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(Page 1 of 111)

ESSO AUSTRALIA LTD

WELL SEISMIC PROCESSING REPORT

Vertical Incidence VSP

BLACKBACK A1 ST-1

FIELD: BLACKBACK

COUNTRY: AUSTRALIA

COORDINATES: 038 32' 31.677" S
: 148 33' 11.274" E

DATE OF VSP SURVEY: 18/21-April 1999

REFERENCE NO:

INTERVAL: 4440 - 421 m MD

Prepared by Henry Cao

File list on the tape

File name	content
Blackback-a1st.pdf	Well seismic report
Appendix-A.PDF	Well deviation data
Appendix-B-run1.PDF	Raw navigation data and transit times for Run-1
Appendix-B-run2.PDF	Raw navigation data and transit times for Run-2
Appendix-C-run1-.PDF	Edited navigation data and re-picked transit times for Run-1
Appendix-C-run2.PDF	Edited navigation data and re-picked transit times for Run-2
Appendix-D-Geophy-airgun.PDF	Geophysical airgun report
Appendix-E-inversion_init.PDF	Residual times for the initial model - Model-0
Appendix-E-inversion_final.PDF	Residual times for the final model - Model-1
Run1-Raw-S1.sgy	Raw data from the hydrophone for Run-1
Run1-Raw-X.sgy	Raw data from X-component of downhole CSI for Run-1
Run1-Raw-Y.sgy	Raw data from Y-component of downhole CSI for Run-1
Run1-Raw-Z.sgy	Raw data from Z-component of downhole CSI for Run-1
Run2-Raw-S1.sgy	Raw data from the hydrophone for Run-2
Run2-Raw-X.sgy	Raw data from X-component of downhole CSI for Run-2
Run2-Raw-Y.sgy	Raw data from Y-component of downhole CSI for Run-2
Run2-Raw-Z.sgy	Raw data from Z-component of downhole CSI for Run-2
Edit_S1.sgy	Edited the hydrophone for Run-1 & 2
Edit_X.sgy	Edited X-component of downhole CSI for Run-1 & 2
Edit_Y.sgy	Edited Y-component of downhole CSI for Run-1 & 2
Edit_Z.sgy	Edited Z-component of downhole CSI for Run-1 & 2
Stack_X.sgy	Stacked X-component of downhole CSI for Run-1 & 2
Stack_Y.sgy	Stacked Y-component of downhole CSI for Run-1 & 2
Stack_Z.sgy	Stacked Z-component of downhole CSI for Run-1 & 2
Run1-TRY.sgy	Run-1 TRY component
Run1-Down.sgy	Run-1 downgoing after velocity filtering
Run1-Up.sgy	Run-1 upgoing after velocity filtering
Run1-Down-Pdn.sgy	Run-1 downgoing after predictive deconvolution
Run1-Up-Pdn.sgy	Run-1 upgoing after predictive deconvolution
Run1-Down-Wsf.sgy	Run-1 downgoing after waveshaping deconvolution
Run1-Up-Wsf.sgy	Run-1 upgoing after waveshaping deconvolution
Run1-Down-Wsf-TWT.sgy	Run-1 downgoing after waveshaping decon in two-way time
Run1-Up-Wsf-TWT.sgy	Run-1 upgoing after waveshaping decon in two-way time
Run1-time-mig.sgy	Run-1 time migration of upgoing wave using Model-1
Run1-depth-mig.sgy	Run-1 depth migration of upgoing wave using Model-1
Run2-TRY.sgy	Run-2 TRY component
Run2-Down.sgy	Run-2 downgoing after velocity filtering
Run2-Up.sgy	Run-2 upgoing after velocity filtering
Run2-Down-Pdn.sgy	Run-2 downgoing after predictive deconvolution
Run2-Up-Pdn.sgy	Run-2 upgoing after predictive deconvolution
Run2-Down-Wsf.sgy	Run-2 downgoing after waveshaping deconvolution
Run2-Up-Wsf.sgy	Run-2 upgoing after waveshaping deconvolution
Run2-Down-Wsf-TWT.sgy	Run-2 downgoing after waveshaping decon in two-way time
Run2-Up-Wsf-TWT.sgy	Run-2 upgoing after waveshaping decon in two-way time
Run2-time-mig.sgy	Run-2 time migration of upgoing wave using Model-1
Run2-depth-mig.sgy	Run-2 depth migration of upgoing wave using Model-1

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1. Introduction

A borehole seismic survey was conducted using Combinable Seismic Imager (CSI) tools at the *Blackback A1 ST-1 (BBA1ST-1)* well. The survey was carried out between 18 and 21 April, 1999.

The borehole seismic program consists of three parts: a velocity survey for the water column, a wireline conveyed vertical incidence VSP (VIVSP) and a TLC conveyed VIVSP. The water velocity was obtained by measuring the transit time between the source and the receiver at the sea bottom. The wireline conveyed VIVSP covers a measured depth range of 1312 – 1912 m. The TLC conveyed VIVSP covers a measured depth range of 3144.5 – 4440 m.

The borehole seismic data were edited and processed using the borehole seismic package of GeoFrame 3.5 which was commercially released from Schlumberger Austin Systems Center.

This report describes the processing of the borehole seismic surveys.

2. Data Acquisition

The objectives of the Blackback A1 ST-1 (BBA1ST-1) borehole seismic survey were as follows:

- Accurate time-depth conversion table for surface seismic events intersecting the well trajectory
- Good average velocity above the well trajectory
- Reflection imaging below the well trajectory

The downhole tools for the survey were the Combinable Seismic Imager (CSI, also called CSAT – Combinable Seismic Acquisition Tool) fitted with gimballed SM4 geophones. The CSI has its sensor module acoustically decoupled from the tool house and this unique separation prevents the signal distortion caused by coupling resonance and modal resonance results from the size and mass of conventional openhole VSP tools. For seismic acquisition, the CSI tool is anchored against the formation. Then the sensor module is decoupled from the main body of the tool and held firmly against the borehole wall. Optimum placement of the sensor module is verified by the response of each geophone to mechanical excitation generated by the shaker in the module. The decoupled sensor module uses the large acquisition cartridge in the tool body for powerful downhole signal processing and quality control without being adversely affected by any tool body vibrations.

In addition to its high accuracy, the CSI tool is extremely versatile. Because the decoupled design allows running long tool strings without acoustical degradation, an array of several CSI tools can be used to obtain rapid multilevel seismic arrays. The CSI tool is also compatible with other tools for positioning and correlation measurements.

The data was acquired in several logging attempts. The first wireline attempt was made with tail guiding DLEs and flex joints electrically decoupled from the CSAT. Calibration shots were recorded at 421 and 1312 m MD. The toolstring could not pass 1312 m MD.

The second wireline attempt was made with HRMS added to tail and flex joints removed. The toolstring could not pass 1530 m MD due to too much drag. The third wireline attempt was made with one more HRMS added and the hole finder and tool turners removed. The toolstring could not pass 1930 m MD. VIVSP was recorded from 1912 to 1320 m MD.

Toolstring was reconfigured for TLC run: second CSAT, AMS, swivel, tool turners and DWCH were added. Toolstring was run blindly in open hole from 1302 to 3150 m MD on ESSO's request. Compression on toolstring could not be monitored due to very high drag on drill pipe. VIVSP was recorded with both CSATs in TLC from 4440 to 3150 m MD (maximum interval possible with one latch). Noisy signal was recorded at 3360 m MD. Checkshots were recorded above 3360 m MD as per ESSO request.

For easy reference, the VSP data acquired on wireline will be referred to as Run-1 and the data acquired on TLC will be referred to as Run-2 in subsequent descriptions.

A G-type airgun of 150 cc was used as the seismic energy source. The gun was fired at 120 bar with compressed nitrogen bottles. The gun was positioned 6 meter below the mean sea level (MSL) and a hydrophone was directly above the gun and 3 m below MSL. A supply boat was used to tow the gun to the position approximately directly above the downhole CSAT. Gun positions were navigated by FUGRO using a differential GPS system. The communication between the supply boat and the MAXIS logging unit was established by a MACHA radio system.

Recording was made on the Schlumberger Maxis 500 Unit and data were saved in the DLIS format. A copy of the seismic data in SEG Y format was made at the wellsite and immediately delivered to ESSO Australia.

2.1 Well deviation

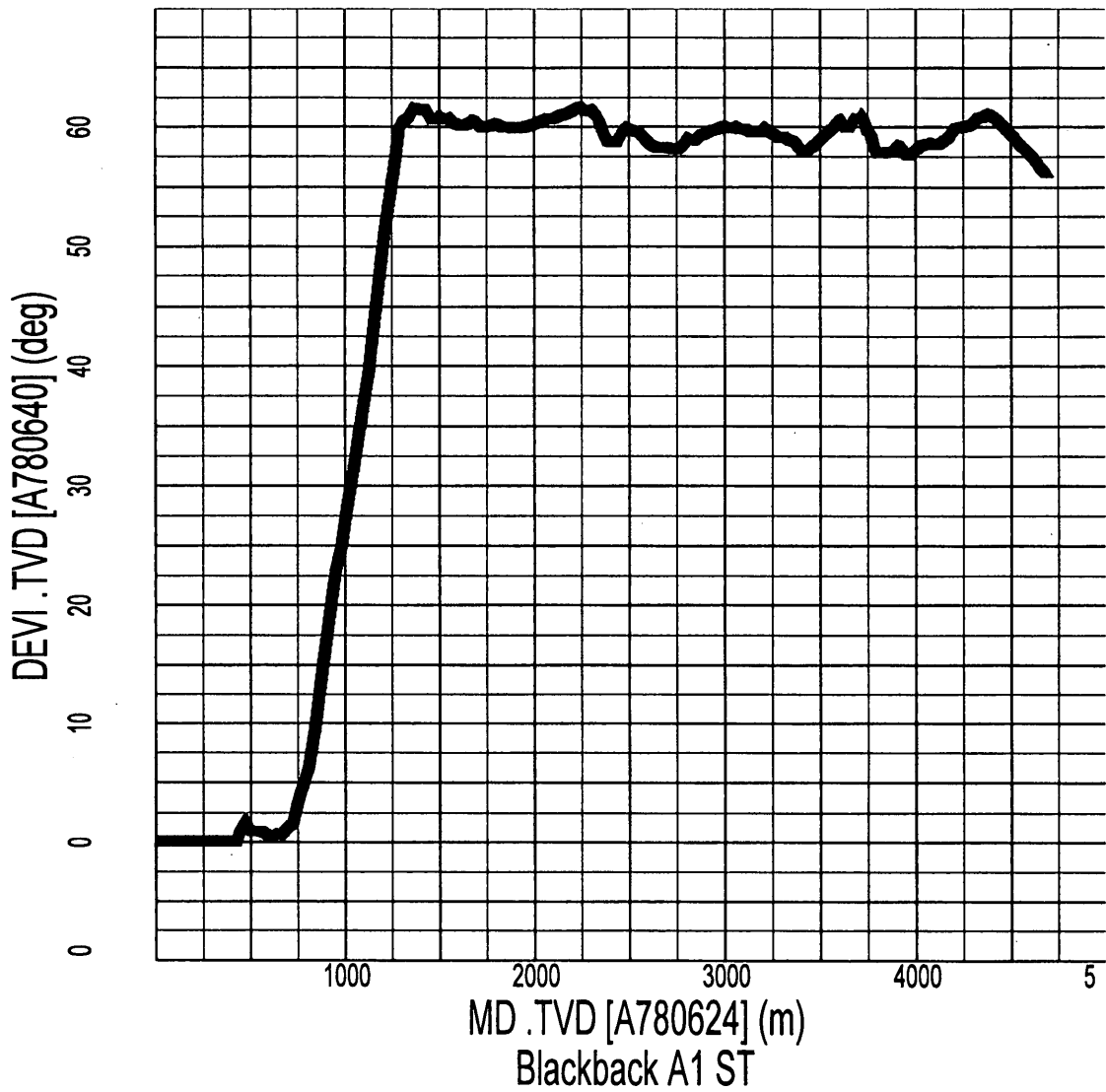
Well deviation data was acquired during drilling and is attached here as Appendix A. The well is vertical until it starts to deviate at about 800 m MD. At around 1280 m MD, the well deviation reaches 60 degrees and remains fairly constant till TD of 4695 m MD. In the deviated section of the well, the well azimuth keeps at 355 degrees from the North. Figures 1 and 2 show the well deviation and azimuthal data. X-Y (Easting and Northing with the wellhead as the origin) and Sagittal (azimuthal) planes of downhole geophones are displayed in Figures 3 and 4.

2.2 VSP acquisition geometry

The VSP survey parameters are listed in Table 1. Important raw geometry data (surface source and downhole tool positions) and transit times, which were recorded in the seismic trace headers during the VSP acquisition, were attached as Appendix B without any modifications. The first column is the trace number. The second and third columns are the X (Easting) and Y (Northing) positions of each shot. The fourth column is the measured depth from the Kelly Bush (KB). The fifth and sixth columns are the arrival times of the seismic signal at the hydrophone and downhole geophone after the Maxis started the recording. The seventh column is the transit time between the hydrophone and geophone.

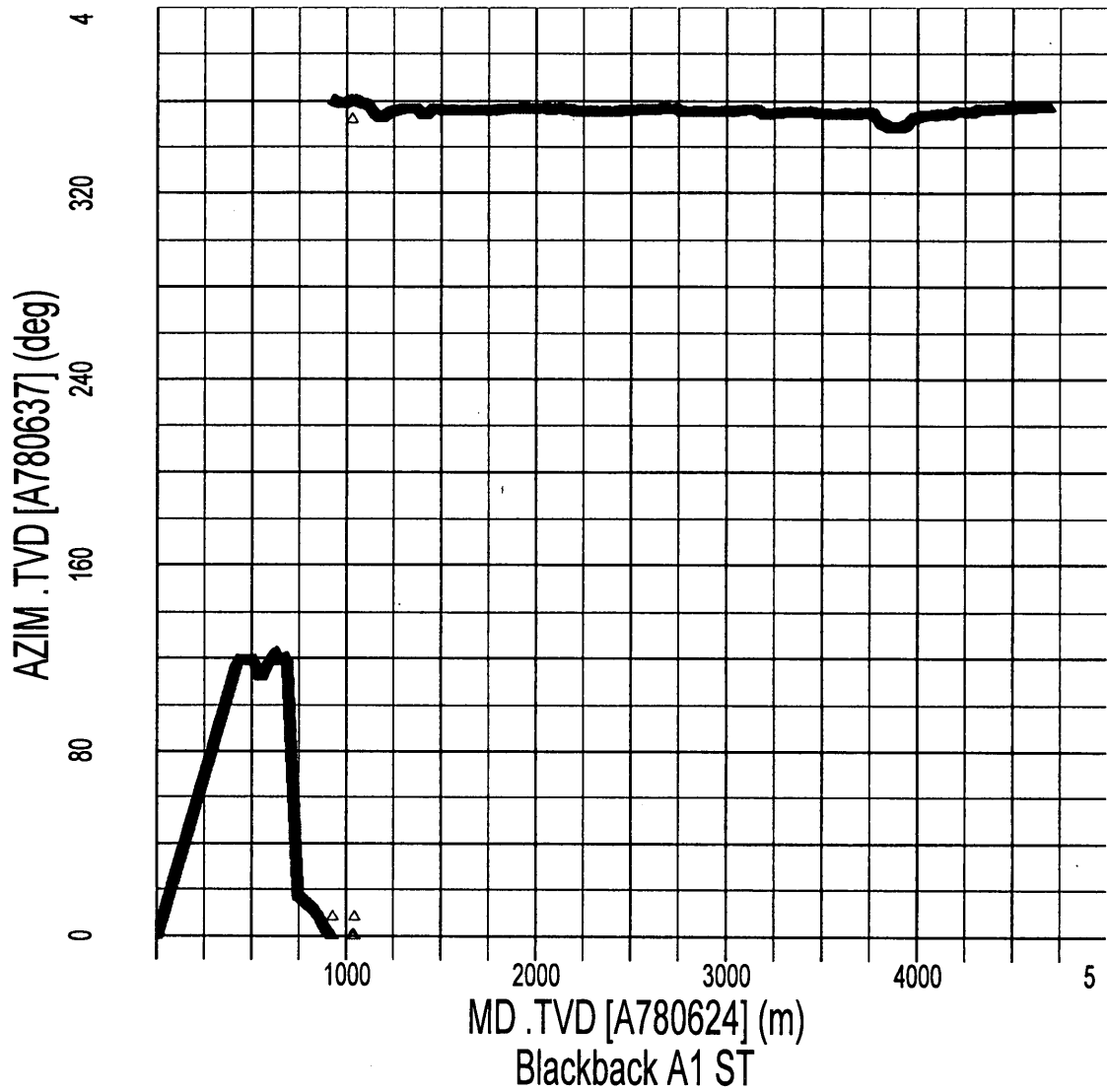
Table 1. Survey Parameters

Elevation of KB	26 m
Elevation of DF	26 m
Elevation of Sea Bottom	-395 m
Energy Source	150 cu in. G-gun fired at 120 bar
Source position	Navigation recorded in header
Source Depth	6 m below MSL
Reference Sensor	Hydrophone
Hydrophone Offset	Same as those of the sources
Hydrophone Depth	3 m below MSL
Tool Type	CSI
Tool Combination	Stand alone or dual
De-coupled Geophones	Yes
Shaker Fitted	Yes
Number of Axis	3
Geophone Type	SM-4 (gimballed)
Frequency Response	10-150 Hz
Sampling Rate	1.0 ms
Recording Time	5000 ms
Acquisition Unit	MAXIS
Recording Format	DLIS



		# Points Total:	30808
Start Depth:	4694.99 m	# Points Plotted:	30808
Stop Depth:	0.00343438 m	# Points Absent:	0
Sampling Rate:	0.1524 m	# Points Cut:	0
X Max Value:	4694.84 m	# > X Scale Max:	0
X Min Value:	0 m	# < X Scale Min:	0
Y Max Value:	61.5898 deg	# > Y Scale Max:	0
Y Min Value:	0 deg	# < Y Scale Min:	0
Z Max Value:	61.5898 deg	# > Z Scale Max:	0

Figure 1. Blackback A1 ST-1 well deviation



		# Points Total:	30808
Start Depth:	4694.99 m	# Points Plotted:	30808
Stop Depth:	0.00343438 m	# Points Absent:	0
Sampling Rate:	0.1524 m	# Points Cut:	0
X Max Value:	4694.84 m	# > X Scale Max:	0
X Min Value:	0 m	# < X Scale Min:	0
Y Max Value:	360 deg	# > Y Scale Max:	0
Y Min Value:	0 deg	# < Y Scale Min:	0
Z Max Value:	360 deg	# > Z Scale Max:	0

Figure 2. Blackback A1 ST-1 well azimuth

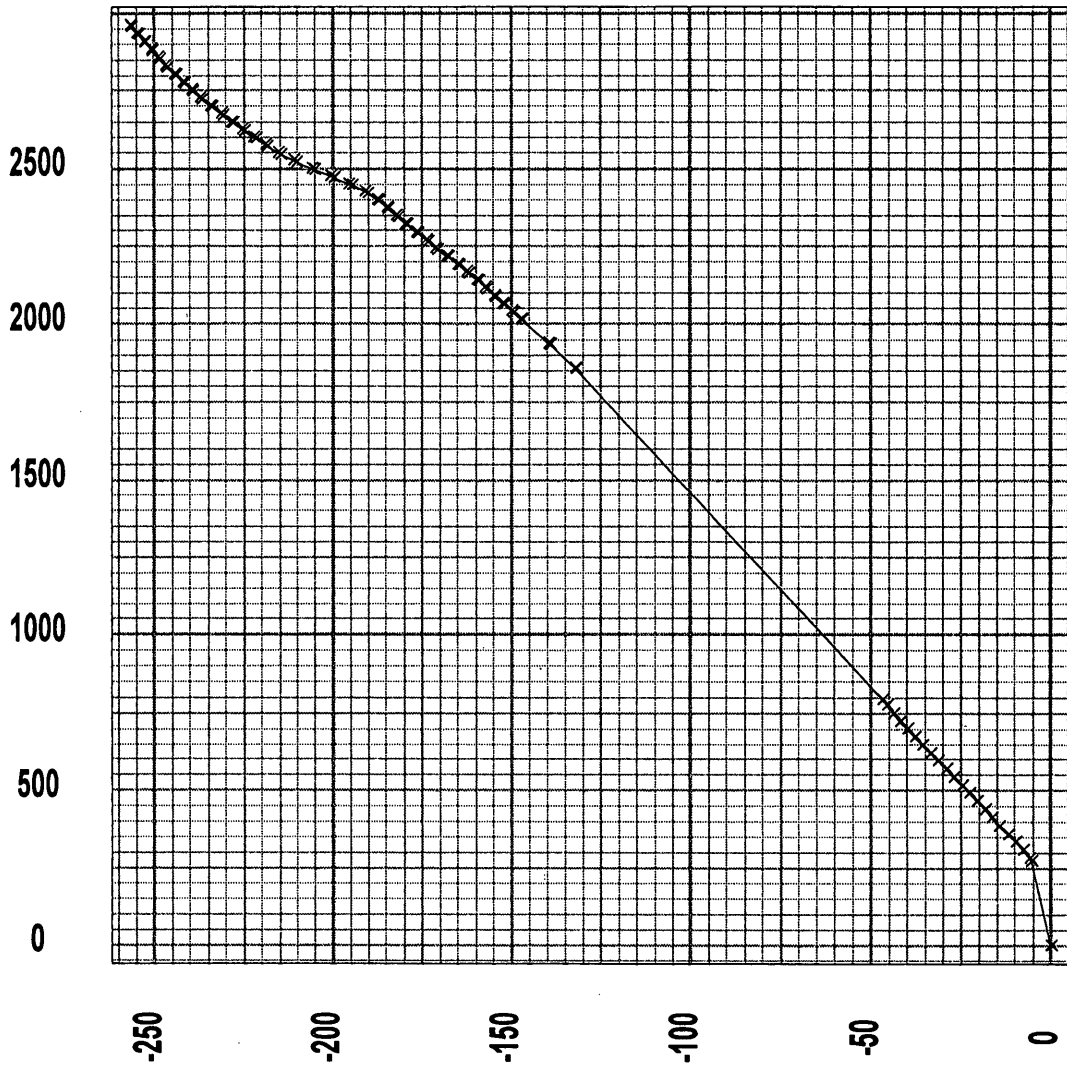


Figure 3. X-Y plane of geophone positions at Blackback A1 ST-1

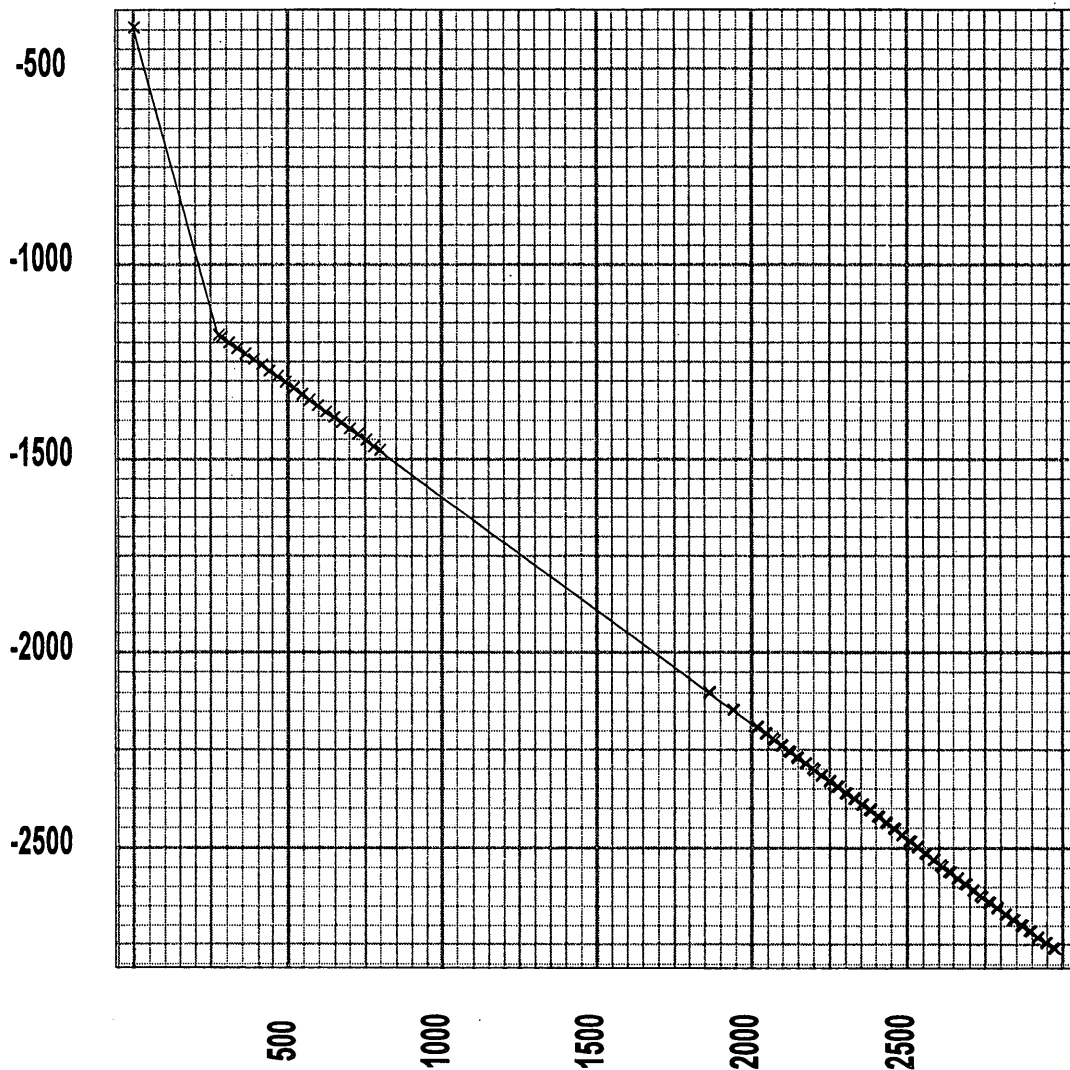


Figure 4. Sagittal (azimuthal) plane of geophone positions at Blackback A1 ST-1

2.3 Polarity Convention

An increase in acoustic impedance gives a positive reflection coefficient, is written to tape as a negative number and is displayed as a white trough under normal polarity. Polarity conventions are displayed in Figure 20.

3. Well Seismic Edit

The raw geophone/source position data and transit times of each shot are listed in Appendix B. By inspection, it is easy to note that there are some zeros in source positions and transit times. For the source positions, this means that the logging unit did not capture the navigation data or the navigation data were not sent to the logging unit at the appropriate time. For the whole survey, the dropout rate was very small, about 1 percent. For data processing, it was assumed that the missing source position would be the average of its sequentially neighboring shot positions. The edited navigation data were listed in Appendix C.

Both the geophone and hydrophone data were evaluated for signal/noise level and signature changes. Bad traces were identified and edited out. For example, the seismic data recorded at the measured depth of 4200 m were very noisy and this level was therefore deleted without further processing.

3.1 Data quality

The overall quality of the data was good. Note the following:

- **The Z component** was good on both Run-1 and Run-2. It is important to note that each source was approximately above the corresponding downhole geophones and the geophones were gimballed with their Z-components in the vertical direction. Thus, most of compressional energy at the first arrival was on the Z component.

The first sea bottom multiple was clearly visible and might offer an opportunity of determining the water depth with their transit times. The shape of this multiple suggested that there was a channel in the well azimuthal direction. In the zone of Run-2, the multiple event reversed the normal trend (increasing time with increasing depth) and would be difficult to attenuate with velocity filtering. Fortunately, this event was out of the zone of interest.

- **The X and Y components** from Run-1 showed a fairly good S/N ratio, those from Run-2 had lower S/N ratio, especially on the Y component where the signal was weak.

Some amount of the mode-converted downgoing shear energy can be clearly seen on both X and Y components. But these mode converted events were very weak in comparison to the compressional energy on Z component. By inspection of Figures 5A & B, it was noted that most mode conversions occurred at the sea bottom and the interface between BCHAN and MMIO formations. These mode converted shear events were recorded as downgoing events propagating at the shear velocity of the corresponding formation.

3.2 Transit Time Measurement

The transit time measured, Delta t, corresponds to the difference between first-break times recorded by surface reference and downhole sensors. The reference time (zero time) is the physical recording of the source signal by accelerometers on the gun or sensors positioned near the source. In this case, a hydrophone positioned 3.0 m above the gun was used as the reference. It is important that the actual recording starts before the signal arrives at the sensor. For the surface reference sensor, the recording starts immediately after the firing command was sent out from the Maxis. For the downhole sensor, the recording normally starts with a delay (blank time) after the firing command.

The blank time can be estimate by dividing the least source-receiver distance by the highest velocity along the ray path between the source and receivers.

All the first-break times were re-picked and the same first-break picking algorithm was used on both the hydrophone and the geophone channels. By comparing the raw data with the re-picked data, it was easy to note that there were some differences between them. All the differences were due to the nature of time picking in the field where minimal human interactions were involved. This was confirmed that some of the reference times in the raw data were at the start of recording.

The edited source position data and the re-picked transit times for both Run-1 and Run-2 were listed in Appendix C.

3.3 Correction to Datum

Seismic Reference Datum (SRD) used for VSP processing is at the mean sea level (MSL). The source was suspended 6.0 meters below MSL. A hydrophone was attached to the source 3.0 meters above the outlet ports and was used as the time reference. A static correction of 5.9 msec (OWT) would be applied to correct to SRD if the source is directly above the receiver. Otherwise, a geometry correction would also be applied. Indeed, both were applied simultaneously.

4. VSP Processing

The following subsections describe the main aspects of VSP processing schemes.

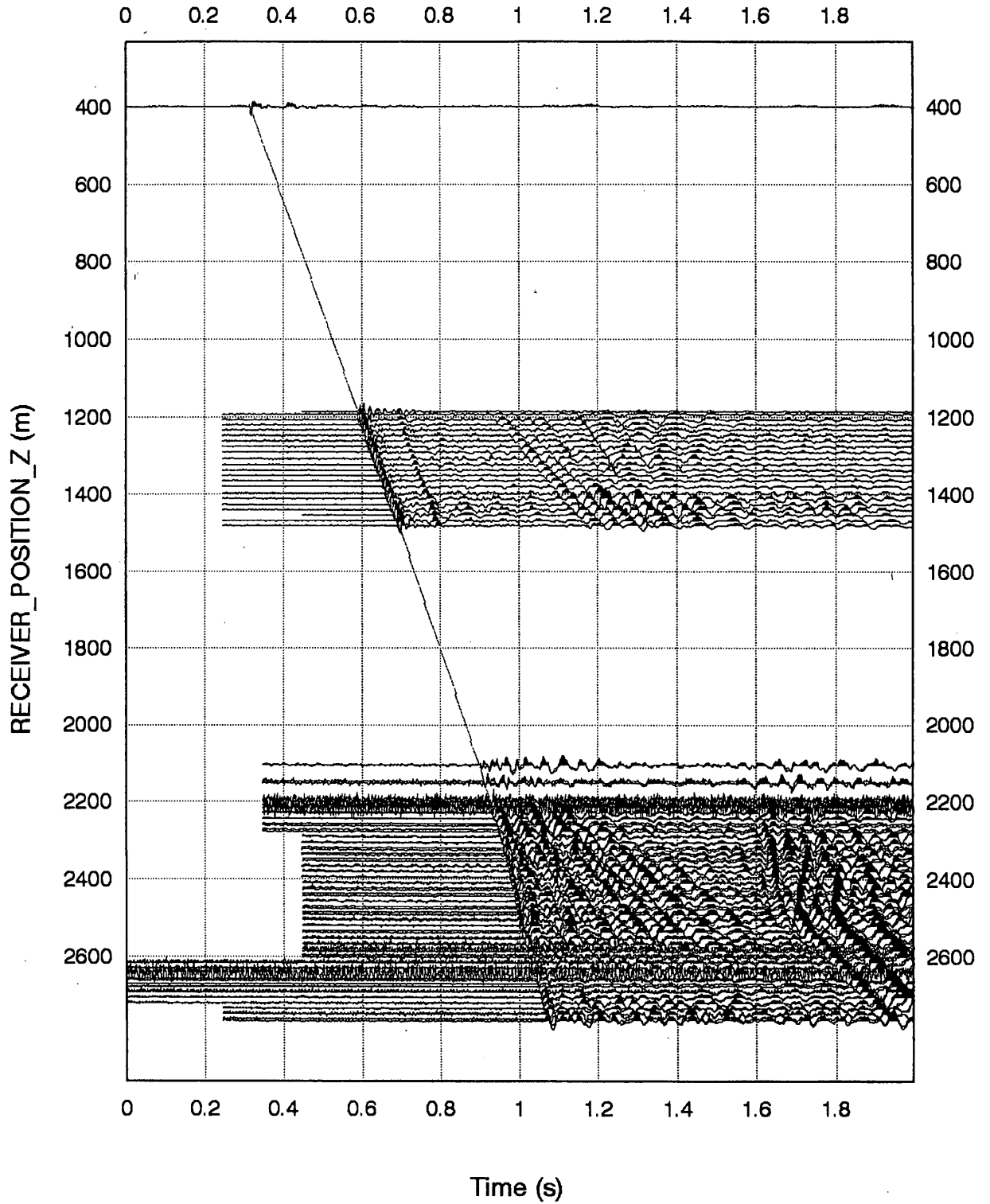
- stacking
- 3-component rotation
- up & down wavefield separation
- downgoing wave analysis
- predictive and waveshaping deconvolutions
- model building
- tomographic inversion
- Kirchhoff migration

4.1 Stacking

Several shots are normally fired for each downhole position. These multiple shot records offer an opportunity of increasing the signal-to-noise ratio. By stacking, the coherent signal would be enhanced whereas random noises would be suppressed. Here, the data were stacked using radio hydrophone channels as zero time reference. After stacking, break times were re-picked. As expected, most of them were very close to those shown on the field acquisition log print. An extra 3 msec was added to the one-way transit times to compensate for radio delay. Figure 5 shows the stacked data acquired at BBA1ST-1.

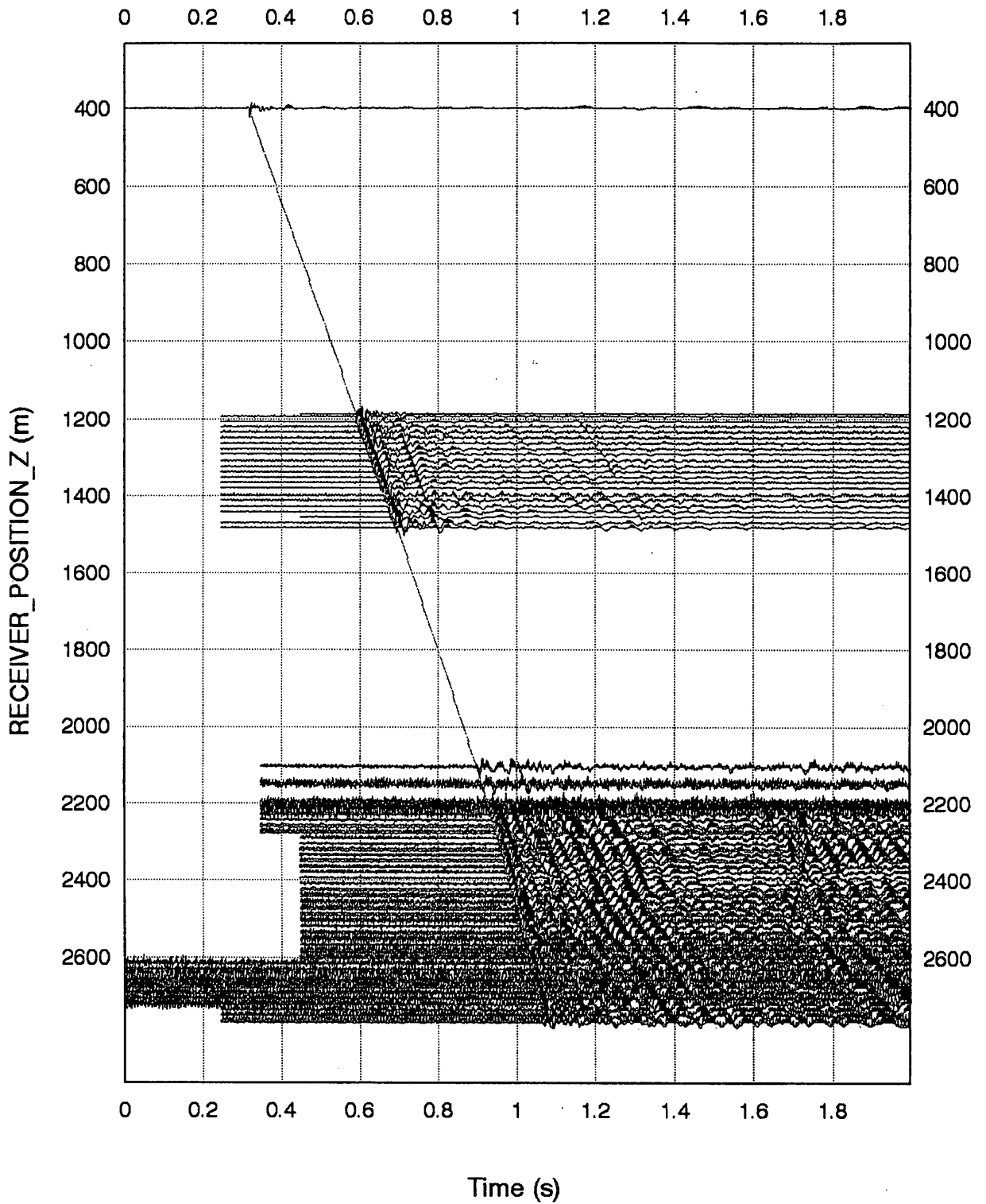
The re-picked transit times were corrected to true vertical times with $SRD = MSL$. Average velocity from SRD to the current receiver position and interval velocity between neighbouring receiver positions were then calculated. All the time and depth information was listed in Appendix D.

X Component

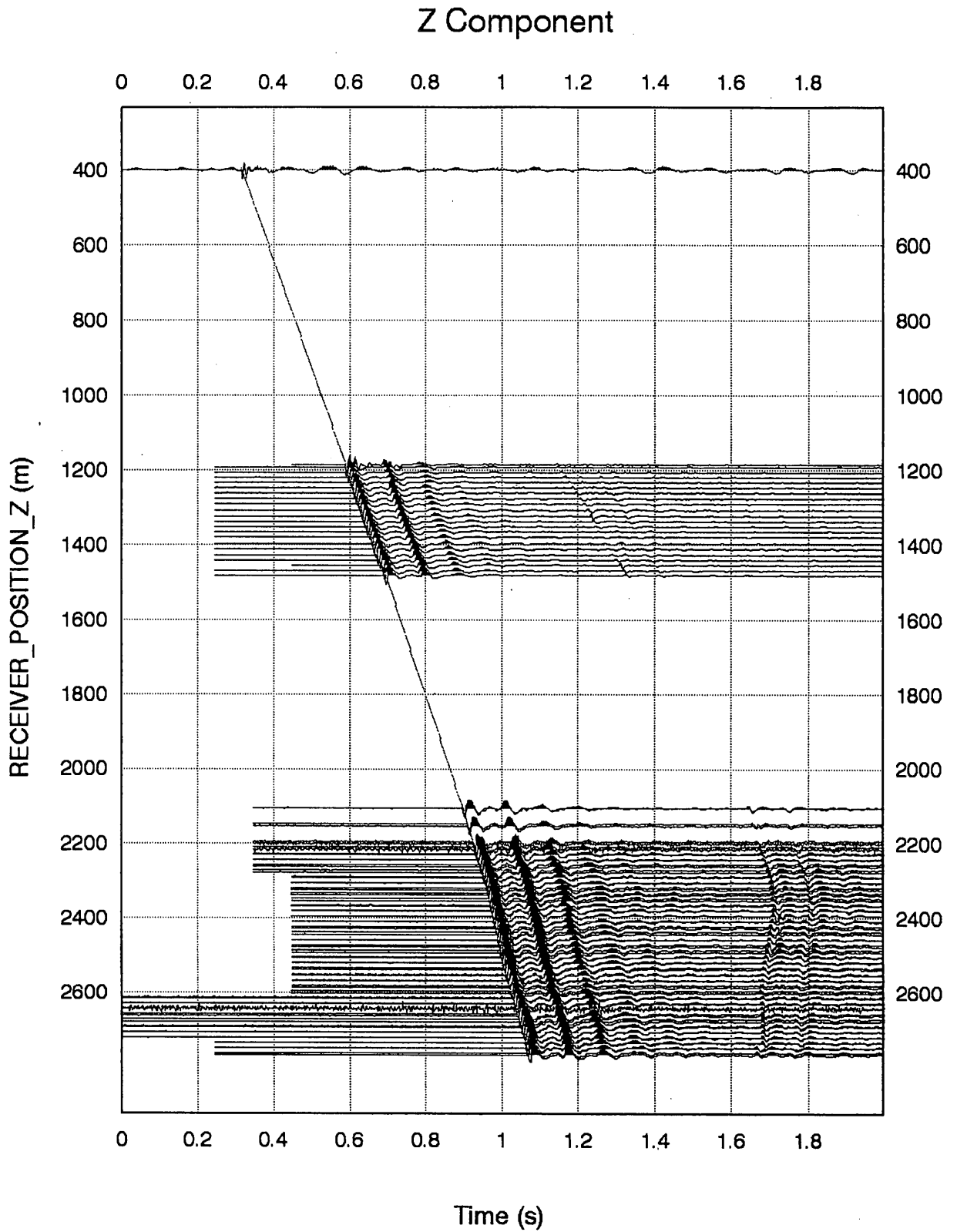


(A) Stacked X component

Y Component



(B) Stacked Y component



(C) Stacked Z component

Figure 5. Stacked sections of BBA1ST-1 seismic data.

