Open File Envelope No. 8295

SCIENTIFIC INVESTIGATION PERMIT

OFFSHORE EUCLA BASIN

GREAT AUSTRALIAN BIGHT 1990 SPECULATIVE MARINE SEISMIC, GRAVITY AND MAGNETIC SURVEY. REPORTS FOR THE PERIOD 19/3/90 TO FEBRUARY 1992

Submitted by

Japan National Oil Corp.
1992

Enquiries: Customer Services
Ground Floor
101 Grenfell Street, Adelaide 5000

Telephone: (08) 8463 3000
Facsimile: (08) 8204 1880

PRIMARY INDUSTRIES AND RESOURCES SA

DATA PROCESSING REPORT
ON
THE GEOPHYSICAL SURVEY
IN
OFFSHORE EUCLA BASIN, WESTERN AUSTRALIA

FOR

JAPAN NATIONAL OIL CORPORATION

BY

JAPEX GEOSCIENCE INSTITUTE, INC.

MARCH 1991

CONTENTS

3. WELL LOG DATA PROCESSING

3 - 1 Data processing

3 - 2 Data display

4. NAVIGATION DATA PROCESSING

5. CONCLUSION

APPENDIX A

A - 1 Data acquisition summary

A - 2 List of the processed seismic sections

A - 3 List of the products of log data processing

A - 4 List of the well coordinates

A - 5 List of the well log contents

A - 6 List of the drift values of wells

A - 7 List of the seismic data processing sequence test

APPENDIX B

B - 1 Production processing summary

B - 2 Captions of the figures

1. INTRODUCTION

Japan National Oil Corporation (JNOC) was granted the Special Prospecting Authority (SPA) from the Department of Mines for the State of Western Australia on 8 May 1990 and is carrying out the geological and geophysical survey in the offshore Eucla basin. From 26 August and 5 October 1990, Halliburton Geophysical Service (HGS) acquired geophysical data over the area on behalf of JNOC using the survey vessel "M/V PACIFIC TITAN". A total length of approximately 5350 km of seismic data was obtained. The index map of the survey is shown in Fig. 1.

These newly acquired seismic data were processed at the computer center of Japex Geoscience Institute Inc. (JGI) during the period between October 1990 and March 1991. The synthetic seismograms of 2 wells and the compiled seismic location maps were also produced by JGI.

This report is concerned with the results of the above data processing work.

2. SEISMIC DATA PROCESSING

Preceding to the main processing, the processing sequence test was conducted at the portion between SP4996 and SP5796 on the line JA90-23 to seek for the effective procedure in this particular area. The flow diagram of the data processing is shown in Fig. 2-1.

2-1. Format conversion, edit and trace sum

JGI received the field data in the SEG-Y format between October 1990 and January 1991, which had been converted from the original format of SEG D by HGS, Sidney.

Prior to the main data processing, defective traces in the shot records were identified by displaying them at every 120 shot interval along with displaying all of the near trace records.

Those traces were eliminated and never were used in the subsequent data processing. Then, every adjoining two traces were put together for reducing the number of the traces from 240 to 120.

These defective records were likely caused by some of reasons stated below :

(1) Errors of tape copy and/or absence of EOF

(2) Abnormal waveforms which were difficult to detect in the monitor records by the on board system

(3) Spike waveforms occured somewhere in the recording system

(4) Increase the background noise level

2-2. Velocity filter (not applied)

Although it was found by the test processing that the velocity filter was rather effective to suppress the coherent noises dominating in this area, the velocity filter was not adopted for the production processing because the time migration is considered to be more effective than the velocity filter for degrading such kind of noises (refer to the test section, Sheet No. T-1N).

2-3. CDP sorting and datum correction

Common Depth Point (CDP) sorting was carried out on each of the seismic lines so that midpoints between sources and receivers within a CDP gather fell into a common location. Each CDP is spaced at 12.5m and number of CDP folds is 60.

Various time corrections for datum (sea level) were also applied at this stage as stated below :

(1) Time delay due to the recording system (-51.2ms)

(2) Adjustment of the time origin to the datum plane (sea level)

- submerge depth of airguns and streamer cable (10.8ms)
- intentional recording time delay in the deep sea area (optional)

Moreover, portions in a same line separately recorded in the field survey were put together into an original single line.

2-4. Minimum phase conversion and first break suppression

The wavelet processing of the minimum phase conversion was carried out. The basic wavelet was extracted from the averaged sea bottom reflection.

The wavelet processing above was followed by the whitening deconvolution to enhance the wavelet resolution. Those processing can be rationalized by comparing with the outcome of the application of whitening deconvolution without minimum phase conversion (refer to Fig. 3-1).

In the same Figure one can see that the extracted wavelet processing above is superior to the observed airgun source wavelet one from the viewpoint of the wavelet resolution. The analysis of wavelet and its power spectrum for the deconvolved wavelet after minimum phase conversion were shown in Fig. 3-2 and 3-3.

Furthermore, the refraction waves near the first breaks and direct waves in water layer were muted or suppressed in this phase.

2-5. Amplitude recovery

According to the test result shown in Fig. 4, the gain function proposed by Newman (1973) was adopted for compensating the amplitude decay by the geometrical spreading.

The gain function by Newman is given by the following formula :

$$G (X, T) = T \times V_{rms}^2 (T_0) / V_1$$

$$T = (T_0^2 + (X / V_{rms} (T_0))^2)^{1/2}$$

, where

V_1	:	RMS velocity in the first subsurface layer
$V_{rms}(T_0)$	:	RMS velocity at the time T_0
T_0	:	Two way travel time at zero offset point
X	:	Offset distance.

As for the parameter of $V_{rms}(T_0)$, the same velocity profiles derived from the velocity analysis was applied (refer to the Chapter 2-9).

This method was found to be quite effective in this particular line where the variation of the water depth was very wide.

2-6. Prestack deconvolution

The selected parameters for the prestack deconvolution are listed below (refer to the test result shown in Fig. 5) :

Operator length	300 ms
Prediction distance	4 ms
Prewhitening	0.5 %
Design gate at zero offset	300 - 3300 ms
Gate sliding velocity	1450 m/s (hyperbola)

Since the thickness of sedimentary layers was generally less than 3 seconds in this area, the operators of the deconvolution filter were calculated within a fixed design gate.

2-7. Multiple suppression

In order to suppress the multiple reflections generated from water layer between the sea surface and a sea bottom, the multiple subtraction method utilizing the constant multiple velocity of 1500 m/s was applied. The specified velocity 1500 m/s was employed from the test result as shown in Fig. 6.

The CDP gathers which contained less than 16 traces were ruled out of this processing to avoid the decrease of the S/N ratio.

Meanwhile, the weighted stack method was carried out to reduce the pegleg multiples (refer to the Chapter 2-10).

Most of the data were severely affected by the multiple reflections caused by both water layer and interfaces of subsurface layers.

Therefore, the following two methods were applied to reduce those noises.

① Multiple subtraction

② Weighted stack

In the processing the multiple subtraction using the constant velocity was first applied and then the weighted stack was applied at the stage of CDP stacking (refer to the test section, Sheet No. T-3N).

2-8. Dip moveout correction (not applied)

The result of the dip moveout correction process is shown in Fig. 12.

One may see a slight improvement in clarifying the structure of the faults. However, the dip moveout was excluded from the production processing, since no apparent improvement were expected, considering the rather simple subsurface structures throughout this survey area (refer to the test section, Sheet No. T-2N).

2-9. Velocity analysis, normal moveout (NMO) correction and mute

Velocity analysis was conducted by using the constant velocity scan method with 48 different velocities at a 2 km (160 CDP) interval. The JGI's interactive velocity analysis system " AIVAS " was utilized for this velocity analysis.

