## Petroleum Exploration Reports

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AMITY OIL N.L.
Seismic Data Processing Report
1995 Sandy Creek Seismic Survey
EP 66 N.T.

## BASIC DATA

Signed                    Date
Delegate of:  Designated Authority
                    Minister for Mines & Energy

OPEN FILE

ONSHORE

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# 1995 SANDY CREEK SEISMIC SURVEY

# SEISMIC DATA PROCESSING REPORT

FOR

# AMITY OIL N.L.

LOCATION    EP 66 N.T.

COMPILED BY  :  ROBERTSON RESEARCH
                   AUSTRALIA PTY. LTD.

FEBRUARY 1996

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## INDEX

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## 1.    INTRODUCTION

The 1995 Sandy Creek Seismic Survey was acquired for Amity Oil N.L. by Geosystems Pty Ltd in October 1995. The survey comprised 6 lines totalling 52.6 km and was recorded with a nominal fold of 120.

Processing was conducted by Robertson Research Australia at their Perth office. The processing parameters used were based on test line SC95-04. A comprehensive suite of tests was conducted on this dataset which includes FK-Filters, deconvolution, DMO, mutes. poststack filter, scaling and migration. All lines were processed to 4 seconds at 2ms sample rate. Final filming was completed in December 1995.

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## 1.1 PROJECT MAP
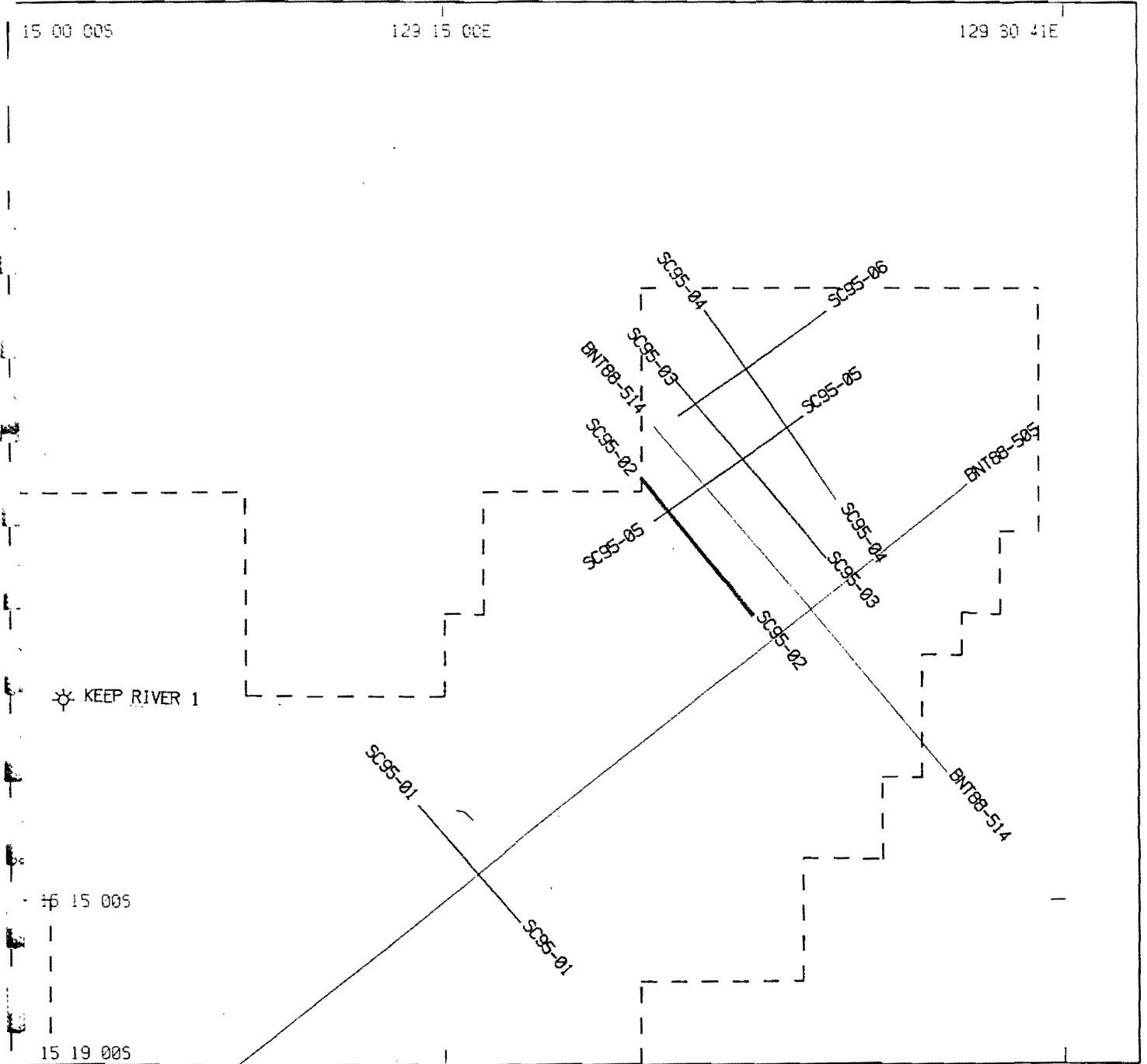
## 1.2 PROCESSING SEQUENCE DIAGRAM