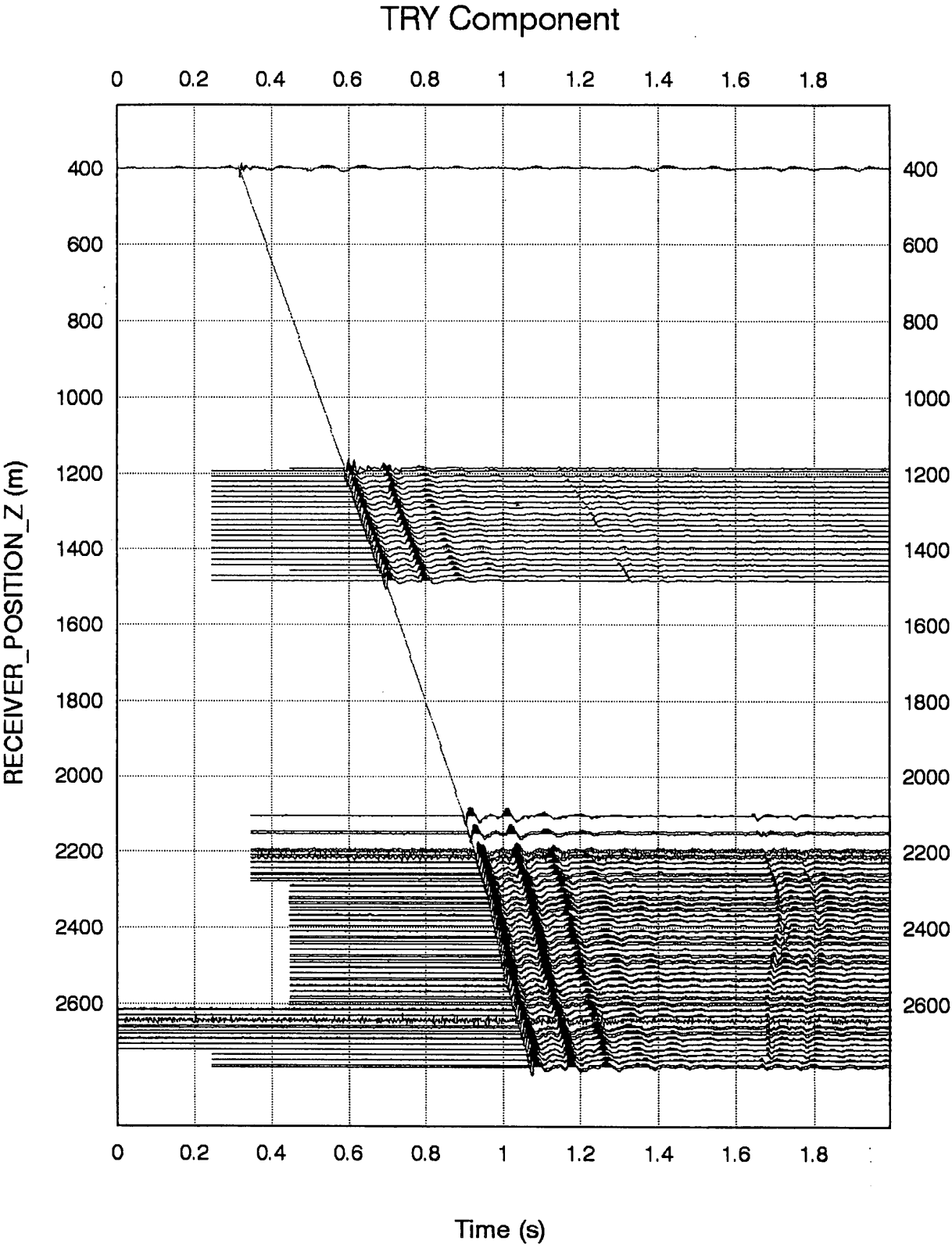


Figure 6. TRY component after 3-C rotation

4.2 3-C Rotation

Most source-receiver configurations were very close to vertical and the primary arrival (compressional wave) were mainly on the Z component. Indeed, the Z components were more than five times greater than the horizontal components at most levels. For improved VSP processing, a three-component rotation was applied. After opening a narrow time window (60 msec.) around the first arrival, a rotational vector was first applied on two components (X and Y) in the direction of maximum horizontal energy (HMX) to obtain HMX and HMN. Then, another rotational vector was applied on two components (HMX and Z) in the direction of maximum downgoing energy (TRY) to obtain TRY and NRY. This was computed for each geophone position. The main benefit of computing the TRY component is to have most compressional energy at the first arrival concentrated along one component (TRY) and rotate out downgoing shear energy (Figure 6).

Definitions for three component rotation

HMX projection (Horizontal MaXimum) The projection of the X and Y components into the direction of maximum horizontal compressional energy.

HMN projection. (Horizontal MiNimum) The projection of the X and Y components into the direction of minimum horizontal compressional energy. The Z, HMX and HMN form an orthogonal data set.

TRY projection (Tangent to direct RaY) The projection Z and HMX into the direction maximum downgoing compressional energy

NRV projection (Normal to direct RaY) The projection Z and HMX into the direction minimum downgoing compressional energy. The NRV and TRY are perpendicular to each other and the NRV, TRY and HMN form a second orthogonal data set.

4.3 Velocity filter

The TRY downgoing coherent energy was estimated using nine (9) levels median velocity filter. The filter array was moved down one level after each computation and the process was repeated level by level over the entire dataset.

The residual wavefield was obtained by subtracting the downgoing compressional wavefield from the total wavefield. The residual wavefield was dominated by reflected compressional events.

The TRY upgoing wavefield was enhanced by making a median stack of the upgoing aligned traces using a seven (7) levels median filter.

Table 2. Median velocity filter parameters

Internal normalisation window	500 ms
No of levels to estimate downgoing P	9
No of levels to enhance upgoing P	7

4.4 Downgoing wave analysis

Power spectrum of TRY component for entire interval is presented in Figure 7. In general, the frequency band narrows as the distance between the source and receiver increases mainly due to anelastic attenuation. At the sea bottom, the power spectrum can reach up to 120 Hz. At 1200 m, the high end of the spectrum drops to about 80 Hz and at 2500 m, this further drops to 65 Hz.

The effects of air bubble from the gun on the power spectrum are clearly visible. The oscillating variation of the power spectrum is due to the constructive and destructive interference of the bubble and primary signals.

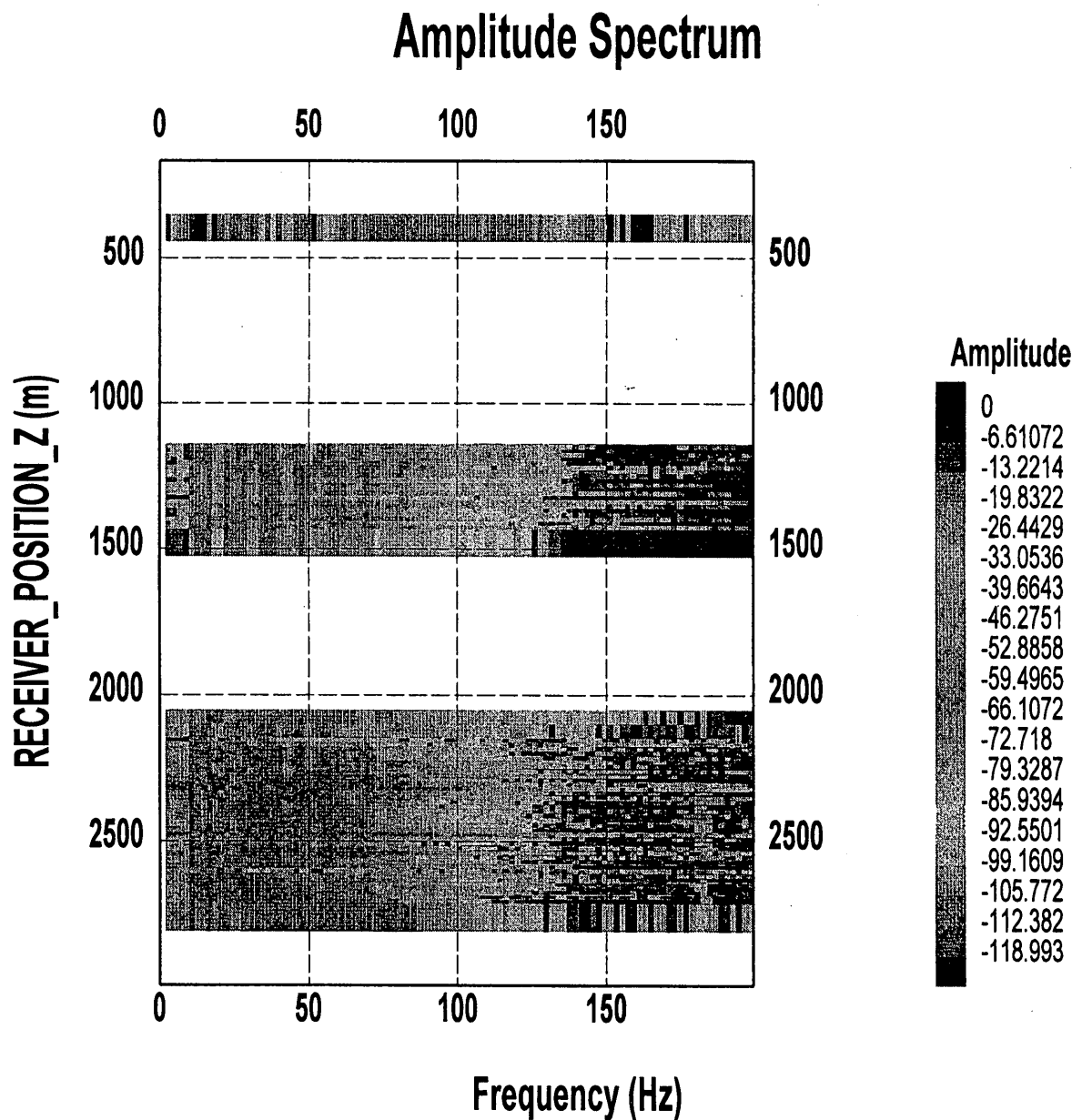


Figure 7. 2D power spectrum on Z component indexed in MD (meters)

Both maximum and minimum amplitudes of the downgoing wave are shown in Figure 8. Theoretical decay curves are computed and displayed together with the observed amplitudes. The theoretical curve is based on the following equation:

$$AMP = B_0 (t^{-(1+\alpha)}) \exp(-\beta t) \quad (1)$$

Equation (1) is the true amplitude recovery (TAR) function used in VSP processing where alpha and beta are the spherical divergence and attenuation factors. Two sets of parameters were used for the analysis. The first set was $\alpha = 1.3$ and $\beta = 0.1$ (shown as AMP-1 in Figure 8) and the second set was $\alpha = 1.3$ and $\beta = 0.5$ (shown as AMP-2).

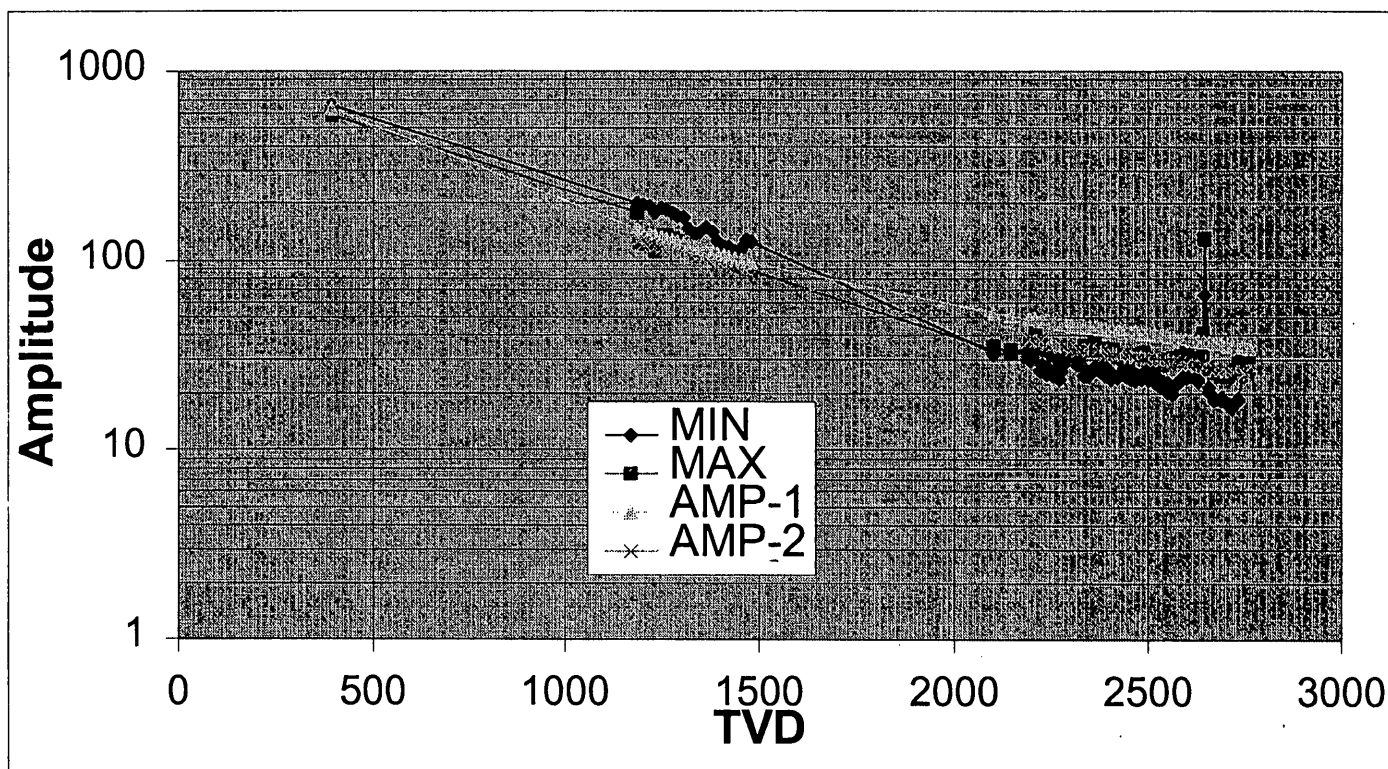


Figure 8. VSP amplitude analysis

Amplitude analysis shows that the amplitude decay in depth less than 1500 m is much less than that in depth greater than 1500. This variation in amplitude attenuation can be attributed to two major factors. The first one is the transmission loss due to the existence of large acoustic impedance contrasts between 1500 and 2000 m. The other is the variation of anelastic attenuation, i.e. the formations in the shallow section (< 1500m) are less attenuative than those in the deep section (> 1500 m).

4.5 Predictive and waveshaping deconvolution

The predictive deconvolution uses information from the earlier part of a seismic trace to predict and deconvolve the latter part of that trace. Some types of systematic noise, such as reverberations and multiples can be predicted. The predictive deconvolution operator is designed trace by trace based on the downgoing wavefield, opening 20 ms before the first break with a window length of 2500 ms.

The prediction time is chosen to be 60 ms. Once the design is made upon the downgoing wavefield, it is applied to the downgoing and upgoing wavefield at the same level.

The waveshaping deconvolution operator is a double sided operator and is designed trace by trace opening 20 ms before the first break with a window length of 2500 ms. The desired output is chosen to be the truncated version of the auto-correlation function of the down-going wavefield after the predictive deconvolution. The truncation point is chosen to be at the third zero crossing of the auto-correlation function. Again, once the design is made upon the downgoing wavefield, it is applied to the downgoing and upgoing wavefield at the same level.

The trace by trace deconvolution is applied in order to collapse the multiple sequence in both the down- and up-going wavefields. For a VSP in a layered model, both the down- and up-going wavefield should have very similar characteristics. If a deconvolution operator can suppress the down-going wave sequence, it should also be able to suppress the up-going wave sequence in the same way. However, if the up-going wave is significantly different from the down-going wave, the deconvolution would become less effective.

The results of predictive and waveshaping deconvolutions show that the suppression of the multiple sequence was completely successful on the down-going wavefield (Figures 9E&G and Figures 10 E&G), but was less impressive on the up-going wavefield. This was mainly due to variations in character between the down and up going wavefields. Also note that both down and up going wavefields may contain mode converted shear and diffractions, these noises are comparable in magnitude to the reflected up-going wavefield, but they are negligible in comparison to the primary down-going wavefield.

Table 3. Predictive and waveshaping deconvolution parameters

Predictive	
Opening	ms before first-break
Operator length	2500 ms
Autocorrelation length	1250 ms
Prediction time	60 ms
Noise level	1 %
Waveshaping	
Operator length	2500 ms
Noise level	1 %
Output wavelet	Auto-correlation at 3 rd zero crossing
Wavelet delay	1250 ms

Figure 9 shows the results of each processing step for Run-1. Figure 9A is the VSP section after bandpass filtering and muting at BBA1ST-1.

Figure 9B is the downgoing wavefield after applying a median velocity filter to the VSP section shown in (A).

Figure 9C shows the residual wavefield obtained by subtracting the down-going wavefield (B) from the total wavefield (A). Coherent up-going events can be clearly seen, but there are some significant down-going events.

Figure 9D is the enhanced upgoing wavefield obtained by applying a median velocity filter to the residual wavefield (C). Downgoing events in the residual wavefield have been filtered out.

Figure 9E shows the result of predictive deconvolution of the downgoing wavefield (B). For each trace, an independent deconvolution operator was designed and applied. The predictive deconvolution filter has been able to suppress the multiple sequences of the down-going wavetrain (B) into a simple wavelet (E).

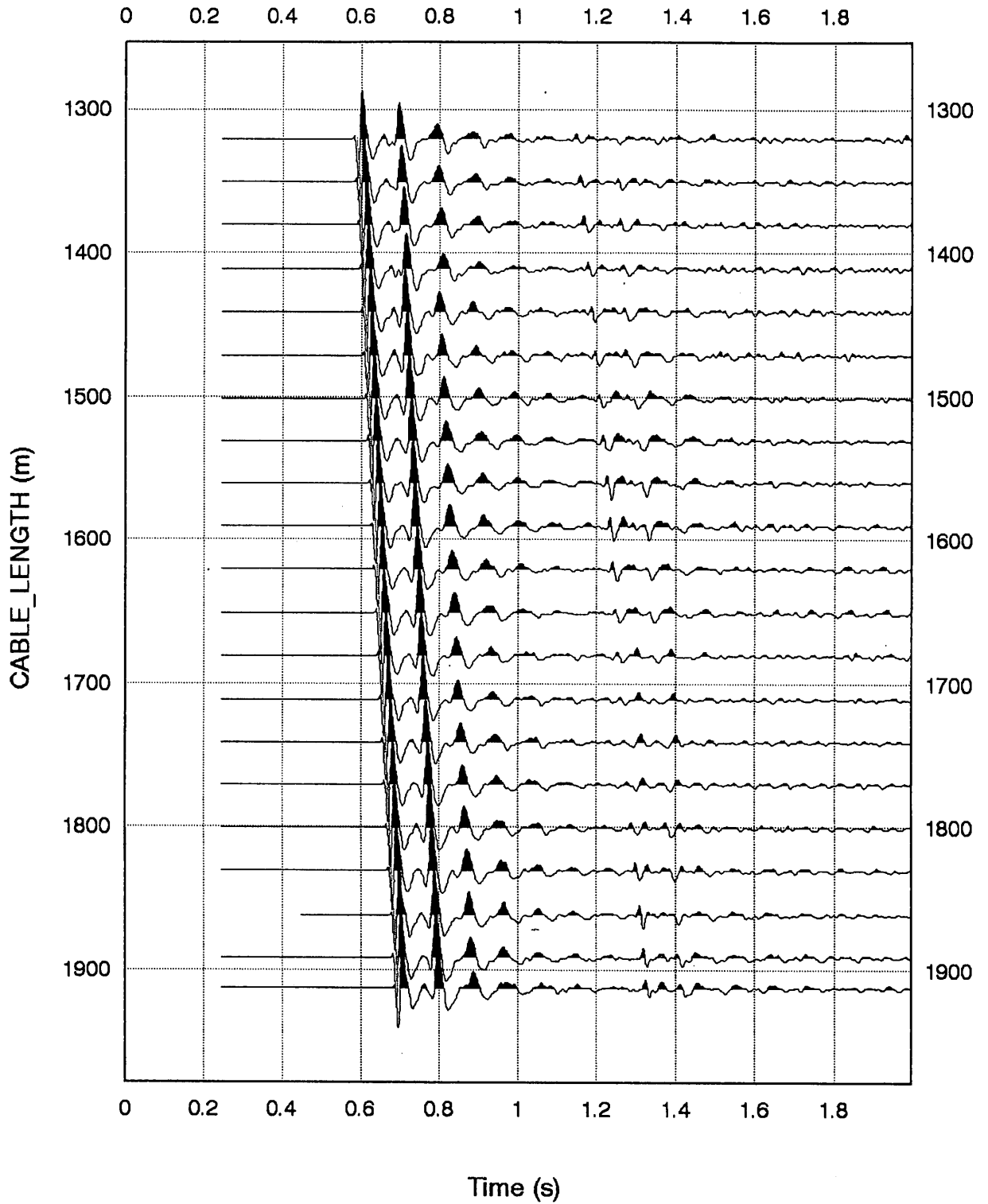
Figure 9F displays the upgoing wavefield after predictive deconvolution. At each depth level, the corresponding predictive deconvolution operator applied to the downgoing wavefield in (E) was used.

Figure 9G displays the result of the waveshaping deconvolution of the downgoing wavefield (E). At each depth level, the desired output was chosen to be the truncated version of the auto-correlation function. The truncation was made at the third zero crossing of the auto-correlation function.

Figure 9H shows the result of the waveshaping deconvolution of the upgoing wavefield. For each trace, the corresponding waveshaping deconvolution operator applied to the down-going wavefield in (G) was used.

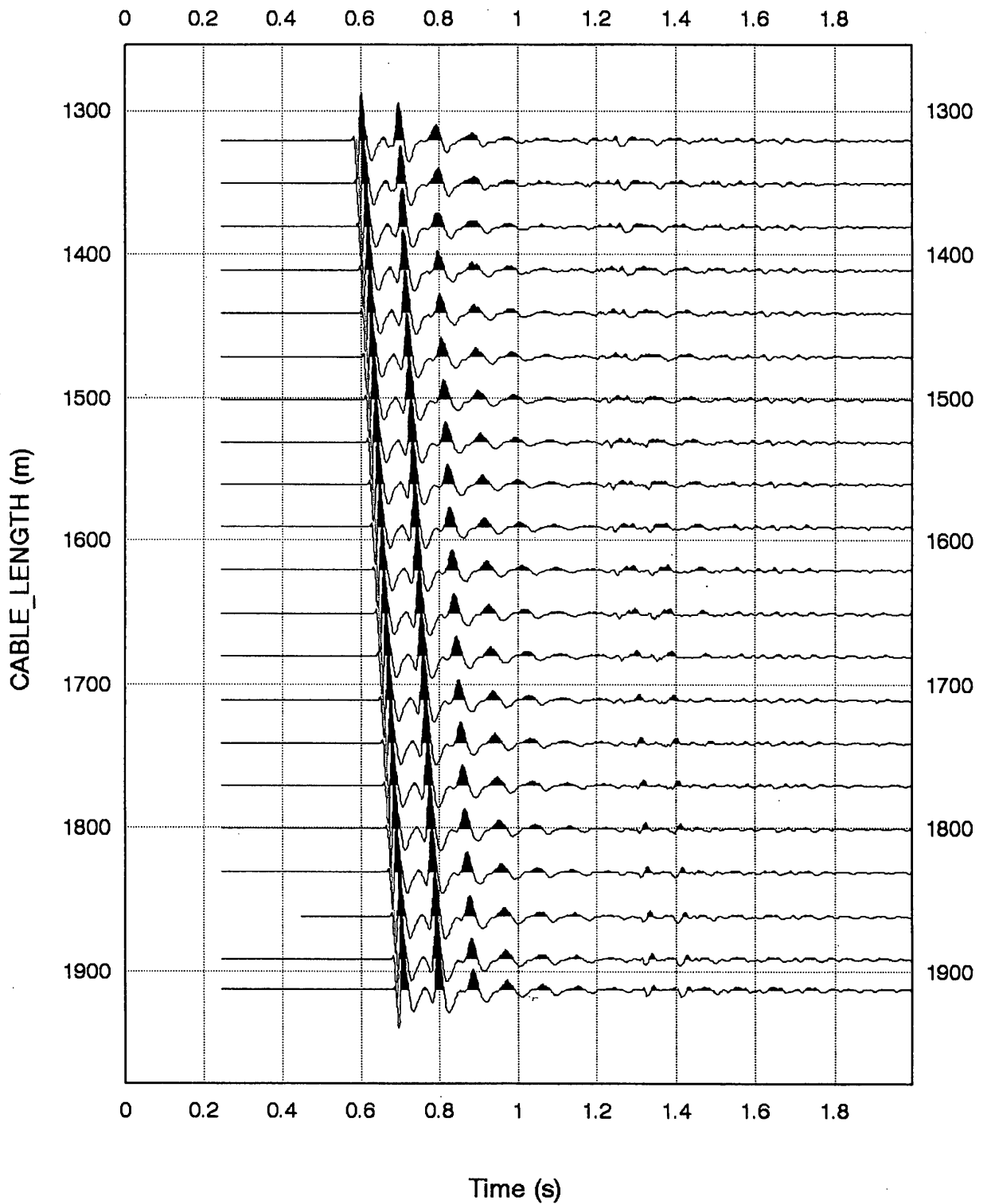
The same processing sequences were applied to Run-2 and Figure 10 shows the result of each corresponding step.

Filtering & Muting



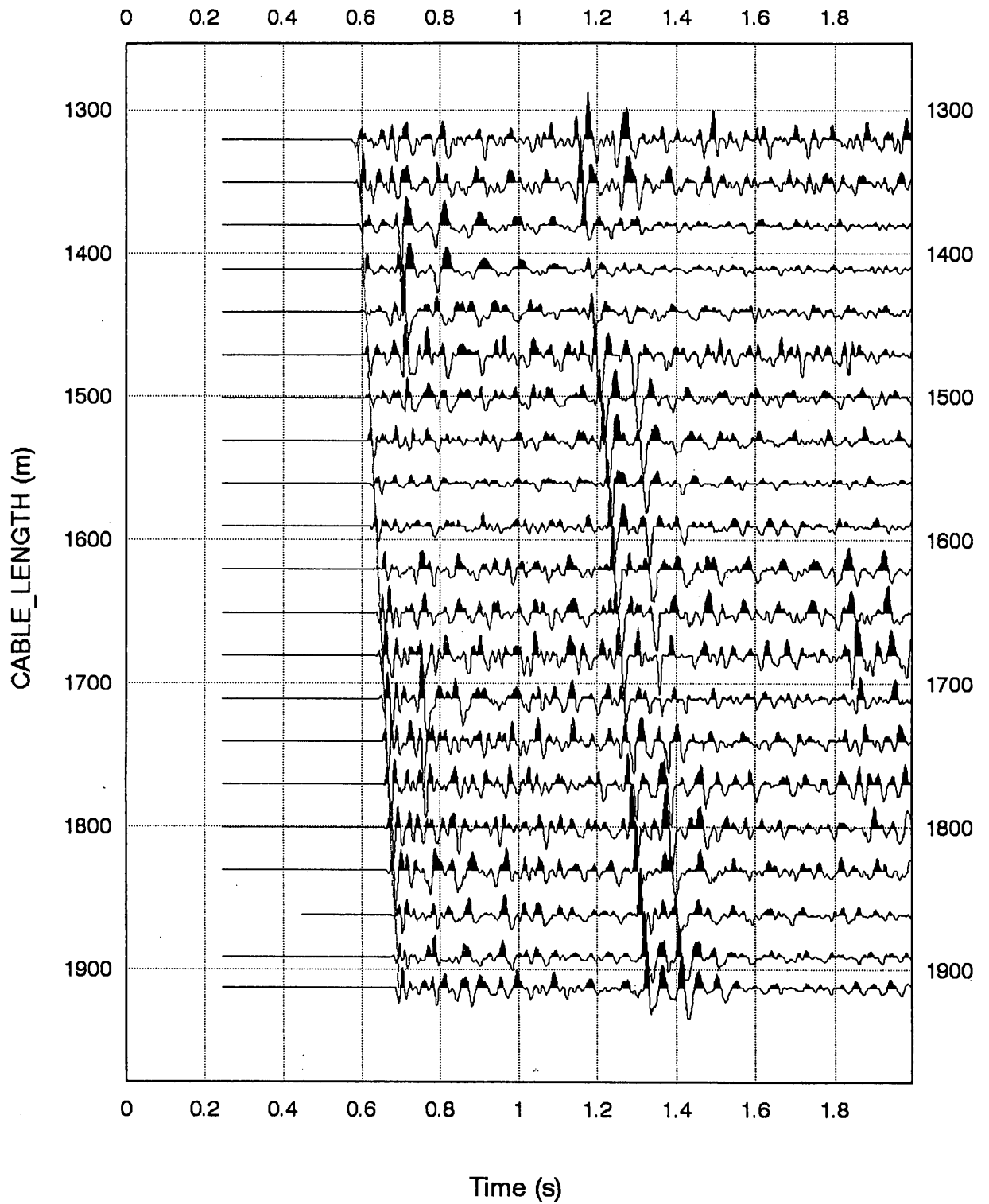
(A) Seismic data after bandpass filtering and muting of Run-1 at Blackback A1 ST-1

Downgoing Wavefield - Median Filtering



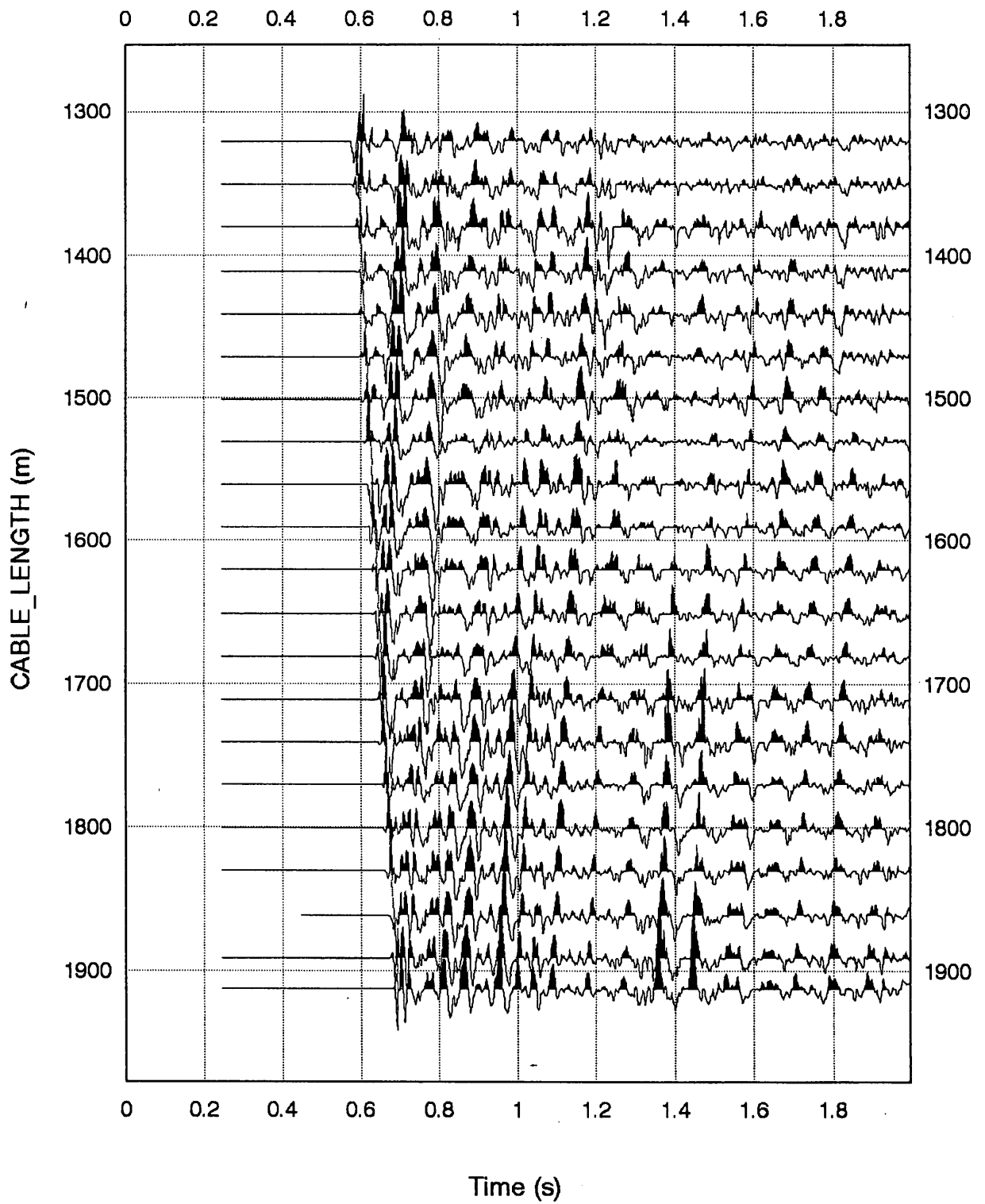
(B) Downgoing P wave after velocity filtering

Residual - Median Filtering



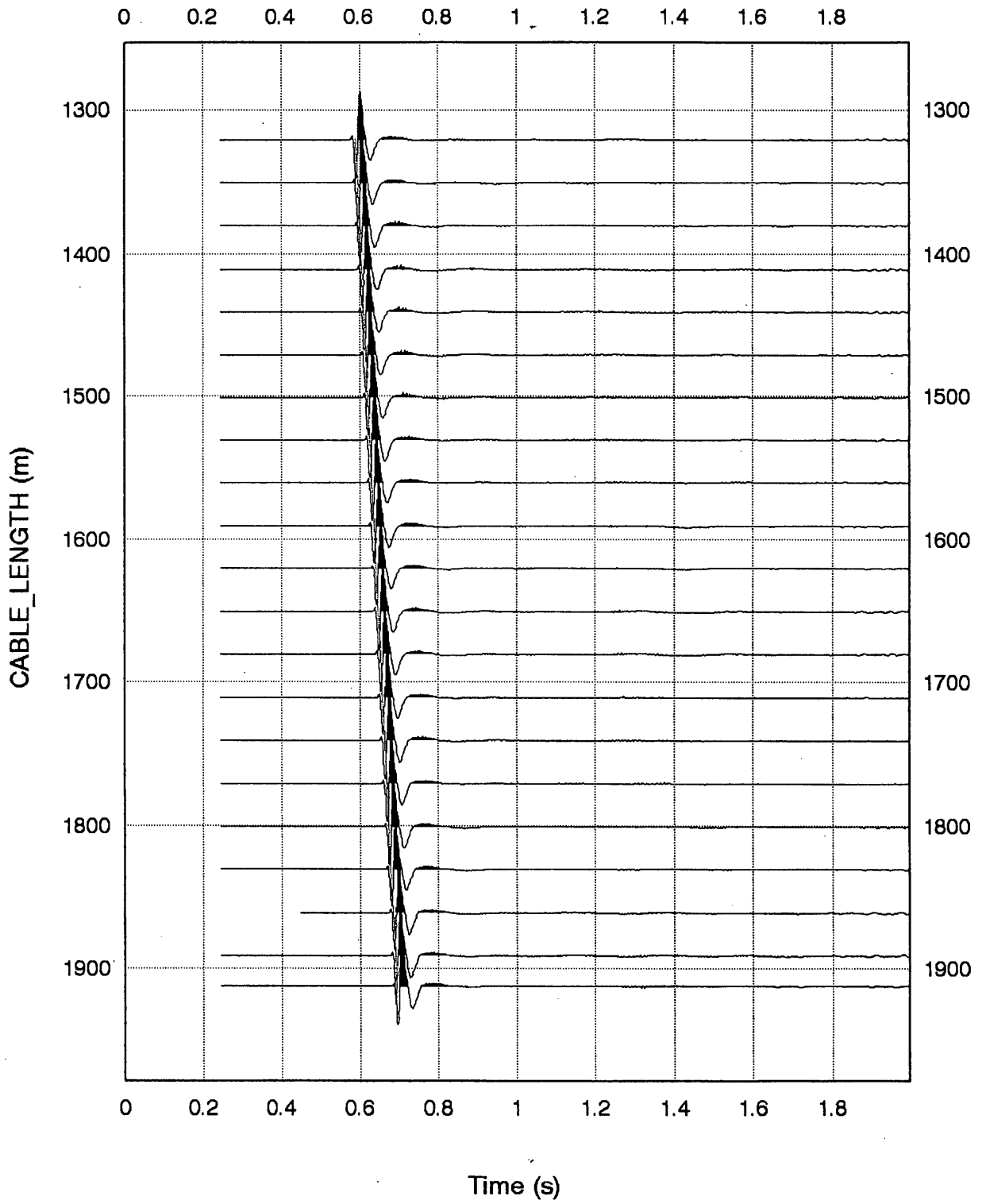
(C) Residual wavefield after median velocity filtering

Enhanced Up - Median Filtering



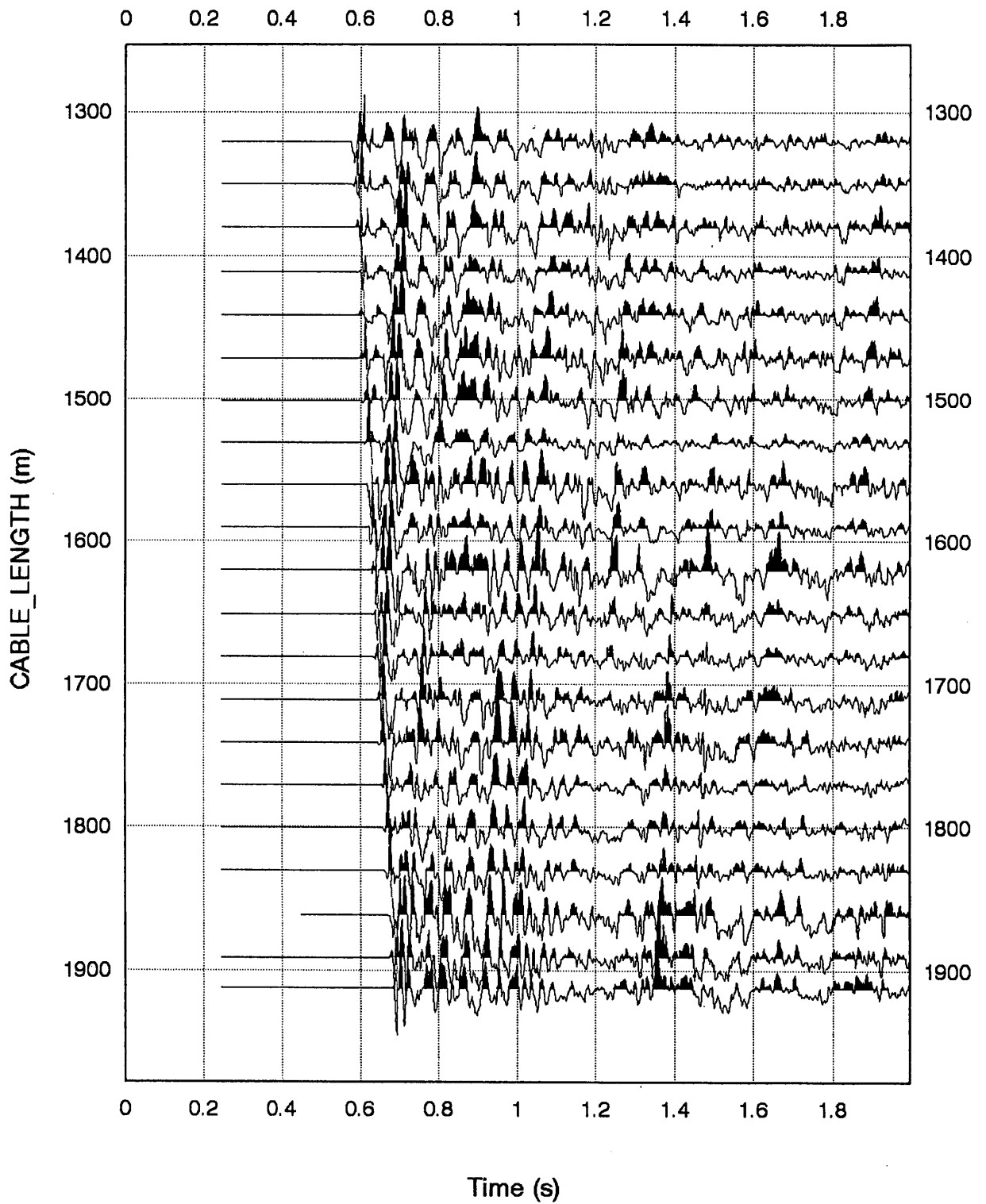
(D) Enhanced Upgoing P after applying a median velocity filter to the residual wavefield

Predictive Decon - Downgoing



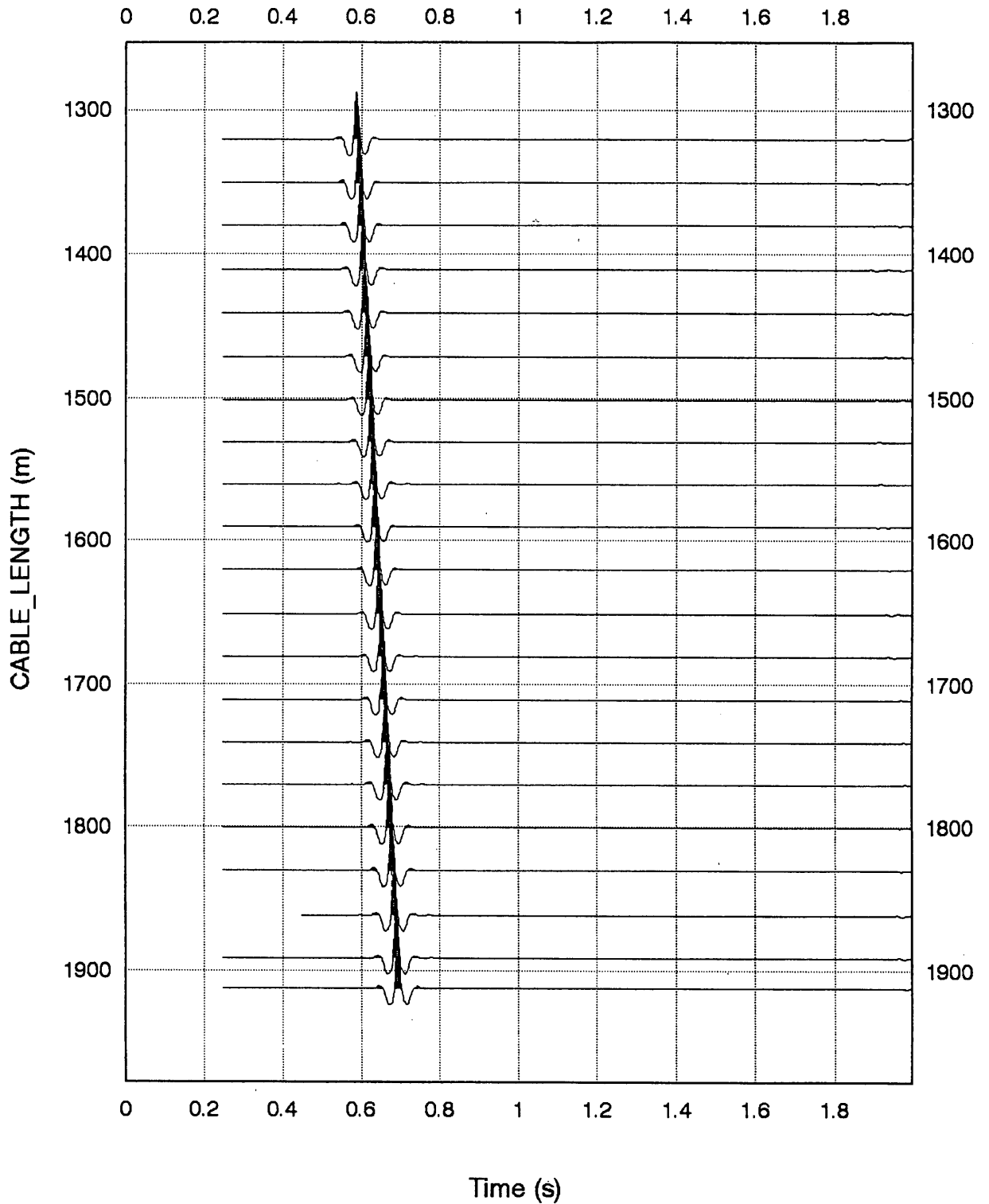
(E) Downgoing P after predictive deconvolution

