ROWANS - 1

COMPLETION REPORT

W6444

SHELL DEVELOPMENT

(AUSTRALIA)

PTY. LTD.

WCR

Rowans-1

(WELL-H)

SHELL

1/47

47 Pages

+ ENCLOSURES

(1) WELL VELOCITY SURVEY 1 SHEET
(2) DISTRIBUTION SELECTED FORAMINIFERA. 1 "
(3) COMPARISON OF FORAMINIFERAL ZONATIONS. 1 "
(4) RELATIONSHIP ROWANS-1 TO REGIONAL GEOLOGY 1 "
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(7) COMPOSITE WELL LOG 1 "
(8) MUD LOG 1 "

SHELL DEVELOPMENT (AUSTRALIA) PTY. LTD.

ROWANS NO. 1

WELL COMPLETION REPORT

COMPILED BY

D.W. ELLENOR

SDA REPORT 131

MELBOURNE
JULY, 1972.

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Wireline Logs	Run 1	Run 2
IES	2495'-212'	5903'-2489'
FDC-GR	2495'-212'	5902'-2490'
BHCS	2490'-212'	5893'-2489'
CDM		5899'-2489'

SUMMARY

Drilling

Rowans - 1, located 16 miles east southeast of Warrnambool in southwestern Victoria, spudded on 18/4/72, reached a total depth of 5900 feet and was abandoned as a dry hole on 5/5/72.

Wireline logs include IES, BHC and FDC-GR from 212 feet to TD, and CDM from 2489 feet to TD. Sixteen sidewall cores were recovered over the interval 4343-5826 ft. A well velocity survey was conducted at TD. No conventional cores were cut and no drill stem tests were performed.

Geological

Rowans - 1 tested a small dip closure with additional fault trap potential for hydrocarbon accumulations in the Upper Cretaceous Waarre Formation.

To 3285 ft. the drilled section, consisting of 1960 feet of Oligocene-Miocene limestones and marls (Heytesbury Group) and 1325 feet of Paleocene-Eocene clastics (Nirranda and Wangerrip Groups), conformed closely to prognosis.

The Upper Cretaceous Sherbrook Group (3285-5320 ft.) comprises 1205 feet of alternating sandstones, argillaceous siltstones and claystones (Curdies/ Paaratte Formations), followed by 510 feet of chloritic sandstones (Nullawarre Greensand Member) and 210 feet of claystones/siltstones (Belfast Mdst/Flaxmans Fm.). The objective Waarre Formation (5211-5320 ft.) underlies this mudstone section and is some 360 feet deeper than prognosed. Well velocity data suggest that the mapped 'Top Otway' reflection is not coincident with the top of the Otway Group, but rather ties with the top of the Belfast Mudstone.

The 109 feet thick Waarre Formation consists of sandstones and claystones in 10-30 foot thick interbeds. Porosities in the sandstones range from 15 to 26%, but no hydrocarbons were recorded.

The underlying Lower Cretaceous Eumeralla Formation (5320 - 5900 ft. TD) consists of interbedded water-bearing lithic sandstones and siltstones with generally low porosities.

The well fulfilled its objective by encountering Upper Cretaceous Waarre Formation reservoir sandstones in a small dip closure. Based on present correlation across the faults bounding the Rowans horst, the Belfast Mudstone in the downthrown blocks is too thin to have provided a lateral seal for the Waarre Formation objective in the upfaulted block.

The absence of hydrocarbons in Rowans - 1 is believed due to the lack of source rocks and generation.

1. INTRODUCTION

The Rowans - 1 test is the latest in a series of exploration wells drilled by various oil companies for an Upper Cretaceous Waarre Formation objective in the Port Campbell-Mepunga area of the onshore Otway Basin. The significant, but noncommercial hydrocarbon shows recorded from the Waarre Formation in several of these former wells were held to warrant further drilling in this area. The location of previous wells was based on poor single fold seismic, but it is now apparent that none of these wells tested the crestal position of closures as mapped from the recent multiple seismic data.

Rowans - 1 was proposed to test a small dip closure, with additional fault trap potential, for hydrocarbons in the Upper Cretaceous Waarre Formation. The overlying Belfast Mudstone was to provide the seal. Although the Rowans structure is small, it was held that if oil productive, other similar shallow (~5000 ft.) follow-up prospects, likewise situated in the relative proximity of existing refineries (~100 miles), could be matured.

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644.

2. WELL HISTORY

2.1 General Data

(i)	Well Name and Number	:	Rowans No. 1
(ii)	Name and Address of Operator	:	Shell Development (Australia) Pty. Ltd. 155 William Street, Melbourne, Vic. 3000.
(iii)	Name and Address of Joint Tenement Holders	:	Frome-Broken Hill Company Pty. Ltd., Mobil Centre, 2 City Road, South Melbourne, Vic. 3205. AND Shell Development (Australia) Pty. Ltd., 155 William Street, Melbourne, Vic. 3000.
(iv)	Petroleum Tenement	:	Petroleum Exploration Permit No. 5
(v)	District	:	Colac (1:250,000; sheet SJ, 54-12)
(vi)	Location	:	Lat. 38° 27' 34.86" S Long. 142° 47' 19.26" E
(vii)	Elevation	:	Ground : 218' ASL RT : 232' ASL (Datum for measurements)
(viii)	Total Depth	:	5900 feet
(ix)	Date Drilling Commenced	:	18/4/72
(x)	Date Total Depth Reached	:	2/5/72
(xi)	Date Well Abandoned	:	5/5/72
(xii)	Date Rig Released	:	5/5/72
(xiii)	Drilling Time in Days	:	15
(xiv)	Status	:	Plugged and abandoned Cement plugs: 5400'-5008' 2635'-2245' 200'- 50' Plugs set by balanced plug method.
(xv)	Total Cost	:	Approximately $A160,000

2.2 Drilling Data

(i)	Name and Address of Drilling Contractor	:	Oil Drilling and Exploration Ltd., 37 York Street, Sydney, N.S.W. 2000.
(ii)	Drilling Plant	:	Make : Ideco Type : H-40 Capacity: 7500 ft. with 3½" DP Motors : 2 Make : General Motors Type : 8V-71 N diesel BHP : 295 each

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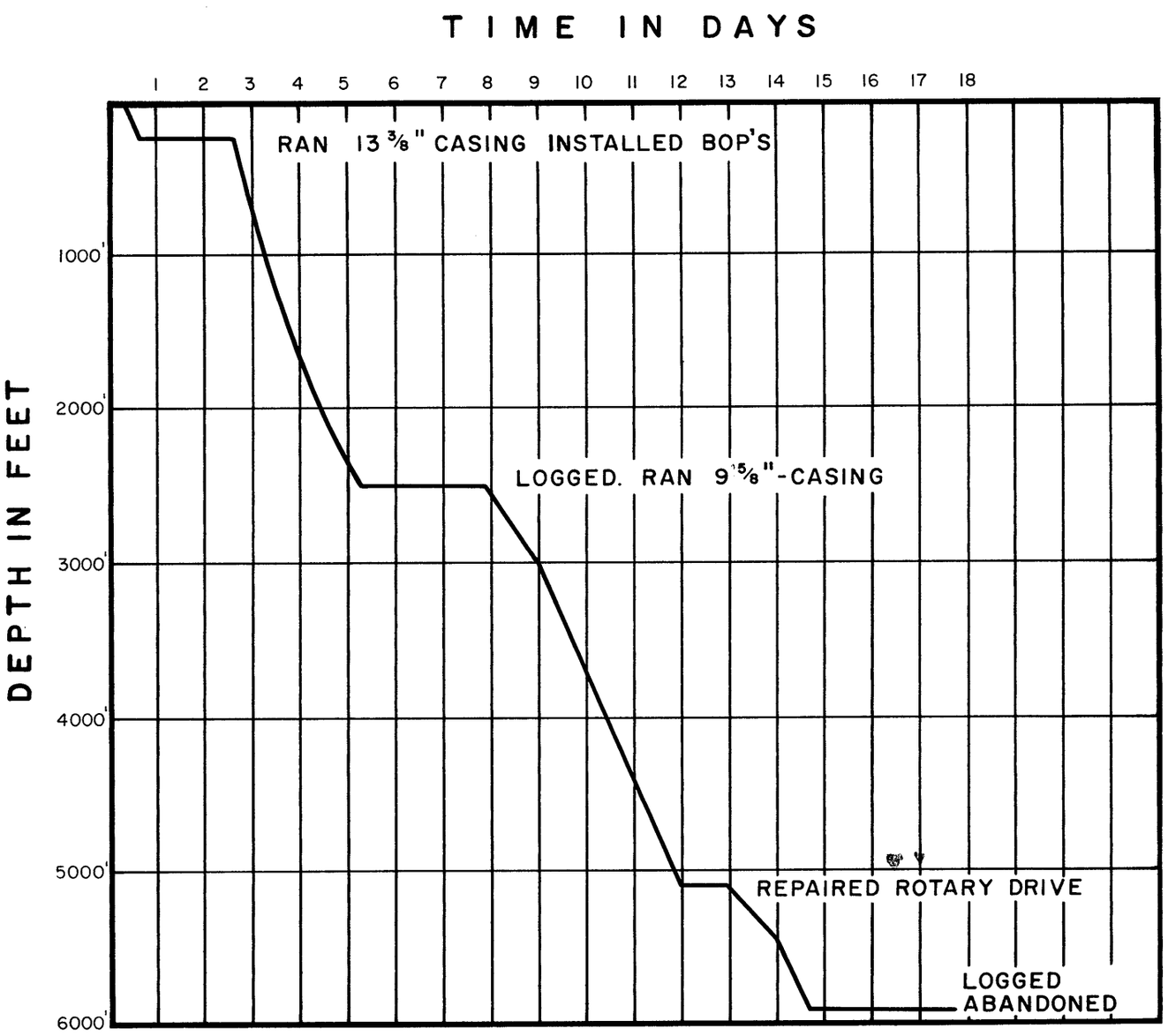


OTWAY BASIN

ROWANS - 1

TIME - DEPTH CURVE

Date : July, 1972
Report WRC. SDA. 131.
Text Fig. 1
S.D.A. Drg. No. 5829

(iii) Mast : Make : Ideco
Type : KM 108-268 AGH
Capacity: 268,000 lbs.

(iv) Pump : Make : Ideco
Type : MM 700F
Size : Max. 7¼" x 16"

Motors : 2
Make : General Motors
Type : 12103E Diesel
BHP : 700

(v) Blowout Preventer Equipment : Make : Shaffer and Hydril
Size : 12 inch 12 inch
Type : Double gate "GB" "GK"
Series : 3000 psi 3000 psi

(vi) Hole Sizes : 17½" to 228'
12¼" to 2500'
8½" to 5900'

(vii) Casing and Cementing Details :

Size	13-3/8"	9-5/8	
weight (lbs/ft)	68	36	40
Grade	J55	J55	N80
Range	2	2	2
Setting Depth	212'	0-535'	535'-2485'
Collar	-	2451'	
Shoe	212	2485	
Cement used	226 sacks +1.5% CaCl-2	440 sacks + 2.5% Bentonite + 160 Sacks + 1% CaCl-2	
Cemented to	Surface	Surface	
Method used	Single Stage	Single Stage	

(viii) Drilling Fluid : Type : Fresh water bentonite
Average weight : 9.4 lbs/gal.
Treatment : Water loss controlled with Dextrid.
Viscosity controlled with Q-Broxin.
PH controlled with caustic.

AVERAGE WEEKLY ANALYSISES:

WEEK ENDING	WEIGHT PPG	VISCOSITY MF	FLUID LOSS CC	PH
24/4	9.4	40	12.0	9.5
1/5	9.4	42	10.0	10.0
5/5	9.6	44	10.0	10.0

MUD MATERIALS CONSUMED

Aquagel	149 x 100 lbs.
Q-Broxin	41 x 50 lbs.
Dextrid	45 x 50 lbs
Caustic Soda	11 x 140 lbs.
Sod. Bicarb.	12 x 50 lbs.

(ix) Water Supply : A 130 feet deep water well capable of producing 8000 gallons per hour was drilled on the location.

(x) Perforations : Nil.

(xi) Plugging Back Record :

Plug No.	Length of plug (ft)	Sacks of cement	Tested
1	5400-5008 (392)	135	Yes
2	2635-2245 (390)	154	Yes
3	200- 50 (150)	55	No

(xii) Fishing Operations and Hole Troubles:

: No fishing operations were required. Drilling in the Gellibrand marl with a penetration rate of 60 ft/hr. cuttings showed a tendency to ball-up in the annulus, at one stage resulting in complete loss of circulation. Circulation was regained with water. Problems were eliminated by restricting the penetration rate to 40 ft/hr.

(xiii) Sidetracked Hole: No.

2.3 Formation Sampling

(i) Ditch Cuttings: Cuttings were collected at 10 foot intervals. Samples were distributed as follows:

1 sample washed and dried - Bureau of Mineral Resources,
Core and Cuttings Laboratory,
Collie Street,
FYSHWICK, CANBERRA, A.C.T.

1 sample washed and dried - Victorian Mines Department,
Core Laboratories,
Cook Street,
PORT MELBOURNE, VIC.

1 sample washed and dried - Shell Development (Australia) Pty. Ltd.,
1 sample unwashed 155 William Street,
MELBOURNE, VIC. 3000

(ii) Coring : No cores were taken

(iii) Sidewall Sampling : At total depth 30 sidewall samples were shot of which 16 were recovered and accepted.

DEPTH (FT)	RECOVERY (INS)
4478	1½
5029	1½
5065	1½
5080	1½
5269	1¼
5291	¾
5307	1
5316	1½
5328	1
5346	1½
5500	1¼
5549	1½
5643	¼
5680	1
5739	1
5826	1

2.4 Logging and Surveys

(i) Wireline Logging :

Induction Electrical Survey + SP	:	2495'- 212' 5903'-2489'
Borehole Compensated Sonic Log	:	2490'- 212' 5893'-2489'
Formation Density Log + Gamma Ray	:	2495'- 212' GR to surface 5902'-2490'
Continuous Dipmeter	:	5899'-2489'

(ii) Penetration Rate and Gas Logs:

Penetration Rate:

A continuous log of penetration rate was maintained by "Exploration Logging".

Gas Logs:

From 13 3/8" casing depth (212') to total depth a continuous record of mudgas was kept using a hot wire detector and gas chromatograph.

(iii) Deviation Surveys : A sure shot 0-7° recorder was used.

DEPTH (FT)	DEVIATION (DEG.)
215	¼
760	½
1350	¼
1840	½
2400	0
2950	0
3415	0
4218	¼
4998	1
5310	½
5890	¾

(iv) Temperature Surveys : None

(v) Other Surveys : Geophone Survey, See Appendix 6.3

2.5 Testing

(i) Formation Testing : No drill stem tests were performed in view of the absence of hydrocarbon shows both on mudstream and wireline logs.

(ii) Production Testing : None

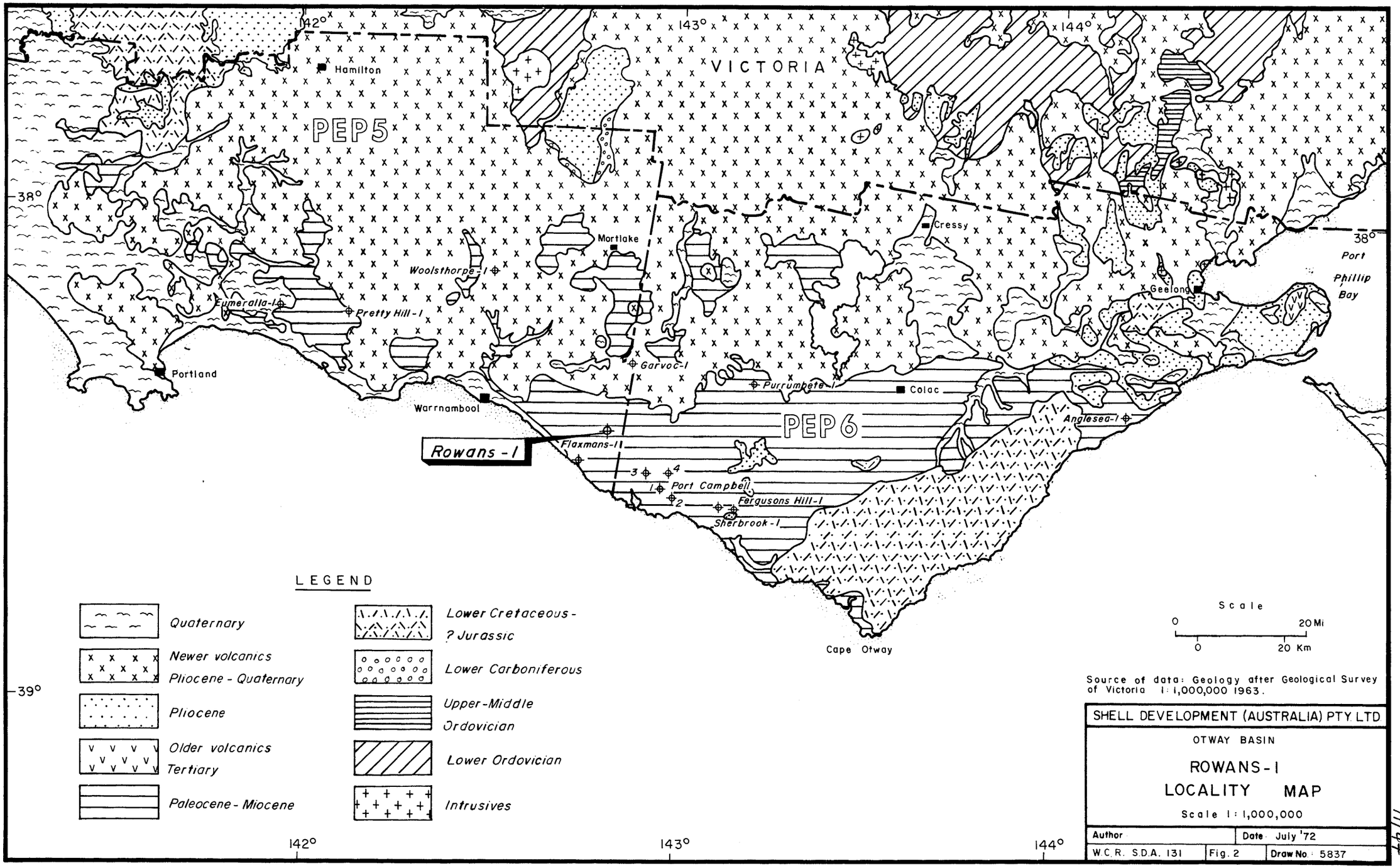
3. GEOLOGY

3.1 Previous Work

To date, 16 exploration wells (Shell-2 Interstate Oil - 3 Frome-Broken Hill -9, Pursuit Oil -1, Oil Development Ltd. -1) have been drilled in Victoria's onshore portion of the Otway Basin. No commercial discoveries have been made, but significant hydrocarbon shows were encountered, mainly in the Frome-Broken Hill wells drilled in the Port Campbell area. (Port Campbell-1 tested 4.15 MMCFD gas and some condensate from Waarre Formation (Upper Cretaceous); from upper Eumeralla Formation (Lower Cretaceous) Port Campbell-4 tested 0.16 MMCFD gas with some oil/water emulsion, while Flaxmans-1 flowed 0.25 MMCFGD gas plus some condensate).

