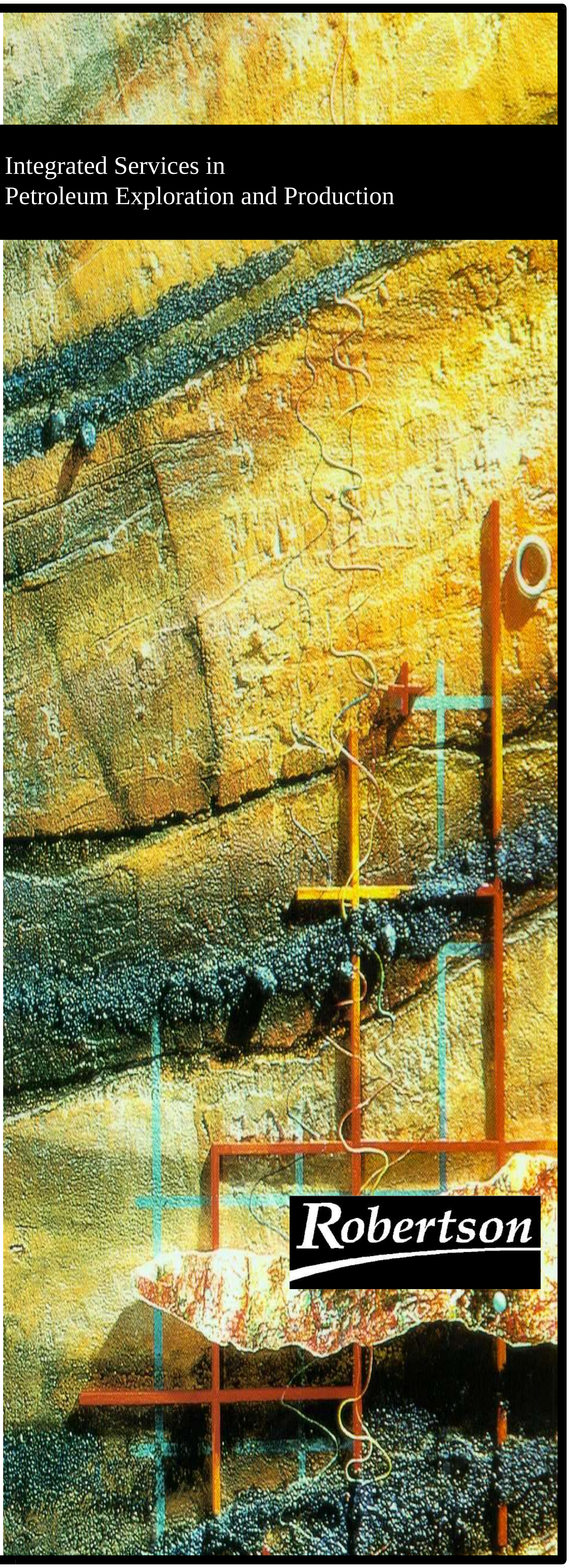
Integrated Services in
Petroleum Exploration and Production



