SEISMIC DATA PROCESSING REPORT

for

3D OIL LIMITED

Project:	T41P 2008 Processing
Survey:	TDOB08
Location:	T41P, Bass Strait
Date:	September 2008

Fugro Seismic Imaging Pty Ltd
69 Outram Street
WEST PERTH WA 6005
Tel: +61 (0)8 9322 2490
Fax: + 61 (0)8 9481 6721
Email: info@fugro-fsi.com.au

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1 Introduction

The TDOB08 survey was recorded by CGG Veritas using M/V Pacific Titan in the month of April 2008. A total of 2204.550 km of seismic data was acquired, comprised of 65 lines. The survey is located in the T41P, Bass Strait area in water depths of approximately 80 metres.

Testing for the TDOB08 survey was comprehensive with attention paid to multiple and noise attenuation, steep dip and amplitude preservation. The zone of interest was approximately 1.5 seconds, and it was important to remove the linear noise as much as possible so that the shallow events could be tracked across all offsets.

The main final delivered products consisted of Final Migrations, Raw Migrations and Angle Migrations. Final PSTM gathers with NMO were also archived.

All processing, including velocity picking and QC was undertaken at the Fugro Seismic Imaging office in Perth, Western Australia.

Geological setting:

The TBOB08-Survey was acquired in the Eastern Bass basin, where the Eastern View Coal measures are known to contain coal sequences.

Prospective targets extend from the Oligiocene sands to the base of the Eastern View Coal measures. AVO has differentiated Hydrocarbons previously in this basin, and considerable efforts were made to retain relative amplitude information.

1.1 Personnel

Fugro Seismic Imaging Pty Ltd

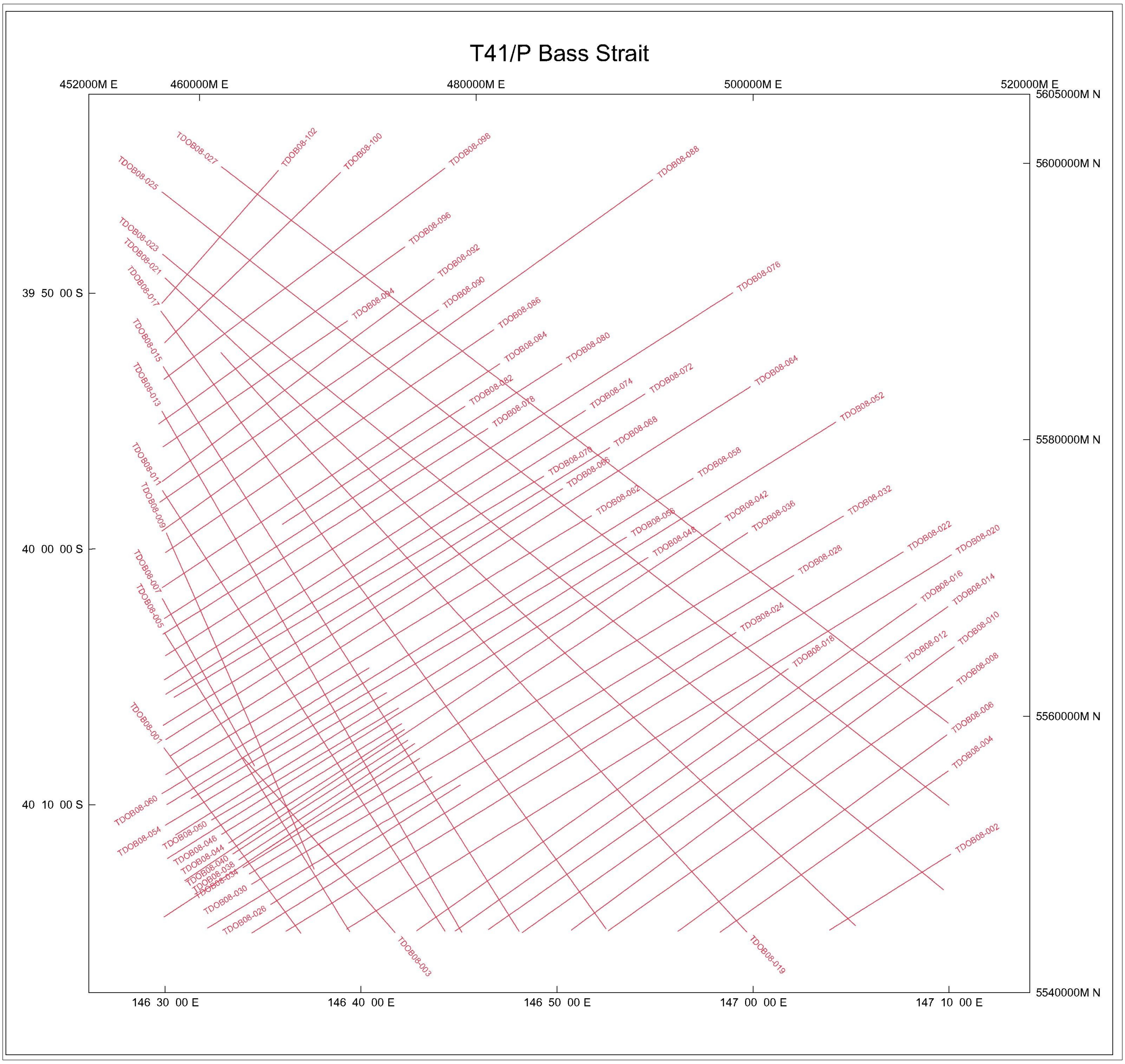
Kelly Beauglehole	Chief Geophysicist
Simon Stewart	Processing Manager
Louise Onslow	Geophysicist

3D Oil

John Cant	Consultant
Bruce Hawkes	Consultant

1.2 Location Map

T41P, Bass Strait



1.3 Line Listing

Line name	SP range	CDP range	Km	Line name	SP range	CDP range	Km
TDOB08-001	1667 - 1001	1 - 1572	16.675	TDOB08-040	1604 - 1001	1 - 1446	15.100
TDOB08-002	1001 - 1414	1 - 1066	10.350	TDOB08-042	2865 - 1001	1 - 3968	46.625
TDOB08-003	1669 - 1001	1 - 1576	16.725	TDOB08-044	1001 - 1606	1 - 1450	15.150
TDOB08-004	1809 - 1001	1 - 1856	20.225	TDOB08-046	1001 - 1612	1 - 1462	15.300
TDOB08-005	2018 - 1001	1 - 2274	25.450	TDOB08-048	2641 - 1001	1 - 3520	41.025
TDOB08-006	1964 - 1001	1 - 2166	24.100	TDOB08-050	1001 - 1631	1 - 1500	15.775
TDOB08-007	1001 - 1553	1 - 1344	13.825	TDOB08-052	3253 - 1001	1 - 4744	56.325
TDOB08-008	1001 - 2222	1 - 2682	30.550	TDOB08-054	1746 - 1001	1 - 1730	18.650
TDOB08-009	2063 - 1001	1 - 2364	26.575	TDOB08-056	1001 - 2470	1 - 3178	36.750
TDOB08-010	1001 - 2378	1 - 2994	34.450	TDOB08-058	1001 - 2792	1 – 4104	44.800
TDOB08-011	2516 - 1001	1 - 3270	37.900	TDOB08-060	1702 - 1001	5 – 1646	17.550
TDOB08-012	1001 - 2343	1 - 2924	33.575	TDOB08-062	2442 - 1001	1 - 3122	36.050
TDOB08-013	2741 - 1001	1 - 3720	43.525	TDOB08-064	1001 - 2990	1 - 4218	49.750
TDOB08-014	1001 - 2625	1 - 3488	40.625	TDOB08-066	1001 - 2359	1 - 2956	33.975
TDOB08-015	1001 - 2933	1 - 4104	48.325	TDOB08-068	2522 - 1001	1 - 3282	38.050
TDOB08-016	1001 - 2637	1 - 3512	40.925	TDOB08-070	2247 - 1001	1 - 2732	31.175
TDOB08-017	1001 - 3204	1 - 4646	55.100	TDOB08-072	1001 - 2636	1 - 3510	40.900
TDOB08-018	1001 - 2316	1 - 2870	32.900	TDOB08-074	1001 - 2447	1 - 3132	36.175
TDOB08-019	3265 - 1001	1 - 4768	56.625	TDOB08-076	1001 - 2949	1 - 4136	48.725
TDOB08-020	1001 - 3057	1 - 4352	51.425	TDOB08-078	2113 - 1001	1 - 2464	27.825
TDOB08-021	3739 - 1001	1 - 5716	68.475	TDOB08-080	1001 - 2367	1 - 2972	34.175
TDOB08-022	1001 - 3097	1 - 4432	52.425	TDOB08-082	1630 - 1001	1 - 1498	15.750
TDOB08-023	3914 - 1001	1 - 6066	72.850	TDOB08-084	2173 - 1001	1 - 2584	29.325
TDOB08-024	2649 - 1001	1 - 3536	41.225	TDOB08-086	1001 - 2148	1 - 2534	28.700
TDOB08-025	1001 - 3887	1 - 6012	72.175	TDOB08-088	2747 - 1001	1 - 3732	43.675
TDOB08-026	1001 - 1649	1 - 1536	16.225	TDOB08-090	1980 - 1001	1 - 2198	24.500
TDOB08-027	1001 - 3649	1 - 5536	66.225	TDOB08-092	1981 - 1001	1 - 2200	24.525
TDOB08-028	2979 - 1001	1 - 4196	49.475	TDOB08-094	1627 - 1001	1 - 1492	15.675
TDOB08-030	1608 - 1001	1 - 1454	15.200	TDOB08-096	1001 - 1858	1 - 1954	21.450
TDOB08-032	3007 - 1001	1 - 4252	50.175	TDOB08-098	1001 - 2018	1 - 2274	25.450
TDOB08-034	1601 - 1001	1 - 1440	15.025	TDOB08-100	1001 - 1708	1 - 1654	17.700
TDOB08-036	3022 - 1001	1 - 4282	50.550	TDOB08-102	1512 - 1001	1 - 1262	12.800
TDOB08-038	1001 - 1611	1 - 1460	15.275			**Total**	1245.150

2 Acquisition Parameters

DESCRIPTION	***DETAILS***
Data recorded by:	CGGVeritas
Date recorded:	April 2008
Vessel:	M/V Pacific Titan
General:	
Nominal fold	120
Recording format:	SEG D 8058 rev 1.0
Seismic source:	
Type	Air gun
Volume	3040 cu.in.
Pressure:	2000 psi
Depth:	6 m
Shot interval:	25 m
Gun delay	0 ms
Recording system:	
Instrument:	Sercel Seal 408XL
Record length:	6000 ms
Sample interval:	2 ms
Instrument delay:	50 ms
Low cut filter:	4.7Hz@12dB/Octave
High cut filter:	200 Hz @ 370 dB/octave
Receivers:	
Streamer length:	6000 m
Streamer depth:	8 m
Number of groups:	480
Near group number:	1
Group interval:	12.5 m
Centre source to centre near group:	145m
SP annotation**:**	Source position

3 Parameter Testing

Line TDOB08-030-002 was chosen as our main test line.