The analysed velocities were linearly interpolated in the space and time directions and then the NMO correction was applied by using the respective velocity functions for each CDP.

The mute parameters were carefully designed to eliminate such noisy and spurious events as refractions and undesirable events occured due to excessive stretching by NMO correction. Mute parameters are as follows :

Offset distance	500 m (shallower than 300 ms)
	800 m (deeper than 300 ms)
Mute start time at zero-offset	450 ms
Sliding velocity of mute start time	1400 m/sec

2-10. CDP stack (weighted)

The amplitudes of the CDP gathers less than 650 m of the offset distances were weighted by 0.75 before the CDP stacking. This processing intends for attenuating pegleg multiples. The time range of the attenuation is limited between two times of the water depth and the end time of the trace.

The adjustment of the amplitude balance within CDP gathers was not performed, for avoiding the adverse effect of losing the amplitude balances in the stacked records (refer to Fig. 7).

Meanwhile, seismic lines divided in the opposite directions were edited at this stage to form an original single line.

2-11. Poststack filtering

Post stack deconvolution was not applied, because it gave an adverse effect of amplifying high frequency noises in the deeper portion of seismic traces (refer to the test result shown in Fig. 8).

Thus, the band pass filter only was carried out as the post stack filtering. The various parameters for the filtering were specified based on the series of tests as shown in Fig. 9-1-1, 9-1-2, 9-2-1 and 9-2-2. The design gates for the band pass filter being measured from sea bottom are indicated in the index of the final record sections.

The parameters of the specified filter are shown as follows :

Pass band	gate 1	8 - 90 Hz
	gate 2	8 - 70 Hz
	gate 3	8 - 50 Hz
	gate 4	8 - 35 Hz
Operator length		300 ms
Gate overlap length		500 ms

2-12. Trace scaling

The deterioration of the amplitude balance due to the weighted stack was corrected by the trace scaling. References were the root mean square of the trace amplitudes within the design gates specified by the test result as shown in Fig. 10.

2-13. Time migration

The time migration in F-K domain controlling the events with the maximum dip angle of 55 degree was applied.

Smoothed and scaled stacking velocities were used for this migration processing. The velocity scaling was carried out for reducing the 10 % of velocities for the time range less than 1 second, 20 % for the time range greater than 5 seconds and the linear interpolation in the scaling factor was applied between 1 sec and 5 sec.

The dip control parameter was decided so that the maximum angle was 55 degree which seems larger than usual one. The test result is shown in Fig. 11.

The bandpass filter described in the Chapter 2-11 was carried out after the time migration. Then, the trace scaling was followed with the reference to the root mean square amplitudes within the time gate of 600 ms.

2-14. Data display

The final seismic sections were displayed, in which each adjoining traces were mixed together. The horizontal scale of the displayed sections are one to hundred thousand (1:100,000). The amplitudes of those are normalized for each trace.

Meanwhile, the black sides of variable areas correspond to positive reflection coefficients in the seismic record sections.

For the convenience of the interpretation, the locations of the crossing lines in the surveys by ESSO in 1979 (ESSO79) and by GENOA in 1979 (GENOA70) are indicated on the related sections in addition to those of this survey.

3. WELL LOG DATA PROCESSING

The synthetic seismograms were generated with the well log data at the wells of JERBOA-1 and POTOROO-1. The flow diagram of the data processing is shown in Fig. 2-2, and other information such as the well locations are indicated at the Appendix A-3, 4, 5 and 6.

3-1. Data processing

Data processing was carried out according to the following sequence.

- Editing defective data
- Datum plane conversion to the mean sea level
- Generation of depth versus time curve from check shot
- Application of anti-alias filter
- Calculation of the acoustic impedance logs
  (using the sonic and the density log)
- Depth to time correction
- Generation of the synthetic seismograms
  (Bandpass filters and Ricker wavelet were applied)

3-2. Data display

On the transparent films, the composite logs are displayed with the synthetic seismograms of both positive and negative polarities.

4. NAVIGATION DATA PROCESSING

While making navigation data processing, the following jobs were carried out.

1) Connecting the seismic lines.
2) Calculating the crosspoint coordinate of seismic lines.
3) Compiling other seismic lines such as JNOC survey 1990, GENOA survey 1970 and ESSO survey 1979.

Following three types of scale were used for mapping.

1/250,000 , 1/500,000 , 1/1,000,000

All geodetic parameters used in the processing are listed in the Table A-1.

5. CONCLUSION

In the survey area, a sufficient reduction of the noises caused by the multiple reflections played the significant role in enhancing S/N ratio of the seismic data in the sedimentary layers. The continuity and resolution of other seismic events also improved with such multiple noise attenuation.

As for the velocity analysis conducted with rather denser interval than usual one, the excellent subsurface velocity profiles were derived. Those velocity profiles provided quite successful results for both CDP stack and time migration.

Comparing the data processing for the existing data to which velocity filtering was applied with that for the present data, the outcome of the present processing obviously provides the clearer vision of the subsurface structures particularly in the sediments just above the basement than that of the existing data.

In the production processing, although the dip moveout was not applied, to obtain much more accurate velocity, application of the dip moveout processing might be recommended.

As for the well log data processing, the correlation between the synthetic seismograms and the seismic sections shows quite successful results.

APPENDIX A

A-1. Data acquisition summary

The marine geophysical data acquisition was conducted by Halliburton Geophysical Service Inc. (HGS) during the period from August 26 through October 5, 1990.

Total line length was 5345.7 km (including overlap).

For the primary positioning system, the SPOT system was assigned and GPS (Global Positioning System) was provided both for the secondary positioning system and for the calibration of the SPOT system.

The base maps were prepared using the geodetic parameters listed in the Table A-1.

SPHEROID	:	AUSTRALIAN NATIONAL
PROJECTION	:	U.T.M.
ZONE NO.	:	52
FALSE NORTHING	:	10,000,000 m
FALSE EASTING	:	500,000 m
CENTRAL MERIDIAN	:	129°E
SCALE FACTOR	:	0.9996

Table A-1. Geodetic parameters of the present survey

The recording parameters are summarized in the following :

Seismic survey	
recording length	6 sec.
sample rate	4 msec
CDP coverage	6000 %
receiver interval	12.5 m, 240 channels
shot point interval	25 m
recording instrument	TITAN 1000
filter	8 Hz (18 dB / oct)
	90 Hz (72 dB / oct)
tape format	SEG-D
airgun volume	2180 cu.in. (airgun array)
airgun pressure	1850 PSI
timing delay	51.2 ms

