PROCESSING REPORT

FOR PANCONTINENTAL PETROLEUM PTY. LTD.

LOCATION: AMADEUS BASIN

AREA: HIGHWAY

ALICE

GLEN EDITH

COMPILED BY:-

HOSKING GEOPHYSICAL CORPORATION (AUSTRALIA)

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INTRODUCTION

The Highway and Alice lines were recorded from February to June 1981 while the Glen Edith lines were shot in April 1982. All lines were shot by G.S.I. Crew 1858. Original processing was performed by Seismic Data Processors International in Sydney.

Reprocessing was completed in February 1983 by Hosking Geophysical Corporation (Australia) in Perth.

FIELD SURVEY INFORMATION

A) ACQUISITION PARAMETERS

Vibroseis Production Data

	1200%
Spread Configuration	1325-175-X-175-1325
Group Interval	50 M
Interval	100 M
Source	Vibroseis
Sweep Length	Alice/Highway: 16 sec Glen Edith: 24 sec
Listen Time	4 sec
Sweep Frequency	Alice/Highway: 12 - 80 Hz Glen Edith: 12 - 50 Hz
Vibrator Configuration	3 in line
No. of Sweeps	8
Geophone Type	GSC 20D 10 Hz
Geophone Configuration	24 in line
Geophone Interval	Alice/Highway: 3 M Glen Edith: 4 M
No. of Channels	48
Recording Instrument	DFS V
Record Length	4 sec
Sample Rate	4 msec
Recording Filter	8 - 90 Hz
Tape Format	SEGB 1600 B.P.I.

PROCESSING PARAMETER EXPERIMENTATION

Testing procedures were performed on P82-GE32, P81-H3 and P81-10. The testing for processing parameters was conducted as follows:

1) True Amplitude Recovery:-

Spherical divergence correction was achieved by the application of gain using the following formula -

$$\text{Gain} = K\, t^{n}\, e^{at}$$

where "t" = time, "K" and "n" were set to 1.0, and "a" was varied.

"a" values from 0.2 through to 1.0 in increments of 0.2 were tested by way of display of shot records.

2) FK Filtering:-

FK domain displays were produced on several records These plots along with examination of field records enabled the organized noise to be identified and a suitable filter designed.

3) Deconvolution:-

Stack panels were created for different minimum phase deconvolution types; predictive with gaps of 12, 20, 28, 36 and 44 msec, and spiking with 5% white noise. Operator length of 120 msec and design window of 500 - 2000 msec for near offset, and 1200 - 2700 msec for far offset remained constant throughout.

4) Muting:-

Initial and surgical muting were tested. Tests took the form of variable offset stacks.

5) Post Stack Band Pass Filtering:-

Band pass stack panels were produced to determine the band pass filter.

WEATHERING STATICS

Weathering Statics were derived from the production vibroseis refraction breaks.

Refraction breaks were picked by hand from the production records (every shot) and statics derived using the Gardner/Layat method. Breaks were picked in both the forward and reverse directions and intercept times converted to one way statics. (See Appendix C)

PROCESSING SEQUENCE

1) Demultiplex -

Conversion of field data to PHOENIX I format. Zero phase cross-correlation performed.

2) Line Geometry Creation

3) True Amplitude Recovery -

Using the formula -

$$K\, t^{n}\, e^{at}$$ where "t" = time,

"K" and "n" were set to 1.0

and "a" = 0.4.

4) Trace Equalization

500 msec AGC scaling.

5) FK Filtering -

Dip ranges rejected were

a) Highway:- 12/16 - 75/80 msec/tr
b) Alice:- 10/14 - 35/45 msec/tr
c) Glen Edith:- 10/14 - 75/80 msec/tr

6) Deconvolution

Spiking deconvolution with a 120 msec operator length and 5% white noise was used for all lines. Design windows were:

500 - 2000 msec Near Offset
1200 - 2700 msec Far Offset

7) Datum Statics (1)

Application of the floating datum correction as calculated from the average elevation corrections within each CDP.

8) Weathering Statics (1)

Application of weathering corrections derived from first breaks.