In mid-1965, Shell Development (Australia) Pty. Ltd. entered into a farm in agreement with Frome-Broken Hill Pty. Ltd., by which Shell became operator and obtained 50% interest in PEP's 5 and 6. Since then Shell has conducted five seismic surveys in these permits, totalling approximately 1000 miles stacked seismic, and drilled 2 dry holes.

The 'Mepunga lead' was discovered in mid-1971 and was confirmed as a drillable prospect later that year. Using the nine 1971 twelve-fold seismic lines (Geophysical Service Ltd. 1971) and some older six-fold data, the combination dip/fault closed 'Mepunga prospect' was mapped as culminating near VP 170 on line 71-58 (encl. 1).



Source of data: Geology after Geological Survey of Victoria 1:1,000,000 1963.

SHELL DEVELOPMENT (AUSTRALIA) PTY LTD		
OTWAY BASIN ROWANS-1 LOCALITY MAP Scale 1:1,000,000		
Author	Date: July '72	
W.C.R. S.D.A. 131	Fig. 2	Draw No.: 5837

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3.2 Regional Geology

Present seismic data indicates that structurally the central Otway Basin onshore (PEP's 5 & 6) is essentially a southward dipping monocline, broken by numerous down-to-south normal faults that lie subparallel to to the basin's northern margin. Faulting appears to be synsedimentary with considerable throws at basement and Lower Cretaceous levels, resulting in a significant thickening of sediments in the downthrown blocks. (encls. 1 & 2). Generally, movements ceased in late Upper Cretaceous, with only some faults found extending into Tertiary sediments.

The sedimentary fill of the central Otway Basin consists of Upper Jurassic - Lower Cretaceous continental sandstones and intercalated shales (Otway Group), Upper Cretaceous-Paleocene transgressive-regressive sands/shales (Sherbrook and Wangerrip Groups), Upper Eocene marine sands/marls (Nirranda Group) and Oligocene-Miocene limestones/marls (Heytesbury Group). Paleontological and palynological data indicate that these major units are each bounded by unconformities which are equated with mappable seismic events (encl. 1).

The basal sands (Waarre Formation) of the Upper Cretaceous Sherbrook Group were the reservoir objectives in Rowans -1. These sediments, which are generally restricted to the Port Campbell area, consist of fine to locally very coarse grained, often argillaceous sandstones with intercalated siltstones and carbonaceous shales. Where encountered, both porosities and permeabilities of the sandstones are good. The lithic sandstones of the underlying Otway Group (upper Eumeralla Formation) are generally tight, but hydrocarbon shows have been recorded from this interval.

3.3 Lithological Description

3.3.1 Heytesbury Group

(a) Port Campbell Limestone

Surface-80' Lime Grainstone, yellowish grey 5Y7/2, loosely consolidated, bioclastic, fine grained, sandy, glauconitic, slightly dolomitic, fossiliferous; predominantly Bryozoa and shell fragments.
Minor Lime Packstone yellowish grey 5Y7/2-dusky yellow 5Y6/4 consolidated, dolomitic, fossiliferous as above.

80' - 540' Lime Grainstone, light olive grey 5Y5/2, loosely consolidated, fine grained, sandy, glauconitic, slightly dolomitic, slightly argillaceous in part, fossiliferous as above. Common reddish brown clay mineral occurs at 180'.

Between 430' and 450' glauconite common, altered to limonite in part with brown limonitic clay matrix.

540' - 784' Interbedded Lime Grainstone light olive grey 5Y5/2, friable, bioclastic, very fine grained, recrystallized in part, argillaceous in part, fossiliferous as for 80'-540' and Lime Packstone light olive grey 5Y5/2 friable-consolidated, bioclastic, recrystallized in part.

(b) Gellibrand Marl

784' -1902' Marl olive grey 5Y4/1, friable-plastic particularly between 1405' and 1580', glauconitic, very fossiliferous, fossils predominantly Foraminifera, Bryozoa and Echinoid fragments; grades locally to Calcareous Claystone. Occasional thin Limestone streaks occur between 1200' and 1902'.

(c) Clifton formation

1902' - 1960' Limestone moderate reddish brown 10YR4/6 - light brown 5YR5/6, consolidated, sandy; very coarse limonite stained quartz grains and abundant limonite pellets, limonite also occurs as mold fillings and replacement of fossils; fossiliferous, mainly Bryozoa and fossil fragments.

Minor Limestone - olive grey 5Y4/1, sandy, grading to Calcareous Quartz Sandstone loosely consolidated, fine quartz grains subangular, well sorted and common glauconite altered to limonite in part, set in a calcareous matrix.

3.3.2 Nirranda Group

(a) Narrawaturk Marl

1960' - 2106' Marl olive grey 5Y4/1, friable slightly glauconitic, fossiliferous as for 784'-1902', trace pyrite, locally grades to Calcareous Claystone.

(b) Mepunga formation

2106' - 2320' Quartz Sand clear - pale yellowish orange 10YR8/6, dark patchy limonite stained, less staining below approximately 2130'; unconsolidated, medium - very coarse grained, dominantly coarse, subangular - subrounded, moderately sorted, occasionally polished and frosted, with trace white calcite cement.

2320' - 2640' Quartz Sand as above with soluble clays brown - very light grey calcareous - very calcareous possibly at least in part Marl; micaceous and glauconitic in part, with minor Siltstone brownish black 5YR2/1, friable, calcareous, micaceous, pyritic, argillaceous and slightly sandy. Quartz Sandstone yellowish grey 5Y7/2 - light olive grey 5Y5/2, friable, very fine - medium grained, dominantly very fine grained, subangular - subrounded, well sorted, glauconitic, yellowish grey slightly calcareous silty matrix.

3.3.3 Wangerrip Group

Cuttings over this inverval largely unreliable due to poor or no returns over shale shaker screen.

2640' - 3060' Interbedded:

Quartz Sands predominantly clear unconsolidated, very fine grained, subangular - subrounded, well sorted.
Quartz Sands clear - very light grey N8 - yellowish grey 5Y7/2 unconsolidated fine grained and coarse grained bimodal? angular - subrounded. (It appears the sand intervals grade from coarse to fine downwards).

Siltstone brownish black 5YR2/1 friable - soft, lignitic micaceous, probably also very thin lignite bands, and minor thin beds of Quartz Sandstone yellowish grey 5Y7/2 - light olive grey 5Y6/1 friable very fine - medium grained, dominantly very fine, subangular - subrounded, well sorted, yellowish grey slightly calcareous silty matrix.

3060' - 3285' Interbedded:

Siltstone greenish black 562/1, friable, glauconitic micaceous, sandy - very sandy grading locally to Quartz Sandstones glauconitic; slightly argillaceous - argillaceous grading in

in part to Claystone, silty, soluble, and Quartz Sands as above.

3.3.4 Sherbrook Group

(a) Paaratte/Curdies Formations

3285' - 4120' Interbedded:

Quartz Sand clear, very light grey N8 - yellowish grey 5Y7/2 unconsolidated, coarse - very coarse grained, occasionally granular - pebbly, angular-subrounded, moderately sorted trace - poor angular light grey felspar grain.
Siltstone light grey N7 - medium dark grey N4 friable, carbonaceous, micaceous, slightly argillaceous, sandy grading to very fine grained Quartz Sandstone with minor thin beds of:

Quartz Sandstone light olive grey 5Y5/2 consolidated - friable fine grained subangular with pyrite cement.
Quartz Sandstone yellowish grey 5Y7/2, friable-consolidated fine grained well sorted, dolomitic with minor thin Coal bands.

4120' - 4170' Interbedded:

Siltstone as above.
Quartz Sandstone yellowish grey 5Y7/2 - light olive grey 5Y5/2, friable - consolidated, fine - medium grained dominantly fine grained, subangular - subrounded, well sorted slightly glauconitic, yellowish grey, slightly calcareous matrix.

4170' - 4490' Predominantly soluble Clays grey - light brown, slightly calcareous, micaceous, silty and sandy in part with minor thin interbeds of Siltstone as above.

(b) Nullawarre Greensand Member

4490' - 5000' Quartz Sand(stone) clear - yellowish grey quartz grains with pale green coating, possibly chlorite, unconsolidated - loosely consolidated, medium - very coarse, dominantly coarse subangular - subrounded, well sorted, cemented at least in part with pale green chlorite?
Minor Siltstone medium dark grey N4, friable - consolidated glauconitic, slightly argillaceous, sandy; occasionally occurs as matrix of Quartz Sandstone, the quartz grains being similar to above.

(c) Belfast Mudstone

5000' - 5097' Claystone, olive grey 5Y3/2 - greenish black 56Y2/1 friable, very glauconitic, glauconite locally altered to limonite, sandy in upperpart, silty in part grading to Siltstone consolidated.

(d) Flaxmans Formation

5097' - 5211' Unreliable cuttings recovered over this interval.
Quartz Sands predominantly clear, coarse grained, argillaceous passing downwards into a thinly interbedded sequence of Quartz Sands as above and Soluble Clays. At the base of this unit Dolomite olive black 5Y2/1 - olive grey 5Y4/1 - hard, sandy, silty, glauconitic, overlying a thin basal Clay bed.

(e) Waarre Formation

5211' - 5350' Interbedded:

Quartz Sandstone, porous, very light grey N8 - yellowish

grey 5Y7/2 loosely consolidated, very fine - medium grained, occasionally granular, dominantly medium grained, subangular - subrounded moderately sorted, very light grey slightly calcareous clayey matrix; common carbonaceous matter occurs as streaks and patches; slightly micaceous, occasional lithic fragments occur. Claystone, olive grey 5Y4/1, friable, sandy with numerous sandstone streaks, silty, micaceous, carbonaceous. Minor Siltstone light olive grey 5Y6/1 loosely consolidated argillaceous sandy as above; slightly micaceous, slightly calcareous slightly carbonaceous occasional lithic fragments occur.
Minor Quartz Sand unconsolidated, medium - coarse grained sorted, subangular - subrounded.

3.3.5 Otway Group

5350' - 5900 TD Interbedded:

Lithic Sandstone slightly porous, very light grey N8 - greenish grey 5G6/1 speckled, friable, fine - coarse grained, dominantly medium grained, subangular - subrounded, moderately sorted, very light grey silty clay matrix, greenish grey lithics predominate with minor yellowish grey felspar.
Claystone greenish grey 5GY6/1 - dark greenish grey 56Y4/1 friable-consolidated, sandy, silty, carbonaceous, micaceous occasional lithic fragments occur.
Minor Claystone medium grey N5 friable silty.
Siltstone olive grey 5Y4/1 - dark greenish grey, consolidated lithics common, sandy locally grading to Sublithic Sandstone very fine grained.
Lithic Sandstone, light greenish grey 5G8/1, loosely consolidated very fine grained subangular well sorted silty clay matrix.
Also thin Coal bands.

Stratigraphy	Tops (ft. below KB)	Thickness (ft.)	Lithology
HEYTESBURY GROUP (Miocene-Oligocene)	Surface	1742	
Port Campbell Limestone	Surface	566	Lime Grainstones
Gellibrand Marl	784	1118	Fossiliferous Marls
Clifton formation	1902	58	Sandy Limestones
NIRRANDA GROUP (Upper Eocene)	1960	680	
Narrawatunk Marl	1960	146	Fossiliferous Marls
Mepunga formation	2106	534	Limonitic Sands
WANGERRIP GROUP (Paleocene)	2640	645	
Unit I	2640	420	Sands + Lignitic Siltstones
Unit II	3060	225	Glauconitic Siltstones + Sands
SHERBROOK GROUP (Upper Cretaceous)	3285	2035	
Curdies/Paratte formation	3285	1205	Sands Siltstones + Clays
Nullawarre Greensand member	4490	510	Chloritic? Sandstones
Belfast Mudstone	5000	105	Glauconitic Claystones
Flaxmans formation	5097	106	Sands, Clays + Dolomite
Waarre formation	5211	109	Intbd Sandstones and claystones
OTWAY GROUP (Lower Cretaceous)	5320	580	Intbd Lithic sandstones
	TD5900		

STRATIGRAPHIC TABLE

Figure 3.

3.4 Structure

The 'Mepunga prospect' tested by Rowans -1 is a low relief feature with simple areal closure of 2.5 square miles and vertical closure of about 200 feet (encl. 1). This simple closure is situated on a NW-SE trending, slightly infaulted horst, showing structural growth to early Teriary time (encl. 1). With additional fault closure, the structure covers 8.6 square miles with over 350 feet vertical closure.

The seismic horizon was initially equated with the top of the Lower Cretaceous Otway Group. However, drilling and subsequent well velocity data have shown that at the well location, the mapped horizon is not coincident with top Otway Group, but rather ties with the top of the Upper Cretaceous Belfast Mudstone , the regional seal (for further details see Appendix 6.3).

3.5 Porosity/Permeability

The Waarre Formation in Rowans -1 is 109 feet thick and consists of sandstones and claystones in 10-30 foot thick interbeds. Porosities of the sandstones, based on log evaluation, range from 15 to 26 percent (average 23%, Appendix 6.2).

The shaley lithic sandstones of the underlying Eumeralla Formation generally have low porosities.

3.6 Hydrocarbon Indications

No hydrocarbons were noted in cuttings or sidewall samples. Logs showed that all potential reservoir sandstones were water saturated and no drill stem tests were performed.

Petrophysical evaluation (Appendix 6.2) of the drilled section shows freshwater flushing extends from surface through the marine Tertiary section and into the Upper Cretaceous Sherbrook Group. Salinity in the Nullawarre Greensand Member (4490-5000 ft.) is low (3000 ppm NaCl equ.), and it is not certain whether this value is due to flushing or represents relatively fresh connate water.

The Waarre Formation contains brackish (?) water (13,500 ppm NaCl equ.) suggesting that the overlying claystones/siltstones (Belfast Mdst/ Flaxmans Fm.) have acted as adequate seals.

In the objective interval (5100 ft.-TD), gas readings averaged 100 ppm methane (max. 650 ppm) and trace ethane, while above 5000 ft. (i.e. above Belfast Mdst) only a trace methane was recorded (encl. 5). This further suggests that the Belfast Mudstone has acted as an effective seal for the 'Mepunga prospect'.

4. CONCLUSIONS

The feature tested by Rowans -1 is considered both closed and sealed at the Upper Cretaceous objective level (Waarre Formation). The lack of hydrocarbons is believed to be primarily due to the absence of a nearby source rock section. The good shows in the more southerly Port Campbell wells and Flaxmans -1 (p. 9) are probably due to limited generation from local Lower Cretaceous source rocks situated in a deeper, more basinward position.

The potential of fault trapping occurring in the Rowans horst is now considered low since the recognized seal - the Belfast Mudstone - in the downthrown blocks is too thin (105 feet in Rowans -1) to have provided a lateral seal for the Waarre Formation objective in the upfaulted block.

The well conformed closely to prognosis except that the 'Top Otway' reflection was 320 feet lower than predicted. Well velocity data indicate that the mapped horizon is related to the top of the Belfast

Mudstone. The lithology and wireline logs of the Rowans -1 section correlate favourably with the numerous neighbouring wells (encl. 2).

The dry Rowans -1 test has considerably downgraded the hydrocarbon-bearing potential of similar Upper Cretaceous prospects in the Port Campbell-Mepunga area.

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6. APPENDICES

6.1 Sidewall Core Descriptions

Feet	
4343	Not recovered
4425	Not recovered
4478	Claystone, olive grey 5Y4/1, friable - consolidated, silty carbonaceous, micaceous, sandy with numerous Sandstone streaks, lithics.
4627	Not recovered
4718	Not recovered
5029	Claystone, olive grey 5Y3/2, friable, very glauconitic, in part oxidized to limonite, glauconite grains Lf-Um predominantly Lf, subang-subrounded, silty in part grading to Siltstone, slightly sandy, qz clear-Fe stained Lf-mU subang-subrounded, slightly micaceous.
5045	Not recovered
5051	Not recovered
5065	As for 5029
5080	As for 5029
5086	Not recovered
5218	Not recovered
5259	Not recovered
5269	Quartz Sandstone, porous, very light grey N8, Lf-Uf predominantly fL, subangular-subrounded, well sorted, argillaceous clear-white qz grains set in white slightly calcareous clay matrix, loosely consolidated, slightly micaceous, carbonaceous streaks common, lithics.
5291	Quartz Sandstone, porous, very light grey N8, Lf-gran, predominantly mL subangular-subrnd, sorted, argillaceous clear-white, qz grains set in white calcareous clay matrix, loosely consolidated, slightly micaceous carbonaceous patches common, lithics.
5307	As for 5269 and 5291 separated by carbonaceous material.
5316	Quartz Sandstone, porous, very light grey N8 Lf-pbl, predominantly Uf, angular-subangular, sorted, argillaceous clear-white qz grains set in white slightly calcareous clay matrix, loosely consolidated, carbonaceous, lithics. With interlamination of: Clay, dark grey N3 soft, silty, micaceous, carbonaceous,
5328	Claystone, olive grey 5Y4/1 loosely consolidated-friable, sandy - very sandy, silty, micaceous, carbonaceous, lithics, very slightly calcareous. with: Siltstone, light olive grey 5Y6/1, loosely consolidated, very argillaceous sandy with occasional sandstone streaks, slightly micaceous, carbonaceous, lithics, slightly calcareous. Separated by thin lense of: Qz Sandstone as for 5269.
5346	Claystone, olive grey 5Y4/1, friable-consolidated, sandy with numerous Sandstone streaks, silty, carbonaceous, micaceous, lithics.
5460	Not recovered
5473	Not recovered
5500	Claystone, greenish grey 5GY6/1 - dark greenish grey 5GY4/1 friable - consolidated, sandy - very sandy, silty, carbonaceous, micaceous, lithics.
5549	As above
5643	Mostly Mud Cake with Qz Grains clear-ltgy Uf-Lcrs, ang-subrnd + Glauconite Uf-Lcrs (rnd) + rounded pebble lithic Sandstone, slightly porous, med gy-dk gy mottled, Qz Uf-Lm, pred Lf ang-(rnd), well sorted, lithics green, dk gy, mod red brn, cream felspar, slightly argillaceous + angular pebble Siltstone dark grey hard slightly carb.
5680	Claystone, medium grey N5 friable silty.
5699	Not recovered

5739 Claystone, greenish grey 5GY6/1, - dark greenish grey 5GY4/1, loosely consolidated - friable, very sandy, silty, carbonaceous micaceous, lithics.
5741 Not recovered
5817 Not recovered
5826 Claystone, greenish grey 5GY6/1 - dark greenish grey 5GY4/1 loosely consolidated - friable, sandy - very sandy, silty, carbonaceous micaceous, lithics.