Processing Report

for

Santos Limited

Otway Basin Reprocessing
VIC/P29

December 2004

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APPENDICES

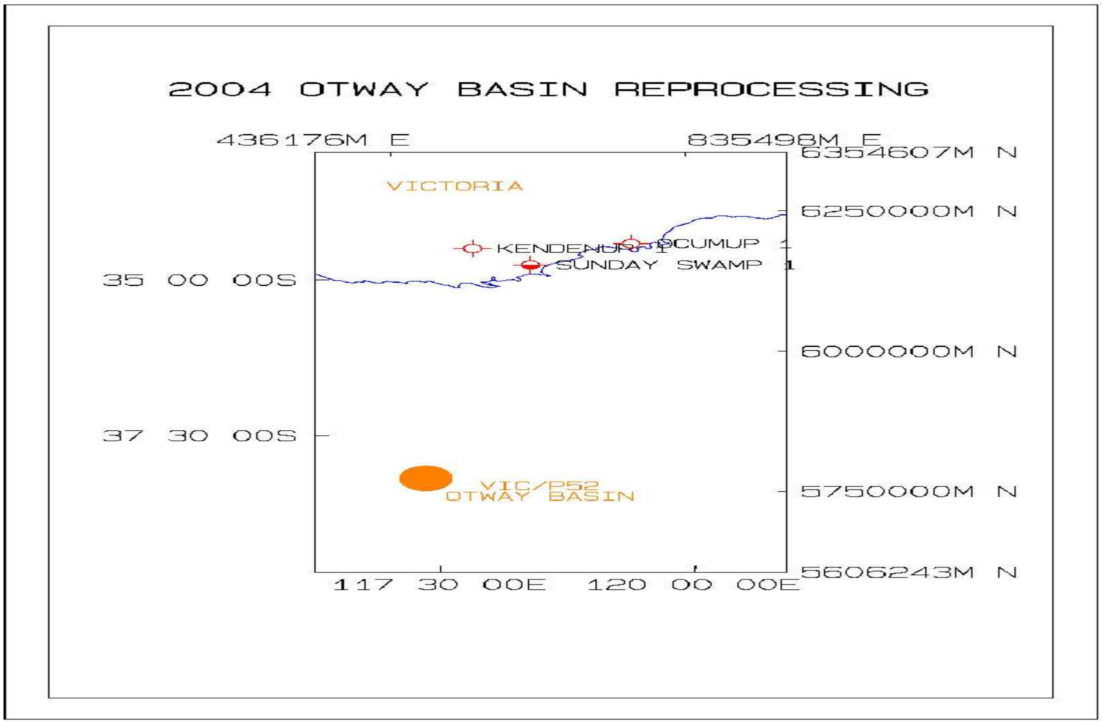
1.0 INTRODUCTION

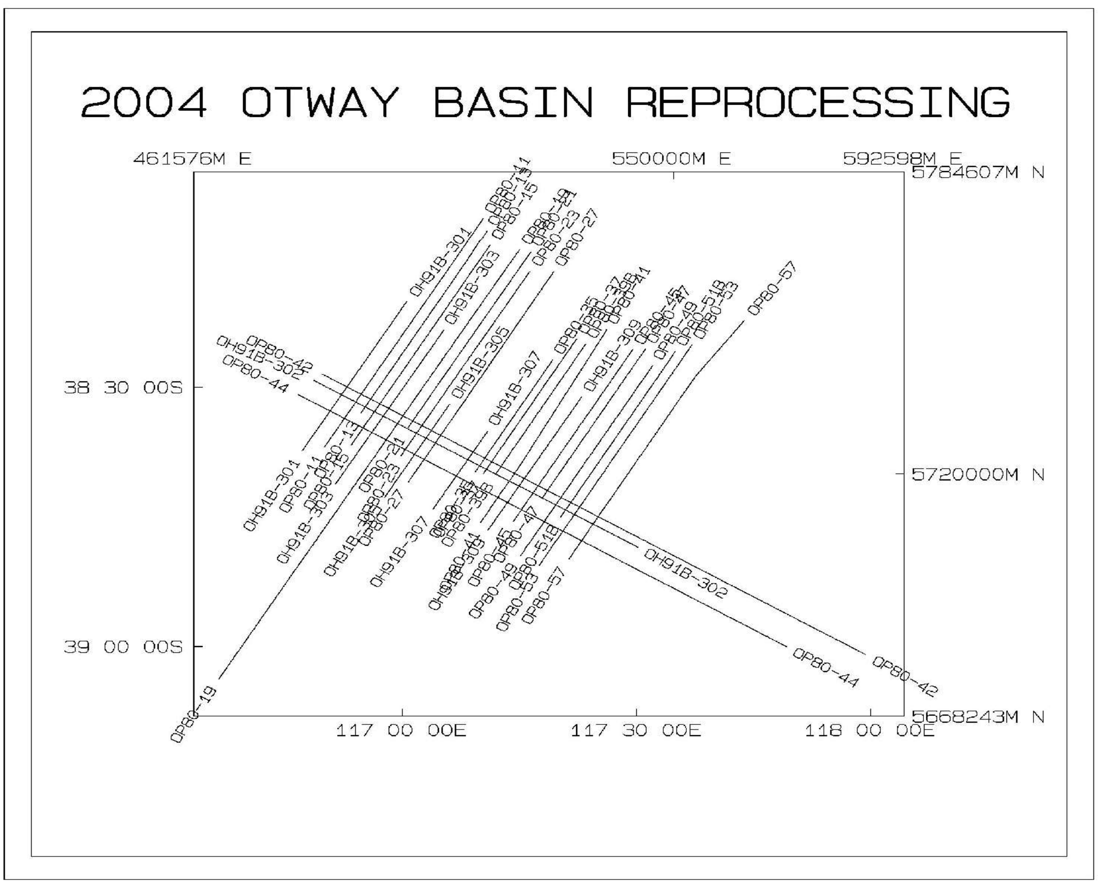
The 2004 Otway Basin Reprocessing consisted of 6 lines of OH91B vintage and 19 lines of OP80 vintage, totalling 627.468 km. Water bottom was varying and so it was necessary to vary the processing parameters to compensate for a change in water depths. The processing was started in June 2004 and completed in September 2004.