The processing test sequence includes review of the following processing phases and parameter choices:

1) Designature
   Using far field signature provided by CGG Veritas. Test various fuzzy cable ghost at 8m +/- 0.5m , 1m 1.5m and 2m.

2) Gain Recovery
   Initial gain correction estimate, compensating for spherical divergence and inelastic attenuation losses. Test t**2 gain to confirm applicability.

3) Pre-Filter
   Re-application of boat low-cut frequency filter: 4 Hz at 12 dB/oct.

4) Time Frequency De-noise
   Test different frequency ranges and threshold attributes.

5) Tau-P Deconvolution
   Test various gap lengths and operators.

6) Tau-P Linear Noise Attenuation
   Test different severities of muting in Tau-P domain. Compare shot records and stack sections.

7) SRME
   Comparison of shot records and stack sections with and without SRME plus using different global shifts.

8) Radon Demultiple
   Test the linear mode versus parabolic mode with varying inputs, and velocities.

9) Surface consistent amplitude correction (SCAMP)
   To confirm the applicability of SCAMP.

10) Inverse Q
    It was decided to apply phase only inverse Q prior to final PSTM .

11) Pre-Stack Kirchhoff Migration
    Test straight ray versus curved ray.

12) Residual Radon Demultiple
    Test varying frequency range, number of p values.
    Also test the linear mode versus parabolic mode.

13) Inverse Q
    Amplitude only Q was used to with a boost to 12d/B.

14) Mutes
Test different severities of normal outer and inner mutes.

15) Bandpass Filter
Run suites of bandpass varying low cut and varying high cut to pick the filters.

16) Post-Stack Scaling
Produce stacks with various dual window AGC with different percentages of mix-back.

17) Angle Migrations
Test different ranges of angle of incidence and also the various limiting offsets to apply the angle mutes.

4 Processing Sequence Diagram

5 Processing Description

A brief description of each of the processes used in the processing sequence follows:

5.1 Transcription

The supplied field tapes were copied directly to disk, without transcription from SEGD format. The practice of preserving a pristine field tape image ensures that the field tapes need only be read once in a processing project. The field tape images are later converted to Fugro Seismic Imaging internal format - trace sequential with samples in 32 bit IEEE floating point.

5.2 Correction for Instrument Delay

A static correction of -50 ms is applied to the whole survey to account for the instrument delay.

5.3 Initial Gain Recovery

A gain function is applied to the data set to compensate for amplitude decay. The functions applied use t squared compensation for inelastic attenuation and spherical divergence losses. (t is the two way travel time in milliseconds).

5.4 Low Cut Filter

A low-cut filter (4 Hz at 12 dB/Octave) was applied to the shot records.

5.5 Navigation Merging

The seismic trace headers are updated with easting and northing values for sources, receivers and CDPs from the supplied navigation files. Water bottom times are digitised from stacks and read into the headers.

Parameters for Navigation	
Spheroid:	GDA 94 (6378137.000 298.2572236)
Projection type:	002 UTM South
Projection Zone:	55 S
Longitude of CM:	147 0 0.000 E

5.6 Time Frequency De-noise

TFDN - (**T**ime **F**requency **D**e-**N**oise) is used to attenuate swell noise.

TFDN works by transforming all traces in a short sliding time window to the frequency domain. There, it compares the frequency content of each trace to the frequency content of neighboring traces in order to identify anomalies. The 'neighbourhood' is defined by the horizontal window 20 traces, and the comparison is working on single frequencies at a time. Threshold of 4 calculation is done by using the computed median of the spectral amplitude in the horizontal window (the phase is not being altered in TFDN). If any frequency component in a given trace is larger than a threshold defined as a fraction of the computed attribute mentioned above, TFDN attenuates the anomalous amplitude at that frequency in the current trace under investigation to the level of the threshold attribute. This results in well balanced gathers. TFDN tries to smooth out any changes being made. Frequency range applied from 0 to 30 Hz.

TFDN is working in a very localized way (in time as well as in frequency), trying to minimize the side-effects on actual data. It should, thus, allow amplitude-preserved processing.

5.7 Tau-P Linear Noise Removal and Deconvolution

The data was transformed to the Tau-P domain using the linear transform. The transform was performed with p limits of -2500ms and +4500ms, with increments of 6ms at the far offset.

A long gap deconvolution (total operator length 308ms, gap 48ms tied to the water bottom) was applied in Tau-P domain to remove short period multiples whilst minimising any wavelet shaping effects.

Strong linear noise trains with large dip can be differentiated from primary energy in the linear Tau-P space, and these events are attenuated by a scaling pattern - tapering from the primary to noise areas of the transform.

Some mix-back of data are employed to protect the shallow section from aliased artefacts generated in the modelling process.

Parameters for Tau-P Muting		
WBT(ms)	**Tau (ms)**	**Trace numbers in transform (pass)**
100	0	120 - 1050
	175	140 - 900
	450	180 - 750
	2950	230 - 650

Parameters for Tau-P Muting for Parabolic Radon Transform		
WBT (ms)	**Tau (ms)**	**Primary p range (muted) (ms)**
100	100	-1400 to 900
	1000	-1400 to 300
	2000	-1400 to 200
	6000	-1400 to 100

5.8 Designature

Using the supplied calculated far field signature the designature is applied to convolve the wavelet to zero phase wavelet with the same spectrum. – refer to appendices for details of the wavelet used.

5.9 SRME

SRME or **S**urface **R**elated **M**ultiple **E**limination uses the geometry of shot recording to estimate all possible multiples that can be generated by the surface. It was developed by the Delphi Consortium at TUDelft in the Netherlands. One order of surface related multiples is predicted using auto-convolutions of input data. The predicted multiple energy is then removed from the input gathers by a process of cascaded adaptive subtraction.

Prior to forming the multiple estimate, it is necessary to interpolate new shots such that the shotpoint interval is equal to the group interval. The recorded data is then extrapolated to zero offset, before constructing the multiple estimate by a series of convolutions and summation.

A mute is applied to the input shot records prior to remove direct arrival energy. Before adaptive subtraction, the modelled multiples are NMO corrected and any energy above the first seafloor multiple removed by muting.

Parameters for SRME	
Group interval	12.5m
SP interval (after interpolation)	12.5m
SRME	80 reciprocal traces to generate 60 reciprocal traces to taper 560 shots used 8 ms global shift
Adaptive subtraction	Common shot domain 30 filter traces 500 ms window 21 adjacent traces used in matching

5.10 First Pass Velocity Analysis

The first pass velocities were picked at a 1km interval using our Fugro Seismic Imaging Pty Ltd “MGIVA” interactive velocity analysis program. Each velocity analysis comprises a semblance display, a CDP stacked panel repeated 14 times with a suite of velocity functions, and a central CDP gather. The suite of functions are generated using 0%, +/-5%, +/-10%, +/-15%, +/-20%, +/-25% , +/-30% and +/-40% increments from a central velocity function. The central functions for this velocity analysis were based on crude velocity functions varied according to WBT. QC of the velocities by client representatives was carried out on SRME data.

5.11 Receiver Array Simulation

A receiver array simulation is achieved by using a frequency-wavenumber filter.

After decimation, the shot records consist of half the number of channels, with new group intervals being double the original group intervals.

5.12 CDP Gather

Data from each source/cable combination is sorted into the common midpoint domain.

Parameters for CDP Gather	
Shot interval:	25 m
Group interval:	25 m
Number of channels:	240
CDP interval:	12.5 m
CDP fold:	120

5.13 Radon Multiple Attenuation (Hi-Res)

Attenuation of multiples was achieved by modelling and subtraction using a least squares, parabolic radon transform. Normal moveout corrections were performed using the first pass velocities, and the CDP gathers transformed into the parabolic Tau-P domain. The segment of the Tau-P domain corresponding to primary reflections is muted, leaving the multiple energy to be transformed back into the T-X domain and subtracted from the original CDP gather. The Hi-resolution radon option was invoked, where the resolution of the radon transform is improved by adding weighting terms to the least squares solution, thus minimising the residual error. To further reduce the potential for aliasing, the radon transform was performed on 240 fold gathers formed by F-X interpolation of new shots. After demultiple, the interpolated traces were dropped from the processing stream. A mild t-x mute was applied immediately before the radon transform to remove NMO stretch noise from the shallow zone of longer offsets.