A-2. List of the processed seismic sections

LINE	SP RANGE	CDP RANGE	DIRECTION	SHEET NO. STACK *	**	MIGRATION †	††
JA90 - 01	101 - 5756	1 - 11430	N → S	FL1	FS1	ML1	MS1
JA90 - 02	101 - 10778	1 - 21465	W → E	FL2	FS2	ML2	MS2
JA90 - 03	101 - 6530	1 - 12978	S → N	FL3	FS3	ML3	MS3
JA90 - 04	101 - 6774	1 - 13466	E → W	FL4	FS4	ML4	MS4
JA90 - 05	101 - 7145	1 - 14208	N → S	FL5	FS5	ML5	MS5
JA90 - 06	101 - 14979	1 - 29876	E → W	FL6	FS6	ML6	MS6
JA90 - 07	101 - 7344	1 - 14606	S → N	FL7	FS7	ML7	MS7
JA90 - 08	42.5 - 16568	1 - 33052	W → E	FL8	FS8	ML8	MS8
JA90 - 09	101 - 7553	1 - 15024	N → S	FL9	FS9	ML9	MS9
JA90 - 10	101 - 5679	1 - 11394	E → W	FL10	FS10	ML10	MS10
JA90 - 11	101 - 7358	1 - 14634	S → N	FL11	FS11	ML11	MS11
JA90 - 12	101 - 12541	1 - 25000	W → E	FL12	FS12	ML12	MS12
JA90 - 12	12541 - 24585	25000 - 49088	W → E	FL13	FS13	ML13	MS13
JA90 - 13	101 - 7352	1 - 14622	N → S	FL14	FS14	ML14	MS14
JA90 - 14	101 - 14799	1 - 29516	E → W	FL15	FS15	ML15	MS15
JA90 - 15	101 - 7350	1 - 14618	S → N	FL16	FS16	ML16	MS16
JA90 - 16	101 - 11732	1 - 23382	W → E	FL17	FS17	ML17	MS17
JA90 - 17	101 - 3545	1 - 7008	N → S	FL18	FS18	ML18	MS18
JA90 - 19	101 - 6984	1 - 13886	S → N	FL19	FS19	ML19	MS19
JA90 - 21	101 - 3537	1 - 6992	S → N	FL20	FS20	ML20	MS20
JA90 - 23	101 - 9580	1 - 19078	N → S	FL21	FS21	ML21	MS21
JA90 - 25	101 - 3577	1 - 7072	S → N	FL22	FS22	ML22	MS22
JA90 - 27	101 - 7337	1 - 14592	S → N	FL23	FS23	ML23	MS23
JA90 - 29	101 - 3973	1 - 7864	N → S	FL24	FS24	ML24	MS24
JA90 - 31	101 - 7768	1 - 15454	S → N	FL25	FS25	ML25	MS25
JA90 - 33	101 - 3960	1 - 7838	N → S	FL26	FS26	ML26	MS26
JA90 - 35	101 - 9953	1 - 19824	N → S	FL27	FS27	ML27	MS27

* Large scale size display described below (stack)
** Small scale size display described below (stack)
† Large scale size display described below (migration)
†† Small scale size display described below (migration)

Large scale	;	Horizontal scale	1 : 50,000
		Vartical scale	10cm / sec
Small scale	;	Horizontal scale	1 : 100,000
		Vartical scale	5cm / sec

A-3. List of the products of well log data processing

WELL NAME	Composite Log	Impedance Log	Synthetic Seismogram	Depth-Time Conversion Curve
JERBOA-1	○	○	○	○
POTOROO-1	○	○	○	○

A-4. List of the well coordinates

- WELL NAME : JERBOA-1
  LATITUDE : 33° 30' 14.83" S
  LONGITUDE : 127° 36' 02.75" E

- WELL NAME : POTOROO-1
  LATITUDE : 33° 23' 13.57" S
  LONGITUDE : 130° 46' 06.90" E

A-5. List of the well log contents

- WELL NAME : JERBOA-1

  DT
  RHOB
  SP
  ILD
  SFLU
  MSFL
  GR
  CALI
  DRHO
  NPHI
  NRAT
  NCNL
  FCNL

- WELL NAME : POTOROO-1

  DT
  RHOB
  SP
  IND
  LLD
  LLS
  SFL
  GR
  CALI
  DRHO
  NPHI

A-6. List of the drift values of wells

1 WELL : JERBOA-1

(1-1) DRIFT CALCULATION TABLE BEFORE CALIBRATION

CHECK DEPTH (METER)	CHECK TIME (C.T.) (MSEC)	INTEGRATED TIME (I.T.) (MSEC)	C.T. - I.T. (MSEC)
1014.60	632.50	632.50	0.00
1091.60	665.50	664.59	0.91
1138.60	687.00	684.99	2.01
1240.60	737.00	733.87	3.13
1321.60	775.00	770.91	4.09
1499.60	857.00	852.41	4.59
1625.60	916.00	912.72	3.28
1898.60	1035.00	1025.97	9.03
2097.10	1119.00	1106.90	12.10
2238.60	1173.00	1159.40	13.60
2485.60	1261.00	1246.92	14.08

(1-2) DRIFT CALCULATION TABLE AFTER CALIBRATION

CHECK DEPTH (METER)	CHECK TIME (C.T.) (MSEC)	INTEGRATED TIME (I.T.) (MSEC)	C.T. - I.T. (MSEC)
1014.60	632.50	632.50	0.00
1091.60	665.50	665.52	-0.02
1138.60	687.00	686.98	0.02
1240.60	737.00	737.00	0.00
1321.60	775.00	774.98	0.02
1499.60	857.00	856.98	0.02
1625.60	916.00	916.05	-0.05
1898.60	1035.00	1034.99	0.01
2097.10	1119.00	1118.99	0.01
2238.60	1173.00	1172.99	0.01
2485.60	1261.00	1261.00	0.00

2 WELL : POTOROO-1

(2-1) DRIFT CALCULATION TABLE BEFORE CALIBRATION

CHECK DEPTH (METER)	CHECK TIME (C.T.) (MSEC)	INTEGRATED TIME (I.T.) (MSEC)	C.T. - I.T. (MSEC)
531.00	305.47	305.47	0.00
566.00	322.17	321.62	0.55

CHECK DEPTH (METER)	CHECK TIME (C.T.) (MSEC)	INTEGRATED TIME (I.T.) (MSEC)	C.T. - I.T. (MSEC)
611.00	342.47	341.58	0.89
643.00	356.27	355.41	0.86
751.00	397.06	399.38	-2.32
795.00	412.37	416.49	-4.12
818.00	421.07	425.10	-4.03
891.00	446.37	451.13	-4.76
931.00	460.37	465.61	-5.24
943.00	464.68	471.17	-6.49
1043.00	510.17	516.25	-6.08
1141.00	554.88	557.23	-2.35
1241.00	597.18	595.76	1.42
1297.00	619.28	615.92	3.36
1361.00	643.66	639.57	4.09
1449.00	677.18	669.24	7.94
1573.00	725.10	713.51	11.59
1641.00	751.60	737.03	14.57
1768.00	801.09	781.96	19.13
1841.00	829.19	807.09	22.10
1941.00	867.08	840.36	26.72
2081.00	918.08	885.69	32.39
2191.00	955.18	917.31	37.87
2286.00	985.99	943.57	42.42
2326.00	998.29	955.41	42.88
2384.00	1017.59	974.20	43.39
2425.00	1031.23	986.48	44.75
2486.00	1052.74	1007.55	45.19
2571.00	1077.84	1033.22	44.62
2641.00	1098.24	1052.34	45.90
2681.00	1109.74	1063.04	46.70
2726.00	1121.64	1074.08	47.56
2751.00	1127.95	1079.91	48.04
2781.00	1135.53	1087.63	47.90
2806.00	1141.84	1094.59	47.25
2841.00	1149.00	1101.56	47.44
2911.00	1163.34	1115.75	47.59

(2-2) DRIFT CALCULATION TABLE AFTER CALIBRATION

CHECK DEPTH (METER)	CHECK TIME (C.T.) (MSEC)	INTEGRATED TIME (I.T.) (MSEC)	C.T. - I.T. (MSEC)
531.00	305.47	305.47	0.00
566.00	322.17	322.16	0.01
611.00	342.47	342.46	0.01
643.00	356.27	356.23	0.04

