CAROLINE 1

ENCLOSURE 8 OF WCR:

WELL VELOCITY SURVEY

PARTS 1 + 2

PE904309

WELL VEL. SURVEY
CAROLINE 1.

FINAL REPORT

on the

VELOCITY DETERMINATION SURVEY

CAROLINE NO. 1 WELL

O. E. L. 22, South Australia

Submitted to

ALLIANCE OIL DEVELOPMENT AUSTRALIA N. L.

by

NAMCO GEOPHYSICAL COMPANY

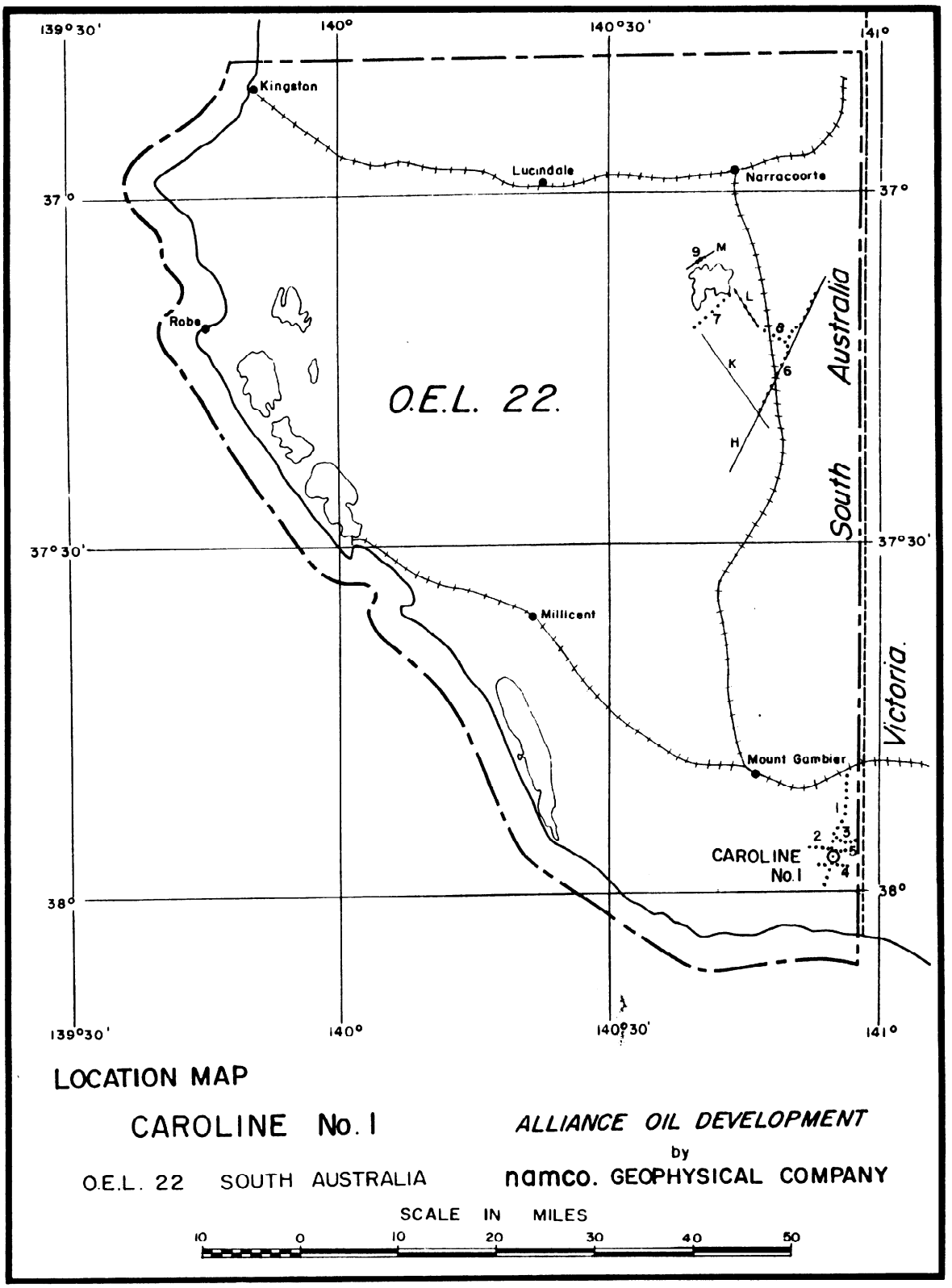
CONTENTS

ABSTRACT

A seismic velocity determination survey was conducted on 8th December, 1966 for Alliance Oil Development in their Caroline No. 1 Well located near Mount Gambier in Oil Exploration Licence 22, South Australia.

The survey was made by Namco Geophysical Company of Dallas, Texas, with Australian headquarters at 64 Tribune Street, South Brisbane, Queensland.

The results of the survey are considered reliable and indicate a gradual increase in seismic velocity with depth to a maximum average velocity of 9,248 feet per second at a total depth (6009' below K.B.).



LOCATION MAP

CAROLINE No. 1

O.E.L. 22 SOUTH AUSTRALIA

ALLIANCE OIL DEVELOPMENT

by

namco. GEOPHYSICAL COMPANY

SCALE IN MILES

10 0 10 20 30 40 50

INTRODUCTION

A well velocity determination survey was conducted for Alliance Oil Development in their Caroline No. 1 Well located near Mount Gambier, South Australia. Refer to Location Map, Frontispiece.

The survey was conducted on 8th December, 1966 by Namco Geophysical Company with Australian headquarters at 64 Tribune Street, South Brisbane, Queensland. Statistical data for the project is summarised in Appendix III.

PROCEDURE

Seismic times from shot position to the well geophone were recorded using National Geophysical Company instruments in conjunction with the equipment of Schlumberger (Seaco) Inc.. The well geophone, a pressure sensitive type, was made by Seiscor.

National Geophysical Company 26AA amplifiers and pre-amplifiers with a National 4F oscillograph were used in the recording procedure. The electric wave filters of the amplifiers were adjusted to attenuate seismic frequencies below 3.1 cycles per second and above 140 cycles per second at 50% response, with a maximum response in a broad band at about 20 cycles per second. The composition of each time-depth recording was as follows:

Trace 1	:	Time Break
Trace 2	:	Up-hole time
Trace 3	:	Reference geophone (at rig)
Trace 4	:	Well geophone - low gain, no A.G.C.
Trace 5	:	Well geophone - medium gain, no A.G.C.
Trace 6	:	Well geophone - high gain, no A.G.C.
Trace 7	:	Well geophone - no A.G.C.; BH-EL Filter.

Linkages from the reference and well geophones to the recording truck were by cable. The shot point seis and time break for the holes located to the south of the well (S. P's A, C, D and E) were transmitted to the recording truck by cable while the same traces were transmitted by radio for the shot points located to the north of the well (S. P's B, F, G, H and I-24).

Shot points were drilled at diametrically opposed positions on either side of the well. Refer to Velocity Determination Layout, Figure 1.

Nineteen shots were recorded with the well geophone at KB depths from 750 to 6,009 feet. In positioning the geophone the last movement was always upwards with the exception of the shot at total depth.

RESULTS

The results of the survey are considered reliable between 750 feet and total depth. One set of breaks at 1,520 feet are questionable.

The raw observed times have been corrected to a reference plane at 100 feet above sea level, with due consideration to the angularity of travel path. Plotted curves of time vs depth, average velocity vs depth and interval velocity vs depth appear on Enclosure I.

A 2,770' offset shot was recorded to a geophone depth of 6009' to provide information on anisotropy within the shallow part of the section. The results, of course, are not conclusive but there is an increase in average velocity of approximately 2%.

A Miller's Procedure Calculation, for instantaneous velocity at any depth, gives a velocity function of $V_i = 6860 + .88Z$. The acceleration factor derived should not be used for extrapolation of the function into the deeper section because of a rapid acceleration shown between 2,506' and 3,016'.

