VELSEIS PROCESSING

DATA PROCESSING REPORT

TALINGA SEISMIC SURVEY

2002 PROCESSING

ATP 692 P

BOWEN BASIN

QUEENSLAND

THE VELSEIS GROUP

PREPARED FOR
OIL COMPANY OF AUSTRALIA LTD

July 2002

INTRODUCTION

Velseis Processing Pty Ltd processed approximately 50 km of seismic data for Oil Company of Australia during April 2002. This data was recorded during January and February 2002. The data were acquired in ATP 692P in the Talinga area of the Bowen Basin. In addition to this, a further line was reprocessed (P81-12) from an earlier seismic survey. The geometry for this line was reconstructed by Velseis Processing without the aid of Observer's logs as these had been lost.

Line Summary

Line	Group Interval	CMP Fold	Station Range	Length (km)	Source
OS02-01	12.5	80/20	96-350	3.1875	Vib/Dyn
OS02-02	12.5	80	116-864	9.3625	Vib
OS02-03	12.5	80	101-761	8.2625	Vib
OS02-04	12.5	80	94-694	7.5125	Vib
OS02-05	12.5	80	101-1592	18.6500	Vib
P81-12	25	12	128-1336	29.5500	Dyn

Acquisition Parameters

P81-12 was recorded in 1981 by GES using a dynamite source. The sample rate was 2ms and the record length was 3 seconds. The near trace was 50m offset from the shot – the far trace 1225m. The data were recorded in SegB 9 track format and was recorded into 96 channels. Further information for this line was unavailable as the Observer's logs have been lost. Below is a brief description of the acquisition parameters used for the 2002 survey.

Acquisition Date	January and February, 2002
Contractor	Trace Energy
Source	Vibroseis (line OS02-01 also recorded from dynamite source)
Instruments	Sercel SN 388
Geophones	SENSOR SM4 LD SM-24
Tape format	Seg D on 3480 drive
Sample Rate	1.0 millisecond
Record Length	2.0 seconds
Recording Spread	Symmetric split

1 -------------------- 80 ------------* ----------- 81 -----------------160

|← 1000m →|←6.25m→|←6.25m→|← 1000m →|

Shot Spacing	12.5 metres (Vibroseis); 50 metres (Dynamite)
Group Spacing	12.5 meters
No of Channels	160
Coverage	8000% (Vibroseis) 2000% (Dynamite)

PROCESSING PARAMETERS

Reformat

Input and reformatted to Promax internal data format.

Geometry

Assign line geometry information to trace headers. Information assigned to each trace includes source, receiver and CMP locations along with offsets, elevations, shot depths and CMP fold.

Trace Edit

Remove bad or noisy traces from shot records interactively.

Gain

True Amplitude recovery based on the reciprocal of the distance the wavefront has travelled.

Statics Computation

Statics were calculated using a refraction static delay time algorithm. First arrivals for a single refraction layer were picked. Shot and receiver delay times were then calculated using a least squares delay time algorithm. A replacement velocity of 2750m/s and a datum of 244m were used. The refraction statics were then tied to uphole static values provided by OCA.

Deconvolution

Whitening of the spectrum to enhance signal resolution was achieved using Surface Consistent Deconvolution with a Spiking Wiener-Levinson operator. The spectrum was calculated from an averaged autocorrelogram of each shot record. 0.1% white noise was added to the autocorrelogram. The filter applied was a spiking operator with an application length of 160 milliseconds. The deconvolution window was limited to offsets up to 600m.

1st Pass Velocity Analysis

Velocities were picked from constant velocity analysis panels at locations 500 metres apart. Each panel consisted of 11 CMPs stacked with constant velocities incrementing at 100 metres per second.

Normal Move-Out Correction

Normal move-out (NMO) correction was computed using velocities picked from the constant velocity analysis.

The following equation was used to compute the NMO correction:

$T = T_0\left[1 - \frac{4X^2}{H^2}\right]^{\frac{1}{2}}$	T_x	= time at offset X
	T_0	= time at zero offset
	X	= offset of the trace
	V	= velocity at time T

1st Pass Residual Statics Calculation and Application

Surface consistent residual statics were calculated and applied using Maximum Power Autostatics.

Pilot or reference traces were formed for a 400ms time gate following structure by flattening all traces along the autostatics horizon over 5 CDP's.

These traces are summed to form a single pilot trace. Each trace from the active CDP is time shifted relative to the pilot trace and summed with it. The power of the stack is measured for each time shift. This shift-power trace is then summed with other traces having the same shot and receiver in their respective domains.

After the shift spectra has been calculated for the entire line and summed in the Receiver/Shot domains, time shifts are picked at the maximum of the power shift spectra and stored as Static Values.

The pilot stack is updated and the process repeated for a number of iterations.

In this case, calculations were conducted for at least 4 iterations or until the RMS of the change in the computed statics was less than .05.

Dip Move Out

Common Offset FK DMO were applied to all datasets.

2nd Pass Velocity Analysis

Velocities were picked from constant velocity analysis panels at locations 500 metres apart. Testing indicated that picking velocities at reduced intervals (< 500m) did not greatly improve resolution in this case. Each panel consisted of 11 CMPs stacked with constant velocities incrementing 100 metres per second.

Normal Move-Out Correction

An inverse NMO correction was applied to remove the first pass moveout from the gathers and was followed by a forward NMO correction using the 2nd pass velocity picks.

2nd Pass Residual Static Calculation and Application

An additional pass of surface consistent residual statics was undertaken to further optimize shot and receiver residual statics.

Mute

A mute was applied to eliminate refractors and stretch caused by normal move-out corrections. A 25% stretch mute was applied to these data.

Trace Amplitude Balance

Trace amplitude balancing scalars were calculated for each sample at the centre of a sliding balance window. The scaling factor is the ratio of the absolute average amplitude of the window and the average amplitude of the entire trace. Before this is calculated, the average amplitude of the entire trace is made equal to a requested value.

A scaling window of 150 ms was applied.

Statics Application

Data shifted to a final seismic datum of 244 metres.

Stack

Add traces within a common midpoint gather. The post stack trace was scaled by the square root of the sum of fold for each sample in the trace.

Blend

50% addback of original data to fx deconvoluted data.

FX Decon

Random Noise Attenuation using a 5 trace operator.

Migration

Finite Difference Migration using 95% of smoothed stacking velocities were used to migrate the data set.

Frequency Filter

Although time variant frequency filters were tested, a single Ormsby Zero Phase Bandpass Filter with corner frequencies 20-40-120-140 Hz was applied to the 2002 data. The reprocessed line (P81-12) was filtered with the same filter type but using corner frequencies 30-40-120-140 Hz.

Display

Migrated and non-migrated stacks are displayed at a horizontal scale of 1 : 10,000 (13.33 traces per centimeter (2002 data) and 8 traces per centimeter (1981 data)) and a vertical scale of 30.0 centimetres per second. A scalar calculated over all traces was applied. A positive number on tape represents a peak.

Displayed with the traces are S.P annotation, velocity information, refraction static values, residual static values, fold and elevations.

Disclaimer

This report has been prepared in good faith and with all due care and diligence. It is based on the seismic and other geophysical data presented and referred to, in combination with the author's experience with the seismic technique, and as tempered by the geological and stratigraphic evidence presented in various forms and through discussions with client representatives.

As such, the report represents a collation of opinions, conclusions and recommendations, the majority of which remain untested at the time of preparation. In the light of these facts it must be clearly understood that Velseis Processing Pty Ltd and its proprietors and employees cannot take responsibility for any consequences arising from this report.