Parameters for Parabolic Radon Transform	
Reference offset	6112 m
Frequency range	3-100 Hz
Minimum p	*-1500 (parabolic delta-t, at reference offset)*
Maximum p	+5500 *(parabolic delta-t, at reference offset)*
No. of p traces	701

The application start times varied according to water bottom times and are as follows :

Parameters for Radon Demultiple Start Time and Application Times	
WBT (ms)	**Application start time (ms)**
100	150

A 200 ms AGC is applied before the Radon demultiple, and the scalars preserved for later removal.

5.14 Reverse Gain Recovery

t2 scaling that is applied at the start of processing is removed.

5.15 Spherical Divergence (Ursin & Gain)

With the previously applied t2 gain function removed, it is then replaced with an offset and velocity dependent spherical divergence approximation as described by Bjorn Ursin (GEOPHYSICS Vol.55 No.4, pp492-496 1990).

$$\sqrt{\frac{T0\times V^4}{V0^2}+(2\times(\frac{V}{V0})^2-1)\times X^2+\frac{X^4\times(\frac{1}{V0^2}-\frac{1}{V^2})}{t0^2}}$$

Where T0 is the two way travel time, V is the RMS velocity at T0, and V0 is the velocity in the first layer. Although this method is applicable to uncorrected data as a moveout tracking divergence correction, for algorithmic ease it is applied to NMO corrected CDP gathers.

5.16 First Pass PSTM

Pre-stack Kirchhoff time migration is used to migrate data for velocity analysis. The migration algorithm is used in straight ray mode, with a 7.5 km half aperture. The velocity field is constructed by smoothing the first pass velocities. Anti-aliasing protection is applied by pre-filtering the data within the migration scan depending upon the local migration operator dip. Apertures are muted with a 80% stretch mute to avoid operator aliasing. Migration is performed on the full offset planes. The migration generates fully corrected CDP gathers on each line. The migration velocity field is then used to 'remove' the NMO corrections before velocity analysis.

5.17 Second Pass Velocity Analysis

Full pre stack Kirchhoff time migration was used to migrate lines for velocity analysis. The velocity field was constructed by smoothing the first pass velocities. Migration was performed on 120 offset planes.

The second pass of velocities are picked at 750m interval on first pass PSTM gathers using our Fugro Seismic Imaging Pty Ltd “MGIVA” interactive velocity analysis program. Each velocity analysis comprises a semblance display, a CDP stacked panel repeated 14 times with a suite of velocity functions, and a central CDP gather. The suite of functions are generated using 0%, +/-2%, +/-4%, +/-6%, +/-8%, +/-10%, +/-12%, +/-14% increments from a central velocity function. The first pass velocities are used as the central function for this suite of velocity variant functions.

5.18 Phase only Q

Earth filtering can be modelled as an exponential decay of energy with propagation distance. This decay is approximately constant with each frequency cycle. The net result is high frequency attenuation and dispersion: high frequencies travel faster than low frequencies, causing distortion of the waveform. Q compensation adds to the model by correcting for the amplitude and/or phase effects of earth filtering.

Q compensation was performed using the method described by Hargreaves and Calvert, published in Geophysics Vol 56 No4, April 1991. This applies corrections to the phase spectrum only. A Q value of 140 was used.

5.19 Final PSTM

Kirchhoff pre-stack time migration is applied using curved ray algorithm with a maximum half aperture of 15 km,invoking the curved ray algorithm. Anti-aliasing protection is applied by pre-filtering the data within the migration scan depending upon the local migration operator dip. Apertures are muted with a 80% stretch mute to avoid operator aliasing. Smoothed 100% second pass velocities at 750m are used and migration is performed on the full offset planes.

Surface consistent velocity smoothing for final PSTM employs the same scheme as that for the first pass PSTM

5.20 Third Pass Velocity Analysis

The third pass of velocities are picked at 500m intervals on final PSTM gathers using our Fugro Seismic Imaging Pty Ltd “MGIVA” interactive velocity analysis program. Each velocity analysis comprises a semblance display, a CDP stacked panel repeated 14 times with a suite of velocity functions, and a central CDP gather. The suite of functions are generated using 0%, +/-2%, +/-4%, +/-6%, +/-8%, +/-10%, +/-12%, +/-14% increments from a central velocity function. The second pass of velocities are used as the central function for this suite of velocity variant functions.

5.21 Residual Radon Demultiple (Hi-Res)

The initial demultiple was performed in a lenient fashion because the preliminary velocity field did not permit fine discrimination between primary and multiple energy. Most seafloor multiple energy was removed. The data benefits from applying a residual Radon demultiple to remove some of the steeply dipping noises still residing on the PSTM gathers which could not be removed in the earlier attempt of demultiple. It is also used to target multiple events with similar moveout to the primary data. The Hi-resolution radon option was invoked, where the resolution of the radon transform is improved by adding weighting terms to the least squares solution, minimising the residual error. A mild t-x mute was applied immediately before the radon transform to remove NMO stretch noise from the shallow zone of longer offsets.

Normal moveout corrections are performed using the third pass velocities, and the pre-stack time migrated gathers transform into the linear Tau-P domain. The segment of the Tau-P domain corresponding to primary reflections is then muted, leaving the multiple energy to be transformed back into the T-X domain and subtracted from the original CDP gather.

Parameters for Linear Radon Transform	
Reference offset	6112 m
Frequency range	3-200 Hz
Minimum p	-500 *ms (linear delta-t, at reference offset)*
Maximum p	+1500 *ms (linear delta-t, at reference offset)*
No. of p traces	401
Tau-P muting	Time variant

Parameters for Tau-P Muting for Parabolic Radon Transform		
WBT (ms)	***Tau (ms)***	***Primary p range (muted) (ms)***
100	*400*	*-500 to 400*
	500	*-500 to 320*
	800	*-500 to 280*
	1100	*-500 to 200*
	1600	*-500 to 160*
	2400	*-500 to 140*

To reduce the potential for aliasing, 2:1 interpolation is performed in the CDP domain prior to demultiple. After demultiple, the interpolated traces are dropped from the processing stream.

5.22 Amplitude only Q

Using a Q value of 155 and a maximum boost of 12dB.

5.23 Residual Gain

A value of 2.5db/sec held constant after 3.5 seconds was used.

5.24 NMO Correction

Fourth order NMO corrections are applied using the final picked PSTM velocity functions.

5.25 Outer Trace Mute

Post-NMO outer trace mutes are applied to remove any coherent noise on the outer races and to reduce contamination from the effect of NMO stretch on the far offsets.

5.26 Inner Trace Mute

A post NMO inner trace mute is applied to help remove remnant multiple energy still apparent on the inner traces following the demultiple.

5.27 Stack

The traces within each common depth point gather are summed using 1/rootN stack compensation.

5.28 Gun and Cable Static Corrections

A static compensation of 9ms for gun and cable depths is applied.

5.29 Band-Pass Filter

Unwanted noise that lay outside the frequency range of the desired reflection data is attenuated by the application of a series of zero phase Butterworth time variant filters.

Parameters for Band-Pass Filter (milder version)		
WBT	**Time(ms)**	**Frequency (Hz)(dB/oct)**
100ms	100	9/20 - 150/72
	400	8/18 – 140/72
	800	6/18 – 110/72
	1200	4/18– 85/72
	2000	3/18 - 78/72
	2500	3/18 – 72/72
	3000	3/18 – 62/68
	4000	3/18 – 55/65
	6000	3/18 - 55/60

5.30 Post-Stack Scaling

The CDP gather traces were modulated to compensate for amplitude irregularities by scaling each trace using a combination of trace balance, and nested AGC. The detrimental effects normally associated with AGC are avoided by employing two different length windows to determine the amplitude model (using the minimum of the two mean amplitudes determined at each sample). This time variant amplitude model is then conditioned by a weighted mix with the static amplitude model derived from a single window per trace. Variations in the mix weighting gives the user fine control over the amount of trace modulation.

Window lengths of 1000 ms and 200 ms are defined with equalization applied at 50%.

6 Angle Products

Angle products, stacks generated after restricting input to a portion of the pstm gathers corresponding to a particular range of incident angles, are produced for lithology and fluid predictions. The angle of incidence calculations are performed using 1D raytracing method, and considered a smoothed version of the final velocities. The angle gathers are produced where the incident angles are restricted to the specified ranges, divide equally into 3 parts, prior to stacking.

The angle mutes use smoothed velocities (3 passes of lateral and temporal smoothing with 50% mix-back) and the stacks do not have any pre-stack nor post-stack scaling applied. Matching scalars are used to bring the near and far angle products to an overall mean value of 1000.

Parameters for Angle Products	
Near Angle	First 33% of 4 – 38 degrees
Mid Angle	Second 33% of 4 – 38 degrees
Far Angle	Last 33% of 4 – 38 degrees

The 38 degree angle mute is applied from the offset of 501 m and the 4 degree angle mute is applied to the offset of 500m so as to preserve the beginning part of water bottom and the deeper section. These products were scaled pre-stack as per the supplied pstm gathers, I.e. with a transmission loss of 2.5dB/sec held constant after 3.5seconds.

7 Summary

The sections are generally good, with improved imaging and bandwidth down to the coals of the Eastern View Coal measures. These coals result in high reflection coefficients, which dominate the sections and generate complex interbed multiples. These were to a certain degree resolved through the use of Tau-P deconvolution and two passes of Radon Demultiple. However, attempts to produce " true amplitude " sections were hampered.

All the gain recovery on the Gathers, Raw Stacks and Angle Stacks are reversible relative amplitude processes. As such the deep section below the coals are likely to have reduced amplitudes.

The final filtered and scaled stacks used a two window AGC in an attempt to recover effects due to lateral changes in amplitude losses.

8 Polarity

The final desired polarity was SEG negative (or SEG reverse), where an increase in acoustic impedance is represented by a negative number on tape, and white trough on display.