Predictive Decon - Upgoing

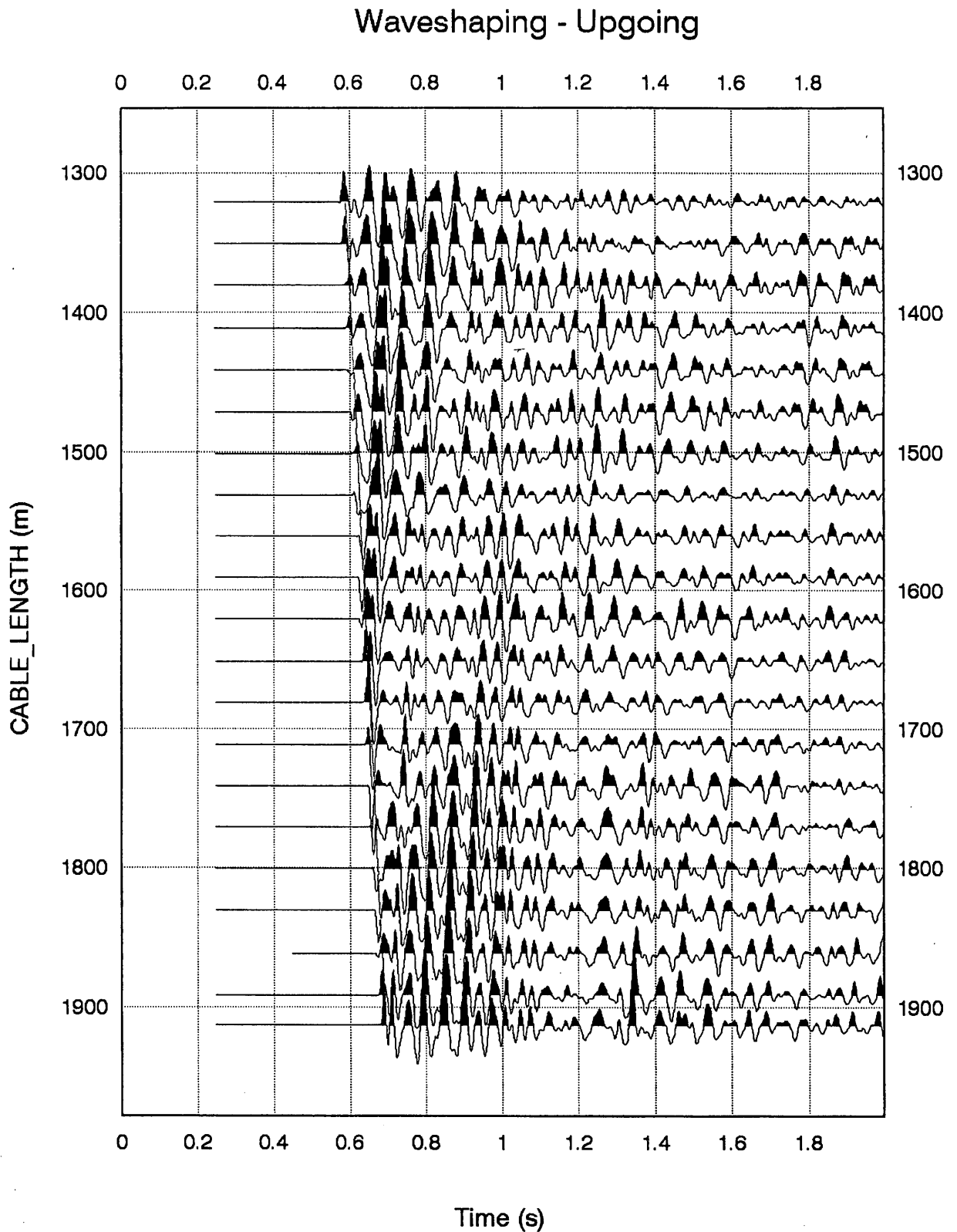


(F) Upgoing wavefield after predictive deconvolution

Waveshaping - Downgoing



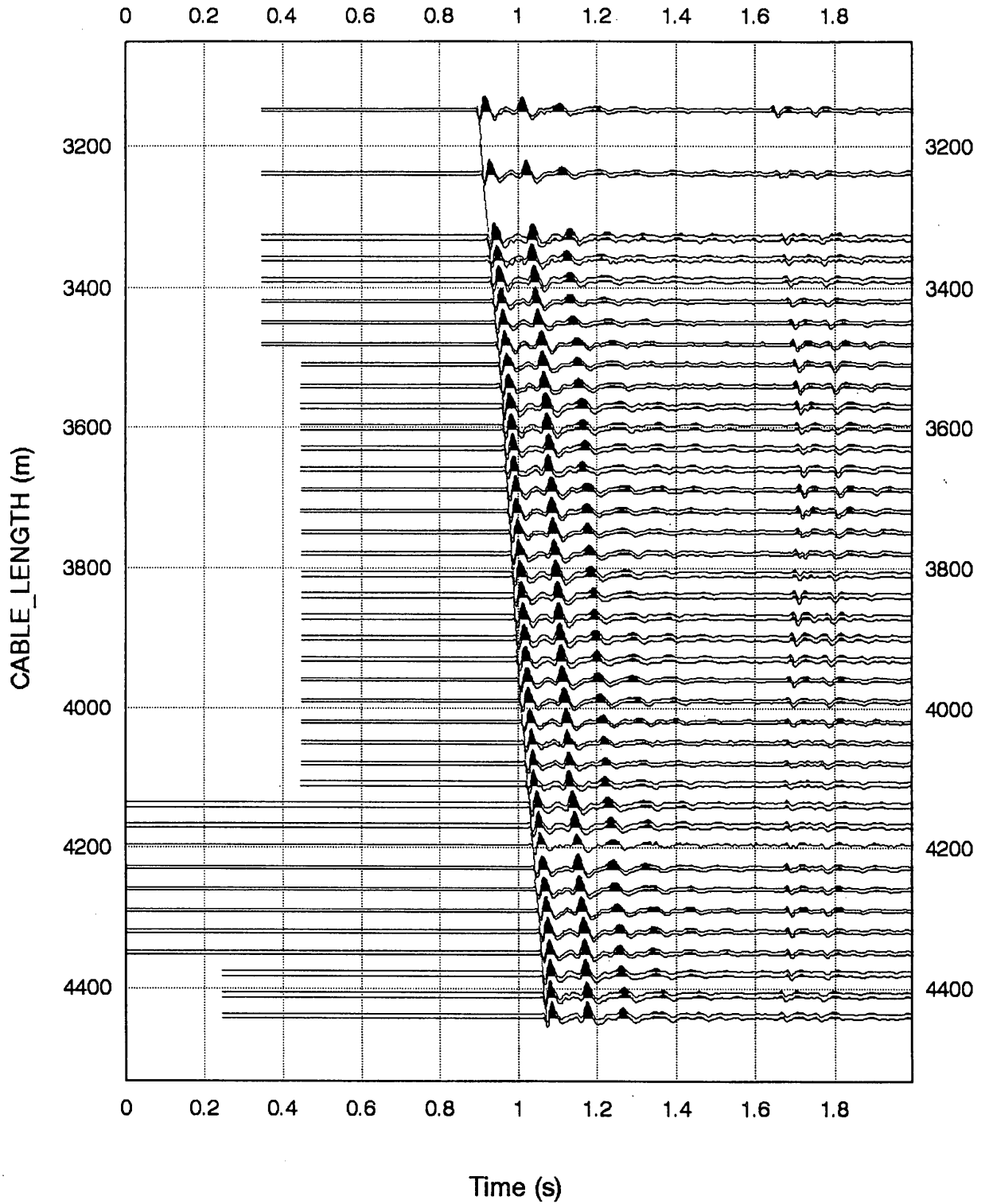
(G) Downgoing wavefield after waveshaping deconvolution



(H) Upgoing wavefield after waveshaping deconvolution

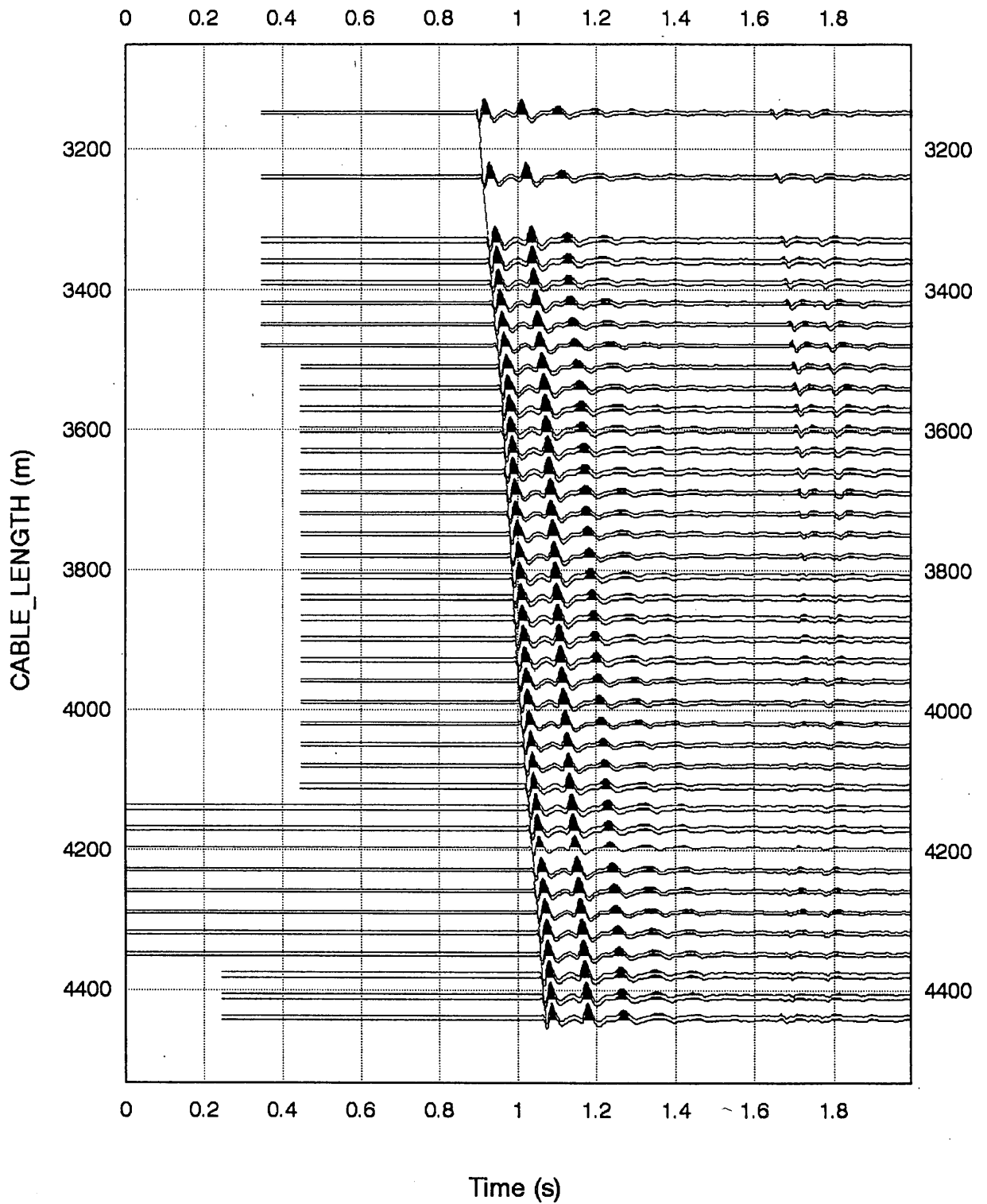
Figure 9. Results of each processing steps for Run-1

Filtering & Muting

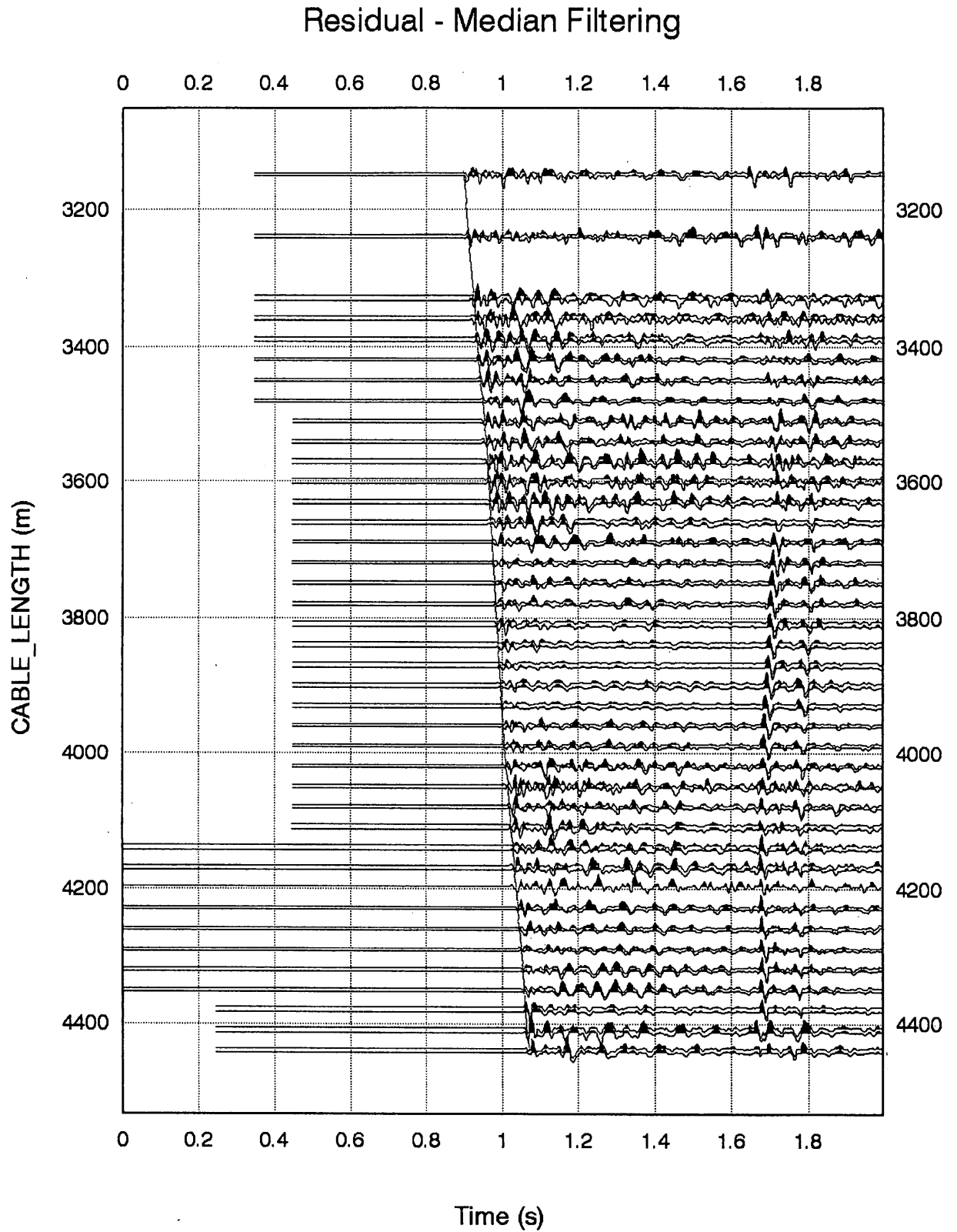


(A) Seismic data after bandpass filtering and muting of Run-2 at Blackback A1 ST-1

Downgoing Wavefield - Median Filtering

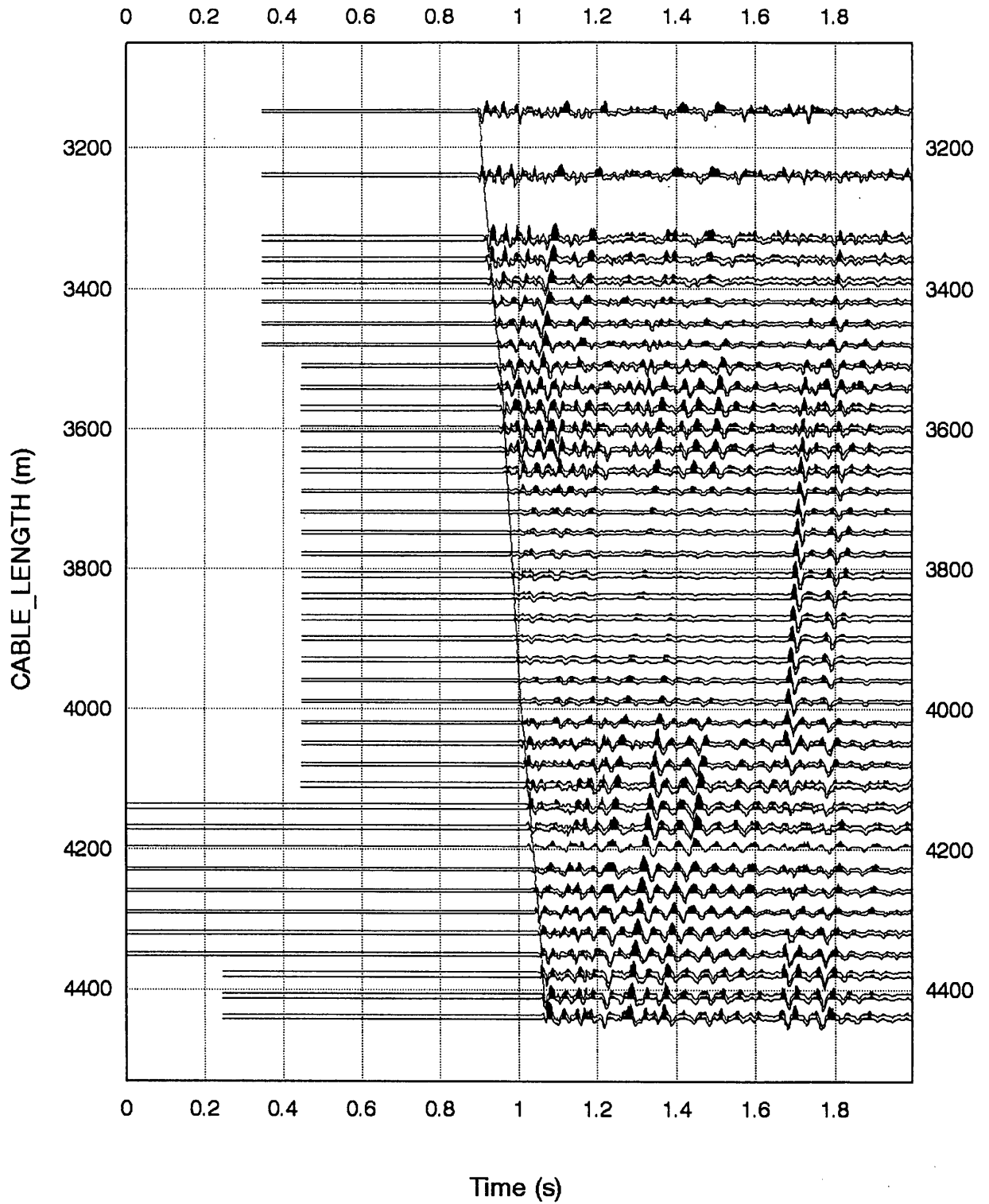


(B) Downgoing wavefield wave after velocity filtering



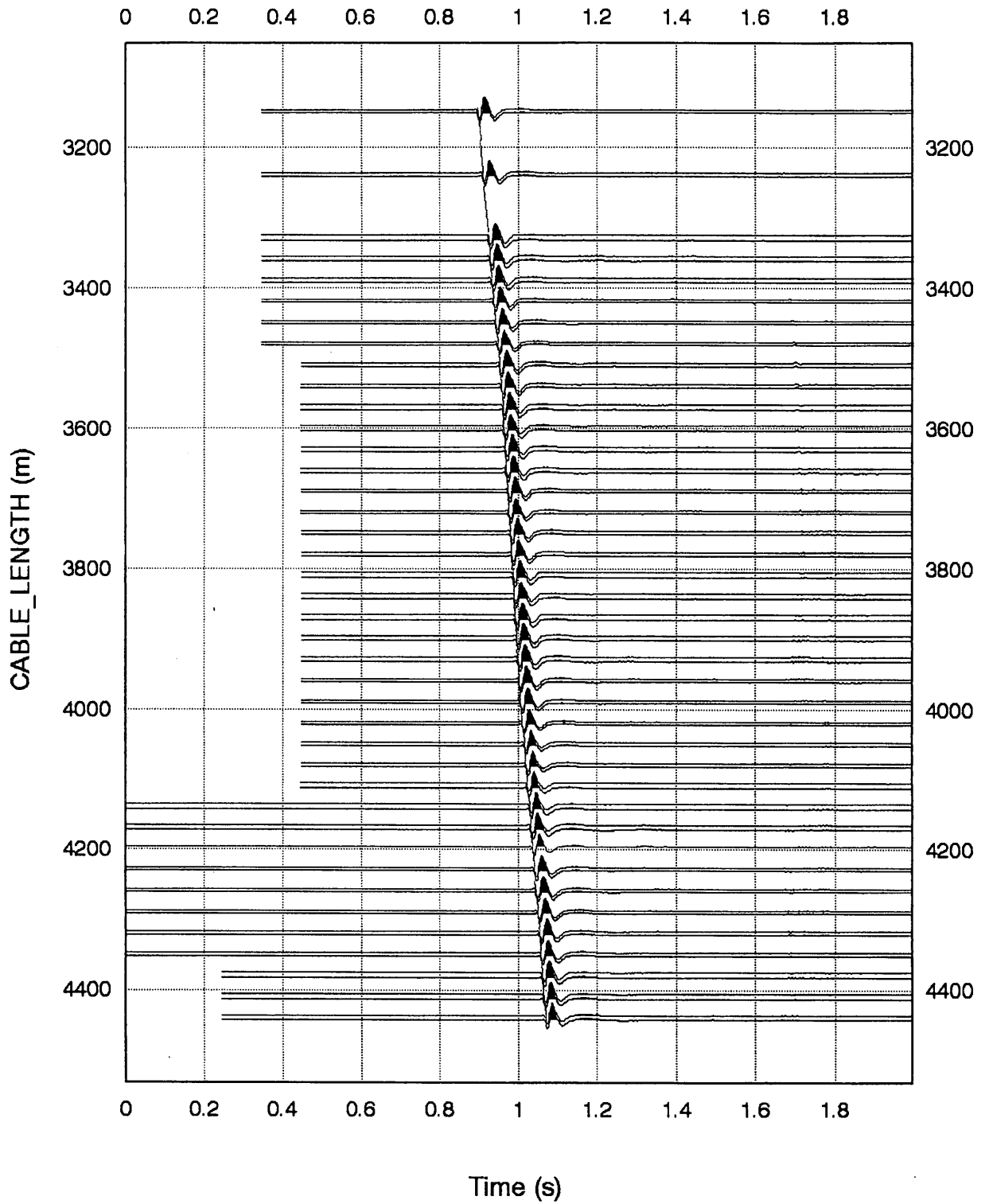
(C) Residual wavefield after median velocity filtering

Enhanced Up - Median Filtering



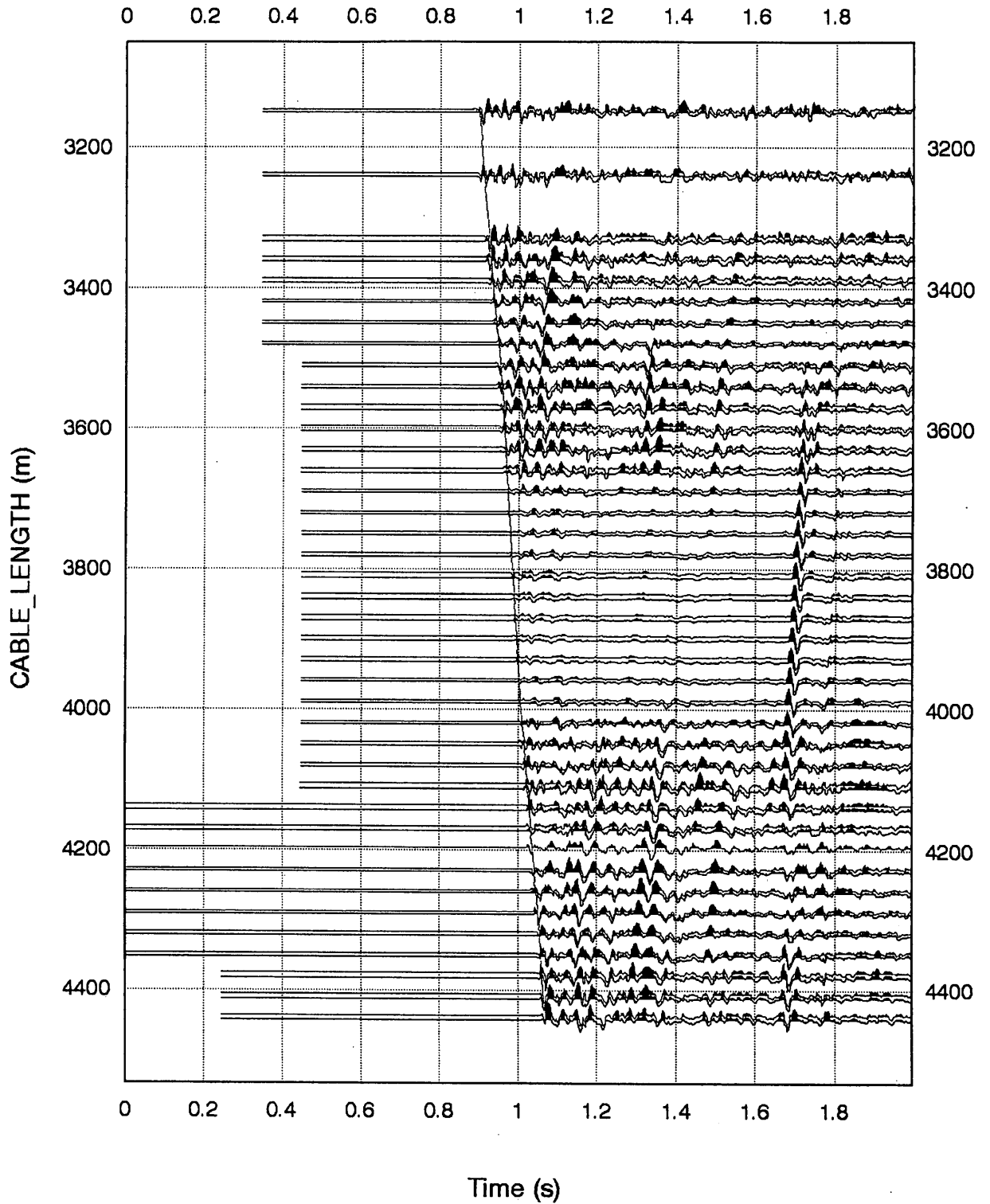
(D) Enhanced upgoing wavefield after applying a median velocity filter to the residual wavefield

Predictive Decon - Downgoing

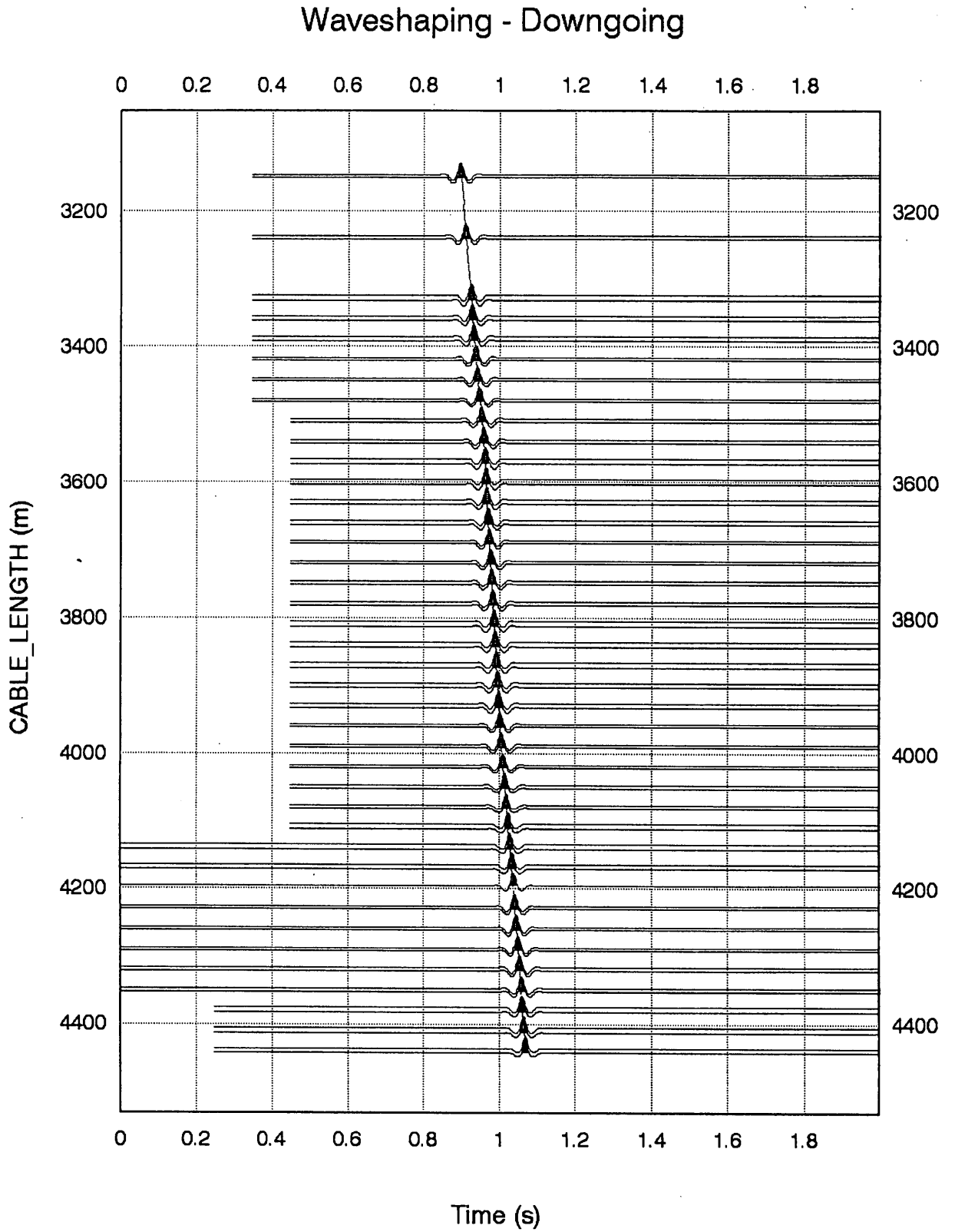


(E) Downgoing wavefiled after predictive deconvolution

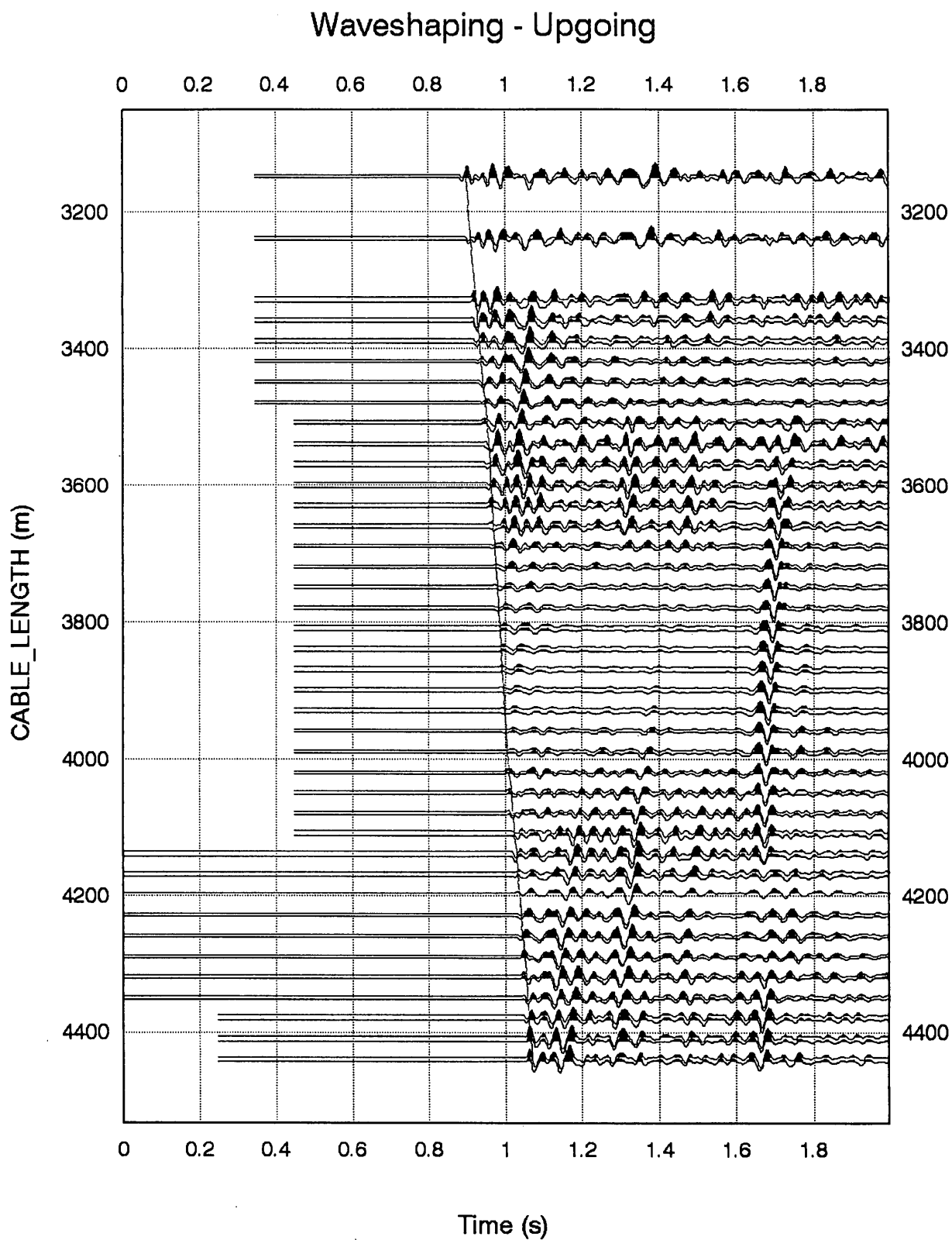
Predictive Decon - Upgoing



(F) Upgoing wavefield after predictive deconvolution



(G) Downgoing wavefield after waveshaping deconvolution



(H) Upgoing wavefield after waveshaping deconvolution

Figure 10 Results of each processing steps for Run-2

4.6 Model building and ray tracing

It was necessary to build an acoustic model of the subsurface for following reasons.

- VSP ray tracing modeling can illuminate a lateral coverage of the subsurface.
- Kirchhoff migration of borehole seismic data requires a background velocity model to guide the migration.

Before the borehole seismic survey, ESSO Australia supplied a 3D model for the area. This 3D model was specified by 12 horizons from the 3D surface seismic interpretation. Interval velocities with lateral variations between these horizons were also given. The base map of the 3D model is shown in Figure 11.

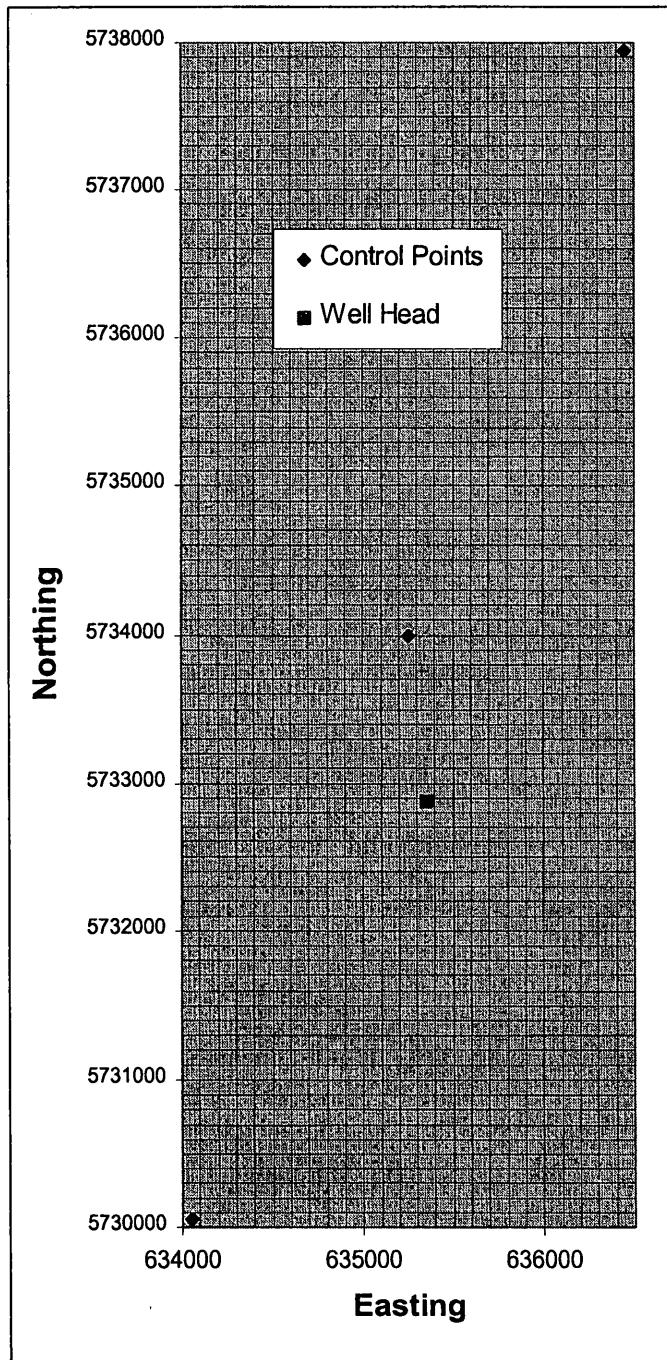


Figure 11 Base map of the 3D model

A 2D vertical cross section along the well trajectory is shown in Figures 12 and 13. The well trajectory projected on the cross section is denoted by the downhole geophone positions. In this 2D section, the origin is at (635305.7E, 5734002.4N). The wellhead is located at (-1130.5, 0). Hereafter, all 2D coordinates are referred to this definition. For simplicity, the interval velocities within each layer were kept constant. These velocities are averages of the interval velocities from the 3D model and listed in Table 4. This velocity model is termed as Model-0.

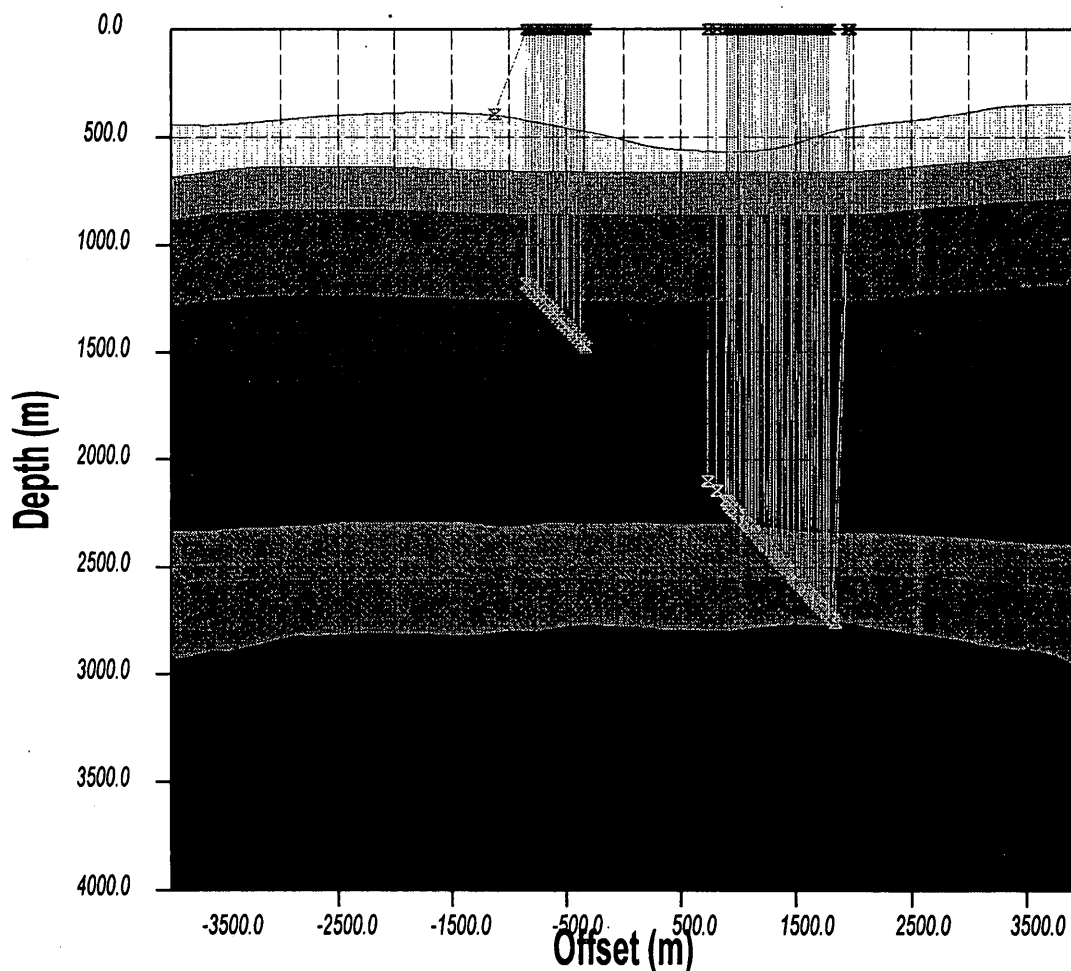


Figure 12 Downgoing P wave rays connecting corresponding sources and receivers in Model-0

Rays were traced between sources and receiver pairs corresponding to the acquisition geometry. In Figure 12, only direct downgoing P wave was considered (PP mode). These rays correspond to the first arrivals on the seismic section. In Figure 13, mode-converted direct downgoing wave was considered (PS mode). In this case, the wave propagated down as compressional wave in the water. Then, it was mode converted to shear at the sea bottom and propagated down to the receivers as shear wave.

More ray bending in PS mode than in PP mode was clearly seen at sections where sea floor is dipping or the source is not directly above the corresponding receivers. This is also reflected by the strength of the shear event mode-converted at the sea floor. In Figure 5A, a shear event mode-converted at the sea floor was clearly visible on Run-1. This event almost disappeared at the shallower section of Run-2 where sea floor is flat, and it re-appeared at the deeper section. In fact,

this event is stronger at the deeper section of Run-2 than that in Run-1 because the sea floor is dipper in the deeper section of Run-2 than the corresponding section of Run-1.