1. TRANSCRIBE GEOSYSTEM TO S.P.T. INTERNAL FORMAT
   |
2. AMPLITUDE RECOVERY
   |
3. FK VELOCITY FILTER
   |
4. CDP SORT
   |
5. SPIKING DECONVOLUTION
   |
6. REFRACTION STATICS (FLOATING DATUM COMPUTATION)
   |
7. VELOCITY ANALYSIS (APPROX.2 KM INTERVALS)
   |
8. SURFACE CONSISTENT RESIDUAL STATICS
   |
9. VELOCITY ANALYSIS (APPROX. 1 KM INTERVALS)
   |
10. NORMAL MOVEOUT CORRECTION
    |
11. OUTER TRACE MUTE
    |
12. PRE-STACK EQUALISATION
    |
13. FLOATING DATUM TO FINAL DATUM
    |
14. COMMON DEPTH POINT STACK
    |
15. FD MIGRATION
    |
16. SPECTRAL ENHANCEMENT
    |
17. BAND PASS FILTER
    |
18. SCALING
    |
19. TAU-P FILTER

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## 1.3   FINAL DISPLAYS

Final displays were produced as follows:

| | | | | |
|---|---|---|---|---|
| 1. | Final Stack | Horizontal Scale : | 1:10000, | (25.4 tpi) |
| | | Vertical Scale   : | 10 cm/sec | |
| 2. | Final Migration | Horizontal Scale : | 1:10000, | (25.4 tpi) |
| | | Vertical Scale   : | 10cm/sec | |
| 3. | Tau-P Migration | Horizontal Scale : | 1:10000, | (25.4 tpi) |
| | | Vertical Scale   : | 10cm/sec | |
| 4. | Tau-p Migration | Horizontal Scale : | 1:25000, | (63.5 tr/in) |
| | | Vertical Scale   : | 10cm/sec | |

## 1.4   ARCHIVE DATA

No archived dataset was requested as yet by client at time of compiling report.

## 1.5   DATA DISPOSITION

To Amity Oil

1. 4 film displays per line (as above)
2. 1 print of each film
3. Return of observers logs and supporting documents
4. All field tapes

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## 1.6 <u>LINE SUMMARY</u>

| LINE | VP RANGE | KMS |
|------|----------|------|
| SC95-01 | 100-460 | 7.22 |
| SC95-02 | 500-100 | 8.02 |
| SC95-03 | 100-626 | 10.54 |
| SC95-04 | 620-100 | 10.42 |
| SC95-05 | 100-510 | 8.22 |
| SC95-06 | 508-100 | 8.18 |