1.1 PERSONNEL

Robertson Research Australia	
Kelly Beauglehole	Processing Manager
Simon Stewart	Marine Processing Manager
Gail Dias	Geophysicist
Essential Petroleum Resources Limited	
Gordon Wakelinking	Senior Staff Geophysicist
Oil Hunters	
Tony Weatherall	Senior Geophysicist

1.2 SURVEY MAP





2.0 PARAMETER TESTING

Extesive testing was performed to determine the optimum processing sequence. Testing procedures were conducted on two test lines selected from the two different vintages across the whole area. A processing sequence was established for the area with parameters varing to account for the changing water depth and the survey vintage geometry.

Parameter selection was made with consideration for the processing objective of improving the imaging of complex structural patterns.

Please refer to the table below for further details of the tests performed.

Test	Format		
	Shot Record	CDP Gather	STACK
Shot record displays	❂		
Gain recovery: Amplitude decay analysis	❂		
Gain recovery: exponential gain	❂		
F-K filter (shot domain, various cuts)	❂		❂
F-K filter with NMO (shot domain, various cuts)	❂		❂
F-K filter (shot domain)	❂		❂
Signature deconvolution	❂		❂
Tau-P Linear Noise Removal	❂		❂
Multiple attenuation: F-K method		❂	❂
Multiple attenuation: Radon method		❂	❂
Predictive deconvolution (before stack)			❂
PSTM Testing (SCAMP)		❂	❂
Outer and inner trace mutes		❂	❂
Bandpass filter and Post stack scaling			❂

3.0 COMMENTS & CONCLUSION

The Otway processing began in June 2004 with all processing being completed in September 2004. The processing flow was chosen after extensive testing. The same processing streams were applied to botht vintages.

Surface Consistent Scaling (SCAMP) was applied to the demultiple gathers. Migration artifacts in the data were reduced by the application of a scamp after demultiple attenuation.

The final data was phase rotated, OP80 was phase rotated -135 degrees and OH91B was phase rotated -155 degrees.

4.0 PROCESSING SEQUENCE

4.1 PRE STACK TIME MIGRATION SEQUENCE (FILTERED & SCALED)

TRANSCRIPTION
|
BULK STATIC CORRECTIONS(*)
|
LOW CUT FILTER
|
GAIN RECOVERY (t^2)
|
SWELL NOISE ATTENUATION
|
F-K FILTER (shot fk +/-2250 m/s)
|
SIGNATURE DECONVOLUTION
|
ADJACENT TRACE SUM(+)
|
CDP GATHER
|
FIRST PASS VELOCITY ANALYSIS (2 km intervals)
|
TRACE INTERPOLATION (Receiver Domain)
|
MULTIPLE ATTENUATION (Fk/Radon)
|
DROP INTERPOLATED TRACES
|
SECOND PASS (PSTM) VELOCITY ANALYSIS (1 km intervals)
|
SCAMP
|
REVERSE t^2 GAIN RECOVERY
|
SPHERICAL DIVERGENCE (URSIN)
|
(OUTPUT GATHERS FOR DEPTH MIGRATION)
|
KIRCHHOFF PRE-STACK TIME MIGRATION / DBS
|
NMO CORRECTION
|
OUTER TRACE MUTE / PRE STACK SCALING / INNER TRACE MUTE
|
CDP STACK
|
GUN & CABLE STATIC CORRECTIONS
|
ZERO PHASING & PHASE ROTATION
|
Q COMPENSATION / TVDIP (80%)
|
BAND-PASS FILTER / POST STACK SCALING