CONCLUSIONS

A reliable determination of seismic velocities to depth at Caroline No. 1 has been achieved by this survey. The average velocity to near total depth is 9,248 feet per second. The maximum interval velocity measured was between the two deepest shots and measured 12,929 feet per second.

An average velocity inversion occurs in the interval between 726-1496 and the interval between 3016-3276 feet below datum. These inversions are not real but are caused by an averaged, up-dip and down-dip Tgd, being plotted in juxtaposition to an unaveraged Tgd.

NAMCO GEOPHYSICAL COMPANY

H. Lowman

Supervisor

Date: Dec. 22 1966

APPENDIX I

EQUIPMENT

1 Complete set of National Geophysical Company Type 26AA 24 trace recording system.

2 Complete sets of shooting equipment including multi-hole blasters and firing harnesses.

1 International 160 Recording Truck.

1 Toyota shooting vehicle.

1 Holden general purpose vehicle.

1 Seiscor, Pressure sensitive type well geophone.

1 Toyota four-wheel-drive survey truck.

1 Complete set of surveying equipment.

1 Heavy duty Mayhew 1000 combination air-water drilling rig, equipped with 667 CFM air compressor (one-stage) 5x6 Gardner-Denver mud pump and two hundred feet of heavy duty drill stem.

1 Water truck equipped with 600 gallon tank mounted on an International Model 160 4-wheel-drive truck.

APPENDIX II

PERSONNEL

Party Chief	A. E. Bluestone
Observer	I. B. Fraser
Shooter	W. Johnson
Shooter	G. Steen
Driller	W. Johnson
Surveyor	B. Williams
Assistant Shooters	Two

The total complement of the field crew during the actual shooting was six men. Surveying, drilling and loading had been done in advance.

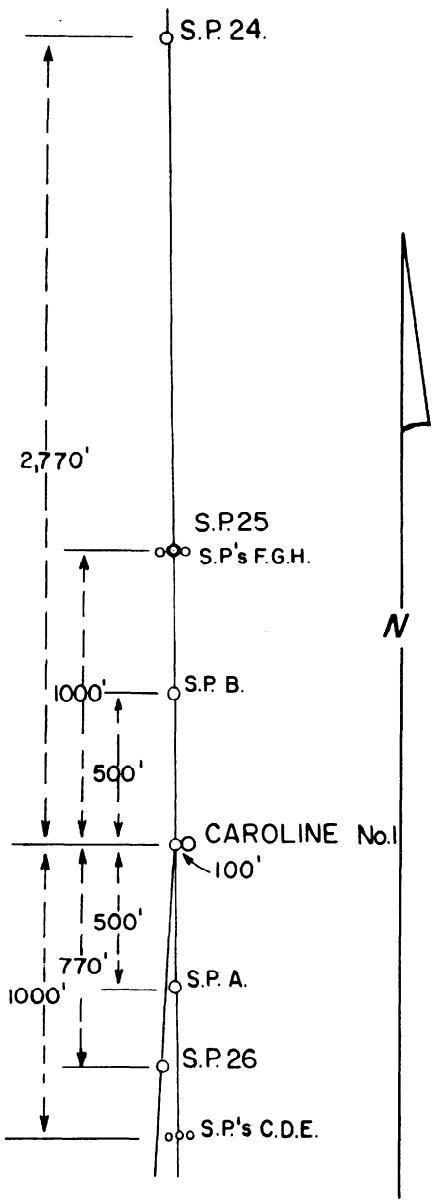
Technical and administrative supervisor was Mr. H. E. Bowman.

