SEISMIC DATA PROCESSING REPORT

for

TAP Oil

Survey:	Molson 2D
Location:	Bass Basin, T/47P
Date:	August 2008

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1 Introduction

The Molson 2D survey was acquired by the CGG Veritas vessel MV Pacific Titan in March 2008. A total of 597km was acquired, comprised of 23 lines. The survey is located in the Bass Basin, Australia in water depths of approximately 70m.

This report describes the 2008 processing of this survey, which was undertaken at the Fugro Seismic Imaging office in Perth, Western Australia.

1.1 Personnel

Fugro Seismic Imaging Pty Ltd

Simon Stewart	Data Processing Manager
Scott Wilkinson	Senior Geophysicist

TAP Oil

John Thornton
Silvano Pagnozzi

1.2 Location Map

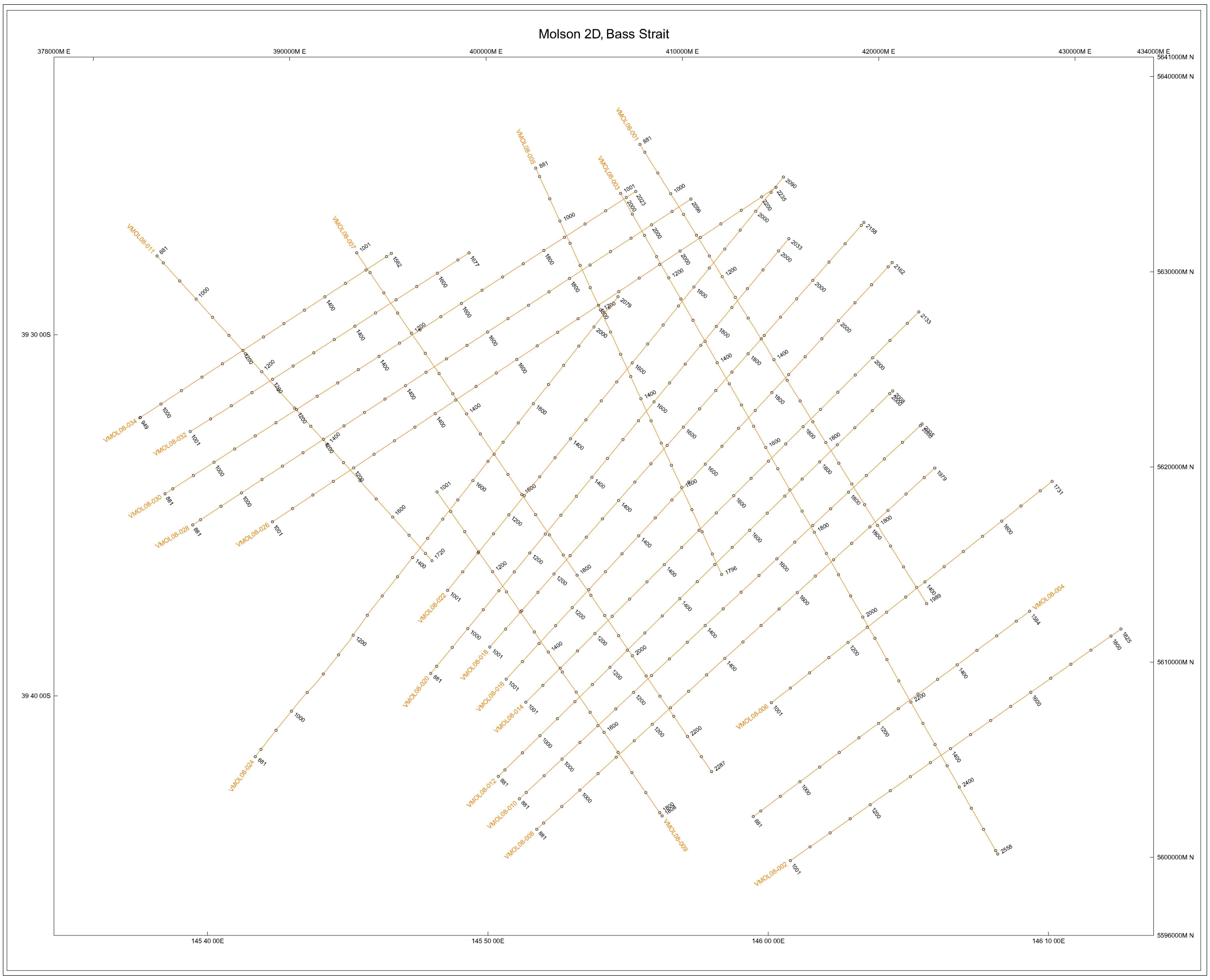


Figure 1.2.1 Line Location Map

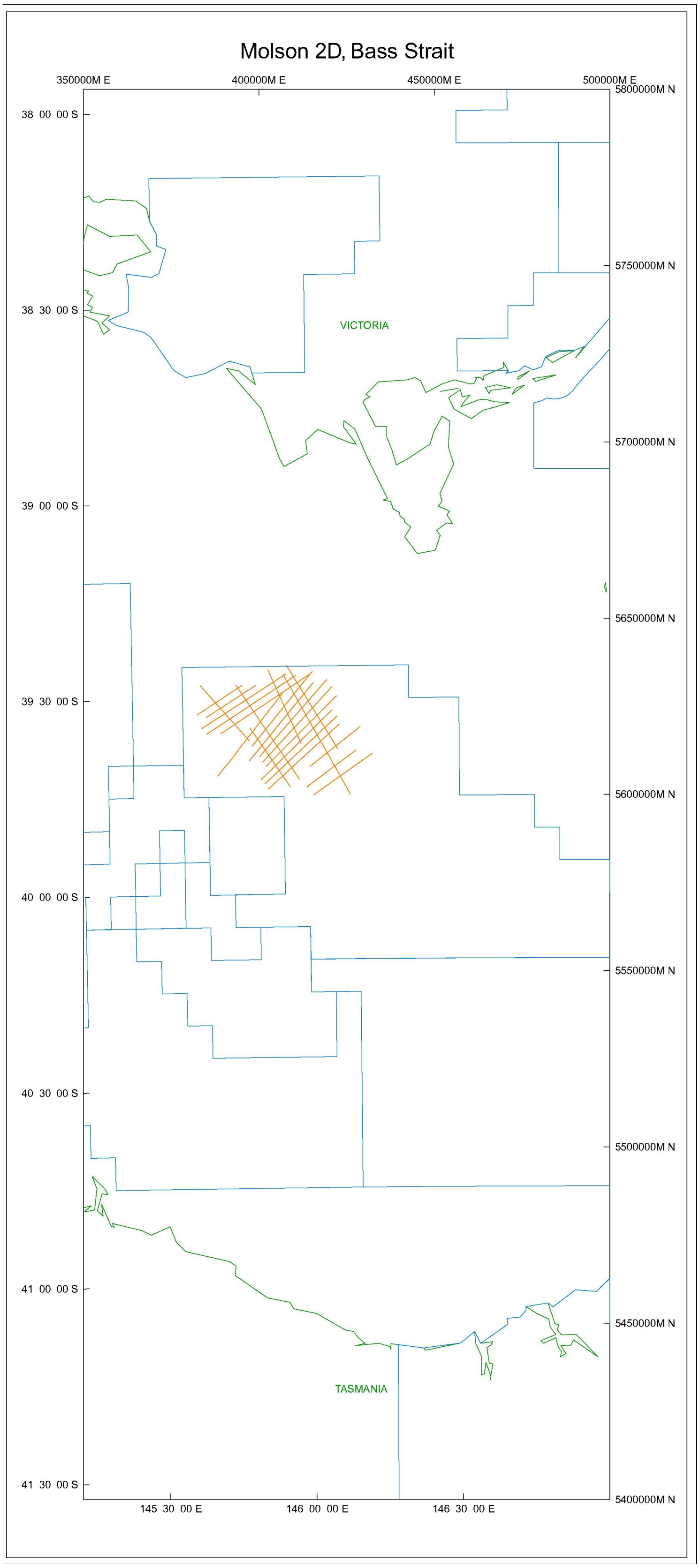


Figure 1.2.2 Survey Location Map

1.3 Line Listing

LINE	First SP	Last SP	Last CDP	Length (km)
VMOL08-001	1987	881	2452	027.675
VMOL08-002	1001	1825	1888	020.625
VMOL08-003	1001	2558	3354	038.950
VMOL08-004	1584	881	1646	017.600
VMOL08-005	1796	881	2070	022.900
VMOL08-006	1001	1731	1700	018.275
VMOL08-007	1001	2287	2812	032.175
VMOL08-008	1979	881	2436	027.475
VMOL08-009	1001	1808	1854	020.200
VMOL08-010	2005	881	2488	028.125
VMOL08-011	1720	881	1918	021.000
VMOL08-012	2008	881	2494	028.200
VMOL08-014	1001	2133	2504	028.325
VMOL08-016	1001	2162	2562	029.050
VMOL08-018	1001	2158	2554	028.950
VMOL08-020	2033	881	2544	028.825
VMOL08-022	1001	2090	2418	027.250
VMOL08-024	2079	881	2636	029.975
VMOL08-026	1001	2235	2708	030.875
VMOL08-028	2096	881	2670	030.400
VMOL08-030	2023	881	2524	028.575
VMOL08-032	1001	1677	1592	016.925
VMOL08-034	1562	970	1424	014.825
			TOTAL	**597.175**

2 Acquisition Parameters

DESCRIPTION	***DETAILS***
Data recorded by:	CGGVeritas
Date recorded:	March 12-17, 2008
Vessel:	MV Pacific Titan
***General**:*	
Field CMP Interval	6.25m
Nominal Fold	120
Recording Format:	SEGD 8058
***Seismic source**:*	
Volume	3040cu. in.
Pressure:	2000psi
Depth:	6m
Shot interval:	25m
Gun Delay	50ms
***Recording system**:*	Sercel SEAL 408XL
Record length:	6000ms
Sample interval:	2ms
Number of Channels:	480
Near Channel:	1
Low Cut Filter:	4.7Hz (12dB/Oct)
High Cut Filter:	200 Hz (370dB/Oct)
***Receivers**:*	
Streamer Length:	6000m
Streamer depth:	8m
Number of groups:	480
Group interval:	12.5m
Centre source to centre near group:	145m
***Navigation**:*	
Geodetic Datum:	WGS-84
Projection:	UTM Zone 55 South
Central Meridian:	147 deg East

