CONTENTS ENVELOPE 807

TENEMENT: P.E.L. 31

TENEMENT HOLDER: Clarence River Basin Oil Exploration Coy. N.L.

ENV. 807

Namco International, Inc.

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FINAL REPORT

on the

LAKE STEWART SEISMIC SURVEY

Petroleum Exploration Licence No. 31

New South Wales

Submitted to

CLARENCE RIVER BASIN OIL EXPLORATION COMPANY N.L.

by

NAMCO INTERNATIONAL INCORPORATED

Namco International, Inc.

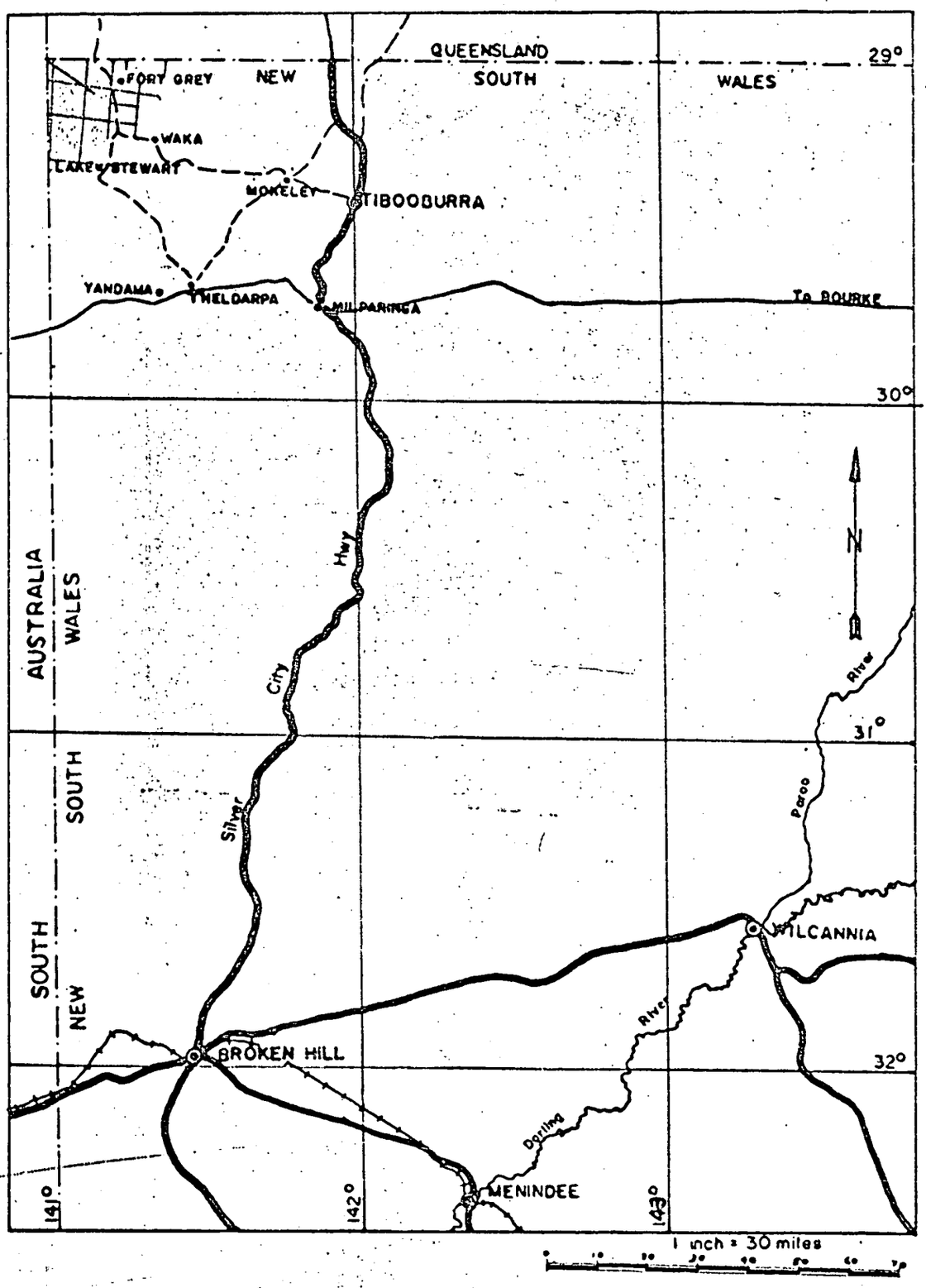
CONTENTS

ABSTRACT

A seismic reflection survey was conducted within Petroleum Exploration Licence 31 of New South Wales during June and July, 1964 for Clarence River Basin Oil Exploration Company N.L. by Party 84 of Namco International Incorporated, in a project designated as the Lake Stewart Seismic Survey.

The objective of the survey was to provide reconnaissance structural control on the attitudes of the subsurface and to provide more detailed control in the more interesting areas. In particular, the survey was expected to determine whether wedges of pre-Blythesdale or older sediments are present and to define the most suitable location for a stratigraphic test of the sediments.

The results of the survey demonstrate that the area is on the north flank of an old positive basement feature and that the sediments generally thicken to the north. A pronounced anticlinal feature, which plunges to the north, is evident in the central portion of the survey area, however, no structural closure has been established along the culmination.



LOCATION DIAGRAM

Pl.

1. INTRODUCTION

The Lake Stewart Seismic Survey was conducted within Petroleum Exploration Licence 31 in the State of New South Wales for Clarence River Basin Oil Exploration Company N.L., the registered office of which is at 16 Hunter Street, Sydney, New South Wales. The Location Map (frontispiece) shows the regional location of the area and the position of the seismic lines.

The geophysical contractor was Namco International Incorporated of Dallas, Texas, U.S.A., with Australian headquarters at 15 Franklin Street, Adelaide, South Australia. Details of the equipment, personnel and statistical data are presented in Appendix I, Appendix II and Appendix III, respectively.