6.2 Petrophysical Evaluation

6.2.1 Data Available

IES	:	2495 - T.D.
BHC	:	2490 - T.D.
FDC-GR	:	2495 - T.D. (GR to surface)
Mud Log	:	200 - T.D. (incl. gas detector and chromatograph)
Cuttings	:	every 10 feet.

No shows of hydrocarbons.

6.2.2 Summary of Results

Surface - 2106 ft.

Alternations of marls and fresh water bearing limestones.

2106 - 3285 ft.

Porous sandstones interbedded with shales and siltstones. All reservoir zones appear to be fresh water flushed.

3285 - 4490 ft.

Generally porous sandstone with some minor dolomite and lignitic siltstones. Water salinities are of the same order as the mud filtrate. A number of resistivity anomalies in this formation correlate with coal observed in the ditch cuttings.

4490 - 5020 ft.

The Nullawarre Greensand has been described as a "dirty" sand with a large percentage of chlorite as cement and some dispersed coal. Rather high resistivities with a spread of two to three times the values calculated for a water bearing formation are shown on a density versus resistivity plot. From the SP difference and the water salinity of the petrophysically better defined Waarre sands, a salinity of approx. 3000 ppm NaCl eq. is found for the Nullawarre Greensand. This value is in agreement with the water tested from the same formation in Port Campbell-4 which showed up identically on the logs. The test results of the Port Campbell-4 well, along with the absence of shows, the presence of chlorite and the comparison of short normal and induction log curves justify the conclusion that the Nullawarre Greensand is water bearing in Rowans-1.

5000 - 5211 ft.

Clay and siltstones.

5211 - 5320 ft. (fig. 4)

The Waarre Formation contains 62 feet of porous and presumably permeable sands. A plot of formation density versus resistivity indicates the formation to be water bearing (Rw = .24 at BHT, i.e. 13,500 ppm NaCl equivalent). Porosities range from 15 to 26 percent with an average of 23 percent.

5320 ft. - T.D. (fig. 5)

The Eumeralla Formation appears to be very shaly, both from logs (Gamma Ray) and cutting description. Over some sections the formation could be permeable because a mudcake developed. On the basis of S.P. deflections approximately 120 feet of shaly sands with some permeability are present in the penetrated part

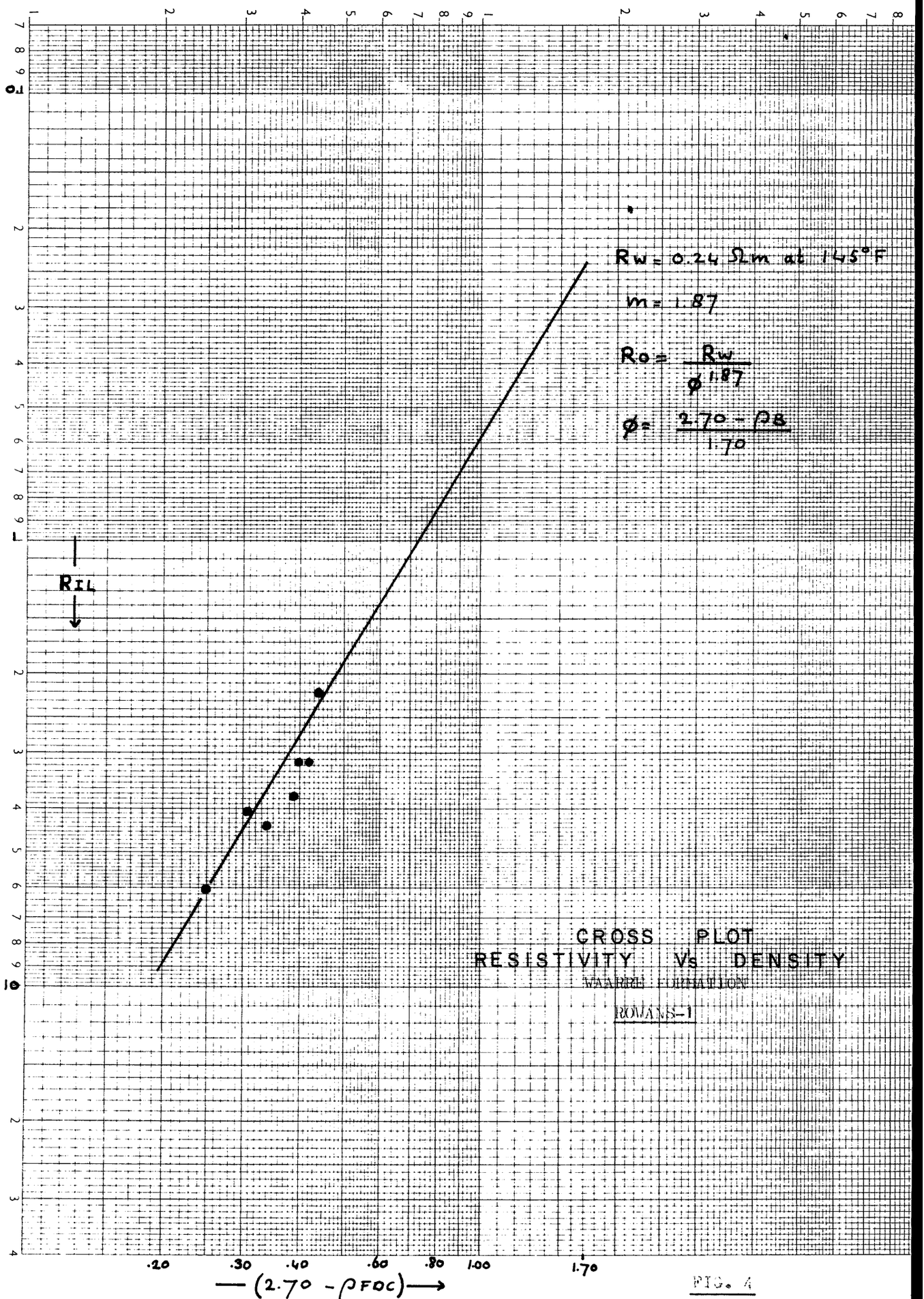
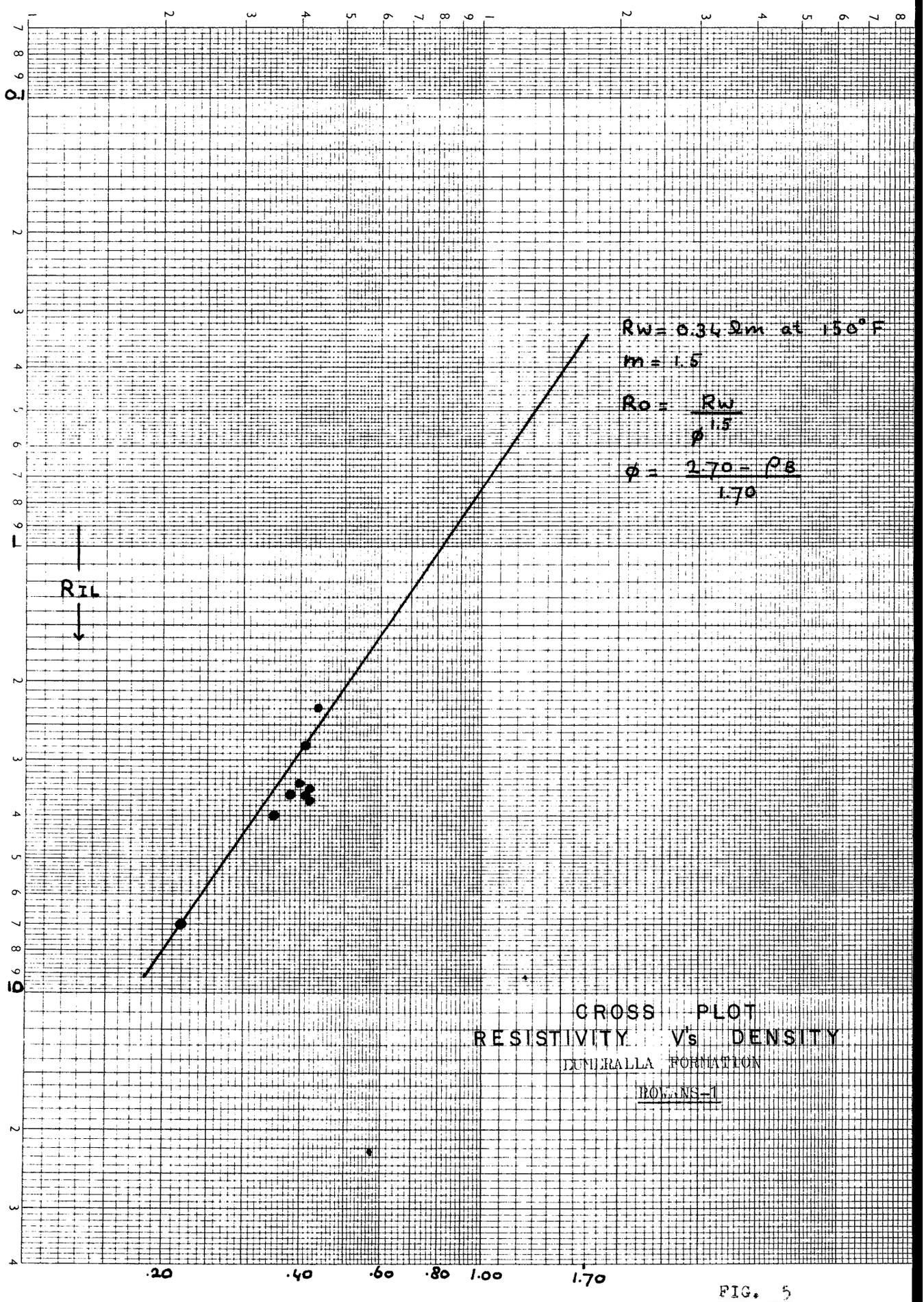


FIG. 4

D.M.R. 131

OTWAY BASIN

S.D.A. Drg No 5786.



CROSS PLOT
RESISTIVITY V's DENSITY
DUNERALLA FORMATION
BOWANS-1

FIG. 5

W.C.R. S.D.A. 131

OTWAY BASIN

S.D.A. Drg. No. 5787

of the Eumeralla Formation. All intervals are water bearing. The calculated water salinity is influenced by the shaliness of the formation. Porosities, without correcting for shale, range from 13 to 25 percent.

6.2.3 Conclusions

No testworthy intervals are present.

6.3 Well Velocity Survey

6.3.1 Introduction

A velocity survey was carried out on 3rd May 1972 at the Rowans No. 1 well in P.E.P. 5 Otway Basin, Victoria near Nullawarre.

The recording equipment and observer were on loan from WAPET. G.S.I. drilled and pre-loaded the holes and supplied a shooter. A velocity type 3-component well geophone from B.M.R. was used.

A summary of information relevant to the survey is given in Table 1.

6.3.2 Operations

6.3.2.1 Procedure

The Rowans No. 1 site was permitted and surveyed for shotholes by G.S.I., Party 827, then working in the Colac area. Shotholes were drilled to 80 feet and were loaded with 15 pounds of anzite blue. The holes were 500 feet from the well (fig. 6).

The reference geophone was placed 12' from the BOP perpendicular to the line of fire. For each shot the up-hole geophone was 3' from the top of the hole.

Check shots were taken at eight levels as the geophone was run into the well. The levels were again shot as the geophone was pulled out to 3000' below rotary table then 2 shots were taken at 1800'. Some holes were reloaded to make up for lost shots and faulty records (figs. 7 and 8).

The amplifier was wired to record the vertical and horizontal components of the geophone on separate traces.

An uphole survey was conducted to check the datum correction.

6.3.3.2 Operational Problems

The major problem was due to an unsuitable geophone adapter. The geophone and the Schlumberger geophone adapter were wired as follows:

	Geophone Pins	Adapter Pins: Geophone end		Adapter Pins: Cable end
1st horizontal phone	(1	1	to	1
	(2	2	to	2
2nd horizontal phone	(3	3	to	3
	(4	4	to	4
Vertical phone	(5	5	to	5
	(6	6	to	6,7,8,9,10
(7 not used)		7	to	6,7,8,9,10

Pins 8 and 9 from the cable were exposed to the mud when the geophone was down the hole so that the vertical phone circuit shorted to ground. However when the geophone was pulled out the circuit read normal because 8 and 9 were not grounded. Due to the intermittent nature of the trouble there was a considerable delay before recording commenced. If the B.M.R. 3 component geophone is used again on a well shoot it will be necessary to give advance warning to Schlumberger so that they can rewire the adapter.

The survey was shot at night and the observer had difficulty monitoring the equipment and checking the records in the dark. The drywrite records would not develop properly in the light from an electric torch. As a result some uphole breaks and one time break were not recorded and the record had to be reshot.

The velocity type geophone took a long time to quieten after being moved to each level.

6.3.3 Computing

The records were generally not too difficult to pick using the horizontal component to discriminate between the formation breaks and the cable/casing break.

Due to noise preceeding the shot break no reasonable pick could be made for the 3000' b.d.f. level. The pick for the shot at the 1800' b.d.f. level is not reliable as it was shot with the geophone in the casing.

The correction velocity used to datum was 6000 feet/second. The correction from ground level to datum (sea level) using the uphole time is 42-44. This agrees with the time from the deepest shot (175 ft.) from the uphole survey. As the 2 way correction to datum used in processing the seismic data at the nearest shot-point was 100 ms. it is necessary to take 12 ms. off the reflection times to horizons taken from the interpreted seismic section.

Some records lacked either an uphole break or a time break however, the time relationship between the time break, the uphole break and the reference geophone break was almost constant for every hole so the position of a missing break could be estimated to within 2 or 3 ms.

6.3.4 Results

The seismic section of line 072-58 interpreted by W. Ogden picked the Base Heytesbury and the Base Wangerrip to within a few milliseconds. (Table 2). The velocity survey indicates that the picked Top Otway reflection is actually the Top Belfast Mudstone. This is also shown by the interval velocity change at Top Belfast Mudstone level.

SURVEY INFORMATION — TABLE 1.

A. WELL

Name	:	Rowans No. 1
Location	:	P.E.P. 5, 2 miles east of Nullawarre, Victoria.
Co-ordinates	:	Latitude 38° 27' 34.86" S Longitude 142° 47' 19.26" E
Elevation	:	rotary table 232.19' ground 217.70'
Total Depth	:	5900' below R.T.
Casing	:	9-5/8" to 2485' below R.T.
Nearest Shotpoint	:	S.P. 170; line 071-58

B. OPERATIONS

Date	:	3rd May, 1972
Datum Plane	:	Mean Sea Level
Interval Surveyed	:	1800' to 5900' below R.T.

Equipment

Well geophone	:	3- component velocity type
Reference geophone	:	velocity type
Amplifiers	:	S.I.E. model OPA-4
Camera	:	S.I.E. model R-4
Radio	:	Phillips F.M. - 1680C/10N
Blaster	:	Electro Tech - Model BC 1

Personel

Observer	:	B.K. Potter (WAPET)
Shooter	:	P. Millward (G.S.I.)

Trace Identification

1 - 6	:	horizontal component (pins 3 and 4)
7, 8, 9	:	vertical component (pins 5 and 6)
10, 11	:	reference phone
12	:	uphole
13	:	time break

Number of Shots : 19 (15lb @ 74-80')

Levels checked : 9

TABLE 2.

ARRIVAL TIMES TO HORIZONS

(2-way in seconds)

Horizon	from T-Z curve	from interpreted* Seismic Section
Base Heytesbury	.490	.493
Base Nirranda	.640	.578
Base Wangerrip	.800	.793
Top Belfast Mudstone	1.164	not picked
Top Otway	1.220	1.168

* Ogden, 1971
line 072-58 S.P. 170

(The interpreted two-way correction times have been corrected by .012 ms.)

OTWAY BASIN

ROWANS – 1

VELOCITY SURVEY SHOT HOLE LAYOUT

Scale 100 feet to 1 inch

Author: J. Fraser
Date: July 1972
WCR SDA 131
Text Fig. 6
SDA Drg. N° 5913

PE907689

This is an enclosure indicator page.
The enclosure PE907689 is enclosed within the container PE902778 at this location in this document.

The enclosure PE907689 has the following characteristics:

ITEM_BARCODE	= PE907689
CONTAINER_BARCODE	= PE902778
NAME	= Well Velocity Calculation Form
BASIN	= OTWAY
PERMIT	= PEP/5
TYPE	= WELL
SUBTYPE	= VELOCITY_CHART
DESCRIPTION	= Well Velocity Calculation Form (enclosure from WCR) for Rowans-1
REMARKS	=
DATE_CREATED	=
DATE_RECEIVED	=
W_NO	= W644
WELL_NAME	= ROWANS-1
CONTRACTOR	=
CLIENT_OP_CO	= SHELL DEVELOPMENT (AUSTRALIA) PTY LTD

(Inserted by DNRE - Vic Govt Mines Dept)

DATE 3 MAY 82 WELL Rowans RIG ODE II

TIME WELLHEAD FOR SURVEY 1530

TIME INTO HOLE 1535

TIME CLEAR OF HOLE 2030

OBSERVERS LOG
(WELL VELOCITY SURVEY)

WATER DEPTH

DEPTH OF REF PHONE

WELL PHONE TYPE I.I.C 3comp.