CHECK DEPTH (METER)	CHECK TIME (C.T.) (MSEC)	INTEGRATED TIME (I.T.) (MSEC)	C.T. - I.T. (MSEC)
751.00	397.06	397.05	0.01
795.00	412.37	412.44	-0.07
818.00	421.07	421.05	0.02
891.00	446.37	446.37	0.00
931.00	460.37	460.24	0.13
943.00	464.68	464.81	-0.13
1043.00	510.17	510.18	-0.01
1141.00	554.88	554.83	0.05
1241.00	597.18	597.13	0.05
1297.00	619.28	619.20	0.08
1361.00	643.66	643.66	0.00
1449.00	677.18	677.11	0.07
1573.00	725.10	725.08	0.02
1641.00	751.60	751.54	0.06
1768.00	801.09	801.05	0.04
1841.00	829.19	829.15	0.04
1941.00	867.08	867.03	0.05
2081.00	918.08	918.05	0.03
2191.00	955.18	955.13	0.05
2286.00	985.99	985.89	0.10
2326.00	998.29	998.24	0.05
2384.00	1017.59	1017.58	0.01
2425.00	1031.23	1031.15	0.08
2486.00	1052.74	1052.67	0.07
2571.00	1077.84	1077.83	0.01
2641.00	1098.24	1098.20	0.04
2681.00	1109.74	1109.69	0.05
2726.00	1121.64	1121.59	0.05
2751.00	1127.95	1127.87	0.08
2781.00	1135.53	1135.45	0.08
2806.00	1141.84	1141.84	0.00
2841.00	1149.00	1148.95	0.05
2911.00	1163.34	1163.29	0.05

A-7. List of the seismic data processing sequence test

LINE	SP RANGE	CDP RANGE	DIRECTION	SHEET NO.
JA90 - 23				
(Velocity filter)	4996 - 5796	9910 - 11510	N → S	T-1N
(Dip moveout)	4996 - 5796	9910 - 11510	N → S	T-2N
(Multiple suppression)	4996 - 5796	9910 - 11510	N → S	T-3N
(Time migration)	4996 - 5796	9910 - 11510	N → S	T-4N

scale ; Horizontal 1 : 50,000
Vertical 10cm / sec

APPENDIX B

B-1. Production processing summary

The production processing was performed in the following sequence (refer to Fig. 2-1) :

(1)	Adjacent traces summing :	240ch to 120ch	
(2)	CDP sorting :	CDP interval 12.5m	
(3)	Datum correction :	+10.8ms (to MSL)	
(4)	Minimum phase conversion		
(5)	Amplitude recovery :	Geometrical spreading compensation	
(6)	Prestack deconvolution :		
		operator length	300 msec
		prediction distance	4 msec
		prewhitening	0.5 %
		design gate at 0 m offset	
			300 - 3300 msec
		gate sliding velocity	1450 m/sec
(7)	Multiple suppression :	Suppressed multiple velocity 1500m/s	
(8)	Velocity analysis (constant velocity scan method) :		
		no. of velocities	48
		analysis interval	2.0 km
(9)	Normal moveout correction and mute		
(10)	CDP stack (weighted) :	weight	0.25 (distance < 650m)
			1.00 (distance > 650m)
	(amplitude normalized by square root of the number of stacking folds)		
		stacking fold	6000 %
(11)	Poststack band pass filter :		
		pass bands	8 - 90 Hz
			8 - 70 Hz
			8 - 50 Hz
			6 - 35 Hz
		operator length	300 msec
		gate overlap	500 msec
(12)	Trace scaling :		
		RMS amplitude scaling	
		gate length	150 msec
		overlap length	25 msec

(13) Time migration

F-K migration (using stacking velocity functions obtained from velocity analysis)

velocity scaling

90 % (at 1 sec) -80 % (at 5 sec)