The Lake Stewart area is located in the extreme northwestern corner of the state, west of the town of Tibooburra. Access to the area is via the Fort Grey track west from Tibooburra. Within the area, various tracks joining stations, as well as those along the border pest fences, can be used to travel throughout the region.

Surface topography in the area varies from lightly vegetated mobile sand dunes in the west and northwest to stable wind-swept plains and gibber flats in the south and east. Surface relief is small and the height above sea level is only a few hundred feet, rising gently to the east. Drainage patterns are seasonal and very irregular. Excess precipitation normally collects in clay pans and small lake beds found between the dunes.

The climate of the area is normally fine and clear. The survey was conducted during winter months when only small amounts of precipitation were recorded. Inclement weather in the form of severe sandstorms was experienced on a number of occasions and caused temporary suspension of field operations.

2. GEOLOGY *

The surface is generally covered by sand dunes or Cainozoic waste sheets or alluvium. The only outcrops within the licence area are Tertiary beds in the vicinity of Yandama, but these lie to the south of the section covered by the seismic survey. The main sequence within the area was laid down in the Mesozoic Era on a basement of Proterozoic age. There is a possibility that some wedges of Permian strata were present in low lying areas, beneath the Mesozoic beds.

The nature of the Mesozoic sequence is revealed from an examination of outcrops to the east of the licence and water well information. Fortunately the Fortville No.3 Well, sunk six miles to the west of P.E.L. 31, was completed recently and information from it is available. It commenced in a superficial cover of Recent material and penetrated Lower Tertiary, Cretaceous and Upper Jurassic beds before entering the Proterozoic basement. Total depth was 3,610 feet.

The section for the Fortville No.3 Well, quoted by H. Wopfner and B.E. Cornish (Dept. of Mines, South Australia, Report 846/64) in the Well Completion Report was as follows:

	Feet
Recent	62
Lower Tertiary	338
Cretaceous	
Winton Formation	917
Tambo Formation	570
Roma Formation	781
Cretaceous - Upper Jurassic	
Blythesdale Group - Transition Beds	371
Mooga Sandstone	490
Lower Proterozoic	
Willyama Phyllite	115
Total	3,610

The sequence within P.E.L. 31 would be similar. There were no pre-Blythesdale Mesozoic or Permian beds in the Fortville No.3 Well, but these could be present in P.E.L. 31. The interval between the top of the Blythesdale Group and the basement in P.E.L. 31 could be up to 150 to 200 feet thicker than at Fortville and this probably represents a thickening of the Blythesdale Group. The thicker developments in general correspond to the synclinal areas as defined by the seismic survey.

The "Basal Sedimentary" event mapped during the seismic survey could correspond with the "P" event mapped previously by others to the north in the Birdsville - Dullingari area. In the synclinal area between Lines A and G a lower reflector, some 600 feet deeper, was identified on the records. In view of the strongly folded nature of the Proterozoic rocks it is unlikely that any persistent reflector with a shallow dip would be found in the basement. This additional section probably represents pre-Blythesdale Mesozoic and/or Permian beds.

Lower Tertiary

Unnamed Unit: These beds comprise mainly fine-grained sandstones with subordinate shale and thin beds of conglomerate. In the Fortville No.3 Well they are described as "Sands, silts and lignitic clays with embedded granules, pebbles and cobbles of chert, silicified sandstones and siltstones." In outcrop they generally have a capping of secondary "grey billy". Their maximum thickness is 400 to 500 feet. They overlie disconformably and probably unconformably, the Cretaceous Rolling Downs Group.

Rolling Downs Group:

This group was deposited under marine conditions and the sedimentary types are mainly fine-grained. The best sections available close to P.E.L. 31 are in the Fortville No.3 Well and the descriptions from the Well Completion Report are quoted below.

Winton Formation: "Predominantly very fine-grained clastics with interbeds of salt and pepper sands, impure sandy limestones and low grade coal".

Tambo Formation: "Predominantly shale, dark grey to dark bluish-grey, soft, fissile, micro-micaceous, with occasional interbeds of grey, soft, shaly siltstone to very fine-grained sandstone. Infrequent bands and lenses of grey to brown finely micro-crystalline, argillaceous limestone occur at irregular intervals. Lenses of low-grade coal near top of sequence".

Roma Formation: "Predominantly dark grey, fissile, micaceous, silty, occasionally pyritic, shale, with frequent thin interbeds of grey very fine-grained glauconitic sandstone

with occasional calcareous cement. Lenses and bands of hard, dense, dark grey, fossiliferous limestone near base."

Blythesdale Group:

This group comprises two units which have been referred to as the Transition beds and Mooga Sandstone. It is the latter formation which outcrops in the neighbourhood of Milparinka and Tibooburra and surrounding areas. It is essentially sandy with subordinate shales, shaly sandstones and conglomerates. The sandstones are medium to coarse grained, often current-bedded and generally porous, forming one of the main aquifers of the Great Artesian Basin.

Quotations from the descriptions given for the units in the Fortville No.3 Well are:

Transition beds: "Interbedded very fine grained clastics grading downwards to fine-grained clastics and medium-grained sandstones." .... "The sandstones have medium to low porosity."

Mooga Sandstone: "Predominantly sandstone with thin conglomeratic beds of rounded quartz pebbles and minor shale beds." "Porosity in range 20% - 30%. Permeability good to excellent."

Pre-Blythesdale beds:

In the Innamincka No.1 Well probable equivalents of the Walloon Coal Measures, Marburg Formation, Bundamba Group, Triassic and Permian beds were encountered. Dullingari No.1 also struck pre-Blythesdale beds from Jurassic to Permian in age. In Fortville No.3 Well the Blythesdale Group rested

directly on the Proterozoic basement. It is probable that the 600 feet or so of additional section in the synclinal area between Lines A and G in P.E.L. 31 represent developments of pre-Blythesdale Mesozoic and/or Permian strata.