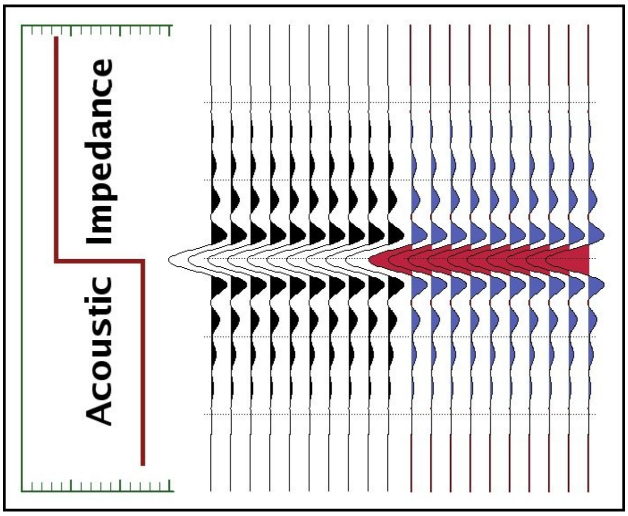


Figure 7.1 Desired polarity diagram. An acoustic impedance increase is represented by a trough.

9 Archive Listing

Tape Number	*Media*	*Lines*	*Description*
672FS001DVD	DVD	All Lines	Final Enhanced, Filtered and Scaled Full Stacks SEGY Format – Copy 1
672FS002DVD	DVD	All Lines	Final Enhanced, Filtered and Scaled Full Stacks SEGY Format – Copy 2
672RS003DVD	DVD	All Lines	Raw Stacks SEGY Format – Copy 1
672RS004DVD	DVD	All Lines	Raw Stacks SEGY Format – Copy 2
672RA005USB	USB	All Lines	Relative Amplitude Pre-Stack Time Migrated Gathers with NMO, Raw Stacks, Final Enhanced, Filtered and Scaled Stacks, Final Enhanced, Filtered Mid, Near and & Far Stacks, Final Velocities and High Density Velocities at 25m Spacing.
672VF006DVD	DVD	All Lines	Initial Velocities (Prevels) SEGY Format – Copy 1
672VF007DVD	DVD	All Lines	Initial Velocities (Prevels) SEGY Format – Copy 2
672VF008DVD	DVD	All Lines	Smoothed Velocities for PSTM (Smooth) SEGY Format – Copy 1
672VF009DVD	DVD	All Lines	Smoothed Velocities for PSTM (Smooth) SEGY Format – Copy 2
672VF010DVD	DVD	All Lines	Final Stacking Velocities (Stack) SEGY Format -Copy 1
672VF011DVD	DVD	All Lines	Final Stacking Velocities (Stack) SEGY Format -Copy 2
672AS012DVD	DVD	All Lines	Final Enhanced, Filtered Near Angle Stack (SEGY Format) – Copy 1
672AS013DVD	DVD	All Lines	Final Enhanced, Filtered Near Angle Stack (SEGY Format) – Copy 2
672AS014DVD	DVD	All Lines	Final Enhanced, Filtered Mid Angle Stack (SEGY Format) – Copy 1
672AS015DVD	DVD	All Lines	Final Enhanced, Filtered Mid Angle Stack (SEGY Format) – Copy 2
672AS016DVD	DVD	All Lines	Final Enhanced, Filtered Far Angle Stack (SEGY Format) – Copy 1
672AS017DVD	DVD	All Lines	Final Enhanced, Filtered Far Angle Stack (SEGY Format) – Copy 2
672WV018DVD	DVD	All Lines	Final Velocities in Western Format (Prevel, Smooth, Stack & HDVA) – Copy 1
672WV019DVD	DVD	All Lines	Final Velocities in Western Format (Prevel, Smooth, Stack & HDVA) – Copy 2
672RA020LTO	LTO	All Lines	Relative Amplitude Pre-Stack Time Migrated Gathers with NMO - TAR SEGY
672PR021CD	CD	All Lines	Final Processing Report (PDF Format) – Copy 1
672PR022CD	CD	All Lines	Final Processing Report (PDF Format) – Copy 2
672PR023CD	CD	All Lines	Final Processing Report (PDF Format) – Copy 3

10 SP-CDP Relationship

The SP-CDP relationships for all lines are as follows:

JOB	LINE	FSP	FCDP	LSP	LCDP	JOB	LINE	FSP	FCDP	LSP	LCDP
1	TDOB08-044-001	1001	240	1606	1450	**35**	TDOB08-078-035	2113	240	1001	2464
2	TDOB08-030-002	1608	240	1001	1454	**36**	TDOB08-003-036	1669	240	1001	1576
3	TDOB08-022-003	1001	240	3097	4432	**38**	TDOB08-012-038	1001	240	2343	2924
4	TDOB08-036-004	3022	240	1001	4282	**39**	TDOB08-024-039	2649	240	1001	3536
6	TDOB08-050-006	1001	240	1631	1500	**40**	TDOB08-038-040	1001	240	1611	1460
7	TDOB08-034-007	1601	240	1001	1440	**41**	TDOB08-060-041	1704	240	1001	1646
8	TDOB08-046-008	1001	240	1612	1462	**42**	TDOB08-074-042	1001	240	2447	3132
9	TDOB08-054-009	1746	240	1001	1730	**43**	TDOB08-082-043	1630	240	1001	1498
10	TDOB08-064-010	1001	240	2990	4218	**44**	TDOB08-009-044	2063	240	1001	2364
11	TDOB08-042-011	2865	240	1001	3968	**45**	TDOB08-018-045	1001	240	2316	2870
12	TDOB08-026-012	1001	240	1649	1536	**46**	TDOB08-048-046	2461	240	1001	3160
13	TDOB08-040-013	1604	240	1001	1446	**47**	TDOB08-058-047	1001	240	2792	3822
14	TDOB08-007-014	1001	240	1553	1344	**48**	TDOB08-068-048	2522	240	1001	3282
15	TDOB08-001-015	1667	240	1001	1572	**49**	TDOB08-076-049	1001	240	2949	4136
16	TDOB08-016-016	1001	240	2637	3512	**50**	TDOB08-088-050	2747	240	1001	3732
17	TDOB08-052-017	3253	240	1001	4744	**51**	TDOB08-096-051	1001	240	1858	1954
19	TDOB08-066-019	1001	240	2359	2956	**52**	TDOB08-094-052	1627	240	1001	1492
20	TDOB08-070-020	2247	240	1001	2732	**53**	TDOB08-100-053	1001	240	1708	1654
21	TDOB08-080-021	1001	240	2367	2972	**54**	TDOB08-102-054	1512	240	1001	1262
22	TDOB08-090-022	1980	240	1001	2198	**55**	TDOB08-011-055	2516	240	1001	3270
23	TDOB08-098-023	1001	240	2018	2274	**56**	TDOB08-010-056	1001	240	2378	2994
24	TDOB08-092-024	1981	240	1001	2200	**57**	TDOB08-006-057	1964	240	1001	2166
25	TDOB08-005-025	2018	240	1001	2274	**58**	TDOB08-015-058	1001	240	2933	4104
26	TDOB08-014-026	1001	240	2625	3488	**59**	TDOB08-019-059	3265	240	1001	4768
27	TDOB08-028-027	2979	240	1001	4196	**60**	TDOB08-017-060	1001	240	3204	4646
28	TDOB08-020-028	1001	240	3057	4352	**61**	TDOB08-013-061	2741	240	1001	3720
29	TDOB08-032-029	3007	240	1001	4252	**62**	TDOB08-008-062	1001	240	2222	2682
30	TDOB08-056-030	1001	240	2470	3178	**63**	TDOB08-004-063	1809	240	1001	1856
31	TDOB08-062-031	2442	240	1001	3122	**64**	TDOB08-002-064	1001	240	1414	1066
32	TDOB08-072-032	1001	240	2636	3510	**65**	TDOB08-027-065	1001	240	3649	5536
33	TDOB08-084-033	2173	240	1001	2584	**67**	TDOB08-023-067	3914	240	1001	6066
34	TDOB08-086-034	1001	240	2148	2534	**68**	TDOB08-025-068	1001	240	3887	6012
						69	TDOB08-021-069	3739	240	1001	5716

11 SEGY Header Information

11.1 Header of Post-Stack Data

Type	Start byte	Description	Type	Start byte	Description
I32	1	Trace number within line.	I16	99	Source static correction.
I32	5	Trace number within reel.	I16	101	Receiver static correction.
I32	9	Sequential record number.	I16	103	Total static applied.
I32	9	Original field record number.	I16	109	Delay recording time (ms).
I32	13	Trace number.	I16	111	Mute time start.
I32	17	Shot point number.	I16	113	Mute time end.
I32	21	CDP number.	I16	115	No. of samples.
I32	25	Trace no. within the CDP.	I16	117	Sample interval in microseconds.
I16	29	Trace identification code.	I16	157	Year of recording.
I16	31	No. of summed traces.	I16	159	Julian day number (1-366).
I16	33	Total number of traces in CDP.	I16	161	Hour of day (24 hour clock).
I16	35	Data use 1=production, 2=test.	I16	163	Minute of hour.
I32	37	Trace offset (integer).	I16	165	Second of minute.
I32	41	Elevation at receiver.	I16	167	Time base code 1.local,2.gmt,3.?
I32	45	Elevation at source.	I32	181	3D Line number.
I32	61	Water depth at source.	I32	185	CDP no. within 3D line.
I32	65	Water depth at receiver.	I32	189	2D shotpoint number (Maersk).
I16	69	Scaler to be applied to elevations.	I32	193	Easting of CDP.
I16	71	Scaler to be applied to coordinates.	I32	197	Northing of CDP.
I32	73	Source easting.	I16	201	Scaler to be applied to SPNO.
I32	77	Source northing.			
I32	81	Receiver easting.			
I32	85	Receiver northing.			
I16	89	Coordinate units (m/arc).			