dip limit max 40 ~ 55°

Trace scaling : RMS amplitude scaling

gate length 600 ms

B-2. Captions of the figures

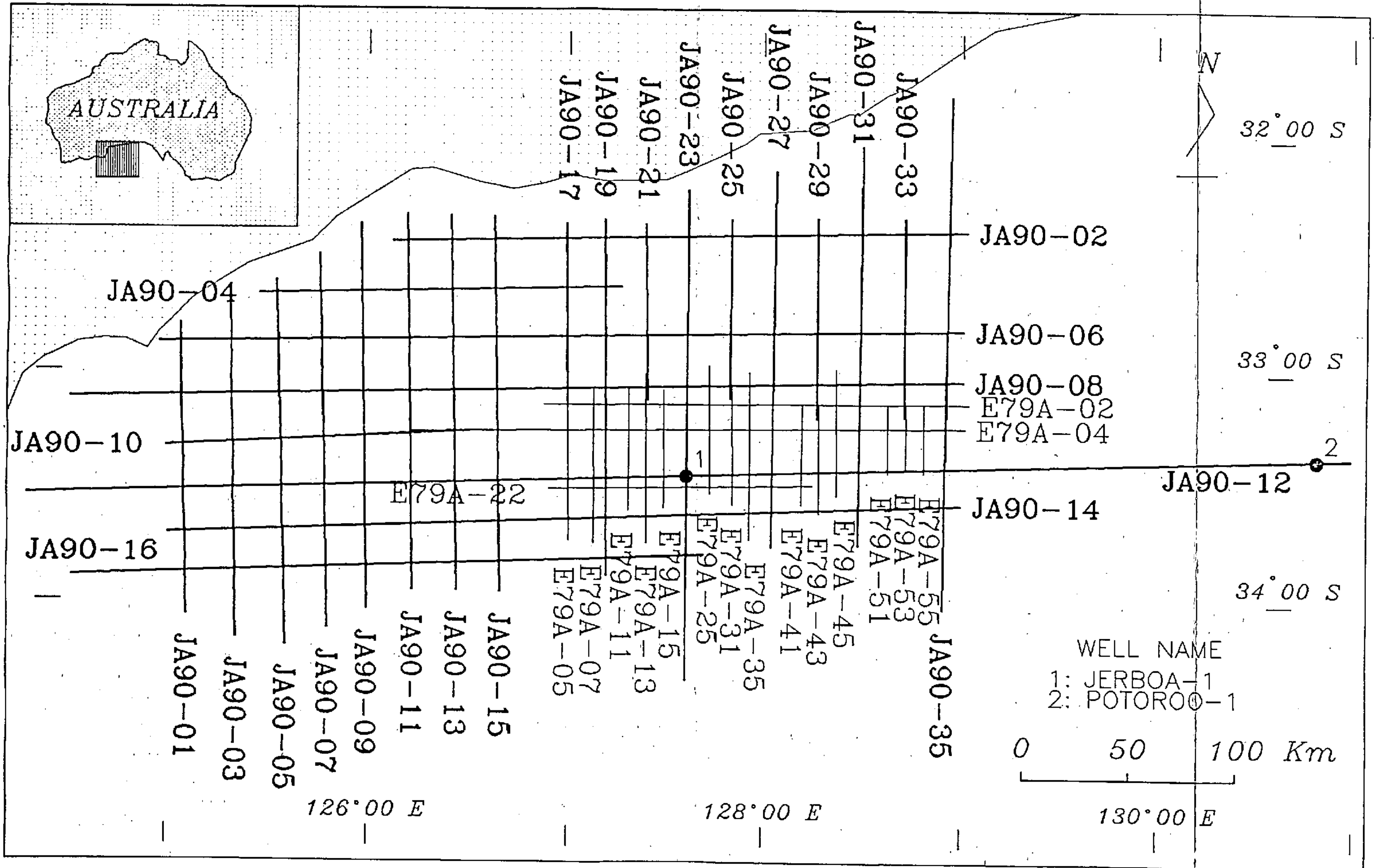


Fig.1 INDEX MAP

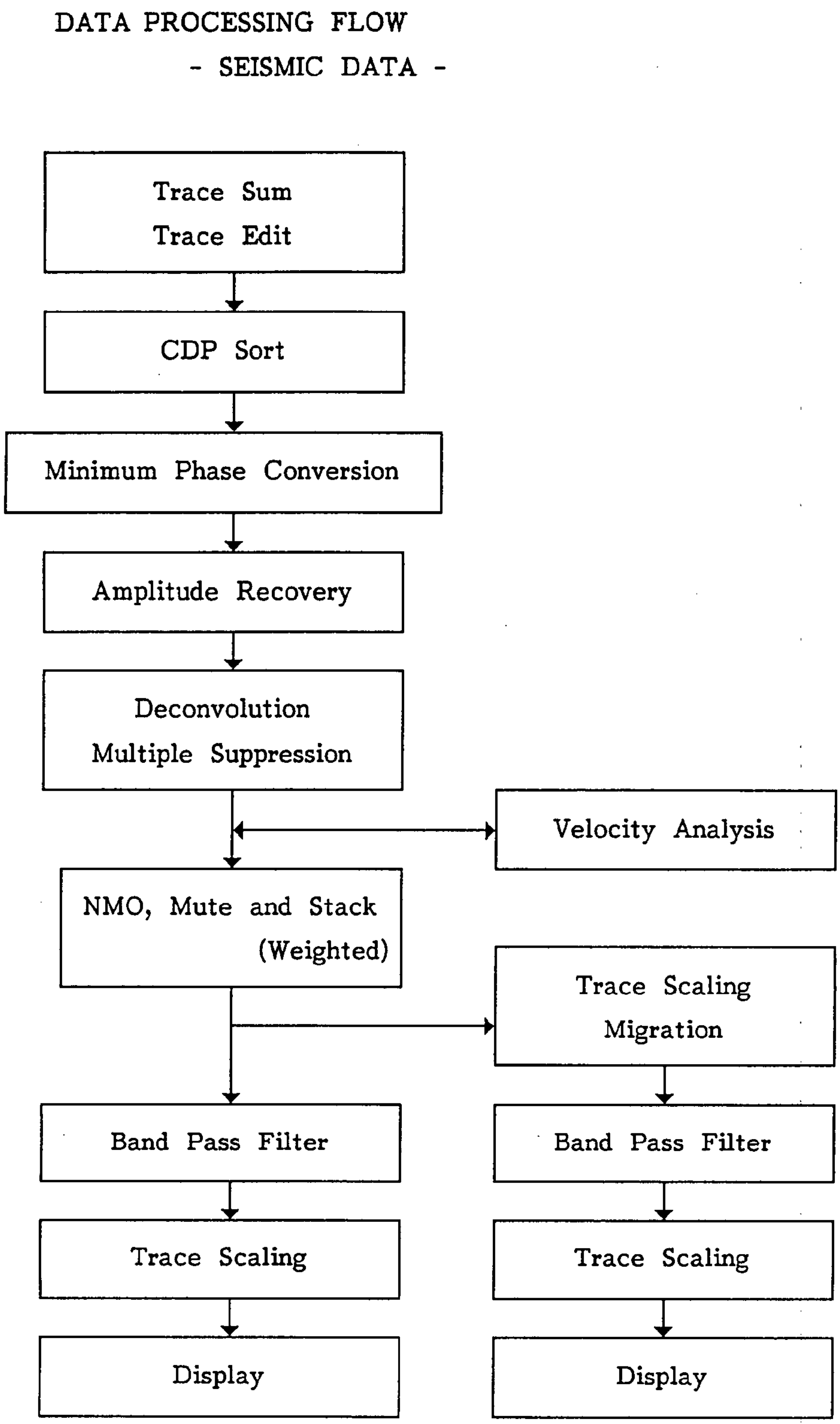

DATA PROCESSING FLOW
- SEISMIC DATA -
Trace Sum
Trace Edit
CDP Sort
Minimum Phase Conversion
Amplitude Recovery
Deconvolution
Multiple Suppression
Velocity Analysis
NMO, Mute and Stack (Weighted)
Trace Scaling
Migration
Band Pass Filter
Trace Scaling
Display
Band Pass Filter
Trace Scaling
Display