EXPLOSIVES

	CAPS	PRIMERS
AVAILABLE	PRELOADED Hex	
USED		
RETURNED		
DESTROYED		

SHOT No.	RECORD No.	TIME	DEPTH	CHARGE SIZE	CHARGE DEPTH	SHOTPOINT	GRADE	AMP. GAIN 1	2	3	4	COMMENTS
1	1	1817	2600	15		1	OK	4	4	2	2	
2	2	1822	3000			2		5	4	2	2	
3	3	1824	3500			3						
4	4	1828	4000			4						
5	5	1832	4500			5		5	5	3	2	
6	6	1835	5000			6						
7	7	1838	5500			7						
8	8	1842	5900			8		6	4	3	2	
9	9	1856	5900	15		9		6	4	3	2	No U/H
10	10	1900	5500			10						
11	N/R	1922	5000			11						SHOT LOST
12	11	1935	5000			13						
13	12	1939	4500			14	WEAK					Very Weak
14	13	1946	4500			15						
15	14	1951	4000			16						
16	15	2002	3500	10		11A		5	3	3	2	
17	16	2007	3000			10A						T/B WEAK
18	17	2010	1800			9A						T/B FAULTY.
19	18	2022	1800			10B		4	4	2	2	

25

Figure 8

28/47

6.4 Paleontological Report

6.4.1 Introduction

Cutting samples from Rowans -1 were examined at 100 foot intervals from 220' to 5200'. Eight sidewall cores from the Upper Cretaceous and two from the Lower Cretaceous were examined, but all were barren of microfauna.

The foraminiferal zonation used is that of Taylor for the Gippsland, Bass and Otway Basins, modified by later drilling results of Shell Development (Aust.) Ltd. Enclosure 8 outlines this zonation and presents comparisons with zonations of other areas.

Cuttings from the carbonates of the Tertiary Heytesbury and Nirranda Groups were severely caved, and no accurate definition of zonule boundaries was possible. Cuttings in the Wangerrip Group were predominantly sandy or coaly, and no precisely dateable mocrofaunas were found. The Upper Cretaceous Sherbrook Group was also predominantly sandy, but contained two marine shaley intervals which could be dated. Sidewall cores shot in these intervals were unfossiliferous, which suggests that the Cretaceous faunas occur discontinuously through the marine intervals.

6.4.2 The Foraminiferal Sequence

6.4.2.1 Miocene 220- approx. 1400 ft.

Zonule D: 220 - 700 ft. (Middle Miocene)

The occurrence in this interval of Orbulina universa, O. suturalis, and rare Globigerinoides glomerous circularis, in the absence of older species of the Orbulina bioseries, defines zonule D.

Zonule E: 700 - 1000 ft. (Middle Miocene)

The highest occurrence of Globigerinoides glomerosus at 700 ft. defines the top of this zonule. At 790 ft. the earlier form Globigerinoides glomerosus curvus is also present. Small specimens referable to Globigerinoides cf. bisphericus are rare at 890 and 950 ft., but true G. bisphericus is absent.

Zonules F and G: 1000 - 1200 ft. approximately (Lower Miocene).

The limits of these zonules, defined as they are on the downhole disappearance of certain species, cannot be accurately defined on cuttings because of the extremely heavy caving. Globigerinoides bisphericus is present below 1000 ft., defining the top of Zonule F. Below 1100 ft. Globigerinoides trilobus is very abundant, and this may indicate that the sequence is within zonule G at around this depth.

Zonule H: approx. 1200 - approx. 1400 ft. (Lower Miocene)

Globigerina woodi is moderately abundant in samples in this interval, but the fauna appears to be largely masked by caving. Evidence for the presence of the zonule is largely negative: it is placed above the highest occurrence of Zonule I species, and below the abundant G. trilobus faunas of Zonule G.

6.4.2.2 Middle to Upper Oligocene. Approx. 1400 - 1960ft.

Zonule I: ?1400 - ?1960 ft.

The top of this zonule is difficult to determine, because specimens of Globigerina euapertura, the index species, appear to lose their distinctive identity near the top of their range. Below 1600 ft. however, G. euapertura is definitely present. Also occurring are rare Globorotalia opima, G. nana, and abundant specimens referable to the Globigerina apertura group. Specimens referred to Globigerina angiporoides are present throughout Zonule I and into Zonule H; in the higher samples they are joined by rare Globigerina linaperta. The presence of these Lower Oligecene and Upper Eocene forms is attributed to reworking of the underlying Nirranda Group. Some slight support for this explanation lies in the presence of the older species G. linaperta only in the higher samples; erosion of Nirranda Group sediments would remove and redeposit progressively older faunas with the passage of time. It is uncertain how long this reworking continued; a search for reworked specimens was not made in the well above approximately 1200 ft.

The age of the Clifton Formation is believed to be zonule I (middle to upper Oligocene), based on the presence of abundant Globigerina euapertura directly above the formation, and the presence of very rare specimens of G. euapertura preserved in the red colour of the Clifton lithology, which have caved into the Narrawaturk Marl directly below. No specimens of Globigerina angiporoides were observed in the Clifton Formation, although the lithology is hardly a favourable one for their preservation.

6.4.2.3 Lower Oligecene and Upper Eocene: 1970 - 2100 ft.

Zonules J and K

Dating of the Nirranda Group proved difficult, as severe caving from the Heytesbury Group obscured most of the in situ fauna. Less than 5% of the fauna are estimated to be in place. Two cutting samples eventually were dated. Sample 1970-80 close to the top of the Narrawaturk Marl, contained sufficient fauna to assign it to probable zonule J (Lower Oligecene). Species present include Globigerina angiporoides (very rare), Globigerina euapertura (common), Globorotalia cf. ampliapertura (v. rare), Globigerina ouachitaensis, Spirillina medioscabra, and Spirillina decorata. Globorotalia increbescens is present as a single specimen at 1990'. Sample 2090-2100' from near the base of the Narrawaturk, is assigned to high in zonule K (Upper Eocene) on the basis of the presence of Globigerina linaperta. Other rare species include G. angiporoides, G. ouachitaensis, G. ampliapertura, Cibicides pseudoconvexus and Cerobertina kakahoica. Of five other samples examined between these two, all were so heavily contaminated that no definite zonule determination could be made. It was therefore not possible to fix the position of the Oligocene - Eocene boundary, which lies between 1980' and 2090'.

6.4.2.4 Undated: 2100' - 3000'

Only caved faunas from the Heytesbury Group were seen in this interval, which comprises the coarse sands of

the Mepunga Formation and the sands and silts of the top of the Wangerrip Group.

6.4.2.5 ?Lower Tertiary: 3090' - 3130'

A sparse arenaceous paralic fauna composed of Haplophragmoides complanata and Ammodiscus parri is suggestive of a Lower Tertiary age, by comparison with other wells in the Otway Basin.

6.4.2.6 Undated: 3180' - 4380'

This predominantly sand interval was barren of in situ foraminifera.

6.4.2.7 Upper Cretaceous: 4440' - 5070'

Upper Cretaceous foraminifera occur in two thin intervals which are separated by a thick unfossiliferous sand.

Zonule XA: 4370' - 4480' approx. (Santonian - Campanian approximately)

A sparse, entirely arenaceous fauna, dominated by Haplophragmoides spp., occurs in this interval. Species present include Marssonella oxycona, Hyperammina elongata, Trochammina sp. -14, and Ammobaculites subcretacea. The occurrence of Textularia semicomplanata at 4440' - 50' defines the interval as zonule XA.

6.4.2.8 Undated: 4480' - 5020'

Unfossiliferous sand covers this interval.

Zonule XB: 5020' - 5150' (Turonian)

Sparse faunas dominated by Haplophragmoides spp. are undateable, with the exception of a much richer arenaceous fauna at 5140-50'. At this depth the presence of Textularia trilobita defines the zonule XB. Other species here include Dorothia filiformis and D. cf. filiformis, Ammobaculites goodlandensis, and questionable Colomia austrotrochus.

6.4.2.9 Undated: 5160' - 5350'

No in situ foraminifera were found in cuttings or sidewall cores over this interval (lower Flaxmans Fm. - Waarre Fm. - top Otway Gp.) The deeper part of the Otway Group intersected in the well was not checked for foraminifera.

6.4.3 Depositional Environments of the Sequence, and Notes on Correlation

6.4.3.1 Upper Cretaceous

Both marine intervals (XB and XA) contain an entirely arenaceous fauna, indicating severely restricted marine conditions. The water depth was probably shallow, and water circulation was poor.

The presence of marine shale of XB (Turonian) age in this well indicates a correlation of the Belfast Formation here with the lower part of the Belfast Formation in the Flaxmans -1 well and the Port Campbell

wells. It also implies that Rowans -1 occupied a depositional low during the Turonian, whereas surrounding wells such as Laang -1, Mepunga -7 and Nirranda -3 occupied higher structural positions at this time. The depositinally low position of this well might have some bearing on the quality of the Waarre Formation as a potential reservoir rock.

The fauna of zonule XA is considerably less rich than that of the Port Campbell area, which is the opposite of what might be expected in a well in a depositional low which had received Turonian marine sediments. Therefore it seems probable that some structural re-adjustment of the Rowans area occurred between the Turonian and Senonian, and that the rise of the area more than compensated for the relatively higher sea level of the Senonian Transgression.

6.4.3.2 Lower Tertiary

Apart from a short paralic interval near the base, the entire Wangerrip appears to be barren of microfauna, rich in coaly fragments, and is therefore interpreted as non-marine. The paralic interval at 3100' may perhaps be correlated with the Rivernook Member, as that is the most widespread of the Lower Terriary marine incursions, but there is no direct palaeontological evidence for such a correlation.

6.4.3.3 Upper Eocene and Lower Oligocene

Due to the heavy caving, the depositional environment of the Narrawaturk Marl is impossible to assess. All that can be said is that it is marine, probably open marine.

6.4.3.4 Middle to Upper Oligecene and Miocene

The Clifton Formation contains a moderately abundant microfauna, not suggestive of very shallow depth. This may lend some support to the recently advanced hypothesis of Carter and Landis (1972) that the disconformity underlying the Clifton Formation represents a period of submarine erosion, not subaerial exposure. The Clifton Formation is then seen as being deposited during the period of slowing down of the erosive currents, which may explain why it contains an abundant foraminiferal and bryozoal fauna in a high energy lithological framework. Obviously much further work will be necessary before this hypothesis can be accepted, but the old picture of the Clifton Formation as the shallow water base of the Heytesbury transgression, advancing over an exposed land surface, seems to require modification.

The succeeding marls and limestones of the Heytesbury Group contain a fully open marine microfauna rich in planktonics, and as elsewhere in the Otway Basin a middle to outer neritic carbonate shelf environment seems indicated.

6.4.4 Reference

Carter, R.M. and Landis, C.A. Nature Physical Science, vol. 237, May 1, 1972.

6.5 Palynology

6.5.1 Introduction

Some 15 sidewall cores were prepared for palynological examination. The s.w.c. at 5,500 ft. was rich in sporomorphs, whilst at 5,739 ft. the sample was virtually barren. All others contained a low ratio of sporomorphs. All residues except s.w.c. 5,500 ft. contained an excess of dense black carbonaceous material.

Age determinations were mostly based on the zonation established by Dettmann and Playford 1969.

6.5.2 S.W.C. 4478 ft. L224

Sporomorphs

Aequitriradites spinulosus C & D.
Baculatisporites comaumensis Pot.
Ceratosporites equalis C & D.
Deltoidospora minor Miner
Ginkgocycadophytus sp.
Gelicheniidites cf. G. cercinidites Ckn.
?Kraeuselisporites majus Dtmn.
?Leptolepidites major Couper
Lycopodiumsporites austroclavatidites Pot.
?Osmundacidites wellmanii Couper
?Pilosisporites parvisphinosus Dtmn.
Proteacidites spp.
Tricolporites sp.

Microplankton

Hystrichosphaeridium sp.
Spiniferites furcata

Age

Sporomorphs and microplankton present are all long ranging. Not younger than Paleocene.

6.5.3 S.W.C. 5029 ft. L225

Sporomorphs

Ceratosporites equalis C $ D.
Deltoidospora minor Miner
Foraminisporis wonthaggiensis Dtmn.
Ginkgocycadophytus nitidus de J.
Gleicheniidites cf. G. cercinidites Ckm.
Klukisporites sp.
Lycopodiumsporites sp.
Proteacidites sp.
Stereisporites antiquasporites Dtmn.

Microplankton

Deflandrea porifera
Hystrichosphaeridium cf. simplex
Micrhystridium sp.
Odontochitina porifera

Age

Probably Turonian, certainly no younger than Maastrichtian.

6.5.4 S.W.C. 5065 ft. L226

Sporomorphs

Deltoidospora minor Miner
Gleicheniidites cf. G. cercinidites Ckn.
Klukisporites sp.
?Laevigatosporites ovatus W & W.
Microcachyridites antarcticus Ckn.
Reticulatisporites pudens Balme
Stereisporites antiquasporites Dtmn.
Triorites sp.

Age

No indication of age can be inferred from the sporomorphs present.

6.5.5 S.W.C. 5080 ft. L227

Sporomorphs

Cicatricosisporites sp.
Deltoidospora minor Miner
Gleicheniidites cf. G. cercinidites Ckn.
?Osmundacidites wellmanii Couper
Stereisporites antiquasporites Dtmn.

Age

Coniacian - Albian.

6.5.6 S.W.C. 5268 ft. L228

Sporomorphs

?Baculatisporites comaumensis Pot.
Cicatricosisporites australiensis Pot.
Deltoidospora minor Miner
Gleicheniidites cf. G. cercinidites Ckn.
Inaperturopollenites australis Pocock
Lycopodiumsporites austroclavatidites Pot.
Stereisporites antiquasporites Dtmn.

Age

Not younger than Coniacian.

6.5.7 S.W.C. 5291 ft. L229

Sporomorphs

Baculatisporites comaumensis Pot.
Contignisporites cooksonii Dtmn.
Deltoidospora australis Miner
D. minor Miner
Foraminisporis asymmetricus Dtmn.
Ginkgocycadophytus nitidus de J.
Gleicheniidites cf. G. cercinidites Ckn.
Klukisporites scaberis Dtmn.
?Kraeuselisporites majus Dtmn.
Lycopodiumsporites austroclavatidites Pot.
Microcachyridites antarcticus Ckn.
Osmundacidites wellmanii Couper
Podocarpidites cf. ellipticus Ckn.
Stereisporites antiquasporites Dtmn.

Age

Not younger than Aptian.

6.5.8 S.W.C. 5307 ft. L230

Sporomorphs

Alisporites similis Dtmn.
?Ceratosporites equalis C & D.
Deltoidospora australis Miner
D. minor Miner
Ginkgocycadophytus nitidus de J.
Gleicheniidites cf. G. cercinidites Ckn.
Lycopodiumsporites austroclavatidites Pot.
Stereisporites antiquasporites Dtmn.

Age

Probably not younger than Albian.

6.5.9 S.W.C. 5328 ft. L233

Sporomorphs

Alisporites similis Dtmn.
Baculatisporites comaumensis Pot.
?Cingutriletes clavus Dtmn.
Deltoidospora australis Miner
D. minor Miner
Ginkgocycadophytus nitidus de J.
Gleicheniidites cf. G. cercinidites Ckn.
Laevigatosporites ovatus W & W.
Lycopodiacidites asperatus Dtmn.
Lycopodiumsporites austroclavatidites Pot.
Microcachyridites antarcticus Ckn.
Podocarpidites cf. ellipticus Ckn.

Microplankton

Baltisphaeridium pseudodinium
Callaiosphaeridium asymmetricum
Muderongia cf. mcwhaei

Age

Barremian - Hauterivian.

6.5.10 S.W.C. 5346 ft. L234

Sporomorphs

Aequitriradites sp. 1
" sp. 2
Alisporites similis Dtmn.
Baculatisporites comaumensis Pot.
Cicatricosisporites australiensis Pot.
C. pseudotripartitus Dtmn.
Cingutriletes clavus Dtmn.
Deltoidospora minor Miner
Disaccites sp.
Gleicheniidites cf. G. cercinidites Ckn.
Inaperturopollenites australia Pocock
Lycopodiumsporites austroclavatidites Pot.
Mattesisporites tumulosus Dor.
Microcachyridites antarcticus Ckn.
?Neoraistrickia truncatus Pot.
Proteacidites sp.
Stereisporites antiquasporites Dtmn.
Todisporites sp.

Microplankton

Baltisphaeridium armatum
Cyclonephalium distinctum

Age

Lower Cretaceous (not younger than Albian).

6.5.11 S.W.C. 5361 ft. L231

Sporomorphs

Baculatisporites comaumensis Pot.
Cicatricosisporites australiensis Pot.
Cingutriletes clavus Dtmn.
Classopollis cf. classoides Dtmn.
Deltoidospora australis Miner
D. minor Miner
Ginkgocycadophytus nitidus de J.
Laevigatosporites ovatus W & W.
Matthesisporites tumulosus Dor.
Microcachyridites antarcticus Ckn.
Osmundacidites wellmanii Couper
Stereisporites antiquasporites Dtmn.

Age

Lower Cretaceous (not younger than Albian).

6.5.12 S.W.C. 5500 ft. L192

Sporomorphs

?Acanthotriletes levidensis Balme
Alisporites grandis Dtmn.
Baculatisporites comaumensis Pot.
?Ceratosporites equalis C & D.
Cicatricosisporites australiensis Pot.
Cingutriletes clavus Dtmn.
?Cycadopites carpentieri Del. & Spr.
cf. Cycadopites sp.
?Deltoidospora australis Miner
D. minor Miner
Dictyotosporites speciosus C & D
Disaccites sp.
Foraminisporis asymmetricus Dtmn.
?Fwonthaggiensis Dtmn.
Ginkgocycadophytus nitidus de J.
Gleicheniidites cf. G. cercinidites Ckn.
Inaperturopollenites australis Pocock
?Laevigatosporites ovatus W & W
?Lycopodiacidites asperatus Dtmn.
Lycopodiumsporites austroclavatidites Pot.
Microcachyridites antarcticus Ckn.
?Podocarpidites cf. ellipticus Ckn.
Podosporites microsaccatus Dtmn.
?Proteacidites sp.
?Schizosporis parvus C & D.
aff. Sestrosporites pseudoalveolatus Dtmn.
Spheripollenites psilatus Couper
Stereisporites antiquasporites Dtmn.
?Tricolpites pachyexinus Couper
?T. pannosus D & P.
T. sp.
Trilobosporites sp.

