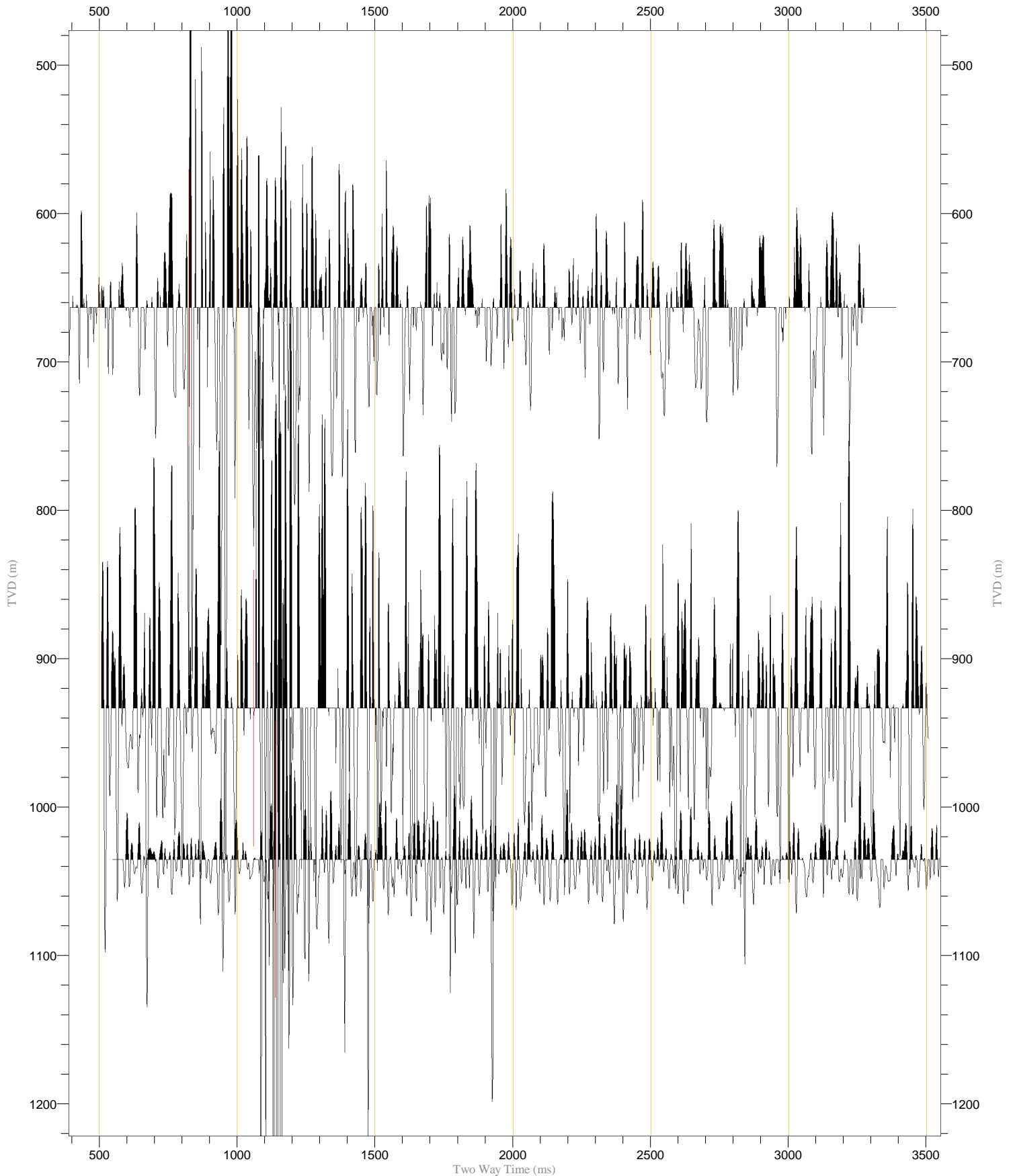
VSP Downgoing  
BPF 5.0 - 90.0Hz  
Median Filter 9 Traces

Normalization Trace by Trace (250%)  
Polarity Normal  
Zero Time (ms)  
Scaling 5.4 cm/sec, 1/3420



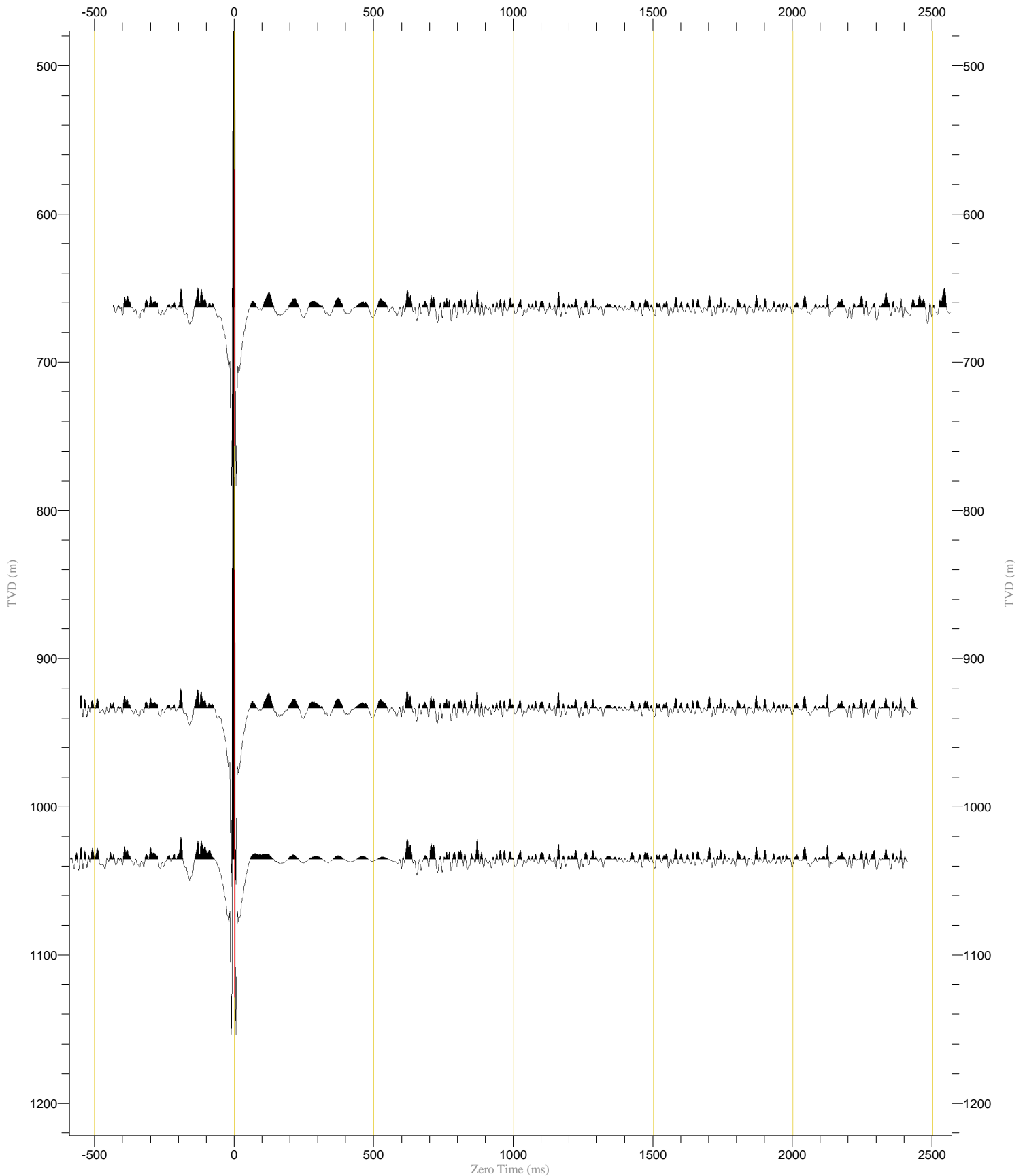
VSP Upgoing  
BPF 5.0 - 90.0Hz  
Median Filter 9 Traces