Fig. 2 - 1

DATA PROCESSING FLOW

- WELL LOG DATA -

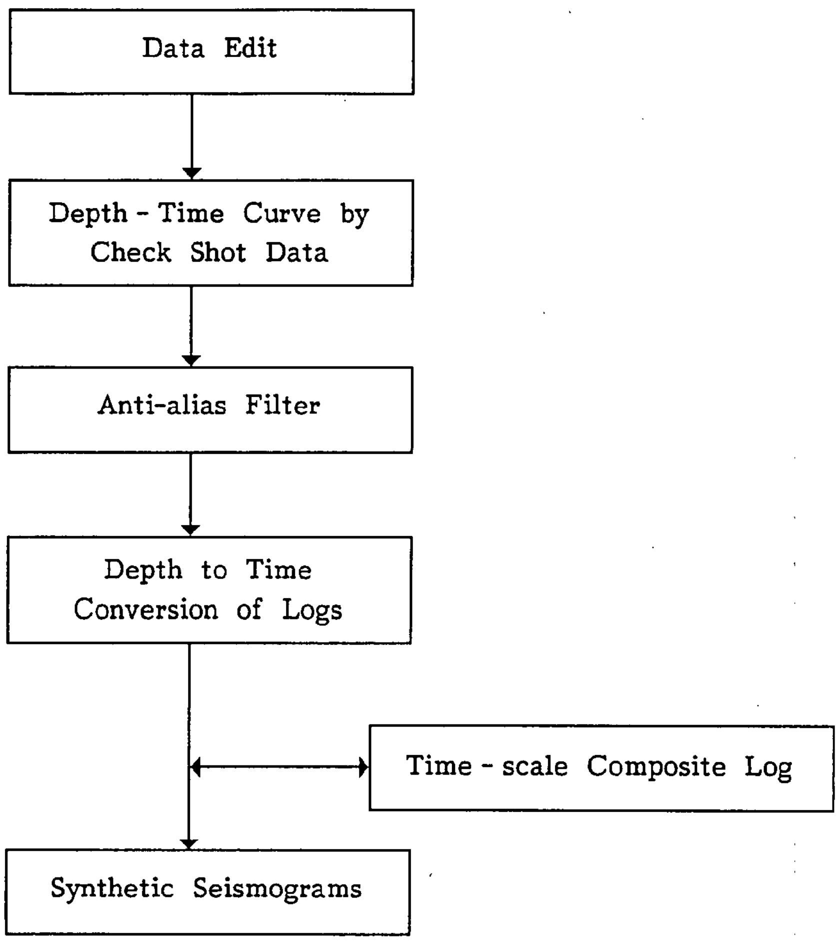


Fig. 2 - 2

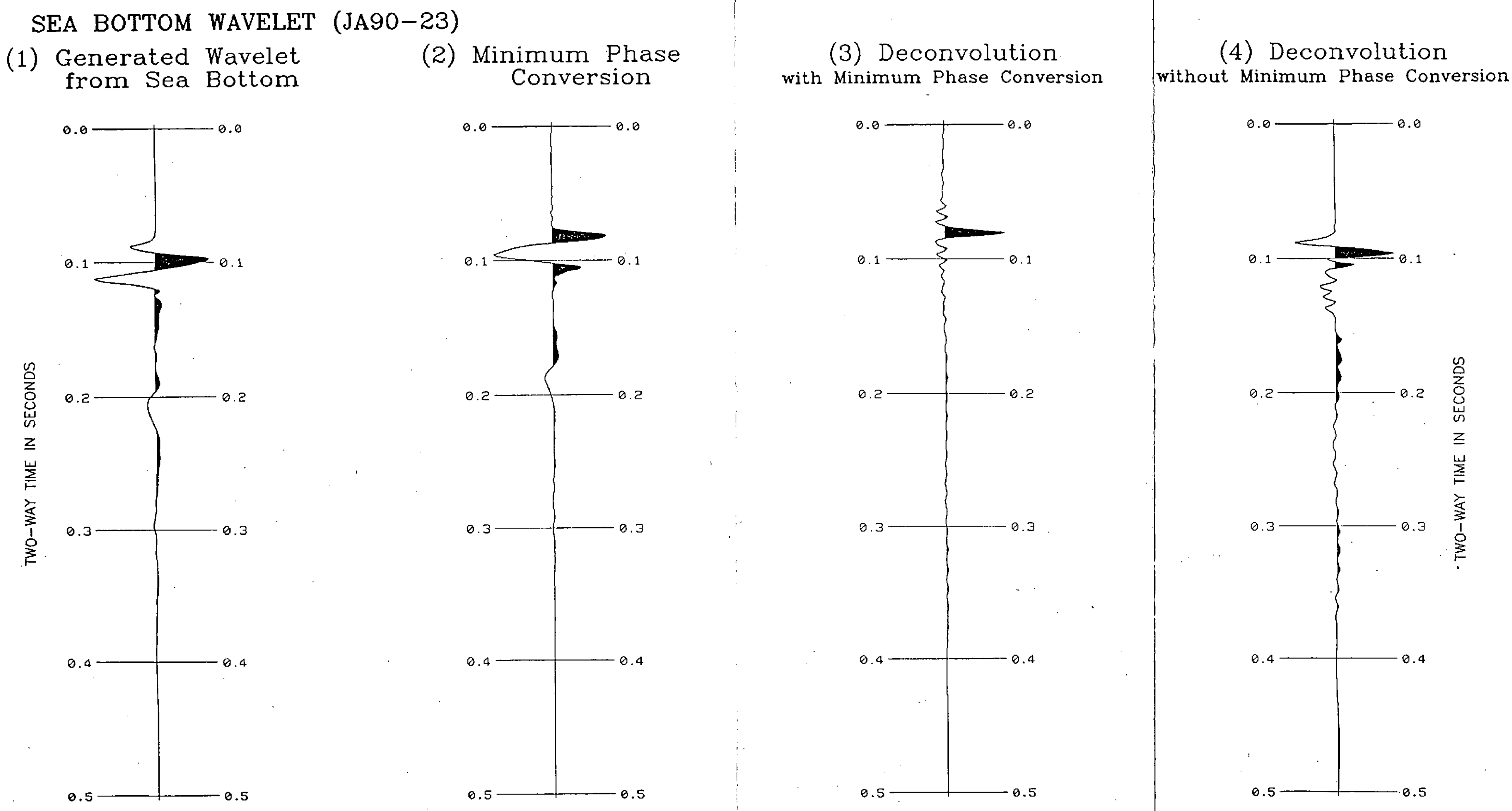


Fig. 3-2 Basic Wavelet Analysis

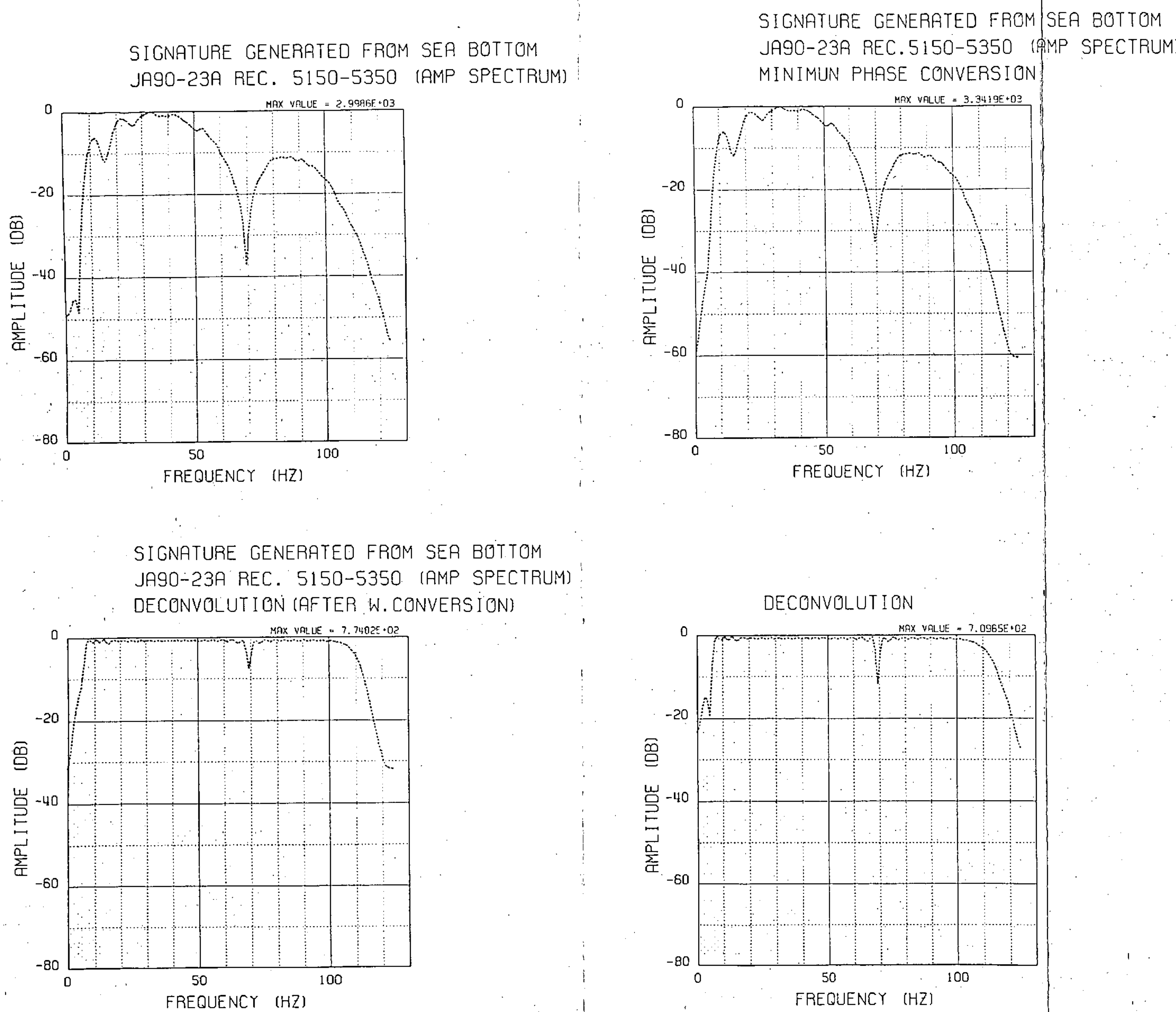
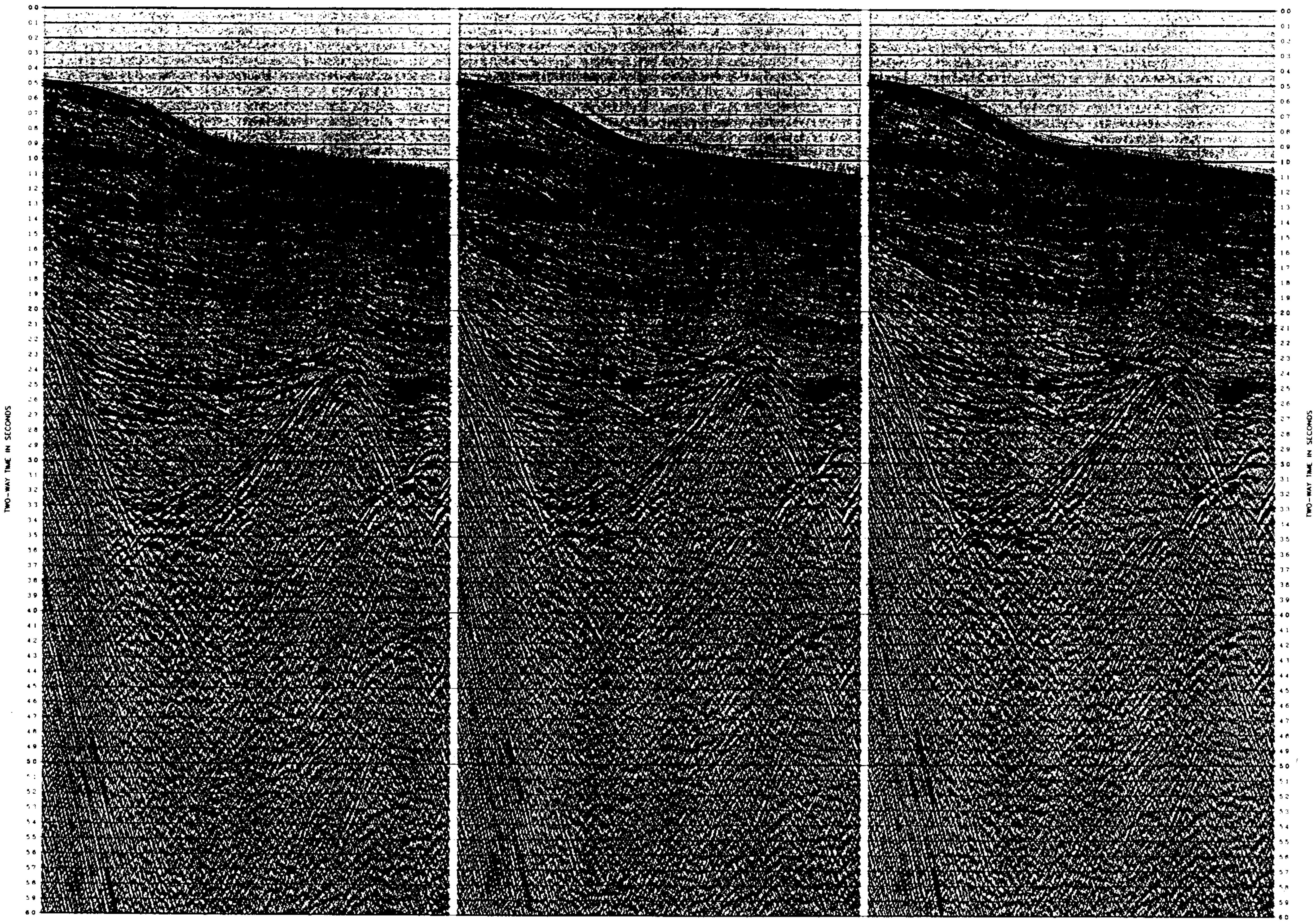