APPENDIX III

STATISTICAL DATA

Left crew headquarters (Broken Hill)	9.00 p.m.	5 December, 1966
Arrived Mt. Gambier	4.00 p.m.	6 December, 1966
Arrived at well	5.00 a.m.	8 December, 1966
Began velocity survey	8.00 a.m.	8 December, 1966
Completed velocity survey	12.50 p.m.	8 December, 1966
Returned to headquarters (Mt. Gambier)	1.30 p.m.	8 December, 1966

Shots recorded by well geophone	19
Total pounds dynamite (Geophex) used	800
Total number of detonators used	32
Total number holes drilled	8
Total footage drilled	690
Total bags mud used	Nil
Total bags bran used	Nil
Drill move time (Naracoorte-Mt. Gambier, Mt. Gambier to Field)	8 hours
Drilling time	11 hours



VELOCITY DETERMINATION LAYOUT

CAROLINE No. 1

O.E.L. 22 SOUTH AUSTRALIA

ALLIANCE OIL DEVELOPMENT

by

namco GEOPHYSICAL COMPANY

Figure No.1

PE904312

This is an enclosure indicator page.
The enclosure PE904312 is enclosed within the container PE904309 at this location in this document.

The enclosure PE904312 has the following characteristics:

ITEM_BARCODE	= PE904312
CONTAINER_BARCODE	= PE904309
NAME	= Caroline 1 Well Velocity Calculation Form, Figure 2
BASIN	= Otway
PERMIT	= OEL 22
TYPE	= WELL
SUBTYPE	= VELOCITY_CHART
DESCRIPTION	= Caroline 1 Well Velocity Calculation Form, Figure 2
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DATE_CREATED	= *
DATE_RECEIVED	= *
W_NO	= *
WELL_NAME	= Caroline 1
CONTRACTOR	= Namco Geophysical Company
CLIENT_OP_CO	= Alliance Oil Development Australia N.L.

(Inserted by DNRE - Vic Govt Mines Dept)

PE904313

This is an enclosure indicator page.
The enclosure PE904313 is enclosed within the container PE904309 at this location in this document.

The enclosure PE904313 has the following characteristics:

ITEM_BARCODE	= PE904313
CONTAINER_BARCODE	= PE904309
NAME	= Caroline 1 Seismic Shot F & D
BASIN	= Otway
PERMIT	= OEL 22
TYPE	= WELL
SUBTYPE	= VELOCITY_CHART
DESCRIPTION	= Caroline 1 Seismic Shot F & D
REMARKS	=
DATE_CREATED	= *
DATE_RECEIVED	= *
W_NO	= *
WELL_NAME	= Caroline 1
CONTRACTOR	= Namco Geophysical Company
CLIENT_OP_CO	= Alliance Oil Development Australia N.L.

(Inserted by DNRE - Vic Govt Mines Dept)

PE904314

This is an enclosure indicator page.
The enclosure PE904314 is enclosed within the container PE904309 at this location in this document.

The enclosure PE904314 has the following characteristics:

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CONTAINER_BARCODE	= PE904309
NAME	= Caroline 1 Seismic Shot C, D, & E
BASIN	= Otway
PERMIT	= OEL 22
TYPE	= WELL
SUBTYPE	= VELOCITY_CHART
DESCRIPTION	= Caroline 1 Seismic Shot C, D, & E
REMARKS	=
DATE_CREATED	= *
DATE_RECEIVED	= *
W_NO	= *
WELL_NAME	= Caroline 1
CONTRACTOR	= Namco Geophysical Company
CLIENT_OP_CO	= Alliance Oil Development Australia N.L.

(Inserted by DNRE - Vic Govt Mines Dept)

PE904315

This is an enclosure indicator page.
The enclosure PE904315 is enclosed within the container PE904309 at this location in this document.

The enclosure PE904315 has the following characteristics:

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CONTAINER_BARCODE	= PE904309
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BASIN	= Otway
PERMIT	= OEL 22
TYPE	= WELL
SUBTYPE	= VELOCITY_CHART
DESCRIPTION	= Caroline 1 Seismic Shot F & E
REMARKS	=
DATE_CREATED	= *
DATE_RECEIVED	= *
W_NO	= *
WELL_NAME	= Caroline 1
CONTRACTOR	= Namco Geophysical Company
CLIENT_OP_CO	= Alliance Oil Development Australia N.L.