Normalization Trace by Trace (250%)  
Polarity Normal  
Two Way Time (ms)  
Scaling 5.4 cm/sec, 1/3420



VSP Waveshape decon downgoing  
BPF 5.0 - 90.0Hz  
Median Filter 9 Traces  
Waveshape Decon.(wavelet: 8.0 - 85.0 Hz zero-phase)

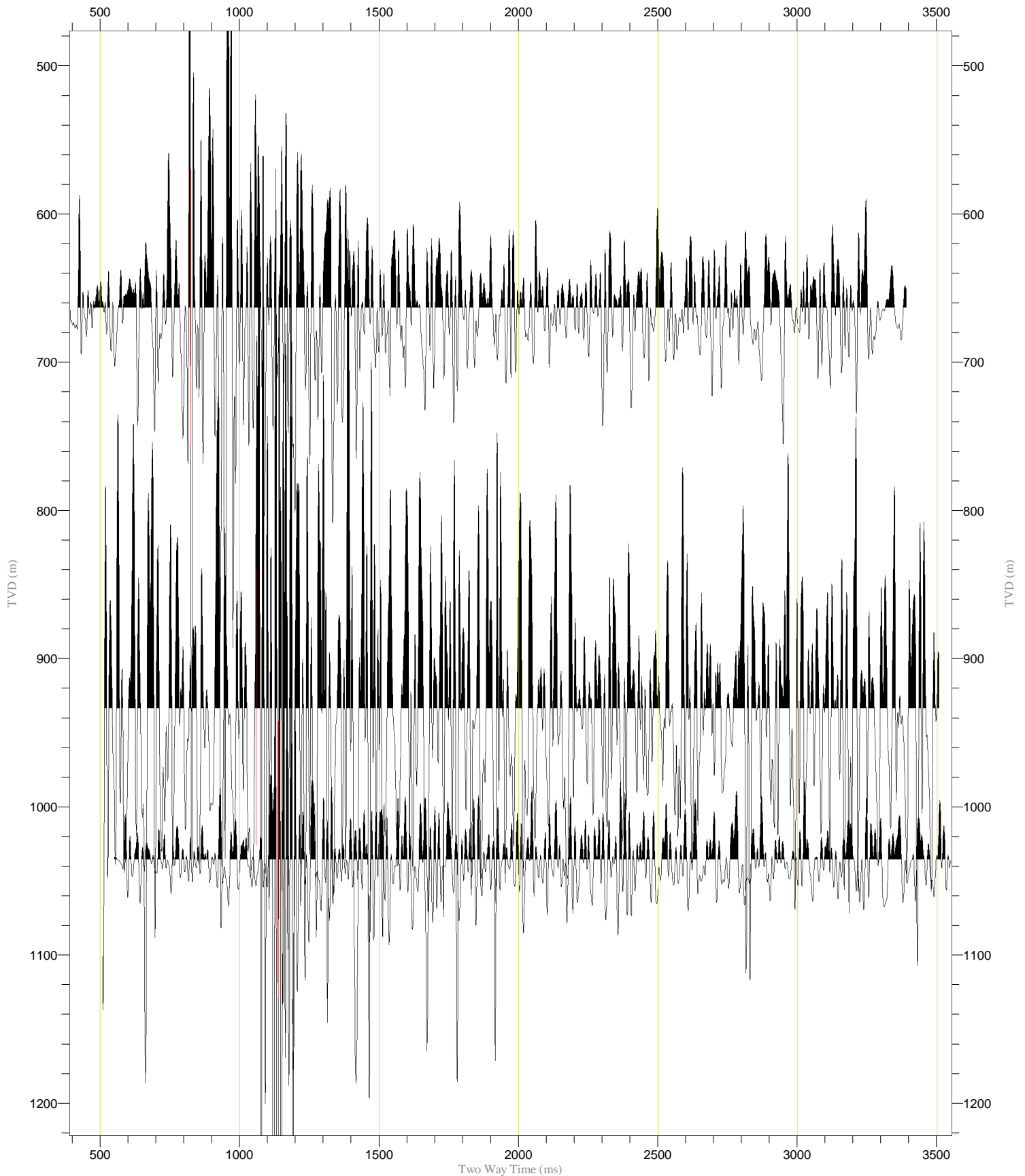
Normalization Trace by Trace (250%)  
Polarity Normal  
Zero Time (ms)  
Scaling 5.4 cm/sec, 1/3470