Fig. 3–3 Power Spectrum of Basic Wavelet

(1) Original without Wavelet Conversion

(2) Generated Wavelet from Sea Bottom

(3) Gun Signeture



WAVELET CONVERSION TEST

OFFSHORE EUCLA BASIN
WESTERN AUSTRALIA

LINE : JA90-23
SP. : 4996-5796

PROCESSING SEQUENCE

1) BAD TRACE EDIT
2) TRACE SUM (240ch to 120ch)
3) CDP SORT and DATUM CORRECTION

– TEST –

4) MINIMUM PHASE CONVERSION
5) FIRST BREAK SUPPRESSION
6) AMPLITUDE RECOVERY
7) PRESTACK DECONVOLUTION
8) NMO CORRECTION and MUTE
9) STACK
10) BAND PASS FILTER (8-75 Hz.)

8295-3

Fig.3-1

AMPLITUDE RECOVERY TEST

OFFSHORE EUCLA BASIN
WESTERN AUSTRALIA

LINE : JA90-23
SP. : 4996-5796

PROCESSING SEQUENCE

1) BAD TRACE EDIT
2) TRACE SUM (240ch to 120ch)
3) CDP SORT and DATUM CORRECTION
4) FIRST BREAK SUPPRESSION
   - TEST -
5) AMPLITUDE RECOVERY
6) NMO CORRECTION and MUTE
7) STACK
8) BAND PASS FILTER (8-75 Hz)

8295-4

Fig.4

PRESTACK DECONVOLUTION TEST

OFFSHORE EUCLA BASIN
WESTERN AUSTRALIA

LINE : JA90-23
SP. : 4996-5796

PROCESSING SEQUENCE

1) BAD TRACE EDIT
2) TRACE SUM (240ch to 120ch)
3) CDP SORT and DATUM CORRECTION
4) MINIMUM PHASE CONVERSION
5) FIRST BREAK SUPPRESSION
6) AMPLITUDE RECOVERY

- TEST -

7) PRESTACK DECONVOLUTION
8) NMO CORRECTION and MUTE
9) STACK
10) BAND PASS FILTER (8-75 Hz.)

8295-5

Fig.5

MULTIPLE SUPPRESSION TEST

OFFSHORE EUCLA BASIN
WESTERN AUSTRALIA

LINE : JA90-23
SP. : 4996-5796

PROCESSING SEQUENCE

1) BAD TRACE EDIT
2) TRACE SUM (240ch to 120ch)
3) CDP SORT and DATUM CORRECTION
4) MINIMUM PHASE CONVERSION
5) FIRST BREAK SUPPRESSION
6) AMPLITUDE RECOVERY
7) PRESTACK DECONVOLUTION
   - TEST -
8) MULTIPLE SUPPRESSION
9) NMO CORRECTION and MUTE
10) STACK
11) BAND PASS FILTER (8-75 Hz)

8295-6

Fig.6

PRESTACK TRACE SCALING TEST

OFFSHORE EUCLA BASIN
WESTERN AUSTRALIA

LINE : JA90-23
SP. : 4996-5796

PROCESSING SEQUENCE

1) BAD TRACE EDIT
2) TRACE SUM (240ch to 120ch)
3) CDP SORT and DATUM CORRECTION
4) MINIMUM PHASE CONVERSION
5) FIRST BREAK SUPPRESSION
6) AMPLITUDE RECOVERY
7) PRESTACK DECONVOLUTION
8) MULTIPLE SUPPRESSION
9) NMO CORRECTION and MUTE

\- TEST -

10) TRACE SCALING
11) STACK (WEIGHTED)
12) BAND PASS FILTER (8-75 Hz)

8295-7

Fig 7

POSTSTACK DECONVOLUTION TEST

OFFSHORE EUCLA BASIN
WESTERN AUSTRALIA

LINE : JA90-23
SP. : 4996-5796

PROCESSING SEQUENCE

1) BAD TRACE EDIT
2) TRACE SUM (240ch to 120ch)
3) CDP SORT and DATUM CORRECTION
4) MINIMUM PHASE CONVERSION
5) FIRST BREAK SUPPRESSION
6) AMPLITUDE RECOVERY
7) PRESTACK DECONVOLUTION
8) MULTIPLE SUPPRESSION
9) NMO CORRECTION and MUTE
10) STACK (WEIGHTED)
- TEST -
11) POSTSTACK DECONVOLUTION
12) BAND PASS FILTER (8-75 Hz)

8295-8

Fig 8

Filter Test
Frequency Content Analysis

OFFSHORE EUCLA BASIN
WESTERN AUSTRALIA

LINE : JA90-23
SP. : 4996-5796

PROCESSING SEQUENCE

1) BAD TRACE EDIT
2) TRACE SUM (240ch to 120ch)
3) CDP SORT and DATUM CORRECTION
4) MINIMUM PHASE CONVERSION
5) FIRST BREAK SUPPRESSION
6) AMPLITUDE RECOVERY
7) DECONVOLUTION
8) MULTIPLE SUPPRESSION
9) NMO CORRECTION and MUTE
10) STACK (WEIGHTERD)
  - TEST -
11) FREQUENCY CONTENT ANALYSIS