(*) Bulk Static – Vintage OP80. See section 5.4
(+) Vintage OH91B

4.2 PRE STACK DEPTH MIGRATION SEQUENCE (FILTERED & SCALED)

TRANSCRIPTION
|
BULK STATIC CORRECTIONS(*)
|
LOW CUT FILTER
|
GAIN RECOVERY (t^2)
|
SWELL NOISE ATTENUATION
|
F-K FILTER (shot fk +/-2250 m/s)
|
SIGNATURE DECONVOLUTION
|
ADJACENT TRACE SUM(+)
|
CDP GATHER
|
FIRST PASS VELOCITY ANALYSIS (2 km intervals)
|
TRACE INTERPOLATION (Receiver Domain)
|
MULTIPLE ATTENUATION (Fk/Radon)
|
DROP INTERPOLATED TRACES
|
SECOND PASS (PSTM) VELOCITY ANALYSIS (1 km intervals)
|
REVERSE t^2 GAIN RECOVERY
|
SPHERICAL DIVERGENCE (URSIN)
|
DEPTH MIGRATION
|
GUN & CABLE STATIC CORRECTIONS
|
ZERO PHASING & PHASE ROTATION
|
Q COMPENSATION / TVDIP (80%)
|
BAND-PASS FILTER
|
POST STACK SCALING

(*) Bulk Static – Vintage OP80. See section 5.4
(+) Vintage OH91B

4.3 PRE STACK TIME MIGRATED ANGLE STACKS (FILTERED/SCALED)

TRANSCRIPTION
|
BULK STATIC CORRECTIONS(*)
|
LOW CUT FILTER
|
GAIN RECOVERY (t^2)
|
SWELL NOISE ATTENUATION
|
F-K FILTER (shot fk +/-2250 m/s)
|
SIGNATURE DECONVOLUTION
|
ADJACENT TRACE SUM(+)
|
CDP GATHER
|
FIRST PASS VELOCITY ANALYSIS (2 km intervals)
|
TRACE INTERPOLATION (Receiver Domain)
|
MULTIPLE ATTENUATION (Fk/Radon)
|
DROP INTERPOLATED TRACES
|
SECOND PASS (PSTM) VELOCITY ANALYSIS (1 km intervals)
|
SCAMP
|
REVERSE t^2 GAIN RECOVERY
|
SPHERICAL DIVERGENCE (URSIN)
|
KIRCHHOFF PRE-STACK TIME MIGRATION / DBS
|
NMO CORRECTION
|
OUTER TRACE MUTE / PRE STACK SCALING / INNER TRACE MUTE
|
CDP STACK
|
GUN & CABLE STATIC CORRECTIONS
|
ZERO PHASING & PHASE ROTATION
|
Q COMPENSATION / TVDIP (80%)
|
BAND-PASS FILTER
|
POST STACK SCALING

(*) See page 5.
(+) See page 5.

4.4 PRE STACK TIME MIGRATION SEQUENCE (RAW)

TRANSCRIPTION
|
BULK STATIC CORRECTIONS(*)
|
LOW CUT FILTER
|
GAIN RECOVERY (t^2)
|
SWELL NOISE ATTENUATION
|
F-K FILTER (shot fk +/-2250 m/s)
|
SIGNATURE DECONVOLUTION
|
ADJACENT TRACE SUM(+)
|
CDP GATHER
|
FIRST PASS VELOCITY ANALYSIS (2 km intervals)
|
TRACE INTERPOLATION (Receiver Domain)
|
MULTIPLE ATTENUATION (Fk/Radon)
|
DROP INTERPOLATED TRACES
|
SECOND PASS (PSTM) VELOCITY ANALYSIS (1 km intervals)
|
SCAMP
|
REVERSE t^2 GAIN RECOVERY
|
SPHERICAL DIVERGENCE (URSIN)
|
KIRCHHOFF PRE-STACK TIME MIGRATION
|
DBS
|
NMO CORRECTION
|
OUTER TRACE MUTE / PRE STACK SCALING / INNER TRACE MUTE
|
CDP STACK
|
GUN & CABLE STATIC CORRECTIONS
|
ZERO PHASING & PHASE ROTATION

(*) See page 5.
(+) See page 5.

5.0 PROCESSING TECHNIQUES

Processing sequence was the same for both vintages.
A Bulk Static correction was applied to vintage OP80.
Trace Summation for vintage OH91B.
A brief description of each of the processes used in the processing sequence follows:

5.1 TRANSCRIPTION

Field data were converted to Robertson's internal format for processing. RRA's internal processing format is trace sequential, with samples in 32 bit IEEE floating point. At intermediate processing stages the data is stored on magnetic tape in sixteen-bit integer with a gain ranging scalar for each trace.

5.2 LOW-CUT FILTER

A low-cut filter of 6/12 Hz/dB/Octave was applied to the shot records.