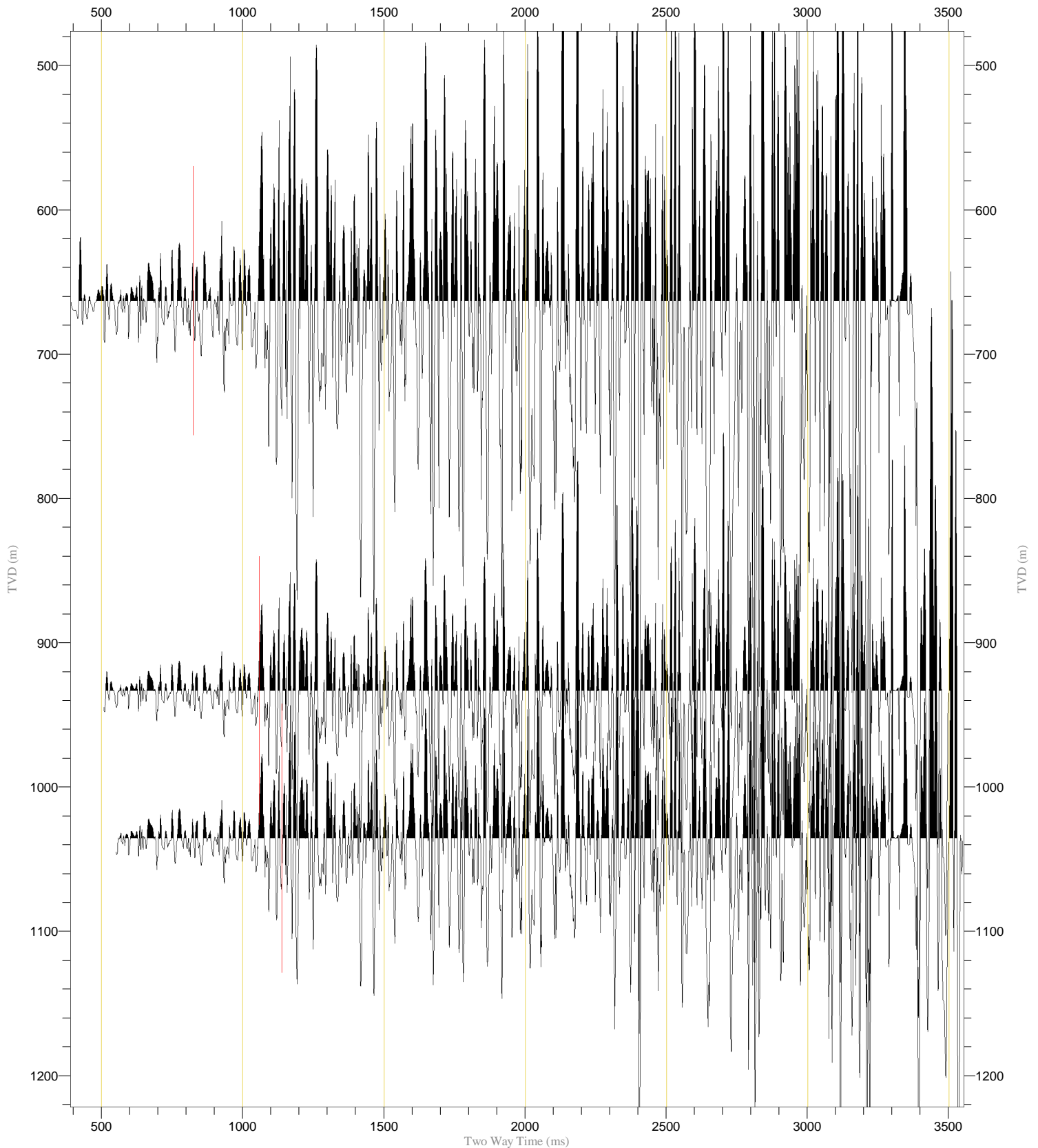
VSP Waveshape decon upgoing  
BPF 5.0 - 90.0Hz  
Median Filter 9 Traces  
Waveshape Decon.(wavelet: 8.0 - 85.0 Hz zero-phase)


Normalization Trace by Trace (250%)  
Polarity Normal  
Two Way Time (ms)  
Scaling 5.4 cm/sec, 1/3470

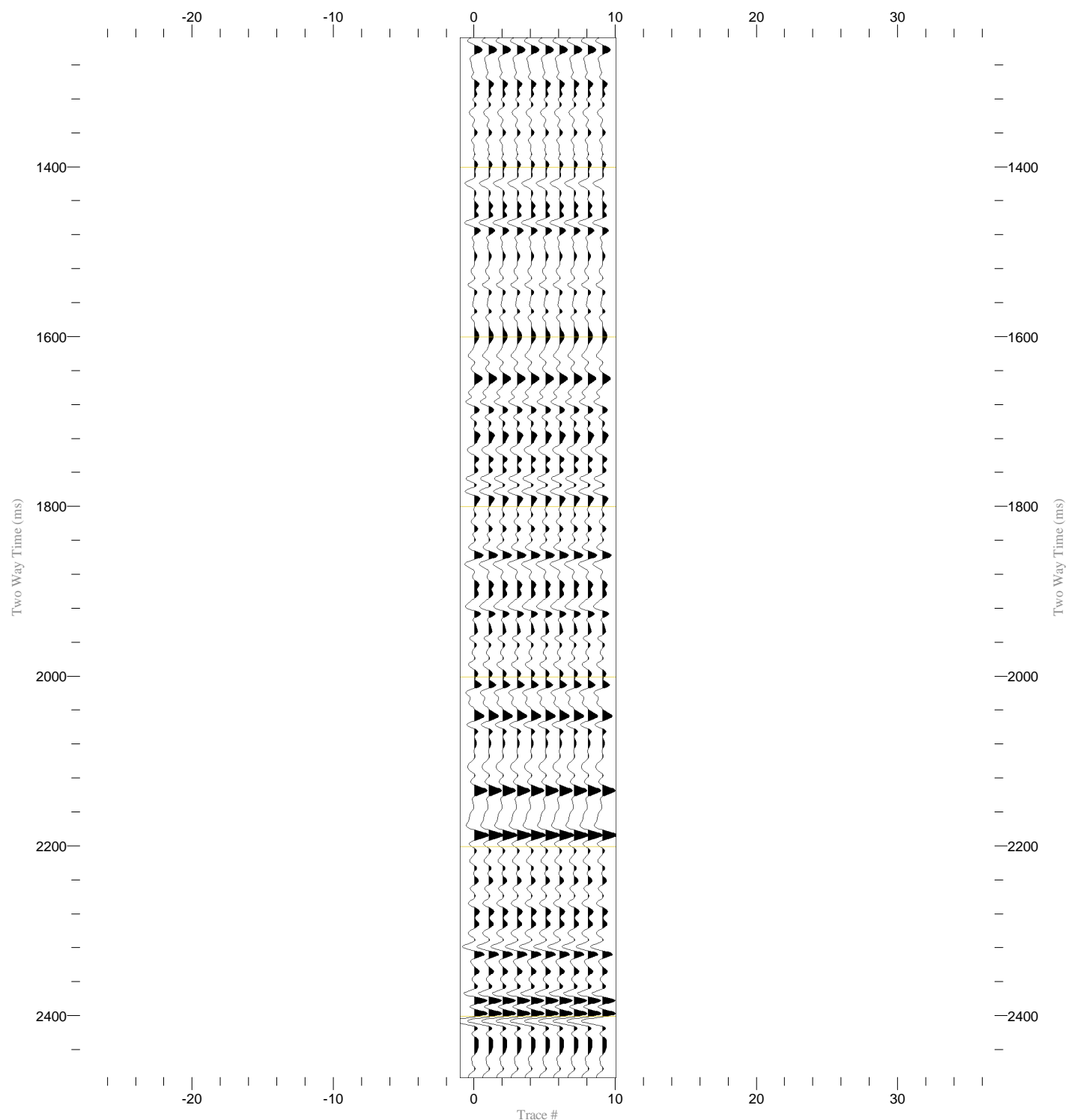


VSP Corridor Stack (Input)  
BPF 5.0 - 90.0Hz  
Median Filter 9 Traces  
Waveshape Decon.(wavelet: 8.0 - 85.0 Hz zero-phase)  
BPF 8.0 - 85.0Hz  
Travel time exponent = 1.50  
Median Filter 7 Traces

Normalization Trace by Trace (250%)  
Polarity Normal  
Two Way Time (ms)  
Scaling 5.4 cm/sec, 1/3610