8295-9

Fig 9-1-1

Filter Test
Pass Band Determination

OFFSHORE EUCLA BASIN
WESTERN AUSTRALIA

LINE : JA90-23
SP. : 4996-5796

PROCESSING SEQUENCE

1) BAD TRACE EDIT
2) TRACE SUM (240ch to 120ch)
3) CDP SORT and DATUM CORRECTION
4) MINIMUM PHASE CONVERSION
5) FIRST BREAK SUPPRESSION
6) AMPLITUDE RECOVERY
7) DECONVOLUTION
8) MULTIPLE SUPPRESSION
9) NMO CORRECTION and MUTE
10) STACK (WEIGHTED)
- TEST -
11) PASS BAND DETERMINATION

8295-10

Fig 9-1-2

Filter Test
Frequency Content Analysis

OFFSHORE EUCLA BASIN
WESTERN AUSTRALIA

LINE : JA90-23
SP. : 8591-8990

PROCESSING SEQUENCE

1) BAD TRACE EDIT
2) TRACE SUM (240ch to 120ch)
3) CDP SORT and DATUM CORRECTION
4) MINIMUM PHASE CONVERSION
5) FIRST BREAK SUPPRESSION
6) AMPLITUDE RECOVERY
7) DECONVOLUTION
8) MULTIPLE SUPPRESSION
9) NMO CORRECTION and MUTE
10) STACK (WEIGHTERD)
    - TEST -
11) FREQUENCY CONTENT ANALYSIS

8295-11

Fig.9-2-1

Filter Test
Pass Band Determination

OFFSHORE EUCLA BASIN
WESTERN AUSTRALIA

LINE : JA90-23
SP. : 8591-8990

PROCESSING SEQUENCE

1) BAD TRACE EDIT
2) TRACE SUM (240ch to 120ch)
3) CDP SORT and DATUM CORRECTION
4) MINIMUM PHASE CONVERSION
5) FIRST BREAK SUPPRESSION
6) AMPLITUDE RECOVERY
7) DECONVOLUTION
8) MULTIPLE SUPPRESSION
9) NMO CORRECTION and MUTE
10) STACK (WEIGHTED)
- TEST -
11) PASS BAND DETERMINATION

8295-12

Fig 9-2-2

POSTSTACK TRACE SCALING TEST

OFFSHORE EUCLA BASIN
WESTERN AUSTRALIA

LINE : JA90-23
SP. : 4996-5796

PROCESSING SEQUENCE

1) BAD TRACE EDIT
2) TRACE SUM (240ch to 120ch)
3) CDP SORT and DATUM CORRECTION
4) MINIMUM PHASE CONVERSION
5) FIRST BREAK SUPPRESSION
6) AMPLITUDE RECOVERY
7) PRESTACK DECONVOLUTION
8) MULTIPLE SUPPRESSION
9) NMO CORRECTION and MUTE
10) STACK (WEIGHTED)
11) FINAL FILTER
 - TEST -
12) TRACE SCALING

8295-13

Fig.10

Migration Test

OFFSHORE EUCLA BASIN
WESTERN AUSTRALIA

LINE : JA90-23
SP. : 4996-5796

PROCESSING SEQUENCE

1) BAD TRACE EDIT
2) TRACE SUM (240 ch to 120 ch)
3) CDP SORT and DATUM CORRECTION
4) MINIMUM PHASE CONVERSION
5) FIRST BREAK SUPPRESSION
6) AMPLITUDE RECOVERY
7) PRESTACK DECONVOLUTION
8) MULTIPLE SUPPRESSION
9) NMO CORRECTION and MUTE
10) CDP STACK (WEIGHTED)
11) TRACE SCALING
- TEST -
12) TIME MIGRATION
13) FINAL FILTER

8295-14

Fig.11

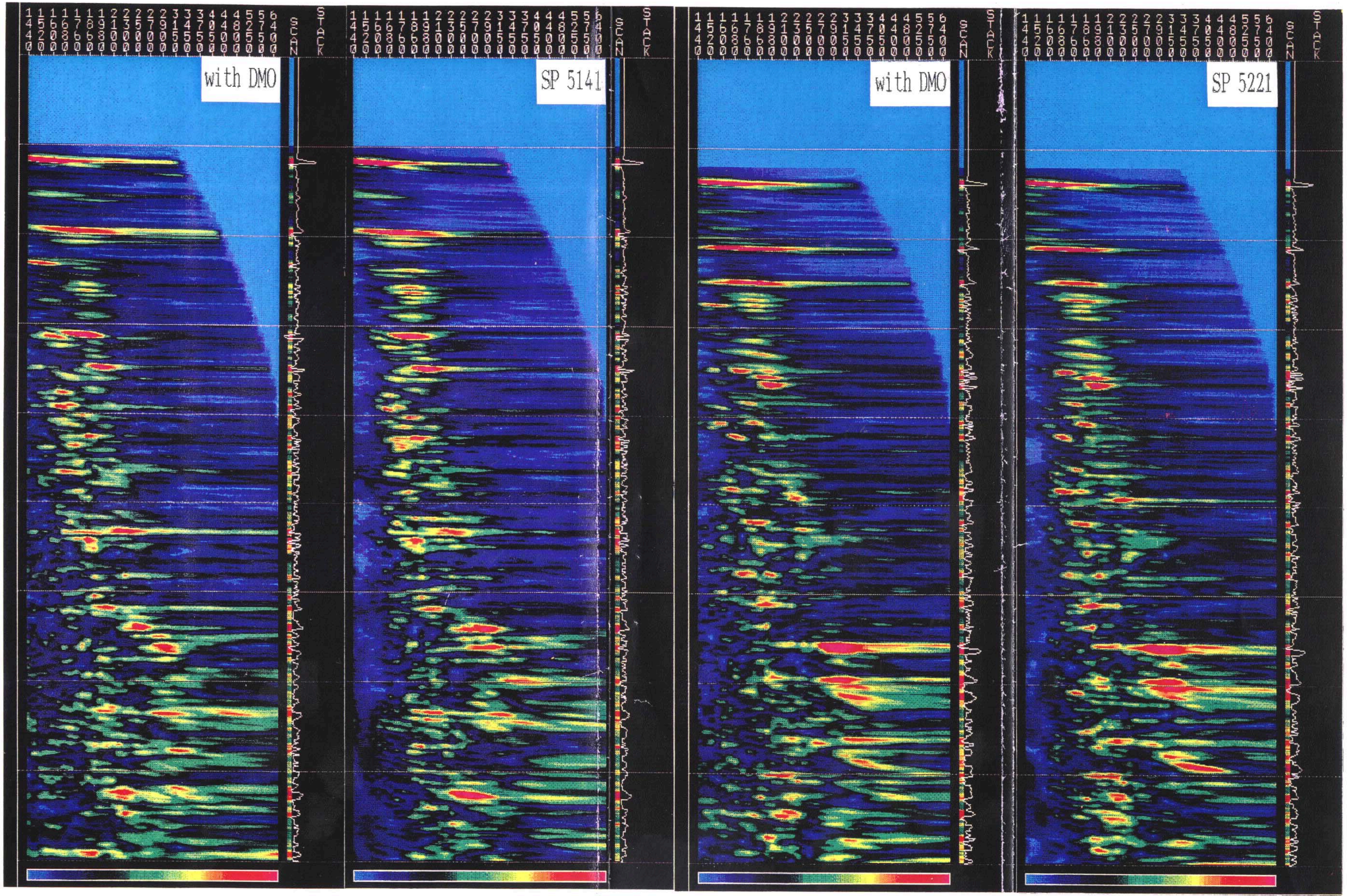


Fig. 12 Velocity Analysis after DMO