Age

Lower Cretaceous.

6.5.13 S.W.C. 5549 ft. L193

Sporomorphs

Baculatisporites comaumensis Pot.
?Ceratosporites equalis C & D.
Cicatricosisporites australiensis Pot.
?Cingutriletes clavus Dtmn.
Contignisporites sp.
Cycadopites sp.
Deltoidospora minor Miner
Dictyotosporites filosus Dtmn.
Speciosus C & D.
Foraminisporis wonthaggiensis
Inaperturopollenites australis Pocock
?Kraeuselisporites majus Dtmn.
Lydopodiumsporites austroclavatidites Pot.
Microcachyridites antarcticus Ckn.
Podocarpidites cf. ellipticus Ckn.
Stereisporites antiquasporites Dtmn.

Age

Lower Cretaceous.

6.5.14 S.W.C. 5680 ft. L194

Sporomorphs

Baculatisporites comaumensis Pot.
?Camarozonosporites bullatus Harris
Cingutriletes clavus Dtmn.
Deltoidospora australis Miner
D. minor Miner
Dictyotosporites speciosus C & D.
Foraminisporis wonthaggiensis Dtmn.
Ginkgocycadopthytus nitidus de J.
Gleicheniidites cf. G. cercinidites Ckn.
Inaperturopollenites australis Pocock
?Leptolepidites verrucatus Couper
Cycopodiumsporites austroclavatidites Pot.
Microcachyridites antarcticus Ckn.
Podocarpidites cf. ellipticus Ckn.
Reticulatisporites pudens Balme
Stereisporites antiquasporites Dtmn.

Age

Lower Cretaceous.

6.5.15 S.W.C. 5739 ft. L195

Sporomorph

Gleicheniidites cf. G. cercinidites Ckn.

Age

Sample virtually barren - no indication of age possible.

6.5.16 S.W.C. 5826 ft. L196

Sporomorphs

Alisporites grandis Dtmn.
Ceratosporites equalis C & D.
Classopollis cf. classoides Dtmn.
cf. Coronatispora telata Dtmn.
Deltoidospora minor Miner
Foraminisporis wonthaggiensis Dtmn.
Ginkgocycadopthytus nitidus de J.
Gleicheniidites cf. G. cercinidites Ckn.
Inaperturopollenites australis Pocock
Lycopodiumsporites austroclavatidites Pot.
Microcachyridites antarcticus Ckn.
?Podocarpidites cf. ellipticus Ckn.
Reticulatisporites pudens Balme
Tsugaepollenites sp.

Age

Lower Cretaceous.

6.5.17 Conclusion

As it has only been possible to examine the limited number of sidewall cores, no general age conclusions can be made.

Age determinations made support accepted ages for the stratigraphic units sampled by sidewall cores.

6.5.18 Reference

Dettmann, M.E. and Playford, G. 1969: Palynology of the Australian Cretaceous - a reniew. IN: Stratigraphy and palaeontology, Essays in honour of Dorothy Hill (K.S.W. Campbell, Ed.); Chapter 9, 174-210. Aust. Nat. Uni. Press, Canberra.

6.6 WEEKLY DRILLING REPORTS

SHELL DEVELOPMENT (AUSTRALIA) PTY LTD	PERMIT: P.E.P. 5	WELL ROWANS-1
WEEKLY DRILLING REPORT No. 1 from 18-4-72 to 24-4-72		RIG ODE/RIG-11

R. T. Elevation 232 ft above MSL

~~Sea Bottom Depth~~ ~~Reference Datum~~

CASING						
Size	13⅜"	9-5/8"				
Depth	212'	2,485'				

DATE	DEPTH (PROGRESS) (feet)	MUD Weight (lb/gal) / pH	Viscosity (MF secs) / oil (%)	Waterloss (cc/30 mins) / Cl (ppm)	OPERATIONS
18-4	228 (228)				Spudded in at 09.00 hours with 17½" bit. Drilled to 228'. Made wipertrip.
19-4	228 (-)				Ran 7 joints 13⅜" casing, 355, 68lbs/ft. Shoe at 212 ft. Cemented same with 226 sacks Class-A + 1.5% Cacl-2. Returns 75%. Cement on surface. Waited on cement.
20-4	670 (442)	9.5 10.0	37 -	17	Installed BOP's. Tested blind rams and choke manifold to 1500 psi. Ran in. Tested piperams to 1500 psi. Tested Hydril to 1000 psi. Drilled cement 190'-212'. Drilled.
21-4	1634 (964)	9.4 10.5	43 -	15	Drilled to 1,634'. Lost returns. Pulled out. Ran in to 700' and tried to regain circulation. Unsuccessful. Pulled out.
22-4	2348 (714)	9.4 9.5	54 -	12	Ran in open ended to 200 feet. Regained circulation with water. Ran into 400 ft. circulated out mud ring with water. Pulled out. Ran in with bit to 1000 feet. Circulated out mud ring with water. Ran in to 1300'. Circulated. Ran in. Drilled. Deviation:- ½° at 1,840 feet.
23-4	2500 (152)	9.4 9.5	40	11	Drilled to 2,413 feet. Made roundtrip to change bit. Drilled to 2,500 feet. Made 5-stand wipertrip. Pulled out. Logged: IES : 2,495'-212' BHC-Cal : 2,490'-212' FDC-GR : 2,495'-212' GR to surface.
24-4	2500 (-)	9.4 9.5	40	11	Made roundtrip. Ran 63 joints, 9-5/8" casing, N80. 40 lbs/ft. Ltc + 17 joints, 9-5/8" casing, 355, 36 lbs/ft., Stc. Shoe at 2,485 feet. Cemented casing with 440 sacks Class-A + 2.5% Bentonite, 12.8 PPG, + 160 sacks Class-A + 1% Cacl-2, 15.4 PPG. Bumped with 1500 psi. Full returns. Cement on surface. Set slip and seal assembly.

SHELL DEVELOPMENT (AUSTRALIA) PTY LTD | PERMIT: | WELL

WEEKLY DRILLING REPORT No. from to | RIG

R. T. Elevation ft above MSL

Sea Bottom Depth ft below MSL

CASING						
Size						
Depth						

DATE	DEPTH (PROGRESS) (feet)	MUD			OPERATIONS
		Weight (lb/gal)	Viscosity (MF secs)	Waterloss (cc/30 mins)	
		pH	oil (%)	Cl (ppm)	

BIT RECORD

No.	Type	Size	Depth-in	Depth-out	Nozzles	WOB	RPM	PR	HOURS	COND.
1	T3AR	17½	0	228	-	8,000	70	28	8	1-1-I
2	YT3-3	12¼	228	1634	3x20	10,000	160	62	22½	1-1-I
RR2	YT3-3	12¼	1634	2413	3x20	15,000	160	42	18¾	4-4-I
3	YT3-3	12¼	2413	2500	3x20	15,000	160	38	2¼	1-1-I

MUD CHEMICALS USED

Aquagel	:	72 sacks
Q-Broxin	:	21 sacks
Dextrid	:	16 sacks
Sod. Bicarb.	:	8 sacks
Caustic	:	3 Drums

CEMENT

Class-A	:	826 sacks
Cacl -2	:	10 sacks

SHELL DEVELOPMENT (AUSTRALIA) PTY. LTD.

WEEKLY TIME ALLOCATION NO. 1

WEEK: 1 Well ROWANS-1 From 18-4-72 To 24-4- 1972

	OPERATIONS	18/4	19/4	20/4	21/4	22/4	23/4	24/4	Total hrs this week	Cum. Total hrs	Cum %
1	RIGGING-UP	9							9		
2	ANCHORING/BALLASTING										
3	WAITING ON WEATHER										
	SUB TOTAL MOVING										
4	DRILLING HRS ON BOTTOM	8		6½	16	15¾	4¾		51		
5	DRILLING ROUNDTRIPPING	½		½	6¼	5½	7¼	4½	24½		
6	REAMING						¼		¼		
7	ENLARGING										
8	CIRCULATION, COND. MUD.	3¾	1½		1	2½	2		10¾		
9	MISCELLANEOUS (TOTCO, ETC.				½	¼	¼		1		
	SUB TOTAL DRILLING								87½		
10	CORING HRS. ON BOTTOM										
11	CORING ROUNDTRIPPING										
12	CORING MISCELLANEOUS										
13	LOGGING						9		9		
14	ROUND TRIPS/CIRC. FOR LOG'NG						½		½		
15	DST & FIT										
16	ROUND TRIPS/CIRC. FOR TESTING										
	SUB TOTAL SUBSURFACE EVAL.								9½		
17	RUNNING CASING AND CEM.	2¾	3	6¼				14¾	26¾		
18	RUNNING/TESTING BOP		19½	8¼				4¾	32½		
	SUB TOTAL CASING								59¼		
19	FISHING										
20	STIMULATION TREATMENT										
21	COMPLETION										
22	PRODUCTION TESTING										
23	ABANDONMENT										
	SUB TOTAL										
24	REPAIR DRAWWORKS										
25	REPAIR PUMPS										
26	REPAIR ENGINES/GENERATORS				¼				¼		
27	REPAIR BOP			2¼					2¼		
28	REPAIR MISCELLANEOUS			¼					¼		
29	WAITING ON WEATHER/TIDE										
30	WAITING ON COMPANY										
31	WAITING ON CONTRACTOR										
	SUB TOTAL								2¾		
	GRAND TOTAL								168		

SHELL DEVELOPMENT (AUSTRALIA) PTY LTD | PERMIT: P.E.P. 5 | WELL ROWANS-1

WEEKLY DRILLING REPORT No. 2 from 25-4-72 to 1-5-72 | RIG ODE RIG 11

R.T. Elevation 232 ft above MSL

~~Sea x Bottom x Depth~~ ~~Bottom x MSL~~

CASING						
Size	13⅜"	9-5/8"				
Depth	212'	2,485'				

DATE	DEPTH (PROGRESS) (feet)	MUD Weight (lb/gal) / pH	MUD Viscosity (MF secs) / oil (%)	MUD Waterloss (cc/30 mins) / Cl (ppm)	OPERATIONS
25-4	2525 (25)	9.2 100	38 -	13	Installed BOP's. Tested blind rams to 2000 p.s.i. pipe rams to 3000 p.s.i. Hydril to 1500 p.s.i. Ran in. Drilled out cement. Drilled to 2525 ft. Bit plugged.
26-4	2979 (454)	9.2 10.0	35 -	12	Made roundtrip. Bit plugged again. Repaired pump. Made roundtrip. Drilled. Deviation: 0° at 2950 ft.
27-4	3716 (737)	9.2 9.5	42 -	9.2	Drilled to 3703 ft. Made roundtrip to change bit. Drilled. Deviation: 0° at 3415 ft.
28-4	4440 (724)	9.6 9.5	42 -	9.0	Drilled to 4351 ft. Made roundtrip to change bit. Drilled. Deviation: ¼° at 4218 ft.
29-4	5070 (630)	9.4 10.0	40 -	10.2	Drilled to 5018 ft. Made roundtrip to change bit. Drilled to 5070 ft. Bearings of Rotary Table drive worn out. Pulled out to casing shoe. Waited on new bearings. Deviation: 1° at 4998 ft.
30-4	5105 (35)	9.6 10.0	42 -	10.0	Repaired Rotary Table drive. Ran in. Drilled.
1-5	5450 (345)	9.5 10.0	44 -	10.0	Drilled to 5321 ft. Made roundtrip to change bit. Drilled. Deviation: ½° at 5310 ft.

SHELL DEVELOPMENT (AUSTRALIA) PTY LTD | PERMIT: | WELL

WEEKLY DRILLING REPORT No. from to | RIG

R. T. Elevation ft above MSL

Sea Bottom Depth ft below MSL

CASING

Size						
Depth						

DATE	DEPTH (PROGRESS) (feet)	MUD Weight (lb/gal)	Viscosity (MF secs)	Waterloss (cc/30 mins)	OPERATIONS
		pH	oil (%)	Cl (ppm)	

BIT RECORD

No.	Type	Size	Depth in	Depth out	Nozzles	WOB	RPM	PR	HOURS	Condition
4	S33	8½	2500	3703	3 x 12	20,000	85	53	22½	7-6-⅜
5	S44	8½	3703	4351	3 x 12	25,000	80	42	15½	6-4-⅛
6	S44	8½	4351	5018	3 x 12	25,000	90	46	14½	7-2-⅛
7	S44	8½	5018	5321	3 x 12	25,000	80	22	13½	4-2-⅛
8	S44	8½	5321	IN HOLE						

MUD CHEMICALS USED

Aquagel	77 sacks
Q-Broxin	15 sacks
Dextrid	29 sacks
Sodium Bicarb.	4 sacks
Caustic	8 drums

SHELL DEVELOPMENT (AUSTRALIA) PTY. LTD.

WEEKLY TIME ALLOCATION NO. 2

WEEK: 2 Well ROWANS-1 From 25-4-72 To 1-5- 1972

	OPERATIONS	25/4	26/4	27/4	28/4	29/4	30/4	1/5	Total hrs this week	Cum.Total hrs	Cum %
1										EXCLUDED	
2	ANCHORING/BALLASTING										
3	WAITING ON WEATHER										
	SUB TOTAL MOVING										
4	DRILLING HRS ON BOTTOM	½	6½	16½	18¼	13¼	1¼	16¼	72½	123½	
5	DRILLING ROUNDTRIPPING	6¼	11¾	6	5¼	7	1¼	6¾	44¼	68¾	
6	REAMING		2	¾		¾		¼	3¾	4	
7	ENLARGING										
8	CIRCULATION, COND. MUD.		1½			½	¼	¾	3	13¾	
9	MISCELLANEOUS (TOTCO,ETC.		¼	¼	½	¼			1¼	2¼	
	SUB TOTAL DRILLING								124¾	212¼	
10	CORING HRS. ON BOTTOM										
11	CORING ROUNDTRIPPING										
12	CORING MISCELLANEOUS										
13	LOGGING									9	
14	ROUND TRIPS/CIRC.FOR LOG'NG									½	
15	DST & FIT										
16	ROUND TRIPS/CIRC.FOR TESTING										
	SUB TOTAL SUBSURFACE EVAL.									9½	
17	RUNNING CASING AND CEM.									26¾	
18	RUNNING/TESTING BOP's	17							17	49½	
	SUB TOTAL CASING								17	76¼	
19	FISHING										
20	STIMULATION TREATMENT										
21	COMPLETION										
22	PRODUCTION TESTING										
23	ABANDONMENT										
	SUB TOTAL										
24	REPAIR DRAWWORKS						2		2	2	
25	REPAIR PUMPS		1						1	1	
26	REPAIR ENGINES/GENERATORS									¼	
27	REPAIR BOP									2¼	
28	REPAIR MISCELLANEOUS	¼	1	½		2¼			4	4¼	
29	WAITING ON WEATHER/TIDE										
30	WAITING ON COMPANY										
31	WAITING ON CONTRACTOR						19¼		19¼	19¼	
	SUB TOTAL								26¼	29	
	GRAND TOTAL								168	327	

SHELL DEVELOPMENT (AUSTRALIA) PTY LTD | PERMIT: P.E.P. 5 | WELL ROWANS-1

WEEKLY DRILLING REPORT No. 3 from 2-5-72 to 5-5-72 | RIG ODE RIG 11

R. T. Elevation 232 ft above MSL

~~Sea Bottom Depth~~ ~~ft below MSL~~

CASING						
Size	13⅜"	9-5/8"				
Depth	212'	2485'				

DATE	DEPTH (PROGRESS) (feet)	MUD Weight (lb/gal) / pH	MUD Viscosity (MF secs) / oil (%)	MUD Waterloss (cc/30 mins) / Cl (ppm)	OPERATIONS
2-5	5900 (450)	9.7 / 10.0	47 / -	9.8	Drilled to 5,900 feet (T.D.). Circulated. Pulled out. Deviation: ¾° at 5890 ft.
3-5	5900	9.7 / 10.0	47	9.8	Logged : IES Stood up at 5460 feet. Made roundtrip. Logged: IES : 5903-2489 feet BHC-Cal : 5893-2489 feet Geophone Survey FDC-GR : 5902-2490 feet
4-5	5900				CDM : 5899-2489 feet CST : Tried 30 Recovered 16 Lost bullets 17 Laid down drill collars. Ran in open ended to 5400 feet and set cement plug 5400-5000 feet. Pulled to shoe. WOC.
505	5900 (50' PB)				Ran in. Tagged top cement at 5008 feet. Set cement plug 2635-2285 feet. WOC. Tagged top plug at 2245 feet. Laid down drill pipe. Set cement plug 200 - 50 feet. Removed BOP's. Welded plate on 13⅜" casing head housing. Released rig at 20.00 hours.
					Final co-ordinates Rowans-1: AMG : 656 062.63 metres east 5741 650.07 metres north LATITUDE : 38° 27' 34.86" S LONGITUDE: 142° 47' 19.26" E ROTARY TABLE ELEVATION : 232.2 feet above MSL

SHELL DEVELOPMENT (AUSTRALIA) PTY LTD | PERMIT: | WELL

WEEKLY DRILLING REPORT No. from to | RIG

R. T. Elevation ft above MSL

Sea Bottom Depth ft below MSL

CASING

Size						
Depth						

DATE	DEPTH (PROGRESS) (feet)	MUD: Weight (lb/gal) / pH	MUD: Viscosity (MF secs) / oil (%)	MUD: Waterloss (cc/30 mins) / Cl (ppm)	OPERATIONS

BIT RECORD

No.	Type	Size	Depth in	Depth out	Nozzles	WOB	RPM	PR	Hours	Condition
8	S44	$8\frac{1}{2}$	5321	5900	3 x 12	25.000	75	24	$23\frac{3}{4}$	4-4-I

MUD CHEMICAL USED	WEEK	TOTAL CONSUMPTION
Aquagel	-	149 sacks
Q-Broxin	5 sacks	41 sacks
Dextrid	-	45 sacks
Sodium Bicarb.	-	12 sacks
Caustic	-	11 drums

CEMENT		TOTAL CONSUMPTION
Class-A	344 sacks	1170 sacks
CaCl-2	-	10 sacks

SHELL DEVELOPMENT (AUSTRALIA) PTY. LTD.