11.2 Header of Pre-Stack Data

Type	Start byte	Description	Type	Start byte	Description
I32	1	Trace number within line.	I16	99	Source static correction.
I32	5	Trace number within reel.	I16	101	Receiver static correction.
I32	9	Sequential record number.	I16	103	Total static applied.
I32	9	Original field record number.	I16	109	Delay recording time (ms).
I32	13	Trace number.	I16	111	Mute time start.
I32	17	Shot point number.	I16	113	Mute time end.
I32	21	CDP number.	I16	115	No. of samples.
I32	25	Trace no. within the CDP.	I16	117	Sample interval in microseconds.
I16	29	Trace identification code.	I16	157	Year of recording.
I16	31	No. of summed traces.	I16	159	Julian day number (1-366).
I16	33	Total number of traces in CDP.	I16	161	Hour of day (24 hour clock).
I16	35	Data use 1=production, 2=test.	I16	163	Minute of hour.
I32	37	Trace offset (integer).	I16	165	Second of minute.
I32	41	Elevation at receiver.	I16	167	Time base code 1.local,2.gmt,3.?
I32	45	Elevation at source.	I32	181	3D Line number.
I32	61	Water depth at source.	I32	185	CDP no. within 3D line.
I32	65	Water depth at receiver.	I32	189	2D shotpoint number (Maersk).
I16	69	Scaler to be applied to elevations.	I32	193	Easting of CDP.
I16	71	Scaler to be applied to coordinates.	I32	197	Northing of CDP.
I32	73	Source easting.	I16	201	Scaler to be applied to SPNO.
I32	77	Source northing.	I16	203	Seqn record nos. (pre-stack only).
I32	81	Receiver easting.	I32	205	Source station number.
I32	85	Receiver northing.	I32	209	Receiver station number.
I16	89	Coordinate units (m/arc).			

11.3 SEGY EBCDIC Headers

Typical SEGY EBCDIC line header (from line TDOB08-030-002)

Final Migration

```
C01 CLIENT          : 3D OIL
C02 LINE            : TDOB08-030-002
C03 PROSPECT        : BASS STRAIT
C04 DATASET         : PSTM
C05
C06 ACQ. YEAR       : 2008            DATE PROCESSED : AUGUST 2008
C07 SHOT INTERVAL   : 25.0M           GRP INTERVAL   : 12.5M
C08 CABLE LENGTH    : 6000M           GRPS PER CABLE : 480
C09 MIN OFFSET      : 98M             MAX OFFSET     : 6132.5M
C10 DATUM OF REF    :                 PROJECTION     :
C11 COORDINATE UNITS: METRES          VERTICAL DATUM : MEAN SEA LEVEL
C12 SAMPLE RATE (MS): 2               MAX TIME (MS)  : 6002
C13
C14 PROCESSING SEQUENCE: BY FUGRO SEISMIC IMAGING
C15 REFORMAT / INSTRUMENT DELAY / T SQUARED GAIN  / LOW CUT FILTER
C16 NAVIGATION MERGE / TFDN / TAUP LINEAR NOISE ATTENUATION
C17 DESIGNATURE OUTPUT TO ZERO PHASE
C18 SRME / FIRST PASS VELOCITIES
C19 RECEIVER ARRAY SIMULATION / SORT TO CDP
C20 RADON MULTIPLE ATTENUATION / PSTM FOR SECOND PASS VELOCITIES
C21 REMOVAL OF T SQUARED / SPHERICAL DIVERGENCE CORRECTION
C22 PHASE ONLY Q / PSTM / THIRD PASS VELOCITIES / RESIDUAL RADON /
AMPLITUDE ON
C23 NMO CORRECTION / TFDN (FAR OFFSETS ONLY TAPERED ON FROM 1.2-2 SECS )/
C24 INNER AND OUTER MUTES / STACK / DUAL WINDOW AGC / TIME VARIANT FILTER
C25
C26
C27
C28 ARCHIVE
C29     TRACE HEADER DEFINITION
C30     ITEM            BYTES       FORMAT
C31     SHOTPOINT       017 - 020   INTEGER
C32     CDP             021 - 024   INTEGER
C33     EASTING         193 - 196   INTEGER
C34     NORTHING        197 - 200   INTEGER
C35
C36 SP/CDP RELATIONSHIP: CDPS 245,246 = SP 1608 (I.E. 2CDPS PER SP)
C37 CDP POSITION CLOSEST TO SHOT LOCATION
C38 SP RANGE  : 1608 TO 1001
C39 CDP RANGE : 1 TO 1454
C40 END OF EBCDIC HEADER
```

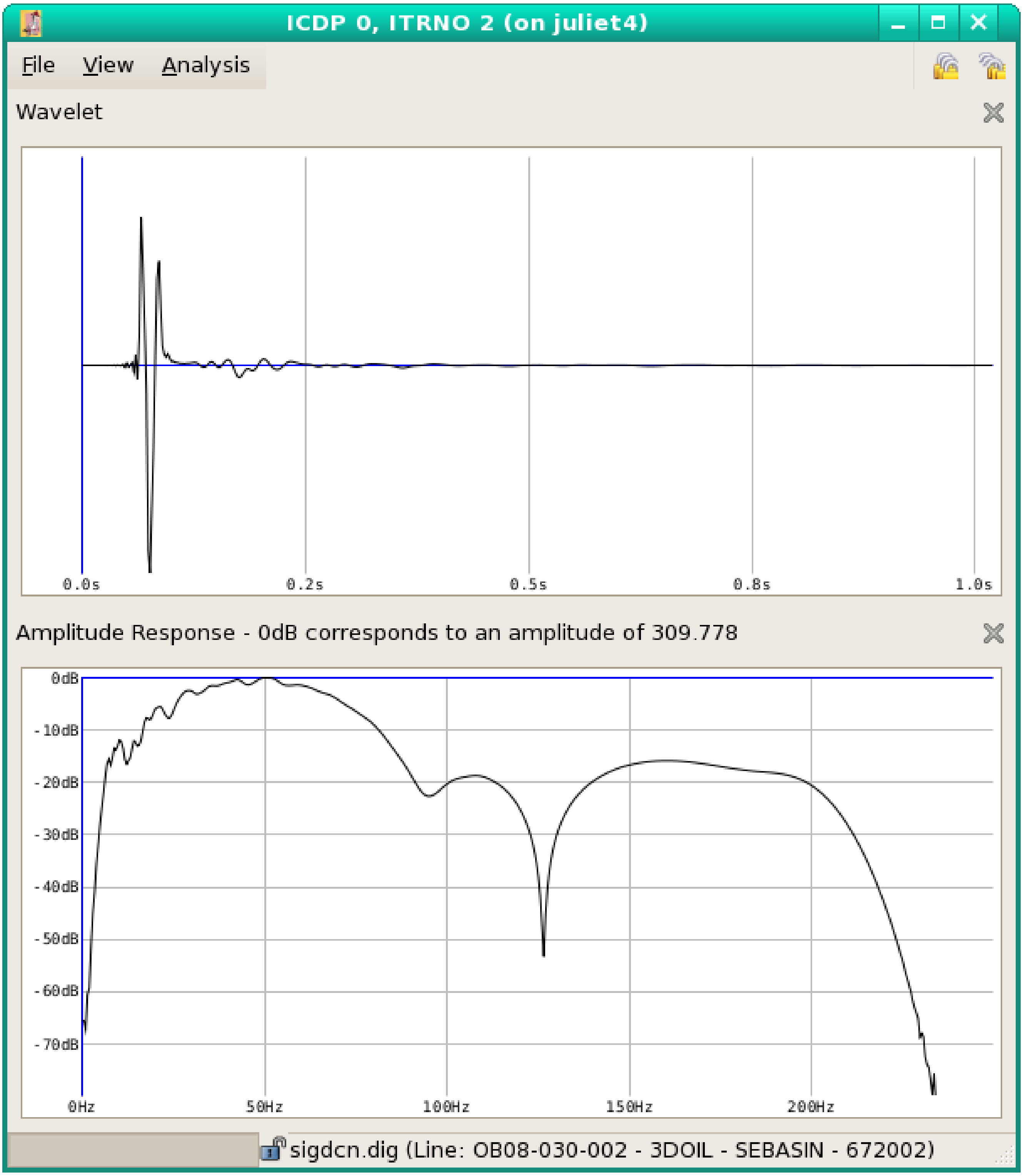
12 Data Disposition

Data	*Date sent*	*Destination*
93 x 3590 cartridges containing field data. Tape # 1-93 1 x 3590 cartridge containing SOJ/EOJ Tests. tape # 94 1 x CD containing Observers/Source/Tape Logs, Timing Diagram & Shipping Proforma 1 x DVD containing P1/90 & Raw P2/94 Navigation data 1 x DVD containing QC deliverables	04/11/08	3D Oil Level 5, 164 Flinders Lane MELBOURNE VIC 3000 Attn: Tape Librarian

13 Appendix

13.1 Far Field Signature

Far field signature with source depth of 6 m and cable depth of 8m, incorporating the fuzzy cable ghost at 8 m +/- 2m



13.2 Far Field Signature Listing

Farfield signature was generated by Nucleus version 6.5.4
Farfield signature was generated by Marine source modelling version 5.2.4

Array name : A3040C60TT1S10
Total volume : 3040 cu.in.
Source depth : 6.00 m
Streamer depth : 0.00 m
Group length : 12.50 m
Average pressure : 2000 psi
Ghost strength : -1.00
Primary amplitude : 45.57 bar m
Peak-peak amplitude : 94.90 bar m
P/B-ratio : 17.82
Bubble period (+) : 98.50 msec
Bubble period (-) : 117.50 msec
Seawater temperature: 7.00 C
Seawater velocity : 1517.0 m/s
Filter :
Low-cut frequency : 2.50 Hz
Low-cut slope : 12.00 dB/oct
High-cut frequency: 200.00 Hz
High-cut slope : 370.00 dB/oct
Instrument : Sercel SEAL mp
Time of 1st sample: -64.00 msec i.e. index of time zero = 33.00
Sample interval : 2.00 msec
Farfield position :
Distance : 9000.00 m
Azimuth : 0.00 deg
Angle of vertical : 0.00 deg