3 Parameter Testing

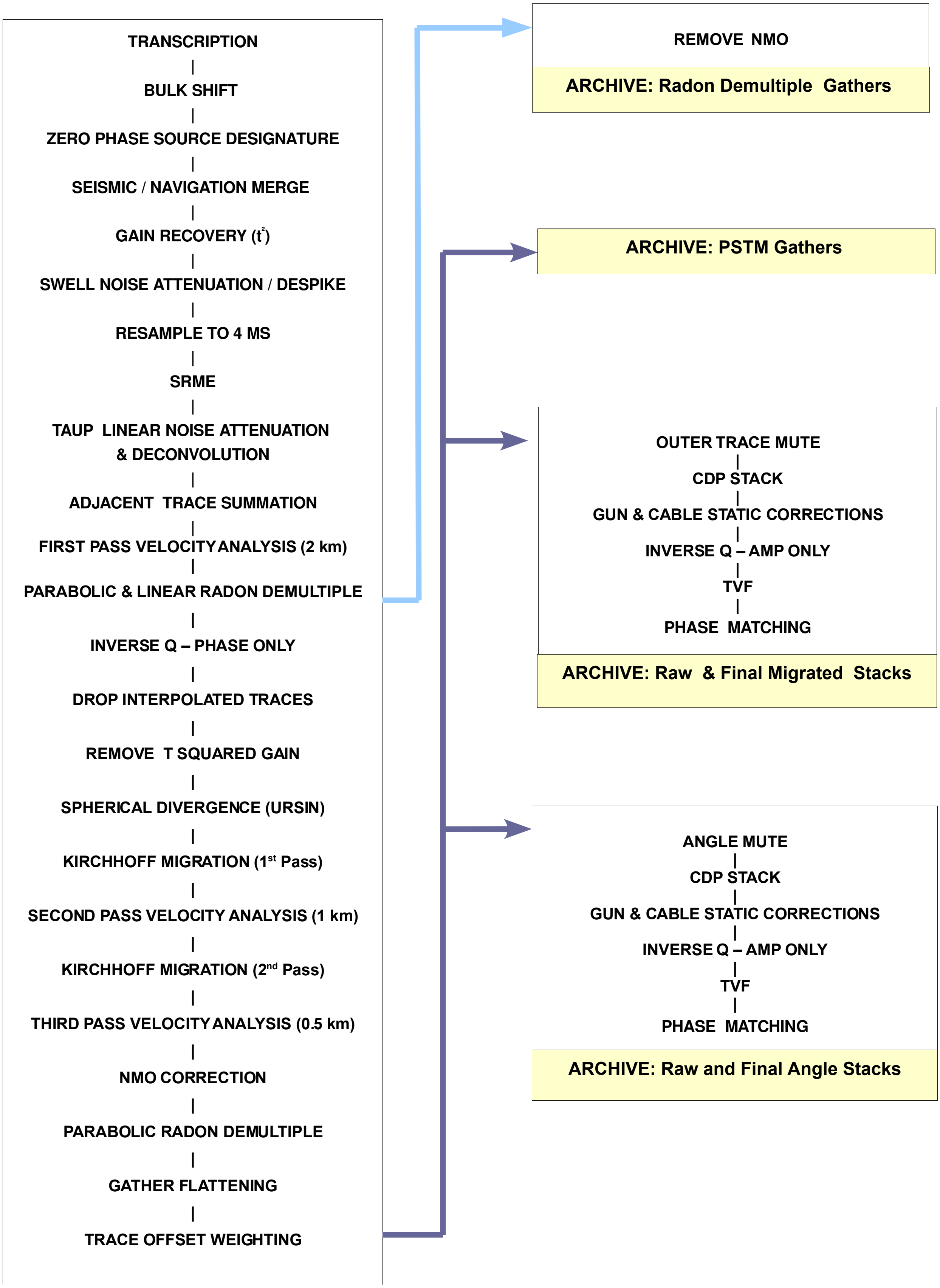
The testing was run on line VMOL08-014 and VMOL08-026, with confirmatory testing on other lines as required to determine the final parameters.

Please refer to the table below for a list of the tests performed.

Description	***Format***
Raw displays	Shot
Gain recovery	Shot
Low Cut Filter	Shot
Swell Noise Attenuation	Shot/Stack
Source Designature (Zero phasing)	Shot/Stack
Surface Related Multiple Elimination (SRME)	Shot/Stack
Tau-P Deconvolution	Shot/Stack
Trace Interpolation	Shot/Gather
Radon Demultiple	Gather/Stack
Random Noise Attenuation	Gather/Stack
Scaling before PSTM (SCAMP)	Stack
PSTM velocity field smoothing	Velocity profile
Stack mutes (outer and inner trace)	Gather/Stack
Angle Mutes	Gather/Stack
Residual Radon	Gather/Stack
Scaling	Stack
Filter	Stack
Phase Matching	Stack

Parameter tests were presented to John Thornton of TAP Oil for evaluation.

4 Processing Sequence Diagram



5 Processing Description

5.1 Transcription

Field data were converted to Fugro Seismic Imaging's internal format for processing. When reading the format shot records, strategic header values related to acquisition were preserved (where available).

5.2 Static Shift

A static shift of -50ms was applied to compensate for the gun delay.

5.3 Zero Phase Source Designature

A filter was designed to convert the supplied far field signature to its zero phase equivalent. The effect of applying this filter to the data is to remove the phase rotations caused by the recording instruments, and to collapse the effective source signature. The convolution filters were based on the modelled far field signature and included a correction for the receiver ghost.

5.4 Gain

A t squared gain was applied to the data

5.5 Swell Noise Attenuation

Swell noise attenuation is achieved by shaping the amplitude spectra of selected "swell noise affected" traces.

Analysis and attenuation are performed in the FX domain, processing one source position at a time. For analysis, the amplitude spectra are normalised, considering only the higher frequency range which is less influenced by swell noise. After normalisation the swell noise traces are recognised by their relatively high amplitude, low frequency component. The shallow portion of each shot record is muted before analysis, removing the high amplitude shallow reflections and direct arrivals.

A frequency range of 0-15Hz was selected for analysis, and for spectral scaling. Scalars are calculated to shape the spectra of individual swell noise affected traces to the mean of the non swell noise affected traces. The scalars are fully applied from 0 to one half the defined frequency range, after which the scalars are tapered to zero application at the maximum defined frequency. No modification is made to other traces.

The mechanism of swell noise recognition is not influenced by change in source energy, or by systematic variation in trace amplitude levels. Shots not affected by swell noise will not present any traces for swell noise attenuation.

Two passes of swell removal were applied, firstly in common offset domain and then in common shot domain.

5.6 Resample to 4ms

The data were resampled from 2ms to 4ms with a 3(12) to 100 (72) Hz (dB/Oct) bandpass anti-alias filter.

5.7 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 shot point 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 was applied to the input shot records prior to remove direct arrival energy. Before adaptive subtraction, the modelled multiples were NMO corrected and any energy above the first sea floor multiple removed by muting.

5.8 Tau-P Linear Noise Removal and Deconvolution

The data was transformed to the Tau-P domain using the linear transform. 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. The transform was performed with p limits of -4500ms and +5500ms, with increments of 10ms at the far offset.

A long gap deconvolution was applied in Tau-P domain to remove short period multiples whilst minimising any wavelet shaping effects.

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Total Operator Length:	332ms
Gap:	32ms
Design:	0-4000ms
Apply:	0ms

5.9 First Pass Velocity Analysis

First pass velocities (2km interval) were determined using FSI's "MGIVA" interactive velocity analysis program. Each velocity analysis comprised a semblance display, a CDP stacked panel repeated a selected number of times with a suite of velocity functions, and a central CDP gather. The suite of functions were generated using percantage increments from a central velocity function.

The velocity analysis incorporated a map of all velocity locations, and the semblance display included functions from proximate lines. This enabled the velocities to be picked with knowledge of areal velocity trends. Velocity QC can be performed more effectively when discordant velocities can be recognised on the map.

5.10 Channel Amplitude Smoothing

To compensate for local variations in amplitude trend due to channel response, or external noise such as bird or swell noise, a scheme similar to surface consistant scaling was designed. Amplitudes are analysed in an offset consistant manner which balance mean amplitude with offset. The scalars are modified by computing a running median, so that only local fluctucuations and channel amplitude are removed, and smooth amplitude variation with offset preserved.