VSP Corridor Stack (output) BPF 5.0 - 90.0Hz Median Filter 9 Traces Waveshape Decon.(wavelet: 8.0 - 85.0 Hz zero-phase) BPF 8.0 - 85.0Hz Travel time exponent = 1.50 Median Filter 7 Traces Corridor Stack (Mean): BPF 5.0 - 90.0Hz	Normalization Trace by Trace (250%) Polarity Normal Two Way Time (ms) Scaling 15.00 cm/sec, 4.01/cm	
--	--	---



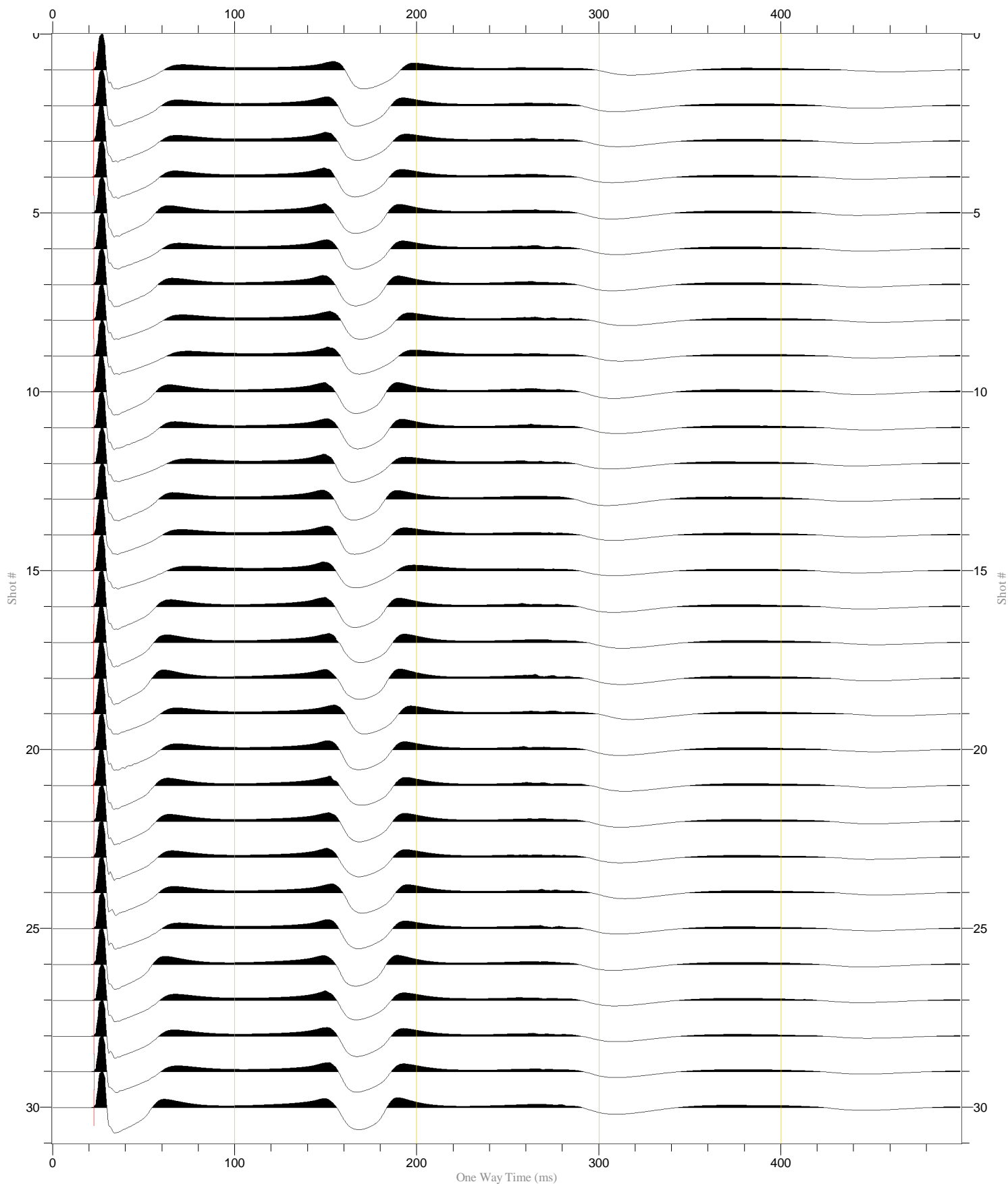
Source Sensor Signature

Normalization Trace by Trace (100%)