Lower Proterozoic

Willyama Phyllite: E.J. Kenny (Mineral Resources No.36, Dept. of Mines, N.S.W.) describes these beds in the neighbourhood of Tibooburra as comprising slates and cleaved sandstones, together with masses of quartzite, dense and fine-grained, dark green to black in colour. Quartz veins and lenses abound in the slates. Near Warratta he mentions the occurrence of interbedded flows of felsite and porphyry. In Fortville No.3 Well they are described as highly sheared and folded, banded quartz sericite schists and phyllites, pale olive-green with silky sheen. A weathered zone, twenty feet thick, at the top is described as being, "White-silver grey quartz sericite schist, very kaolinitic, soft, friable, micaceous, soapy feel."

Fortville No.3 Well showed a weathered zone about twenty feet thick at the top of the basement complex. It could be anticipated that a similar zone of weathering would be present within P.E.L. 31.

Structural Geology:

The structural picture of the basement shows a shallow northerly trending ridge in the central northern part of the licence area, another broader ridge trending in a north-westerly direction towards the Tri-State corner and a third

ridge lying further to the east. No definite closure is shown on any of the high areas. Some faulting is indicated on the eastern flank of the central ridge. The greatest thickness of possible pre-Blythesdale beds is developed in the synclinal area to the east of the central high.

3. PREVIOUS GEOPHYSICAL SURVEYS

In late 1962 a one month reconnaissance refraction survey was conducted in the area by Namco International Inc., consisting of two lines traversing the tenement. The results of the survey indicated the existence of at least 4,500 feet of sediments in the northern portion of the area decreasing to approximately 3,000 feet of section in the southern part of the area. The survey also revealed a gently undulating sub-surface, including one dip reversal at basement depth in the vicinity of Fort Grey House. Brief experimental seismic reflection work incorporated in the survey indicated that reflections could be recorded to basement depths.

Santos-Delhi-Taylor carried out an aero-magnetic survey of the area to the north; one line of their survey is across the northern part of P.E.L. 31. Results of the survey have not been made public at the time of writing.

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* Provided by Geological Department of Clarence River Basin Oil Exploration Company

4. OPERATIONS

No unusual operational problems were encountered during the course of the survey. The initial reflection reconnaissance lines began on the eastern side of the area where the small sand dunes seldom hindered the movement of vehicles. As the control was extended to the west, the terrain became more rugged and difficult to work. The long drive via circuitous routes to the western reaches of the control also decreased progress in that area and was undoubtedly the greatest operational impediment.

Another operational difficulty was experienced in the drilling. Thick layers of loose sand were encountered in many holes. In many cases the drillers were frustrated in their attempts to penetrate the sand by constant caving of the hole, and in the end a system of pattern hole setups was introduced to maintain the progress and obtain the best recording results. Many different types of sand were encountered but the most troublesome was a fine, white, powdery sand. The use of an abundance of water was necessary while using mud drilling techniques, and the procedure was soon found to be impractical because of the travel time to and from water supplies.

Probably the most successful procedure was the water injection method of air-water drilling. The arrangement was entirely satisfactory where thin layers of sand were present or where thick layers of a sand-clay mixture were encountered; where the fine white sand was struck, however, the caving sand could not be controlled and a pattern arrangement was drilled.

Usually the weather in the area during the winter months is fine and clear. During the period of this survey a number of severe and sustained wind and sandstorms struck the area. The full effects of the wind were felt by the survey crews who had to suspend operations because of poor visibility during the high winds; the recorders were not hindered to the same extent because the wind noise could be reduced to practical limits by burying the seismometers.

5. FIELD PROCEDURE

In order to gain maximum subsurface coverage within the time limits appropriated, a reconnaissance method using six continuous profiles in each four miles of traverse was employed. The shot point intervals along each segment were one-quarter mile.

Using shotpoint-to-near-geophone offset distances of 55 feet, the twelve geophone stations were spaced at 110 foot intervals between the offsets and adjacent shot points. The last trace fell across the adjacent holes to provide completely reversed subsurface coverage between shot points. Refer to Figure 1, Typical Seismometer arrangement.

Recording was accomplished with National Geophysical Company 24-channel Type 26-AA amplifiers and a National 4F oscillograph. Simultaneous recording on magnetic tapes was done with a Model 401-A Techno system.

Monitor filtering of the reflection signals was accomplished using the BH-EH filter setting; this filter has a low cutoff of 18 cycles per second and a high cutoff of 72 cycles per second at 50% response, and a peak frequency of 37 cycles per second.

The tapes were later played back using a CH-CH filter setting and a 25% unidirectional mix of adjacent traces. The characteristics of the CH-CH filter are: Low cutoff down 6 db at 24 cycles, high cutoff down 6 db at 58 cycles, and peak frequency at 37 cycles.

Two combination air-water drill rigs were used to obtain shot holes. Mud drilling procedures proved impractical in view of the long water hauls and sandy drilling, and were abandoned in favor of a water injection air drilling program.

All instrument spreads were chained, and horizontal and vertical control were obtained with alidade and plane table. The datum for elevation and traverse control was established from New South Wales government bench marks on the Queensland border fence. Traverses were checked by loop closure, and the control was maintained within normal limits. Permanent metal markers were set at a number of shot points within each profile segment.

6. INTERPRETATION PROCEDURE

Observed reflection times were corrected to a velocity reference plane 200 feet above sea level using the standard up-hole method and a correctional velocity of 5,500 feet per second. Subsequent shots in a hole were corrected to a reference shot using a factor equal to the difference in up-hole times.

Any additional weathering delay below the shot reference position was removed by applying an additional correction to the data. The thickness of the weathering below the shot was determined using a rectilinear intercept method, see Figure 2, and the differential time through this layer became the secondary correction.