(Inserted by DNRE - Vic Govt Mines Dept)

PE904316

This is an enclosure indicator page.
The enclosure PE904316 is enclosed within the container PE904309 at this location in this document.

The enclosure PE904316 has the following characteristics:

ITEM_BARCODE	= PE904316
CONTAINER_BARCODE	= PE904309
NAME	= Caroline 1 Seismic Shot G , D &H
BASIN	= Otway
PERMIT	= OEL 22
TYPE	= WELL
SUBTYPE	= VELOCITY_CHART
DESCRIPTION	= Caroline 1 Seismic Shot G , D &H
REMARKS	=
DATE_CREATED	= *
DATE_RECEIVED	= *
W_NO	= *
WELL_NAME	= Caroline 1
CONTRACTOR	= Namco Geophysical Company
CLIENT_OP_CO	= Alliance Oil Development Australia N.L.

(Inserted by DNRE - Vic Govt Mines Dept)

PE904317

This is an enclosure indicator page.
The enclosure PE904317 is enclosed within the container PE904309 at this location in this document.

The enclosure PE904317 has the following characteristics:

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CONTAINER_BARCODE	= PE904309
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BASIN	= Otway
PERMIT	= OEL 22
TYPE	= WELL
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DESCRIPTION	= Caroline 1 Seismic Shot G & J
REMARKS	=
DATE_CREATED	= *
DATE_RECEIVED	= *
W_NO	= *
WELL_NAME	= Caroline 1
CONTRACTOR	= Namco Geophysical Company
CLIENT_OP_CO	= Alliance Oil Development Australia N.L.

(Inserted by DNRE - Vic Govt Mines Dept)

FINAL REPORT

on the

VELOCITY DETERMINATION SURVEY

CAROLINE No. 1 WELL

PART II (7100'- 11050')

O. E. L. 22, SOUTH AUSTRALIA

Submitted to

ALLIANCE OIL DEVELOPMENT AUSTRALIA N. L.