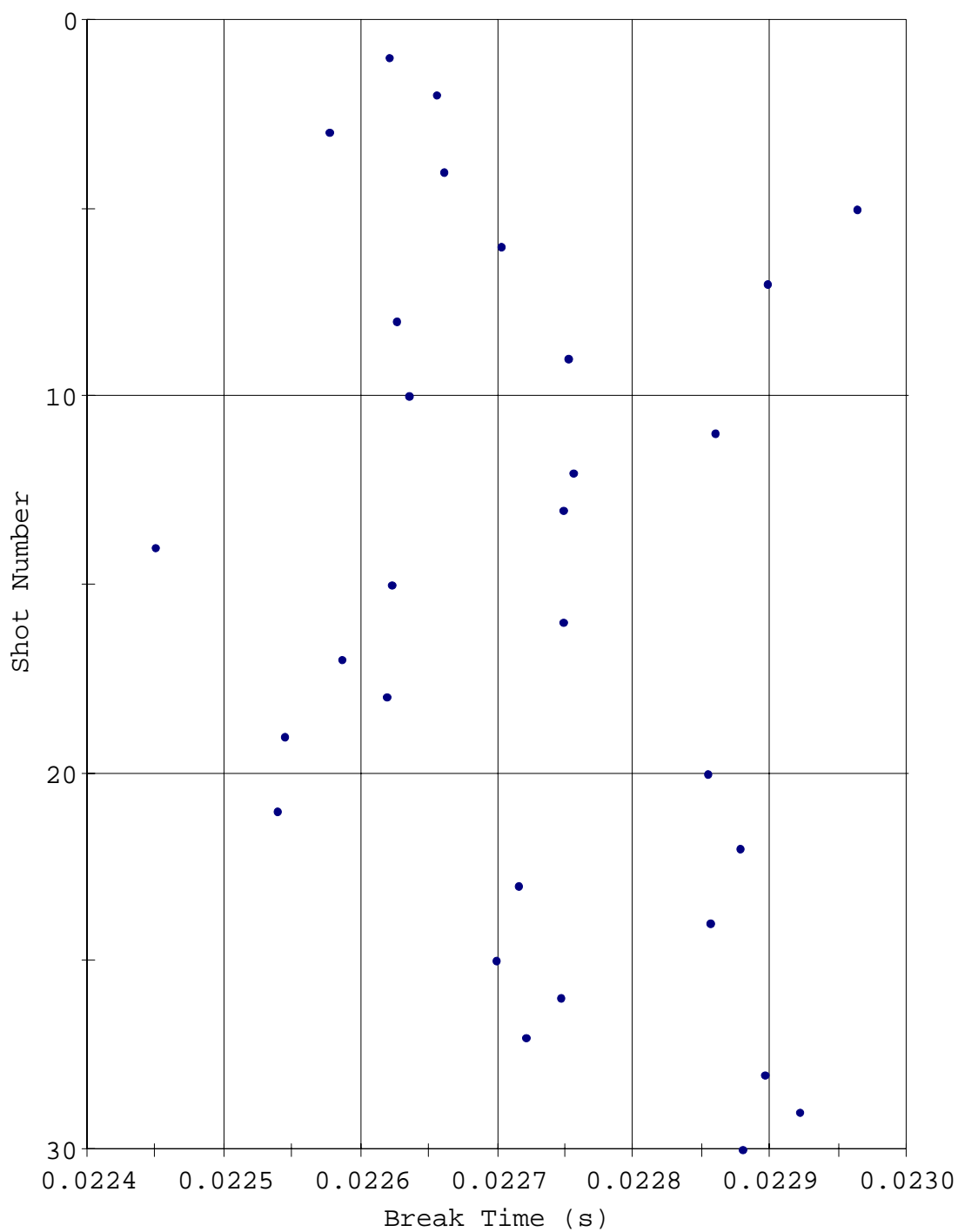
Polarity Normal

One Way Time (ms)