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## 2. ACQUISITION PARAMETERS

| | |
|---|---|
| Source | Vibroseis LRS-315 |
| Source Array | 3 Vibrators inline |
| Array Centre | Between station |
| Sweep Length | 8 seconds |
| Sweep Frequencies | 10-100 Hz |
| End Taper | 200 ms |
| Source Interval | 20 m |
| Fold | 120 |
| Number of Data Channels | 240 |
| Spread Type | Split Spread |
| Offsets | 2390 - 10 - x - 10 - 2390 m |
| Group Interval | 20 m |
| Geophone Array | 6 phones inline at 3.3m spacing |
| Geophone Type | Sm4 |
| Recording Instrument | GEOCOR IV |
| Record Length | 4 seconds (Correlated) |
| Correlation Type | Zero Phase |
| Sample period | 2 msec |
| Gain mode | Sign Bit |
| Recording Filter | High cut: Out. |
| | Low cut: Out |
| Tape Format | Geosystems 16 bit integer |

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## 3. FIELD DATA SUPPORT MATERIAL

The following support information was provided

a) Observers reports
b) Floppy disks containing co-ordinate and elevation information
c) Surveyors diagram

## 5.. SUMMARY OF THE PROCESSING PARAMETERS

1. Transcribe Geosystem data into SPT internal format.

2. Application of synthetic gain curve of 0t + 10 log(t) to 4.0 seconds

3. FK velocity filter of 1600 m/s

4. CDP Sort of nominal fold 120

5. Band Limited
   Spiking deconvolution
   Operator Length : 160 ms
   Gap : 2 ms
   White Noise : 0.1%
   Design window : 100-2000 & 1600-3400 ms   10m
   : 1000-2100 & 1700-3500 ms  2390m

6. Green Mountain Refraction Statics application : floating datum correction

7. Velocity analysis using CVS panel
   Frequency of analyses : 2 km intervals
   Velocity range : 1800 to 5700 m/s
   Number of CDP/analysis : 21

8. Surface consistent residual statics
   Number of pilot traces : 7

9. Velocity analysis using 'OMNIVEL'
   Frequency of analyses : 1.0 km intervals
   Velocity range : 1800 to 6500 m/s
   Number of CDP/analysis : 15
   Number of 4% increment panels per analysis : 9

10. NMO correction using second pass velocity functions as annotated.

11. Outer trace mute
    Offset (m) : 40  70  110  270  950  2390
    Time (ms) : 0  50  100  200  660  1300

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12. Pre-stack scaling
    AGC window : 800 ms

13. Floating datum to m.s.l datum.
    Variable replacement velocity

14. Common depth point stack -120 fold

15. F.D. Migration
    Wave-equation method
    100% smoothed stacking velocity
    First order solution 20 ms depth step

16. Spectral enhancement
    Frequency bandwidth 10-80 Hz

17. Application Time (ms)     Freq (Hz)
          200           8 - 12 - 90 - 100
          1000          8 - 12 - 80 - 90
          2000          8 - 12 - 70 - 80
          3000          8 - 12 - 50 - 60

18. Scaling
    Dual window AGC with lengths of 1000 and 400 ms
    equalisation applied 50%

19. Taup FilterTime variant dip and coherency filter
    15 trace transform with DIP-cut +/- 4 ms per trace
    Addback : 65% at 0 - 2000 ms
              90% at 3000 ms

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## 6.  CONCLUSION

The data benefitted from the application of F-K filtering to remove linear low velocity noise.   This produces a cleaner correlation to derive better deconvolution operator.   The resulting stack has better continuity.   Dip-movement was not used because it did not improve the first second of the stacked section which was the primary zone of interest.

Overall the processing of this project proceeded in a smooth and timely manner with good communication and co-operation between Robertson Research and Amity Oil.

Robertson Research Australia would like to thank Greg Irwin for his co-operation and immediate replies to queries.

Alex Tan
ROBERTSON RESEARCH AUSTRALIA

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