Table 4 Model-0 built from information supplied from ESSO Australia

Layer Name	P velocity (m/s)	S velocity (m/s)	Density (kg/m ³)
Water	1500	0	1000
SR27	1676	750	1620
SR28	2423	1200	1751
SR29	2724	1400	1805
SR30	3038	1550	1856
SR31	3289	1650	1893
SR32	3294	1670	1895
SR33	3558	1850	1940
SR34	3491	1820	1940
SR35	3662	1870	1951
BCHAN	3800	2050	2040
MMIO	2983	1550	1850
TLAT	2858	1480	1836
BASE	3800	2100	2100

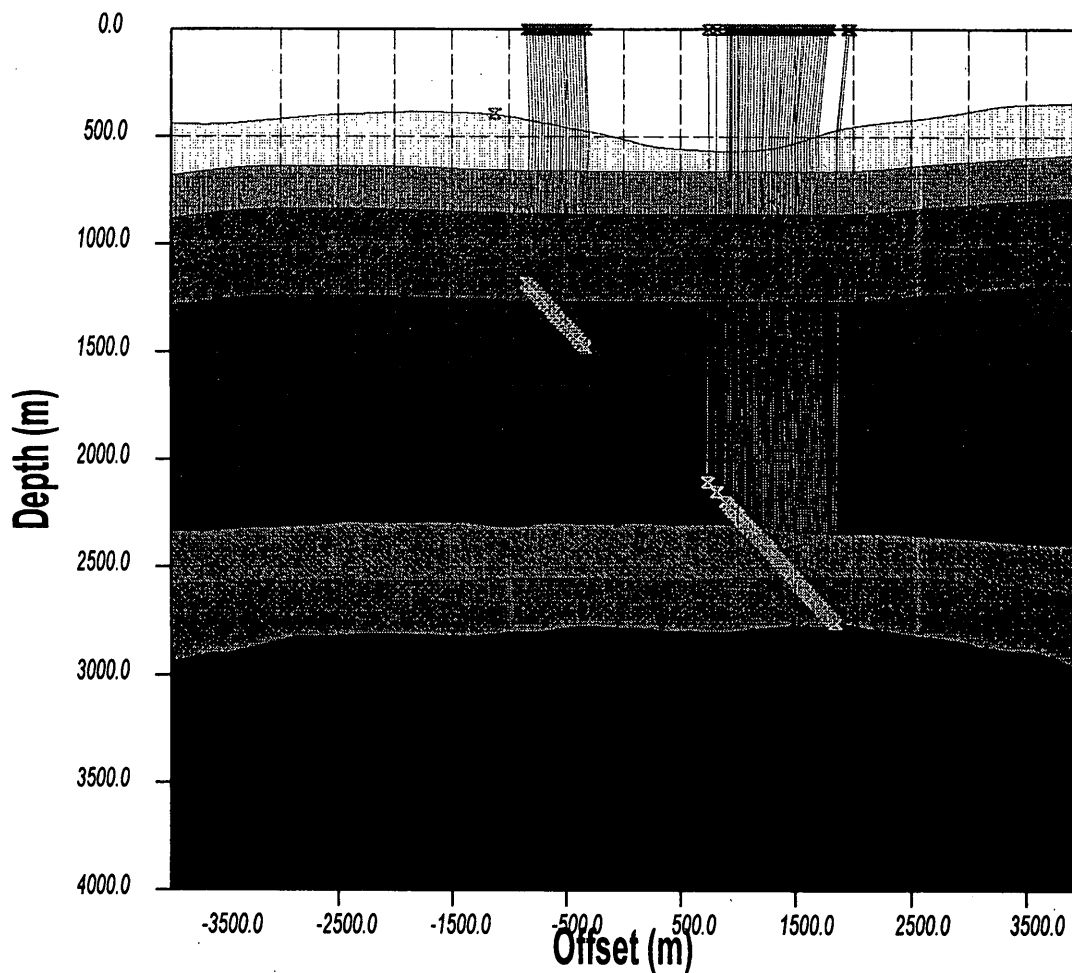


Figure 13 Downgoing mode converted S waves at the sea bottom, rays connecting corresponding sources and receivers in Model-0

4.7 Tomographic inversion of travel times

To verify if Model-0 is a good representative of the local geology, we compare the calculated travel times with the observed travel times for the same source-receiver configuration. The observed transit time is the travel time between the surface hydrophone and the downhole geophone. For the purpose of comparison, therefore, we change the source positions to a depth of 9 m to compensate for the distance between the hydrophone and the airgun. This change is very reasonable considering all source-receiver configurations are almost vertical except for the receiver at the sea floor.

Appendix D lists the source and receiver positions, calculated and observed travel times and the residuals between the calculated and observed travel times. By inspection, it is obvious that there are large positive residuals at the two ends of VIVSP survey and small negative residuals at the middle of the VIVSP survey. The positive residuals indicate that the velocity in the corresponding sections (two ends of the survey) of the model is too slow so that the calculated travel times are greater than the observed travel times. The negative residuals indicate that the velocity in the corresponding section (middle) of the model is too fast so that the calculated travel times are less than the observed travel times.

Table 5 Model-1 obtained from tomographic inversion of travel times

Layer Name	P velocity (m/s)	S velocity (m/s)	Density (kg/m ³)
Water	1513	0	1000
SR27	1703	762	1620
SR28	2462	1219	1751
SR29	2768	1422	1805
SR30	3087	1575	1856
SR31	3342	1676	1893
SR32	3347	1697	1895
SR33	3615	1880	1940
SR34	3547	1849	1940
SR35	3721	1900	1951
BCHAN	3861	2083	2040
MMIO	2983	1550	1850
TLAT	2858	1480	1836
BASE	3800	2100	2100

Tomographic inversion of travel times is an optimisation process where the velocity model is systematically updated to minimise the objective function. The objective function is normally a combination of two parts: one is related to the travel time residuals and the other is related to the *a priori* information about the local geology. Here, a simple objective function is defined as

$$F(m) = \sum_{i=1}^N (t_{cal}^i - t_{obs}^i)^2 + \text{Regularization} \quad (2)$$

Here, the regularisation has three parts. The first part involves the acoustic velocity in the water. Here, the transit times between a receiver at the sea bottom and the corresponding transit times were used to determine the water velocity. The acoustic velocity in the water was calculated to be 1513 m/s instead of 1500 m/s, given by ESSO prior to the survey. The second part of the

regularisation involves the formations from SR27 to BCHAN. During the inversion, the velocity ratios among these formations were kept at the same values as those for the original model. The reason behind this is that VIVSP does not have good vertical resolution. The third part of the regularisation involves formations below MMIO. Velocities for formations below MMIO were not changed. After the minimisation of the objective function, a new velocity model, Model-1, was obtained. This new model is tabled in Table 5 and is very close to Model-0.

Rays were traced in Model-1 between sources and receiver pairs corresponding to the acquisition geometry. This time, only reflected events were shown. In Figure 14, both down and upgoing legs were compressional (PP mode). In Figure 15, the downgoing leg was compressional and the upgoing leg was shear (PS mode).

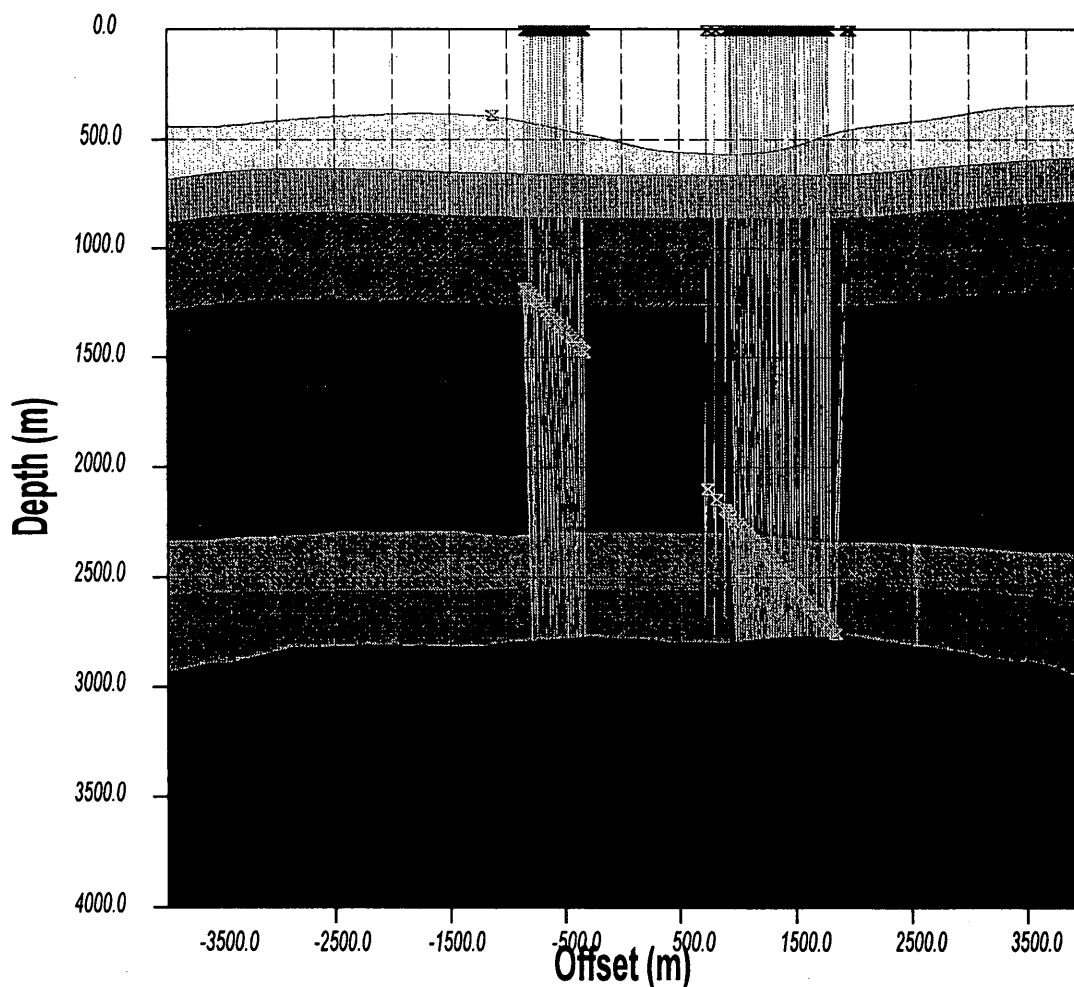


Figure 14 PP reflected rays connecting corresponding sources and receivers in Model-1

Appendix E lists the positions for all source-receiver pairs, the observed direct transit times and the calculated transit times obtained from ray tracing. The residual times are the differences between the calculated and observed times. The mean squared residual times for Model-0 and Model-1 are 17.3 and 12.1 ms, respectively.

An important observation from the variation of the residual times for both Model-0 and Model-1 was that the calculated times at both ends of the survey were greater than those in the middle. This means that the velocities at both ends of the survey should be greater than those used in the models whereas the velocities in the middle should be less than those used in the models. Unfortunately, this lateral variation was not built into the models.

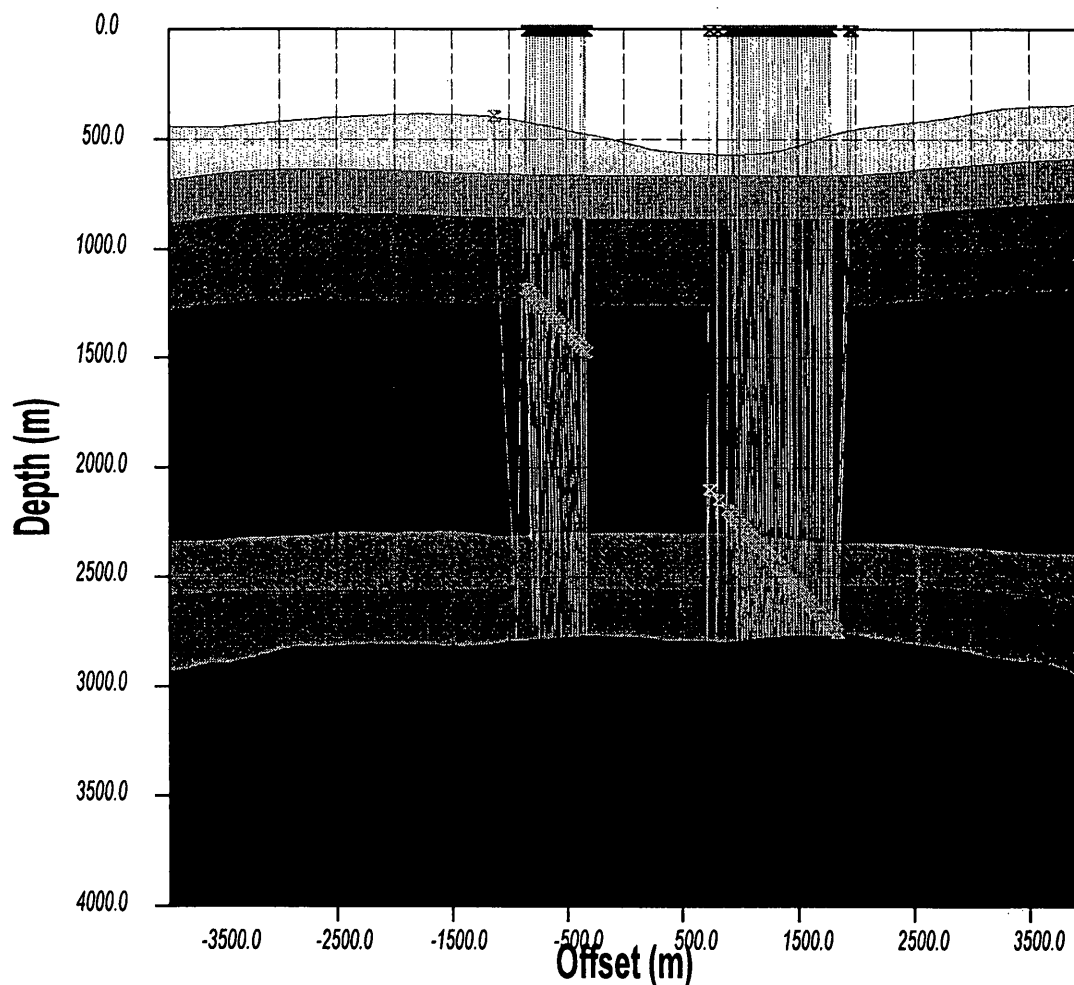


Figure 15 PS reflected rays connecting corresponding sources and receivers in Model-1

4.8 Migration

The purpose of migration is to position the reflected energy contained within the residual wavefield above to its true reflected points (x, y, z) or (x, y, t) .

The program used here is a 2D Kirchhoff method and can migrate PP, PS, SP or SS reflections. Both vertical and horizontal input components may be used. In this case the enhanced UP P wavefield was used.

According to the Kirchhoff integral, each point of the subsurface is imaged (migrated) in the following way:

Given the geometry of the survey (relative positions of the sources and the receivers) and a velocity model, the time T_1 is computed to go from the source to one particular point (x, z) in the subsurface. At this point, the existence of a layer having a local dip of CENDIP-APERT is assumed. Knowing at this point the arrival angle of the ray coming from the source, the Snell's law is applied for the requested code (PP, PS, SP or SS) to compute the departure angle.

Starting from point (x, z) , a ray is sent through the model and its intersection with the well (defined by the receiver co-ordinates) is computed. This leads to a time T_2 to go from (x, z) to the well at (x_0, z_0) .

Assuming a locally spherical wavefront, the actual arrival time (T_i) of this wavefront is computed on several receivers in the same layer as point (x_0, z_0) . At this stage the image is computed by summing the recorded data at times T_1+T_i for i receivers (curve $T_1+T_i(z)$ is generally a hyperbola). This operation is reproduced for a hypothetical reflector at the same point (x, z) having dips ranging from CENDIP-APERT+1 to CENDIP-APERT.

The final value of the image at point (x, z) is the sum for all dips of each estimation damped by a function depending on the distance between the central dip (CENDIP) and the maximum aperture APERT.

The stacking is performed over all traces. If a reflector really exists at that point, the stacked amplitude should be non-zero. If no reflector exists, however, the stacked energy should average out to be zero.

Aperture and Dip:

A prevailing strike and dip (if it is known) of the reflectors to be imaged can be specified. In this case, tomographic inversion results of BBA1ST-1 were used. The maximum dip allowed for a potential reflector was set by the aperture (APERT).

Many tests were run to determine the optimum parameters. The final migration was performed on both Run-1 and Run-2 (Figures 9H and 10H with the parameters described in Table 6.

Table 6. Migration Parameters

Velocity Model	Dip (DEG)	Aperture (DEG)
Model-1	0	+/-7.5

The migration results of both Run-1 and Run-2 are displayed in Figures 16, 17, 18 and 19.

Time Migration of Run-1

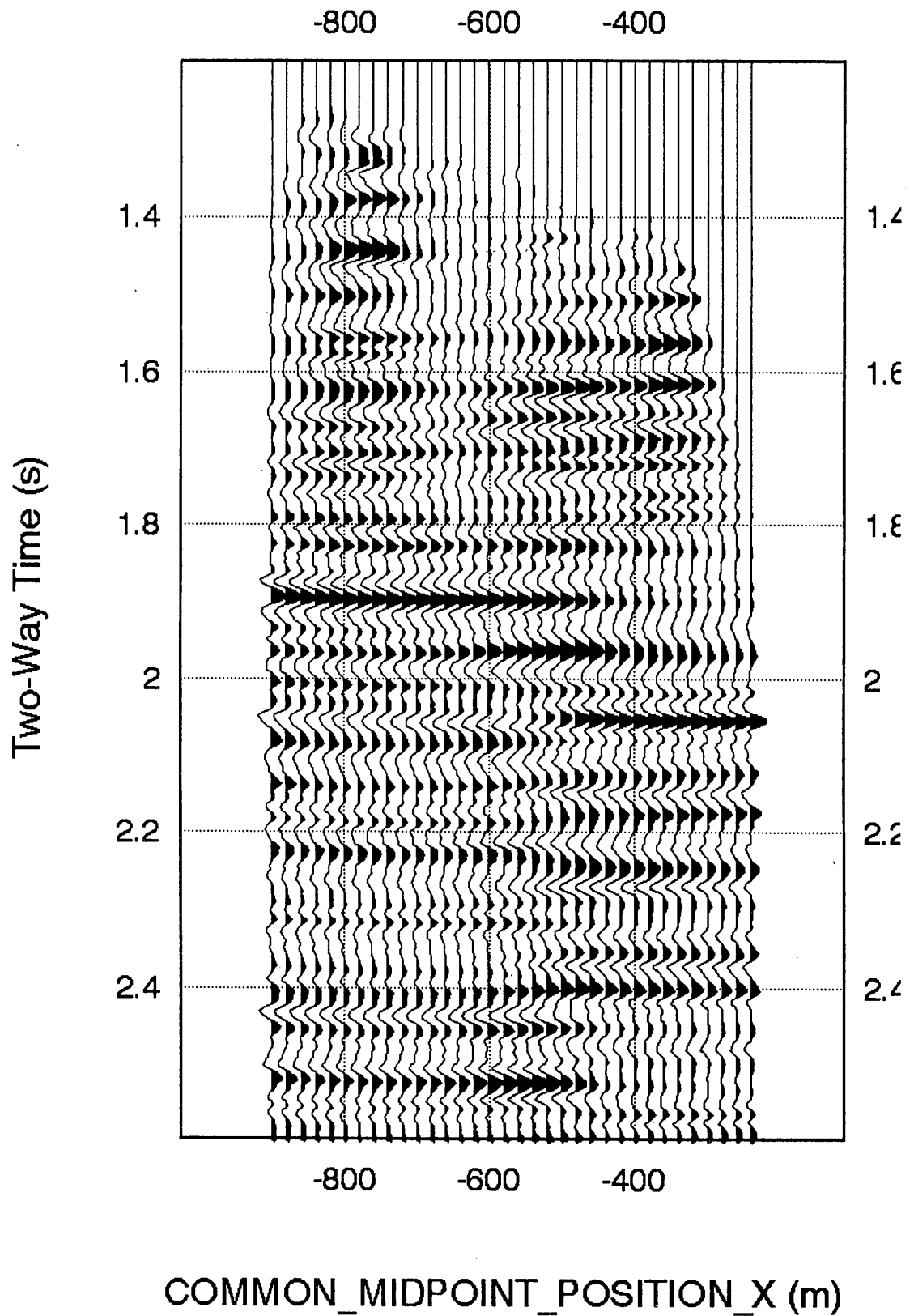


Figure 16. Time migration of Run-1 using Model-1 velocity model

Depth Migration of Run-1

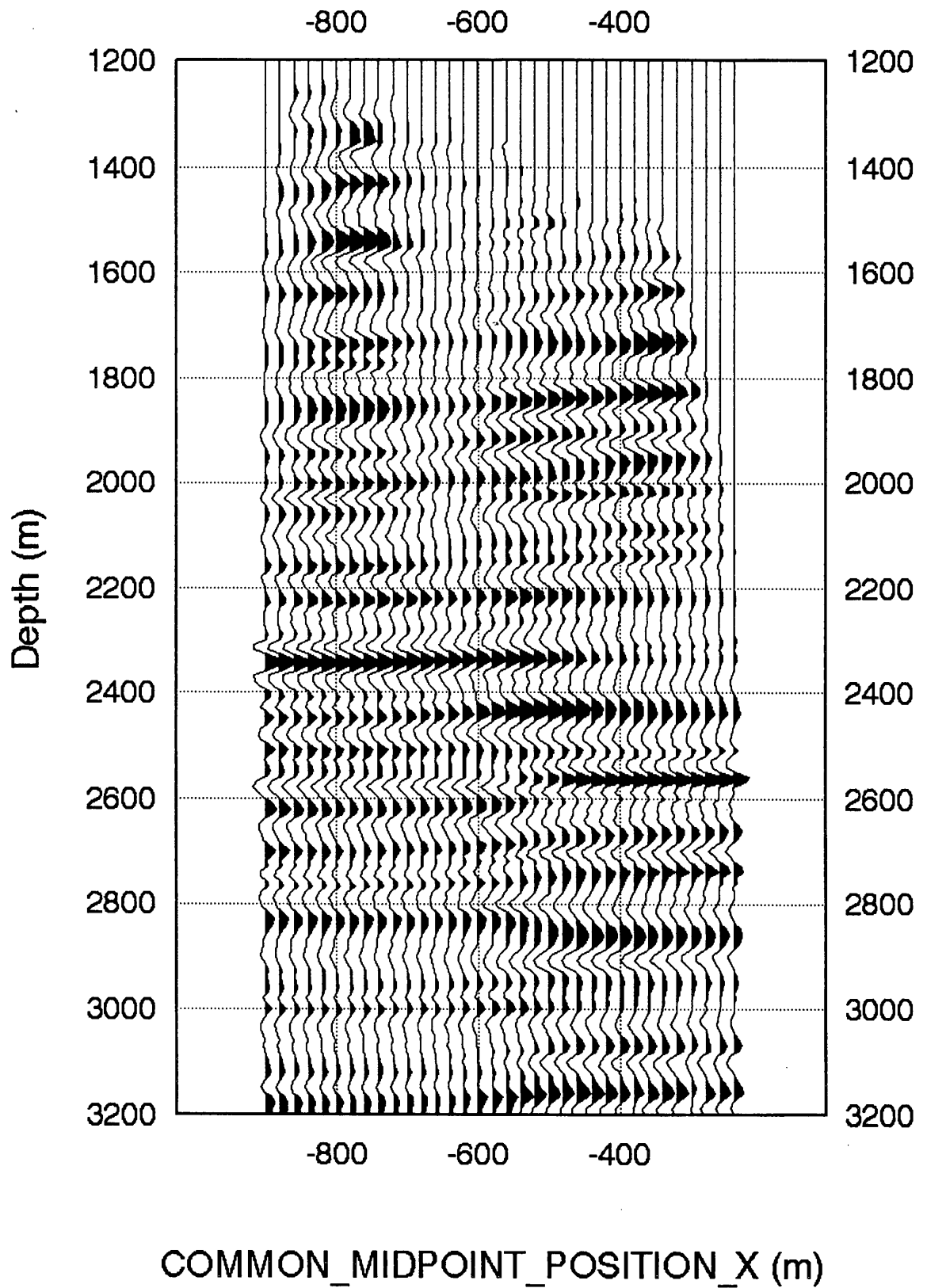


Figure 17. Depth migration of Run-1

Time Migration of Run-2

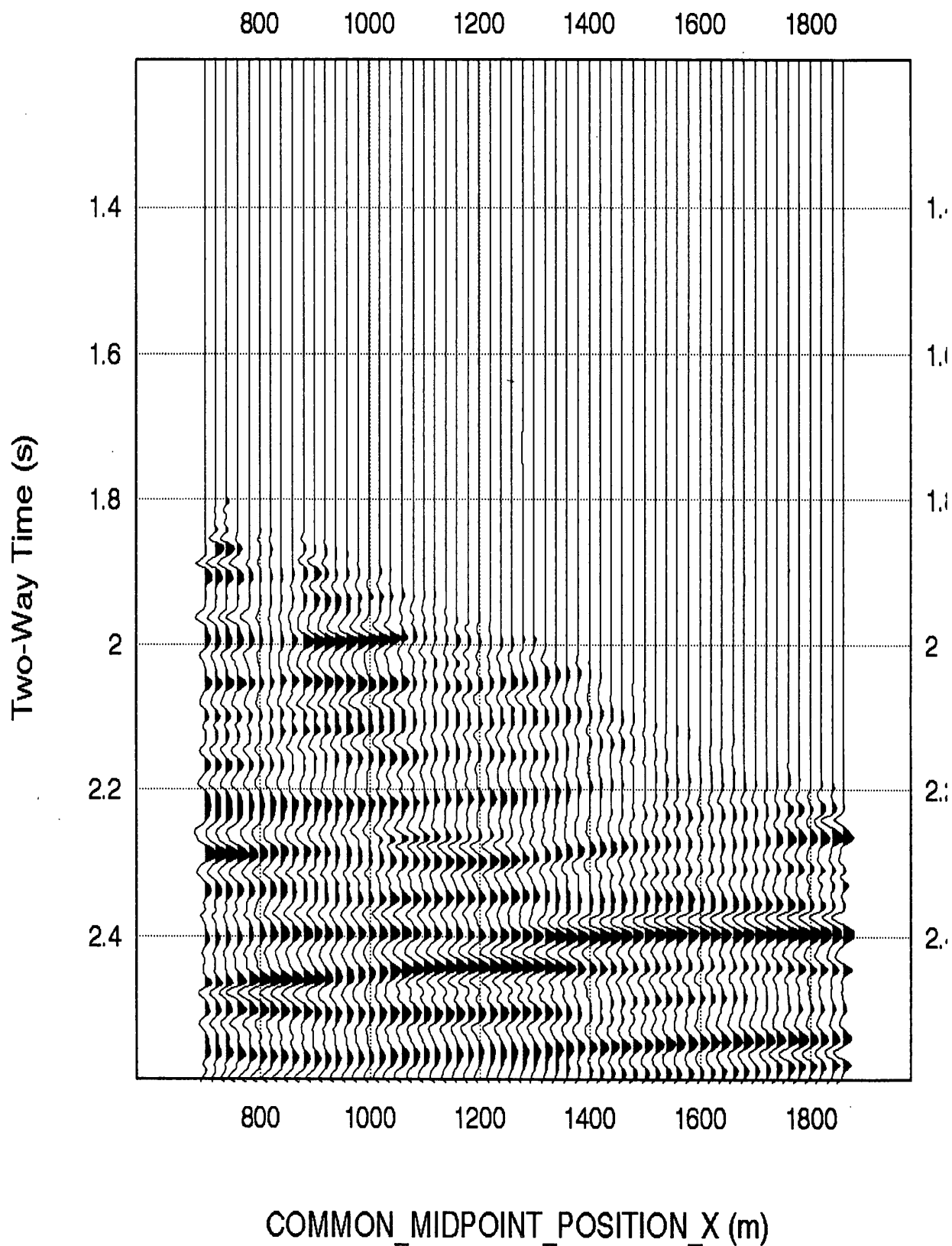


Figure 18. Time migration of Run-2

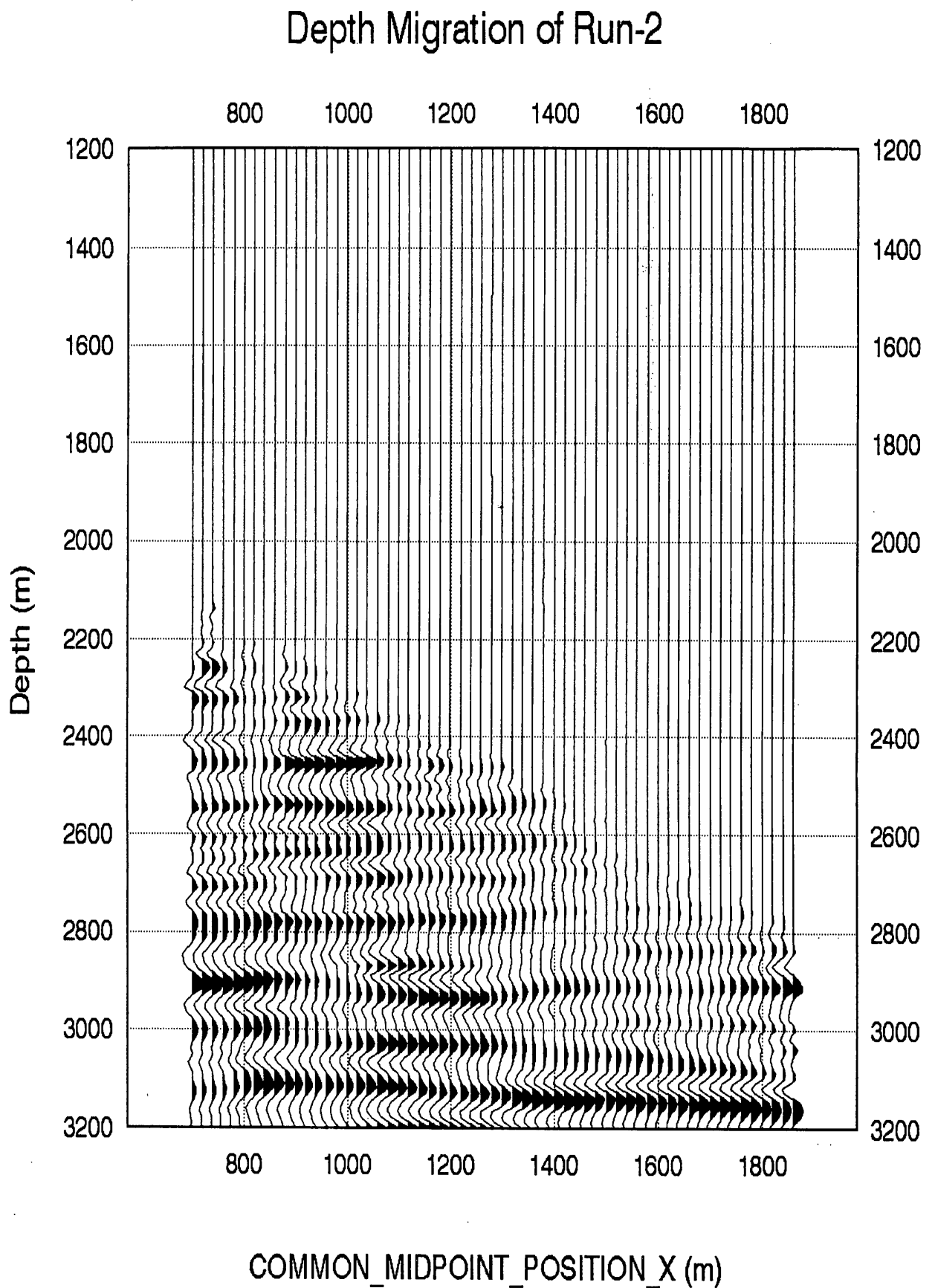
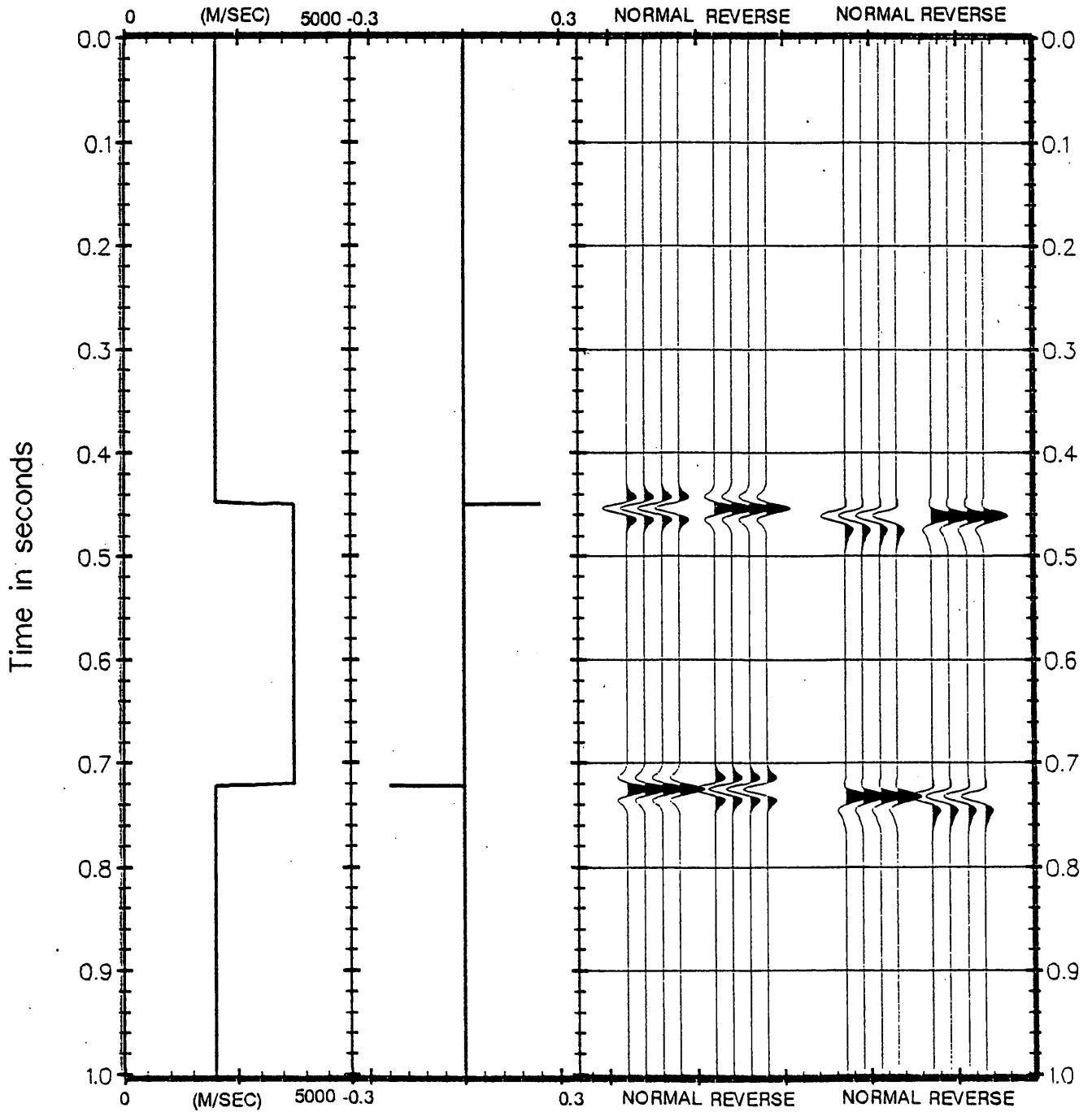


Figure 19. Depth migration of Run-2

SCHLUMBERGER (SEG-1976) WAVELET POLARITY CONVENTION

INTERVAL VELOCITY REFLECTION COEFF. ZERO PHASE MINIMUM PHASE



907525 053

A. Well deviation data

Survey

<p>Client: Esso Australia Ltd Field: BlackBack Gippsland Offshore Structure: BlackBack Sedco 702 A-1 Well: A-1 Borehole: A-1 ST API #: Date: April 21, 1999 Grid Convergence: -0.96788765° Scale Factor: 0.99982562</p>	<p>Survey Computation Method: Minimum Curvature DLS Computation Method: Lubinski Vertical Section Azimuth: 355.700° Vertical Section Origin: N 0.000 m, E 0.000 m TVD Reference: Rotary Table 26.0 m above MSL Magnetic Declination: 13.384° Total Field Strength: 60296.736 nT Dip: -69.042° Declination Date: February 27, 1999 Magnetic Declination Model: BGS 1998 North Reference: Grid North Coordinate Reference To: Structure Reference Point</p>
<p>Location: S 38 32 31.677, E 148 33 11.274 : N 5732873.400 m, E 635355.100 m Coordinate System: UTM Zone 55 S on Australian Datum 1984</p>	

Station ID	Grid Coordinates							Geographic Coordinates				
	MD (m)	Incl (°)	Azim (°)	TVD (m)	VSec (m)	N/S (m)	E/W (m)	DLS (°30m)	Northing (m)	Easting (m)	Latitude	Longitude
Tie-In	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5732873.40	635355.10	S 38 32 31.677	E 148 33 11.274
	421.00	0.00	118.67	421.00	0.00	0.00	0.00	0.00	5732873.40	635355.10	S 38 32 31.677	E 148 33 11.274
	424.40	0.44	118.67	424.40	-0.01	-0.01	0.01	3.88	5732873.39	635355.11	S 38 32 31.677	E 148 33 11.275
	433.90	0.67	118.67	433.90	-0.06	-0.05	0.09	0.73	5732873.35	635355.19	S 38 32 31.678	E 148 33 11.278
	443.60	1.22	118.67	443.60	-0.14	-0.13	0.23	1.70	5732873.27	635355.33	S 38 32 31.681	E 148 33 11.284
	453.30	1.40	118.67	453.30	-0.26	-0.23	0.43	0.56	5732873.17	635355.53	S 38 32 31.684	E 148 33 11.292
	463.00	1.35	118.67	462.99	-0.39	-0.35	0.63	0.15	5732873.05	635355.73	S 38 32 31.688	E 148 33 11.301
	472.60	1.94	118.67	472.59	-0.54	-0.48	0.87	1.84	5732872.92	635355.97	S 38 32 31.692	E 148 33 11.311
	482.30	1.67	118.67	482.28	-0.71	-0.62	1.14	0.84	5732872.78	635356.24	S 38 32 31.696	E 148 33 11.322
	487.00	1.35	118.67	486.98	-0.78	-0.68	1.25	2.04	5732872.72	635356.35	S 38 32 31.698	E 148 33 11.327
30" Casing	491.10	1.06	118.67	491.08	-0.82	-0.72	1.33	2.12	5732872.68	635356.43	S 38 32 31.699	E 148 33 11.330
	519.90	0.83	118.67	519.88	-1.08	-0.95	1.74	0.24	5732872.45	635356.84	S 38 32 31.706	E 148 33 11.347
	548.90	0.85	112.10	548.87	-1.29	-1.13	2.13	0.10	5732872.27	635357.23	S 38 32 31.712	E 148 33 11.363
	578.00	0.76	117.52	577.97	-1.49	-1.30	2.50	0.12	5732872.10	635357.60	S 38 32 31.717	E 148 33 11.379

607.00	0.44	120.87	606.97	-1.65	-1.45	2.76	0.33	5732871.95	635357.86	S 38 32 31.722	E 148 33 11.389
636.10	0.66	122.56	636.07	-1.82	-1.60	3.00	0.23	5732871.80	635358.10	S 38 32 31.727	E 148 33 11.399
650.00	0.56	118.40	649.97	-1.90	-1.67	3.13	0.24	5732871.73	635358.23	S 38 32 31.729	E 148 33 11.405
689.12	1.26	120.18	689.08	-2.25	-1.98	3.67	0.54	5732871.42	635358.77	S 38 32 31.739	E 148 33 11.427
719.19	1.50	65.10	719.15	-2.30	-1.98	4.31	1.29	5732871.42	635359.41	S 38 32 31.738	E 148 33 11.454
748.79	3.53	17.27	748.72	-1.32	-0.95	4.93	2.79	5732872.45	635360.03	S 38 32 31.705	E 148 33 11.479
807.91	6.57	13.29	807.60	3.60	4.08	6.25	1.55	5732877.48	635361.35	S 38 32 31.541	E 148 33 11.530
838.21	9.51	11.16	837.60	7.67	8.23	7.13	2.93	5732881.63	635362.23	S 38 32 31.406	E 148 33 11.563
865.42	12.94	8.40	864.29	12.81	13.45	8.01	3.83	5732886.85	635363.11	S 38 32 31.236	E 148 33 11.596
896.24	16.67	3.22	894.08	20.56	21.28	8.77	3.85	5732894.68	635363.87	S 38 32 30.982	E 148 33 11.622
924.88	20.03	0.25	921.26	29.53	30.29	9.02	3.65	5732903.69	635364.12	S 38 32 30.690	E 148 33 11.626
951.82	23.17	359.15	946.30	39.42	40.20	8.96	3.53	5732913.59	635364.06	S 38 32 30.368	E 148 33 11.616
981.56	25.16	358.42	973.44	51.57	52.37	8.70	2.03	5732925.76	635363.80	S 38 32 29.974	E 148 33 11.597
1009.78	28.29	359.43	998.64	64.24	65.06	8.47	3.36	5732938.45	635363.57	S 38 32 29.562	E 148 33 11.579
1038.86	31.04	0.21	1023.91	78.59	79.45	8.43	2.86	5732952.84	635363.53	S 38 32 29.096	E 148 33 11.567
1067.13	33.93	359.33	1047.75	93.74	94.63	8.36	3.11	5732968.01	635363.46	S 38 32 28.604	E 148 33 11.554
1096.16	36.75	358.31	1071.43	110.50	111.42	8.01	2.98	5732984.80	635363.11	S 38 32 28.059	E 148 33 11.527
1127.05	39.69	357.70	1095.69	129.60	130.51	7.34	2.88	5733003.89	635362.44	S 38 32 27.441	E 148 33 11.486
1155.88	43.87	354.25	1117.19	148.79	149.66	5.97	4.96	5733023.03	635361.07	S 38 32 26.821	E 148 33 11.417
1183.49	47.66	352.36	1136.45	168.55	169.30	3.65	4.37	5733042.67	635358.75	S 38 32 26.185	E 148 33 11.307
1212.09	51.37	354.08	1155.02	190.28	190.90	1.10	4.13	5733064.27	635356.20	S 38 32 25.486	E 148 33 11.187
1242.07	54.60	354.94	1173.06	214.21	214.73	-1.19	3.30	5733088.09	635353.91	S 38 32 24.715	E 148 33 11.076
1271.80	57.80	355.55	1189.60	238.91	239.34	-3.24	3.27	5733112.70	635351.86	S 38 32 23.918	E 148 33 10.974
1289.16	60.26	355.87	1198.53	253.80	254.19	-4.35	4.28	5733127.55	635350.75	S 38 32 23.437	E 148 33 10.918
1326.74	60.69	356.00	1217.05	286.50	286.80	-6.67	0.35	5733160.15	635348.43	S 38 32 22.381	E 148 33 10.799
1354.99	61.51	355.93	1230.70	311.23	311.47	-8.41	0.87	5733184.82	635346.69	S 38 32 21.582	E 148 33 10.710
1384.41	61.45	355.95	1244.75	337.08	337.26	-10.24	0.06	5733210.60	635344.86	S 38 32 20.746	E 148 33 10.616
1414.28	61.36	353.52	1259.05	363.30	363.37	-12.64	2.14	5733236.71	635342.46	S 38 32 19.901	E 148 33 10.499
1442.19	61.35	355.92	1272.43	387.78	387.76	-14.90	2.26	5733261.09	635340.20	S 38 32 19.111	E 148 33 10.389
1471.63	60.53	355.63	1286.73	413.52	413.42	-16.79	0.87	5733286.75	635338.31	S 38 32 18.280	E 148 33 10.293
1501.64	60.89	355.68	1301.41	439.69	439.52	-18.78	0.36	5733312.84	635336.32	S 38 32 17.435	E 148 33 10.193
1530.17	60.53	355.09	1315.37	464.57	464.32	-20.78	0.66	5733337.64	635334.32	S 38 32 16.632	E 148 33 10.093
1558.47	60.71	355.47	1329.25	489.23	488.90	-22.81	0.40	5733362.22	635332.29	S 38 32 15.836	E 148 33 9.992
1586.27	60.25	355.14	1342.95	513.42	513.01	-24.79	0.59	5733386.32	635330.31	S 38 32 15.055	E 148 33 9.893
1617.82	60.06	355.20	1358.65	540.79	540.28	-27.09	0.19	5733413.59	635328.02	S 38 32 14.172	E 148 33 9.779
1643.74	60.17	355.19	1371.57	563.26	562.67	-28.97	0.13	5733435.97	635326.14	S 38 32 13.448	E 148 33 9.686