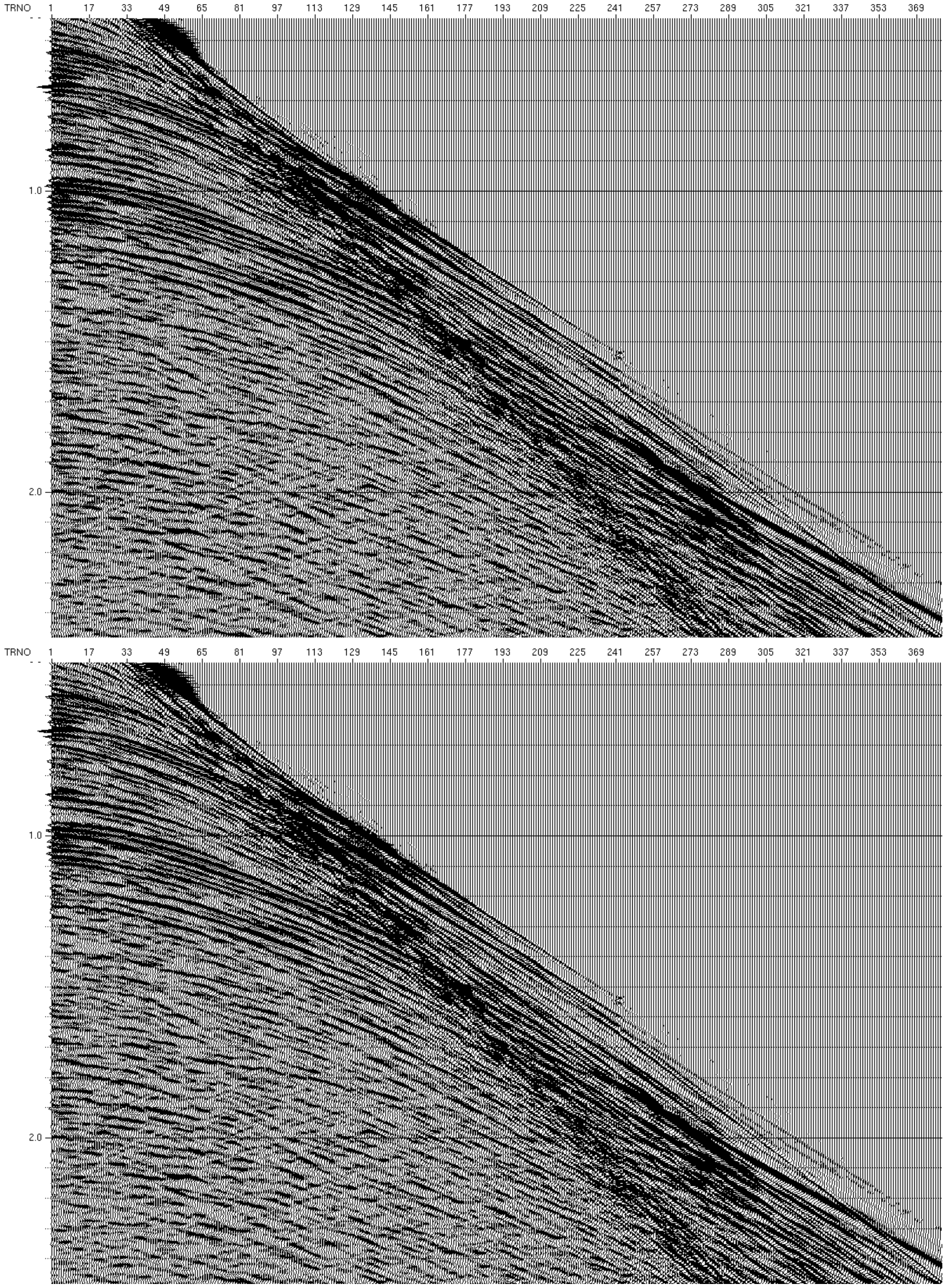

Figure 5.10.1 Example shot before (above) and after (below) channel smoothing

5.11 Adjacent Trace Sum

A 2:1 adjacent trace sum and trace mix was applied to the data.

5.12 CDP Gather

Shot records were sorted into common depth point gathers.

5.13 Parabolic Radon Demultiple

After shot interpolation, High Resolution Parabolic Radon demultiple was used to attenuate multiples by modelling and subtracting 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 form the original CDP gather.

Reference offset:	6123m
Minimum - Maximum P:	-1000 to +4500ms
Number of p traces:	551
Mute Primary Energy	-1500 to +200ms at 2000ms -1500 to +100ms at 3000ms
Demultiple Start Time:	Water Bottom * 1.5

An additional pass of linear radon was used to further reduce noise in the gathers using a linear transform of -1500 to +1500ms (10ms sampling at the far offset). Energy within these limits was passed with no further muting applied.

5.14 Spherical Divergence (URSIN)

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

5.15 Pre-Stack Time Migration (First Pass)

Kirchhoff PSTM was applied using a maximum half aperture of 600 traces and a 50% stretch mute. Smoothed 100% first pass 2km velocities were used in the migration. Anti-aliasing protection was applied by pre-filtering the data within the migration scan depending upon the local migration operator dip.

5.16 Second Pass Velocity Analysis

The second pass of velocities were picked at 1km intervals on first pass PSTM gathers using FSI's "MGIVA" interactive velocity analysis program. The suite of functions were generated using increments from a central velocity function. The first pass velocities were used as the central function for this suite of velocity variant functions.

5.17 Q Compensation

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 at this stage to correct for phase effects only, with amplitude compensation applied post stack

Q Compensation Parameters	
Q value:	130
Onset:	Sea floor two way time
Ref Freq:	62.5Hz

5.18 Pre-Stack Time Migration (Second Pass)

Kirchhoff PSTM was applied using a maximum half aperture of 6500m and a 50% stretch mute. Anti-aliasing protection was applied by pre-filtering the data within the migration scan depending upon the local migration operator dip. Smoothed 100% second pass velocities at 1km were used in the migration. Migration was performed on all offset planes using the curved ray option.

5.19 Third Pass Velocity Analysis

The third pass of velocities were picked at 0.5km intervals on second pass PSTM gathers using FSI's "MGIVA" interactive velocity analysis program. The suite of functions were generated using increments from a central velocity function. The second pass of velocities were used as the central function for this suite of velocity variant functions.

5.20 Residual Radon Demultiple

Attenuation of remnant multiples was achieved by modelling and subtraction using a least squares, parabolic Radon transform. Normal moveout corrections were performed using the final 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, minimising the residual error. To further reduce the potential for aliasing, the radon transform was performed after CMP interpolation.

Reference offset:	6110m
Minimum - Maximum P:	-1500 to +10500ms
Number of p traces:	1201
Multiple p cut:	Time Cut 100 -1500 to 2500ms 1000 -1500 to 200ms 2000 -1500 to 200ms 2500 -1500 to 100ms
Demultiple Start Time:	Water Bottom * 1.5

To further attenuate remant linear noise, primary energy was modelled using a narrow radon transform and subtracted from from the input.

Reference offset:	6110m
Minimum - Maximum P:	-500 to +500ms
Number of p traces:	1001

5.21 Gather Flattening

The GFLAT module uses a correlation technique to attempt to flatten an NMO corrected CDP gather. Cross-correlations are computed between a stack of the CDP and every input trace in a series of continually moving windows. This pilot stack is constructed from 5 traces, growing to 10 where the correlation coefficient is poor, and the total average static is zero for 5-80% of the offset range. The peak value of each correlation is picked to provide a sample-by-sample estimate of "static" correction down each trace. The maximum allowable relative static between traces was 10ms.
These "statics" (weighted by the cross-correlation coefficient) are then smoothed to build a set of dynamic corrections for each trace which are then applied.

5.22 Offset Weighting

The following weighting was applied to the traces in the gather:

weighting = 0.0004 x offset + 1 where offset is in metres

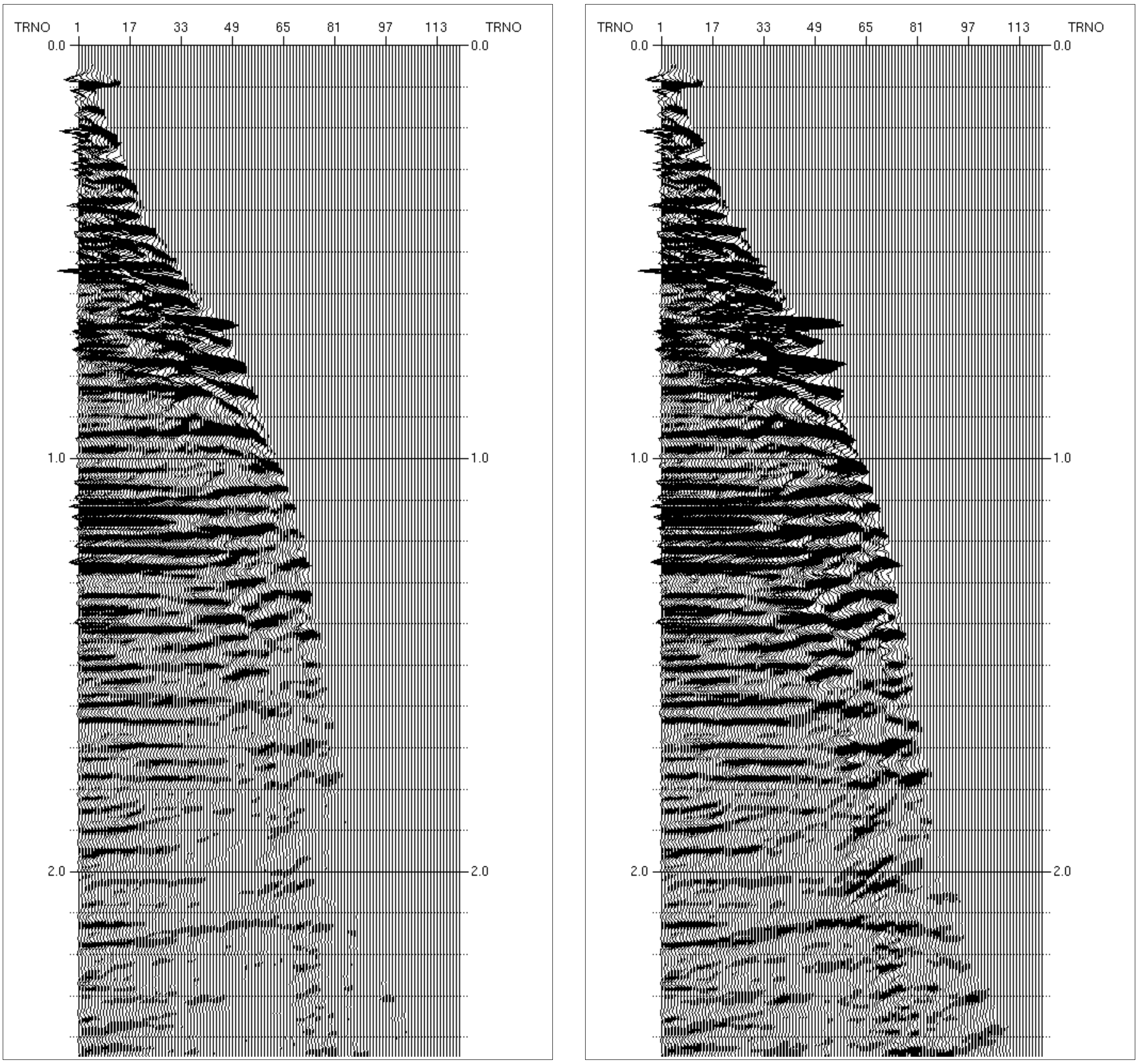

Figure 5.22.1 CMP Gather before (left) and after (right) trace offset weighting

5.23 NMO Correction

Fourth order NMO corrections were applied using the final picked 0.5km velocity functions.