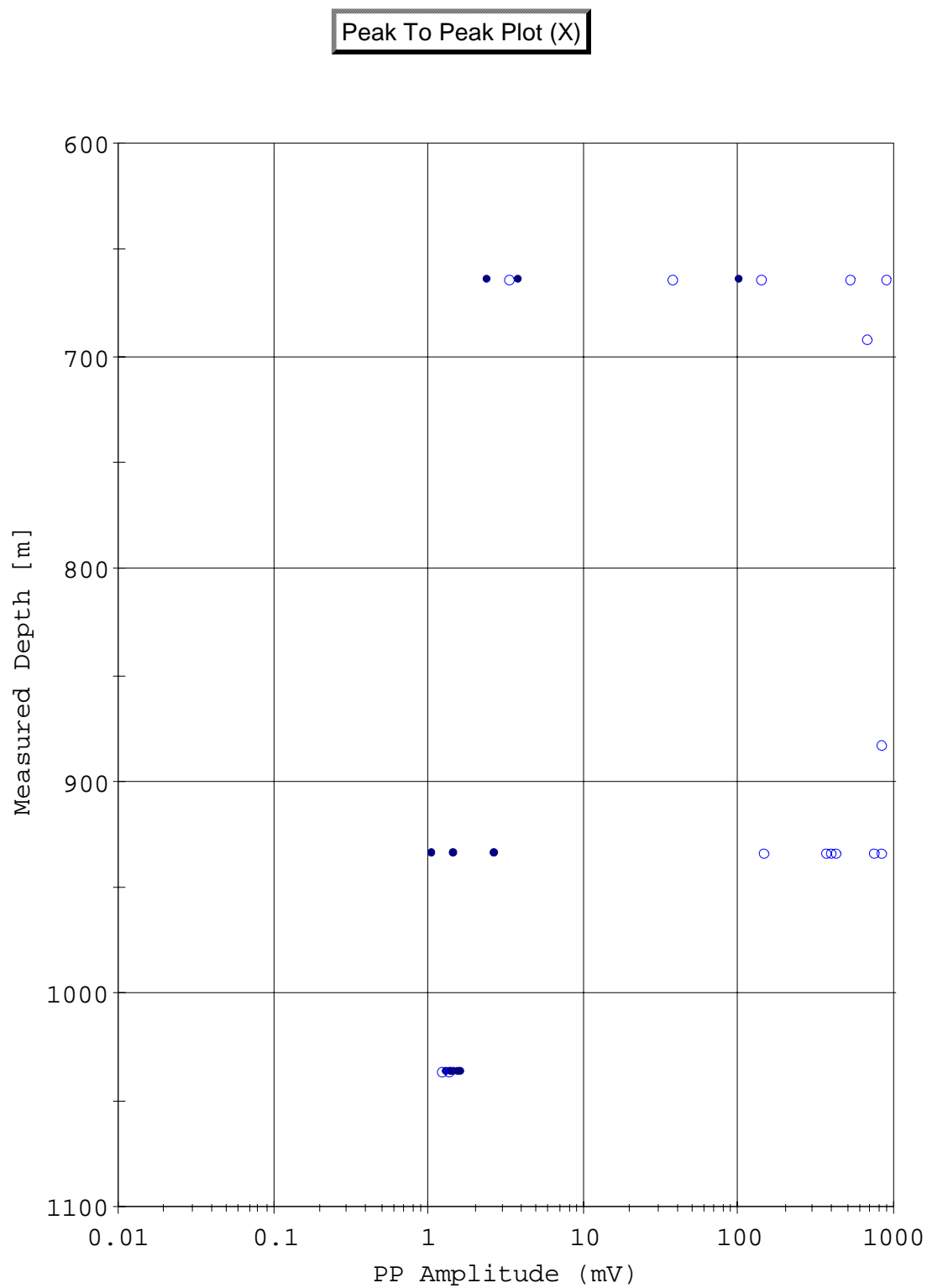
Scaling 35.67 cm/sec, 1.43/cm



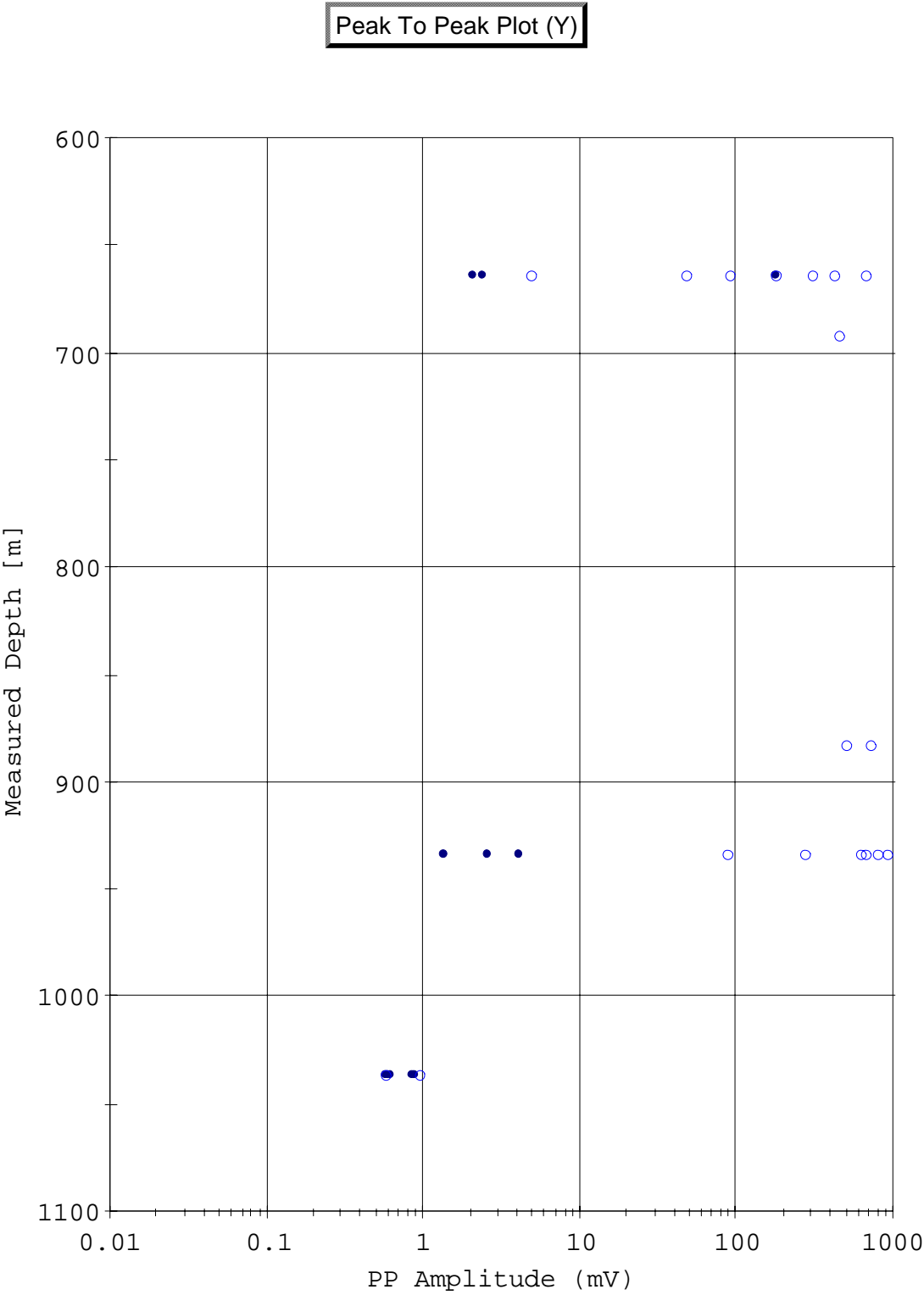
## Surface Sensor QC Plot Page



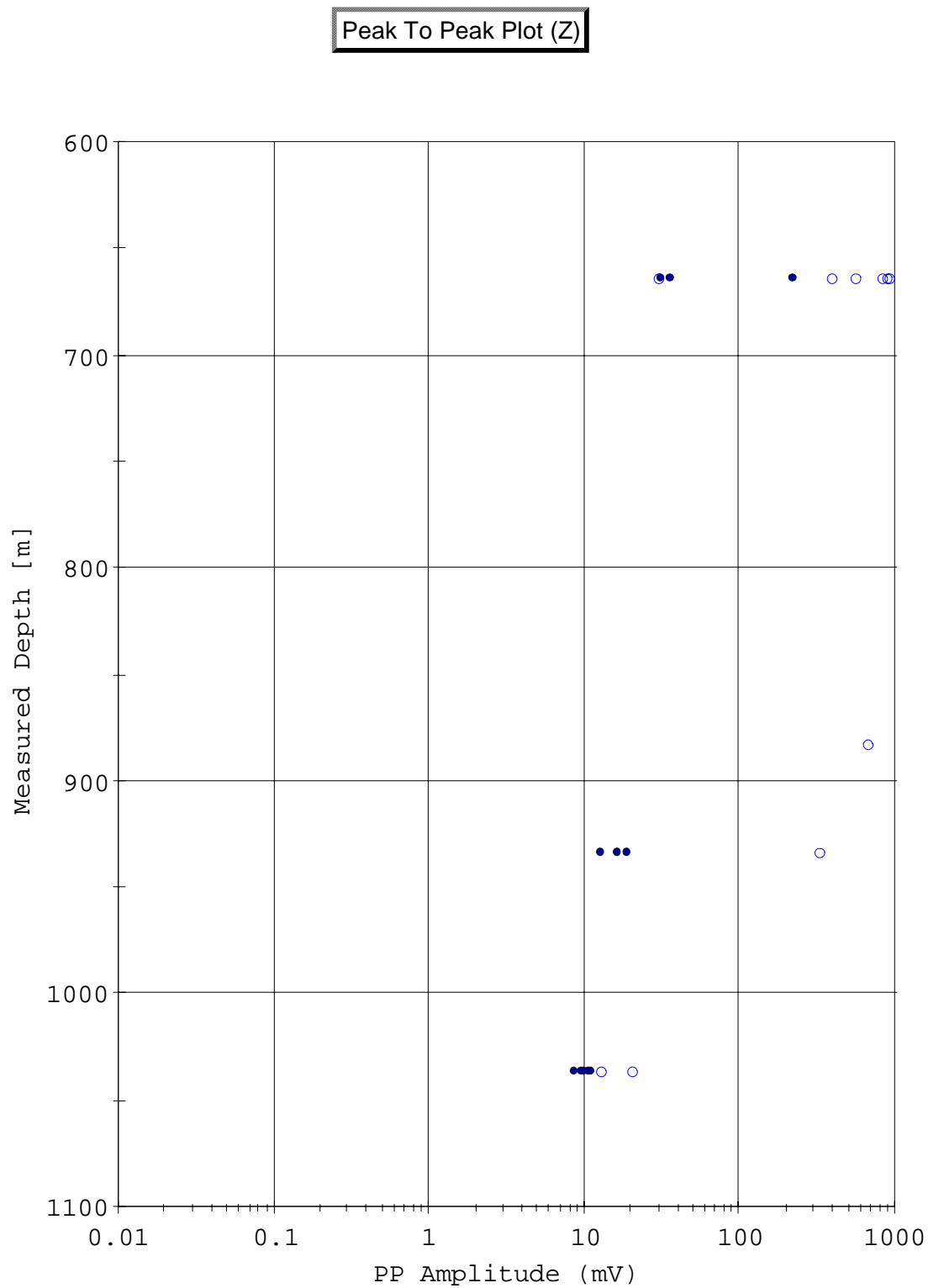
• Surface Sensor Break Time



- PP Amplitude (mV) accepted for stack