20 Casing

13 3/8 Casing

1674.41	60.53	355.08	1386.74	589.91	589.23	-31.23	0.36	57333462.53	635323.88	S 38 32 12.588	E 148 33 9.574
1705.36	60.32	355.33	1402.01	616.83	616.05	-33.48	0.29	57333489.34	635321.63	S 38 32 11.719	E 148 33 9.463
1732.48	59.91	355.30	1415.53	640.34	639.49	-35.40	0.45	57333512.78	635319.71	S 38 32 10.960	E 148 33 9.367
1762.81	60.02	355.13	1430.71	666.60	665.65	-37.59	0.18	57333538.93	635317.52	S 38 32 10.113	E 148 33 9.258
1791.92	60.22	355.56	1445.21	691.84	690.81	-39.64	0.44	57333564.09	635315.47	S 38 32 9.298	E 148 33 9.156
1819.51	60.09	355.85	1458.94	715.77	714.67	-41.44	0.31	57333587.95	635313.67	S 38 32 8.526	E 148 33 9.065
1849.39	59.87	355.87	1473.89	741.64	740.48	-43.30	0.22	57333613.75	635311.81	S 38 32 7.690	E 148 33 8.970
1880.00	59.87	355.87	1489.26	768.11	766.88	-45.21	0.00	57333640.15	635309.90	S 38 32 6.835	E 148 33 8.873
1907.89	59.81	355.96	1503.27	792.23	790.94	-46.93	0.11	57333664.20	635308.18	S 38 32 6.056	E 148 33 8.785
1932.35	59.85	356.20	1515.56	813.38	812.03	-48.37	0.26	57333685.29	635306.74	S 38 32 5.372	E 148 33 8.711
1961.76	59.98	356.09	1530.30	838.82	837.42	-50.08	0.16	57333710.67	635305.03	S 38 32 4.550	E 148 33 8.623
1991.39	60.13	356.14	1545.09	864.50	863.04	-51.82	0.16	57333736.29	635303.29	S 38 32 3.720	E 148 33 8.533
2021.50	60.36	356.29	1560.04	890.64	889.12	-53.55	0.26	57333762.37	635301.56	S 38 32 2.876	E 148 33 8.444
2053.78	60.54	356.51	1575.96	918.71	917.15	-55.31	0.24	57333790.39	635299.80	S 38 32 1.968	E 148 33 8.352
2082.87	60.56	355.75	1590.26	944.04	942.42	-57.02	0.68	57333815.66	635298.09	S 38 32 1.149	E 148 33 8.263
2108.93	60.70	356.10	1603.04	966.75	965.07	-58.64	0.39	57333838.30	635296.47	S 38 32 0.416	E 148 33 8.181
2129.97	60.90	356.17	1613.31	985.12	983.40	-59.87	0.30	57333856.63	635295.24	S 38 31 59.822	E 148 33 8.117
2137.25	60.88	356.23	1616.85	991.48	989.75	-60.30	0.23	57333862.98	635294.81	S 38 31 59.616	E 148 33 8.095
2167.68	61.06	355.73	1631.61	1018.09	1016.29	-62.16	0.47	57333889.51	635292.95	S 38 31 58.757	E 148 33 8.000
2195.96	61.31	355.75	1645.24	1042.87	1041.00	-64.00	0.27	57333914.22	635291.11	S 38 31 57.956	E 148 33 7.906
2221.57	61.52	354.86	1657.50	1065.35	1063.41	-65.84	0.95	57333936.63	635289.27	S 38 31 57.231	E 148 33 7.815
2251.46	61.59	354.77	1671.73	1091.63	1089.58	-68.22	0.11	57333962.79	635286.89	S 38 31 56.384	E 148 33 7.698
2280.40	61.22	354.95	1685.59	1117.04	1114.89	-70.49	0.42	57333988.10	635284.62	S 38 31 55.564	E 148 33 7.587
2310.84	61.40	354.79	1700.20	1143.74	1141.49	-72.88	0.22	5734014.69	635282.23	S 38 31 54.703	E 148 33 7.470
2341.94	60.86	354.75	1715.21	1170.97	1168.61	-75.36	0.52	5734041.81	635279.75	S 38 31 53.825	E 148 33 7.349
2367.51	59.72	355.02	1727.89	1193.18	1190.73	-77.34	1.37	5734063.92	635277.77	S 38 31 53.109	E 148 33 7.251
2398.31	58.68	354.68	1743.66	1219.63	1217.08	-79.72	1.05	5734090.27	635275.39	S 38 31 52.256	E 148 33 7.135
2426.78	58.62	354.84	1758.47	1243.94	1241.29	-81.94	0.16	5734114.47	635273.17	S 38 31 51.472	E 148 33 7.026
2455.75	59.57	355.47	1773.35	1268.79	1266.06	-84.04	1.13	5734139.24	635271.08	S 38 31 50.670	E 148 33 6.922
2481.11	59.91	355.22	1786.13	1290.70	1287.89	-85.82	0.48	5734161.07	635269.30	S 38 31 49.963	E 148 33 6.834
2511.84	59.71	355.38	1801.58	1317.26	1314.36	-87.99	0.24	5734187.53	635267.13	S 38 31 49.106	E 148 33 6.726
2540.56	59.56	355.64	1816.10	1342.04	1339.07	-89.93	0.28	5734212.24	635265.19	S 38 31 48.306	E 148 33 6.628
2569.31	59.42	355.58	1830.70	1366.81	1363.76	-91.83	0.16	5734236.92	635263.29	S 38 31 47.506	E 148 33 6.533
2597.51	58.88	355.83	1845.16	1391.02	1387.90	-93.64	0.62	5734261.06	635261.48	S 38 31 46.724	E 148 33 6.441
2629.14	58.39	355.75	1861.62	1418.03	1414.84	-95.62	0.47	5734287.99	635259.50	S 38 31 45.852	E 148 33 6.341

2658.37	58.13	356.10	1877.00	1442.88	1439.64	-97.39	0.41	5734312.79	635257.73	S 38 31 45.049	E 148 33 6.250
2687.52	58.15	356.31	1892.38	1467.64	1464.34	-99.03	0.18	5734337.49	635256.09	S 38 31 44.249	E 148 33 6.165
2718.09	58.14	355.76	1908.52	1493.61	1490.24	-100.82	0.46	5734363.38	635254.30	S 38 31 43.410	E 148 33 6.074
2743.91	58.00	356.38	1922.17	1515.52	1512.10	-102.33	0.63	5734385.24	635252.79	S 38 31 42.702	E 148 33 5.996
2773.53	58.44	354.90	1937.77	1540.70	1537.21	-104.24	1.35	5734410.34	635250.88	S 38 31 41.888	E 148 33 5.900
2802.50	59.04	354.59	1952.81	1565.46	1561.87	-106.51	0.68	5734435.00	635248.61	S 38 31 41.090	E 148 33 5.789
2833.23	58.77	354.86	1968.68	1591.77	1588.07	-108.93	0.35	5734461.19	635246.19	S 38 31 40.242	E 148 33 5.671
2858.12	59.17	354.91	1981.51	1613.10	1609.32	-110.83	0.48	5734482.44	635244.29	S 38 31 39.554	E 148 33 5.577
2887.62	59.34	354.83	1996.59	1638.45	1634.57	-113.10	0.19	5734507.69	635242.02	S 38 31 38.736	E 148 33 5.466
2917.72	59.57	354.62	2011.89	1664.37	1660.38	-115.48	0.29	5734533.49	635239.64	S 38 31 37.901	E 148 33 5.350
2946.84	59.68	354.74	2026.61	1689.48	1685.40	-117.81	0.16	5734558.51	635237.31	S 38 31 37.091	E 148 33 5.236
2975.99	59.88	354.77	2041.28	1714.67	1710.48	-120.11	0.21	5734583.58	635235.01	S 38 31 36.279	E 148 33 5.124
3006.75	59.95	355.16	2056.70	1741.28	1736.99	-122.45	0.34	5734610.09	635232.67	S 38 31 35.420	E 148 33 5.009
3035.02	59.77	354.92	2070.90	1765.73	1761.35	-124.56	0.29	5734634.44	635230.56	S 38 31 34.632	E 148 33 4.905
3063.76	59.98	355.23	2085.32	1790.59	1786.11	-126.70	0.36	5734659.20	635228.42	S 38 31 33.830	E 148 33 4.799
3092.62	59.70	355.52	2099.82	1815.54	1810.99	-128.71	0.39	5734684.07	635226.41	S 38 31 33.024	E 148 33 4.699
3121.60	59.72	355.38	2114.44	1840.56	1835.93	-130.69	0.13	5734709.01	635224.43	S 38 31 32.217	E 148 33 4.600
3151.49	59.46	355.62	2129.57	1866.34	1861.63	-132.72	0.33	5734734.71	635222.40	S 38 31 31.384	E 148 33 4.498
3179.29	59.46	355.20	2143.69	1890.28	1885.50	-134.63	0.39	5734758.57	635220.49	S 38 31 30.612	E 148 33 4.403
3207.72	59.93	353.69	2158.04	1914.82	1909.92	-137.01	1.46	5734782.99	635218.11	S 38 31 29.821	E 148 33 4.287
3235.57	59.64	353.88	2172.06	1938.87	1933.85	-139.61	0.36	5734806.91	635215.51	S 38 31 29.046	E 148 33 4.163
3266.39	59.34	354.09	2187.70	1965.41	1960.26	-142.40	0.34	5734833.32	635212.73	S 38 31 28.192	E 148 33 4.030
3296.82	59.00	354.34	2203.30	1991.54	1986.25	-145.03	0.40	5734859.30	635210.10	S 38 31 27.350	E 148 33 3.903
3325.72	59.05	354.56	2218.17	2016.31	2010.92	-147.43	0.20	5734883.97	635207.70	S 38 31 26.552	E 148 33 3.787
3354.64	58.78	354.17	2233.10	2041.07	2035.56	-149.86	0.45	5734908.61	635205.27	S 38 31 25.754	E 148 33 3.670
3380.91	58.66	354.44	2246.74	2063.51	2057.90	-152.09	0.30	5734930.94	635203.04	S 38 31 25.031	E 148 33 3.562
3413.02	57.98	354.59	2263.61	2090.83	2085.10	-154.70	0.65	5734958.14	635200.43	S 38 31 24.150	E 148 33 3.435
3423.01	57.87	354.76	2268.91	2099.30	2093.53	-155.48	0.54	5734966.57	635199.65	S 38 31 23.877	E 148 33 3.397
3440.37	58.13	354.77	2278.11	2114.02	2108.19	-156.83	0.45	5734981.22	635198.30	S 38 31 23.403	E 148 33 3.331
3469.22	58.53	354.43	2293.26	2138.57	2132.64	-159.14	0.51	5735005.67	635195.99	S 38 31 22.611	E 148 33 3.219
3498.05	58.98	353.92	2308.21	2163.21	2157.16	-161.64	0.65	5735030.18	635193.49	S 38 31 21.817	E 148 33 3.099
3526.68	59.44	353.82	2322.87	2187.79	2181.61	-164.27	0.49	5735054.63	635190.86	S 38 31 21.026	E 148 33 2.973
3557.62	59.86	353.40	2338.50	2214.47	2208.15	-167.24	0.54	5735081.17	635187.89	S 38 31 20.167	E 148 33 2.832
3586.46	60.43	353.31	2352.86	2239.46	2232.99	-170.13	0.60	5735106.00	635185.00	S 38 31 19.363	E 148 33 2.695
3614.50	60.59	353.98	2366.66	2263.85	2257.25	-172.83	0.65	5735130.26	635182.30	S 38 31 18.578	E 148 33 2.567
3643.60	59.87	353.97	2381.11	2289.10	2282.37	-175.49	0.74	5735155.37	635179.64	S 38 31 17.765	E 148 33 2.440

3649.14	60.13	353.79	2383.88	2293.90	2287.14	-176.00	1.64	5735160.14	635179.13	S 38 31 17.611	E 148 33 2.416
3672.54	60.63	353.44	2395.45	2314.22	2307.35	-178.26	0.75	5735180.35	635176.87	S 38 31 16.957	E 148 33 2.308
3692.54	60.57	354.11	2405.26	2331.64	2324.67	-180.15	0.88	5735197.67	635174.98	S 38 31 16.396	E 148 33 2.218
3700.54	60.62	354.07	2409.19	2338.60	2331.61	-180.87	0.23	5735204.60	635174.26	S 38 31 16.171	E 148 33 2.184
3719.65	61.09	354.05	2418.50	2355.29	2348.21	-182.59	0.74	5735221.20	635172.54	S 38 31 15.634	E 148 33 2.101
3728.96	60.81	354.10	2423.02	2363.42	2356.30	-183.43	0.91	5735229.29	635171.70	S 38 31 15.372	E 148 33 2.061
3756.08	59.63	354.26	2436.49	2386.95	2379.72	-185.82	1.31	5735252.71	635169.31	S 38 31 14.614	E 148 33 1.946
3765.73	59.60	354.22	2441.37	2395.28	2388.00	-186.66	0.14	5735260.98	635168.47	S 38 31 14.346	E 148 33 1.905
3768.39	59.56	354.22	2442.72	2397.57	2390.28	-186.89	0.45	5735263.26	635168.24	S 38 31 14.272	E 148 33 1.894
3775.11	59.08	353.63	2446.15	2403.35	2396.03	-187.50	3.12	5735269.01	635167.63	S 38 31 14.086	E 148 33 1.865
3786.27	58.44	353.53	2451.93	2412.88	2405.51	-188.57	1.74	5735278.49	635166.56	S 38 31 13.779	E 148 33 1.814
3799.87	57.94	352.08	2459.10	2424.42	2416.98	-190.01	2.93	5735289.96	635165.12	S 38 31 13.408	E 148 33 1.747
3810.10	57.74	350.23	2464.55	2433.06	2425.54	-191.34	4.63	5735298.52	635163.79	S 38 31 13.131	E 148 33 1.686
3866.55	57.81	347.93	2494.65	2480.49	2472.42	-200.39	1.03	5735345.39	635154.75	S 38 31 11.616	E 148 33 1.280
3903.92	58.44	347.96	2514.39	2511.93	2503.46	-207.02	0.51	5735376.42	635148.12	S 38 31 10.613	E 148 33 0.985
3934.85	58.21	349.26	2530.63	2538.05	2529.26	-212.22	1.10	5735402.22	635142.92	S 38 31 9.779	E 148 33 0.752
3963.27	57.60	351.79	2545.73	2562.03	2553.00	-216.18	2.35	5735425.96	635138.96	S 38 31 9.012	E 148 33 0.572
3990.63	57.99	352.27	2560.31	2585.13	2575.93	-219.39	0.62	5735448.88	635135.75	S 38 31 8.270	E 148 33 0.424
4020.51	58.37	352.98	2576.07	2610.48	2601.11	-222.65	0.72	5735474.06	635132.49	S 38 31 7.455	E 148 33 0.272
4049.81	58.49	352.90	2591.41	2635.42	2625.88	-225.72	0.14	5735498.82	635129.42	S 38 31 6.654	E 148 33 0.128
4078.87	58.58	353.21	2606.57	2660.18	2650.49	-228.72	0.29	5735523.43	635126.42	S 38 31 5.857	E 148 32 59.987
4108.46	58.46	353.62	2622.03	2685.39	2675.56	-231.61	0.37	5735548.49	635123.53	S 38 31 5.046	E 148 32 59.850
4134.49	58.73	353.45	2635.59	2707.59	2697.63	-234.11	0.35	5735570.56	635121.03	S 38 31 4.332	E 148 32 59.732
4162.49	59.07	353.72	2650.05	2731.55	2721.46	-236.79	0.44	5735594.39	635118.35	S 38 31 3.561	E 148 32 59.604
4191.66	59.77	354.86	2664.89	2756.66	2746.45	-239.29	1.24	5735619.37	635115.85	S 38 31 2.752	E 148 32 59.484
4220.96	59.87	354.67	2679.62	2781.98	2771.67	-241.60	0.20	5735644.59	635113.54	S 38 31 1.935	E 148 32 59.371
4250.49	59.96	354.62	2694.43	2807.53	2797.11	-243.98	0.10	5735670.02	635111.16	S 38 31 1.112	E 148 32 59.255
4280.76	60.10	354.45	2709.55	2833.75	2823.21	-246.48	0.20	5735696.12	635108.66	S 38 31 0.267	E 148 32 59.134
4310.18	60.63	355.88	2724.09	2859.32	2848.69	-248.63	1.38	5735721.59	635106.51	S 38 30 59.442	E 148 32 59.027
4339.21	60.72	355.65	2738.31	2884.62	2873.93	-250.50	0.23	5735746.83	635104.64	S 38 30 58.624	E 148 32 58.932
4368.56	60.96	355.49	2752.61	2910.26	2899.49	-252.48	0.28	5735772.38	635102.66	S 38 30 57.796	E 148 32 58.833
4378.54	61.02	355.77	2757.45	2918.98	2908.19	-253.15	0.76	5735781.08	635101.99	S 38 30 57.515	E 148 32 58.799
4407.69	60.87	355.82	2771.61	2944.46	2933.60	-255.02	0.16	5735806.49	635100.12	S 38 30 56.692	E 148 32 58.704
4436.98	60.55	355.85	2785.94	2970.01	2959.08	-256.87	0.33	5735831.96	635098.28	S 38 30 55.867	E 148 32 58.610
4467.11	60.10	356.04	2800.86	2996.19	2985.19	-258.72	0.48	5735858.07	635096.43	S 38 30 55.021	E 148 32 58.516
4495.88	59.62	356.20	2815.30	3021.07	3010.02	-260.41	0.52	5735882.90	635094.74	S 38 30 54.217	E 148 32 58.429

4523.91	59.15	356.39	2829.58	3045.19	3034.09	-261.97	0.53	5735906.96	635093.18	S 38 30 53.437	E 148 32 58.348
4553.13	58.55	356.63	2844.69	3070.19	3059.05	-263.49	0.65	5735931.92	635091.66	S 38 30 52.629	E 148 32 58.268
4583.31	58.09	356.50	2860.54	3095.87	3084.68	-265.03	0.47	5735957.54	635090.12	S 38 30 51.798	E 148 32 58.186
4611.60	57.67	356.79	2875.58	3119.83	3108.60	-266.43	0.52	5735981.46	635088.72	S 38 30 51.023	E 148 32 58.112
4641.09	57.14	356.87	2891.47	3144.67	3133.41	-267.80	0.54	5736006.26	635087.35	S 38 30 50.220	E 148 32 58.038
4670.25	56.46	356.84	2907.44	3169.07	3157.77	-269.14	0.70	5736030.62	635086.01	S 38 30 49.431	E 148 32 57.966
4678.23	56.34	356.97	2911.85	3175.71	3164.41	-269.50	0.61	5736037.26	635085.65	S 38 30 49.215	E 148 32 57.946
4695.00	56.10	357.00	2921.18	3189.65	3178.33	-270.23	0.43	5736051.18	635084.92	S 38 30 48.764	E 148 32 57.907

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B. RAW NAVIGATION DATA
AND TRANSIT TIMES

B. Raw navigation data and transit times

Raw navigation data and transit times for Run-1 at Blackback A1 ST-1

TRACE NUMBER	SOURCE POSITION_X (m)	SOURCE POSITION_Y (m)	MEASURED DEPTH (m)	TRANSIT_TIME SENSOR (s)	TRANSIT_TIME GEOPHONE (s)	TRANSIT TIME (s)
0	635347.0	5733157.0	421.0	0.0170	0.0170	0.0000
1	635347.0	5733150.0	421.0	0.0273	0.0273	0.0000
2	635350.0	5733157.0	421.0	0.0518	0.3693	0.3174
3	635349.0	5733153.5	421.0	0.0518	0.3682	0.3164
4	0.0	0.0	421.0	0.0574	0.3686	0.3112
5	0.0	0.0	421.0	0.0000	0.0000	0.0000
6	635347.0	5733159.0	421.0	0.0575	0.3703	0.3129
7	635346.0	5733153.5	421.0	0.0000	0.0000	0.0000
8	635349.0	5733151.0	421.0	0.0574	0.3676	0.3102
9	635353.0	5733161.0	421.0	0.0000	0.0000	0.0000
10	635352.0	5733155.0	421.0	0.0566	0.3361	0.2795
11	635341.0	5733157.0	1312.0	0.0565	0.6412	0.5847
12	635346.0	5733151.0	1312.0	0.0574	0.6421	0.5847
13	635355.0	5733157.0	1312.0	0.0566	0.6411	0.5845
14	635348.0	5733155.5	1320.0	0.0572	0.6444	0.5872
15	635350.0	5733155.0	1320.0	0.0566	0.6437	0.5871
16	635351.0	5733155.0	1320.0	0.0573	0.6442	0.5870
17	635351.0	5733159.0	1320.0	0.0573	0.6440	0.5866
18	635345.0	5733160.0	1320.0	0.0566	0.6434	0.5868
19	635353.0	5733179.0	1350.0	0.0573	0.6501	0.5929
20	635347.0	5733188.0	1350.0	0.0573	0.6493	0.5921
21	635342.0	5733185.0	1350.0	0.0573	0.6500	0.5927
22	635347.0	5733180.0	1350.0	0.0573	0.6496	0.5923
23	635353.0	5733182.0	1350.0	0.0573	0.6499	0.5926
24	635351.0	5733207.0	1380.0	0.0573	0.6551	0.5979
25	635349.0	5733209.0	1380.0	0.0572	0.6551	0.5978
26	635344.0	5733211.0	1380.0	0.0565	0.6543	0.5978
27	635340.0	5733210.0	1380.0	0.0574	0.6554	0.5980
28	635342.0	5733207.0	1380.0	0.0573	0.6551	0.5978
29	635345.0	5733229.0	1410.0	0.0565	0.6602	0.6037
30	635343.0	5733230.5	1410.0	0.0574	0.6604	0.6030
31	635344.0	5733237.0	1410.0	0.0573	0.6606	0.6033
32	635346.0	5733235.0	1410.0	0.0574	0.6606	0.6032
33	635348.0	5733232.0	1410.0	0.0575	0.6608	0.6033
34	635341.0	5733258.5	1440.0	0.0572	0.6650	0.6078
35	635342.0	5733263.0	1440.0	0.0566	0.6648	0.6082
36	635342.0	5733263.0	1440.0	0.0574	0.6654	0.6080
37	635346.0	5733256.5	1440.0	0.0573	0.6652	0.6079
38	635344.0	5733258.0	1440.0	0.0573	0.6650	0.6077
39	635341.0	5733291.0	1470.0	0.0572	0.6707	0.6134
40	635339.0	5733289.0	1470.0	0.0565	0.6699	0.6134
41	635341.0	5733286.0	1470.0	0.0573	0.6702	0.6129
42	635343.0	5733283.5	1470.0	0.0565	0.6697	0.6133
43	635344.0	5733287.0	1470.0	0.0573	0.6702	0.6129

44	635338.0	5733312.0	1500.0	0.0565	0.6756	0.6192
45	635339.0	5733315.0	1500.0	0.0573	0.6756	0.6183
46	635342.0	5733314.0	1500.0	0.0572	0.6757	0.6184
47	635340.0	5733311.0	1500.0	0.0565	0.6751	0.6185
48	635342.0	5733311.0	1500.0	0.0574	0.6760	0.6186
49	635336.0	5733339.0	1530.0	0.0563	0.6802	0.6239
50	635335.0	5733341.0	1530.0	0.0565	0.6804	0.6239
51	635335.0	5733340.0	1530.0	0.0573	0.6810	0.6237
52	635338.0	5733338.0	1530.0	0.0566	0.6799	0.6233
53	635336.0	5733336.0	1530.0	0.0566	0.6803	0.6238
54	635337.0	5733364.0	1560.0	0.0565	0.6854	0.6289
55	635335.0	5733366.0	1560.0	0.0566	0.6852	0.6286
56	635337.0	5733367.0	1560.0	0.0573	0.6859	0.6286
57	0.0	0.0	1560.0	0.0565	0.6851	0.6286
58	635337.0	5733365.0	1560.0	0.0574	0.6860	0.6286
59	635330.0	5733391.0	1590.0	0.0564	0.6898	0.6334
60	635331.0	5733391.0	1590.0	0.0573	0.6907	0.6334
61	635335.0	5733392.0	1590.0	0.0574	0.6904	0.6331
62	635333.0	5733395.5	1590.0	0.0565	0.6898	0.6333
63	635336.0	5733389.0	1590.0	0.0572	0.6903	0.6330
64	635332.0	5733428.0	1620.0	0.0571	0.6957	0.6386
65	635333.0	5733422.0	1620.0	0.0565	0.6954	0.6389
66	635333.0	5733418.0	1620.0	0.0572	0.6960	0.6388
67	635331.0	5733415.0	1620.0	0.0573	0.6952	0.6378
68	635329.0	5733416.0	1620.0	0.0573	0.6953	0.6380
69	635332.0	5733433.0	1650.0	0.0572	0.7010	0.6438
70	635329.0	5733442.0	1650.0	0.0565	0.7003	0.6438
71	635328.0	5733445.5	1650.0	0.0573	0.7009	0.6436
72	635330.0	5733441.0	1650.0	0.0566	0.7005	0.6440
73	635329.0	5733438.0	1650.0	0.0566	0.7004	0.6438
74	635329.0	5733471.0	1680.0	0.0564	0.7061	0.6497
75	635323.0	5733472.5	1680.0	0.0566	0.7060	0.6494
76	635322.0	5733471.0	1680.0	0.0565	0.7065	0.6500
77	635325.0	5733466.0	1680.0	0.0565	0.7065	0.6500
78	635329.0	5733464.0	1680.0	0.0572	0.7067	0.6495
79	635323.0	5733491.0	1710.0	0.0573	0.7125	0.6553
80	635322.0	5733497.0	1710.0	0.0574	0.7122	0.6548
81	635320.0	5733500.0	1710.0	0.0573	0.7123	0.6550
82	635322.0	5733501.0	1710.0	0.0574	0.7122	0.6548
83	635326.0	5733491.0	1710.0	0.0565	0.7118	0.6553
84	635323.0	5733492.0	1710.0	0.0574	0.7120	0.6547
85	635325.0	5733522.5	1740.0	0.0564	0.7168	0.6604
86	635323.0	5733522.5	1740.0	0.0574	0.7178	0.6604
87	635320.0	5733521.0	1740.0	0.0572	0.7174	0.6602
88	635318.0	5733527.0	1740.0	0.0574	0.7177	0.6603
89	0.0	0.0	1740.0	0.0564	0.7166	0.6602
90	635322.0	5733524.0	1740.0	0.0574	0.7180	0.6607
91	635321.0	5733527.0	1740.0	0.0574	0.7178	0.6604
92	635327.0	5733557.0	1770.0	0.0564	0.7225	0.6662

93	635318.0	5733550.5	1770.0	0.0564	0.7221	0.6657
94	635316.0	5733550.0	1770.0	0.0565	0.7224	0.6659
95	635320.0	5733548.5	1770.0	0.0572	0.7230	0.6658
96	635320.0	5733549.0	1770.0	0.0573	0.7230	0.6657
97	635318.0	5733552.0	1770.0	0.0565	0.7219	0.6654
98	635314.0	5733577.0	1800.0	0.0571	0.7281	0.6710
99	635317.0	5733577.0	1800.0	0.0567	0.7281	0.6714
100	635317.0	5733572.0	1800.0	0.0572	0.7278	0.6705
101	635313.0	5733578.0	1800.0	0.0573	0.7282	0.6709
102	635315.0	5733567.0	1800.0	0.0571	0.7282	0.6711
103	635315.0	5733577.0	1800.0	0.0565	0.7273	0.6708
104	635314.0	5733575.5	1800.0	0.0565	0.7270	0.6705
105	635314.0	5733605.0	1830.0	0.0564	0.7328	0.6764
106	635313.0	5733605.0	1830.0	0.0566	0.7330	0.6764
107	635314.0	5733602.0	1830.0	0.0573	0.7333	0.6761
108	635316.0	5733596.0	1830.0	0.0572	0.7329	0.6757
109	635311.0	5733597.0	1830.0	0.0565	0.7326	0.6761
110	635310.0	5733631.0	1860.0	0.0565	0.7388	0.6822
111	635309.0	5733635.0	1860.0	0.0573	0.7390	0.6817
112	635308.0	5733624.0	1860.0	0.0564	0.7385	0.6820
113	635311.0	5733624.0	1860.0	0.0573	0.7387	0.6815
114	635314.0	5733627.0	1860.0	0.0565	0.7382	0.6816
115	635315.0	5733630.0	1860.0	0.0565	0.7379	0.6813
116	635313.0	5733627.0	1860.0	0.0574	0.7389	0.6815
117	635313.0	5733663.0	1890.0	0.0572	0.7450	0.6878
118	635315.0	5733659.0	1890.0	0.0564	0.7439	0.6874
119	635317.0	5733654.0	1890.0	0.0566	0.7439	0.6873
120	635316.0	5733650.5	1890.0	0.0565	0.7437	0.6872
121	635310.0	5733655.0	1890.0	0.0565	0.7440	0.6875
122	635315.0	5733668.0	1912.0	0.0573	0.7490	0.6916
123	635312.0	5733662.5	1912.0	0.0574	0.7489	0.6915
124	635321.0	5733664.5	1912.0	0.0565	0.7480	0.6915
125	635314.0	5733679.0	1912.0	0.0573	0.7494	0.6922
126	635309.0	5733694.0	1912.0	0.0564	0.7486	0.6922

Raw navigation data and transit times for Run-2 at Blackback A1 ST-1

TRACE NUMBER	SOURCE POSITION_X (m)	SOURCE POSITION_Y (m)	MEASURED DEPTH (m)	TRANSIT_TIME SENSOR (s)	TRANSIT_TIME INITIAL (s)	TRANSIT TIME (s)
0	635232.0	5734740.0	3144.5	0.0581	0.9528	0.8947
1	635214.0	5734729.0	3144.5	0.0566	0.9516	0.8950
2	635215.0	5734733.0	3144.5	0.0575	0.9516	0.8941
3	635228.0	5734737.0	3144.5	0.0572	0.9518	0.8945
4	635230.0	5734740.0	3144.5	0.0575	0.9527	0.8953
5	635232.0	5734742.0	3144.5	0.0572	0.9513	0.8941
6	635232.0	5734742.0	3144.5	0.0565	0.9528	0.8963
7	635232.0	5734740.0	3150.0	0.0581	0.9538	0.8956
8	635214.0	5734729.0	3150.0	0.0566	0.9523	0.8958
9	635215.0	5734733.0	3150.0	0.0575	0.9522	0.8947
10	635228.0	5734737.0	3150.0	0.0572	0.9526	0.8954
11	635230.0	5734740.0	3150.0	0.0575	0.9525	0.8951
12	635232.0	5734742.0	3150.0	0.0572	0.9535	0.8963
13	635232.0	5734742.0	3150.0	0.0565	0.9521	0.8956
14	635222.0	5734815.0	3234.5	0.0571	0.9647	0.9076
15	635220.0	5734813.0	3234.5	0.0576	0.9643	0.9066
16	635224.0	5734814.0	3234.5	0.0567	0.9638	0.9071
17	635222.0	5734809.0	3234.5	0.0576	0.9660	0.9085
18	635221.0	5734807.5	3234.5	0.0566	0.9647	0.9082
19	635217.0	5734806.0	3234.5	0.0566	0.9645	0.9078
20	635220.0	5734807.5	3234.5	0.0571	0.9647	0.9076
21	635222.0	5734815.0	3240.0	0.0571	0.9658	0.9087
22	635220.0	5734813.0	3240.0	0.0576	0.9658	0.9082
23	635224.0	5734814.0	3240.0	0.0567	0.9649	0.9083
24	635222.0	5734809.0	3240.0	0.0576	0.9667	0.9092
25	635221.0	5734807.5	3240.0	0.0566	0.9656	0.9091
26	635217.0	5734806.0	3240.0	0.0566	0.9652	0.9086
27	635220.0	5734807.5	3240.0	0.0571	0.9657	0.9086
28	635202.0	5734885.0	3324.5	0.0574	0.9802	0.9228
29	635199.0	5734895.0	3324.5	0.0574	0.9784	0.9210
30	635197.0	5734901.0	3324.5	0.0566	0.9784	0.9218
31	635193.0	5734906.0	3324.5	0.0000	0.9773	0.9773
32	635197.0	5734910.0	3324.5	0.0000	0.9773	0.9773
33	635209.0	5734906.0	3324.5	0.0000	0.9790	0.9790
34	635202.0	5734885.0	3330.0	0.0574	0.5401	0.4826
35	635199.0	5734895.0	3330.0	0.0574	0.9788	0.9214
36	635197.0	5734901.0	3330.0	0.0566	0.4364	0.3798
37	635193.0	5734906.0	3330.0	0.0000	0.0000	0.0000
38	635197.0	5734910.0	3330.0	0.0000	0.0000	0.0000
39	635209.0	5734906.0	3330.0	0.0000	0.0000	0.0000
40	635206.0	5734921.0	3354.5	0.0000	0.9832	0.9832
41	635203.0	5734916.0	3354.5	0.0000	0.9813	0.9813
42	635200.0	5734913.0	3354.5	0.0574	0.0000	-0.0574
43	635194.0	5734923.0	3354.5	0.0575	0.9851	0.9276

44	635203.0	5734929.0	3354.5	0.0565	0.9817	0.9252
45	635210.0	5734930.5	3354.5	0.0000	0.9828	0.9828
46	635206.0	5734921.0	3360.0	0.0000	0.0000	0.0000
47	635203.0	5734916.0	3360.0	0.0000	0.0000	0.0000
48	635200.0	5734913.0	3360.0	0.0574	0.9843	0.9269
49	635194.0	5734923.0	3360.0	0.0575	0.4105	0.3530
50	635203.0	5734929.0	3360.0	0.0565	0.6587	0.6022
51	635210.0	5734930.5	3360.0	0.0000	0.0000	0.0000
52	635206.0	5734943.0	3384.5	0.0575	0.9877	0.9302
53	635202.0	5734944.5	3384.5	0.0572	0.9862	0.9290
54	635200.0	5734944.5	3384.5	0.0575	0.9873	0.9298
55	635198.0	5734945.0	3384.5	0.0574	0.9864	0.9289
56	635198.0	5734944.5	3384.5	0.0574	0.9865	0.9291
57	0.0	0.0	3384.5	0.0566	0.9856	0.9290
58	635208.0	5734946.5	3384.5	0.0574	0.9867	0.9293
59	635206.0	5734943.0	3390.0	0.0575	0.9887	0.9312
60	635202.0	5734944.5	3390.0	0.0572	0.9875	0.9303
61	635200.0	5734944.5	3390.0	0.0575	0.9882	0.9306
62	635198.0	5734945.0	3390.0	0.0574	0.9876	0.9302
63	635198.0	5734944.5	3390.0	0.0574	0.9874	0.9299
64	0.0	0.0	3390.0	0.0566	0.9866	0.9301
65	635208.0	5734946.5	3390.0	0.0574	0.9877	0.9302
66	635214.0	5734968.0	3414.4	0.0575	0.9921	0.9346
67	635220.0	5734965.0	3414.4	0.0566	0.9913	0.9347
68	635212.0	5734966.0	3414.4	0.0574	0.9918	0.9344
69	635206.0	5734967.0	3414.4	0.0575	0.9913	0.9338
70	635201.0	5734969.5	3414.4	0.0574	0.9917	0.9343
71	635200.0	5734971.0	3414.4	0.0575	0.9912	0.9337
72	635200.0	5734974.0	3414.4	0.0574	0.9917	0.9342
73	635214.0	5734968.0	3420.0	0.0575	0.9930	0.9355
74	635220.0	5734965.0	3420.0	0.0566	0.9929	0.9363
75	635212.0	5734966.0	3420.0	0.0574	0.9930	0.9356
76	635206.0	5734967.0	3420.0	0.0575	0.9928	0.9353
77	635201.0	5734969.5	3420.0	0.0574	0.9926	0.9352
78	635200.0	5734971.0	3420.0	0.0575	0.9924	0.9349
79	635200.0	5734974.0	3420.0	0.0574	0.9922	0.9348
80	635197.0	5734993.0	3444.5	0.0572	0.9965	0.9393
81	635195.0	5734993.0	3444.5	0.0575	0.9972	0.9397
82	635197.0	5734994.5	3444.5	0.0567	0.9962	0.9395
83	635199.0	5734994.5	3444.5	0.0576	0.9968	0.9392
84	635202.0	5734993.0	3444.5	0.0566	0.9956	0.9390
85	635205.0	5734994.5	3444.5	0.0574	0.9966	0.9392
86	635208.0	5734996.5	3444.5	0.0566	0.9961	0.9395
87	635197.0	5734993.0	3450.0	0.0572	0.9973	0.9401
88	635195.0	5734993.0	3450.0	0.0575	0.9983	0.9408
89	635197.0	5734994.5	3450.0	0.0567	0.9973	0.9406
90	635199.0	5734994.5	3450.0	0.0576	0.9977	0.9401
91	635202.0	5734993.0	3450.0	0.0566	0.9962	0.9395
92	635205.0	5734994.5	3450.0	0.0574	0.9977	0.9403

93	635208.0	5734996.5	3450.0	0.0566	0.9971	0.9405
94	635200.0	5735020.0	3474.5	0.0572	1.0021	0.9449
95	635203.0	5735021.0	3474.5	0.0566	1.0017	0.9451
96	635202.0	5735019.5	3474.5	0.0566	1.0016	0.9450
97	635198.0	5735017.0	3474.5	0.0566	1.0011	0.9445
98	635199.0	5735016.0	3474.5	0.0574	1.0020	0.9446
99	635199.0	5735017.0	3474.5	0.0567	1.0011	0.9445
100	635198.0	5735019.5	3474.5	0.0574	1.0015	0.9441
101	635200.0	5735020.0	3480.0	0.0572	1.0029	0.9457
102	635203.0	5735021.0	3480.0	0.0566	1.0026	0.9460
103	635202.0	5735019.5	3480.0	0.0566	1.0026	0.9459
104	635198.0	5735017.0	3480.0	0.0566	1.0021	0.9456
105	635199.0	5735016.0	3480.0	0.0574	1.0031	0.9457
106	635199.0	5735017.0	3480.0	0.0567	1.0020	0.9453
107	635198.0	5735019.5	3480.0	0.0574	1.0024	0.9450
108	635188.0	5735042.0	3504.5	0.0000	0.0000	0.0000
109	635186.0	5735040.0	3504.5	0.0566	1.0066	0.9500
110	635194.0	5735038.0	3504.5	0.0574	1.0074	0.9499
111	635196.0	5735042.0	3504.5	0.0567	1.0070	0.9504
112	635198.0	5735043.0	3504.5	0.0574	1.0072	0.9498
113	0.0	0.0	3504.5	0.0575	1.0071	0.9496
114	635195.0	5735043.0	3504.5	0.0575	1.0074	0.9498
115	635194.0	5735044.5	3504.5	0.0567	1.0072	0.9505
116	635188.0	5735042.0	3510.0	0.0000	0.0000	0.0000
117	635186.0	5735040.0	3510.0	0.0566	1.0075	0.9509
118	635194.0	5735038.0	3510.0	0.0574	1.0082	0.9508
119	635196.0	5735042.0	3510.0	0.0567	1.0078	0.9512
120	635198.0	5735043.0	3510.0	0.0574	1.0081	0.9507
121	0.0	0.0	3510.0	0.0575	1.0079	0.9505
122	635195.0	5735043.0	3510.0	0.0575	1.0082	0.9507
123	635194.0	5735044.5	3510.0	0.0567	1.0080	0.9514
124	635188.0	5735070.0	3534.5	0.0575	1.0122	0.9547
125	635189.0	5735063.0	3534.5	0.0624	1.0127	0.9503
126	635189.0	5735066.0	3534.5	0.0575	1.0124	0.9549
127	635183.0	5735074.0	3534.5	0.0575	1.0121	0.9546
128	635200.0	5735063.0	3534.5	0.0575	1.0124	0.9548
129	635200.0	5735064.0	3534.5	0.0583	1.0128	0.9545
130	635200.0	5735072.5	3534.5	0.0572	1.0115	0.9542
131	635182.0	5735078.0	3534.5	0.0574	1.0118	0.9543
132	635188.0	5735070.0	3540.0	0.0575	1.0131	0.9556
133	635189.0	5735063.0	3540.0	0.0624	1.0137	0.9513
134	635189.0	5735066.0	3540.0	0.0575	1.0134	0.9560
135	635183.0	5735074.0	3540.0	0.0575	1.0130	0.9556
136	635200.0	5735063.0	3540.0	0.0575	1.0133	0.9558
137	635200.0	5735064.0	3540.0	0.0583	1.0137	0.9555
138	635200.0	5735072.5	3540.0	0.0572	1.0125	0.9553
139	635182.0	5735078.0	3540.0	0.0574	1.0128	0.9554
140	635183.0	5735094.0	3564.5	0.0574	1.0154	0.9581
141	635196.0	5735093.0	3564.5	0.0576	1.0157	0.9581

142	635195.0	5735091.0	3564.5	0.0575	1.0156	0.9581
143	635192.0	5735092.0	3564.5	0.0566	1.0149	0.9582
144	635186.0	5735090.0	3564.5	0.0574	1.0156	0.9582
145	635186.0	5735090.0	3564.5	0.0626	1.0153	0.9527
146	635187.0	5735093.0	3564.5	0.0576	1.0153	0.9578
147	635198.0	5735096.0	3564.5	0.0574	1.0157	0.9583
148	635183.0	5735094.0	3570.0	0.0574	1.0164	0.9590
149	635196.0	5735093.0	3570.0	0.0576	1.0165	0.9588
150	635195.0	5735091.0	3570.0	0.0575	1.0164	0.9589
151	635192.0	5735092.0	3570.0	0.0566	1.0156	0.9589
152	635186.0	5735090.0	3570.0	0.0574	1.0165	0.9590
153	635186.0	5735090.0	3570.0	0.0626	1.0163	0.9537
154	635187.0	5735093.0	3570.0	0.0576	1.0163	0.9588
155	635198.0	5735096.0	3570.0	0.0574	1.0165	0.9591
156	635181.0	5735115.0	3594.5	0.0574	1.0181	0.9606
157	635186.0	5735113.0	3594.5	0.0623	1.0179	0.9555
158	635188.0	5735116.0	3594.5	0.0575	1.0181	0.9606
159	635191.0	5735122.5	3594.5	0.0574	1.0178	0.9604
160	635183.0	5735117.0	3594.5	0.0574	1.0184	0.9610
161	635185.0	5735118.0	3594.5	0.0574	1.0179	0.9605
162	635186.0	5735119.0	3594.5	0.0573	1.0178	0.9604
163	635188.0	5735115.0	3594.5	0.0574	1.0180	0.9607
164	635181.0	5735115.0	3600.0	0.0574	1.0187	0.9612
165	635186.0	5735113.0	3600.0	0.0623	1.0185	0.9562
166	635188.0	5735116.0	3600.0	0.0575	1.0187	0.9612
167	635191.0	5735122.5	3600.0	0.0574	1.0185	0.9611
168	635183.0	5735117.0	3600.0	0.0574	1.0192	0.9618
169	635185.0	5735118.0	3600.0	0.0574	1.0187	0.9613
170	635186.0	5735119.0	3600.0	0.0573	1.0186	0.9612
171	635188.0	5735115.0	3600.0	0.0574	1.0188	0.9615
172	635177.0	5735146.0	3624.5	0.0574	1.0202	0.9628
173	635177.0	5735144.0	3624.5	0.0574	1.0203	0.9629
174	635179.0	5735142.0	3624.5	0.0566	1.0198	0.9632
175	635181.0	5735141.0	3624.5	0.0575	1.0200	0.9624
176	635181.0	5735142.0	3624.5	0.0567	1.0194	0.9628
177	635183.0	5735144.0	3624.5	0.0574	1.0205	0.9631
178	635185.0	5735144.0	3624.5	0.0566	1.0198	0.9632
179	635177.0	5735146.0	3630.0	0.0574	1.0210	0.9636
180	635177.0	5735144.0	3630.0	0.0574	1.0215	0.9641
181	635179.0	5735142.0	3630.0	0.0566	1.0208	0.9642
182	635181.0	5735141.0	3630.0	0.0575	1.0212	0.9637
183	635181.0	5735142.0	3630.0	0.0567	1.0203	0.9636
184	635183.0	5735144.0	3630.0	0.0574	1.0214	0.9640
185	635185.0	5735144.0	3630.0	0.0566	1.0207	0.9641
186	635183.0	5735173.0	3654.5	0.0565	1.0237	0.9673
187	635178.0	5735169.0	3654.5	0.0572	1.0234	0.9662
188	635173.0	5735163.5	3654.5	0.0573	1.0236	0.9663
189	635186.0	5735170.0	3654.5	0.0576	1.0249	0.9673
190	635184.0	5735176.0	3654.5	0.0573	1.0236	0.9663