5.24 Angle Mute

A 40 degree angle mute was applied. Angle of incidence calculations were performed using Walden's method, and considered a smoothed version of the the third pass velocities.

5.25 Outer Trace Mute

An outer trace mute was also applied to the data to remove remnant noise visible on the far traces.

Offset (m)	***Time (ms)***
1400	0
6108	5000

5.26 Common Depth Point Stack

The traces within each CDP gather were summed using a 1/root(N) stack compensation.

5.27 Statics

A static compensation for gun and cable depths was applied. The static value was calculated using average gun and cable depths supplied in the observers reports and a value of 9.3ms was used in production.

5.28 Q Compensation

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 at this stage to correct for amplitude effects only.

Q Compensation Parameters	
Q value:	130
Onset:	Sea floor two way time
dB Boost	15

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5.29 Filter

Unwanted noise that lay outside the frequency range of the desired reflection data was attenuated using a bandpass filter.

Application Time (ms)	*Frequency Limits: Hz (dB/Oct)*
100	4 (18) – 90 (72)
800	4 (18) – 80 (72)
1500	4 (18) – 70 (72)
2000	4 (18) – 60 (72)
3000	4 (18) – 35 (60)
4000	4 (18) – 30 (48)
6000	4 (18) – 30 (48)

5.30 Phase Matching

A filter was designed and applied to match the Molson 2D survey to the Labatt 3D

Phase Rotation	171 degrees
Bulk Shift	-4.57 ms

6 Angle Stacks

6.1 Input

The input to the offset stacks is 4th order NMO corrected gathers from 5.23

6.2 Angle Mutes

Angle of incidence calculations were performed using Walden's method, and considered a smoothed version of the third pass velocities.

	Angle Range (degrees)
Near Stack	5 to 15
Near Mid Stack	15 to 25
Far Mid Stack	25 to 35
Far Stack	35 to 45

6.3 Outer Trace Mute

An outer trace mute was also applied to the Far-Mid and Far offset data only to remove remnant noise visible on the outer traces.

Offset (m)	***Time (ms)***
1400	0
6108	5000

6.4 Common Depth Point Stack

The traces within each common depth point gather were summed with 1/(N) stack fold compensation.

6.5 Statics

A static compensation for gun and cable depths was applied. The static value was calculated using average gun and cable depths supplied in the observers reports and a value of 9.3ms was used in production.

6.6 Q Compensation

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 at this stage to correct for amplitude effects only.

Q Compensation Parameters	
Q value:	130
Onset:	Sea floor two way time
dB Boost	15

6.7 Filter

Unwanted noise that lay outside the frequency range of the desired reflection data was attenuated using a bandpass filter.

Application Time (ms)	***Frequency Limits (Hz)***
100	4 (18) – 90 (72)
800	4 (18) – 80 (72)
1500	4 (18) – 70 (72)
2000	4 (18) – 60 (72)
3000	4 (18) – 35 (60)
4000	4 (18) – 30 (48)
6000	4 (18) – 30 (48)

6.8 Phase Matching

A filter was designed and applied to match the Molson 2D survey to the Labatt 3D

Phase Rotation	171 degrees
Bulk Shift	-4.57 ms

7 Polarity

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

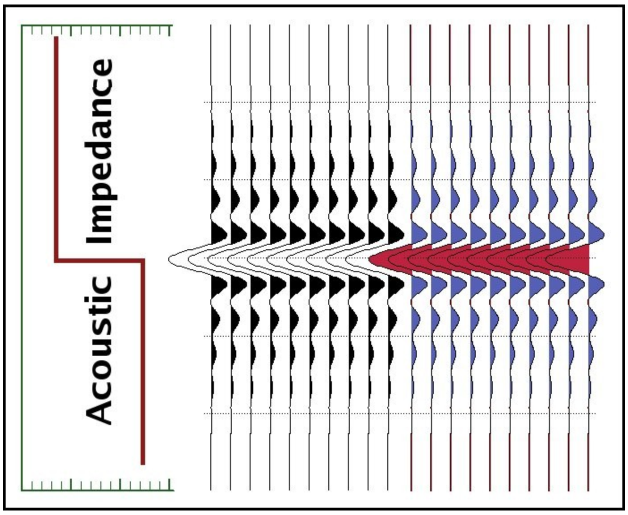


Figure 7.1 Desired polarity diagram. An acoustic impedance increase is represented by a peak.

8 Archive Listing

Tape Number	***Media***	***Lines***	***Description***
N/A	USB Disk	All	Radon Demultiple Gathers - SEGY PSTM Gathers – SEGY Raw Migrated Stacks – SEGY Final Migrated Stacks – SEGY Raw Angle Stacks – SEGY Final Angle Stacks – SEGY RMS Velocities – SEGY - 3rd Pass (0.5km) Stacking velocities Interval Velocities – SEGY - 3rd Pass (0.5km) Stacking velocities RMS Velocities – ASCII – Western Format - 3rd Pass (0.5km) Stacking velocities

9 SEGY Header Information

9.1 Example Final PSTM SEGY EBCDIC Header

```
C01 CLIENT                : TAP OIL
C02 LINE                  : VMOL08-002
C03 AREA                  : MOLSON 2D, T/47P, BASS BASIN
C04 DATASET               : FINAL MIGRATION
C05
C06 ACQ. YEAR             : 2008      DATE PROCESSED       : AUG 2008
C07 SHOT INTERVAL         : 25 m      GRP INTERVAL         : 12.5m
C08 CABLE LENGTH          : 6000 m    GRPS PER CABLE       : 480
C09 MIN OFFSET            : 145 m     MAX OFFSET           : 6132.5 m
C10 DATUM OF REF          : WGS84     PROJECTION ZONE      : UTM 55 S
C11 COORDINATE UNITS: METRES    VERTICAL DATUM     : MEAN SEA LEVEL
C12 SRATE (micro s) : 2000         MAX TIME (ms)                  : 6000
C13
C14 PROCESSING SEQUENCE: BY FUGRO SEISMIC IMAGING
C15 INPUT SEGD / NAV MERGE / STATIC SHIFT -50ms /  ZERO PHASE DESIGNATURE /
C16 DESWELL / RESAMPLE TO 4MS / SRME / TAUP LINEAR NOISE ATTENUATION  & DECON/
C17 VELOCITY ANALYSIS EVERY 2KM / DECIMATE TO 25M GRPS /
C18 LINEAR & PARABOLIC RADON DEMULTIPLE / PHASE ONLY Q / URSIN GAIN / PSTM1 /
C19 VEL ANALYSIS EVERY 1KM / PSTM2 / VEL ANALYSIS EVERY 0.5KM /
C20 RESIDUAL PARABOLIC & LINEAR RADON DEMULTIPLE / GATHER FLATTENING / NMO /
C21 OFFSET WEIGHTING / OUTER TRACE MUTE / STACK / GUN & CABLE STATIC
C22 AMP ONLY Q / TVF / PHASE MATCH TO LABATT 3D / OUTPUT SEGY
C23
C24
C25
C26
C27
C28
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:        CDP 240 = SP 1001
C37                             CDP 440 = SP 1101
C38 SP RANGE              : 1001 TO 1825
C39 CDP RANGE             : 1 TO 1888
C40 END OF EBCDIC HEADER
```

9.2 Example Raw PSTM SEGY EBCDIC Header

```
C01 CLIENT              : TAP OIL
C02 LINE                : VMOL08-002
C03 AREA                : MOLSON 2D, T/47P, BASS BASIN
C04 DATASET             : RAW MIGRATION
C05
C06 ACQ. YEAR           : 2008     DATE PROCESSED       : AUG 2008
C07 SHOT INTERVAL       : 25 M     GRP INTERVAL         : 12.5M
C08 CABLE LENGTH        : 6000 M   GRPS PER CABLE       : 480
C09 MIN OFFSET          : 145 M    MAX OFFSET           : 6132.5 M
C10 DATUM OF REF        : WGS84    PROJECTION ZONE      : UTM 55 S
C11 COORDINATE UNITS: METRES       VERTICAL DATUM       : MEAN SEA LEVEL
C12 SRATE (MICRO S)     : 2000     MAX TIME (MS)        : 6000
C13
C14 PROCESSING SEQUENCE: BY FUGRO SEISMIC IMAGING
C15 INPUT SEGD / NAV MERGE / STATIC SHIFT -50MS /  ZERO PHASE DESIGNATURE /
C16 DESWELL / RESAMPLE TO 4MS / SRME / TAUP LINEAR NOISE ATTENUATION  & DECON/
C17 VELOCITY ANALYSIS EVERY 2KM / DECIMATE TO 25M GRPS /
C18 LINEAR & PARABOLIC RADON DEMULTIPLE / PHASE ONLY Q / URSIN GAIN / PSTM1 /
C19 VEL ANALYSIS EVERY 1KM / PSTM2 / VEL ANALYSIS EVERY 0.5KM /
C20 RESIDUAL PARABOLIC & LINEAR RADON DEMULTIPLE / GATHER FLATTENING / NMO /
C21 OFFSET WEIGHTING / OUTER TRACE MUTE / STACK / GUN & CABLE STATIC
C22 OUTPUT SEGY
C23
C24
C25
C26
C27
C28
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:        CDP 240 = SP 1001
C37                             CDP 440 = SP 1101
C38 SP RANGE            : 1001 TO 1825
C39 CDP RANGE           : 1 TO 1888
C40 END OF EBCDIC HEADER
```