- PP Amplitude (mV) rejected



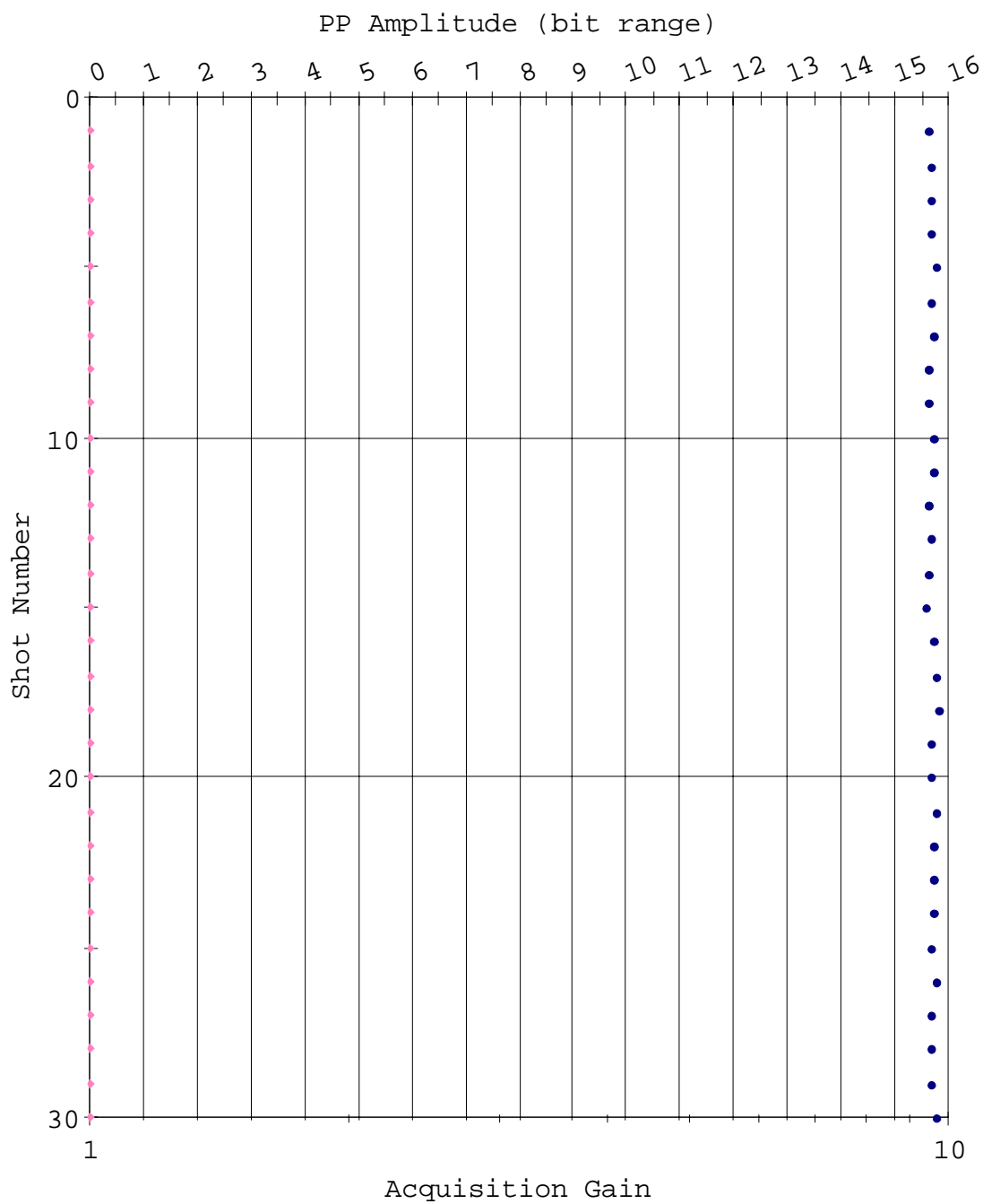
- PP Amplitude (mV) accepted for stack
- PP Amplitude (mV) rejected



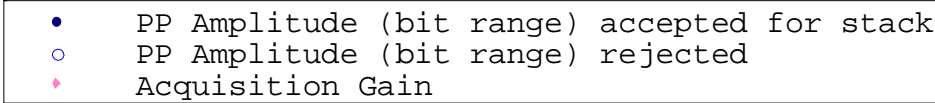
- PP Amplitude (mV) accepted for stack
- PP Amplitude (mV) rejected