5.3 GAIN RECOVERY

A gain function was applied to the data set to compensate for inelastic attenuation and spherical divergence

Gain functions applied were as follows :

Survey	Gain Function (dB)
All	t^2

where t = two way travel time in milliseconds.Applied the following static shift to compensate for recording delay.

5.4 STATICS

Survey	**Static (ms)**
OP80	-51

5.5 SWELL NOISE ATTENUATION

A symmetrical “velocity” filter was designed in the F-K domain to preserve the Swell noise attenuation is achieved by normalization of the amplitude spectra of selected "swell" traces.

To determine which traces are affected by swell noise the shot record is passed through an fx transform after an appropriate gain function has been applied to the data. Although swell noise is predominantly low frequency it also has a significant proportion of high frequency energy which can be more successfully predicted. The user can limit the range of frequencies they wish to perform analysis on by defining a low cut frequency with the upper limit being restricted to 3/4 of the nyquist frequency. For this data a low cut of 32 hz was defined and analysis performed up to 187.5 hz.

Swell traces are then chosen as those whose amplitude are greater than double a user defined percentile less the minimum amplitude. For this data a value of 30% was used for the user defined percentile. A scalar is then computed to normalize frequencies of the "swell" traces to the mean of the "non swell" traces. None of the calculated scalars are allowed to exceed 1 and they are smoothed with a user defined n point filter before application. For these data a nine point filter was used. The scalar is then fully applied to the amplitude spectra of the "swell" trace up to 1/2 of the user defined low cut frequency. For these data the scalar was fully applied from 0 to 16 hz. The scalar is then tapered to no scaling at the cut off frequency (32hz). The data is then passed on for further processing.

For data that exhibits strong swell noise the scalar values applied will be small, significantly changing the low frequency end of the amplitude spectra for the selected "swell" traces. For data with minimal swell noise the scalars will be close to 1 and result in little change to the low frequency end of the amplitude spectra for the selected "swell" traces. Only the selected "swell" traces are altered, all other traces are passed on for further processing unchanged.

5.6 MULTI CHANNEL FILTER (SHOT DOMAIN)

A symmetrical “velocity” filter was designed in the F-K domain to preserve the primary reflection signal and to discriminate against coherent dipping noise trains. The filter employs a cosine-squared taper from k = 0 to the velocity intercept at each frequency. The input data was conditioned with a 300 ms AGC, and the scalars preserved for removal subsequent to the application of the F-K filter. A cut off velocity of 2250 m/sec was used in the filter design and NMO was applied before and removed after the filter.

5.7 SIGNATURE DECONVOLUTION

Robertson Research's signature deconvolution routine is based on Taner's method for estimating a minimum phase signature from a mixed phase record. The method involves the application of an inverse exponential gain to the data to force the actual unknown wavelet into a minimum phase state before the Wiener double inverse method (which presumes minimum phase input) before the Wiener double inverse method (which presumes minimum phase input) is used to derive the minimum phase source signature. The inverse gain is removed before computing the designature operator.

Designature parameters:

Derived wavelet length	300 ms
White noise	1.00%
Inverse Gain	-15dB/s
Offset range	All offsets
Butterworth shaping	5-80 Hz (18 and 45 dB/Octave slopes)

Primary Key	Secondary Key	Design windows
Seafloor twt = 100ms	Near Offset	300-3100ms
	Far Offset	2800-5000ms
Seafloor twt = 500ms	Near Offset	700-3400ms
	Far Offset	3000-5200ms
(Design windows repeated 3 times with 300ms increment		

5.8 ADJACENT TRACE SUM

A 2:1 adjacent trace sum was applied to the OH91B vintage. This was applied after NMO correcting the shots with first pass velocity function. A trace mix was also applied during the summation process:

Trace Mix Details :

Time (ms)	Trace Mix
3000	0 - 1 - 2 - 1 - 0
6000	1 – 2 – 3 – 2 - 1

Summation Details :

Input Traces	Input Trace Interval	Output Traces	Output Trace Interval
240	13.33m	120	26.66m

5.9 CDP GATHER

The shot records were sorted into common depth point gathers.

5.10 FIRST PASS VELOCITY ANALYSIS

First pass velocities were determined using Robertson's "MGIVA" interactive velocity analysis program. Each velocity analysis comprised a semblance display, a 21 CDP stacked panel repeated 14 times with a suite of velocity functions, and a central CDP gather. The suite of functions were generated using 0%, +/-4 %, +/-8%, +/-12%, +/-18 %, +/-24%, +/-30%, and +40% increments from a central velocity function. The central function was derived from a brute velocity that varied according to water depth.