9.3 Example Final Angle Stack SEGY EBCDIC Header

```
C01 CLIENT              : TAP OIL
C02 LINE                : VMOL08-002
C03 AREA                : MOLSON 2D, T/47P, BASS BASIN
C04 DATASET             : FINAL ANGLE STACK 5 TO 15 DEG
C05
C06 ACQ. YEAR           : 2008     DATE PROCESSED      : AUG 2008
C07 SHOT INTERVAL       : 25 M     GRP INTERVAL        : 12.5M
C08 CABLE LENGTH        : 6000 M   GRPS PER CABLE      : 480
C09 MIN OFFSET          : 145 M    MAX OFFSET          : 6132.5 M
C10 DATUM OF REF        : WGS84    PROJECTION ZONE     : UTM 55 S
C11 COORDINATE UNITS: METRES       VERTICAL DATUM      : MEAN SEA LEVEL
C12 SRATE (MICRO S)     : 2000     MAX TIME (MS)       : 6000
C13
C14 PROCESSING SEQUENCE: BY FUGRO SEISMIC IMAGING
C15 INPUT SEGD / NAV MERGE / STATIC SHIFT -50MS /  ZERO PHASE DESIGNATURE /
C16 DESWELL / RESAMPLE TO 4MS / SRME / TAUP LINEAR NOISE ATTENUATION  & DECON/
C17 VELOCITY ANALYSIS EVERY 2KM / DECIMATE TO 25M GRPS /
C18 LINEAR & PARABOLIC RADON DEMULTIPLE / PHASE ONLY Q / URSIN GAIN / PSTM1 /
C19 VEL ANALYSIS EVERY 1KM / PSTM2 / VEL ANALYSIS EVERY 0.5KM /
C20 RESIDUAL PARABOLIC & LINEAR RADON DEMULTIPLE / GATHER FLATTENING / NMO /
C21 OFFSET WEIGHTING / ANGLE MUTE / STACK / GUN & CABLE STATIC
C22 AMP ONLY Q / TVF / PHASE MATCH TO LABATT 3D / OUTPUT SEGY
C23
C24
C25
C26
C27
C28
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: CDP 240 = SP 1001
C37                      CDP 440 = SP 1101
C38 SP RANGE            : 1001 TO 1825
C39 CDP RANGE           : 1 TO 1888
C40 END OF EBCDIC HEADER
```

9.4 Example Raw Angle Stack SEGY EBCDIC Header

```
C01 CLIENT              : TAP OIL
C02 LINE                : VMOL08-002
C03 AREA                : MOLSON 2D, T/47P, BASS BASIN
C04 DATASET             : RAW ANGLE STACK 5 TO 15 DEG
C05
C06 ACQ. YEAR           : 2008     DATE PROCESSED      : AUG 2008
C07 SHOT INTERVAL       : 25 M     GRP INTERVAL        : 12.5M
C08 CABLE LENGTH        : 6000 M   GRPS PER CABLE      : 480
C09 MIN OFFSET          : 145 M    MAX OFFSET          : 6132.5 M
C10 DATUM OF REF        : WGS84    PROJECTION ZONE     : UTM 55 S
C11 COORDINATE UNITS: METRES       VERTICAL DATUM      : MEAN SEA LEVEL
C12 SRATE (MICRO S)     : 2000     MAX TIME (MS)       : 6000
C13
C14 PROCESSING SEQUENCE: BY FUGRO SEISMIC IMAGING
C15 INPUT SEGD / NAV MERGE / STATIC SHIFT -50MS /  ZERO PHASE DESIGNATURE /
C16 DESWELL / RESAMPLE TO 4MS / SRME / TAUP LINEAR NOISE ATTENUATION  & DECON/
C17 VELOCITY ANALYSIS EVERY 2KM / DECIMATE TO 25M GRPS /
C18 LINEAR & PARABOLIC RADON DEMULTIPLE / PHASE ONLY Q / URSIN GAIN / PSTM1 /
C19 VEL ANALYSIS EVERY 1KM / PSTM2 / VEL ANALYSIS EVERY 0.5KM /
C20 RESIDUAL PARABOLIC & LINEAR RADON DEMULTIPLE / GATHER FLATTENING / NMO /
C21 OFFSET WEIGHTING / ANGLE MUTE / STACK / GUN & CABLE STATIC
C22 OUTPUT SEGY
C23
C24
C25
C26
C27
C28
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:       CDP 240 = SP 1001
C37                            CDP 440 = SP 1101
C38 SP RANGE            : 1001 TO 1825
C39 CDP RANGE           : 1 TO 1888
C40 END OF EBCDIC HEADER
```

9.5 Example Demultiple Gathers SEGY EBCDIC Header

```
C01 CLIENT              : TAP OIL
C02 LINE                : VMOL08-002
C03 AREA                : MOLSON 2D, T/47P, BASS BASIN
C04 DATASET             : RADON DEMULTIPLE GATHERS
C05
C06 ACQ. YEAR           : 2008      DATE PROCESSED      : AUG 2008
C07 SHOT INTERVAL       : 25 M      GRP INTERVAL        : 12.5M
C08 CABLE LENGTH        : 6000 M    GRPS PER CABLE      : 480
C09 MIN OFFSET          : 145 M     MAX OFFSET          : 6132.5 M
C10 DATUM OF REF        : WGS84     PROJECTION ZONE     : UTM 55 S
C11 COORDINATE UNITS: METRES        VERTICAL DATUM      : MEAN SEA LEVEL
C12 SRATE (MICRO S) : 2000      MAX TIME (MS)           : 6000
C13
C14 PROCESSING SEQUENCE: BY FUGRO SEISMIC IMAGING
C15 INPUT SEGD / NAV MERGE / STATIC SHIFT -50MS /  ZERO PHASE DESIGNATURE /
C16 DESWELL / RESAMPLE TO 4MS / SRME / TAUP LINEAR NOISE ATTENUATION  & DECON/
C17 VELOCITY ANALYSIS EVERY 2KM / DECIMATE TO 25M GRPS /
C18 LINEAR & PARABOLIC RADON DEMULTIPLE /  OUTPUT SEGY
C19
C20
C21
C22
C23
C24
C25
C26
C27
C28
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:        CDP 240 = SP 1001
C37                             CDP 440 = SP 1101
C38 SP RANGE            : 1001 TO 1825
C39 CDP RANGE           : 1 TO 1888
C40 END OF EBCDIC HEADER
```

9.6 Example PSTM Gathers SEGY EBCDIC Header

```
C01 CLIENT              : TAP OIL
C02 LINE                : VMOL08-002
C03 AREA                : MOLSON 2D, T/47P, BASS BASIN
C04 DATASET             : PSTM GATHERS
C05
C06 ACQ. YEAR           : 2008    DATE PROCESSED      : AUG 2008
C07 SHOT INTERVAL       : 25 M    GRP INTERVAL        : 12.5M
C08 CABLE LENGTH        : 6000 M   GRPS PER CABLE     : 480
C09 MIN OFFSET          : 145 M    MAX OFFSET         : 6132.5 M
C10 DATUM OF REF        : WGS84    PROJECTION ZONE    : UTM 55 S
C11 COORDINATE UNITS: METRES    VERTICAL DATUM        : MEAN SEA LEVEL
C12 SRATE (MICRO S)     : 2000    MAX TIME (MS)       : 6000
C13
C14 PROCESSING SEQUENCE: BY FUGRO SEISMIC IMAGING
C15 INPUT SEGD / NAV MERGE / STATIC SHIFT -50MS /  ZERO PHASE DESIGNATURE /
C16 DESWELL / RESAMPLE TO 4MS / SRME / TAUP LINEAR NOISE ATTENUATION  & DECON/
C17 VELOCITY ANALYSIS EVERY 2KM / DECIMATE TO 25M GRPS /
C18 LINEAR & PARABOLIC RADON DEMULTIPLE / / PHASE ONLY Q / URSIN GAIN / PSTM1 /
C19 VEL ANALYSIS EVERY 1KM / PSTM2 / VEL ANALYSIS EVERY 0.5KM /
C20 RESIDUAL PARABOLIC & LINEAR RADON DEMULTIPLE / GATHER FLATTENING / NMO /
C21 OFFSET WEIGHTING /OUTPUT SEGY
C22
C23 TRACE HEADER DEFINITION
C24 ITEM                BYTES    FORMAT      ITEM                 BYTES    FORMAT
C25 SHOTPOINT           017-020  INT         25DEG START MS       215-216  INT
C26 CDP                 021-024  INT         20DEG START MS       217-218  INT
C27 CDP X               193-196  INT         15DEG START MS       219-220  INT
C28 CDP Y               197-200  INT         10DEG START MS       221-222  INT
C29 50DEG START MS      205-206  INT         5DEG  START MS       223-224  INT
C30 45DEG START MS      207-208  INT         OFFSET WEIGHT        225-228  IBMFP
C31 40DEG START MS      209-210  INT
C32 35DEG START MS      211-212  INT
C33 30DEG START MS      213-214  INT
C34
C35
C36 SP/CDP RELATIONSHIP         : CDP 240 = SP 1001
C37                               CDP 440 = SP 1101
C38 SP RANGE            : 1001 TO 1825
C39 CDP RANGE           : 1 TO 1888
C40 END OF EBCDIC HEADER
```

9.7 SEGY Trace Header Definition

Location of strategic values in the SEGY stack trace header.

