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PROCESSING REPORT

FOR SYDNEY OIL COMPANY

LOCATION: WALLARA RANCH

AMADEUS BASIN

NORTHERN TERRITORY

1985 SURVEY

OP 236

COMPILED BY:

HOSKING GEOPHYSICAL CORPORATION (AUSTRALIA)

INDEX

INTRODUCTION

The field survey was undertaken during February of 1985 by Western Geophysical crew 785. The processing was conducted concurrently by Hosking Geophysical Corporation (Australia) at their Perth office.

FIELD SURVEY INFORMATION

ACQUISITION PARAMETERS -

SOURCE	VIBROSEIS
FOLD	1200%
NUMBER OF CHANNELS	96
SPREAD CONFIGURATION	OFFSETS: 1515-105-0-105-1515 METRES
GROUP INTERVAL	30 METRES
S.P. INTERVAL	120 METRES
SOURCE ARRAY	4 VIBRATORS IN LINE
SWEEPS	6 x 8 SECONDS
SWEEP FREQUENCY	12-96 Hz
SWEEP TAPER	0.2 SECONDS
GEOPHONE TYPE	SENSOR SM-4 10 Hz
GEOPHONE CONFIGURATION	24 x 2.5 M IN LINE
RECORDING INSTRUMENT	DFSV
RECORD LENGTH	12 SECONDS
SAMPLE RATE	2 MSEC
RECORDING FILTER	8 Hz-128 Hz
GAIN	IFP
TAPE FORMAT	1600 B.P.I. SEGB

PROCESSING PARAMETER EXPERIMENTATION

Initial pre-stack testing was performed on line S85-WR06. Further testing of initial mute parameters was performed on additional lines. The testing for processing parameters was conducted as follows:

1) F-K FILTERING: There was not a severe organised noise problem evident on the shot records. However, some reflection energy in the shallow section was being corrupted by primary refractions. A filter was designed to remove the refractor velocity in an attempt to improve the stacking response of the shallow events. A lozenge filter type was employed. Several displays of shot records in the T-X and F-K domains, along with stack panels were used to confirm the filtering parameters.

2) TRUE AMPLITUDE RECOVERY: Spherical divergence correction was achieved by the application of gain using the following formula -

   $GAIN = K\ t^{n}\ e^{at}$ where "t" = time, "K" and "n" were set to 1.0, and "a" was varied.

   "a" values from 0.1 through to 0.9 in increments of 0.2 were tested by way of display of shot records.

3) PRE-DECON BAND-PASS FILTER: Filter panels of shot records were displayed to determine this filter. Some noise above 60 Hz was apparent at depth, thus a time variant filter was chosen.

4) DECONVOLUTION: Stack panels were created for different minimum phase deconvolution types. Predictive with gaps of 8,16,24 and 32 msec, and spiking with 2% and 5% W.N. were tested. Operator length of 120 msec and design window of 200-2000 msec for near offset, and 700-2000 msec for far offset traces remained constant. An autocorrelation of each stack panel was also displayed.

Cont/...over

5) INITIAL AND FINAL MUTING: Tests took the form of variable offset stacks and displays of NMO corrected shot records. Some erratic variation was observed between tests over different areas and some additional improvement could possibly be achieved by high density mute testing. However, due to constraints in time and because only a regional picture was required, constant muting parameters were employed for the entire prospect.

6) POST-STACK B.P. FILTERING: Stack panels with varying bandpass ranges were displayed to determine post-stack filtering parameters. No change in the pre-deconvolution filter was required.

WEATHERING STATICS

Weathering statics were derived from the production vibroseis refraction breaks and upholes.

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 as described in Appendix C.

Statics were also calculated at each uphole location using uphole times and depths. The uphole statics were compared with the refraction statics and differences computed at each uphole location. A difference profile was then produced by linear interpolation. Final "uphole calibrated" statics were derived by combining the difference and refraction profiles.