Corrected reflection times for the two-way seismic paths were plotted on cross sections using scales of one centimeter equal to 200 feet horizontal and 0.04 seconds vertical. These sections display all data plotted vertically below the shot points, with connecting lines indicating the degree of reliability of continuity and correlation. The dip seldom exceeded 5 degrees, and migration of data was not justified.

A deltat analysis of the moveout times was attempted. The paucity of consistent shallow information reduced this analysis to study of the interval between 0.8 and 1.0 second reflection time from surface. The one consistent energy band, of which the Basal Sedimentary horizon is a member, provided the only usable moveout information as the analysis interval varies with the time-depth of this energy between 0.8 and 1.0

second. The average velocity from surface to the median time zone of approximately (unweighted) 0.9 seconds is 7,560 feet per second, which compares with a theoretical velocity of 7,400 computed from the refraction information.

Using the velocity to this time depth as a guide, the association of a reflection with the top of the Willyama Complex as found in the Fortville No. 3 Bore was attempted. The time conversion of the depth suggested that a strong reflection which could be correlated throughout the area was in propinquity to the Willyama Complex although no definite identification could be made.

7. QUALITY OF DATA

Record quality throughout the Fort Grey Area varied from poor to good, with a general tendency of deterioration to the south and west. The data suffers from extremely thick weathering, ambient noise, lack of energy return in sand-covered areas, and changing reflection character. The first three of these conditions might be overcome with very elaborate operational arrangements, or with some of the unconventional seismic techniques. The latter problem might be reduced by procedures to reduce noise and interference, but variations in reflection character are probably inherent to the stratigraphy of the area.

There are three energy bands evident of the seismograms. The most outstanding reflection ("Basal Sedimentary") appears as a

strong event in the last of these energy bands. Another persistent reflection (Upper Blythesdale?) appears 0.2 seconds earlier, but lacks the amplitude to be readily apparent to the south. The third major reflection (Middle Blythesdale?) occurs in an intermediate position, and appears to be more conformable with the upper event than the deeper. Below the "Basal Sedimentary" reflection the general level of returning energy attenuates rapidly, and over much of the area no deeper reflections can be identified. Where deeper reflections do occur, notably between Lines A and G, they are discontinuous and indicate more complicated structural conditions.

Perhaps the greatest single limiting factor to the precision of the data is the variation in near surface weathering. Thick layers of sand blanket the area and can be penetrated by the drills only with difficulty. Standard refraction computing procedures, which can normally be used for measuring thickness of near surface velocity layers, break down when a thin layer of an atypical material displays a high velocity which attenuates rapidly but which still masks the refraction break from the consolidated layer beneath.

It is felt that the procedure used to correct for the intermediate velocity layer has yielded a reasonable approximation of the various delays, and improved corrections could be made only by costly and laborious deep drilling.

8. DISCUSSION OF RESULTS

The results of the survey are presented in the form of Enclosure I, Surface Elevation Map; Enclosure II, Basal Sedimentary Horizon (two-way reflection times); Enclosure III, Basal Sedimentary Horizon (subsea depths); and Enclosure IV, Isochron, Blythesdale to Basal Sedimentary.

Enclosure I is a generalized topographic map of the area contoured on a twenty-five foot interval. The data shown at the shot points are elevations above sea level referred to the New South Wales State Datum.

Enclosure II is a structural control map of the Basal Sedimentary Horizon contoured on 0.020 second intervals. The data represents the two-way reflection times from the datum plane to the reflecting bed.

Enclosure III expresses the data shown on Enclosure II in terms of depths below sea level. Average velocity used was 7,560 feet per second, with a constant correctional factor of -220 feet to effect a tie with subsurface data at the Fortville No. 3 Bore.

Enclosure IV is a time-interval map between a reflection associated with the Upper Blythesdale and the Basal Sedimentary event. Contour interval used was 0.010 second or approximately 48 feet.

The Surface Elevation Map, Enclosure I, shows general conformity with the subsurface and might indicate that major surface

features are an expression of features at depth. The high area shown about shot point D-29 is co-incident with a postulated ridge at depth, and a number of other minor features can also be related to subsurface attitudes.

Enclosures II and III are based on the most reliable event mapped in the area. The contouring suggests primarily north or northwest dip at this level. A broad north-plunging fold has been depicted in western regions while to the east, a pronounced ridge plunges to the northern limits of the area. Possibility of faulting is suggested by erratic reflection patterns on the east flank of this feature.

Enclosure IV presents values for the section interval below the Upper Blythesdale. That upper horizon in itself reveals no significant variations in the structural attitude, but this isopach study is of value in showing some of the variations of section thickness. It has the additional advantage of being independent of near-surface time corrections. Compared with the sediments penetrated by the Fortville No. 3 bore, there is a general increase of section in the portion of P.E.L. 31 surveyed.

9. CONCLUSIONS AND RECOMMENDATIONS

The Lake Stewart Seismic Survey achieved its objective in delineating the sedimentary thickness and structural attitudes in the Fort Grey area. While the major aspects of the structural configuration and some of the stratigraphic conditions have been outlined, the reconnaissance nature of the

control does not exclude the possibility of other secondary conditions of economic interest.

No structural closure has been defined which would serve as the most logical location for a stratigraphic test in the area surveyed. Such closure might exist on the anticlinal trend in the east central sector, and there is a possibility of traps associated with faulting, but more dense control would be required to isolate these. Any future geophysical exploration in the area might include investigation of the area east and south of the intersection of Lines B and G, where closure might develop.

The greatest thickness of sedimentary materials is found in the synclinal areas, as indicated by minor interval changes. The zone bounded by Lines A and G, in particular, have evidence of reflections from unidentified interfaces extending some 600 feet below the "Basal Sedimentary" horizon mapped. On the basis of present evidence, it is recommended that a stratigraphic test be located near Shotpoint B-26 for investigating the section where there exists the greatest possibility of deep sediments in a relatively favorable structural position.