191	635176.0	5735177.0	3654.5	0.0574	1.0237	0.9662
192	635168.0	5735167.0	3654.5	0.0575	1.0239	0.9665
193	635183.0	5735173.0	3660.0	0.0565	1.0244	0.9679
194	635178.0	5735169.0	3660.0	0.0572	1.0242	0.9670
195	635173.0	5735163.5	3660.0	0.0573	1.0245	0.9671
196	635186.0	5735170.0	3660.0	0.0576	1.0257	0.9682
197	635184.0	5735176.0	3660.0	0.0573	1.0244	0.9671
198	635176.0	5735177.0	3660.0	0.0574	1.0246	0.9671
199	635168.0	5735167.0	3660.0	0.0575	1.0247	0.9672
200	635177.0	5735197.5	3684.5	0.0566	1.0270	0.9705
201	635178.0	5735197.5	3684.5	0.0566	1.0268	0.9702
202	635179.0	5735198.0	3684.5	0.0573	1.0275	0.9702
203	635181.0	5735198.0	3684.5	0.0565	1.0270	0.9704
204	635181.0	5735198.0	3684.5	0.0566	1.0271	0.9705
205	635179.0	5735199.0	3684.5	0.0575	1.0276	0.9701
206	635179.0	5735196.0	3684.5	0.0574	1.0277	0.9703
207	635177.0	5735197.5	3690.0	0.0566	1.0280	0.9715
208	635178.0	5735197.5	3690.0	0.0566	1.0278	0.9712
209	635179.0	5735198.0	3690.0	0.0573	1.0286	0.9713
210	635181.0	5735198.0	3690.0	0.0565	1.0277	0.9712
211	635181.0	5735198.0	3690.0	0.0566	1.0282	0.9716
212	635179.0	5735199.0	3690.0	0.0575	1.0284	0.9710
213	635179.0	5735196.0	3690.0	0.0574	1.0285	0.9710
214	635174.0	5735226.0	3714.5	0.0575	1.0311	0.9737
215	635177.0	5735224.0	3714.5	0.0574	1.0310	0.9737
216	635179.0	5735223.0	3714.5	0.0575	1.0313	0.9738
217	635176.0	5735222.5	3714.5	0.0627	1.0307	0.9680
218	635171.0	5735224.5	3714.5	0.0575	1.0308	0.9733
219	635168.0	5735224.0	3714.5	0.0575	1.0312	0.9737
220	635169.0	5735222.5	3714.5	0.0574	1.0313	0.9740
221	635170.0	5735222.5	3714.5	0.0574	1.0311	0.9737
222	635174.0	5735226.0	3720.0	0.0575	1.0322	0.9748
223	635177.0	5735224.0	3720.0	0.0574	1.0322	0.9748
224	635179.0	5735223.0	3720.0	0.0575	1.0324	0.9749
225	635176.0	5735222.5	3720.0	0.0627	1.0319	0.9692
226	635171.0	5735224.5	3720.0	0.0575	1.0319	0.9744
227	635168.0	5735224.0	3720.0	0.0575	1.0323	0.9748
228	635169.0	5735222.5	3720.0	0.0574	1.0324	0.9751
229	635170.0	5735222.5	3720.0	0.0574	1.0322	0.9748
230	635168.0	5735247.5	3744.3	0.0574	1.0345	0.9771
231	635168.0	5735247.5	3744.3	0.0574	1.0337	0.9763
232	635168.0	5735248.0	3744.3	0.0572	1.0339	0.9767
233	635167.0	5735250.5	3744.3	0.0567	1.0334	0.9768
234	635167.0	5735250.5	3744.3	0.0566	1.0332	0.9766
235	635168.0	5735242.0	3744.3	0.0574	1.0344	0.9771
236	635167.0	5735243.0	3744.3	0.0576	1.0347	0.9771
237	635168.0	5735247.5	3750.0	0.0574	1.0355	0.9781
238	635168.0	5735247.5	3750.0	0.0574	1.0344	0.9770
239	635168.0	5735248.0	3750.0	0.0572	1.0347	0.9776

240	635167.0	5735250.5	3750.0	0.0567	1.0344	0.9777
241	635167.0	5735250.5	3750.0	0.0566	1.0340	0.9775
242	635168.0	5735242.0	3750.0	0.0574	1.0352	0.9779
243	635167.0	5735243.0	3750.0	0.0576	1.0355	0.9780
244	635163.0	5735274.0	3774.5	0.0575	1.0376	0.9801
245	635163.0	5735275.5	3774.5	0.0575	1.0376	0.9802
246	635170.0	5735276.0	3774.5	0.0575	1.0374	0.9800
247	635173.0	5735277.5	3774.5	0.0566	1.0361	0.9796
248	635172.0	5735279.0	3774.5	0.0575	1.0377	0.9802
249	635170.0	5735279.0	3774.5	0.0575	1.0373	0.9798
250	635167.0	5735277.5	3774.5	0.0567	1.0365	0.9799
251	635163.0	5735274.0	3780.0	0.0575	1.0385	0.9810
252	635163.0	5735275.5	3780.0	0.0575	1.0387	0.9812
253	635170.0	5735276.0	3780.0	0.0575	1.0383	0.9809
254	635173.0	5735277.5	3780.0	0.0566	1.0372	0.9807
255	635172.0	5735279.0	3780.0	0.0575	1.0387	0.9812
256	635170.0	5735279.0	3780.0	0.0575	1.0384	0.9809
257	635167.0	5735277.5	3780.0	0.0567	1.0376	0.9810
258	635166.0	5735301.0	3803.9	0.0575	1.0406	0.9832
259	0.0	0.0	3803.9	0.0566	1.0391	0.9825
260	635160.0	5735302.0	3803.9	0.0574	1.0399	0.9824
261	635160.0	5735302.0	3803.9	0.0575	1.0400	0.9826
262	635161.0	5735299.0	3803.9	0.0575	1.0406	0.9831
263	635162.0	5735298.0	3803.9	0.0565	1.0400	0.9835
264	635161.0	5735300.5	3803.9	0.0567	1.0397	0.9831
265	635166.0	5735301.0	3810.0	0.0575	1.0419	0.9844
266	0.0	0.0	3810.0	0.0566	1.0402	0.9837
267	635160.0	5735302.0	3810.0	0.0574	1.0410	0.9836
268	635160.0	5735302.0	3810.0	0.0575	1.0412	0.9837
269	635161.0	5735299.0	3810.0	0.0575	1.0418	0.9843
270	635162.0	5735298.0	3810.0	0.0565	1.0411	0.9845
271	635161.0	5735300.5	3810.0	0.0567	1.0408	0.9842
272	635163.0	5735325.5	3834.5	0.0566	1.0428	0.9861
273	635160.0	5735321.0	3834.5	0.0566	1.0425	0.9859
274	635154.0	5735313.0	3834.5	0.0574	1.0438	0.9864
275	635151.0	5735311.5	3834.5	0.0574	1.0449	0.9875
276	635147.0	5735287.0	3834.5	0.0567	1.0442	0.9875
277	635229.0	5735366.0	3834.5	0.0576	1.0459	0.9884
278	635153.0	5735337.0	3834.5	0.0574	1.0428	0.9854
279	635165.0	5735330.0	3834.5	0.0565	1.0421	0.9856
280	635161.0	5735323.0	3834.5	0.0575	1.0435	0.9860
281	635157.0	5735321.0	3834.5	0.0574	1.0431	0.9857
282	635160.0	5735329.0	3834.5	0.0574	1.0431	0.9857
283	635161.0	5735331.0	3834.5	0.0566	1.0419	0.9853
284	635163.0	5735325.5	3840.0	0.0566	1.0436	0.9870
285	635160.0	5735321.0	3840.0	0.0566	1.0433	0.9868
286	635154.0	5735313.0	3840.0	0.0574	1.0444	0.9870
287	635151.0	5735311.5	3840.0	0.0574	1.0461	0.9887
288	635147.0	5735287.0	3840.0	0.0567	1.0452	0.9885

289	635229.0	5735366.0	3840.0	0.0576	1.0471	0.9895
290	635153.0	5735337.0	3840.0	0.0574	1.0435	0.9862
291	635165.0	5735330.0	3840.0	0.0565	1.0431	0.9866
292	635161.0	5735323.0	3840.0	0.0575	1.0442	0.9867
293	635157.0	5735321.0	3840.0	0.0574	1.0440	0.9866
294	635160.0	5735329.0	3840.0	0.0574	1.0439	0.9865
295	635161.0	5735331.0	3840.0	0.0566	1.0430	0.9864
296	635152.0	5735349.0	3864.5	0.0575	1.0463	0.9888
297	635154.0	5735349.0	3864.5	0.0575	1.0466	0.9891
298	635155.0	5735350.5	3864.5	0.0566	1.0459	0.9893
299	635155.0	5735351.0	3864.5	0.0574	1.0465	0.9891
300	635154.0	5735352.0	3864.5	0.0574	1.0455	0.9881
301	635154.0	5735352.5	3864.5	0.0574	1.0463	0.9889
302	635159.0	5735354.0	3864.5	0.0574	1.0458	0.9885
303	635152.0	5735349.0	3870.0	0.0575	1.0472	0.9897
304	635154.0	5735349.0	3870.0	0.0575	1.0476	0.9901
305	635155.0	5735350.5	3870.0	0.0566	1.0469	0.9904
306	635155.0	5735351.0	3870.0	0.0574	1.0473	0.9899
307	635154.0	5735352.0	3870.0	0.0574	1.0465	0.9891
308	635154.0	5735352.5	3870.0	0.0574	1.0472	0.9898
309	635159.0	5735354.0	3870.0	0.0574	1.0469	0.9895
310	635148.0	5735377.5	3894.5	0.0575	1.0495	0.9919
311	635147.0	5735375.5	3894.5	0.0575	1.0492	0.9918
312	635150.0	5735373.0	3894.5	0.0575	1.0491	0.9916
313	635154.0	5735376.0	3894.5	0.0567	1.0488	0.9922
314	635152.0	5735376.0	3894.5	0.0566	1.0493	0.9927
315	635145.0	5735374.0	3894.5	0.0575	1.0494	0.9919
316	0.0	0.0	3894.5	0.0574	1.0494	0.9919
317	635148.0	5735377.5	3900.0	0.0575	1.0504	0.9929
318	635147.0	5735375.5	3900.0	0.0575	1.0507	0.9932
319	635150.0	5735373.0	3900.0	0.0575	1.0500	0.9925
320	635154.0	5735376.0	3900.0	0.0567	1.0498	0.9931
321	635152.0	5735376.0	3900.0	0.0566	1.0507	0.9940
322	635145.0	5735374.0	3900.0	0.0575	1.0505	0.9930
323	0.0	0.0	3900.0	0.0574	1.0507	0.9932
324	635142.0	5735398.0	3924.5	0.0574	1.0532	0.9958
325	635142.0	5735400.5	3924.5	0.0574	1.0522	0.9948
326	635142.0	5735401.0	3924.5	0.0574	1.0528	0.9954
327	635143.0	5735402.0	3924.5	0.0566	1.0519	0.9953
328	635144.0	5735401.0	3924.5	0.0575	1.0524	0.9950
329	635146.0	5735400.5	3924.5	0.0566	1.0524	0.9958
330	635146.0	5735401.0	3924.5	0.0566	1.0524	0.9957
331	635148.0	5735400.5	3924.5	0.0574	1.0528	0.9954
332	635142.0	5735398.0	3930.0	0.0574	1.0540	0.9966
333	635142.0	5735400.5	3930.0	0.0574	1.0533	0.9959
334	635142.0	5735401.0	3930.0	0.0574	1.0536	0.9962
335	635143.0	5735402.0	3930.0	0.0566	1.0529	0.9963
336	635144.0	5735401.0	3930.0	0.0575	1.0533	0.9958
337	635146.0	5735400.5	3930.0	0.0566	1.0535	0.9969

338	635146.0	5735401.0	3930.0	0.0566	1.0534	0.9968
339	635148.0	5735400.5	3930.0	0.0574	1.0538	0.9964
340	635139.0	5735426.0	3954.3	0.0574	1.0563	0.9989
341	635137.0	5735427.5	3954.3	0.0070	0.5480	0.5410
342	635136.0	5735427.5	3954.3	0.0574	1.0557	0.9983
343	635139.0	5735426.0	3954.3	0.0574	1.0556	0.9982
344	635141.0	5735426.0	3954.3	0.0565	1.0561	0.9995
345	635144.0	5735430.5	3954.3	0.0566	1.0553	0.9987
346	635139.0	5735432.0	3954.3	0.0574	1.0557	0.9983
347	635134.0	5735425.5	3954.3	0.0566	1.0551	0.9985
348	635135.0	5735418.0	3954.3	0.0574	1.0564	0.9990
349	635139.0	5735426.0	3960.0	0.0574	1.0574	1.0000
350	635137.0	5735427.5	3960.0	0.0070	0.5156	0.5087
351	635136.0	5735427.5	3960.0	0.0574	1.0569	0.9995
352	635139.0	5735426.0	3960.0	0.0574	1.0568	0.9994
353	635141.0	5735426.0	3960.0	0.0565	1.0572	1.0007
354	635144.0	5735430.5	3960.0	0.0566	1.0565	0.9999
355	635139.0	5735432.0	3960.0	0.0574	1.0568	0.9994
356	635134.0	5735425.5	3960.0	0.0566	1.0562	0.9996
357	635135.0	5735418.0	3960.0	0.0574	1.0577	1.0003
358	635134.0	5735451.0	3984.5	0.0565	1.0590	1.0025
359	635133.0	5735448.0	3984.5	0.0574	1.0595	1.0022
360	635134.0	5735449.0	3984.5	0.0566	1.0589	1.0023
361	635135.0	5735449.0	3984.5	0.0566	1.0587	1.0022
362	635136.0	5735450.5	3984.5	0.0574	1.0592	1.0018
363	635137.0	5735452.0	3984.5	0.0574	1.6826	1.6252
364	635136.0	5735455.0	3984.5	0.0565	1.0581	1.0016
365	635134.0	5735455.0	3984.5	0.0566	1.0578	1.0012
366	635134.0	5735451.0	3990.0	0.0565	1.0600	1.0035
367	635133.0	5735448.0	3990.0	0.0574	1.0610	1.0036
368	635134.0	5735449.0	3990.0	0.0566	1.0601	1.0035
369	635135.0	5735449.0	3990.0	0.0566	1.0601	1.0035
370	635136.0	5735450.5	3990.0	0.0574	1.0605	1.0031
371	635137.0	5735452.0	3990.0	0.0574	1.3241	1.2666
372	635136.0	5735455.0	3990.0	0.0565	1.0590	1.0024
373	635134.0	5735455.0	3990.0	0.0566	1.0588	1.0022
374	635127.0	5735475.0	4014.5	0.0574	1.0635	1.0061
375	635131.0	5735474.0	4014.5	0.0566	1.0622	1.0056
376	635135.0	5735475.0	4014.5	0.0575	1.0639	1.0064
377	0.0	0.0	4014.5	0.0574	1.0646	1.0072
378	635130.0	5735474.0	4014.5	0.0566	1.0629	1.0063
379	635122.0	5735472.0	4014.5	0.0574	1.0638	1.0064
380	635125.0	5735473.0	4014.5	0.0566	1.0631	1.0065
381	635127.0	5735475.0	4020.0	0.0574	1.0654	1.0080
382	635131.0	5735474.0	4020.0	0.0566	1.0648	1.0082
383	635135.0	5735475.0	4020.0	0.0575	1.0654	1.0079
384	0.0	0.0	4020.0	0.0574	1.0660	1.0086
385	635130.0	5735474.0	4020.0	0.0566	1.0651	1.0085
386	635122.0	5735472.0	4020.0	0.0574	1.0649	1.0075

387	635125.0	5735473.0	4020.0	0.0566	1.0648	1.0082
388	635131.0	5735498.0	4044.5	0.0565	0.0000	-0.0565
389	635132.0	5735502.0	4044.5	0.0565	1.0699	1.0134
390	635131.0	5735502.0	4044.5	0.0566	0.0000	-0.0566
391	635128.0	5735502.0	4044.5	0.0566	1.0678	1.0113
392	635130.0	5735498.0	4044.5	0.0574	1.0690	1.0116
393	635134.0	5735499.0	4044.5	0.0565	1.0680	1.0115
394	635132.0	5735501.0	4044.5	0.0566	0.8938	0.8372
395	635125.0	5735500.0	4044.5	0.0566	1.0693	1.0127
396	635126.0	5735497.0	4044.5	0.0566	1.0681	1.0115
397	635127.0	5735496.0	4044.5	0.0574	1.0690	1.0116
398	0.0	0.0	4044.5	0.0574	1.0676	1.0103
399	635128.0	5735502.0	4044.5	0.0566	1.0686	1.0121
400	635131.0	5735498.0	4050.0	0.0565	1.0698	1.0133
401	635132.0	5735502.0	4050.0	0.0565	1.0690	1.0125
402	635131.0	5735502.0	4050.0	0.0566	0.5079	0.4513
403	635128.0	5735502.0	4050.0	0.0566	0.7407	0.6841
404	635130.0	5735498.0	4050.0	0.0574	1.0698	1.0124
405	635134.0	5735499.0	4050.0	0.0565	1.0697	1.0132
406	635132.0	5735501.0	4050.0	0.0566	0.8983	0.8417
407	635125.0	5735500.0	4050.0	0.0566	1.0697	1.0131
408	635126.0	5735497.0	4050.0	0.0566	1.0692	1.0125
409	635127.0	5735496.0	4050.0	0.0574	1.0706	1.0132
410	0.0	0.0	4050.0	0.0574	1.0700	1.0126
411	635128.0	5735502.0	4050.0	0.0566	1.0683	1.0117
412	635131.0	5735526.0	4074.4	0.0565	1.0743	1.0178
413	635131.0	5735526.0	4074.4	0.0566	1.0737	1.0172
414	635130.0	5735528.5	4074.4	0.0574	1.0679	1.0104
415	635129.0	5735529.0	4074.4	0.0574	1.0741	1.0167
416	635126.0	5735530.5	4074.4	0.0574	1.0732	1.0158
417	635127.0	5735529.0	4074.4	0.0574	1.0732	1.0158
418	635129.0	5735527.0	4074.4	0.0566	1.0725	1.0159
419	635131.0	5735528.5	4074.4	0.0565	1.0726	1.0161
420	635130.0	5735529.0	4074.4	0.0574	1.0737	1.0163
421	635127.0	5735527.0	4074.4	0.0000	1.0731	1.0731
422	635123.0	5735528.5	4074.4	0.0574	1.0703	1.0130
423	635131.0	5735526.0	4080.0	0.0565	1.0737	1.0172
424	635131.0	5735526.0	4080.0	0.0566	1.0739	1.0173
425	635130.0	5735528.5	4080.0	0.0574	1.0747	1.0173
426	635129.0	5735529.0	4080.0	0.0574	1.0747	1.0173
427	635126.0	5735530.5	4080.0	0.0574	1.0744	1.0170
428	635127.0	5735529.0	4080.0	0.0574	1.0747	1.0173
429	635129.0	5735527.0	4080.0	0.0566	1.0741	1.0175
430	635131.0	5735528.5	4080.0	0.0565	1.0734	1.0169
431	635130.0	5735529.0	4080.0	0.0574	1.0746	1.0172
432	635127.0	5735527.0	4080.0	0.0000	0.0000	0.0000
433	635123.0	5735528.5	4080.0	0.0574	1.0739	1.0165
434	635127.0	5735548.0	4104.5	0.0566	1.0782	1.0216
435	635127.0	5735549.0	4104.5	0.0566	1.0775	1.0209

436	635125.0	5735552.0	4104.5	0.0566	1.0776	1.0209
437	635121.0	5735549.0	4104.5	0.0566	1.0769	1.0203
438	635119.0	5735547.0	4104.5	0.0565	1.0772	1.0207
439	635124.0	5735549.0	4104.5	0.0000	1.0779	1.0779
440	635128.0	5735553.5	4104.5	0.0566	1.0779	1.0213
441	635128.0	5735555.0	4104.5	0.0566	1.0771	1.0205
442	635123.0	5735554.0	4104.5	0.0574	1.0774	1.0200
443	635127.0	5735548.0	4110.0	0.0566	1.0797	1.0232
444	635127.0	5735549.0	4110.0	0.0566	0.5480	0.4915
445	635125.0	5735552.0	4110.0	0.0566	1.0785	1.0219
446	635121.0	5735549.0	4110.0	0.0566	1.0790	1.0224
447	635119.0	5735547.0	4110.0	0.0565	1.0787	1.0222
448	635124.0	5735549.0	4110.0	0.0000	0.0000	0.0000
449	635128.0	5735553.5	4110.0	0.0566	1.0793	1.0227
450	635128.0	5735555.0	4110.0	0.0566	1.0785	1.0219
451	635123.0	5735554.0	4110.0	0.0574	1.0786	1.0212
452	635122.0	5735578.5	4134.5	0.0000	0.0000	0.0000
453	635116.0	5735579.0	4134.5	0.0575	1.0781	1.0207
454	635115.0	5735575.0	4134.5	0.0566	0.0000	-0.0566
455	635123.0	5735575.0	4134.5	0.0566	0.0000	-0.0566
456	635126.0	5735580.0	4134.5	0.0574	1.0836	1.0263
457	635119.0	5735579.0	4134.5	0.0575	1.0828	1.0253
458	635117.0	5735573.0	4134.5	0.0575	1.0849	1.0274
459	635118.0	5735572.0	4134.5	0.0566	1.0834	1.0268
460	635121.0	5735572.0	4134.5	0.0575	1.0838	1.0263
461	635124.0	5735575.0	4134.5	0.0619	0.0000	-0.0619
462	635125.0	5735577.0	4134.5	0.0574	0.0000	-0.0574
463	635120.0	5735575.0	4134.5	0.0000	0.0000	0.0000
464	635124.0	5735580.5	4134.5	0.0000	1.0826	1.0826
465	635125.0	5735582.0	4134.5	0.0000	1.0826	1.0826
466	635118.0	5735577.0	4134.5	0.0566	1.0819	1.0254
467	635116.0	5735573.0	4134.5	0.0574	1.0829	1.0255
468	635119.0	5735572.0	4134.5	0.0566	1.0822	1.0256
469	635123.0	5735573.0	4134.5	0.0573	1.0836	1.0263
470	635125.0	5735575.0	4134.5	0.0566	1.0818	1.0253
471	635122.0	5735578.5	4140.0	0.0000	0.0000	0.0000
472	635116.0	5735579.0	4140.0	0.0575	1.0833	1.0258
473	635115.0	5735575.0	4140.0	0.0566	0.0815	0.0250
474	635123.0	5735575.0	4140.0	0.0566	1.0834	1.0268
475	635126.0	5735580.0	4140.0	0.0574	1.0836	1.0262
476	635119.0	5735579.0	4140.0	0.0575	1.0835	1.0260
477	635117.0	5735573.0	4140.0	0.0575	1.0845	1.0271
478	635118.0	5735572.0	4140.0	0.0566	1.0833	1.0267
479	635121.0	5735572.0	4140.0	0.0575	1.0849	1.0273
480	635124.0	5735575.0	4140.0	0.0619	1.0831	1.0212
481	635125.0	5735577.0	4140.0	0.0574	1.0847	1.0273
482	635120.0	5735575.0	4140.0	0.0000	0.0000	0.0000
483	635124.0	5735580.5	4140.0	0.0000	0.0000	0.0000
484	635125.0	5735582.0	4140.0	0.0000	0.0000	0.0000

485	635118.0	5735577.0	4140.0	0.0566	1.0840	1.0274
486	635116.0	5735573.0	4140.0	0.0574	1.0843	1.0269
487	635119.0	5735572.0	4140.0	0.0566	1.0831	1.0265
488	635123.0	5735573.0	4140.0	0.0573	1.0844	1.0270
489	635125.0	5735575.0	4140.0	0.0566	1.0831	1.0265
490	635119.0	5735597.0	4164.5	0.0574	0.0000	-0.0574
491	635123.0	5735604.0	4164.5	0.0565	1.0861	1.0296
492	635121.0	5735605.0	4164.5	0.0575	1.0864	1.0290
493	635120.0	5735604.0	4164.5	0.0567	1.0861	1.0295
494	635119.0	5735602.0	4164.5	0.0574	1.0862	1.0288
495	635117.0	5735601.0	4164.5	0.0573	1.0859	1.0287
496	635115.0	5735601.0	4164.5	0.0575	1.0869	1.0294
497	635114.0	5735601.0	4164.5	0.0577	1.0870	1.0293
498	635119.0	5735597.0	4170.0	0.0574	1.0884	1.0310
499	635123.0	5735604.0	4170.0	0.0565	1.0874	1.0308
500	635121.0	5735605.0	4170.0	0.0575	1.0878	1.0304
501	635120.0	5735604.0	4170.0	0.0567	1.0872	1.0306
502	635119.0	5735602.0	4170.0	0.0574	1.0871	1.0297
503	635117.0	5735601.0	4170.0	0.0573	1.0872	1.0299
504	635115.0	5735601.0	4170.0	0.0575	1.0881	1.0306
505	635114.0	5735601.0	4170.0	0.0577	1.0881	1.0304
506	635114.0	5735631.5	4194.4	0.0000	0.0000	0.0000
507	635113.0	5735629.0	4194.4	0.0000	0.1364	0.1364
508	635114.0	5735631.5	4200.0	0.0000	0.0000	0.0000
509	635113.0	5735629.0	4200.0	0.0000	0.0000	0.0000
510	635116.0	5735648.0	4224.5	0.0566	0.8555	0.7989
511	635114.0	5735646.0	4224.5	0.0566	0.0000	-0.0566
512	635112.0	5735647.0	4224.5	0.0571	2.3126	2.2556
513	635111.0	5735651.0	4224.5	0.0567	0.5242	0.4675
514	635115.0	5735654.0	4224.5	0.0575	1.0952	1.0377
515	635115.0	5735654.0	4224.5	0.0575	1.0937	1.0362
516	635117.0	5735653.0	4224.5	0.0000	1.0950	1.0950
517	635116.0	5735653.0	4224.5	0.0566	1.0943	1.0377
518	635113.0	5735653.0	4224.5	0.0566	1.0934	1.0368
519	635111.0	5735653.0	4224.5	0.0566	0.8650	0.8084
520	635110.0	5735652.0	4224.5	0.0566	1.0937	1.0371
521	635113.0	5735648.0	4224.5	0.0566	1.0944	1.0378
522	635112.0	5735649.0	4224.5	0.0566	1.0945	1.0379
523	635115.0	5735653.0	4224.5	0.0573	1.0952	1.0379
524	635116.0	5735648.0	4230.0	0.0566	1.0962	1.0396
525	635114.0	5735646.0	4230.0	0.0566	1.0955	1.0390
526	635112.0	5735647.0	4230.0	0.0571	2.3406	2.2836
527	635111.0	5735651.0	4230.0	0.0567	0.5443	0.4876
528	635115.0	5735654.0	4230.0	0.0575	1.0961	1.0387
529	635115.0	5735654.0	4230.0	0.0575	1.0959	1.0385
530	635117.0	5735653.0	4230.0	0.0000	0.0000	0.0000
531	635116.0	5735653.0	4230.0	0.0566	1.0955	1.0389
532	635113.0	5735653.0	4230.0	0.0566	1.0951	1.0385
533	635111.0	5735653.0	4230.0	0.0566	1.0954	1.0388

534	635110.0	5735652.0	4230.0	0.0566	1.0951	1.0385
535	635113.0	5735648.0	4230.0	0.0566	1.0961	1.0395
536	635112.0	5735649.0	4230.0	0.0566	1.0958	1.0392
537	635115.0	5735653.0	4230.0	0.0573	1.0965	1.0392
538	635111.0	5735685.0	4254.5	0.0574	1.0991	1.0418
539	635108.0	5735683.0	4254.5	0.0565	1.0979	1.0413
540	635106.0	5735679.0	4254.5	0.0575	1.0991	1.0416
541	635107.0	5735671.0	4254.5	0.0574	1.0990	1.0416
542	635109.0	5735672.0	4254.5	0.0566	1.0979	1.0413
543	635109.0	5735675.0	4254.5	0.0575	1.0986	1.0411
544	635110.0	5735680.0	4254.5	0.0574	1.0989	1.0415
545	635111.0	5735685.0	4260.0	0.0574	1.1003	1.0429
546	635108.0	5735683.0	4260.0	0.0565	1.0991	1.0426
547	635106.0	5735679.0	4260.0	0.0575	1.1002	1.0427
548	635107.0	5735671.0	4260.0	0.0574	1.1001	1.0426
549	635109.0	5735672.0	4260.0	0.0566	1.0992	1.0426
550	635109.0	5735675.0	4260.0	0.0575	1.0999	1.0424
551	635110.0	5735680.0	4260.0	0.0574	1.1000	1.0426
552	635103.0	5735708.0	4284.5	0.0574	1.1032	1.0458
553	635105.0	5735706.5	4284.5	0.0566	1.1028	1.0462
554	635108.0	5735702.0	4284.5	0.0567	1.1031	1.0465
555	635108.0	5735700.0	4284.5	0.0576	1.1036	1.0460
556	635109.0	5735704.0	4284.5	0.0575	1.1037	1.0462
557	635113.0	5735708.5	4284.5	0.0574	1.1031	1.0457
558	635110.0	5735706.5	4284.5	0.0566	1.1030	1.0464
559	0.0	0.0	4284.5	0.0575	1.1044	1.0469
560	635103.0	5735708.0	4290.0	0.0574	1.1045	1.0471
561	635105.0	5735706.5	4290.0	0.0566	1.1047	1.0481
562	635108.0	5735702.0	4290.0	0.0567	1.1046	1.0480
563	635108.0	5735700.0	4290.0	0.0576	1.1049	1.0473
564	635109.0	5735704.0	4290.0	0.0575	1.1050	1.0475
565	635113.0	5735708.5	4290.0	0.0574	1.1047	1.0473
566	635110.0	5735706.5	4290.0	0.0566	1.1041	1.0474
567	0.0	0.0	4290.0	0.0575	1.1053	1.0478
568	635109.0	5735735.0	4314.5	0.0617	1.1091	1.0474
569	635109.0	5735733.5	4314.5	0.0572	1.1085	1.0513
570	635108.0	5735733.0	4314.5	0.0000	0.0000	0.0000
571	635108.0	5735727.0	4314.5	0.0575	1.1078	1.0503
572	635108.0	5735725.0	4314.5	0.0575	1.1083	1.0508
573	635107.0	5735725.0	4314.5	0.0575	1.1085	1.0510
574	635109.0	5735737.0	4314.5	0.0566	1.1076	1.0509
575	635109.0	5735736.0	4314.5	0.0566	1.1079	1.0513
576	635109.0	5735729.0	4314.5	0.0575	1.1089	1.0514
577	635106.0	5735727.0	4314.5	0.0567	1.1066	1.0499
578	635109.0	5735735.0	4320.0	0.0617	1.1089	1.0472
579	635109.0	5735733.5	4320.0	0.0572	1.1083	1.0512
580	635108.0	5735733.0	4320.0	0.0000	0.0000	0.0000
581	635108.0	5735727.0	4320.0	0.0575	1.1092	1.0517
582	635108.0	5735725.0	4320.0	0.0575	1.1089	1.0514

583	635107.0	5735725.0	4320.0	0.0575	1.1096	1.0521
584	635109.0	5735737.0	4320.0	0.0566	1.1083	1.0517
585	635109.0	5735736.0	4320.0	0.0566	1.1084	1.0517
586	635109.0	5735729.0	4320.0	0.0575	1.1098	1.0523
587	635106.0	5735727.0	4320.0	0.0567	1.1085	1.0517
588	635106.0	5735760.0	4344.5	0.0566	1.1112	1.0546
589	635102.0	5735757.0	4344.5	0.0575	1.1119	1.0544
590	635102.0	5735758.5	4344.5	0.0575	1.1121	1.0546
591	635105.0	5735760.0	4344.5	0.0574	1.1115	1.0541
592	635108.0	5735760.0	4344.5	0.0576	1.1120	1.0545
593	635108.0	5735758.0	4344.5	0.0585	1.1122	1.0537
594	635105.0	5735757.0	4344.5	0.0577	1.1116	1.0539
595	635099.0	5735750.0	4344.5	0.0575	1.1120	1.0544
596	635103.0	5735754.0	4344.5	0.0576	1.1118	1.0542
597	635106.0	5735760.0	4350.0	0.0566	1.1124	1.0558
598	635102.0	5735757.0	4350.0	0.0575	1.1131	1.0557
599	635102.0	5735758.5	4350.0	0.0575	1.1131	1.0556
600	635105.0	5735760.0	4350.0	0.0574	1.1127	1.0553
601	635108.0	5735760.0	4350.0	0.0576	1.1133	1.0558
602	635108.0	5735758.0	4350.0	0.0585	1.1131	1.0546
603	635105.0	5735757.0	4350.0	0.0577	1.1129	1.0552
604	635099.0	5735750.0	4350.0	0.0575	1.1130	1.0554
605	635103.0	5735754.0	4350.0	0.0576	1.1130	1.0555
606	635089.0	5735766.0	4374.5	0.0571	1.1163	1.0592
607	635092.0	5735772.5	4374.5	0.0574	1.1166	1.0591
608	635095.0	5735775.0	4374.5	0.0574	1.1167	1.0592
609	635099.0	5735776.0	4374.5	0.0574	1.1165	1.0592
610	635099.0	5735785.0	4374.5	0.0574	1.1162	1.0588
611	635101.0	5735782.0	4374.5	0.0566	1.1151	1.0585
612	635099.0	5735780.0	4374.5	0.0565	1.1152	1.0588
613	635089.0	5735766.0	4380.0	0.0571	1.1175	1.0604
614	635092.0	5735772.5	4380.0	0.0574	1.1175	1.0601
615	635095.0	5735775.0	4380.0	0.0574	1.1174	1.0600
616	635099.0	5735776.0	4380.0	0.0574	1.1175	1.0601
617	635099.0	5735785.0	4380.0	0.0574	1.1171	1.0597
618	635101.0	5735782.0	4380.0	0.0566	1.1160	1.0594
619	635099.0	5735780.0	4380.0	0.0565	1.1162	1.0597
620	635092.0	5735940.0	4404.5	0.0575	1.1197	1.0622
621	635092.0	5735938.0	4404.5	0.0566	1.1177	1.0611
622	635093.0	5735934.5	4404.5	0.0573	1.1186	1.0612
623	635090.0	5735941.0	4404.5	0.0575	1.1191	1.0616
624	635092.0	5735936.5	4404.5	0.0565	1.1172	1.0608
625	635091.0	5735934.5	4404.5	0.0573	1.1193	1.0620
626	635085.0	5735929.0	4404.5	0.0565	1.1181	1.0616
627	635087.0	5735935.0	4404.5	0.0574	1.1186	1.0613
628	635099.0	5735936.5	4404.5	0.0574	1.1169	1.0596
629	635092.0	5735940.0	4410.0	0.0575	1.1199	1.0624
630	635092.0	5735938.0	4410.0	0.0566	1.1187	1.0621
631	635093.0	5735934.5	4410.0	0.0573	1.1194	1.0620

632	635090.0	5735941.0	4410.0	0.0575	1.1196	1.0621
633	635092.0	5735936.5	4410.0	0.0565	1.1184	1.0619
634	635091.0	5735934.5	4410.0	0.0573	1.1199	1.0625
635	635085.0	5735929.0	4410.0	0.0565	1.1193	1.0628
636	635087.0	5735935.0	4410.0	0.0574	1.1198	1.0624
637	635099.0	5735936.5	4410.0	0.0574	1.1194	1.0621
638	635091.0	5735965.0	4434.5	0.0572	1.1231	1.0659
639	635093.0	5735958.0	4434.5	0.0574	1.1219	1.0645
640	635087.0	5735961.5	4434.5	0.0575	1.1239	1.0665
641	635087.0	5735965.0	4434.5	0.0575	1.1245	1.0670
642	635086.0	5735958.0	4434.5	0.0566	1.1240	1.0674
643	635094.0	5735960.0	4434.5	0.0574	1.1241	1.0667
644	635096.0	5735960.0	4434.5	0.0575	1.1235	1.0660
645	635092.0	5735966.0	4434.5	0.0566	1.1224	1.0658
646	635090.0	5735964.0	4434.5	0.0566	1.1231	1.0665
647	635091.0	5735957.0	4434.5	0.0575	1.1238	1.0663
648	635089.0	5735955.0	4434.5	0.0575	1.1234	1.0659
649	635087.0	5735959.5	4434.5	0.0574	1.1232	1.0657
650	635089.0	5735961.5	4434.5	0.0566	1.1229	1.0663
651	635091.0	5735965.0	4440.0	0.0572	1.1240	1.0668
652	635093.0	5735958.0	4440.0	0.0574	1.1252	1.0678
653	635087.0	5735961.5	4440.0	0.0575	1.1252	1.0677
654	635087.0	5735965.0	4440.0	0.0575	1.1250	1.0675
655	635086.0	5735958.0	4440.0	0.0566	1.1245	1.0679
656	635094.0	5735960.0	4440.0	0.0574	1.1249	1.0674
657	635096.0	5735960.0	4440.0	0.0575	1.1244	1.0669
658	635092.0	5735966.0	4440.0	0.0566	1.1234	1.0668
659	635090.0	5735964.0	4440.0	0.0566	1.1240	1.0673
660	635091.0	5735957.0	4440.0	0.0575	1.1248	1.0673
661	635089.0	5735955.0	4440.0	0.0575	1.1244	1.0669
662	635087.0	5735959.5	4440.0	0.0574	1.1241	1.0667
663	635089.0	5735961.5	4440.0	0.0566	1.1237	1.0671

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C.EDITED NAVIGATION DATA
AND REPICKED TRANSIT TIMES

C. Edited navigation data and re-picked transit times

Edited navigation data and transit times for Run-1 at Blackback A1 ST-1

TRACE NUMBER	SOURCE POSITION_X (m)	SOURCE POSITION_Y (m)	MEASURED DEPTH (m)	TRANSIT_TIME SENSOR (s)	TRANSIT_TIM GEOPHONE (s)	TRANSIT TIME (s)
0	635347.0	5733157.0	421.0	0.0519	0.3689	0.3170
1	635347.0	5733150.0	421.0	0.0518	0.3665	0.3147
2	635350.0	5733157.0	421.0	0.0518	0.3693	0.3175
3	635349.0	5733153.5	421.0	0.0521	0.3682	0.3162
4	635348.0	5733155.5	421.0	0.0574	0.3686	0.3112
5	635348.0	5733155.5	421.0	0.0574	0.3689	0.3116
6	635347.0	5733159.0	421.0	0.0575	0.3703	0.3129
7	635346.0	5733153.5	421.0	0.0575	0.3689	0.3114
8	635349.0	5733151.0	421.0	0.0574	0.3676	0.3102
9	635353.0	5733161.0	421.0	0.0565	0.3718	0.3153
10	635352.0	5733155.0	421.0	0.0566	0.3679	0.3114
11	635341.0	5733157.0	1312.0	0.0568	0.6412	0.5844
12	635346.0	5733151.0	1312.0	0.0574	0.6421	0.5847
13	635355.0	5733157.0	1312.0	0.0568	0.6411	0.5842
14	635348.0	5733155.5	1320.0	0.0572	0.6443	0.5871
15	635350.0	5733155.0	1320.0	0.0566	0.6437	0.5871
16	635351.0	5733155.0	1320.0	0.0573	0.6442	0.5870
17	635351.0	5733159.0	1320.0	0.0566	0.6439	0.5873
18	635345.0	5733160.0	1320.0	0.0566	0.6434	0.5868
19	635353.0	5733179.0	1350.0	0.0573	0.6501	0.5928
20	635347.0	5733188.0	1350.0	0.0573	0.6493	0.5920
21	635342.0	5733185.0	1350.0	0.0573	0.6500	0.5927
22	635347.0	5733180.0	1350.0	0.0573	0.6496	0.5923
23	635353.0	5733182.0	1350.0	0.0573	0.6499	0.5926
24	635351.0	5733207.0	1380.0	0.0573	0.6551	0.5978
25	635349.0	5733209.0	1380.0	0.0573	0.6551	0.5978
26	635344.0	5733211.0	1380.0	0.0565	0.6543	0.5978
27	635340.0	5733210.0	1380.0	0.0574	0.6554	0.5979
28	635342.0	5733207.0	1380.0	0.0573	0.6551	0.5977
29	635345.0	5733229.0	1410.0	0.0568	0.6602	0.6034
30	635343.0	5733230.5	1410.0	0.0574	0.6604	0.6030
31	635344.0	5733237.0	1410.0	0.0573	0.6606	0.6033
32	635346.0	5733235.0	1410.0	0.0574	0.6604	0.6030
33	635348.0	5733232.0	1410.0	0.0575	0.6608	0.6033
34	635341.0	5733258.5	1440.0	0.0572	0.6650	0.6078
35	635342.0	5733263.0	1440.0	0.0566	0.6648	0.6082
36	635342.0	5733263.0	1440.0	0.0574	0.6653	0.6080
37	635346.0	5733256.5	1440.0	0.0573	0.6652	0.6079
38	635344.0	5733258.0	1440.0	0.0573	0.6650	0.6077
39	635341.0	5733291.0	1470.0	0.0572	0.6707	0.6134
40	635339.0	5733289.0	1470.0	0.0565	0.6699	0.6134
41	635341.0	5733286.0	1470.0	0.0573	0.6702	0.6129
42	635343.0	5733283.5	1470.0	0.0565	0.6697	0.6133
43	635344.0	5733287.0	1470.0	0.0573	0.6702	0.6129
44	635338.0	5733312.0	1500.0	0.0565	0.6756	0.6192
45	635339.0	5733315.0	1500.0	0.0573	0.6756	0.6183
46	635342.0	5733314.0	1500.0	0.0572	0.6757	0.6184
47	635340.0	5733311.0	1500.0	0.0565	0.6751	0.6185