WEEKLY TIME ALLOCATION NO. 3

WEEK: 3 Well ROWANS-1 From 2-5-72 To 5-5- 1972

	OPERATIONS	2/5	3/5	4/5	5/5				Total hrs this week	Cum.Total hrs	Cum %
1	RIGGING-DOWN				4				4	EXCLUDED	
2	ANCHORING/BALLASTING										
3	WAITING ON WEATHER										
	SUB TOTAL MOVING										
4	DRILLING HRS ON BOTTOM	17¼							17¼	140¾	33.6
5	DRILLING ROUNDTRIPPING	3¾							3¾	72½	17.3
6	REAMING									4	.9
7	ENLARGING										
8	CIRCULATION, COND. MUD.	1½							1½	15¼	3.6
9	MISCELLANEOUS (TOTCO,ETC.	¾							¾	3	.7
	SUB TOTAL DRILLING								23¼	235½	56.2
10	CORING HRS. ON BOTTOM										
11	CORING ROUNDTRIPPING										
12	CORING MISCELLANEOUS										
13	LOGGING	¾	15½	10¼					26½	35½	8.5
14	ROUND TRIPS/CIRC.FOR LOG'NG		8½						8½	9	2.1
15	DST & FIT										
16	ROUND TRIPS/CIRC.FOR TESTING										
	SUB TOTAL SUBSURFACE EVAL.								35	44½	10.6
17	RUNNING CASING AND CEM.									26¾	6.4
18	RUNNING/TESTING BOP									49½	11.8
	SUB TOTAL CASING									76¼	18.2
19	FISHING										
20	STIMULATION TREATMENT										
21	COMPLETION										
22	PRODUCTION TESTING										
23	ABANDONMENT			13¾	20				33¾	33¾	8.1
	SUB TOTAL								33¾	33¾	8.1
24	REPAIR DRAWWORKS									2	0.5
25	REPAIR PUMPS									1	0.2
26	REPAIR ENGINES/GENERATORS									¼	0.1
27	REPAIR BOP									2¼	0.5
28	REPAIR MISCELLANEOUS									4¼	1.0
29	WAITING ON WEATHER/TIDE										
30	WAITING ON COMPANY										
31	WAITING ON CONTRACTOR									19¼	4.6
	SUB TOTAL									29	6.9
	GRAND TOTAL								96	419	

ENCLOSURE 7
SDA 131

WELL VELOCITY SURVEY
ROWANS No. 1.

Record No. 2..... Depth. 3000...

Shot Point. 2..... Charge. 15.....

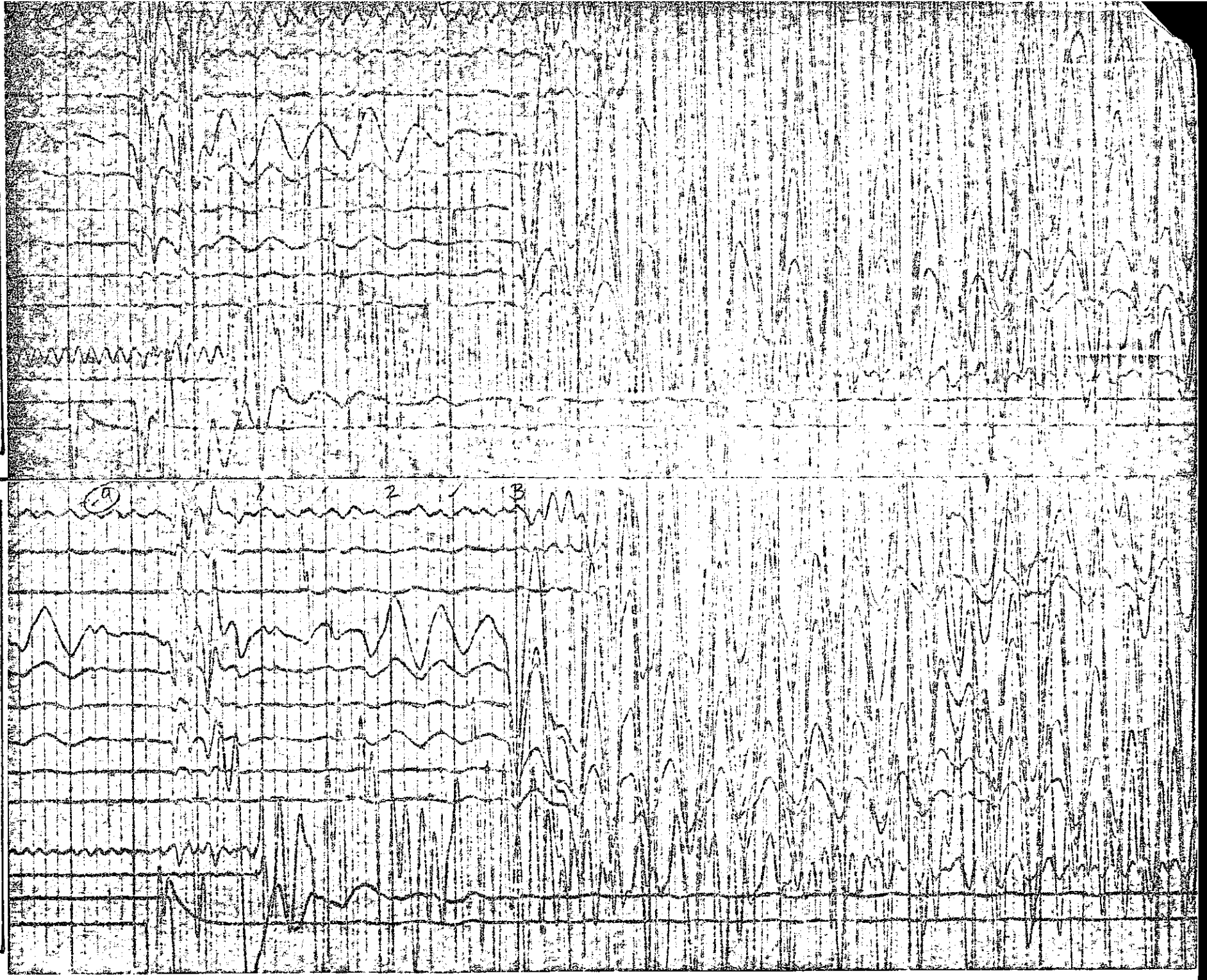
Time. 1822 Date. 3/5/72..

WELL VELOCITY SURVEY
ROWANS No. 1.

Record No. 1..... Depth. 2600....

Shot Point. 1..... Charge. 15 lb.

Time. 1817.. Date. 3/5/72..



WELL VELOCITY SURVEY
ROWANS No. 1.

Record No. 3..... Depth. 3500...

Shot Point. 3..... Charge. 15.....

Time. 1824. Date. 3/5/72..

WELL VELOCITY SURVEY
ROWANS No. 1.

Record No. ..4..... Depth. 4000....

Shot Point. .4..... Charge. 15.....

Time. 1828.... Date. 3/5/72...

WELL VELOCITY SURVEY
ROWANS No. 1.

Record No. 5..... Depth. 4500....

Shot Point. 5..... Charge. 15.....

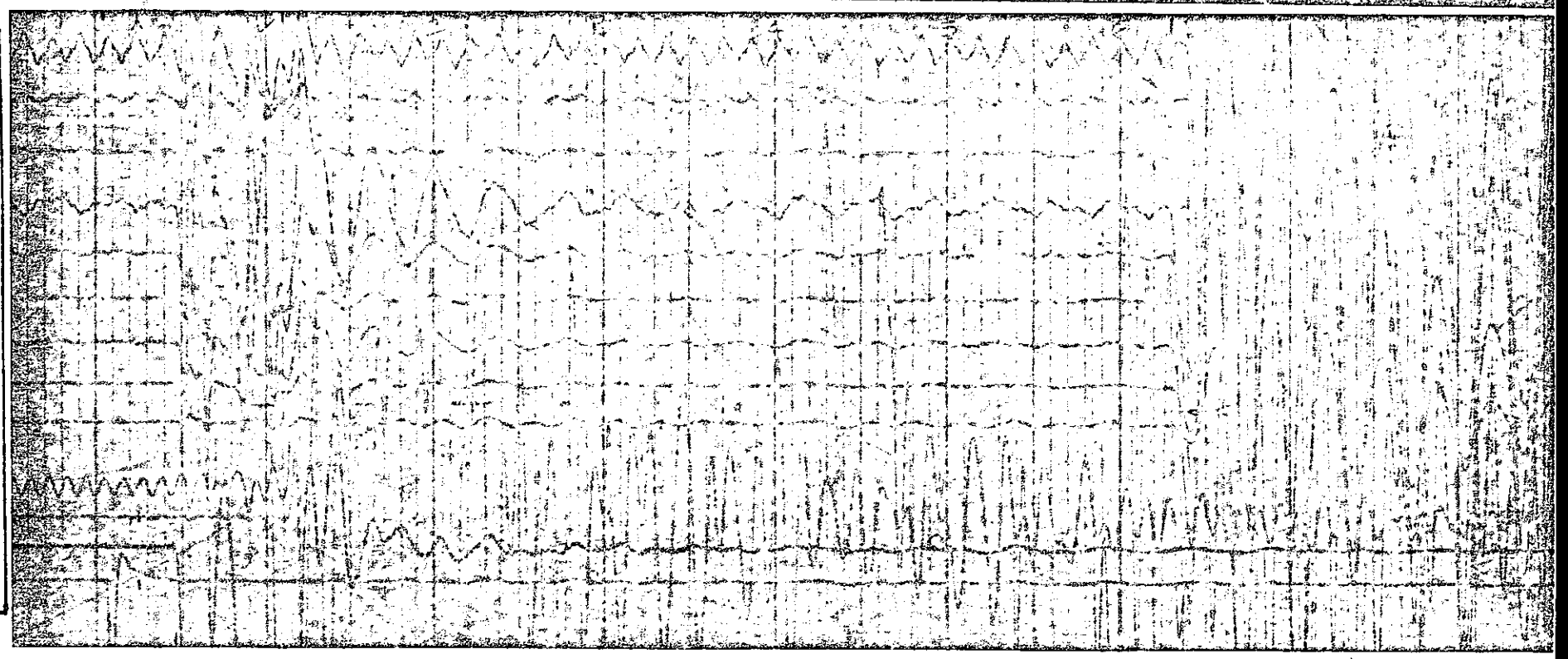
Time. .1832 Date. 3/5/72...

WELL VELOCITY SURVEY
ROWANS No. 1.

Record No. 6..... Depth. 5000....

Shot Point. 6..... Charge. 15.....

Time. 1835. Date. 3/5/72..

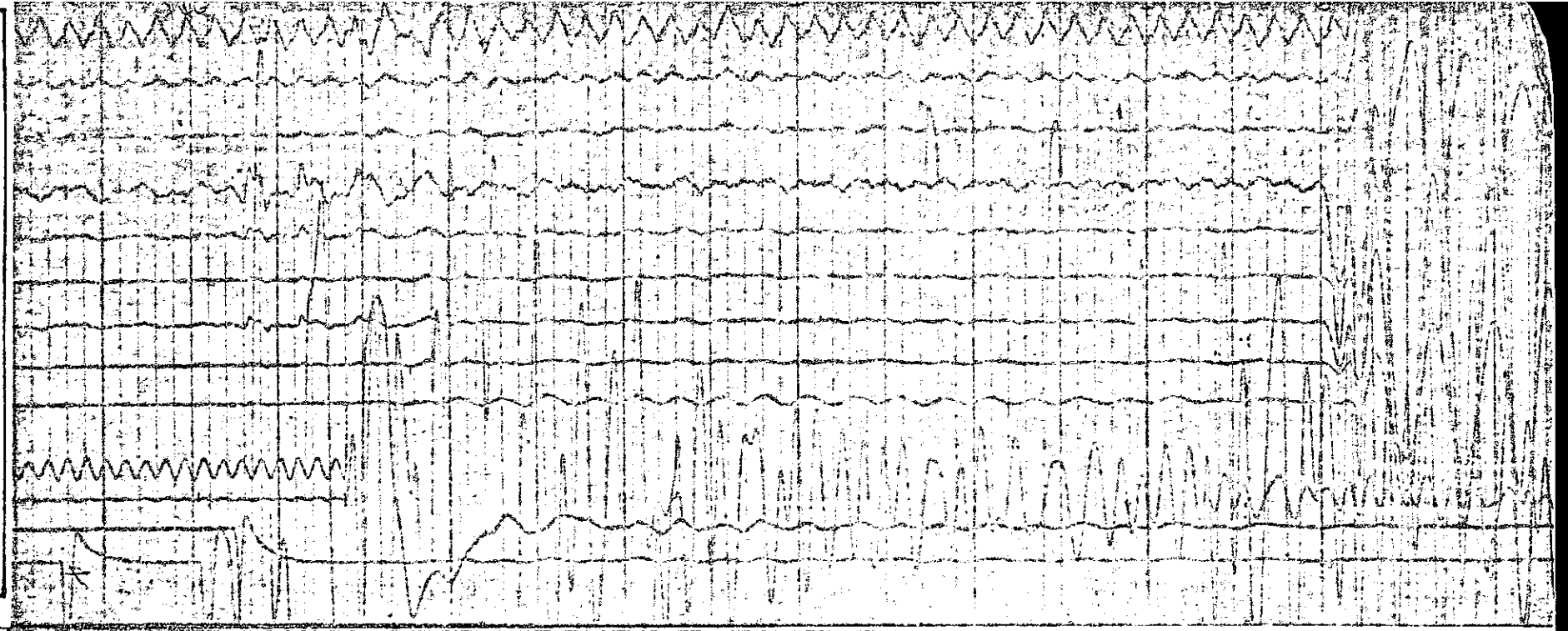


WELL VELOCITY SURVEY
ROWANS No. 1.

Record No. 7..... Depth. 5,500...

Shot Point. 7..... Charge. 15.....

Time. 1838... Date. 3/5/72...

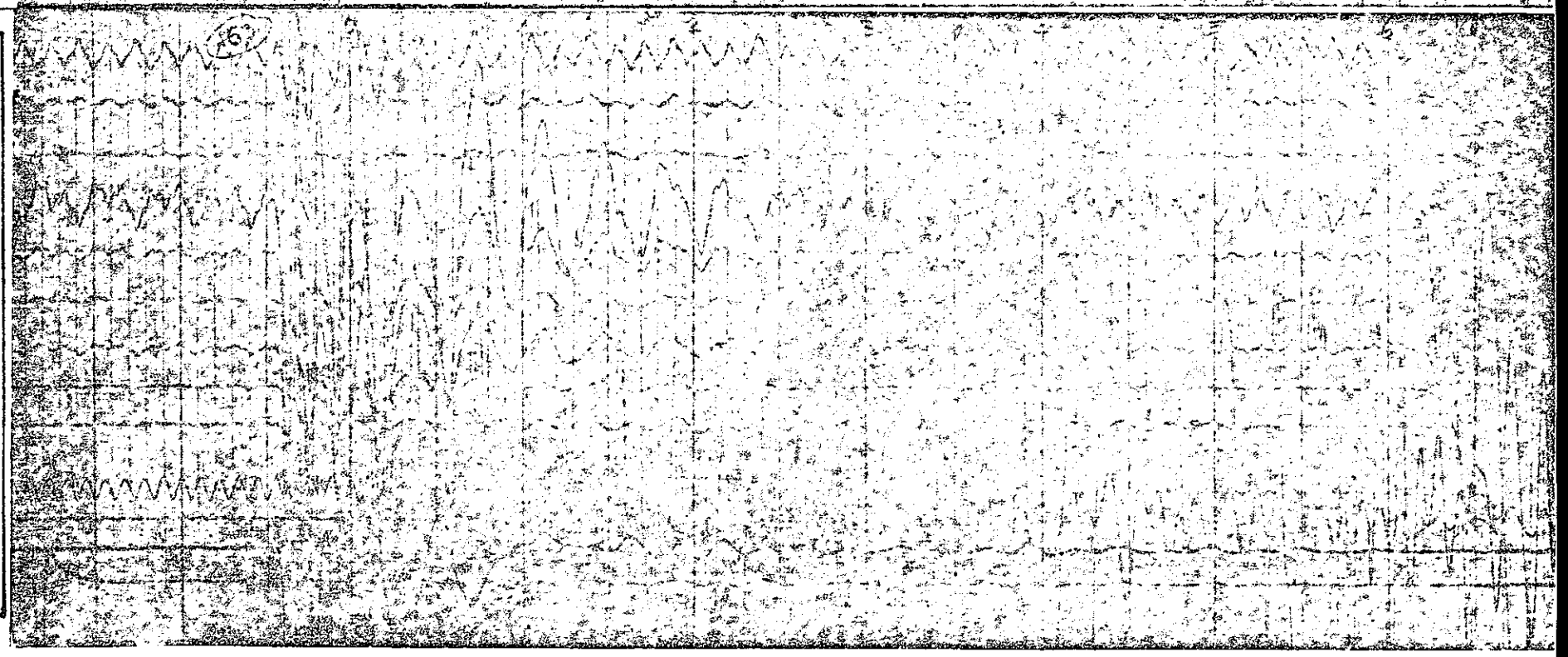


WELL VELOCITY SURVEY
ROWANS No. 1.

Record No. 8..... Depth. 5900...

Shot Point. 8..... Charge. 15.....

Time. 1842 Date. 3/5/72...