NAMCO INTERNATIONAL INCORPORATED

H.E. Bowman, Party Chief.

W.J. Harkey, Supervisor.

July, 1964.

APPENDIX I

EQUIPMENT

RECORDING:

1 International Model 160 4-wheel-drive recording truck, complete with instrument cab, cable reels, front-end winch.

2 International Model 160 4-wheel-drive trucks, complete with explosive compartments, seismometer racks, power cable reels, winches and power steering.

1 Land Rover 4-wheel-drive truck for cable handling.

1 Complete set of National Geophysical Company Type 26-AA 24 trace recording system capable of recording both reflections and refractions, complete with operating supplies and spare parts.

1 Complete Model 401-A Techno magnetic tape recording system capable of field playbacks.

3 Portable reflection cables each designed to accommodate 12 geophone stations on one-quarter mile spreads.

450 Electro-tech EVS 20-cycle geophones, strung in groups of six with sixteen foot intervals.

1 Complete set of shooting equipment, including multi-hole blasters and firing harnesses.

DRILLING:

2 Heavy duty Mayhew 1000 combination air-water drilling rigs, equipped with 667 CFM air compressors, 5 x 6 Gardner Denver mud pumps and 200 feet of heavy duty drill stem per unit. These rigs are mounted on International Model 192 6-wheel-drive trucks with power steering, front-end winches and sand tyres.

2 Heavy duty water trucks with 1200-gallon flat tanks mounted on International 192 6-wheel-drive trucks with power steering, front end winches and sand tyres.

SURVEYING:

2 Land Rover 4-wheel-drive trucks.

1 Complete set of surveying equipment and instruments, including theodolite, alidade and plane table.

OFFICE:

1 Holden utility truck.

1 Complete set of office machines, drafting equipment, furniture and supplies.

CAMP:

1 Elder model Kitchen trailer complete with all equipment.

1 Elder model Dining trailer complete with messing facilities.

1 Elder model shower and utility trailer complete.

1 Elder model office trailer complete.

1 Portable workshop trailer complete with mechanics supplies and equipment.

1 25 KW camp lighting plant complete with auxiliary generator.

1 1200 gallon camp water trailer.

Complete outfit of bedding, tents and linens to accommodate 25 men.

1 International model 4 x 4 stake body supply truck.

1 Complete set of radio equipment for communication between camp and base headquarters.

APPENDIX II

PERSONNEL

Party Chief	H.E. Bowman
Chief Computer	B. Humphrey
Observer	D.E. Rathje
Surveyors	D. Alexander N. Murphy
Drillers	J. Dwan J. Rush
Drill Supervisor	W.G. Pfau
Equipment Supervisor	R. Kersten

The basic crew consisted of twenty-one men.

Technical and administrative supervision were provided by Mr W. Jarrott Harkey.

APPENDIX III

STATISTICAL DATA

Starting date, first shot	June 30, 1964.
Completion date, last shot	July 30, 1964.
Total number of holes shot	286
Total number of shots	295
Average number of holes per day	9.53
Total miles of subsurface coverage	69.23
Total number of moving days	4.0
Days lost due to weather	Nil
Days lost due to holidays	Nil
Days lost due to equipment repair	Nil
Total number of field days, recording	30.0
Total number of field hours, recording	234.3
Total number of driving hours, recording	6.57
Total pounds of dynamite used	9,600
Average pounds of dynamite per shot	32.54
Total number of detonators used	937
Total number of drill shifts in field	61.58
Total number of drill hours in field	488.8
Total number of drill hours driving	127.0
Rock bits used	6
Insert bits used	47
Total number of holes drilled	296
Total footage drilled	36,560
Average number of holes drilled per shift	4.8
Average depth of holes in feet including patterns	123.5'
Average depth of weathering in feet	143'
Mud, chemicals or other drilling aids used	Nil