Statics were calculated to a datum of 500 M above mean sea level.

PROCESSING SEQUENCE

1) DEMULTIPLEX - Conversion of field data to Phoenix I format. Data was output to 4.0 seconds.

2) LINE GEOMETRY CREATION

3) F-K FILTERING - Lozenge type design

4) TRUE AMPLITUDE RECOVERY - Using the formula

   $GAIN = K\ (t^{n})\ (e^{at})$

   K and n = 1, a = 0.1

5) BAND PASS FILTERING: 11/15/90/96 Hz, at 0 - 1800 msec
   11/15/58/62 Hz, at 1800 - 4000 msec

6) DECONVOLUTION - Predictive deconvolution with a 120 msec operator length, 28 msec gap, 1% W.N., and a design window of 200 to 2000 msec for the near offset, 700 to 2000 msec on the far offset.

7) TRACE EQUALISATION - 700 msec A.G.C. scaling

8) DATUM STATICS (1) - Application of the floating datum correction as calculated from the average total static corrections within each C.D.P. Weathering statics were computed using the Gardner/Layat method (see Appendix E) and tied to the uphole survey.

9) RESIDUAL STATICS (1) - First pass surface consistent solution. Full datum statics were applied before calculation and removed afterwards.

10) NORMAL MOVEOUT CORRECTIONS - Locations for constant velocity stack analyses were initially determined from the brute stack. Extra C.V.S.'s were run as required. Each C.V.S. was run over 21 C.D.P.'s.

11) INITIAL MUTING -

OFFSET (M)	TIME (MSEC)
225	0
285	200
555	320
1215	600
1515	700

12) FINAL MUTING -

OFFSET (M)	TIME (MSEC)
105	450
375	600
495	800
555	1000
615	4000

13) DATUM STATICS (2) - Correction of data to a datum of 500M above mean sea level.

14) RESIDUAL STATICS (2) - C.D.P. consistent solution

15) STACK - 12 fold

16) MIGRATION - Finite difference wave equation

17) POST-STACK BAND-PASS FILTER - 11/15/90/96 Hz from 0-1800 msec, 11/15/58/62 Hz from 1800-4000 msec

18) SCALING - 500 msec gates

FINAL DISPLAY

The final display was made on film with a bias of 0%, normal polarity and with a maximum trace deflection of 2 traces. Final and Migrated stacks were displayed at a scale of 10 cm/sec by 10 tr/cm (1:15000). An additional display of the Final Stack was also made at 37.8 tr/cm with variable area only and was spliced onto the 1:15000 Final Stack display.

A line graph plot of the total one way static at each location was displayed above displays for each surface location (not C.D.P.)

APPENDIX A

LINE INFORMATION

LINE NUMBER	FIELD TAPES	SP RANGE
S85-WR01	299 - 301	100 - 560
S85-WR02	302 - 305	616 - 100
S85-WR03	306 - 311	984 - 100
S85-WR04	292 - 298	1120 - 100
S85-WR05	286 - 291	960 - 100
S85-WR06	270 - 276	100- 1292
S85-WR07	277 - 285	100- 1364

APPENDIX B

PURCHASE TAPES

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

There is a descriptor block separating each data set which contains the line number and V.P. range of the data which follows:

TAPE	LINES	DATA
CPT 594	S85-WR01 - 07	Raw Stacks
CPT 657	" "	Raw & Migrated Stacks

APPENDIX C

GARDNER/LAYAT WEATHERING STATICS METHOD

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 subweathering 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 $S = KI$, where $K = 1/2 \cos \emptyset \, (Vw/Vc-1)$, resulting in a profile which gives a static at every surface position. Subweathering velocity is derived directly from first breaks. The vertical correction velocity (Vc) is obtained by taking 85% of the sub-weathering refraction velocity. Weathering velocity (Vw) is derived from uphole data.

Details on the theorectical 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".