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 could be performed more effectively when discordant velocities could be recognised on the map.

5.11 DEMULTIPLE (FK / Radon)

Multiple attenuation was performed in the F-K domain, using NMO corrected gathers with scaled primary velocity functions.

Time (ms)	*Velocity Percentage*
0	95
400	94
1300	92
3500	90
6000	88

Radon demultiple, using 100% first pass velocities was applied to the data using 400p values between maximum offset delta t values of –1000ms and 3000ms. Move-outs greater than those listed below were modelled and subtracted from the data.

Vintage OP80 / OH91B

WB Time (ms)	*Time (ms) / Moveout (ms) Pairs*
100	0/200, 1000/100, 2000/75,6000/50
300	0/200, 1000/125, 2000/75, 6000/50
500	0/200, 1000/150, 2000/100, 6000/50
1000	0/300, 2000/175, 3000/125, 6000/75
2000	0/300, 3000/175, 4000/125, 6000/100
3000	0/300, 4000/175, 4500/125, 6000/100
4000	0/300, 5000/175, 5000/125, 6000/100

Reference Offset = 3375m

The Radon demultiple application times were:

WB Time (ms)	*Full Application (ms)*
100	800 – Tmax
500	900 – Tmax
750	1100 – Tmax
1000	1500 – Tmax
2000	2500 – Tmax
3000	3500 - Tmax

Receiver domain trace interpolation was applied in order to increase the spatial sampling and thus minimise any resulting aliasing. Consequently the fold was doubled for each vintage. The interpolated traces were dropped after demultiple. A 300ms AGC was applied prior to, and removed after, multiple attenuation.

5.12 PRE-STACK TIME MIGRATION (FIRST PASS)

Kirchhoff PreSTM was applied using a maximum half aperture of 600 traces (7500m). Apertures were muted with a 50% stretch mute to avoid operator aliasing. Smoothed 100% first pass 2 km velocities were used in the migration. Migration was performed on all offset planes.

5.13 SECOND PASS VELOCITY ANALYSIS

The second pass of velocities were picked at 1km intervals on first pass PSTM gathers using Robertson's "MGIVA" interactive velocity analysis program. Each velocity analysis comprised a semblance display, a 21 CDP stacked panel repeated 14 times with a suite of velocity functions, and a central CDP gather. The suite of functions were generated using 0%, +/-2 %, +/-4%, +/-6%, +/-10 %, +/-14% , +/-18 % and +/-20% increments from a central velocity function. The first pass of velocities were used as the central function for this suite of velocity variant functions.

5.14 SCAMP

SCAMP is designed to analyse amplitudes in a surface consistent manner. It estimates the amplitude variations due to various components and computes weighting levels for each component, using the Gauss-Seidel iterative metod.

5.15 REVERSE GAIN RECOVERY

Backed off t^2 scaling that was applied at the start of processing.

5.16 SPHERICAL DIVERGENCE CORRECTION

With the previously applied t^2 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).

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

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.

5.17 OUTPUT GATHERS FOR DEPTH MIGRATION

For depth imaging refer to Apendix A.3

5.18 PRE-STACK TIME MIGRATION

Kirchhoff PreSTM was applied using a maximum half aperture of 600 traces (7500m). Apertures were muted with a 50% stretch mute to avoid operator aliasing. Smoothed 100% second pass 1 km velocities were used in the migration. Migration was performed on all offset planes.

5.19 DECONVOLUTION BEFORE STACK

Predictive deconvolution was utilised to attenuate short period reverberations, and to broaden the amplitude spectrum. Design and application parameters werespatiallyvaried according to water depth.

Deconvolution parameters;

Windows	1	2
Operator Lengths	248ms	260ms
Gaps	48ms	60ms
Near trace Design windows	500-2500ms	1500-5500ms
Far trace Design windwos	2500-4500ms	3500-6500ms
Near trace Application start times	200ms	3000ms
Far trace Application stat times	1200ms	4000ms

5.20 NMO CORRECTION

Fourth order NMO correction was performed using the final picked 0.5km PSTM velocity functions.

5.21 OUTER TRACE MUTE

A post-NMO outer trace mute was applied for two main reasons :

- to remove any coherent noise on the outer traces and
- to reduce contamination from the effect of NMO stretch on the far offsets.