DIAGRAM — TYPICAL SPREAD

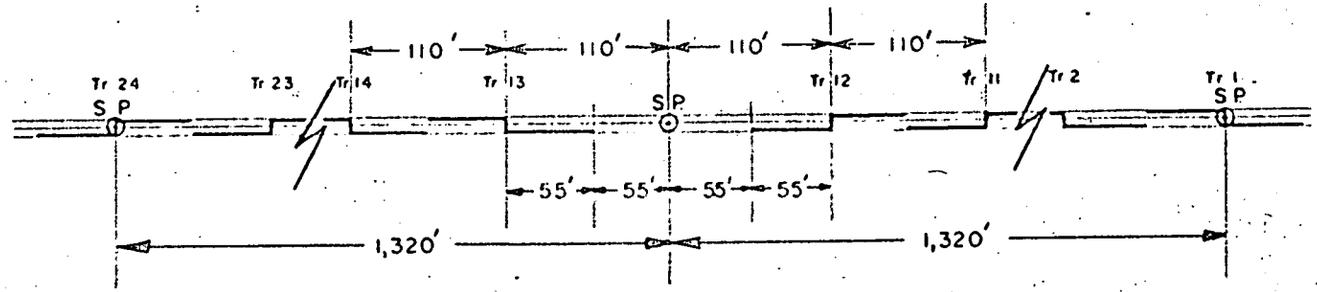
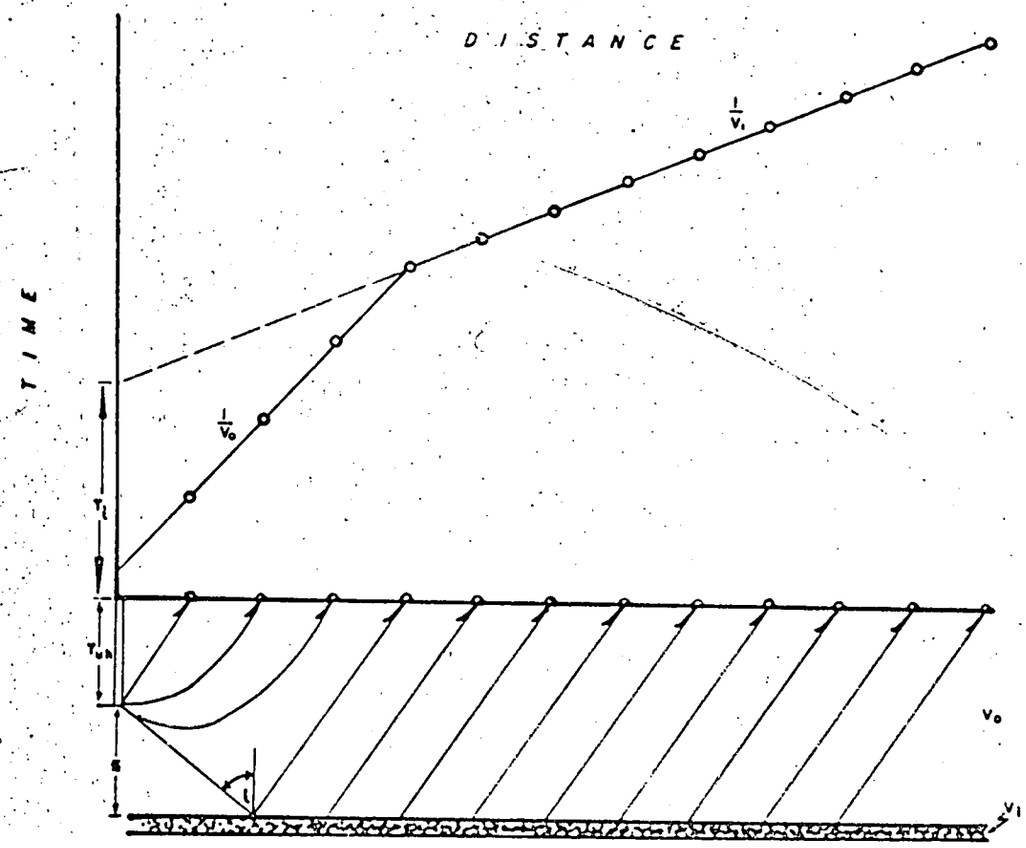


FIGURE 1



CALCULATION — WEATHERING THICKNESS

$$Z = \frac{(T_i - T_{uh})V_o}{2 \cos i}$$

Z = Depth of base of weathering below shot.
T_i = Intercept time of slope, $\frac{1}{V_1}$
V_o = Weathering velocity.
V_1 = Subweathering velocity.
T_{uh} = Uphole time of shot.

$$\text{Sin } i = \frac{V_o}{V_1} \quad \therefore \quad \text{Cos } i = \frac{\sqrt{V_1^2 - V_o^2}}{V_1}$$

RECTILINEAR INTERCEPT METHOD

FIG. 2

QUEENSLAND

NEW SOUTH WALES

SOUTH AUSTRALIA

141°00'E. 141°10' 141°20' 141°25'

29°00'S 29°10' 29°20' 29°25'

S.P. RA-11 S.P. RA-9 S.P. RA-7

Possible faulting

Data could be lower

Note
Many contouring options exist.

LEGEND

Reflection Shot-point	A-1
Other Shot-points	o
Line Designation	(A)
Character Grading	
Good	G.
Fair	F.
Poor	P.
Questionable	?

N.

Scale 1inch = 1 Mile

1 ¾ ½ ¼ 0 1 2 3 4 5 Miles

5 4 3 2 1 0 5 10 15 20 25 Thousand Feet

Depth Computation
Average Velocity 7,500ft/sec.
Lag 219ft.
Reference Final ± 200ft.

SEISMIC REFLECTION SURVEY
of the
FORT GREY AREA
Petroleum Exploration Licence 31,
New South Wales
BASAL SEDIMENTARY HORIZON
for
CLARENCE RIVER BASIN
OIL EXPLORATION Co. N.L.
by
namco INTERNATIONAL INC.

Contour Interval 50 Feet
All Depths below Sea Level
Correctional Velocity 5,500ft/sec.

Party 84 Supervisor W. J. Harkey.
July 1964 Party Chief H. E. Bowman.

LAKE STEWART SEISMIC SURVEY, 1964

ENV 807-1

141°00'E.

QUEENSLAND

141°10'

141°20'

141°25'

29°00'S.

29°00'

AUSTRALIA

SOUTH

NEW SOUTH WALES

S.P. RA-11

S.P. RA-9

THICK

THIN

THICK

THICK

THICK

THIN

THIN

THICK

29°10'

29°20'

29°25'

141°00'

141°10'

141°20'

141°25'

N.

LEGEND

Reflection Shot-point.	A-1
Other Shot-points.	
Line Designation.	Ⓐ
Character Grading	
Good	G.
Fair	F.
Poor	P.
Questionable	?

Scale 1inch = 1 Mile

1 ¾ ½ ¼ 0 1 2 3 4 5 Miles

5 4 3 2 1 0 5 10 15 20 25 Thousand Feet

SEISMIC REFLECTION SURVEY

of the

FORT GREY AREA

Petroleum Exploration Licence 31,

New South Wales

ISOCHRON

BLYTHESDALE - BASAL SEDIMENTARY

for

CLARENCE RIVER BASIN

OIL EXPLORATION Co. N.L.

by

namco INTERNATIONAL INC.

Contour Interval ·010 Sec.

(48 Feet approx.)

Party 84 — Supervisor *W. J. Harkey.*

July 1964 — Party Chief *H. E. Bowman.*

LAKE STEWART SEISMIC SURVEY, 1964

ENV 807-2

QUEENSLAND

NEW SOUTH WALES

SOUTH AUSTRALIA

141° 00' E.