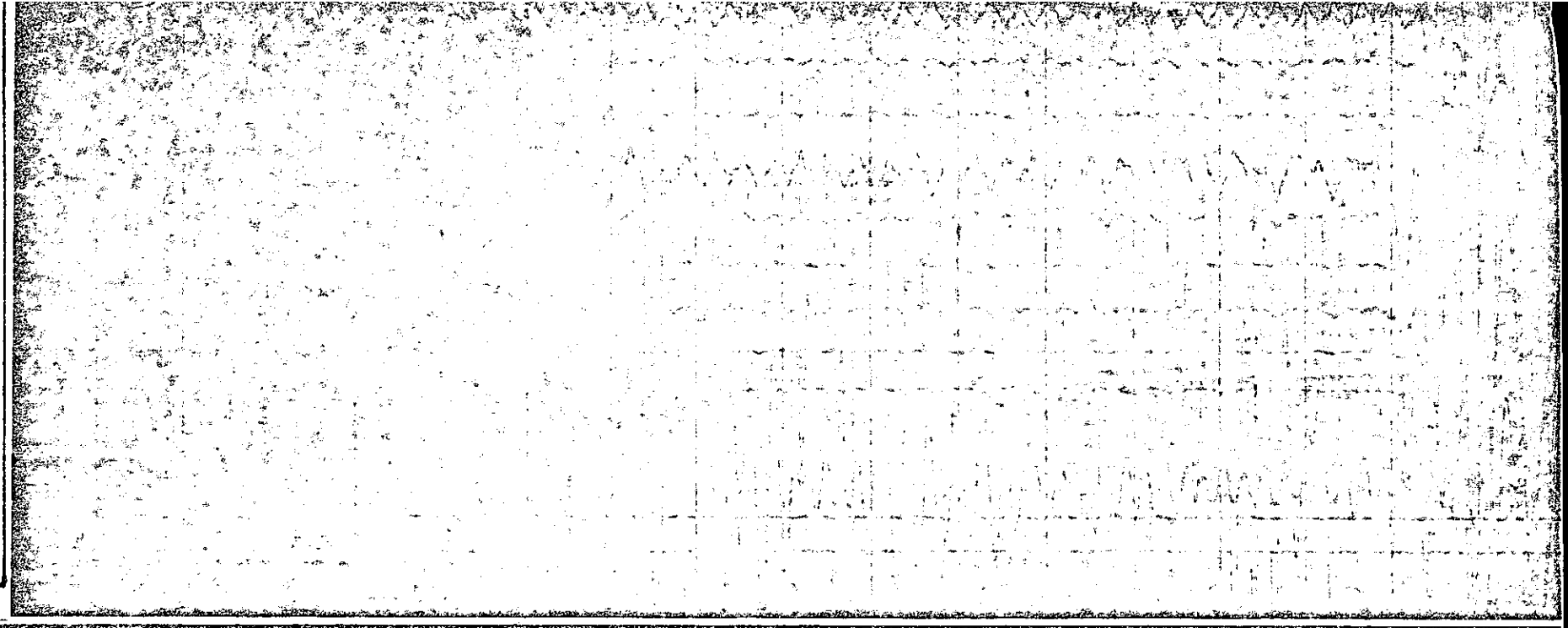


WELL VELOCITY SURVEY
ROWANS No. 1.

Record No. ..9..... Depth. 5900....

Shot Point. ..9..... Charge. 15.....

Time. .1856. Date. 3/5/72..

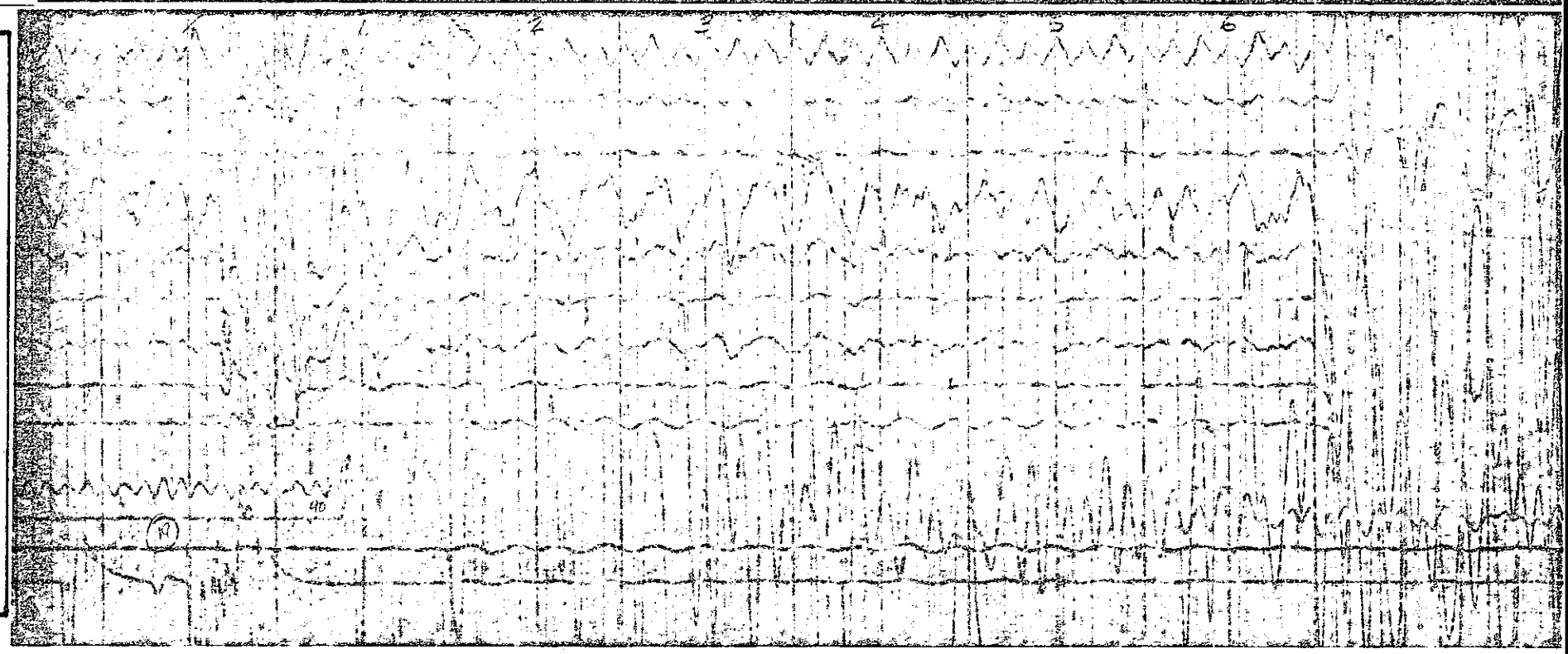


WELL VELOCITY SURVEY
ROWANS No. 1.

Record No. 10..... Depth. 5,500....

Shot Point. 10..... Charge. 15.....

Time. .1900.. Date. 3/5/72..



WELL VELOCITY SURVEY
ROWANS No. 1.

Record No. ..11..... Depth. 5000....

Shot Point. ..13.... Charge. 15.....

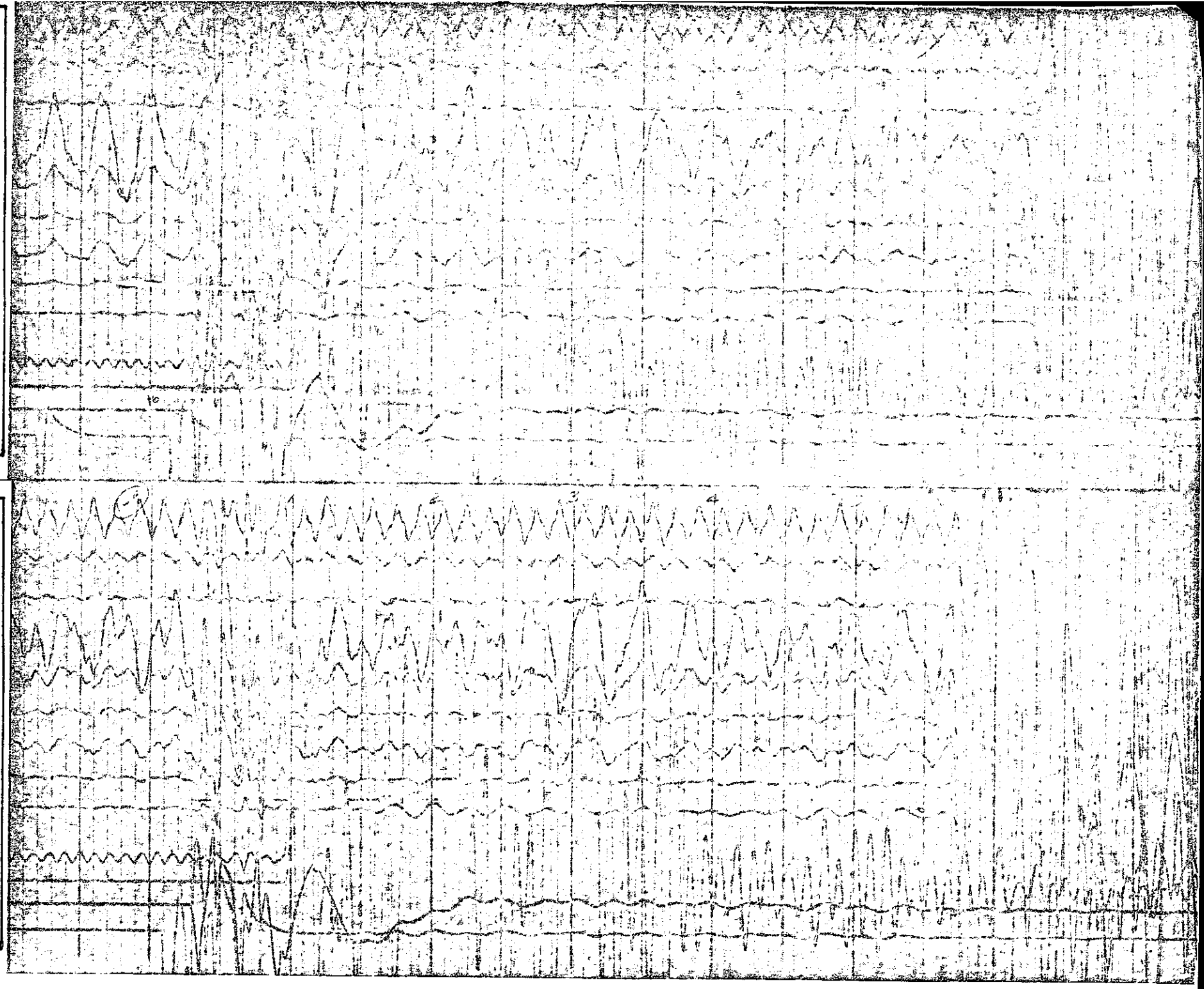
Time. 1935.. Date. 3/5/72...

WELL VELOCITY SURVEY
ROWANS No. 1.

Record No. 13..... Depth. 4500...

Shot Point. 15..... Charge. 15.....

Time. 1946.. Date. 3/5/72..

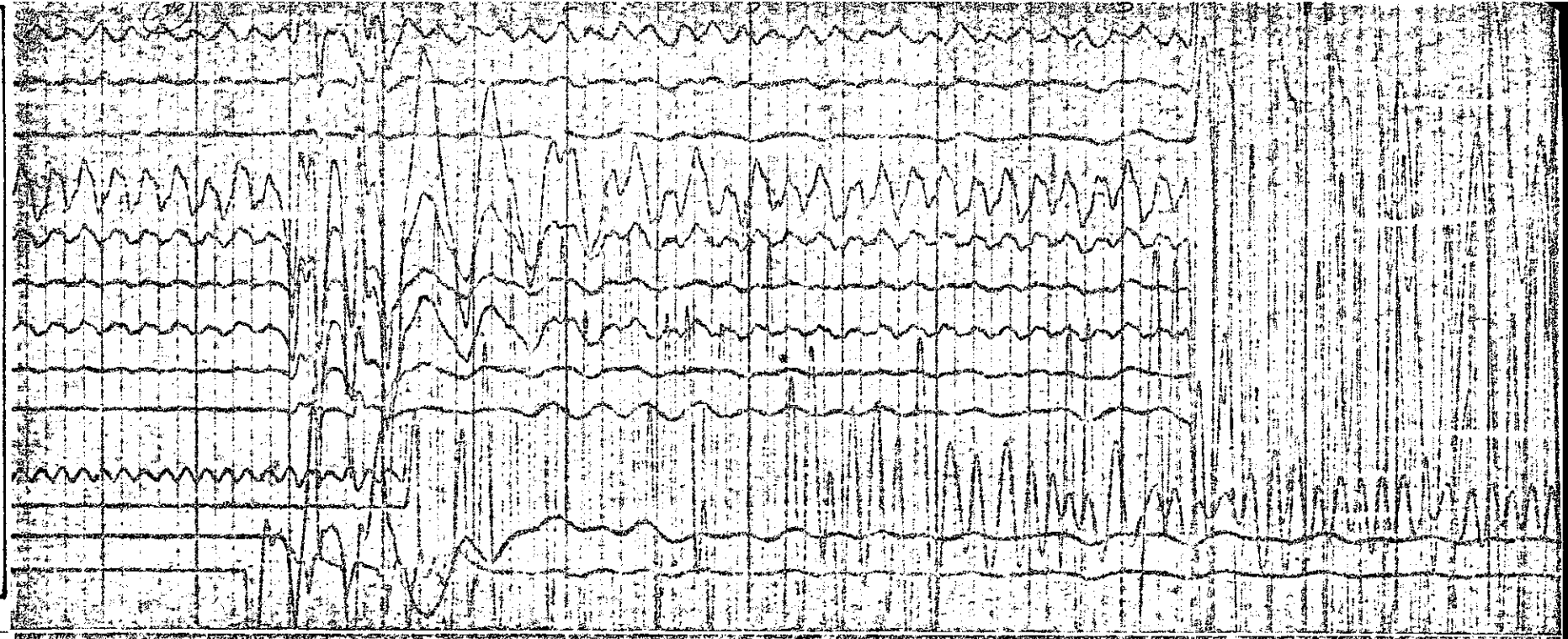


WELL VELOCITY SURVEY
ROWANS No. 1.

Record No. 14..... Depth. 4000....

Shot Point. 16..... Charge. 15.....

Time 1951..... Date. 3/5/72...

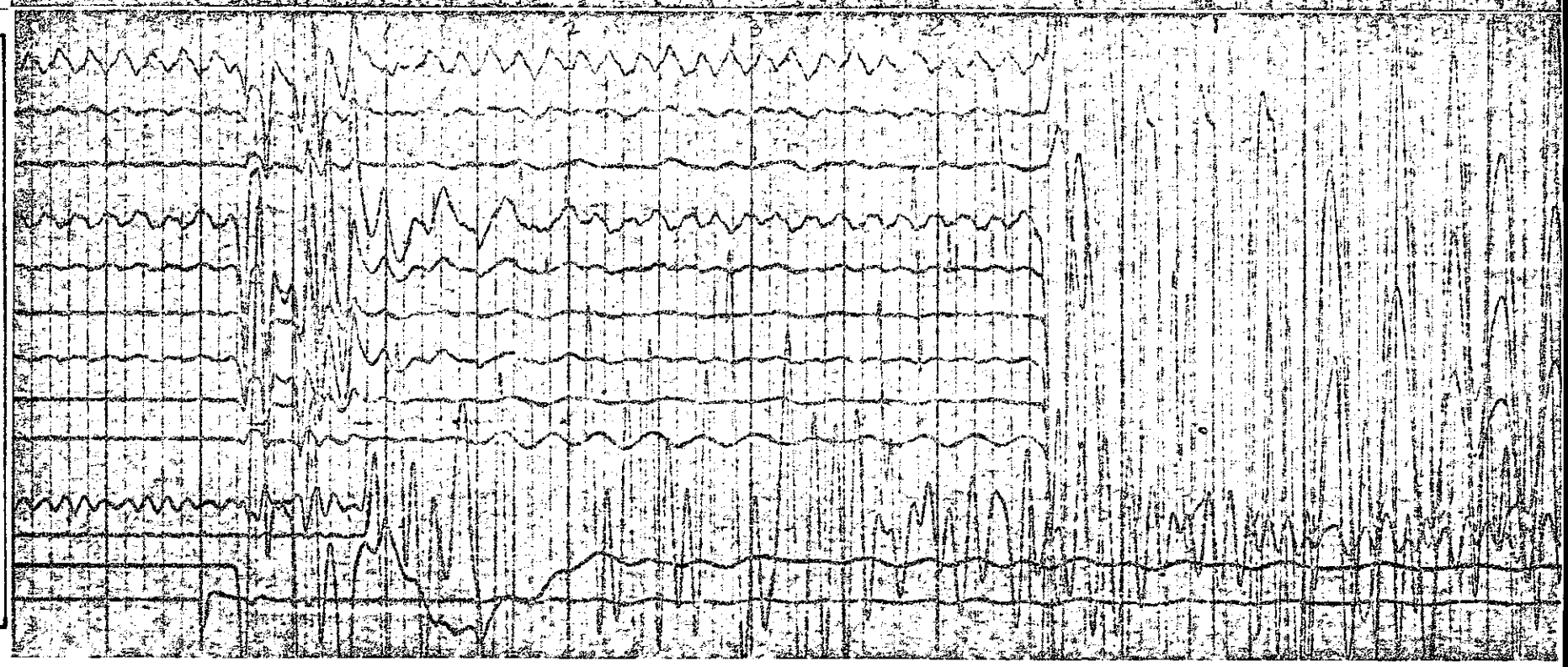


WELL VELOCITY SURVEY
ROWANS No. 1.

Record No. 15..... Depth. 3500....

Shot Point. 11A..... Charge 10.....

Time. 2002. Date. 3/5/72....



WELL VELOCITY SURVEY
ROWANS No. 1.

Record No. 16..... Depth. 3000..

Shot Point. 10A.... Charge. 10.....