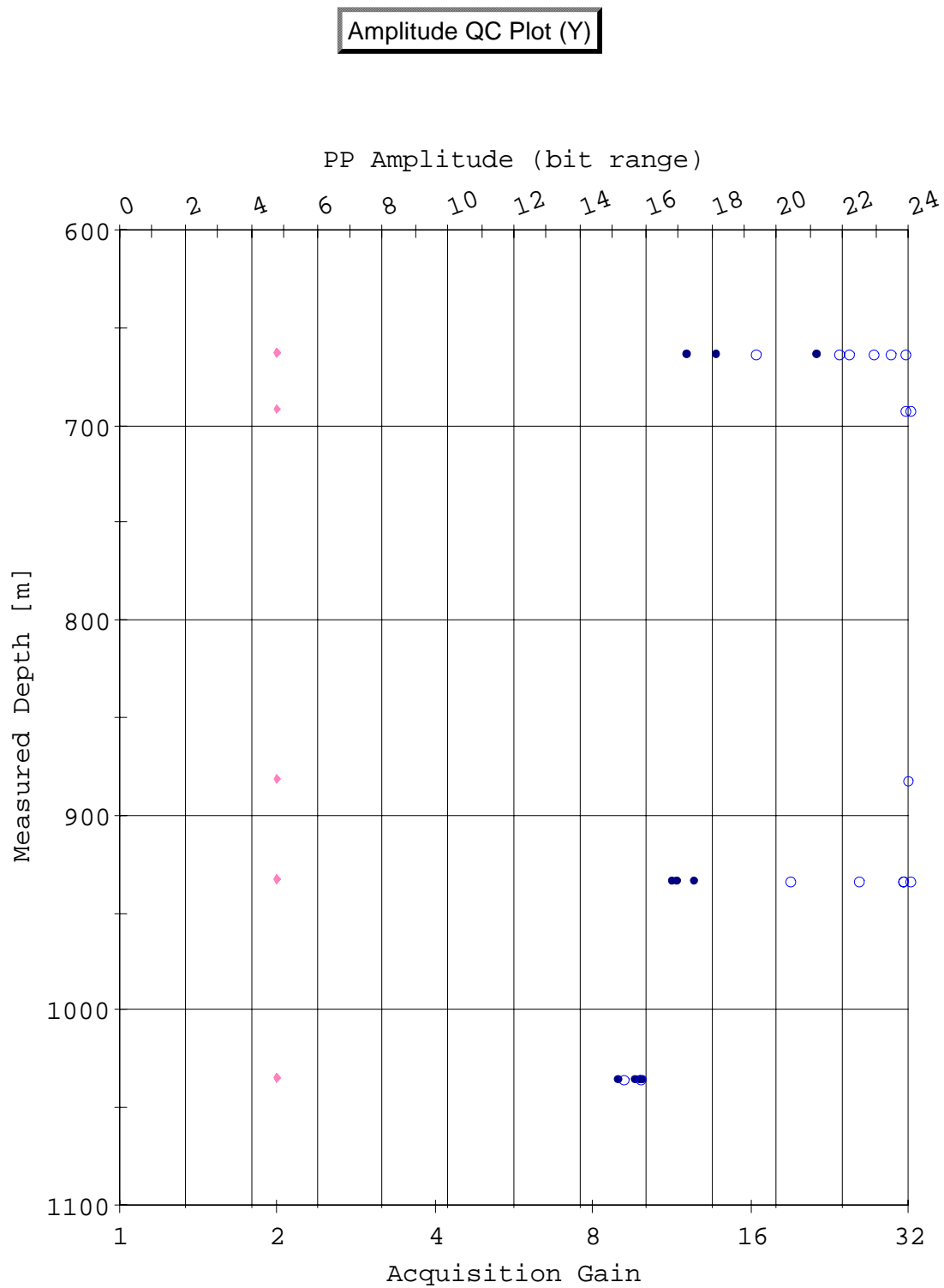


## Amplitude QC Plot (Surface)

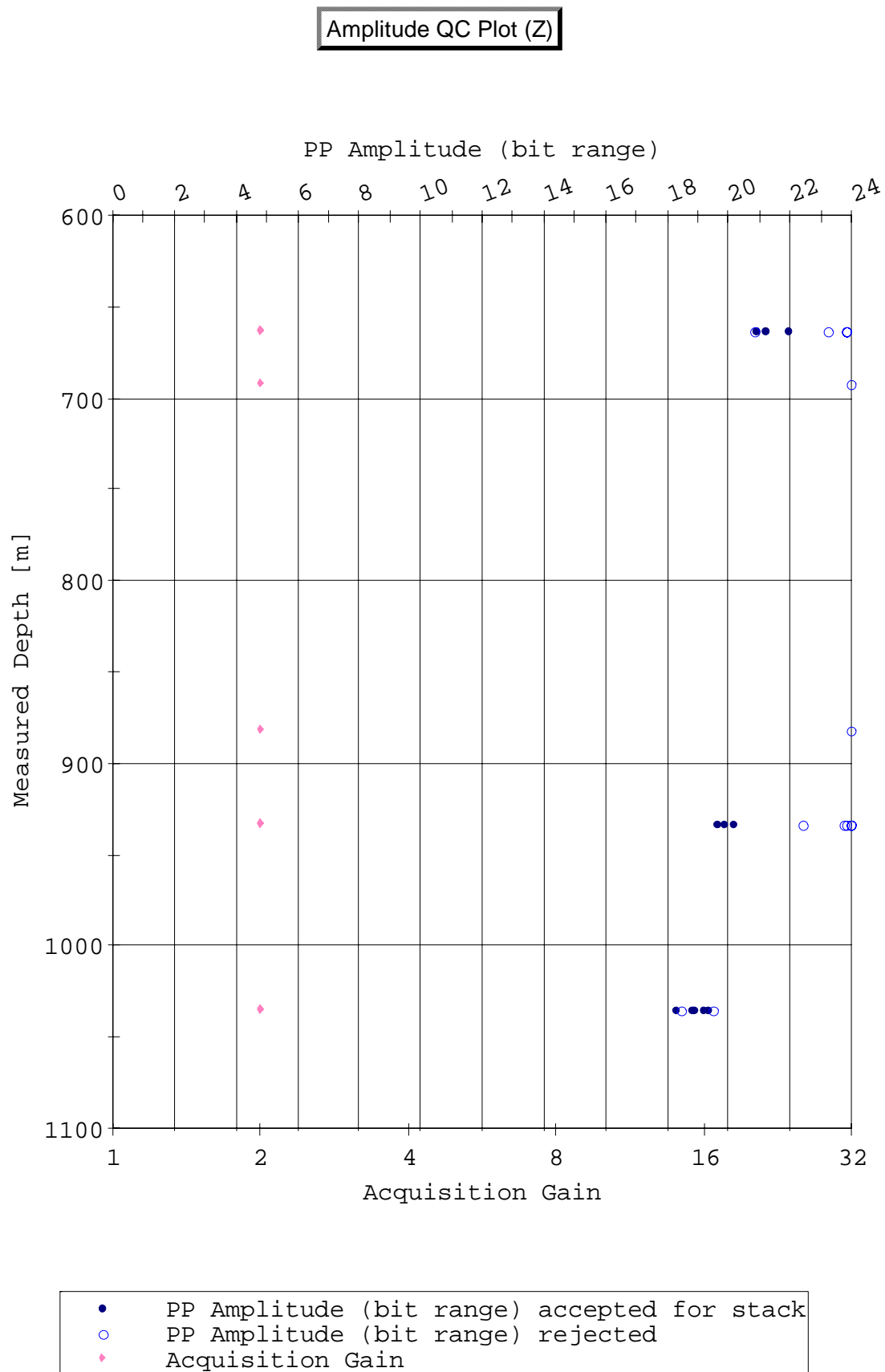


- PP Amplitude (bit range) accepted for stack
- PP Amplitude (bit range) rejected
- ◆ Acquisition Gain





- PP Amplitude (bit range) accepted for stack
- PP Amplitude (bit range) rejected
- ◆ Acquisition Gain



**Observer's Note (1/1)**

Well depth [m]	Time	Shot Type	Shot#	Stack#	Source	Remarks
1035.2	08:48:07	SHOT	1	1	Ggun250x1	Noisy
1035.2	08:48:27	SHOT	2	1	Ggun250x1	
1035.2	08:48:45	SHOT	3	1	Ggun250x1	
1035.2	08:49:03	SHOT	4	1	Ggun250x1	Not selected?
1035.2	08:49:22	SHOT	5	1	Ggun250x1	
1035.2	08:49:40	SHOT	6	1	Ggun250x1	
1035.2	08:49:58	SHOT	7	1	Ggun250x1	
933.0	09:03:19	SHOT	8	2	Ggun250x1	Couple failure
933.0	09:04:12	SHOT	9	2	Ggun250x1	
933.0	09:04:30	SHOT	10	2	Ggun250x1	Garbage
933.0	09:04:48	SHOT	11	2	Ggun250x1	Late Arrival
933.0	09:05:07	SHOT	12	2	Ggun250x1	
933.0	09:05:25	SHOT	13	2	Ggun250x1	
933.0	09:05:43	SHOT	14	2	Ggun250x1	Junk
933.0	09:06:01	SHOT	15	2	Ggun250x1	Junk
933.0	09:06:19	SHOT	16	2	Ggun250x1	Losing formation couple
882.0	09:15:30	SHOT	17	3	Ggun250x1	Bad Coupling
882.0	09:16:27	SHOT	18	3	Ggun250x1	Bad Coupling
691.9	09:34:26	SHOT	19	4	Ggun250x1	Poor Couple
691.9	09:34:45	SHOT	20	4	Ggun250x1	Formation Collapsing
663.0	09:46:37	SHOT	21	5	Ggun250x1	
663.0	09:46:55	SHOT	22	5	Ggun250x1	
663.0	09:47:13	SHOT	23	5	Ggun250x1	Noise
663.0	09:47:31	SHOT	24	5	Ggun250x1	Noisy
663.0	09:47:49	SHOT	25	5	Ggun250x1	Noise
663.0	09:48:10	SHOT	26	5	Ggun250x1	Junk
663.0	09:48:28	SHOT	27	5	Ggun250x1	Noise
663.0	09:48:46	SHOT	28	5	Ggun250x1	Noise
663.0	09:49:04	SHOT	29	5	Ggun250x1	Noise late in the train
663.0	09:49:56	SHOT	30	5	Ggun250x1	Junk