DESCRIPTION	***TYPE***	***BYTE***
Trace number within line.	I32	1-4
Trace number within reel.	I32	5-8
Trace number.	I32	13- 16
Shot point number.	I32	17- 20
CDP number.	I32	21- 24
Trace offset (integer).	I32	37- 40
Water Depth (ms)	I32	61-64
Scaler to be applied to profiles	I16	69-70
Scaler to be applied to coordinates	I16	71- 72
CDP Easting	I32	73-76
CDP Northing	I32	77-80
CDP Easting	I32	81-84
CDP Northing	I32	85-88
Coordinate units (m/arc)	I16	89- 90
No. of samples.	I16	115-116
Sample interval in microseconds.	I16	117-118
Year of recording	I16	157-158
Julian day number (1-366)	I16	159-160
Hour of day (24 hour clock)	I16	161-162
Minute of hour	I16	162-163
Second of minute	I16	165-166
CDP Easting	I32	193-196
CDP Northing	I32	197-200

Location of strategic values in the SEGY gather trace header.

DESCRIPTION	TYPE	BYTE
Trace number within line.	I32	1-4
Trace number within reel.	I32	5-8
Trace number.	I32	13- 16
Shot point number.	I32	17- 20
CDP number.	I32	21- 24
Trace offset (integer).	I32	37- 40
Water Depth (ms)	I32	61-64
Scaler to be applied to profiles	I16	69-70
Scaler to be applied to coordinates	I16	71- 72
Source Easting	I32	73-76
Source Northing	I32	77-80
Receiver Easting	I32	81-84
Receiver Northing	I32	85-88
Coordinate units (m/arc)	I16	89- 90
No. of samples.	I16	115-116
Sample interval in microseconds.	I16	117-118
Year of recording	I16	157-158
Julian day number (1-366)	I16	159-160
Hour of day (24 hour clock)	I16	161-162
Minute of hour	I16	162-163
Second of minute	I16	165-166
CDP Easting	I32	193-196
CDP Northing	I32	197-200
50 degree Start Time (ms) (PSTM Gathers only)	I16	205-206
45 degree Start Time (ms) (PSTM Gathers only)	I16	207-208
40 degree Start Time (ms) (PSTM Gathers only)	I16	208-209
35 degree Start Time (ms) (PSTM Gathers only)	I16	210-211
30 degree Start Time (ms) (PSTM Gathers only)	I16	212-213
25 degree Start Time (ms) (PSTM Gathers only)	I16	214-215
20 degree Start Time (ms) (PSTM Gathers only)	I16	216-217
15 degree Start Time (ms) (PSTM Gathers only)	I16	218-219
10 degree Start Time (ms) (PSTM Gathers only)	I16	220-221
5 degree Start Time (ms) (PSTM Gathers only)	I16	223-224
Trace Weighting Applied (PSTM Gathers only)	IBMFP	225-228

10 Data Disposition

Data	***Date sent***	***Destination***
25 x 3590 cartridges containing field data. Tape # TR0001-TR0025 1 x DVD containing Navigation Data 1 x CD containing QC Processed Deliverables 1 x CD containing Observers/Tape/Gun Logs	2008-10-03	SpectrumData Suite 1, 14 Brodie Hall Drive BENTLEY WA 6102

11 Appendix

11.1 SP-CDP Relationships

Shot point to CDP relationship, using the CMP position as reference.

LINE	First SP	First CDP	Last SP	Last CDP
VMOL08-001	1987	240	881	2452
VMOL08-002	1001	240	1825	1888
VMOL08-003	1001	240	2558	3354
VMOL08-004	1584	240	881	1646
VMOL08-005	1796	240	881	2070
VMOL08-006	1001	240	1731	1700
VMOL08-007	1001	240	2287	2812
VMOL08-008	1979	240	881	2436
VMOL08-009	1001	240	1808	1854
VMOL08-010	2005	240	881	2488
VMOL08-011	1720	240	881	1918
VMOL08-012	2008	240	881	2494
VMOL08-014	1001	240	2133	2504
VMOL08-016	1001	240	2162	2562
VMOL08-018	1001	240	2158	2554
VMOL08-020	2033	240	881	2544
VMOL08-022	1001	240	2090	2418
VMOL08-024	2079	240	881	2636
VMOL08-026	1001	240	2235	2708
VMOL08-028	2096	240	881	2670
VMOL08-030	2023	240	881	2524
VMOL08-032	1001	240	1677	1592
VMOL08-034	1562	240	970	1424

11.2 Data Examples

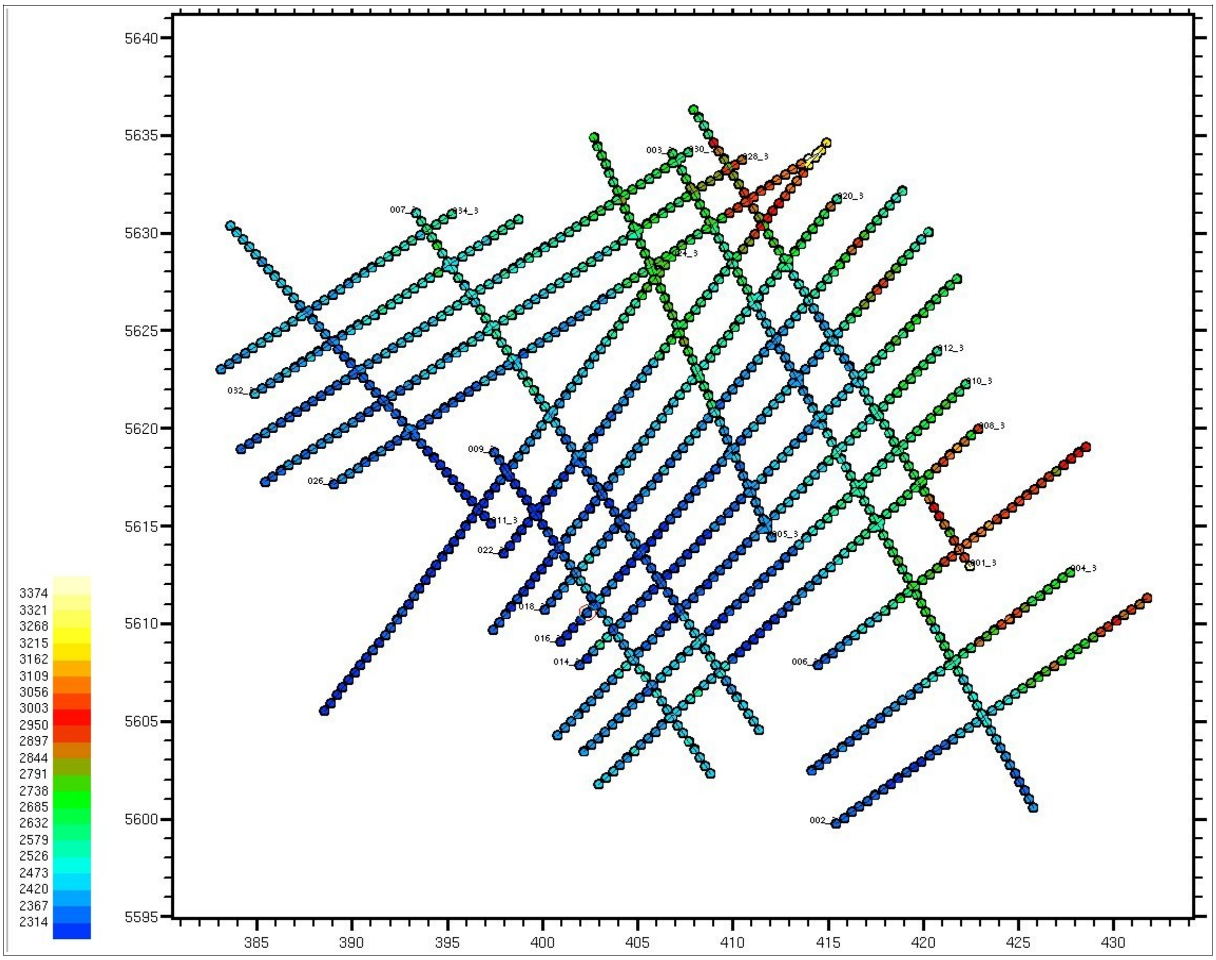
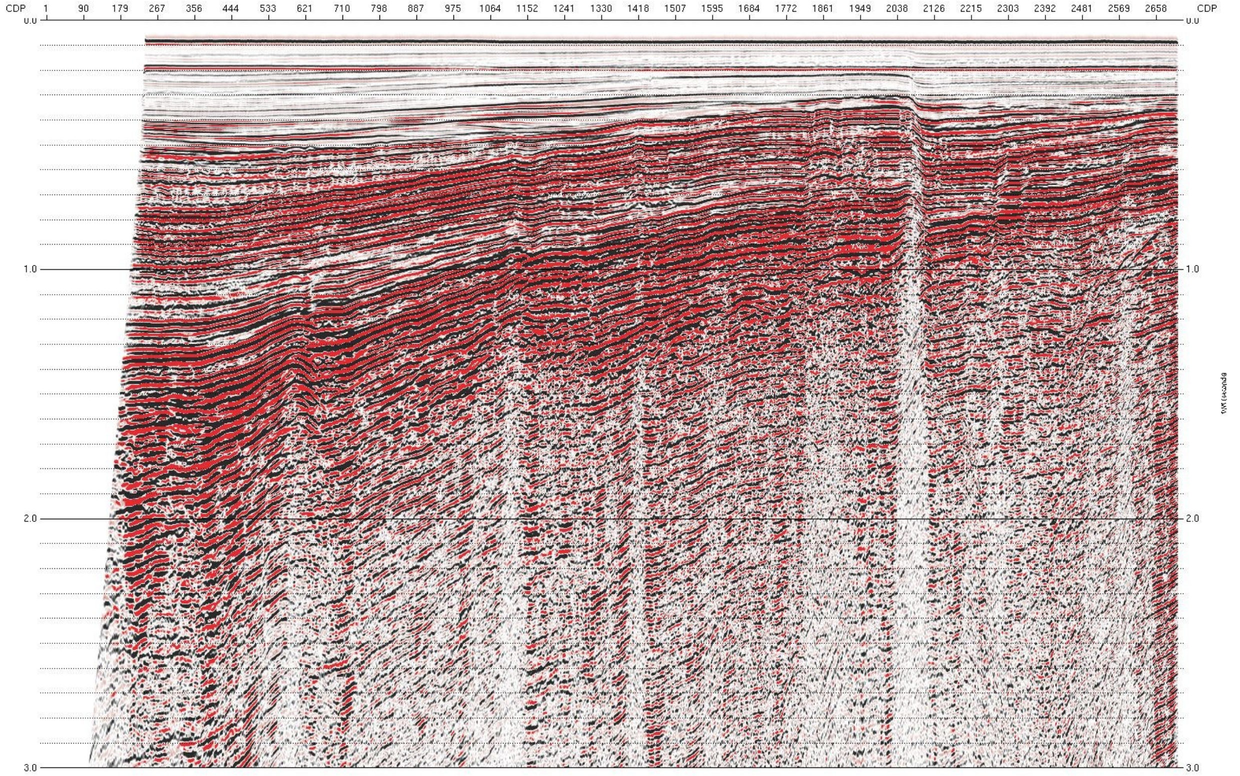