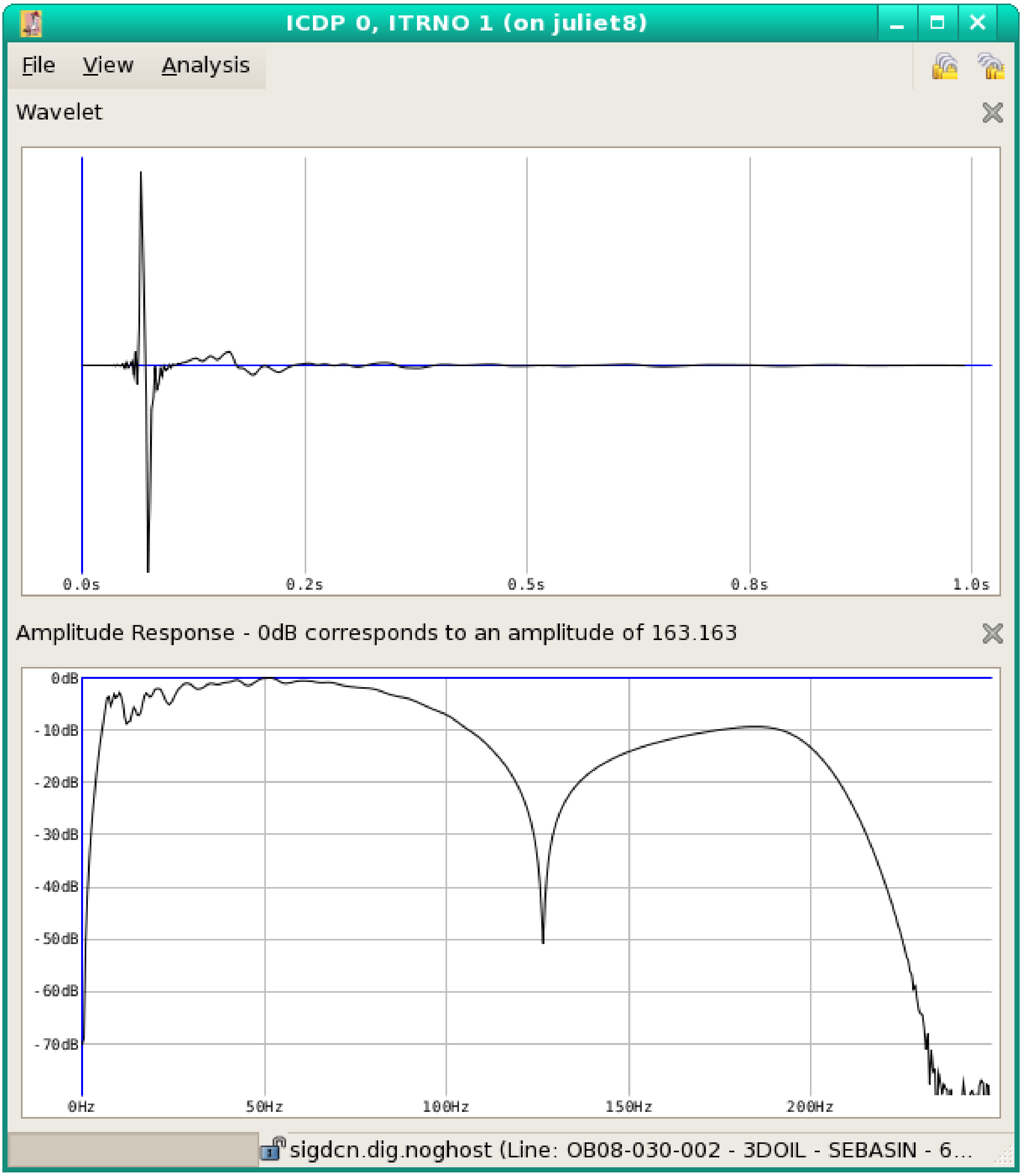
Amplitudes are in bar m
Time is increasing horizontally

0.000	0.000	0.000	0.000	0.000	0.000	0.000
-0.001	0.001	-0.002	0.002	0.001	-0.007	0.016
-0.024	0.022	-0.003	-0.039	0.096	-0.145	0.150
-0.073	-0.103	0.353	-0.593	0.696	-0.521	-0.020
0.913	-2.021	3.133	-4.230	8.557	44.145	29.803
12.759	-8.241	-47.492	-31.943	-9.944	-7.465	-0.272
-5.436	-4.155	-0.721	-2.472	-0.163	-1.083	-0.793
0.148	-0.535	0.241	0.093	0.075	0.452	0.327
0.572	0.638	0.694	0.936	1.018	1.212	1.421
1.571	1.658	1.498	1.230	1.001	0.945	1.184
1.581	1.963	2.164	2.065	1.742	1.400	1.267
1.473	1.910	2.355	2.700	2.954	3.126	3.089
2.611	1.676	0.596	-0.214	-0.552	-0.572	-0.566
-0.726	-1.044	-1.397	-1.756	-2.064	-2.178	-2.025
-1.623	-1.101	-0.621	-0.274	-0.097	-0.090	-0.226

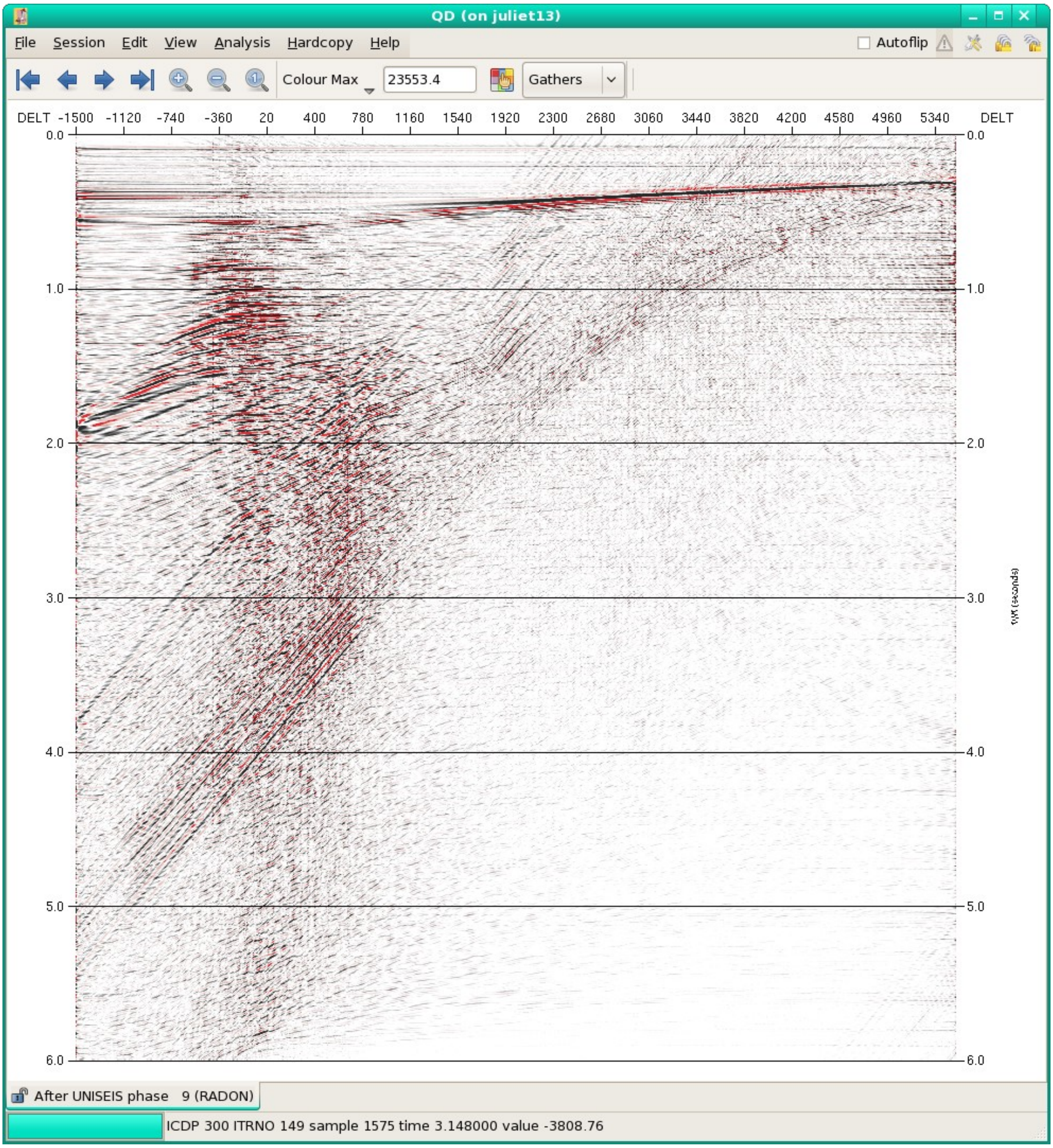
-0.455	-0.712	-0.959	-1.215	-1.452	-1.581	-1.562
-1.387	-1.118	-0.853	-0.618	-0.415	-0.241	-0.094
0.021	0.111	0.183	0.235	0.278	0.328	0.387
0.450	0.495	0.479	0.392	0.265	0.147	0.091
0.112	0.178	0.246	0.281	0.267	0.203	0.108
0.014	-0.044	-0.046	0.004	0.083	0.160	0.213
0.229	0.204	0.139	0.046	-0.063	-0.172	-0.263
-0.317	-0.326	-0.293	-0.225	-0.139	-0.047	0.049
0.142	0.233	0.317	0.394	0.462	0.518	0.563
0.594	0.610	0.612	0.599	0.569	0.518	0.438
0.322	0.175	0.012	-0.149	-0.290	-0.400	-0.476
-0.522	-0.546	-0.559	-0.571	-0.588	-0.608	-0.619
-0.612	-0.580	-0.524	-0.453	-0.372	-0.288	-0.204
-0.123	-0.048	0.018	0.075	0.122	0.156	0.179
0.190	0.191	0.182	0.165	0.142	0.115	0.088
0.063	0.043	0.029	0.022	0.022	0.028	0.038
0.051	0.067	0.083	0.100	0.118	0.137	0.156
0.176	0.195	0.211	0.224	0.232	0.234	0.229
0.217	0.199	0.173	0.141	0.103	0.060	0.015
-0.029	-0.067	-0.097	-0.118	-0.132	-0.139	-0.140
-0.138	-0.133	-0.127	-0.120	-0.112	-0.103	-0.092
-0.077	-0.061	-0.043	-0.025	-0.009	-0.012	-0.016
-0.016	-0.017	-0.005	-0.001	-0.011	-0.028	-0.051
-0.073	-0.096	-0.117	-0.134	-0.147	-0.153	-0.153
-0.146	-0.133	-0.117	-0.097	-0.075	-0.054	-0.035
-0.017	-0.003	0.009	0.018	0.024	0.029	0.032
0.035	0.039	0.044	0.050	0.059	0.069	0.081
0.093	0.106	0.120	0.134	0.149	0.163	0.177
0.190	0.202	0.212	0.219	0.224	0.224	0.220
0.211	0.198	0.179	0.155	0.126	0.093	0.057
0.019	-0.020	-0.059	-0.096	-0.130	-0.161	-0.188
-0.210	-0.228	-0.240	-0.248	-0.252	-0.251	-0.246
-0.238	-0.228	-0.215	-0.201	-0.185	-0.168	-0.150
-0.132	-0.113	-0.094	-0.074	-0.054	-0.034	-0.013
0.007	0.027	0.045	0.063	0.079	0.093	0.104
0.114	0.120	0.125	0.127	0.127	0.126	0.123
0.120	0.116	0.112	0.107	0.104	0.100	0.098
0.095	0.093	0.091	0.090	0.088	0.085	0.083
0.079	0.075	0.070	0.063	0.055	0.046	0.035
0.023	0.010	-0.004	-0.019	-0.035	-0.051	-0.067
-0.083	-0.098	-0.111	-0.124	-0.134	-0.143	-0.148
-0.151	-0.152	-0.150	-0.145	-0.138	-0.130	-0.119