by

NAMCO GEOPHYSICAL COMPANY

CONTENTS

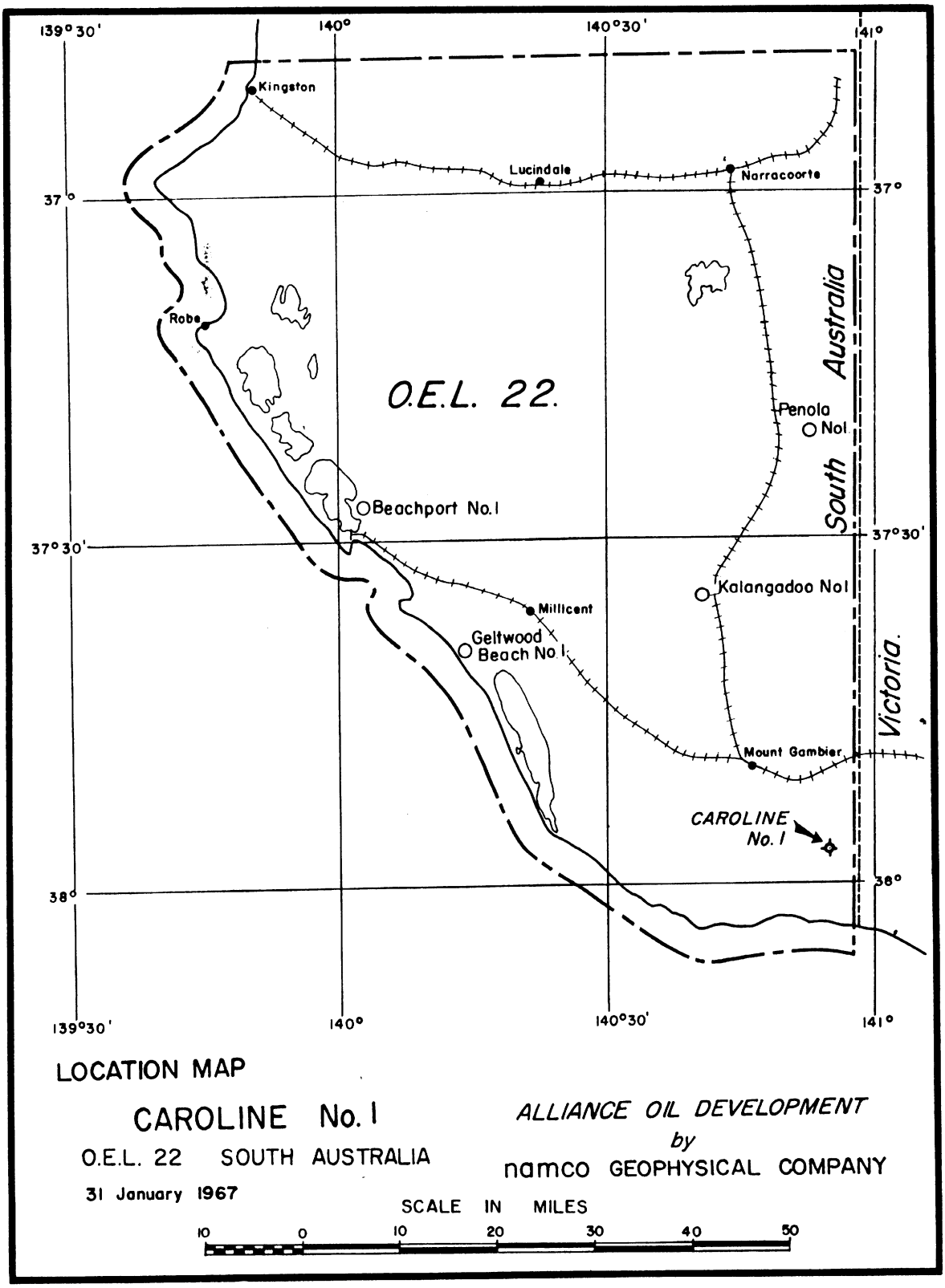
ABSTRACT

A seismic velocity determination survey was conducted on 8th December, 1966, for Alliance Oil Development N. L. in their Caroline No. 1 Well located near Mt. Gambier in Oil Exploration Licence No. 22, South Australia. After this survey was completed to a total depth of 6,009' below K. B., Alliance Oil Development N. L. elected to deepen the Caroline No. 1 Test. This report deals with the part of the survey conducted between 7,100' and the final total depth of 11,050' below K. B. and shot on 30th January, 1967.

This survey, as well as the initial survey, was made by Namco Geophysical Company of Dallas, Texas, with Australian headquarters at 64 Tribune Street, South Brisbane, Queensland.

The results of the survey are considered reliable and indicate a gradual increase in seismic velocity with depth to a maximum average velocity of 10,768 feet per second at the total depth (11,050' below K. B.).

The data from all shots, 750' to 11,050', are presented on the Velocity Curve, Enclosure I of this report.



LOCATION MAP

CAROLINE No. 1

O.E.L. 22 SOUTH AUSTRALIA

31 January 1967

ALLIANCE OIL DEVELOPMENT

by

namco GEOPHYSICAL COMPANY

SCALE IN MILES

10 0 10 20 30 40 50

INTRODUCTION

A well velocity determination was conducted for Alliance Oil Development N. L. in their Caroline No. 1 Well located near Mt. Gambier, South Australia. (Refer to Location Map, Frontispiece).

The survey was begun on 8th December, 1966, when velocities were investigated to a temporary total depth of 6,009' and completed to a final total depth of 11,050' on 30th January, 1967.

The survey was conducted by Namco Geophysical Company with Australian headquarters at 64 Tribune Street, South Brisbane, Queensland. Statistical data for the 30th January, 1967, part of the survey is summarized in Appendix III of this report.

PROCEDURE

Seismic times from shot position to the well geophone were recorded using National Geophysical Company instruments in conjunction with the equipment of Schlumberger (Seaco) Inc.. The well geophone, a pressure sensitive type, was manufactured by Seiscor.