Figure 11.2.1MGIVA Third Pass Velocity Setup: Velocity Map at 1500ms



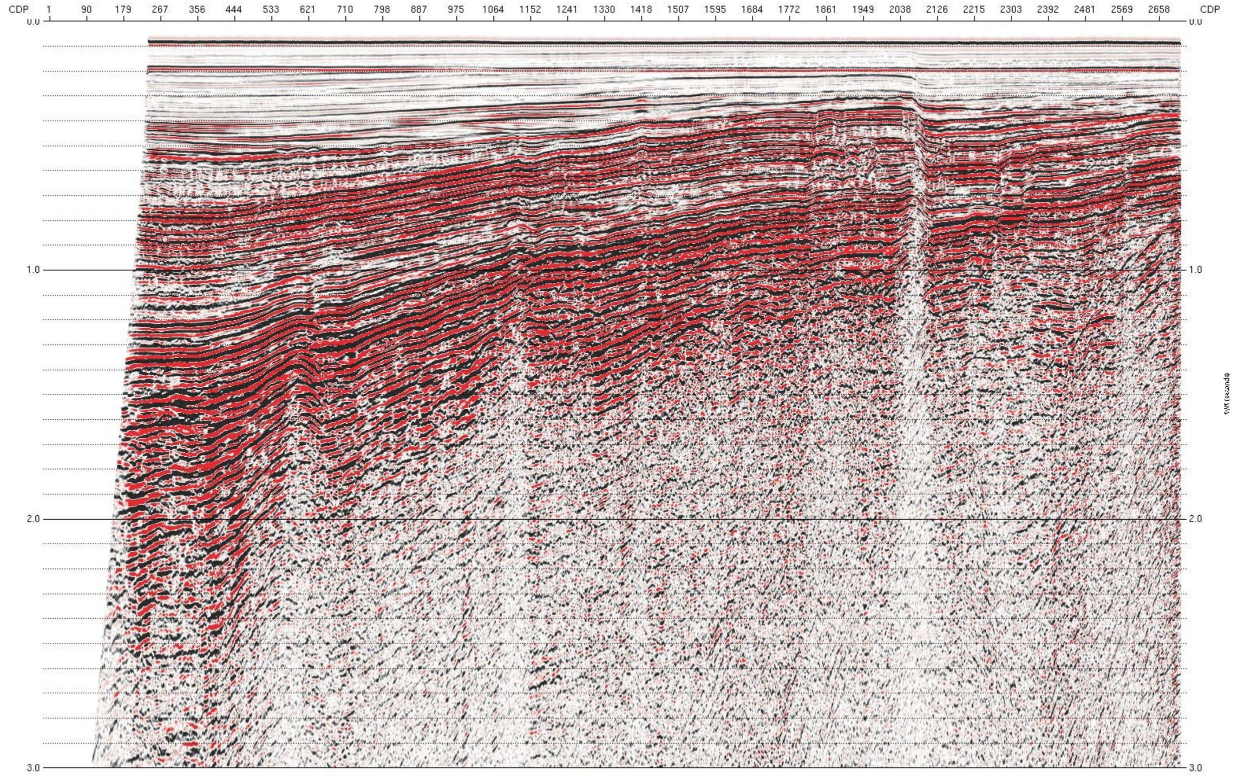


Figure 11.2.3 VMOL08-026 without SRME (above) and with (below)

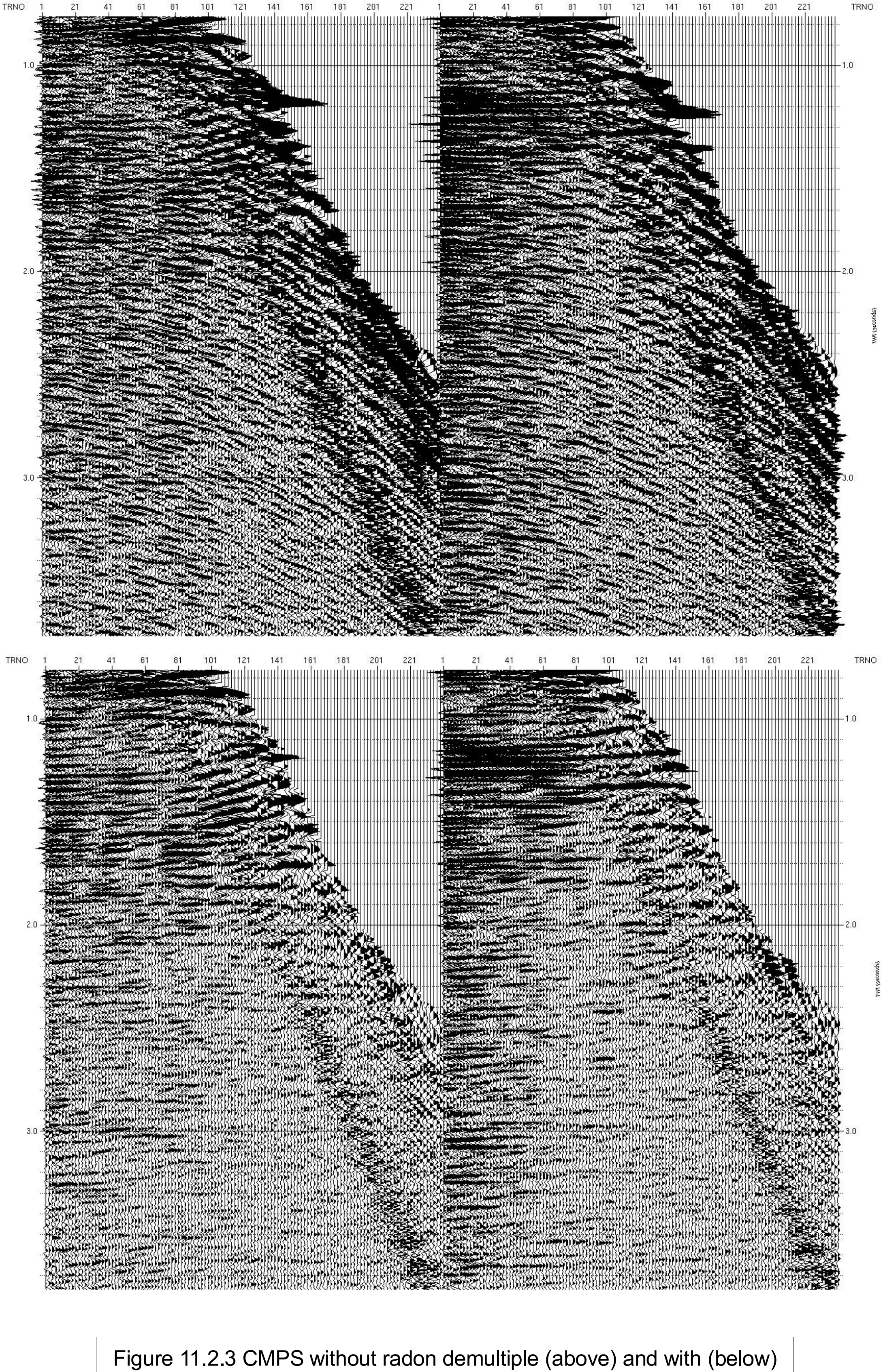


Figure 11.2.3 CMPS without radon demultiple (above) and with (below)