Only defined for shallow water bottom. Mutes follow the water bottom.

Vintage OP80

Water Bottom Time: 100 ms	
Offset (m)	***Application times (ms)***
282	0
417	0
1440	1000
1980	1600
3147	3200

Vintage OH91B

Water Bottom Time: 100 ms	
Offset (m)	***Application times (ms)***
164	0
322	0
1680	1000
2310	1600
3375	3200

5.22 PRE-STACK SCALING

General Parameter Summary:
Window lengths of 1200 ms and 400 ms
Equalization applied : 60
Short window stopped Tmax ms

5.23 INNER TRACE MUTE

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

Vintage OP80

Water Bottom Time: 100 ms	
Offset (m)	***Application times (ms)***
252	1500-9216
600	2500-9216

Vintage OH91

Water Bottom Time: 100 ms	
Offset (m)	***Application times (ms)***
134	1500-6144
600	2500-6144

5.24 COMMON DEPTH POINT STACK

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

Survey	Fold
OP80	48
OH91B	60

5.25 STATICS

A static compensation for gun and cable depths was applied. The static value applied was calculated using average gun and cable depths supplied in the observer's reports.

5.26 ZERO PHASE CONVERSION

Data were converted from minimum phase to zero phase. The spectral estimate was made using the Wiener-Levinson double inverse method.

5.27 PHASE ROTATIONS

OP80 vintage was rotated -135 degrees and OH91B was rotated -155 degrees.

5.28 INVERSE Q

Q compensation was applied to correct for amplitude dispersion. The algorithm used is recommended within Shell Oil. The program designs a series of inverse Q filters for a given time with a given Q value. These filters are applied to the trace in a linear piecewise fashion in order to simulate continuously varying Q compensation. The time interval over which Q compensation is held constant is controlled by a window length of 500 ms. The Q compensation is exact at the centre of the window. At each window time, the program calculates a different Q factor for each frequency ***f***. The Q factor is defined at time ***t*** for frequency ***f*** as (27.3/QVAL) x ***f*** x ***t*** dB
A QVAL of 100 was used for all the surveys.
For all the surveys Q compensation started at the water bottom.

5.29 TVDIP

Tau-p filtering provides an effective time variant dip filter, and enhances coherent events while discriminating against random noise. Semblance enhancement of the data in the Tau-p domain, together with editing of sections of the Tau-p plane, permits retention of data within specified dip limits at any time and enhancement of these dips after transformation back into x - t space.

Tau-p filtering was applied to all surveys. Dip limits used were +/- 6 ms/trace from 0 ms to TMAX ms. Time variant percentages of addback were used and are tabled below for 100ms waterbottom :

Time (ms)	% Addback of unfiltered data
1000	80
4000	80

5.30 BAND PASS FILTER

Unwanted noise that lay outside the frequency range of the desired reflection and diffraction data was removed by the application of a series of zero phase time variant cosine squared tapered filters. Filter application times follow sea floor event.
General parameter summary:

Water Bottom Time: 100 ms	
Time (ms)	***Frequency limits (Hz/dB/Oct)***
0	12/15-85/72
1000	12/9-80/72
2000	12/6-60/72
3000	12/4-45/72
4000	12/4-35/72
5000	12/4-30/72

5.31 POST STACK SCALING

A dual window, time variant AGC method was used for post stack scaling. The negative 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), then conditioning the model by a weighted mix with the amplitude model derived from a single window per trace.

General parameter summary
Window lengths of 1000 ms and 400 ms
Equalisation applied : 40
Short window stopped Tmax ms

5.32 ANGLE STACKS

Using the full fold inner and outer trace mutes, the remaining “live” data was split to produce near, mid and far angle stack datasets.