National Geophysical Company 26AA amplifiers and pre-amplifiers with a National 4F oscillograph were used in the recording procedure. The electric wave filters of the amplifiers were adjusted to attenuate seismic frequencies below 3.1 cycles per second and above 140 cycles per second at 50% response, with a maximum response in a broad band at about 20 cycles per second. The composition of each Time-Depth recording was as follows:

Trace 1	:	Time Break
Trace 2	:	Up-hole Time
Trace 3	:	Reference geophone (at rig)
Trace 4	:	Well geophone - low gain, no A. G. C.
Trace 5	:	Well geophone - medium gain, no A. G. C.
Trace 6	:	Well geophone - high gain, no A. G. C.
Trace 7	:	Well geophone - No A. G. C.; BH-EL Filter.

Linkages from the reference geophone, the well geophone, the shot point seis and the time break to the recording truck were effected by cables.

The shot points drilled for the original survey were utilised with the exception of Shot Point E, which could not be reloaded, and Shot Point D which collapsed after one shot. (Refer to Velocity Determination Layout, Fig. 1).

Fourteen shots were recorded with the well geophones at KB depths from 7,100' to 11,050'. In positioning the geophone the last movement was always upward with the exception of the shot at total depth.

RESULTS

The results of the survey are considered reliable between 750' and total depth.

The overall quality of the breaks showed occasional deterioration below 8,870'. This loss of quality was due in part to the condition of the hole, which prevented Schlumberger from remaining at depth long enough for the geophone to completely cease its vertical oscillation. This forced the velocity shots to be taken while the geophone was still in motion.

The raw observed times have been corrected to a reference plane at 100' above mean sea level at the Port of Adelaide, with due consideration to the angularity of the travel path. Plotted curves of Time vs. Depth, Average Velocity vs. Depth and Interval Velocity vs. Depth appear on Enclosure I.

A Miller's Procedure Calculation, for instantaneous velocity at any depth, gives a velocity function of $V_i = 6870 + .81Z$. The Velocity Distribution derived for depths above 6,009' (KB) was $V_i = 6860 + .88Z$. This refinement agrees with the general assumption that acceleration of the function decreases with depth.

CONCLUSIONS

A reliable determination of seismic velocities to depth at Caroline No. 1 has been achieved by this survey. The average velocity to near total depth is 10,768 feet per second. The maximum interval velocity measured was 15,152 feet per second between the two deepest shots.

The comments made in the last report concerning apparent average velocity inversions in the intervals between 726'-1,496' and 3,016'-3,276' below datum, caused by using an averaged up-dip and down-dip Tgd in juxtaposition to an unaveraged Tgd, are still pertinent.

NAMCO GEOPHYSICAL COMPANY

Supervisor

Date: February 22, 1967

APPENDIX I

EQUIPMENT

1 Complete National Geophysical Company Type 26AA 24-trace Recording System.

2 Complete sets of Shooting Equipment, including multi-hole blasters and firing harnesses.

1 International 160 Recording Truck

1 Toyota Shooting Vehicle

1 Holden general purpose vehicle

1 Seiscor, Pressure sensitive type well geophone

APPENDIX II

PERSONNEL

Party Chief	A. E. Bluestone
Observer	J. F. Lane
Shooter	G. Steen
Shooter	M. Hayes
Assistant Shooters	Two

The total complement of the field crew during the actual shooting was six men. The holes drilled for the initial survey (8th December, 1966) were used and reloaded for this survey.

Technical and administrative supervisor was Mr. H. E. Bowman.