141° 10'

141° 20'

141° 25'

29° 00' S

29° 10'

29° 20'

29° 25'

S.P.RA-11

S.P.RA-9

S.P.RA-7

1·000 ·980 ·960 ·940 ·920 ·900 ·880 ·860 ·840 ·820 ·800 ·780

Possible Faulting

Data could be lower

Note
Many contouring options exist.

LEGEND

Reflection Shot-point	A-1
Other Shot-points.	o
Line Designation.	Ⓐ
Character Grading	
Good	G.
Fair	F
Poor	P
Questionable	?

N.

Scale 1inch = 1 Mile

1 ¾ ½ ¼ 0 1 2 3 4 5 Miles

5 4 3 2 1 0 5 10 15 20 25 Thousand Feet

SEISMIC REFLECTION SURVEY
of the
FORT GREY AREA
Petroleum Exploration Licence 31,
New South Wales
BASAL SEDIMENTARY HORIZON
for
CLARENCE RIVER BASIN
OIL EXPLORATION Co. N.L.
by
namco INTERNATIONAL INC.

Contour Interval ·020 Sec.
Datum Plane 200ft. above Sea Level.
Correctional Velocity 5,500 ft/sec.

Party 84 — Supervisor *W. J. Harkey.*
July 1964 — Party Chief *H. E. Bowman.*

LAKE STEWART SEISMIC SURVEY 1964

ENV 807-3

QUEENSLAND

NEW SOUTH WALES

SOUTH AUSTRALIA

141° 00' E.

141° 10'

141° 20'

141° 25'

29° 00' S.

29° 10'

29° 20'

29° 25'

S.P. RA-11 S.P. RA-10 S.P. RA-9 S.P. RA-8 S.P. A-4 S.P. A-3 S.P. RA-7 S.P. RA-6 S.P. A-2 S.P. RA-5 S.P. RA-3 S.P. A-1 S.P. RA-2 S.P. RA-1

+425' +450' +400' +375' +475' +500'

LEGEND

Reflection Shot-point	o A-1
Other Shot-points.	o
Line Designation.	(A)
Character Grading	
Good	G.
Fair	F.
Poor	P.
Questionable	?

N.

Scale 1inch = 1 Mile

1 3/4 1/2 1/4 0 1 2 3 4 5 Miles

5 4 3 2 1 0 5 10 15 20 25 Thousand Feet

SEISMIC REFLECTION SURVEY
of the
FORT GREY AREA
Petroleum Exploration Licence 31,
New South Wales

SURFACE ELEVATION MAP
All Heights in Feet above Sea Level
for
CLARENCE RIVER BASIN
OIL EXPLORATION Co. N.L.

by

namco INTERNATIONAL INC.

Contour Interval 25 Feet.

Party 84 — Supervisor *W. J. Harkey.*
July 1964 — Party Chief *H. E. Bowman.*

LAKE STEWART SEISMIC SURVEY 1964

ENV 807-4

QUEENSLAND

NEW SOUTH WALES

SOUTH AUSTRALIA

140°50'

141°00' E.

29° 00'

29° 00' S.

29° 10'

29° 10'

140° 50'

141° 00'

S.P. 89½ (S.A. Govt. Dept. of Mines)

Fortville No.3

J-1 347

358 361 378 358 J-6 360

+350

+375

+350

+375

J-7 363 373 366 374 371 J-12 394

N.

Scale: 1 inch = 1 Mile.

1 ¾ ½ ¼ 0 1 2 3 4 5 Miles.

5 4 3 2 1 0 5 10 15 20 25 Thousand Feet.

LEGEND

Reflection Shot-point.	○ A-1
Other Shot-points	○
Line Designation	Ⓐ
Character Grading	
Good	G.
Fair	F.
Poor	P.
Questionable	?

Fortville No. 3 Bore Extension

SOUTH AUSTRALIA

SURFACE ELEVATION MAP

All Heights in Feet above Sea Level

for

CLARENCE RIVER BASIN OIL EXPLORATION Co. N.L.

by

namco INTERNATIONAL INC.

Party 84. Party Chief H.E. Bowman.

July 1964. Supervisor W.J. Harkey.

Contour Interval: 25'

To Accompany **FORT GREY AREA** (N.S.W) Seismic Survey Report

LAKE STEWART SEISMIC SURVEY, 1964

EAV 807 - 5

QUEENSLAND

NEW SOUTH WALES

SOUTH AUSTRALIA

140°50'

141°00'E.

29° 00'

29° 00'S.

29° 10'

29° 10'

140° 50'

141° 00'

.180

.190

.200

.210 Thick

S.P. 89½ (S. A. Govt. Dept. of Mines)

J-1

Fortville No.3

.177

.177

.181

.181

J-6

.186

Thin

J

J-7

.198

.199

N.S.

N.S.

N.S.

J-12

N.S.

N.

Scale: 1 inch = 1 Mile.

1 3/4 1/2 1/4 0 1 2 3 4 5 Miles.

5 4 3 2 1 0 5 10 15 20 25 Thousand Feet.

LEGEND

Reflection Shot-point.	A-1
Other Shot-points	
Line Designation	A
Character Grading	
Good	G.
Fair	F.
Poor	P.
Questionable	?

Fortville No. 3 Bore Extension

SOUTH AUSTRALIA

ISOCHRON

BLYTHESDALE - BASAL SEDIMENTARY

for

CLARENCE RIVER BASIN OIL EXPLORATION Co. N.L.

by

namco INTERNATIONAL INC.

Party 84. Party Chief H.E. Bowman.

July 1964. Supervisor W. J. Harkey.

Contour Interval 010Sec. (48' Est.)