6.0 ACQUISITION PARAMETERS

6.1 Surveys: OP80

Data recorded by:	GSI
Date recorded:	1980
Vessel:	Eugene McDermott
Seismic Source:	
Type:	Airgun
Pressure/Volume:	2000 psi / 2000 cu.in.
Depth:	6m
Shot interval:	25m
Gun delay:	-51.2
Recording System:	
Record length:	5000 - 9000ms
Sample interval:	2 ms
Filters:Low	Out dB / Octave
:High	128 Hz – dB / Octave
Recording Delay	-51 ms
Streamer:	
Streamer length:	2400 m
Streamer depth:	13 m
No. of groups:	96
Near group no:	96
Group interval:	25 m
Near group offset:	248 m
Antenna-source:	50 m
SP annotation:	ANTENNA

6.2 Survey: OH91B

Data recorded by:	Western Geophysical Company
Date recorded:	1991
Vessel:	M/V Western Odyssey
Seismic Source:	
Type:	Airgun
Pressure/Volume:	2000 psi / 2250 cu.in.
Depth:	6m
Shot interval:	26.66m
Gun delay:	0
Recording System:	
Record length:	6000 ms
Sample interval:	2 ms
Filters:Low	6Hz - 18 dB / Octave
:High	188Hz – 156 dB / Octave
Recording Delay	
Streamer:	
Streamer length:	3200 m
Streamer depth:	8-11m
No. of groups:	240
Near group no:	1
Group interval:	13.33 m
Near group offset:	190 m
Antenna-source:	90.84 m
SP annotation:	SHOTPOINT

APPENDICES

A.1 LINE LISTING

Line No	First SP	Last SP	SP Interval	Length
OH91B-301	1000	2000	26.66	26.69
OH91B-302	3400	943	26.66	65.53
OH91B-303	1000	2099	26.66	29.33
OH91B-305	1810	939	26.66	23.25
OH91B-307	1670	939	26.66	19.52
OH91B-309	1000	1850	26.66	22.69
OP80-11	10	950	25.00	23.53
OP80-13	1350	1898	25.00	3.73
OP80-15	1350	2213	25.00	21.6
OP80-19	1550	3000	25.00	36.28
OP80-21	10	500	25.00	12.28
OP80-23	10	720	25.00	17.78
OP80-27	1250	2117	25.00	21.7
OP80-35	850	1414	25.00	14.13
OP80-37	10	550	25.00	13.53
OP80-39B	10	500	25.00	12.28
OP80-41	2021	1150	25.00	21.8
OP80-42	50	2600	25.00	63.78
OP80-44	1500	4200	25.00	67.53
OP80-45	1150	1905	25.00	18.9
OP80-47	10	500	25.00	12.28
OP80-49	10	1000	25.00	24.78
OP80-51B	1438	1733	25.00	7.4
OP80-53	1200	2197	25.00	24.95
OP80-57	10	500	25.00	12.28

A.2 PHASE ROTATION

All data was zero phased with the spectral estimate made using the Wiener-Levinson double inverse method. The data was then phase rotated. This was applied to the final filtered stack data. It was also applied to the raw unfiltered data, gathers and near and far raw and final stacks.

The following are the phase rotation parameters:

Vintage	Rotation (degrees)
OP80	-135
OH91B	-155

A.3 DELIVERABLES

Item	Format	Media	Tape Nos.
Final Migrations	SEGY	CD	329FM077DVD
Final Migrations - copy	SEGY	CD	329FM078DVD
Raw Migrations	SEGY	CD	329RM079DVD
Demultiple Gathers	SEGY	CD	329RG080DVD - 329RG091DVD
Final PSTM Gathers	SEGY	CD	329FG092DVD - 329FG103DVD
Demultiple Gathers – copy	SEGY	CD	329RG104DVD - 329RG115DVD
Final PSTM Gathers	SEGY	CD	329FG116DVD - 329FG127DVD
Angle Stacks	SEGY	CD	329AS128DVD
Sine Squared Thetas	SEGY	CD	329SS129DVD
AVO DelR/Intercept*Gradient	SEGY	CD	329AV137DVD
AVO DelR/Intercept*Gradient	SEGY	CD	329AV138DVD
CGM+ (Time + Depth Sections)	CGM	CD	329FM135CD
CGM+ (Time+ Depth Sections)	PDF	Paper Copy	Two copies
Final Processing Report	PDF	Paper Copy	Two copies
Final Processing Report	PDF	CD	329FR139CD
Final Stacking Velocities (PSTM) 1.0km Intervals	Western	CD	329MV133CD
Final Stacking Velocities (PSTM) 1.0km Intervals	SEGY	CD	329FV136CD
SP – CDP relationship	ASCII	CD	329MV133CD
Interval and Depth Maps		DVD	329DM130DVD
Final PSDM	SEGY	DVD	329FP131DVD
Final Time Scaled PSDM	SEGY	DVD	329FP132DVD
2D Pre-Stack Vel. Modelling + PreSDM Project Report.		CD	
Transcription Listing	ASCII	Floppy	329TL134F