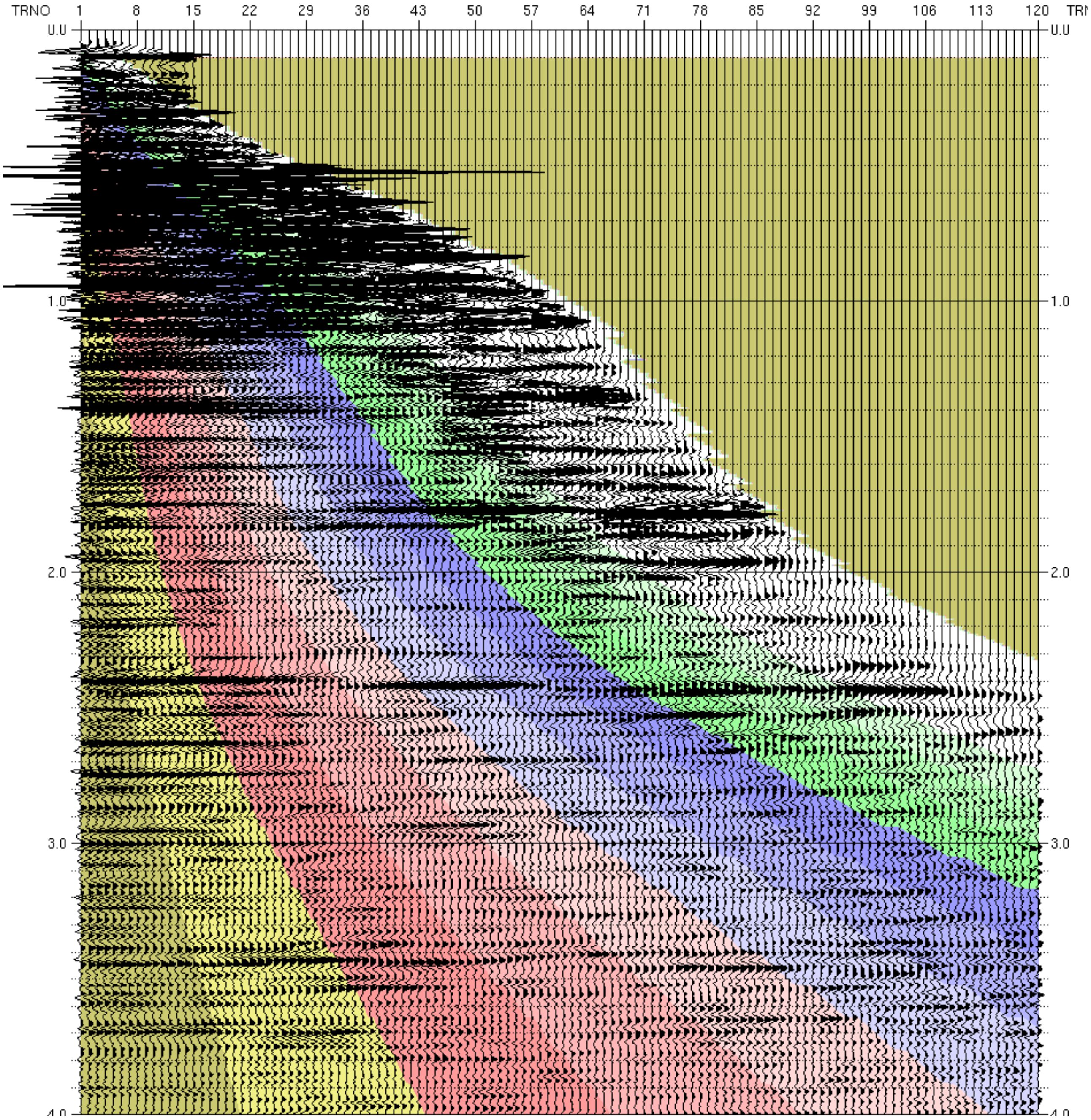


Figure 11.2.8 CDP Angles overlain – 5 degree increments

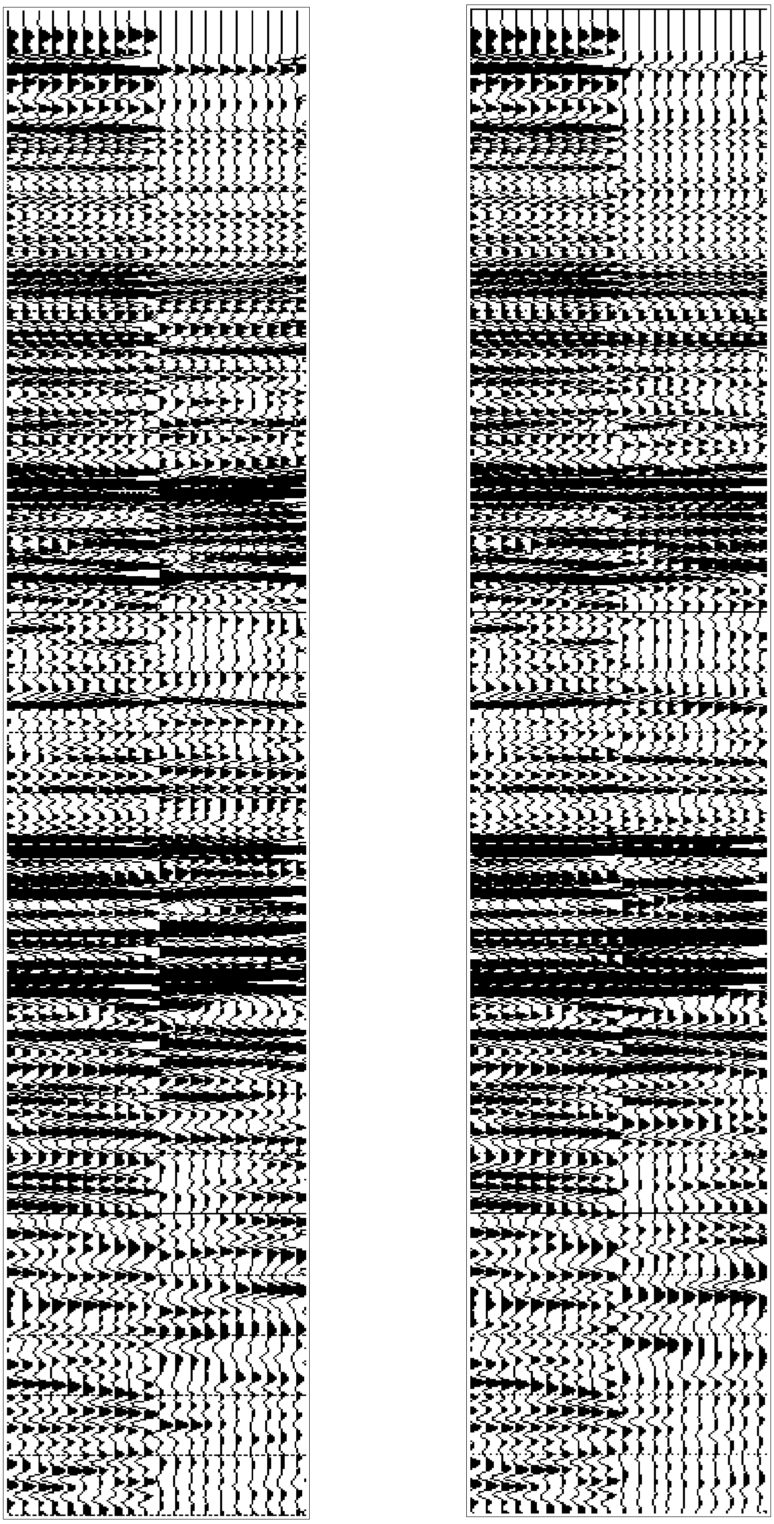


Figure 11.2.8 VMOL08-030 intersecting with Labatt 3D before (left) and after (right) phase matching

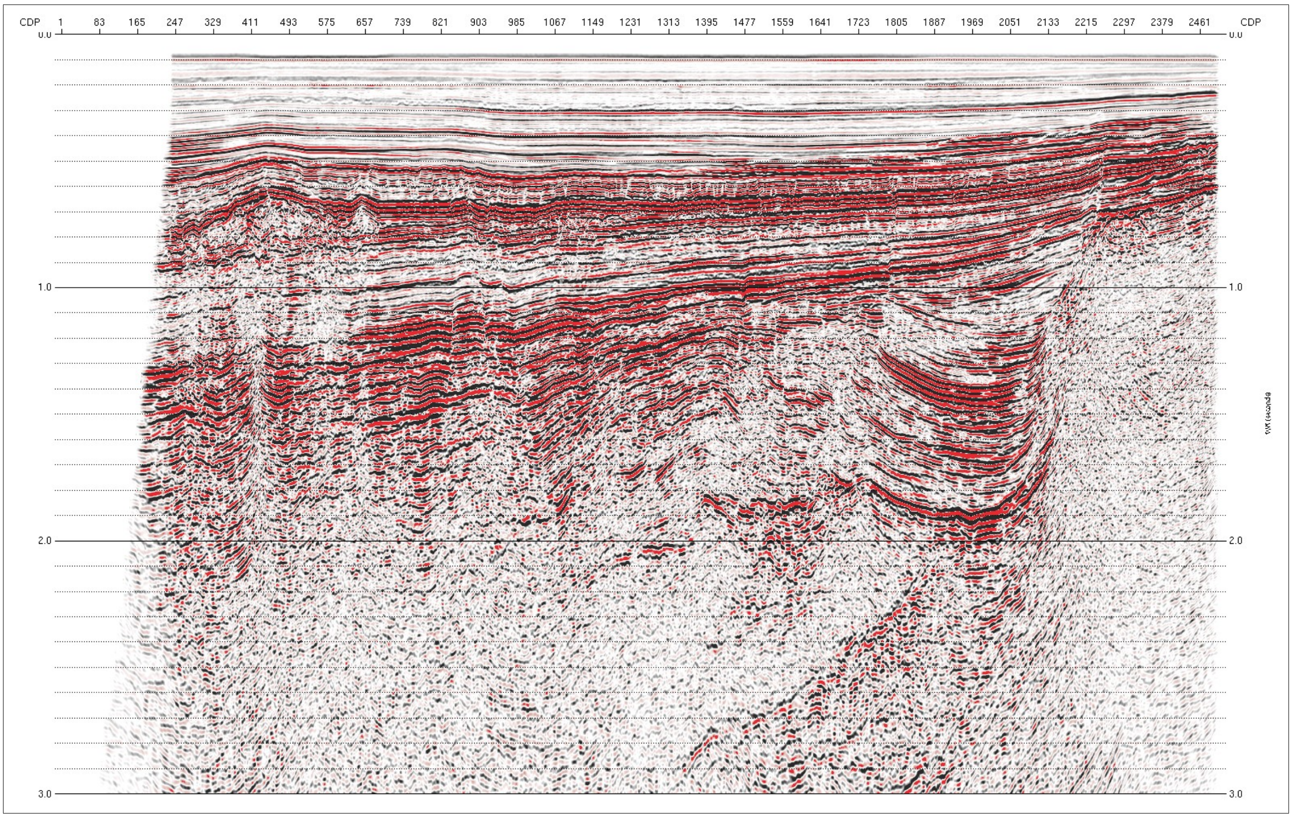


Figure 11.2.8 VMOL08-014 Final Filtered Scaled Migration