-0.107	-0.094	-0.081	-0.066	-0.052	-0.037	-0.023
-0.008	0.005	0.018	0.031	0.043	0.054	0.064
0.073	0.081	0.088	0.094	0.098	0.102	0.104
0.104	0.103	0.101	0.098	0.093	0.087	0.079
0.071	0.062	0.052	0.042	0.031	0.021	0.011
0.001	-0.008	-0.016	-0.023	-0.030	-0.035	-0.039
-0.043	-0.045	-0.047	-0.047	-0.048	-0.047	-0.047
-0.045	-0.044	-0.042	-0.041	-0.039	-0.036	-0.034
-0.032	-0.029	-0.027	-0.024	-0.021	-0.018	-0.014
-0.011	-0.007	-0.003	0.001	0.005	0.009	0.013
0.016	0.020	0.023	0.025	0.028	0.029	0.031
0.031	0.031	0.031	0.030	0.028	0.026	0.023
0.020	0.017	0.013	0.009	0.005	0.001	-0.003
-0.008	-0.012	-0.016	-0.019	-0.022	-0.026	-0.028
-0.030	-0.032	-0.033	-0.034			

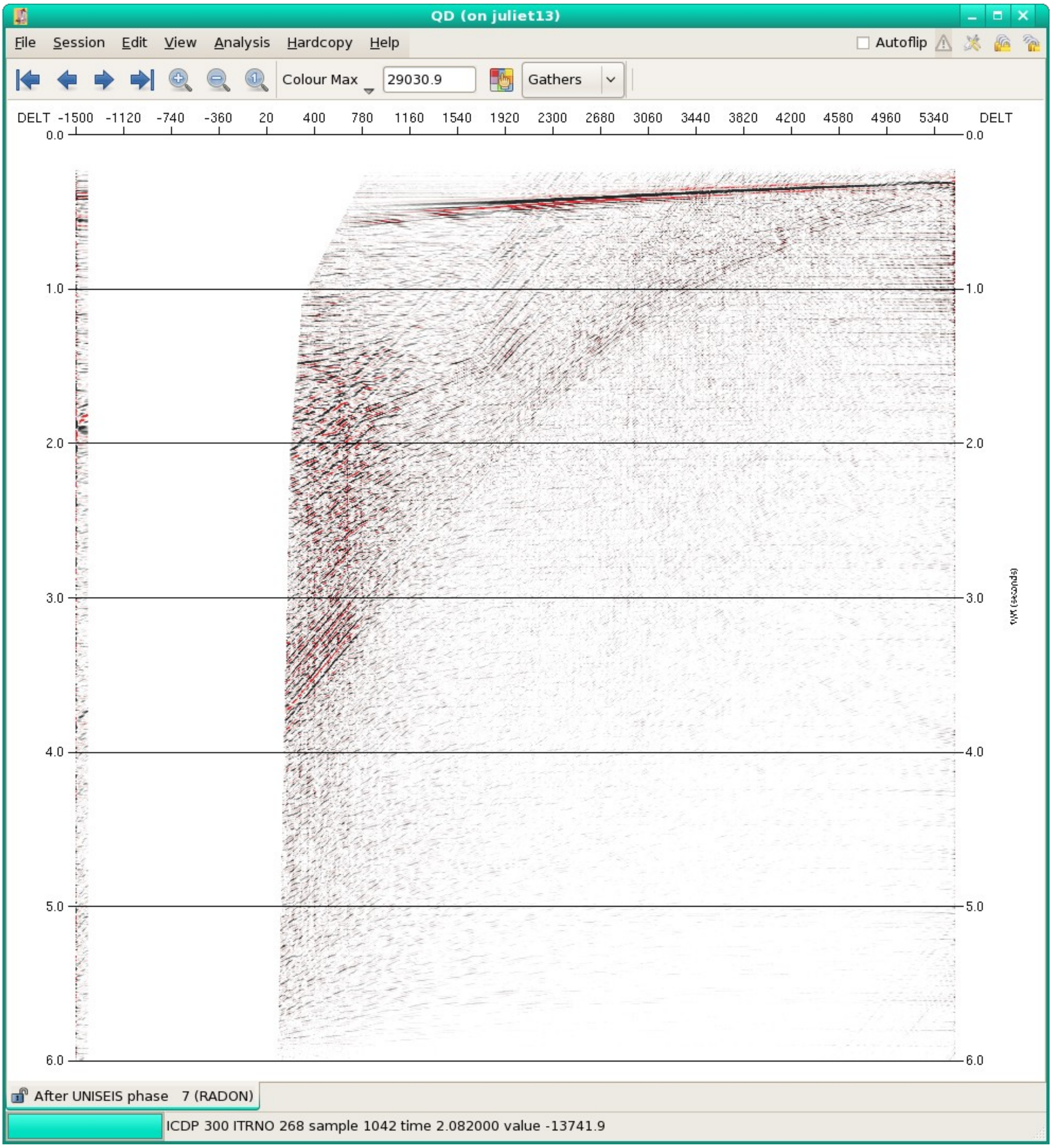
Far field signature as supplied with no ghost applied.



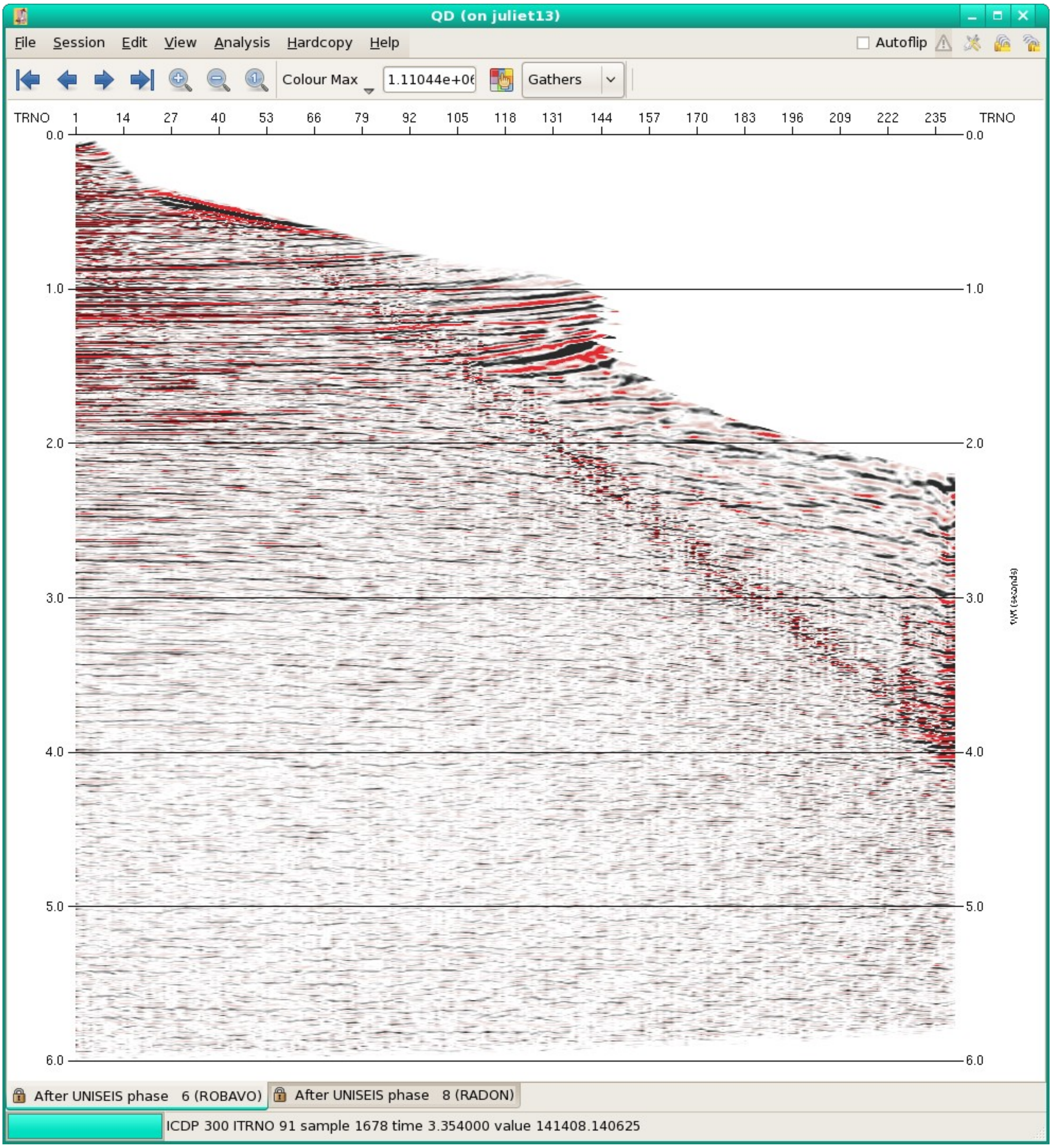
TauP transform of cdp 300 line TDOB08-030-002