APPENDIX III

STATISTICAL DATA

Left crew headquarters (Broken Hill)	10.00 a.m. 28th January, 1967
Arrived Mt. Gambier	11.00 p.m. 28th January, 1967
Arrived at Well	6.30 a.m. 30th January, 1967
Began velocity survey	10.30 a.m. 30th January, 1967
Completed velocity survey	3.30 p.m. 30th January, 1967
Returned to headquarters (Broken Hill)	8.00 a.m. 31st January, 1967

Shots recorded by well geophone	16
Total pounds dynamite (Geophex) used	450
Total number of detonators used	18
Total number of holes drilled	Nil
Total footage drilled	Nil
Total bags mud used	Nil
Total bags bran used	Nil
Drill move time	Nil
Drilling time	Nil

PE602828

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CONTAINER_BARCODE	PE904309
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BASIN	Otway
PERMIT	OEL 22
TYPE	WELL
SUBTYPE	VELOCITY_CHART
DESCRIPTION	Caroline 1 Velocity Log, Reflection Coefficients and Wavelets
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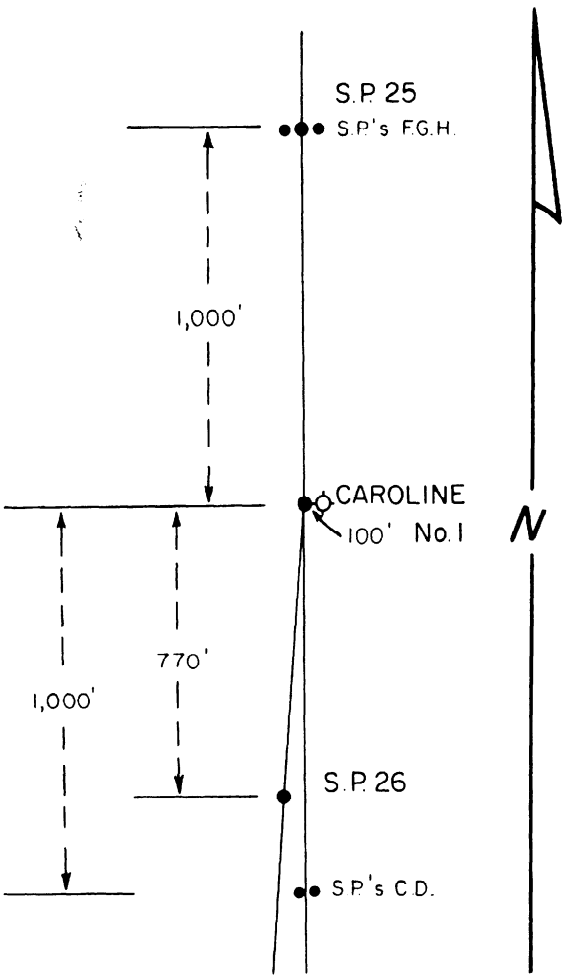
DATE_RECEIVED	*
W_NO	*
WELL_NAME	Caroline 1
CONTRACTOR	Sagasco Resources Ltd
CLIENT_OP_CO	Alliance Oil Development

(Inserted by DNRE - Vic Govt Mines Dept)



VELOCITY DETERMINATION LAYOUT

CAROLINE No.1

O.E.L. 22 SOUTH AUSTRALIA

ALLIANCE OIL DEVELOPMENT

by

January 1967

namco GEOPHYSICAL COMPANY

Fig. No. 1

PE904318

This is an enclosure indicator page.
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BASIN	= Otway
PERMIT	= OEL 22
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SUBTYPE	= VELOCITY_CHART
DESCRIPTION	= Caroline 1 Well Velocity Calculation Form
REMARKS	=
DATE_CREATED	= *
DATE_RECEIVED	= *
W_NO	= *
WELL_NAME	= Caroline 1
CONTRACTOR	= Namco Geophysical Company
CLIENT_OP_CO	= Alliance Oil Development Australia N.L.

(Inserted by DNRE - Vic Govt Mines Dept)

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CONTAINER_BARCODE = PE904309
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BASIN = Otway
PERMIT = OEL 22
TYPE = WELL
SUBTYPE = VELOCITY_CHART
DESCRIPTION = Caroline 1 Velocity Determination Graph
REMARKS =
DATE_CREATED = 1/30/67
DATE_RECEIVED = *
W_NO = *
WELL_NAME = Caroline 1
CONTRACTOR = Namco Geophysical Co
CLIENT_OP_CO = Alliance Oil Development

(Inserted by DNRE - Vic Govt Mines Dept)