48	635342.0	5733311.0	1500.0	0.0574	0.6760	0.6186
49	635336.0	5733339.0	1530.0	0.0563	0.6802	0.6239
50	635335.0	5733341.0	1530.0	0.0565	0.6803	0.6238
51	635335.0	5733340.0	1530.0	0.0573	0.6810	0.6237
52	635338.0	5733338.0	1530.0	0.0566	0.6799	0.6233
53	635336.0	5733336.0	1530.0	0.0567	0.6803	0.6236
54	635337.0	5733364.0	1560.0	0.0566	0.6853	0.6287
55	635335.0	5733366.0	1560.0	0.0566	0.6852	0.6286
56	635337.0	5733367.0	1560.0	0.0573	0.6859	0.6286
57	635337.0	5733366.0	1560.0	0.0565	0.6851	0.6286
58	635337.0	5733365.0	1560.0	0.0574	0.6860	0.6286
59	635330.0	5733391.0	1590.0	0.0564	0.6898	0.6334
60	635331.0	5733391.0	1590.0	0.0573	0.6907	0.6334
61	635335.0	5733392.0	1590.0	0.0574	0.6903	0.6330
62	635333.0	5733395.5	1590.0	0.0565	0.6898	0.6333
63	635336.0	5733389.0	1590.0	0.0572	0.6903	0.6330
64	635332.0	5733428.0	1620.0	0.0571	0.6957	0.6386
65	635333.0	5733422.0	1620.0	0.0565	0.6954	0.6389
66	635333.0	5733418.0	1620.0	0.0572	0.6960	0.6388
67	635331.0	5733415.0	1620.0	0.0573	0.6952	0.6378
68	635329.0	5733416.0	1620.0	0.0573	0.6952	0.6379
69	635332.0	5733433.0	1650.0	0.0572	0.7010	0.6438
70	635329.0	5733442.0	1650.0	0.0565	0.7002	0.6437
71	635328.0	5733445.5	1650.0	0.0573	0.7009	0.6436
72	635330.0	5733441.0	1650.0	0.0566	0.7005	0.6440
73	635329.0	5733438.0	1650.0	0.0566	0.7003	0.6438
74	635329.0	5733471.0	1680.0	0.0564	0.7061	0.6497
75	635323.0	5733472.5	1680.0	0.0566	0.7060	0.6494
76	635322.0	5733471.0	1680.0	0.0565	0.7064	0.6499
77	635325.0	5733466.0	1680.0	0.0565	0.7064	0.6499
78	635329.0	5733464.0	1680.0	0.0572	0.7067	0.6495
79	635323.0	5733491.0	1710.0	0.0573	0.7125	0.6553
80	635322.0	5733497.0	1710.0	0.0574	0.7122	0.6548
81	635320.0	5733500.0	1710.0	0.0573	0.7123	0.6549
82	635322.0	5733501.0	1710.0	0.0574	0.7122	0.6548
83	635326.0	5733491.0	1710.0	0.0565	0.7118	0.6553
84	635323.0	5733492.0	1710.0	0.0573	0.7120	0.6547
85	635325.0	5733522.5	1740.0	0.0564	0.7168	0.6604
86	635323.0	5733522.5	1740.0	0.0574	0.7178	0.6603
87	635320.0	5733521.0	1740.0	0.0572	0.7174	0.6602
88	635318.0	5733527.0	1740.0	0.0574	0.7177	0.6603
89	635320.0	5733525.5	1740.0	0.0564	0.7166	0.6602
90	635322.0	5733524.0	1740.0	0.0574	0.7180	0.6607
91	635321.0	5733527.0	1740.0	0.0574	0.7178	0.6604
92	635327.0	5733557.0	1770.0	0.0564	0.7225	0.6662
93	635318.0	5733550.5	1770.0	0.0564	0.7221	0.6657
94	635316.0	5733550.0	1770.0	0.0565	0.7224	0.6659
95	635320.0	5733548.5	1770.0	0.0572	0.7230	0.6658
96	635320.0	5733549.0	1770.0	0.0573	0.7230	0.6657
97	635318.0	5733552.0	1770.0	0.0565	0.7219	0.6654
98	635314.0	5733577.0	1800.0	0.0571	0.7281	0.6710
99	635317.0	5733577.0	1800.0	0.0572	0.7281	0.6709
100	635317.0	5733572.0	1800.0	0.0572	0.7278	0.6705

101	635313.0	5733578.0	1800.0	0.0573	0.7282	0.6709
102	635315.0	5733567.0	1800.0	0.0571	0.7282	0.6711
103	635315.0	5733577.0	1800.0	0.0565	0.7273	0.6708
104	635314.0	5733575.5	1800.0	0.0565	0.7270	0.6705
105	635314.0	5733605.0	1830.0	0.0564	0.7327	0.6764
106	635313.0	5733605.0	1830.0	0.0568	0.7330	0.6762
107	635314.0	5733602.0	1830.0	0.0573	0.7333	0.6761
108	635316.0	5733596.0	1830.0	0.0572	0.7329	0.6757
109	635311.0	5733597.0	1830.0	0.0565	0.7326	0.6761
110	635310.0	5733631.0	1860.0	0.0565	0.7388	0.6822
111	635309.0	5733635.0	1860.0	0.0573	0.7390	0.6817
112	635308.0	5733624.0	1860.0	0.0564	0.7385	0.6820
113	635311.0	5733624.0	1860.0	0.0573	0.7387	0.6814
114	635314.0	5733627.0	1860.0	0.0565	0.7382	0.6816
115	635315.0	5733630.0	1860.0	0.0565	0.7379	0.6813
116	635313.0	5733627.0	1860.0	0.0574	0.7389	0.6815
117	635313.0	5733663.0	1890.0	0.0572	0.7450	0.6878
118	635315.0	5733659.0	1890.0	0.0564	0.7438	0.6874
119	635317.0	5733654.0	1890.0	0.0566	0.7439	0.6873
120	635316.0	5733650.5	1890.0	0.0565	0.7437	0.6872
121	635310.0	5733655.0	1890.0	0.0565	0.7440	0.6875
122	635315.0	5733668.0	1912.0	0.0573	0.7490	0.6916
123	635312.0	5733662.5	1912.0	0.0574	0.7489	0.6915
124	635321.0	5733664.5	1912.0	0.0565	0.7480	0.6915
125	635314.0	5733679.0	1912.0	0.0573	0.7493	0.6920
126	635309.0	5733694.0	1912.0	0.0564	0.7486	0.6922

Edited navigation data and transit times for Run-2 at Blackback A1 ST-1

TRACE NUMBER	SOURCE POSITION_X (m)	SOURCE POSITION_Y (m)	MEASURED DEPTH (m)	TRANSIT_TIME SENSOR (s)	TRANSIT_TIME GEOPHONE (s)	TRANSIT TIME (s)
0	635232.0	5734740.0	3144.5	0.0582	0.9528	0.8947
1	635214.0	5734729.0	3144.5	0.0570	0.9516	0.8946
2	635215.0	5734733.0	3144.5	0.0577	0.9516	0.8940
3	635228.0	5734737.0	3144.5	0.0572	0.9518	0.8945
4	635230.0	5734740.0	3144.5	0.0577	0.9527	0.8950
5	635232.0	5734742.0	3144.5	0.0572	0.9513	0.8941
6	635232.0	5734742.0	3144.5	0.0568	0.9528	0.8960
7	635232.0	5734740.0	3150.0	0.0582	0.9538	0.8956
8	635214.0	5734729.0	3150.0	0.0570	0.9523	0.8954
9	635215.0	5734733.0	3150.0	0.0577	0.9526	0.8950
10	635228.0	5734737.0	3150.0	0.0572	0.9525	0.8953
11	635230.0	5734740.0	3150.0	0.0577	0.9535	0.8958
12	635232.0	5734742.0	3150.0	0.0572	0.9521	0.8949
13	635232.0	5734742.0	3150.0	0.0568	0.9538	0.8969
14	635222.0	5734815.0	3234.5	0.0571	0.9647	0.9076
15	635220.0	5734813.0	3234.5	0.0580	0.9642	0.9062
16	635224.0	5734814.0	3234.5	0.0571	0.9638	0.9067
17	635222.0	5734809.0	3234.5	0.0578	0.9660	0.9082
18	635221.0	5734807.5	3234.5	0.0568	0.9647	0.9080
19	635217.0	5734806.0	3234.5	0.0569	0.9645	0.9076
20	635220.0	5734807.5	3234.5	0.0571	0.9647	0.9076
21	635222.0	5734815.0	3240.0	0.0571	0.9658	0.9087
22	635220.0	5734813.0	3240.0	0.0580	0.9658	0.9078
23	635224.0	5734814.0	3240.0	0.0571	0.9649	0.9078
24	635222.0	5734809.0	3240.0	0.0578	0.9667	0.9089
25	635221.0	5734807.5	3240.0	0.0568	0.9656	0.9089
26	635217.0	5734806.0	3240.0	0.0569	0.9652	0.9083
27	635220.0	5734807.5	3240.0	0.0571	0.9657	0.9086
28	635202.0	5734885.0	3324.5	0.0577	0.9802	0.9225
29	635199.0	5734895.0	3324.5	0.0574	0.9784	0.9210
30	635197.0	5734901.0	3324.5	0.0570	0.9780	0.9210
31	635193.0	5734906.0	3324.5	0.0575	0.9773	0.9199
32	635197.0	5734910.0	3324.5	0.0570	0.9769	0.9199
33	635209.0	5734906.0	3324.5	0.0572	0.9790	0.9217
34	635202.0	5734885.0	3330.0	0.0577	0.9797	0.9220
35	635199.0	5734895.0	3330.0	0.0574	0.9788	0.9214
36	635197.0	5734901.0	3330.0	0.0570	0.9796	0.9226
37	635193.0	5734906.0	3330.0	0.0575	0.9772	0.9198
38	635197.0	5734910.0	3330.0	0.0570	0.9796	0.9226
39	635209.0	5734906.0	3330.0	0.0572	0.9795	0.9222
40	635206.0	5734921.0	3354.5	0.0572	0.9832	0.9260
41	635203.0	5734916.0	3354.5	0.0565	0.9813	0.9247
42	635200.0	5734913.0	3354.5	0.0574	0.9828	0.9254
43	635194.0	5734923.0	3354.5	0.0575	0.9851	0.9276
44	635203.0	5734929.0	3354.5	0.0566	0.9817	0.9251
45	635210.0	5734930.5	3354.5	0.0567	0.9828	0.9261
46	635206.0	5734921.0	3360.0	0.0572	0.9840	0.9268
47	635203.0	5734916.0	3360.0	0.0565	0.9827	0.9262

48	635200.0	5734913.0	3360.0	0.0574	0.9843	0.9269
49	635194.0	5734923.0	3360.0	0.0575	0.9823	0.9248
50	635203.0	5734929.0	3360.0	0.0566	0.9834	0.9268
51	635210.0	5734930.5	3360.0	0.0567	0.9828	0.9261
52	635206.0	5734943.0	3384.5	0.0579	0.9877	0.9298
53	635202.0	5734944.5	3384.5	0.0572	0.9862	0.9290
54	635200.0	5734944.5	3384.5	0.0575	0.9873	0.9298
55	635198.0	5734945.0	3384.5	0.0574	0.9863	0.9289
56	635198.0	5734944.5	3384.5	0.0574	0.9865	0.9291
57	635204.0	5734945.5	3384.5	0.0568	0.9856	0.9289
58	635208.0	5734946.5	3384.5	0.0574	0.9867	0.9293
59	635206.0	5734943.0	3390.0	0.0579	0.9887	0.9309
60	635202.0	5734944.5	3390.0	0.0572	0.9875	0.9303
61	635200.0	5734944.5	3390.0	0.0575	0.9880	0.9304
62	635198.0	5734945.0	3390.0	0.0574	0.9876	0.9302
63	635198.0	5734944.5	3390.0	0.0574	0.9872	0.9298
64	635204.0	5734945.5	3390.0	0.0568	0.9866	0.9298
65	635208.0	5734946.5	3390.0	0.0574	0.9877	0.9302
66	635214.0	5734968.0	3414.4	0.0579	0.9921	0.9342
67	635220.0	5734965.0	3414.4	0.0570	0.9913	0.9343
68	635212.0	5734966.0	3414.4	0.0574	0.9918	0.9344
69	635206.0	5734967.0	3414.4	0.0575	0.9913	0.9338
70	635201.0	5734969.5	3414.4	0.0574	0.9917	0.9343
71	635200.0	5734971.0	3414.4	0.0575	0.9912	0.9337
72	635200.0	5734974.0	3414.4	0.0574	0.9917	0.9342
73	635214.0	5734968.0	3420.0	0.0579	0.9929	0.9350
74	635220.0	5734965.0	3420.0	0.0570	0.9929	0.9359
75	635212.0	5734966.0	3420.0	0.0574	0.9930	0.9355
76	635206.0	5734967.0	3420.0	0.0575	0.9928	0.9353
77	635201.0	5734969.5	3420.0	0.0574	0.9926	0.9352
78	635200.0	5734971.0	3420.0	0.0575	0.9924	0.9349
79	635200.0	5734974.0	3420.0	0.0574	0.9922	0.9348
80	635197.0	5734993.0	3444.5	0.0572	0.9965	0.9393
81	635195.0	5734993.0	3444.5	0.0575	0.9972	0.9397
82	635197.0	5734994.5	3444.5	0.0572	0.9962	0.9390
83	635199.0	5734994.5	3444.5	0.0578	0.9968	0.9390
84	635202.0	5734993.0	3444.5	0.0571	0.9956	0.9385
85	635205.0	5734994.5	3444.5	0.0574	0.9966	0.9392
86	635208.0	5734996.5	3444.5	0.0569	0.9961	0.9391
87	635197.0	5734993.0	3450.0	0.0572	0.9973	0.9401
88	635195.0	5734993.0	3450.0	0.0575	0.9983	0.9408
89	635197.0	5734994.5	3450.0	0.0572	0.9973	0.9401
90	635199.0	5734994.5	3450.0	0.0578	0.9977	0.9399
91	635202.0	5734993.0	3450.0	0.0571	0.9962	0.9391
92	635205.0	5734994.5	3450.0	0.0574	0.9977	0.9403
93	635208.0	5734996.5	3450.0	0.0569	0.9971	0.9402
94	635200.0	5735020.0	3474.5	0.0572	1.0021	0.9449
95	635203.0	5735021.0	3474.5	0.0570	1.0017	0.9448
96	635202.0	5735019.5	3474.5	0.0570	1.0016	0.9446
97	635198.0	5735017.0	3474.5	0.0569	1.0011	0.9441
98	635199.0	5735016.0	3474.5	0.0574	1.0020	0.9446
99	635199.0	5735017.0	3474.5	0.0571	1.0011	0.9440
100	635198.0	5735019.5	3474.5	0.0574	1.0015	0.9441

101	635200.0	5735020.0	3480.0	0.0572	1.0029	0.9457
102	635203.0	5735021.0	3480.0	0.0570	1.0026	0.9457
103	635202.0	5735019.5	3480.0	0.0570	1.0026	0.9456
104	635198.0	5735017.0	3480.0	0.0569	1.0021	0.9452
105	635199.0	5735016.0	3480.0	0.0574	1.0031	0.9457
106	635199.0	5735017.0	3480.0	0.0571	1.0020	0.9449
107	635198.0	5735019.5	3480.0	0.0574	1.0024	0.9450
108	635188.0	5735042.0	3504.5	0.0578	1.0290	0.9712
109	635186.0	5735040.0	3504.5	0.0568	1.0066	0.9497
110	635194.0	5735038.0	3504.5	0.0574	1.0074	0.9499
111	635196.0	5735042.0	3504.5	0.0571	1.0070	0.9499
112	635198.0	5735043.0	3504.5	0.0574	1.0072	0.9498
113	635196.5	5735043.0	3504.5	0.0575	1.0071	0.9496
114	635195.0	5735043.0	3504.5	0.0575	1.0074	0.9498
115	635194.0	5735044.5	3504.5	0.0572	1.0072	0.9500
116	635188.0	5735042.0	3510.0	0.0578	1.0120	0.9542
117	635186.0	5735040.0	3510.0	0.0568	1.0075	0.9507
118	635194.0	5735038.0	3510.0	0.0574	1.0083	0.9508
119	635196.0	5735042.0	3510.0	0.0571	1.0078	0.9507
120	635198.0	5735043.0	3510.0	0.0574	1.0081	0.9507
121	635196.5	5735043.0	3510.0	0.0575	1.0079	0.9505
122	635195.0	5735043.0	3510.0	0.0575	1.0082	0.9507
123	635194.0	5735044.5	3510.0	0.0572	1.0080	0.9508
124	635188.0	5735070.0	3534.5	0.0579	1.0122	0.9543
125	635189.0	5735063.0	3534.5	0.0574	1.0127	0.9553
126	635189.0	5735066.0	3534.5	0.0575	1.0124	0.9549
127	635183.0	5735074.0	3534.5	0.0575	1.0121	0.9546
128	635200.0	5735063.0	3534.5	0.0575	1.0124	0.9548
129	635200.0	5735064.0	3534.5	0.0583	1.0128	0.9545
130	635200.0	5735072.5	3534.5	0.0572	1.0115	0.9542
131	635182.0	5735078.0	3534.5	0.0575	1.0118	0.9543
132	635188.0	5735070.0	3540.0	0.0579	1.0131	0.9553
133	635189.0	5735063.0	3540.0	0.0574	1.0137	0.9564
134	635189.0	5735066.0	3540.0	0.0575	1.0134	0.9560
135	635183.0	5735074.0	3540.0	0.0575	1.0130	0.9555
136	635200.0	5735063.0	3540.0	0.0575	1.0133	0.9558
137	635200.0	5735064.0	3540.0	0.0583	1.0137	0.9555
138	635200.0	5735072.5	3540.0	0.0572	1.0125	0.9553
139	635182.0	5735078.0	3540.0	0.0575	1.0128	0.9554
140	635183.0	5735094.0	3564.5	0.0574	1.0154	0.9581
141	635196.0	5735093.0	3564.5	0.0580	1.0157	0.9577
142	635195.0	5735091.0	3564.5	0.0575	1.0156	0.9581
143	635192.0	5735092.0	3564.5	0.0570	1.0149	0.9578
144	635186.0	5735090.0	3564.5	0.0574	1.0156	0.9582
145	635186.0	5735090.0	3564.5	0.0574	1.0153	0.9579
146	635187.0	5735093.0	3564.5	0.0576	1.0153	0.9578
147	635198.0	5735096.0	3564.5	0.0574	1.0157	0.9583
148	635183.0	5735094.0	3570.0	0.0574	1.0164	0.9590
149	635196.0	5735093.0	3570.0	0.0580	1.0165	0.9585
150	635195.0	5735091.0	3570.0	0.0575	1.0164	0.9589
151	635192.0	5735092.0	3570.0	0.0570	1.0156	0.9585
152	635186.0	5735090.0	3570.0	0.0574	1.0165	0.9590
153	635186.0	5735090.0	3570.0	0.0574	1.0163	0.9588

154	635187.0	5735093.0	3570.0	0.0576	1.0163	0.9587
155	635198.0	5735096.0	3570.0	0.0574	1.0165	0.9591
156	635181.0	5735115.0	3594.5	0.0574	1.0181	0.9606
157	635186.0	5735113.0	3594.5	0.0570	1.0178	0.9608
158	635188.0	5735116.0	3594.5	0.0575	1.0180	0.9606
159	635191.0	5735122.5	3594.5	0.0574	1.0178	0.9604
160	635183.0	5735117.0	3594.5	0.0574	1.0184	0.9610
161	635185.0	5735118.0	3594.5	0.0574	1.0179	0.9605
162	635186.0	5735119.0	3594.5	0.0573	1.0178	0.9604
163	635188.0	5735115.0	3594.5	0.0574	1.0180	0.9607
164	635181.0	5735115.0	3600.0	0.0574	1.0187	0.9612
165	635186.0	5735113.0	3600.0	0.0570	1.0185	0.9615
166	635188.0	5735116.0	3600.0	0.0575	1.0187	0.9612
167	635191.0	5735122.5	3600.0	0.0574	1.0185	0.9611
168	635183.0	5735117.0	3600.0	0.0574	1.0192	0.9618
169	635185.0	5735118.0	3600.0	0.0574	1.0187	0.9613
170	635186.0	5735119.0	3600.0	0.0573	1.0186	0.9612
171	635188.0	5735115.0	3600.0	0.0574	1.0188	0.9615
172	635177.0	5735146.0	3624.5	0.0574	1.0202	0.9628
173	635177.0	5735144.0	3624.5	0.0574	1.0203	0.9629
174	635179.0	5735142.0	3624.5	0.0568	1.0198	0.9629
175	635181.0	5735141.0	3624.5	0.0575	1.0200	0.9624
176	635181.0	5735142.0	3624.5	0.0570	1.0194	0.9624
177	635183.0	5735144.0	3624.5	0.0574	1.0205	0.9630
178	635185.0	5735144.0	3624.5	0.0570	1.0198	0.9628
179	635177.0	5735146.0	3630.0	0.0574	1.0210	0.9636
180	635177.0	5735144.0	3630.0	0.0574	1.0215	0.9641
181	635179.0	5735142.0	3630.0	0.0568	1.0208	0.9640
182	635181.0	5735141.0	3630.0	0.0575	1.0212	0.9637
183	635181.0	5735142.0	3630.0	0.0570	1.0203	0.9633
184	635183.0	5735144.0	3630.0	0.0574	1.0214	0.9640
185	635185.0	5735144.0	3630.0	0.0570	1.0207	0.9637
186	635183.0	5735173.0	3654.5	0.0568	1.0237	0.9669
187	635178.0	5735169.0	3654.5	0.0572	1.0234	0.9662
188	635173.0	5735163.5	3654.5	0.0573	1.0236	0.9663
189	635186.0	5735170.0	3654.5	0.0580	1.0248	0.9669
190	635184.0	5735176.0	3654.5	0.0573	1.0236	0.9663
191	635176.0	5735177.0	3654.5	0.0575	1.0237	0.9662
192	635168.0	5735167.0	3654.5	0.0575	1.0239	0.9665
193	635183.0	5735173.0	3660.0	0.0568	1.0244	0.9676
194	635178.0	5735169.0	3660.0	0.0572	1.0242	0.9670
195	635173.0	5735163.5	3660.0	0.0573	1.0245	0.9671
196	635186.0	5735170.0	3660.0	0.0580	1.0257	0.9678
197	635184.0	5735176.0	3660.0	0.0573	1.0244	0.9671
198	635176.0	5735177.0	3660.0	0.0575	1.0246	0.9671
199	635168.0	5735167.0	3660.0	0.0575	1.0247	0.9672
200	635177.0	5735197.5	3684.5	0.0569	1.0270	0.9701
201	635178.0	5735197.5	3684.5	0.0568	1.0268	0.9700
202	635179.0	5735198.0	3684.5	0.0573	1.0275	0.9702
203	635181.0	5735198.0	3684.5	0.0568	1.0270	0.9702
204	635181.0	5735198.0	3684.5	0.0569	1.0271	0.9702
205	635179.0	5735199.0	3684.5	0.0575	1.0276	0.9701
206	635179.0	5735196.0	3684.5	0.0574	1.0277	0.9703

207	635177.0	5735197.5	3690.0	0.0569	1.0280	0.9711
208	635178.0	5735197.5	3690.0	0.0568	1.0278	0.9710
209	635179.0	5735198.0	3690.0	0.0573	1.0286	0.9713
210	635181.0	5735198.0	3690.0	0.0568	1.0277	0.9710
211	635181.0	5735198.0	3690.0	0.0569	1.0282	0.9713
212	635179.0	5735199.0	3690.0	0.0575	1.0284	0.9710
213	635179.0	5735196.0	3690.0	0.0574	1.0285	0.9710
214	635174.0	5735226.0	3714.5	0.0575	1.0311	0.9737
215	635177.0	5735224.0	3714.5	0.0574	1.0310	0.9737
216	635179.0	5735223.0	3714.5	0.0575	1.0313	0.9738
217	635176.0	5735222.5	3714.5	0.0573	1.0307	0.9734
218	635171.0	5735224.5	3714.5	0.0575	1.0307	0.9732
219	635168.0	5735224.0	3714.5	0.0575	1.0312	0.9737
220	635169.0	5735222.5	3714.5	0.0574	1.0313	0.9740
221	635170.0	5735222.5	3714.5	0.0574	1.0311	0.9737
222	635174.0	5735226.0	3720.0	0.0575	1.0322	0.9748
223	635177.0	5735224.0	3720.0	0.0574	1.0322	0.9748
224	635179.0	5735223.0	3720.0	0.0575	1.0324	0.9749
225	635176.0	5735222.5	3720.0	0.0573	1.0318	0.9746
226	635171.0	5735224.5	3720.0	0.0575	1.0319	0.9744
227	635168.0	5735224.0	3720.0	0.0575	1.0323	0.9748
228	635169.0	5735222.5	3720.0	0.0574	1.0324	0.9751
229	635170.0	5735222.5	3720.0	0.0574	1.0322	0.9748
230	635168.0	5735247.5	3744.3	0.0574	1.0345	0.9771
231	635168.0	5735247.5	3744.3	0.0574	1.0337	0.9763
232	635168.0	5735248.0	3744.3	0.0572	1.0339	0.9767
233	635167.0	5735250.5	3744.3	0.0570	1.0334	0.9764
234	635167.0	5735250.5	3744.3	0.0568	1.0331	0.9764
235	635168.0	5735242.0	3744.3	0.0574	1.0344	0.9771
236	635167.0	5735243.0	3744.3	0.0578	1.0347	0.9769
237	635168.0	5735247.5	3750.0	0.0574	1.0355	0.9781
238	635168.0	5735247.5	3750.0	0.0574	1.0344	0.9770
239	635168.0	5735248.0	3750.0	0.0572	1.0347	0.9776
240	635167.0	5735250.5	3750.0	0.0570	1.0344	0.9773
241	635167.0	5735250.5	3750.0	0.0568	1.0340	0.9773
242	635168.0	5735242.0	3750.0	0.0574	1.0352	0.9779
243	635167.0	5735243.0	3750.0	0.0578	1.0355	0.9778
244	635163.0	5735274.0	3774.5	0.0578	1.0376	0.9798
245	635163.0	5735275.5	3774.5	0.0575	1.0376	0.9801
246	635170.0	5735276.0	3774.5	0.0575	1.0374	0.9799
247	635173.0	5735277.5	3774.5	0.0569	1.0361	0.9793
248	635172.0	5735279.0	3774.5	0.0575	1.0377	0.9802
249	635170.0	5735279.0	3774.5	0.0575	1.0373	0.9798
250	635167.0	5735277.5	3774.5	0.0570	1.0365	0.9795
251	635163.0	5735274.0	3780.0	0.0578	1.0385	0.9807
252	635163.0	5735275.5	3780.0	0.0575	1.0387	0.9812
253	635170.0	5735276.0	3780.0	0.0575	1.0383	0.9808
254	635173.0	5735277.5	3780.0	0.0569	1.0372	0.9803
255	635172.0	5735279.0	3780.0	0.0575	1.0387	0.9812
256	635170.0	5735279.0	3780.0	0.0575	1.0384	0.9809
257	635167.0	5735277.5	3780.0	0.0570	1.0376	0.9806
258	635166.0	5735301.0	3803.9	0.0576	1.0406	0.9830
259	635163.0	5735301.5	3803.9	0.0569	1.0391	0.9822

260	635160.0	5735302.0	3803.9	0.0574	1.0399	0.9824
261	635160.0	5735302.0	3803.9	0.0575	1.0400	0.9826
262	635161.0	5735299.0	3803.9	0.0575	1.0406	0.9831
263	635162.0	5735298.0	3803.9	0.0568	1.0400	0.9832
264	635161.0	5735300.5	3803.9	0.0570	1.0397	0.9827
265	635166.0	5735301.0	3810.0	0.0576	1.0419	0.9842
266	635163.0	5735301.5	3810.0	0.0569	1.0402	0.9834
267	635160.0	5735302.0	3810.0	0.0574	1.0410	0.9836
268	635160.0	5735302.0	3810.0	0.0575	1.0412	0.9837
269	635161.0	5735299.0	3810.0	0.0575	1.0418	0.9843
270	635162.0	5735298.0	3810.0	0.0568	1.0411	0.9843
271	635161.0	5735300.5	3810.0	0.0570	1.0408	0.9839
272	635163.0	5735325.5	3834.5	0.0570	1.0428	0.9857
273	635160.0	5735321.0	3834.5	0.0568	1.0425	0.9856
274	635154.0	5735313.0	3834.5	0.0574	1.0438	0.9864
275	635151.0	5735311.5	3834.5	0.0574	1.0449	0.9875
276	635147.0	5735287.0	3834.5	0.0570	1.0442	0.9872
277	635150.0	5735312.0	3834.5	0.0581	1.0459	0.9878
278	635153.0	5735337.0	3834.5	0.0574	1.0428	0.9854
279	635165.0	5735330.0	3834.5	0.0568	1.0421	0.9852
280	635161.0	5735323.0	3834.5	0.0575	1.0435	0.9860
281	635157.0	5735321.0	3834.5	0.0574	1.0431	0.9857
282	635160.0	5735329.0	3834.5	0.0574	1.0431	0.9856
283	635161.0	5735331.0	3834.5	0.0568	1.0419	0.9850
284	635163.0	5735325.5	3840.0	0.0570	1.0436	0.9866
285	635160.0	5735321.0	3840.0	0.0568	1.0433	0.9865
286	635154.0	5735313.0	3840.0	0.0574	1.0444	0.9870
287	635151.0	5735311.5	3840.0	0.0574	1.0461	0.9887
288	635147.0	5735287.0	3840.0	0.0570	1.0452	0.9882
289	635150.0	5735312.0	3840.0	0.0581	1.0471	0.9890
290	635153.0	5735337.0	3840.0	0.0574	1.0435	0.9862
291	635165.0	5735330.0	3840.0	0.0568	1.0431	0.9863
292	635161.0	5735323.0	3840.0	0.0575	1.0442	0.9867
293	635157.0	5735321.0	3840.0	0.0574	1.0440	0.9866
294	635160.0	5735329.0	3840.0	0.0574	1.0439	0.9865
295	635161.0	5735331.0	3840.0	0.0568	1.0430	0.9862
296	635152.0	5735349.0	3864.5	0.0575	1.0463	0.9888
297	635154.0	5735349.0	3864.5	0.0575	1.0466	0.9891
298	635155.0	5735350.5	3864.5	0.0568	1.0458	0.9890
299	635155.0	5735351.0	3864.5	0.0574	1.0465	0.9891
300	635154.0	5735352.0	3864.5	0.0574	1.0455	0.9881
301	635154.0	5735352.5	3864.5	0.0574	1.0463	0.9889
302	635159.0	5735354.0	3864.5	0.0574	1.0458	0.9885
303	635152.0	5735349.0	3870.0	0.0575	1.0472	0.9897
304	635154.0	5735349.0	3870.0	0.0575	1.0476	0.9901
305	635155.0	5735350.5	3870.0	0.0568	1.0469	0.9901
306	635155.0	5735351.0	3870.0	0.0574	1.0473	0.9899
307	635154.0	5735352.0	3870.0	0.0574	1.0465	0.9891
308	635154.0	5735352.5	3870.0	0.0574	1.0472	0.9898
309	635159.0	5735354.0	3870.0	0.0574	1.0468	0.9895
310	635148.0	5735377.5	3894.5	0.0578	1.0494	0.9915
311	635147.0	5735375.5	3894.5	0.0575	1.0492	0.9918
312	635150.0	5735373.0	3894.5	0.0575	1.0491	0.9916

313	635154.0	5735376.0	3894.5	0.0570	1.0488	0.9918
314	635152.0	5735376.0	3894.5	0.0569	1.0493	0.9924
315	635145.0	5735374.0	3894.5	0.0575	1.0494	0.9919
316	635146.5	5735376.0	3894.5	0.0575	1.0494	0.9919
317	635148.0	5735377.5	3900.0	0.0578	1.0504	0.9926
318	635147.0	5735375.5	3900.0	0.0575	1.0507	0.9932
319	635150.0	5735373.0	3900.0	0.0575	1.0500	0.9925
320	635154.0	5735376.0	3900.0	0.0570	1.0498	0.9928
321	635152.0	5735376.0	3900.0	0.0569	1.0507	0.9937
322	635145.0	5735374.0	3900.0	0.0575	1.0505	0.9930
323	635146.5	5735376.0	3900.0	0.0575	1.0507	0.9932
324	635142.0	5735398.0	3924.5	0.0574	1.0532	0.9958
325	635142.0	5735400.5	3924.5	0.0574	1.0522	0.9948
326	635142.0	5735401.0	3924.5	0.0574	1.0528	0.9954
327	635143.0	5735402.0	3924.5	0.0568	1.0519	0.9951
328	635144.0	5735401.0	3924.5	0.0575	1.0524	0.9950
329	635146.0	5735400.5	3924.5	0.0568	1.0524	0.9956
330	635146.0	5735401.0	3924.5	0.0570	1.0524	0.9954
331	635148.0	5735400.5	3924.5	0.0574	1.0528	0.9954
332	635142.0	5735398.0	3930.0	0.0574	1.0540	0.9966
333	635142.0	5735400.5	3930.0	0.0574	1.0533	0.9959
334	635142.0	5735401.0	3930.0	0.0574	1.0536	0.9962
335	635143.0	5735402.0	3930.0	0.0568	1.0529	0.9960
336	635144.0	5735401.0	3930.0	0.0575	1.0533	0.9958
337	635146.0	5735400.5	3930.0	0.0568	1.0535	0.9967
338	635146.0	5735401.0	3930.0	0.0570	1.0534	0.9964
339	635148.0	5735400.5	3930.0	0.0574	1.0538	0.9964
340	635139.0	5735426.0	3954.3	0.0574	1.0563	0.9989
341	635137.0	5735427.5	3954.3	0.0565	1.0530	0.9966
342	635136.0	5735427.5	3954.3	0.0574	1.0557	0.9983
343	635139.0	5735426.0	3954.3	0.0574	1.0556	0.9982
344	635141.0	5735426.0	3954.3	0.0565	1.0561	0.9995
345	635144.0	5735430.5	3954.3	0.0568	1.0553	0.9985
346	635139.0	5735432.0	3954.3	0.0574	1.0557	0.9983
347	635134.0	5735425.5	3954.3	0.0568	1.0551	0.9983
348	635135.0	5735418.0	3954.3	0.0574	1.0564	0.9990
349	635139.0	5735426.0	3960.0	0.0574	1.0574	1.0000
350	635137.0	5735427.5	3960.0	0.0565	1.0599	1.0034
351	635136.0	5735427.5	3960.0	0.0574	1.0569	0.9995
352	635139.0	5735426.0	3960.0	0.0574	1.0568	0.9994
353	635141.0	5735426.0	3960.0	0.0565	1.0572	1.0007
354	635144.0	5735430.5	3960.0	0.0568	1.0565	0.9997
355	635139.0	5735432.0	3960.0	0.0574	1.0568	0.9994
356	635134.0	5735425.5	3960.0	0.0568	1.0562	0.9994
357	635135.0	5735418.0	3960.0	0.0574	1.0577	1.0003
358	635134.0	5735451.0	3984.5	0.0568	1.0590	1.0022
359	635133.0	5735448.0	3984.5	0.0574	1.0595	1.0021
360	635134.0	5735449.0	3984.5	0.0569	1.0589	1.0021
361	635135.0	5735449.0	3984.5	0.0568	1.0587	1.0020
362	635136.0	5735450.5	3984.5	0.0574	1.0591	1.0017
363	635137.0	5735452.0	3984.5	0.0574	1.0591	1.0017
364	635136.0	5735455.0	3984.5	0.0567	1.0581	1.0014
365	635134.0	5735455.0	3984.5	0.0569	1.0578	1.0010

366	635134.0	5735451.0	3990.0	0.0568	1.0600	1.0032
367	635133.0	5735448.0	3990.0	0.0574	1.0610	1.0036
368	635134.0	5735449.0	3990.0	0.0569	1.0601	1.0033
369	635135.0	5735449.0	3990.0	0.0568	1.0601	1.0033
370	635136.0	5735450.5	3990.0	0.0574	1.0605	1.0031
371	635137.0	5735452.0	3990.0	0.0574	1.0606	1.0031
372	635136.0	5735455.0	3990.0	0.0567	1.0589	1.0023
373	635134.0	5735455.0	3990.0	0.0569	1.0588	1.0019
374	635127.0	5735475.0	4014.5	0.0574	1.0635	1.0060
375	635131.0	5735474.0	4014.5	0.0568	1.0632	1.0063
376	635135.0	5735475.0	4014.5	0.0575	1.0639	1.0064
377	635132.5	5735474.5	4014.5	0.0574	1.0634	1.0060
378	635130.0	5735474.0	4014.5	0.0567	1.0623	1.0056
379	635122.0	5735472.0	4014.5	0.0574	1.0638	1.0063
380	635125.0	5735473.0	4014.5	0.0568	1.0631	1.0063
381	635127.0	5735475.0	4020.0	0.0574	1.0654	1.0080
382	635131.0	5735474.0	4020.0	0.0568	1.0648	1.0079
383	635135.0	5735475.0	4020.0	0.0575	1.0647	1.0072
384	635132.5	5735474.5	4020.0	0.0574	1.0660	1.0086
385	635130.0	5735474.0	4020.0	0.0567	1.0649	1.0081
386	635122.0	5735472.0	4020.0	0.0574	1.0647	1.0073
387	635125.0	5735473.0	4020.0	0.0568	1.0636	1.0069
388	635131.0	5735498.0	4044.5	0.0568	1.0702	1.0134
389	635132.0	5735502.0	4044.5	0.0565	1.0691	1.0125
390	635131.0	5735502.0	4044.5	0.0567	1.0709	1.0142
391	635128.0	5735502.0	4044.5	0.0568	1.0677	1.0110
392	635130.0	5735498.0	4044.5	0.0574	1.0690	1.0116
393	635134.0	5735499.0	4044.5	0.0567	1.0679	1.0111
394	635132.0	5735501.0	4044.5	0.0568	1.0764	1.0196
395	635125.0	5735500.0	4044.5	0.0568	1.0693	1.0125
396	635126.0	5735497.0	4044.5	0.0569	1.0681	1.0111
397	635127.0	5735496.0	4044.5	0.0574	1.0692	1.0118
398	635127.5	5735499.0	4044.5	0.0574	1.0673	1.0099
399	635128.0	5735502.0	4044.5	0.0568	1.0686	1.0118
400	635131.0	5735498.0	4050.0	0.0568	1.0698	1.0130
401	635132.0	5735502.0	4050.0	0.0565	1.0689	1.0124
402	635131.0	5735502.0	4050.0	0.0567	1.0707	1.0139
403	635128.0	5735502.0	4050.0	0.0568	1.0694	1.0127
404	635130.0	5735498.0	4050.0	0.0574	1.0698	1.0124
405	635134.0	5735499.0	4050.0	0.0567	1.0697	1.0130
406	635132.0	5735501.0	4050.0	0.0568	1.0625	1.0057
407	635125.0	5735500.0	4050.0	0.0568	1.0697	1.0128
408	635126.0	5735497.0	4050.0	0.0569	1.0692	1.0122
409	635127.0	5735496.0	4050.0	0.0574	1.0702	1.0128
410	635127.5	5735499.0	4050.0	0.0574	1.0700	1.0126
411	635128.0	5735502.0	4050.0	0.0568	1.0683	1.0114
412	635131.0	5735526.0	4074.4	0.0567	1.0743	1.0176
413	635131.0	5735526.0	4074.4	0.0566	1.0737	1.0172
414	635130.0	5735528.5	4074.4	0.0574	1.0721	1.0147
415	635129.0	5735529.0	4074.4	0.0574	1.0730	1.0155
416	635126.0	5735530.5	4074.4	0.0574	1.0732	1.0158
417	635127.0	5735529.0	4074.4	0.0574	1.0731	1.0157
418	635129.0	5735527.0	4074.4	0.0568	1.0723	1.0155

419	635131.0	5735528.5	4074.4	0.0565	1.0726	1.0161
420	635130.0	5735529.0	4074.4	0.0574	1.0737	1.0163
421	635127.0	5735527.0	4074.4	0.0574	1.0731	1.0157
422	635123.0	5735528.5	4074.4	0.0574	1.0730	1.0157
423	635131.0	5735526.0	4080.0	0.0567	1.0736	1.0169
424	635131.0	5735526.0	4080.0	0.0566	1.0740	1.0174
425	635130.0	5735528.5	4080.0	0.0574	1.0747	1.0173
426	635129.0	5735529.0	4080.0	0.0574	1.0747	1.0173
427	635126.0	5735530.5	4080.0	0.0574	1.0744	1.0170
428	635127.0	5735529.0	4080.0	0.0574	1.0747	1.0173
429	635129.0	5735527.0	4080.0	0.0568	1.0741	1.0173
430	635131.0	5735528.5	4080.0	0.0565	1.0734	1.0169
431	635130.0	5735529.0	4080.0	0.0574	1.0746	1.0172
432	635127.0	5735527.0	4080.0	0.0574	1.0765	1.0191
433	635123.0	5735528.5	4080.0	0.0574	1.0739	1.0165
434	635127.0	5735548.0	4104.5	0.0570	1.0782	1.0212
435	635127.0	5735549.0	4104.5	0.0567	1.0775	1.0208
436	635125.0	5735552.0	4104.5	0.0570	1.0776	1.0206
437	635121.0	5735549.0	4104.5	0.0568	1.0769	1.0201
438	635119.0	5735547.0	4104.5	0.0565	1.0772	1.0207
439	635124.0	5735549.0	4104.5	0.0569	1.0778	1.0210
440	635128.0	5735553.5	4104.5	0.0567	1.0779	1.0212
441	635128.0	5735555.0	4104.5	0.0566	1.0771	1.0205
442	635123.0	5735554.0	4104.5	0.0574	1.0774	1.0200
443	635127.0	5735548.0	4110.0	0.0570	1.0797	1.0228
444	635127.0	5735549.0	4110.0	0.0567	1.0807	1.0240
445	635125.0	5735552.0	4110.0	0.0570	1.0785	1.0216
446	635121.0	5735549.0	4110.0	0.0568	1.0787	1.0218
447	635119.0	5735547.0	4110.0	0.0565	1.0787	1.0222
448	635124.0	5735549.0	4110.0	0.0569	1.0785	1.0216
449	635128.0	5735553.5	4110.0	0.0567	1.0793	1.0226
450	635128.0	5735555.0	4110.0	0.0566	1.0785	1.0219
451	635123.0	5735554.0	4110.0	0.0574	1.0786	1.0212
452	635122.0	5735578.5	4134.5	0.0569	1.0826	1.0256
453	635116.0	5735579.0	4134.5	0.0575	1.0781	1.0206
454	635115.0	5735575.0	4134.5	0.0567	1.0803	1.0236
455	635123.0	5735575.0	4134.5	0.0569	1.0823	1.0255
456	635126.0	5735580.0	4134.5	0.0574	1.0836	1.0263
457	635119.0	5735579.0	4134.5	0.0575	1.0828	1.0253
458	635117.0	5735573.0	4134.5	0.0575	1.0849	1.0274
459	635118.0	5735572.0	4134.5	0.0569	1.0834	1.0265
460	635121.0	5735572.0	4134.5	0.0575	1.0827	1.0252
461	635124.0	5735575.0	4134.5	0.0568	1.0833	1.0265
462	635125.0	5735577.0	4134.5	0.0574	1.0834	1.0260
463	635120.0	5735575.0	4134.5	0.0574	1.0801	1.0228
464	635124.0	5735580.5	4134.5	0.0574	1.0825	1.0251
465	635125.0	5735582.0	4134.5	0.0568	1.0825	1.0257
466	635118.0	5735577.0	4134.5	0.0567	1.0820	1.0253
467	635116.0	5735573.0	4134.5	0.0574	1.0829	1.0255
468	635119.0	5735572.0	4134.5	0.0568	1.0822	1.0254
469	635123.0	5735573.0	4134.5	0.0573	1.0836	1.0262
470	635125.0	5735575.0	4134.5	0.0568	1.0818	1.0250
471	635122.0	5735578.5	4140.0	0.0569	1.0824	1.0255