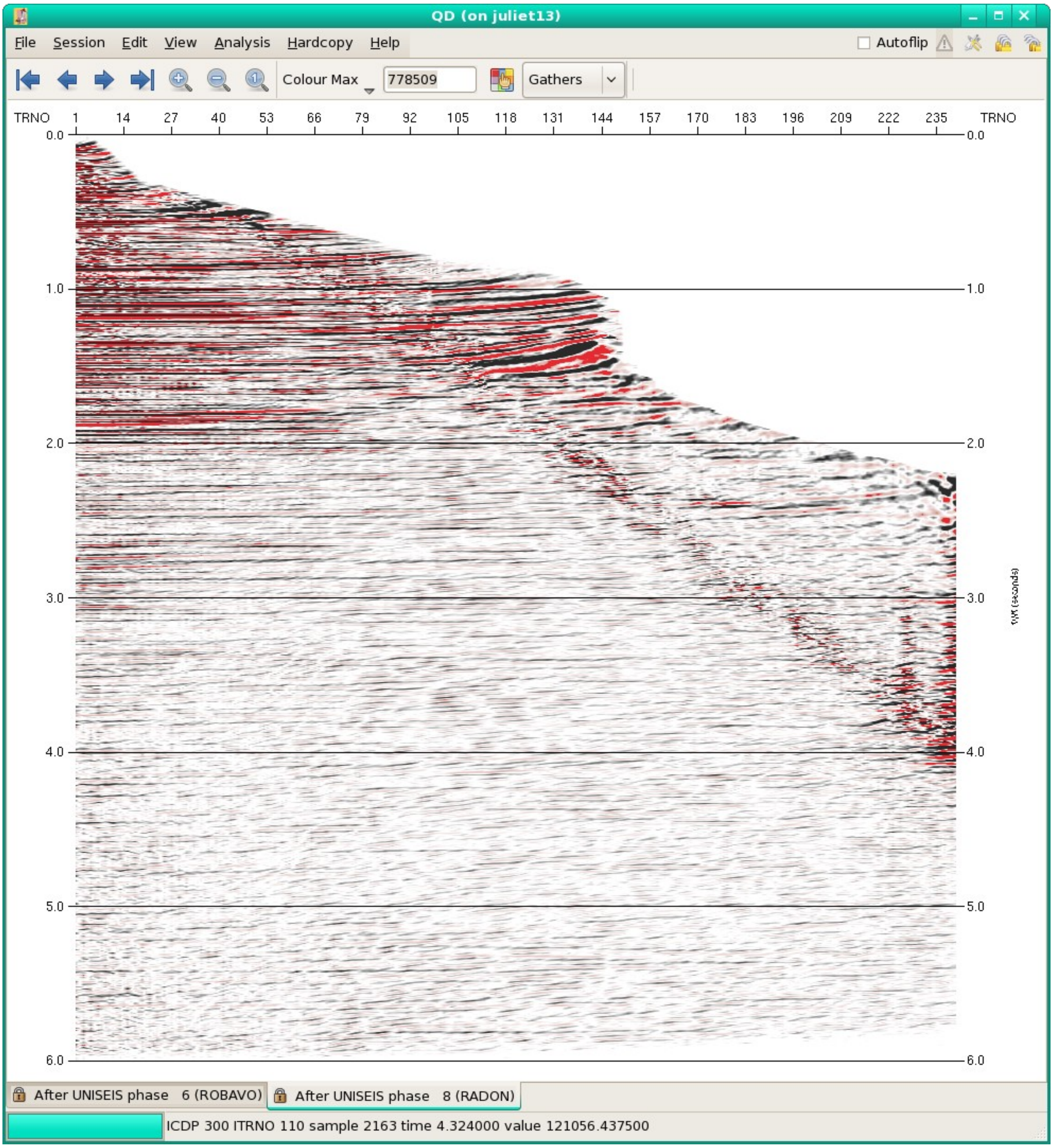
TauP transform of cdp 300 line TDOB08-030-002 mute displayed



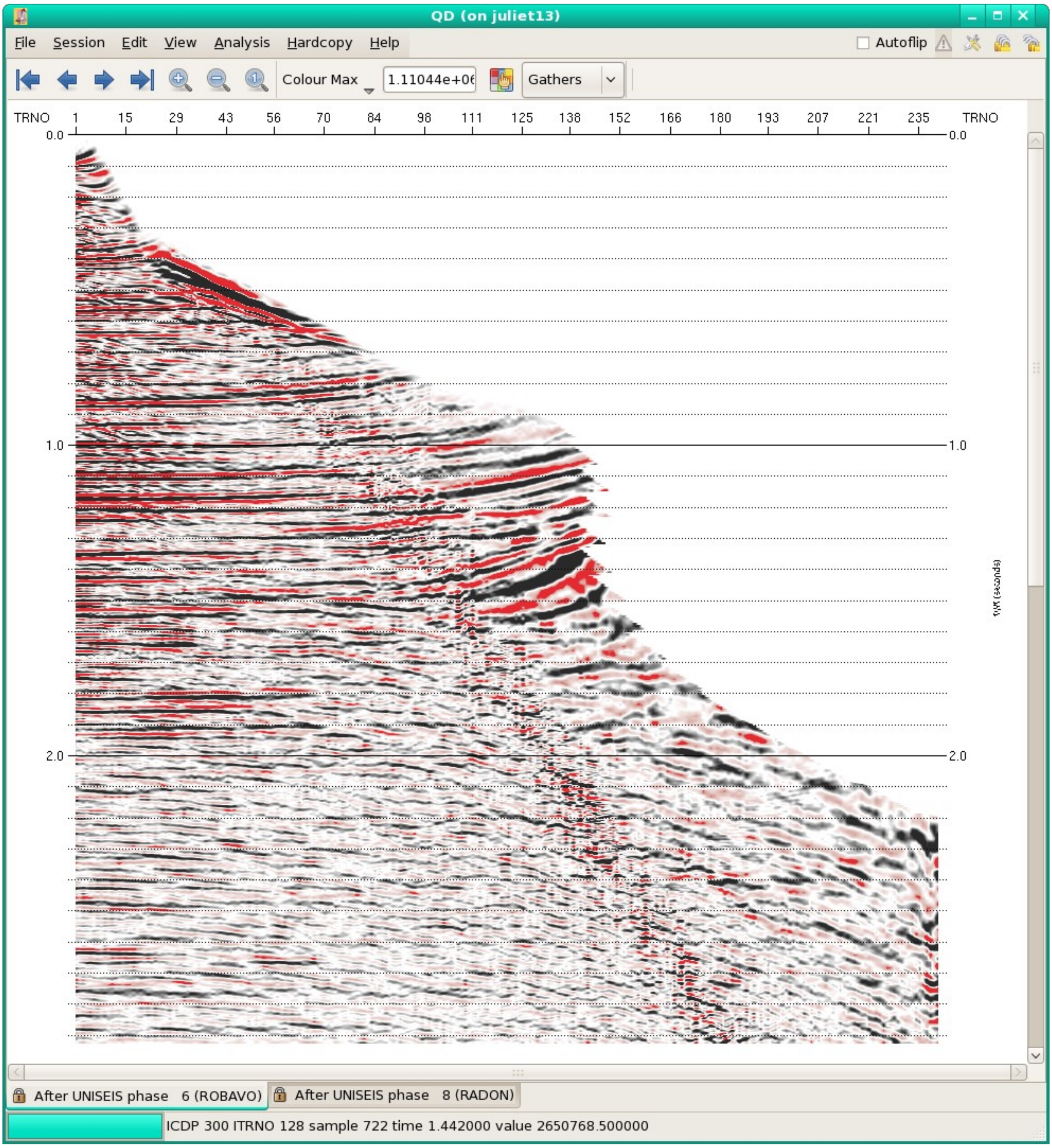
Line TDOB08-030-002 cdp 300 pre radon



Line TDOB08-030-002 cdp 300 post radon



Line TDOB08-030-002 cdp 300 pre radon zoomed



Line TDOB08-030-002 cdp 300 post radon zoomed