To Accompany FORT GREY AREA (N.S.W) Seismic Survey Report

ENV 807 — 6 LAKE STEWART SEISMIC SURVEY, 1964

QUEENSLAND

NEW SOUTH WALES

SOUTH AUSTRALIA

140°50'

141°00' E.

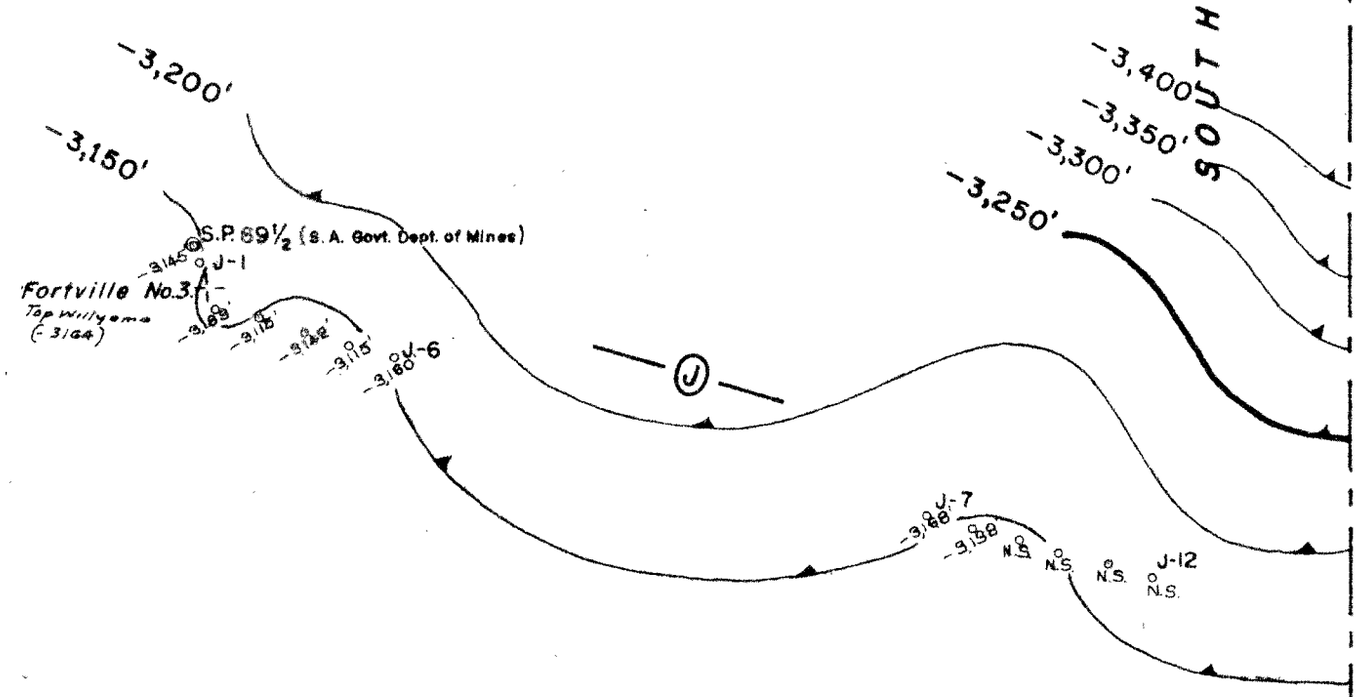
29° 00'

29° 00' S.

29° 10'

140° 50'

141° 00'



N.

Scale: 1 inch = 1 Mile.

1 3/4 1/2 1/4 0 1 2 3 4 5 Miles.

5 4 3 2 1 0 5 10 15 20 25 Thousand Feet.

LEGEND

Reflection Shot-point.	A-1
Other Shot-points	
Line Designation	(A)
Character Grading	
Good	G.
Fair	F.
Poor	P.
Questionable	?

Contour Interval 50 Feet
All Depths below Sea Level
Correctional Velocity 5,500 ft/sec.

Fortville No. 3 Bore Extension
SOUTH AUSTRALIA
BASAL SEDIMENTARY HORIZON
for
CLARENCE RIVER BASIN OIL EXPLORATION Co. N.L.
by
namco INTERNATIONAL INC.
Party 84. Party Chief H.E. Bowman.
July 1964. Supervisor W. J. Harkey.

To Accompany FORT GREY AREA (N.S.W) Seismic Survey Report

ENV 807 - 7

LAKE STEWART SEISMIC SURVEY, 1964

QUEENSLAND

140°50'

141°00'E.

29° 00'

29°00'S.

SOUTH AUSTRALIA

NEW SOUTH WALES

·980

·960

·940

S.P. 89½ (S.A. Govt. Dept. of Mines)

Fortville No.3

J

J-7 949?

N.S. N.S. N.S. J-12 N.S.

29° 10'

140°50'

141°00'

29°10'

N.

Scale: 1 inch = 1 Mile.

1 3/4 1/2 1/4 0 1 2 3 4 5 Miles.

5 4 3 2 1 0 5 10 15 20 25 Thousand Feet.

LEGEND

Reflection Shot-point.	A-1
Other Shot-points	
Line Designation	(A)
Character Grading	
Good	G.
Fair	F.
Poor	P.
Questionable	?

Contour Interval ·020 Sec.
Datum Plane 200ft. above Sea Level
Correctional Velocity 5,500 ft/sec.

Fortville No. 3 Bore Extension
SOUTH AUSTRALIA
BASAL SEDIMENTARY HORIZON
for
CLARENCE RIVER BASIN
OIL EXPLORATION Co. N.L.
by
namco INTERNATIONAL INC.
Party 84. Party Chief *H.E. Bowman.*
July 1964. Supervisor *W. J. Harkey.*

To Accompany **FORT GREY AREA (N.S.W) Seismic Survey Report**

EMV 807 - 8

LAKE STEWART SEISMIC SURVEY, 1964