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9) First Pass Residual Statics -

Surface consistent residual statics were calculated and the velocity analyses rerun with these statics so as to fine tune velocity picking.

Design windows were

Highway	500 - 2000 msec
Alice	300 - 1500 msec
Glen Edith	400 - 1800 msec

10) Normal Moveout Corrections -

Locations for constant velocity stack velocity analyses were determined from the Brute Stack.

11) Initial Muting

The final mutes were

Offset:	425	440	930	1325	Msec
Time:	0	200	350	500	Msec

12) Datum Statics (2) -

Datum level and correction velocity for these lines were:

Alice/Highway:	Datum - 550 m
	Vr - 3800 m/sec
Glen Edith:	Datum - ~~550 m~~
	Vr - 3800 m/sec

13) Auto-Statics -

Second pass surface consistent residual statics were calculated with the same design gate as the for the first pass. The maximum allowable variance in the acceptance of traces for the pilot was +/- 10 msecs. The maximum allowable shift on traces within the CDP gather was set at +/- 20 msec. Traces whose residual static correction was picked to be larger than this value were reduced in amplitude to 30% of their original gain.

14) Stack

12 fold stack

15) Post-Stack Band-Pass Filter -

The filters applied to the data were:

Alice/Highway -	10/14 - 65/75 Hz
Glen Edith -	10/14 - 45/50 Hz

16) Scaling

500 msec gate constant windows were used.

17) Coherency Filter

A coherency filter was applied to lines in the Highway and Glen Edith areas.

Ranges for dip enhancement were set at +/-6 msec/tr for Glen Edith and +/- 8 msec/tr for Highway. The coherency add back factor was tapered from 7 at time zero to 1 at 2 secs.

18) Migration

Finite difference wave equation migration

FINAL DISPLAY

Final display on film was made with a bias of 0% and normal polarity (a negative value on tape is displayed as a trough).

The display scale for the final and migrated stacks was 10 tr/cm (1:25000) and 10 cm/sec.

A line graph plot of the one way static at each location was displayed above the section. This is the combined elevation and weathering static for each surface location.

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APPENDIX A

PURCHASE TAPES

Composited tapes of all raw stacks (post auto-statics), were made for client purchase in SEGY format, 1600 B.P.I.

There is a descriptor block separating each data set which contains the line number of the data which follows.

CPT No.195 contains raw stacks for lines:-

P81-H3
P81-H5
P82-GE32/36
P81-10

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APPENDIX B

LINE INFORMATION

Lines reprocessed were:

LINE	S.P. RANGE	FIELD TAPE NO'S
Highway		
P81-H3	370 - 140	108 - 128
P81-H5	100 - 285	138 - 140
Glen Edith		
P82-GE32	100 - 530	642 - 648
P82-GE36	98 - 362	694 - 697
Alice		
P81-10	100 - 710	91 - 97

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APPENDIX C

GARDNER/LAYAT WEATHERING STATICS MEHTOD

The weathering statics method used by Hosking Geophysical has its development in the procedures established by Gardner and Layat. Trace by trace shot and receiver corrections are derived by establishing a continuous intercept curve from refraction breaks picked from the acquired data.

Intercept time is essentially the difference between the actual travel time of the refracted wave and the time if the wave had travelled a straight line between shot and receiver at the sub-weathering velocity, or

$$I = T - X/Vm.$$

With the redundancy in multi-fold coverage, intercept curves are developed which are the accumulated differences of the variations in time between traces encountering the velocity marker at the base of the weathering and the constant value of the trace interval divided by the marker velocity, as described in the above equation. These curves are derived for both the forward and reverse profiles and averaged to eliminate possible errors in the estimation of the marker velocity.

Intercept times are reduced to one way statics by the equation

$$S = KI, \text{ where } K = 1/2 \cos \theta \ (Vw/Vc-1)$$

resulting in a profile which gives a static at every surface position.

Details on the theoretical background for the method may be found in the paper "Modified Gardner Delay Time and Constant Distance Correlation Interpretation" by C. Layat, printed in the S.E.G. publication "Seismic Refraction Prospecting".