472	635116.0	5735579.0	4140.0	0.0575	1.0833	1.0258
473	635115.0	5735575.0	4140.0	0.0567	1.0829	1.0262
474	635123.0	5735575.0	4140.0	0.0569	1.0834	1.0266
475	635126.0	5735580.0	4140.0	0.0574	1.0836	1.0262
476	635119.0	5735579.0	4140.0	0.0575	1.0835	1.0260
477	635117.0	5735573.0	4140.0	0.0575	1.0845	1.0271
478	635118.0	5735572.0	4140.0	0.0569	1.0833	1.0264
479	635121.0	5735572.0	4140.0	0.0575	1.0849	1.0273
480	635124.0	5735575.0	4140.0	0.0568	1.0825	1.0257
481	635125.0	5735577.0	4140.0	0.0574	1.0847	1.0273
482	635120.0	5735575.0	4140.0	0.0574	1.0841	1.0268
483	635124.0	5735580.5	4140.0	0.0574	1.0843	1.0269
484	635125.0	5735582.0	4140.0	0.0568	1.0841	1.0273
485	635118.0	5735577.0	4140.0	0.0567	1.0835	1.0268
486	635116.0	5735573.0	4140.0	0.0574	1.0843	1.0269
487	635119.0	5735572.0	4140.0	0.0568	1.0831	1.0263
488	635123.0	5735573.0	4140.0	0.0573	1.0844	1.0270
489	635125.0	5735575.0	4140.0	0.0568	1.0826	1.0258
490	635119.0	5735597.0	4164.5	0.0574	1.0871	1.0297
491	635123.0	5735604.0	4164.5	0.0568	1.0861	1.0293
492	635121.0	5735605.0	4164.5	0.0575	1.0864	1.0290
493	635120.0	5735604.0	4164.5	0.0570	1.0860	1.0290
494	635119.0	5735602.0	4164.5	0.0574	1.0862	1.0288
495	635117.0	5735601.0	4164.5	0.0573	1.0859	1.0286
496	635115.0	5735601.0	4164.5	0.0575	1.0869	1.0294
497	635114.0	5735601.0	4164.5	0.0581	1.0870	1.0289
498	635119.0	5735597.0	4170.0	0.0574	1.0884	1.0310
499	635123.0	5735604.0	4170.0	0.0568	1.0874	1.0306
500	635121.0	5735605.0	4170.0	0.0575	1.0878	1.0304
501	635120.0	5735604.0	4170.0	0.0570	1.0871	1.0301
502	635119.0	5735602.0	4170.0	0.0574	1.0871	1.0297
503	635117.0	5735601.0	4170.0	0.0573	1.0871	1.0298
504	635115.0	5735601.0	4170.0	0.0575	1.0881	1.0306
505	635114.0	5735601.0	4170.0	0.0581	1.0881	1.0300
506	635114.0	5735631.5	4194.4	0.0574	1.0891	1.0317
507	635113.0	5735629.0	4194.4	0.0575	1.0888	1.0313
508	635114.0	5735631.5	4200.0	0.0574	1.0889	1.0316
509	635113.0	5735629.0	4200.0	0.0575	1.0911	1.0337
510	635116.0	5735648.0	4224.5	0.0571	1.0945	1.0375
511	635114.0	5735646.0	4224.5	0.0568	1.0951	1.0383
512	635112.0	5735647.0	4224.5	0.0571	1.0944	1.0374
513	635111.0	5735651.0	4224.5	0.0572	1.0940	1.0368
514	635115.0	5735654.0	4224.5	0.0575	1.0952	1.0377
515	635115.0	5735654.0	4224.5	0.0575	1.0948	1.0373
516	635117.0	5735653.0	4224.5	0.0570	1.0950	1.0380
517	635116.0	5735653.0	4224.5	0.0570	1.0943	1.0374
518	635113.0	5735653.0	4224.5	0.0569	1.0941	1.0372
519	635111.0	5735653.0	4224.5	0.0568	1.0936	1.0368
520	635110.0	5735652.0	4224.5	0.0569	1.0936	1.0367
521	635113.0	5735648.0	4224.5	0.0569	1.0943	1.0374
522	635112.0	5735649.0	4224.5	0.0569	1.0945	1.0377
523	635115.0	5735653.0	4224.5	0.0573	1.0952	1.0379
524	635116.0	5735648.0	4230.0	0.0571	1.0962	1.0391

525	635114.0	5735646.0	4230.0	0.0568	1.0955	1.0387
526	635112.0	5735647.0	4230.0	0.0571	1.0958	1.0387
527	635111.0	5735651.0	4230.0	0.0572	1.0885	1.0313
528	635115.0	5735654.0	4230.0	0.0575	1.0961	1.0387
529	635115.0	5735654.0	4230.0	0.0575	1.0959	1.0385
530	635117.0	5735653.0	4230.0	0.0570	1.0962	1.0393
531	635116.0	5735653.0	4230.0	0.0570	1.0955	1.0386
532	635113.0	5735653.0	4230.0	0.0569	1.0951	1.0382
533	635111.0	5735653.0	4230.0	0.0568	1.0954	1.0385
534	635110.0	5735652.0	4230.0	0.0569	1.0950	1.0381
535	635113.0	5735648.0	4230.0	0.0569	1.0949	1.0381
536	635112.0	5735649.0	4230.0	0.0569	1.0958	1.0390
537	635115.0	5735653.0	4230.0	0.0573	1.0965	1.0392
538	635111.0	5735685.0	4254.5	0.0574	1.0991	1.0417
539	635108.0	5735683.0	4254.5	0.0567	1.0979	1.0412
540	635106.0	5735679.0	4254.5	0.0575	1.0991	1.0416
541	635107.0	5735671.0	4254.5	0.0574	1.0990	1.0416
542	635109.0	5735672.0	4254.5	0.0570	1.0979	1.0410
543	635109.0	5735675.0	4254.5	0.0575	1.0986	1.0411
544	635110.0	5735680.0	4254.5	0.0574	1.0989	1.0415
545	635111.0	5735685.0	4260.0	0.0574	1.1003	1.0429
546	635108.0	5735683.0	4260.0	0.0567	1.0991	1.0424
547	635106.0	5735679.0	4260.0	0.0575	1.1002	1.0427
548	635107.0	5735671.0	4260.0	0.0574	1.1001	1.0426
549	635109.0	5735672.0	4260.0	0.0570	1.0992	1.0423
550	635109.0	5735675.0	4260.0	0.0575	1.0999	1.0424
551	635110.0	5735680.0	4260.0	0.0574	1.1000	1.0426
552	635103.0	5735708.0	4284.5	0.0574	1.1032	1.0458
553	635105.0	5735706.5	4284.5	0.0569	1.1028	1.0459
554	635108.0	5735702.0	4284.5	0.0570	1.1030	1.0460
555	635108.0	5735700.0	4284.5	0.0576	1.1036	1.0460
556	635109.0	5735704.0	4284.5	0.0575	1.1037	1.0462
557	635113.0	5735708.5	4284.5	0.0574	1.1031	1.0457
558	635110.0	5735706.5	4284.5	0.0570	1.1030	1.0461
559	635106.5	5735707.0	4284.5	0.0575	1.1041	1.0467
560	635103.0	5735708.0	4290.0	0.0574	1.1045	1.0471
561	635105.0	5735706.5	4290.0	0.0569	1.1047	1.0478
562	635108.0	5735702.0	4290.0	0.0570	1.1046	1.0476
563	635108.0	5735700.0	4290.0	0.0576	1.1011	1.0435
564	635109.0	5735704.0	4290.0	0.0575	1.1050	1.0475
565	635113.0	5735708.5	4290.0	0.0574	1.1047	1.0473
566	635110.0	5735706.5	4290.0	0.0570	1.1041	1.0471
567	635106.5	5735707.0	4290.0	0.0575	1.1052	1.0478
568	635109.0	5735735.0	4314.5	0.0574	1.1081	1.0507
569	635109.0	5735733.5	4314.5	0.0572	1.1085	1.0513
570	635108.0	5735733.0	4314.5	0.0569	1.1120	1.0551
571	635108.0	5735727.0	4314.5	0.0575	1.1075	1.0500
572	635108.0	5735725.0	4314.5	0.0575	1.1083	1.0508
573	635107.0	5735725.0	4314.5	0.0575	1.1085	1.0510
574	635109.0	5735737.0	4314.5	0.0569	1.1076	1.0506
575	635109.0	5735736.0	4314.5	0.0570	1.1079	1.0509
576	635109.0	5735729.0	4314.5	0.0575	1.1089	1.0513
577	635106.0	5735727.0	4314.5	0.0572	1.1075	1.0503

578	635109.0	5735735.0	4320.0	0.0574	1.1089	1.0516
579	635109.0	5735733.5	4320.0	0.0572	1.1083	1.0512
580	635108.0	5735733.0	4320.0	0.0569	1.1290	1.0721
581	635108.0	5735727.0	4320.0	0.0575	1.1092	1.0517
582	635108.0	5735725.0	4320.0	0.0575	1.1089	1.0514
583	635107.0	5735725.0	4320.0	0.0575	1.1096	1.0521
584	635109.0	5735737.0	4320.0	0.0569	1.1083	1.0514
585	635109.0	5735736.0	4320.0	0.0570	1.1084	1.0514
586	635109.0	5735729.0	4320.0	0.0575	1.1098	1.0523
587	635106.0	5735727.0	4320.0	0.0572	1.1085	1.0512
588	635106.0	5735760.0	4344.5	0.0570	1.1112	1.0542
589	635102.0	5735757.0	4344.5	0.0575	1.1119	1.0544
590	635102.0	5735758.5	4344.5	0.0575	1.1121	1.0546
591	635105.0	5735760.0	4344.5	0.0574	1.1115	1.0541
592	635108.0	5735760.0	4344.5	0.0578	1.1120	1.0543
593	635108.0	5735758.0	4344.5	0.0585	1.1122	1.0537
594	635105.0	5735757.0	4344.5	0.0581	1.1116	1.0535
595	635099.0	5735750.0	4344.5	0.0578	1.1120	1.0542
596	635103.0	5735754.0	4344.5	0.0576	1.1118	1.0542
597	635106.0	5735760.0	4350.0	0.0570	1.1124	1.0554
598	635102.0	5735757.0	4350.0	0.0575	1.1131	1.0556
599	635102.0	5735758.5	4350.0	0.0575	1.1131	1.0556
600	635105.0	5735760.0	4350.0	0.0574	1.1127	1.0553
601	635108.0	5735760.0	4350.0	0.0578	1.1133	1.0556
602	635108.0	5735758.0	4350.0	0.0585	1.1131	1.0546
603	635105.0	5735757.0	4350.0	0.0581	1.1128	1.0547
604	635099.0	5735750.0	4350.0	0.0578	1.1130	1.0552
605	635103.0	5735754.0	4350.0	0.0576	1.1130	1.0555
606	635089.0	5735766.0	4374.5	0.0571	1.1163	1.0592
607	635092.0	5735772.5	4374.5	0.0574	1.1166	1.0591
608	635095.0	5735775.0	4374.5	0.0574	1.1167	1.0592
609	635099.0	5735776.0	4374.5	0.0574	1.1165	1.0592
610	635099.0	5735785.0	4374.5	0.0574	1.1162	1.0588
611	635101.0	5735782.0	4374.5	0.0568	1.1151	1.0582
612	635099.0	5735780.0	4374.5	0.0565	1.1152	1.0588
613	635089.0	5735766.0	4380.0	0.0571	1.1175	1.0604
614	635092.0	5735772.5	4380.0	0.0574	1.1175	1.0601
615	635095.0	5735775.0	4380.0	0.0574	1.1174	1.0600
616	635099.0	5735776.0	4380.0	0.0574	1.1175	1.0601
617	635099.0	5735785.0	4380.0	0.0574	1.1170	1.0596
618	635101.0	5735782.0	4380.0	0.0568	1.1160	1.0592
619	635099.0	5735780.0	4380.0	0.0565	1.1162	1.0597
620	635092.0	5735940.0	4404.5	0.0578	1.1197	1.0620
621	635092.0	5735938.0	4404.5	0.0568	1.1181	1.0614
622	635093.0	5735934.5	4404.5	0.0573	1.1186	1.0612
623	635090.0	5735941.0	4404.5	0.0575	1.1191	1.0616
624	635092.0	5735936.5	4404.5	0.0565	1.1176	1.0611
625	635091.0	5735934.5	4404.5	0.0573	1.1193	1.0620
626	635085.0	5735929.0	4404.5	0.0566	1.1180	1.0613
627	635087.0	5735935.0	4404.5	0.0574	1.1188	1.0615
628	635099.0	5735936.5	4404.5	0.0574	1.1186	1.0613
629	635092.0	5735940.0	4410.0	0.0578	1.1198	1.0621
630	635092.0	5735938.0	4410.0	0.0568	1.1187	1.0619

631	635093.0	5735934.5	4410.0	0.0573	1.1194	1.0620
632	635090.0	5735941.0	4410.0	0.0575	1.1196	1.0621
633	635092.0	5735936.5	4410.0	0.0565	1.1183	1.0618
634	635091.0	5735934.5	4410.0	0.0573	1.1199	1.0625
635	635085.0	5735929.0	4410.0	0.0566	1.1193	1.0627
636	635087.0	5735935.0	4410.0	0.0574	1.1198	1.0624
637	635099.0	5735936.5	4410.0	0.0574	1.1193	1.0620
638	635091.0	5735965.0	4434.5	0.0572	1.1227	1.0655
639	635093.0	5735958.0	4434.5	0.0574	1.1241	1.0667
640	635087.0	5735961.5	4434.5	0.0575	1.1239	1.0664
641	635087.0	5735965.0	4434.5	0.0575	1.1245	1.0670
642	635086.0	5735958.0	4434.5	0.0570	1.1240	1.0670
643	635094.0	5735960.0	4434.5	0.0574	1.1241	1.0666
644	635096.0	5735960.0	4434.5	0.0575	1.1235	1.0660
645	635092.0	5735966.0	4434.5	0.0566	1.1224	1.0658
646	635090.0	5735964.0	4434.5	0.0569	1.1231	1.0662
647	635091.0	5735957.0	4434.5	0.0575	1.1238	1.0663
648	635089.0	5735955.0	4434.5	0.0575	1.1234	1.0659
649	635087.0	5735959.5	4434.5	0.0574	1.1232	1.0657
650	635089.0	5735961.5	4434.5	0.0569	1.1229	1.0660
651	635091.0	5735965.0	4440.0	0.0572	1.1235	1.0663
652	635093.0	5735958.0	4440.0	0.0574	1.1252	1.0678
653	635087.0	5735961.5	4440.0	0.0575	1.1252	1.0677
654	635087.0	5735965.0	4440.0	0.0575	1.1250	1.0675
655	635086.0	5735958.0	4440.0	0.0570	1.1245	1.0676
656	635094.0	5735960.0	4440.0	0.0574	1.1249	1.0674
657	635096.0	5735960.0	4440.0	0.0575	1.1244	1.0669
658	635092.0	5735966.0	4440.0	0.0566	1.1234	1.0668
659	635090.0	5735964.0	4440.0	0.0569	1.1240	1.0671
660	635091.0	5735957.0	4440.0	0.0575	1.1248	1.0673
661	635089.0	5735955.0	4440.0	0.0575	1.1244	1.0669
662	635087.0	5735959.5	4440.0	0.0574	1.1241	1.0667
663	635089.0	5735961.5	4440.0	0.0569	1.1237	1.0668

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D. Geophysical airgun report

1. Level number: the level number starting from the top level (includes any imposed shots).
2. Measured depth from KB: the depth in metres from kelly bushing.
3. Vertical depth from SRD: the depth in metres from seismic reference datum.
4. Observed travel time HYD to GEO: the transit time picked from the stacked data by subtracting the surface sensor first break time from the downhole sensor first break time.
5. Vertical travel time SRD to GEO: transit time for the vertical distance between the geophone and the datum after a geometry correction of the observed transit time.
6. Two-way vertical time: two-way vertical transit time between SRD and GEO.
7. Average velocity SRD to GEO: the average seismic velocity from datum to the corresponding checkshot level.
8. Vertical level spacing: the vertical distance between two neighbouring levels.
9. Delta time between levels: the difference of one-way vertical transit time between two neighbouring levels.
10. Interval velocity between levels: the average seismic velocity between two neighbouring levels.

Geophysical Airgun Report for Seismic Survey at Blackback A1 ST-1
 Seismic Reference Datum (SRD) is at Mean Sea Level (MSL)

LEVEL NUMBER	MEASURED DEPTH KB_GEO (m)	TRUE VERTICAL DEPTH SRD_GEO (m)	TRANSIT TIME HYD_GEO (s)	TRUE VERTICAL TRANSIT TIME SRD_GEO (s)	TWO-WAY VERTICAL TRANSIT TIME (s)	AVERAGE VELOCITY SRD_GEO (m/s)	INTERVAL THICKNESS (m)	DELTA TIME (s)	INTERVAL VELOCITY (m/s)
0	421.0	395.0	0.3155	0.2611	0.5222	1513	395.0	0.2611	1513
1	1312.0	1183.8	0.5882	0.5941	1.1882	1993	788.8	0.3330	2369
2	1320.0	1187.7	0.5898	0.5957	1.1915	1994	3.9	0.0017	2357
3	1350.0	1202.3	0.5953	0.6012	1.2024	2000	14.6	0.0055	2662
4	1380.0	1216.6	0.6007	0.6066	1.2133	2006	14.3	0.0054	2649
5	1410.0	1231.0	0.6062	0.6121	1.2241	2011	14.4	0.0054	2635
6	1440.0	1245.4	0.6107	0.6166	1.2333	2020	14.4	0.0046	3158
7	1470.0	1259.9	0.6160	0.6219	1.2438	2026	14.5	0.0053	2771
8	1500.0	1274.6	0.6213	0.6272	1.2543	2032	14.7	0.0053	2775
9	1530.0	1289.3	0.6264	0.6323	1.2647	2039	14.7	0.0052	2835
10	1560.0	1304.0	0.6316	0.6375	1.2751	2045	14.7	0.0052	2841
11	1590.0	1318.8	0.6362	0.6421	1.2841	2054	14.8	0.0045	3256
12	1620.0	1333.7	0.6415	0.6474	1.2949	2060	14.9	0.0054	2788
13	1650.0	1348.7	0.6469	0.6528	1.3055	2066	14.9	0.0053	2796
14	1680.0	1363.5	0.6525	0.6584	1.3167	2071	14.8	0.0056	2652
15	1710.0	1378.3	0.6580	0.6639	1.3277	2076	14.8	0.0055	2692
16	1740.0	1393.3	0.6632	0.6691	1.3382	2082	15.0	0.0053	2850
17	1770.0	1408.3	0.6685	0.6744	1.3489	2088	15.0	0.0053	2822
18	1800.0	1423.2	0.6739	0.6798	1.3597	2093	14.9	0.0054	2768
19	1830.0	1438.2	0.6790	0.6849	1.3699	2100	15.0	0.0051	2934
20	1860.0	1453.2	0.6845	0.6904	1.3809	2105	15.0	0.0055	2730
21	1890.0	1468.3	0.6903	0.6962	1.3924	2109	15.1	0.0057	2620
22	1912.0	1479.3	0.6945	0.7004	1.4008	2112	11.1	0.0042	2612
23	3144.5	2100.0	0.8977	0.9036	1.8071	2324	620.7	0.2031	3055
24	3150.0	2102.8	0.8984	0.9043	1.8087	2325	2.8	0.0008	3544
25	3234.5	2145.5	0.9103	0.9162	1.8323	2342	42.7	0.0118	3611
26	3240.0	2148.3	0.9111	0.9170	1.8339	2343	2.8	0.0008	3518

27	3324.5	2191.5	0.9247	0.9306	1.8611	2355	43.2	0.0136	3180
28	3330.0	2194.4	0.9254	0.9313	1.8625	2356	2.8	0.0007	4011
29	3354.5	2207.0	0.9283	0.9342	1.8683	2363	12.7	0.0029	4354
30	3360.0	2209.9	0.9290	0.9349	1.8698	2364	2.9	0.0007	3977
31	3384.5	2222.6	0.9322	0.9381	1.8762	2369	12.7	0.0032	3997
32	3390.0	2225.5	0.9329	0.9388	1.8776	2371	2.9	0.0007	3919
33	3414.4	2238.3	0.9369	0.9428	1.8856	2374	12.9	0.0040	3201
34	3420.0	2241.3	0.9379	0.9438	1.8875	2375	3.0	0.0009	3188
35	3444.5	2254.3	0.9420	0.9479	1.8959	2378	13.0	0.0042	3108
36	3450.0	2257.2	0.9430	0.9489	1.8978	2379	2.9	0.0010	3032
37	3474.5	2270.0	0.9473	0.9532	1.9064	2381	12.8	0.0043	2968
38	3480.0	2272.9	0.9483	0.9542	1.9084	2382	2.9	0.0010	2934
39	3504.5	2285.5	0.9527	0.9586	1.9172	2384	12.7	0.0044	2861
40	3510.0	2288.3	0.9537	0.9596	1.9192	2385	2.8	0.0010	2921
41	3534.5	2300.8	0.9576	0.9635	1.9269	2388	12.5	0.0039	3221
42	3540.0	2303.6	0.9583	0.9642	1.9284	2389	2.8	0.0008	3706
43	3564.5	2315.9	0.9610	0.9669	1.9339	2395	12.3	0.0027	4515
44	3570.0	2318.7	0.9616	0.9675	1.9349	2397	2.7	0.0005	5194
45	3594.5	2330.8	0.9636	0.9696	1.9391	2404	12.1	0.0021	5803
46	3600.0	2333.5	0.9641	0.9700	1.9401	2406	2.7	0.0005	5587
47	3624.5	2345.6	0.9662	0.9721	1.9443	2413	12.1	0.0021	5766
48	3630.0	2348.3	0.9668	0.9727	1.9454	2414	2.7	0.0006	4922
49	3654.5	2360.5	0.9695	0.9754	1.9508	2420	12.2	0.0027	4518
50	3660.0	2363.3	0.9701	0.9760	1.9520	2421	2.7	0.0006	4389
51	3684.5	2375.3	0.9731	0.9790	1.9580	2426	12.0	0.0030	4014
52	3690.0	2378.0	0.9738	0.9797	1.9593	2427	2.7	0.0006	4176
53	3714.5	2390.0	0.9765	0.9824	1.9649	2433	12.0	0.0028	4318
54	3720.0	2392.6	0.9772	0.9831	1.9661	2434	2.7	0.0006	4264
55	3744.3	2404.6	0.9797	0.9856	1.9712	2440	11.9	0.0025	4678
56	3750.0	2407.4	0.9803	0.9862	1.9724	2441	2.8	0.0006	4706
57	3774.5	2419.8	0.9829	0.9888	1.9775	2447	12.4	0.0026	4838
58	3780.0	2422.6	0.9835	0.9894	1.9787	2449	2.8	0.0006	4832
59	3803.9	2435.2	0.9861	0.9920	1.9840	2455	12.6	0.0026	4771
60	3810.0	2438.5	0.9867	0.9926	1.9852	2457	3.2	0.0006	5422

61	3834.5	2451.5	0.9889	0.9948	1.9897	2464	13.1	0.0022	5849
62	3840.0	2454.5	0.9894	0.9953	1.9907	2466	2.9	0.0005	5696
63	3864.5	2467.5	0.9918	0.9977	1.9955	2473	13.1	0.0024	5464
64	3870.0	2470.5	0.9924	0.9983	1.9966	2475	2.9	0.0005	5393
65	3894.5	2483.4	0.9951	1.0011	2.0021	2481	13.0	0.0028	4672
66	3900.0	2486.3	0.9958	1.0017	2.0034	2482	2.9	0.0006	4613
67	3924.5	2499.2	0.9984	1.0043	2.0087	2488	12.8	0.0027	4849
68	3930.0	2502.1	0.9990	1.0050	2.0099	2490	2.9	0.0006	4621
69	3954.3	2514.9	1.0018	1.0077	2.0153	2496	12.9	0.0027	4743
70	3960.0	2518.0	1.0024	1.0084	2.0167	2497	3.0	0.0007	4419
71	3984.5	2531.0	1.0053	1.0112	2.0225	2503	13.1	0.0029	4548
72	3990.0	2534.0	1.0061	1.0120	2.0240	2504	2.9	0.0008	3833
73	4014.5	2546.9	1.0099	1.0158	2.0315	2507	12.9	0.0038	3430
74	4020.0	2549.8	1.0107	1.0166	2.0332	2508	2.9	0.0008	3417
75	4044.5	2562.6	1.0147	1.0206	2.0413	2511	12.8	0.0040	3174
76	4050.0	2565.5	1.0156	1.0215	2.0430	2511	2.9	0.0009	3330
77	4074.4	2578.2	1.0191	1.0250	2.0499	2515	12.7	0.0035	3680
78	4080.0	2581.1	1.0199	1.0258	2.0515	2516	2.9	0.0008	3666
79	4104.5	2593.9	1.0233	1.0292	2.0584	2520	12.8	0.0034	3728
80	4110.0	2596.8	1.0242	1.0301	2.0601	2521	2.9	0.0009	3348
81	4134.5	2609.6	1.0284	1.0343	2.0686	2523	12.8	0.0042	3020
82	4140.0	2612.4	1.0293	1.0352	2.0704	2524	2.9	0.0009	3165
83	4164.5	2625.1	1.0325	1.0384	2.0768	2528	12.6	0.0032	3916
84	4170.0	2627.9	1.0332	1.0391	2.0782	2529	2.8	0.0007	3973
85	4194.4	2640.2	1.0366	1.0425	2.0851	2533	12.4	0.0034	3620
86	4224.5	2655.4	1.0409	1.0469	2.0937	2537	15.1	0.0043	3507
87	4230.0	2658.1	1.0416	1.0475	2.0951	2538	2.8	0.0007	4060
88	4254.5	2670.4	1.0447	1.0506	2.1012	2542	12.3	0.0031	4009
89	4260.0	2673.2	1.0454	1.0514	2.1027	2543	2.8	0.0008	3617
90	4284.5	2685.4	1.0493	1.0552	2.1104	2545	12.2	0.0039	3169
91	4290.0	2688.1	1.0501	1.0560	2.1121	2545	2.7	0.0008	3300
92	4314.5	2700.2	1.0536	1.0595	2.1191	2548	12.1	0.0035	3449
93	4320.0	2702.9	1.0544	1.0603	2.1205	2549	2.7	0.0007	3679
94	4344.5	2714.9	1.0575	1.0634	2.1268	2553	12.0	0.0031	3861

95	4350.0	2717.6	1.0581	1.0640	2.1281	2554	2.7	0.0007	4030
96	4374.5	2729.5	1.0612	1.0671	2.1342	2558	11.9	0.0031	3869
97	4380.0	2732.1	1.0619	1.0678	2.1355	2559	2.7	0.0006	4239
98	4404.5	2744.0	1.0649	1.0696	2.1392	2565	11.9	0.0018	6449
99	4410.0	2746.7	1.0655	1.0703	2.1406	2566	2.7	0.0007	3850
100	4434.5	2758.7	1.0690	1.0737	2.1474	2569	12.0	0.0034	3506
101	4440.0	2761.4	1.0698	1.0746	2.1492	2570	2.7	0.0009	2995

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E. Residual times for Model-0 and Model-1

Residual times for the initial model - Model-0

SOURCE X	SOURCE Z	RECEIVER X	RECEIVER Z	CALCULATED TIME	OBSERVED TIME	RESIDUAL TIME
m	m	m	m	s	s	s
-848.9	9.0	-1130.5	395.0	0.3185	0.3155	0.0031
-846.8	9.0	-856.5	1183.8	0.6142	0.5882	0.0260
-848.9	9.0	-849.6	1187.7	0.6155	0.5898	0.0256
-819.8	9.0	-823.4	1202.3	0.6205	0.5953	0.0252
-794.2	9.0	-797.0	1216.6	0.6255	0.6007	0.0248
-771.8	9.0	-770.7	1231.0	0.6304	0.6062	0.0243
-745.7	9.0	-744.4	1245.4	0.6354	0.6107	0.0247
-720.2	9.0	-718.2	1259.9	0.6404	0.6160	0.0245
-691.2	9.0	-692.1	1274.6	0.6452	0.6213	0.0239
-664.5	9.0	-665.9	1289.3	0.6499	0.6264	0.0235
-637.6	9.0	-639.8	1304.0	0.6546	0.6316	0.0230
-612.4	9.0	-613.7	1318.8	0.6594	0.6362	0.0232
-585.4	9.0	-587.7	1333.7	0.6641	0.6415	0.0226
-562.3	9.0	-561.7	1348.7	0.6689	0.6469	0.0220
-532.1	9.0	-535.7	1363.5	0.6737	0.6525	0.0212
-508.5	9.0	-509.6	1378.3	0.6784	0.6580	0.0204
-479.0	9.0	-483.6	1393.3	0.6832	0.6632	0.0200
-452.9	9.0	-457.6	1408.3	0.6880	0.6685	0.0195
-425.8	9.0	-431.6	1423.2	0.6928	0.6739	0.0188
-400.7	9.0	-405.6	1438.2	0.6975	0.6790	0.0185
-375.7	9.0	-379.7	1453.2	0.7023	0.6845	0.0178
-347.9	9.0	-353.7	1468.3	0.7071	0.6903	0.0168
-336.9	9.0	-334.7	1479.3	0.7105	0.6945	0.0160
738.3	9.0	729.8	2100.0	0.8968	0.8977	-0.0009
738.3	9.0	734.5	2102.8	0.8975	0.8984	-0.0009
808.3	9.0	807.4	2145.5	0.9093	0.9103	-0.0010
808.3	9.0	812.1	2148.3	0.9100	0.9111	-0.0010
905.3	9.0	884.7	2191.5	0.9218	0.9247	-0.0029
905.3	9.0	889.4	2194.4	0.9226	0.9254	-0.0028
930.7	9.0	910.4	2207.0	0.9261	0.9283	-0.0023
930.7	9.0	915.1	2209.9	0.9268	0.9290	-0.0022
946.3	9.0	936.0	2222.6	0.9303	0.9322	-0.0019
946.3	9.0	940.7	2225.5	0.9311	0.9329	-0.0019
969.4	9.0	961.4	2238.3	0.9346	0.9369	-0.0024
969.4	9.0	966.2	2241.3	0.9354	0.9379	-0.0025
996.3	9.0	986.9	2254.3	0.9389	0.9420	-0.0031
996.3	9.0	991.6	2257.2	0.9397	0.9430	-0.0033
1021.6	9.0	1012.5	2270.0	0.9431	0.9473	-0.0042
1021.6	9.0	1017.2	2272.9	0.9438	0.9483	-0.0045
1045.0	9.0	1038.2	2285.5	0.9471	0.9527	-0.0056
1045.0	9.0	1042.9	2288.3	0.9478	0.9537	-0.0058
1070.0	9.0	1063.9	2300.8	0.9510	0.9576	-0.0065
1070.0	9.0	1068.7	2303.6	0.9519	0.9583	-0.0064
1094.8	9.0	1089.8	2315.9	0.9559	0.9610	-0.0052

1094.8	9.0	1094.6	2318.7	0.9568	0.9616	-0.0048
1119.5	9.0	1115.9	2330.8	0.9607	0.9636	-0.0030
1119.5	9.0	1120.7	2333.5	0.9616	0.9641	-0.0026
1146.8	9.0	1142.0	2345.6	0.9655	0.9662	-0.0007
1146.8	9.0	1146.7	2348.3	0.9664	0.9668	-0.0004
1170.7	9.0	1168.0	2360.5	0.9703	0.9695	0.0008
1170.7	9.0	1172.7	2363.3	0.9712	0.9701	0.0011
1200.8	9.0	1194.1	2375.3	0.9751	0.9731	0.0020
1200.8	9.0	1198.9	2378.0	0.9760	0.9738	0.0023
1226.7	9.0	1220.2	2390.0	0.9798	0.9765	0.0033
1226.7	9.0	1225.0	2392.6	0.9806	0.9772	0.0035
1251.0	9.0	1246.2	2404.6	0.9844	0.9797	0.0047
1251.0	9.0	1251.1	2407.4	0.9853	0.9803	0.0050
1280.7	9.0	1272.3	2419.8	0.9892	0.9829	0.0063
1280.7	9.0	1277.0	2422.6	0.9901	0.9835	0.0067
1304.8	9.0	1297.3	2435.2	0.9941	0.9861	0.0080
1304.8	9.0	1302.4	2438.5	0.9952	0.9867	0.0085
1329.3	9.0	1323.0	2451.5	0.9993	0.9889	0.0104
1329.3	9.0	1327.7	2454.5	1.0002	0.9894	0.0108
1355.2	9.0	1348.2	2467.5	1.0043	0.9918	0.0125
1355.2	9.0	1352.8	2470.5	1.0052	0.9924	0.0129
1380.7	9.0	1373.5	2483.4	1.0092	0.9951	0.0141
1380.7	9.0	1378.1	2486.3	1.0102	0.9958	0.0144
1406.0	9.0	1398.8	2499.2	1.0141	0.9984	0.0157
1406.0	9.0	1403.5	2502.1	1.0151	0.9990	0.0160
1431.2	9.0	1424.0	2514.9	1.0190	1.0018	0.0173
1431.2	9.0	1428.8	2518.0	1.0200	1.0024	0.0176
1456.1	9.0	1449.5	2531.0	1.0241	1.0053	0.0187
1456.1	9.0	1454.1	2534.0	1.0250	1.0061	0.0189
1479.8	9.0	1474.9	2546.9	1.0291	1.0099	0.0192
1479.8	9.0	1479.6	2549.8	1.0300	1.0107	0.0193
1504.6	9.0	1500.5	2562.6	1.0341	1.0147	0.0194
1504.6	9.0	1505.2	2565.5	1.0351	1.0156	0.0195
1532.7	9.0	1525.9	2578.2	1.0392	1.0191	0.0201
1532.7	9.0	1530.7	2581.1	1.0402	1.0199	0.0203
1560.1	9.0	1551.6	2593.9	1.0442	1.0233	0.0209
1560.1	9.0	1556.3	2596.8	1.0452	1.0242	0.0211
1581.4	9.0	1577.2	2609.6	1.0493	1.0284	0.0210
1581.4	9.0	1581.9	2612.4	1.0503	1.0293	0.0210
1607.5	9.0	1602.9	2625.1	1.0543	1.0325	0.0218
1607.5	9.0	1607.6	2627.9	1.0553	1.0332	0.0221
1635.7	9.0	1628.6	2640.2	1.0592	1.0366	0.0225
1659.8	9.0	1654.7	2655.4	1.0641	1.0409	0.0231
1659.8	9.0	1659.4	2658.1	1.0650	1.0416	0.0234
1685.9	9.0	1680.6	2670.4	1.0689	1.0447	0.0242
1685.9	9.0	1685.4	2673.2	1.0699	1.0454	0.0244
1711.8	9.0	1706.6	2685.4	1.0738	1.0493	0.0245
1711.8	9.0	1711.4	2688.1	1.0747	1.0501	0.0246
1734.7	9.0	1732.7	2700.2	1.0786	1.0536	0.0250

1734.7	9.0	1737.5	2702.9	1.0795	1.0544	0.0252
1764.9	9.0	1758.9	2714.9	1.0833	1.0575	0.0259
1764.9	9.0	1763.7	2717.6	1.0843	1.0581	0.0261
1783.4	9.0	1785.1	2729.5	1.0882	1.0612	0.0270
1783.4	9.0	1789.9	2732.1	1.0891	1.0619	0.0273
1942.5	9.0	1811.3	2744.0	1.0927	1.0649	0.0278
1942.5	9.0	1816.1	2746.7	1.0935	1.0655	0.0280
1967.4	9.0	1837.5	2758.7	1.0975	1.0690	0.0285
1967.4	9.0	1842.3	2761.4	1.0984	1.0698	0.0286

Residual times for the final model - Model-1

SOURCE X	SOURCE Z	RECEIVER X	RECEIVER Z	CALCULATED TIME	OBSERVED TIME	RESIDUAL TIME
m	m	m	m	s	s	s
-848.9	9.0	-1130.5	395.0	0.3158	0.3155	0.0003
-846.8	9.0	-856.5	1183.8	0.6064	0.5882	0.0182
-848.9	9.0	-849.6	1187.7	0.6077	0.5898	0.0179
-819.8	9.0	-823.4	1202.3	0.6127	0.5953	0.0174
-794.2	9.0	-797.0	1216.6	0.6176	0.6007	0.0169
-771.8	9.0	-770.7	1231.0	0.6225	0.6062	0.0163
-745.7	9.0	-744.4	1245.4	0.6274	0.6107	0.0167
-720.2	9.0	-718.2	1259.9	0.6324	0.6160	0.0164
-691.2	9.0	-692.1	1274.6	0.6371	0.6213	0.0158
-664.5	9.0	-665.9	1289.3	0.6417	0.6264	0.0153
-637.6	9.0	-639.8	1304.0	0.6464	0.6316	0.0147
-612.4	9.0	-613.7	1318.8	0.6510	0.6362	0.0149
-585.4	9.0	-587.7	1333.7	0.6557	0.6415	0.0142
-562.3	9.0	-561.7	1348.7	0.6604	0.6469	0.0136
-532.1	9.0	-535.7	1363.5	0.6651	0.6525	0.0127
-508.5	9.0	-509.6	1378.3	0.6698	0.6580	0.0118
-479.0	9.0	-483.6	1393.3	0.6746	0.6632	0.0113
-452.9	9.0	-457.6	1408.3	0.6793	0.6685	0.0107
-425.8	9.0	-431.6	1423.2	0.6840	0.6739	0.0101
-400.7	9.0	-405.6	1438.2	0.6887	0.6790	0.0097
-375.7	9.0	-379.7	1453.2	0.6934	0.6845	0.0089
-347.9	9.0	-353.7	1468.3	0.6981	0.6903	0.0078
-336.9	9.0	-334.7	1479.3	0.7015	0.6945	0.0070
738.3	9.0	729.8	2100.0	0.8852	0.8977	-0.0124
738.3	9.0	734.5	2102.8	0.8860	0.8984	-0.0125
808.3	9.0	807.4	2145.5	0.8976	0.9103	-0.0127
808.3	9.0	812.1	2148.3	0.8983	0.9111	-0.0127
905.3	9.0	884.7	2191.5	0.9099	0.9247	-0.0148
905.3	9.0	889.4	2194.4	0.9107	0.9254	-0.0147
930.7	9.0	910.4	2207.0	0.9141	0.9283	-0.0142
930.7	9.0	915.1	2209.9	0.9148	0.9290	-0.0142
946.3	9.0	936.0	2222.6	0.9182	0.9322	-0.0139
946.3	9.0	940.7	2225.5	0.9190	0.9329	-0.0139
969.4	9.0	961.4	2238.3	0.9225	0.9369	-0.0145
969.4	9.0	966.2	2241.3	0.9233	0.9379	-0.0146
996.3	9.0	986.9	2254.3	0.9267	0.9420	-0.0153
996.3	9.0	991.6	2257.2	0.9275	0.9430	-0.0155
1021.6	9.0	1012.5	2270.0	0.9308	0.9473	-0.0165
1021.6	9.0	1017.2	2272.9	0.9316	0.9483	-0.0167
1045.0	9.0	1038.2	2285.5	0.9348	0.9527	-0.0179
1045.0	9.0	1042.9	2288.3	0.9355	0.9537	-0.0182
1070.0	9.0	1063.9	2300.8	0.9387	0.9576	-0.0189
1070.0	9.0	1068.7	2303.6	0.9395	0.9583	-0.0188
1094.8	9.0	1089.8	2315.9	0.9435	0.9610	-0.0176

1094.8	9.0	1094.6	2318.7	0.9444	0.9616	-0.0172
1119.5	9.0	1115.9	2330.8	0.9483	0.9636	-0.0153
1119.5	9.0	1120.7	2333.5	0.9492	0.9641	-0.0149
1146.8	9.0	1142.0	2345.6	0.9531	0.9662	-0.0131
1146.8	9.0	1146.7	2348.3	0.9540	0.9668	-0.0128
1170.7	9.0	1168.0	2360.5	0.9579	0.9695	-0.0116
1170.7	9.0	1172.7	2363.3	0.9588	0.9701	-0.0113
1200.8	9.0	1194.1	2375.3	0.9627	0.9731	-0.0104
1200.8	9.0	1198.9	2378.0	0.9636	0.9738	-0.0101
1226.7	9.0	1220.2	2390.0	0.9674	0.9765	-0.0092
1226.7	9.0	1225.0	2392.6	0.9682	0.9772	-0.0089
1251.0	9.0	1246.2	2404.6	0.9720	0.9797	-0.0078
1251.0	9.0	1251.1	2407.4	0.9729	0.9803	-0.0074
1280.7	9.0	1272.3	2419.8	0.9767	0.9829	-0.0061
1280.7	9.0	1277.0	2422.6	0.9777	0.9835	-0.0058
1304.8	9.0	1297.3	2435.2	0.9816	0.9861	-0.0045
1304.8	9.0	1302.4	2438.5	0.9827	0.9867	-0.0040
1329.3	9.0	1323.0	2451.5	0.9868	0.9889	-0.0021
1329.3	9.0	1327.7	2454.5	0.9878	0.9894	-0.0017
1355.2	9.0	1348.2	2467.5	0.9918	0.9918	-0.0001
1355.2	9.0	1352.8	2470.5	0.9927	0.9924	0.0004
1380.7	9.0	1373.5	2483.4	0.9967	0.9951	0.0016
1380.7	9.0	1378.1	2486.3	0.9976	0.9958	0.0019
1406.0	9.0	1398.8	2499.2	1.0016	0.9984	0.0032
1406.0	9.0	1403.5	2502.1	1.0025	0.9990	0.0035
1431.2	9.0	1424.0	2514.9	1.0065	1.0018	0.0047
1431.2	9.0	1428.8	2518.0	1.0075	1.0024	0.0050
1456.1	9.0	1449.5	2531.0	1.0115	1.0053	0.0061
1456.1	9.0	1454.1	2534.0	1.0124	1.0061	0.0063
1479.8	9.0	1474.9	2546.9	1.0165	1.0099	0.0066
1479.8	9.0	1479.6	2549.8	1.0174	1.0107	0.0067
1504.6	9.0	1500.5	2562.6	1.0215	1.0147	0.0068
1504.6	9.0	1505.2	2565.5	1.0225	1.0156	0.0069
1532.7	9.0	1525.9	2578.2	1.0265	1.0191	0.0074
1532.7	9.0	1530.7	2581.1	1.0275	1.0199	0.0076
1560.1	9.0	1551.6	2593.9	1.0316	1.0233	0.0083
1560.1	9.0	1556.3	2596.8	1.0325	1.0242	0.0084
1581.4	9.0	1577.2	2609.6	1.0366	1.0284	0.0083
1581.4	9.0	1581.9	2612.4	1.0376	1.0293	0.0083
1607.5	9.0	1602.9	2625.1	1.0416	1.0325	0.0091
1607.5	9.0	1607.6	2627.9	1.0426	1.0332	0.0094
1635.7	9.0	1628.6	2640.2	1.0464	1.0366	0.0098
1659.8	9.0	1654.7	2655.4	1.0513	1.0409	0.0104
1659.8	9.0	1659.4	2658.1	1.0523	1.0416	0.0106
1685.9	9.0	1680.6	2670.4	1.0561	1.0447	0.0115
1685.9	9.0	1685.4	2673.2	1.0571	1.0454	0.0116
1711.8	9.0	1706.6	2685.4	1.0610	1.0493	0.0117
1711.8	9.0	1711.4	2688.1	1.0619	1.0501	0.0118
1734.7	9.0	1732.7	2700.2	1.0658	1.0536	0.0121

1734.7	9.0	1737.5	2702.9	1.0667	1.0544	0.0123
1764.9	9.0	1758.9	2714.9	1.0705	1.0575	0.0130
1764.9	9.0	1763.7	2717.6	1.0714	1.0581	0.0133
1783.4	9.0	1785.1	2729.5	1.0753	1.0612	0.0141
1783.4	9.0	1789.9	2732.1	1.0762	1.0619	0.0144
1942.5	9.0	1811.3	2744.0	1.0798	1.0649	0.0148
1942.5	9.0	1816.1	2746.7	1.0806	1.0655	0.0151
1967.4	9.0	1837.5	2758.7	1.0846	1.0690	0.0156
1967.4	9.0	1842.3	2761.4	1.0854	1.0698	0.0156