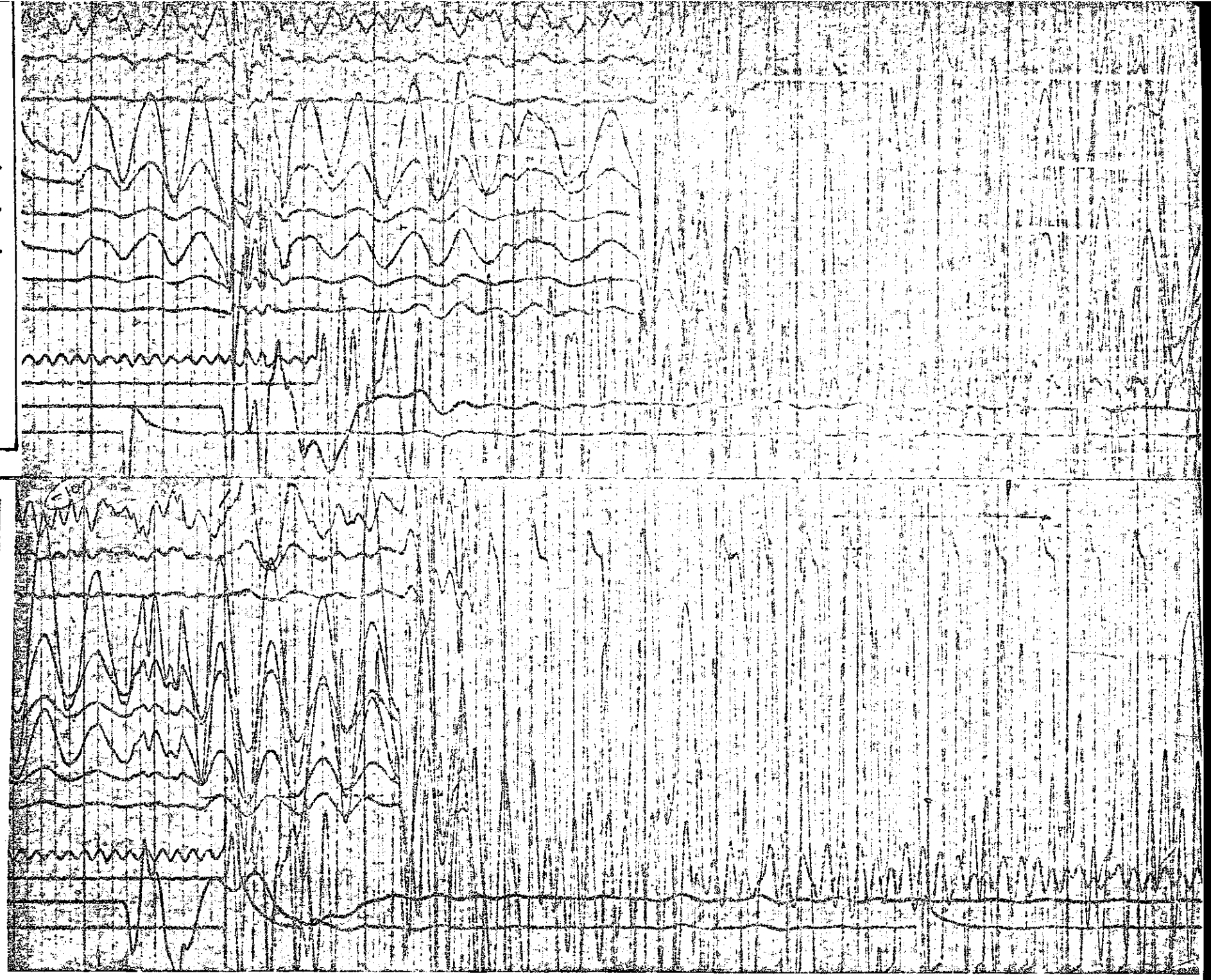
Time. 2007. Date. 3/5/72..

WELL VELOCITY SURVEY
ROWANS No. 1.

Record No. 17..... Depth. 1800....

Shot Point. 9A..... Charge. 10.....

Time. 2018. Date. 3/5/72.

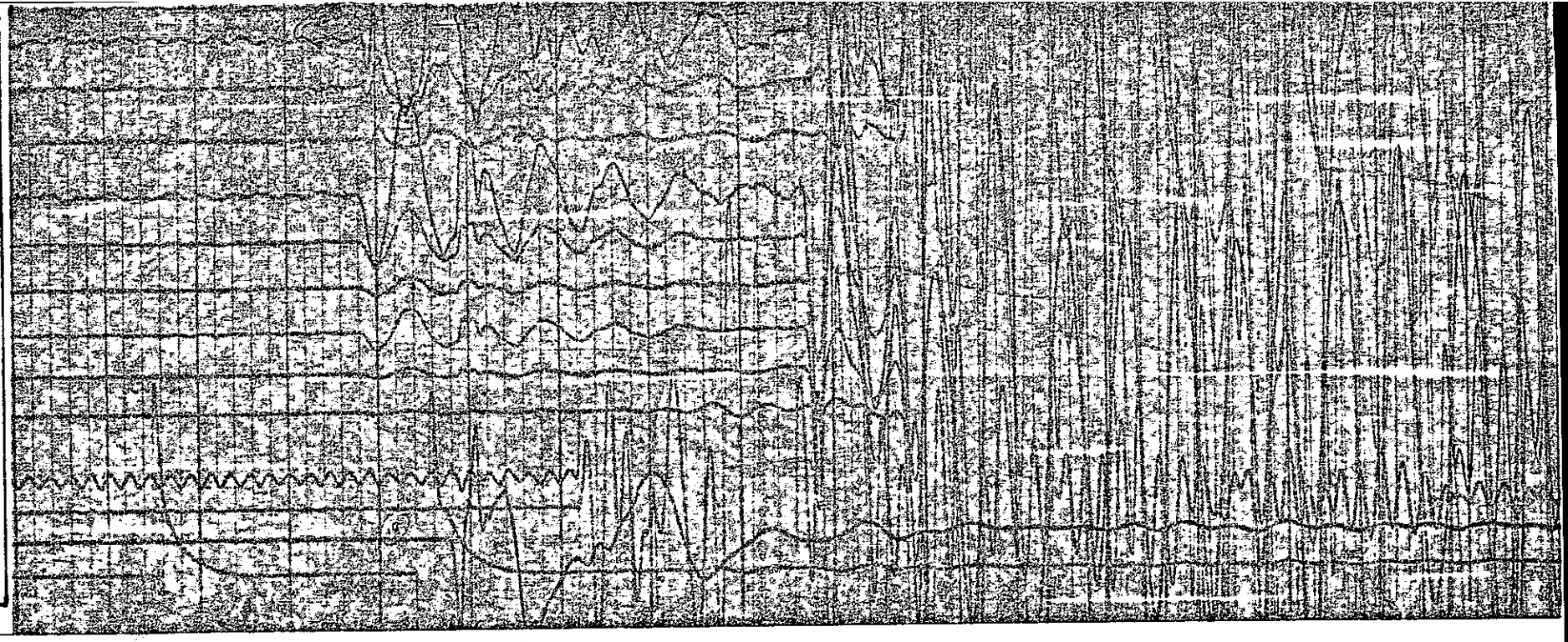


WELL VELOCITY SURVEY
ROWLIS No. 1.

Record No. 18..... Depth. 1800....

Shot Point. 10B..... Charge. 10.....

Time. 4022 Date. 3/5/72..

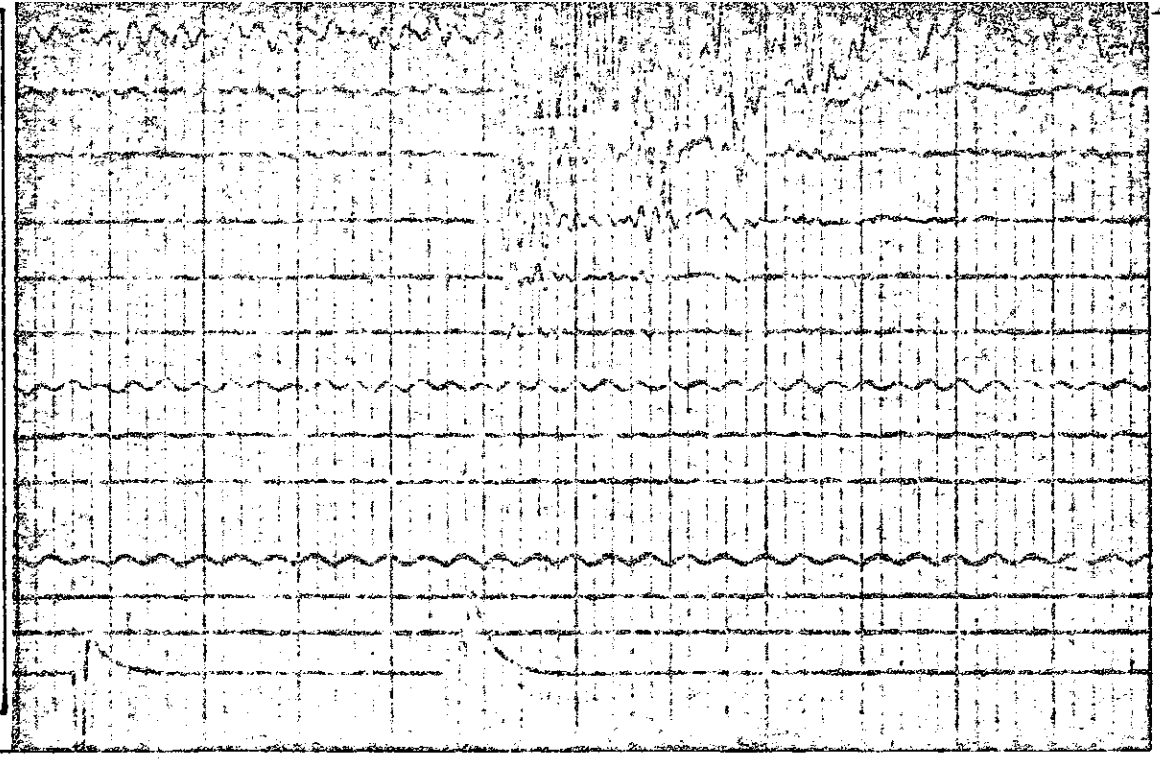


WELL VELOCITY SURVEY
ROWANS No. 1.

Record No. U/H.1... Depth. 200'.....

Shot Point. ..... Charge. .....

Time. 1715.... Date. 3/5/72...

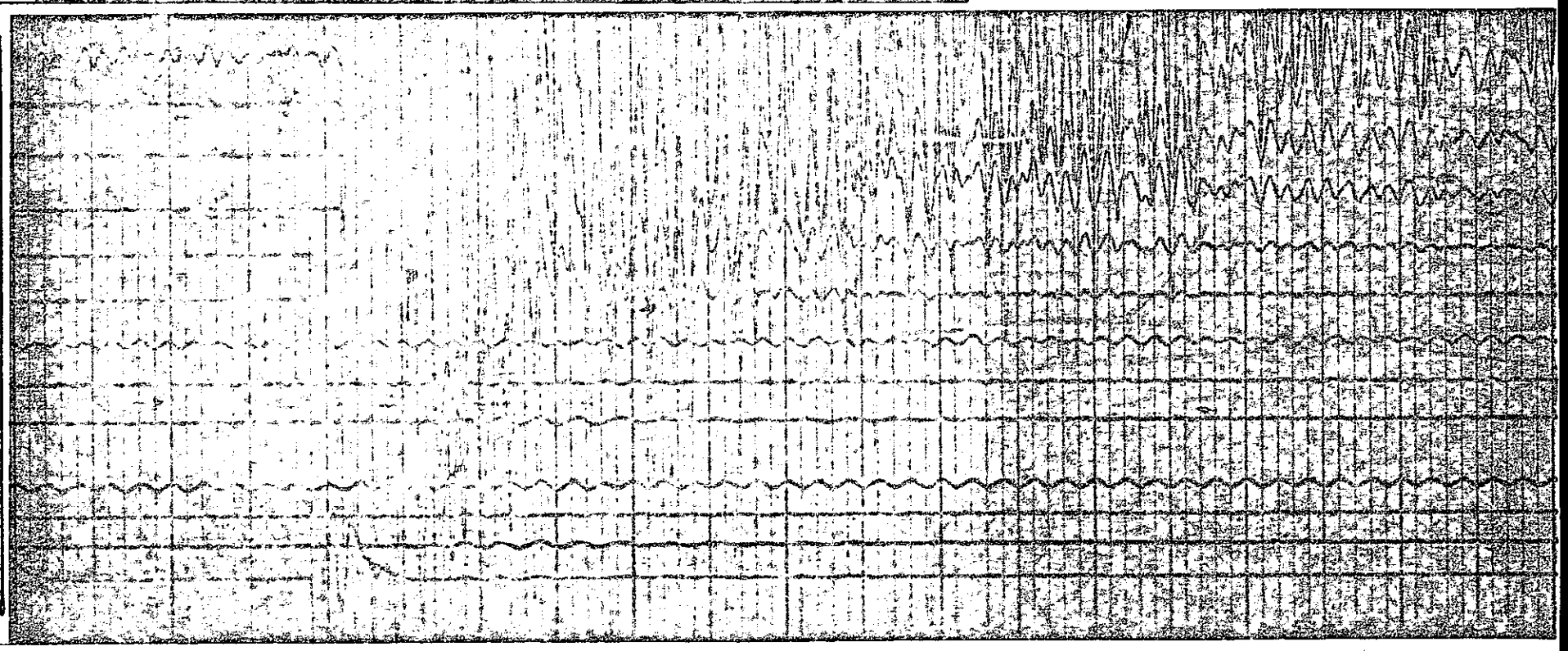


WELL VELOCITY SURVEY
ROWANS No. 1.

Record No. U/H.2... Depth. 150.....

Shot Point. ..... Charge. .....

Time. 1719.... Date. 3/5/72...



WELL VELOCITY SURVEY
ROWANS No. 1.

Record No. U/H.3... Depth. 100.....

Shot Point. ..... Charge. .....

Time. 1721.... Date. 3/5/72..

WELL VELOCITY SURVEY
ROWANS No. 1.

Record No. U/H.5. Depth. ..50'....

Shot Point. ..... Charge. .....

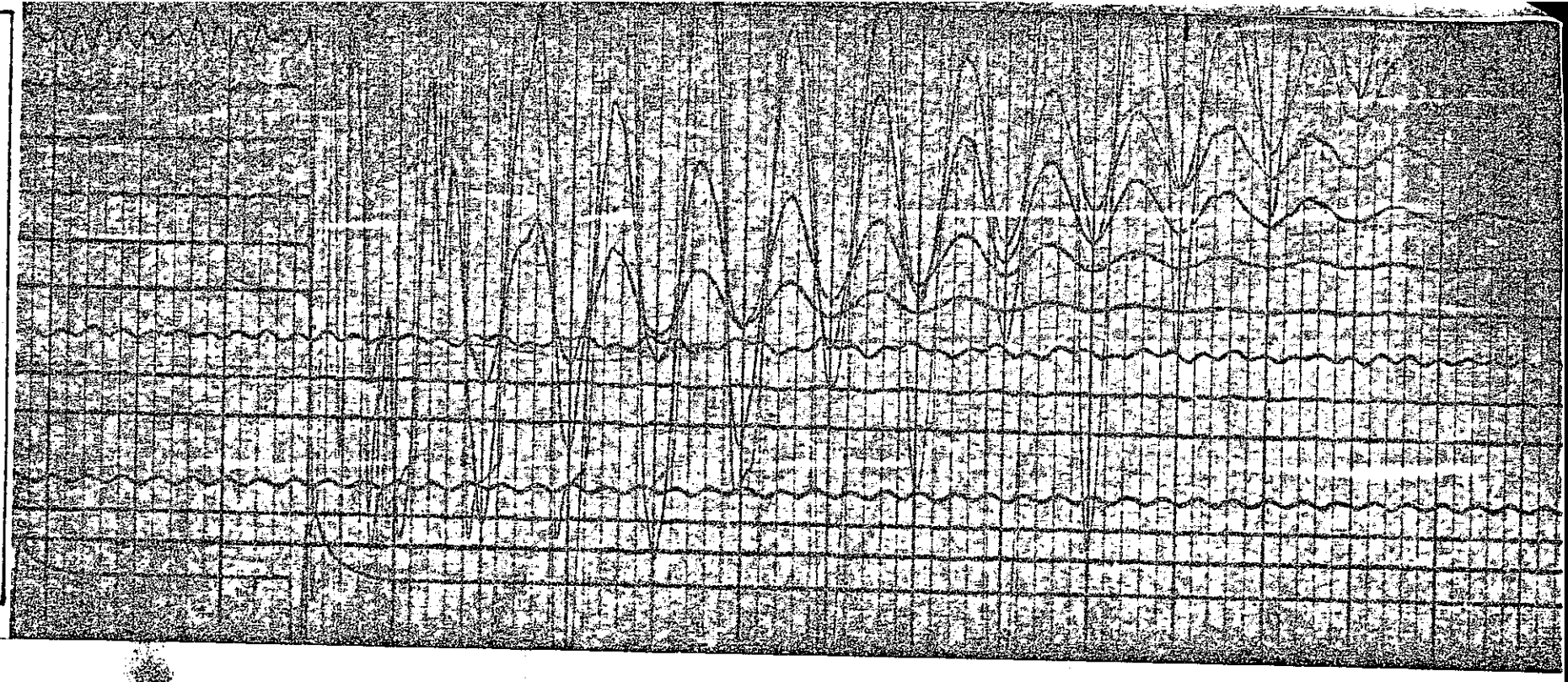
Time. 1730... Date. 3/5/72..

WELL VELOCITY SURVEY
ROWANS No. 1.

Record No. 4/H.7.... Depth. 10'.....

Shot Point. ..... Charge. Cap only..

Time. 1734.. Date. 3/5/72...



PE907133

This is an enclosure indicator page.
The enclosure PE907133 is enclosed within the container PE902778 at this location in this document.

The enclosure PE907133 has the following characteristics:

ITEM_BARCODE	= PE907133
CONTAINER_BARCODE	= PE902778
NAME	= Foraminifera Distribution Chart
BASIN	= OTWAY
PERMIT	= PEP/5
TYPE	= WELL
SUBTYPE	= DIAGRAM
DESCRIPTION	= Distribution of Selected Foraminifera (enclosure from WCR) for Rowans-1
REMARKS	=
DATE_CREATED	= 31/07/72
DATE_RECEIVED	=
W_NO	= W644
WELL_NAME	= ROWANS-1
CONTRACTOR	=
CLIENT_OP_CO	= SHELL DEVELOPMENT (AUSTRALIA)PTY LTD

(Inserted by DNRE - Vic Govt Mines Dept)

PE907134

This is an enclosure indicator page.
The enclosure PE907134 is enclosed within the container PE902778 at this location in this document.

The enclosure PE907134 has the following characteristics:

ITEM_BARCODE	= PE907134
CONTAINER_BARCODE	= PE902778
NAME	= Foraminifera Zonation Chart
BASIN	= OTWAY
PERMIT	= PEP/5
TYPE	= WELL
SUBTYPE	= DIAGRAM
DESCRIPTION	= Comparison of Foraminifera Zonations (enclosure from WCR) for Rowans-1
REMARKS	=
DATE_CREATED	= 30/06/72
DATE_RECEIVED	=
W_NO	= W644
WELL_NAME	= ROWANS-1
CONTRACTOR	=
CLIENT_OP_CO	= SHELL DEVELOPMENT (AUSTRALIA)PTY LTD

(Inserted by DNRE - Vic Govt Mines Dept)

PE907135

This is an enclosure indicator page.
The enclosure PE907135 is enclosed within the container PE902778 at this location in this document.

The enclosure PE907135 has the following character

ITEM_BARCODE	= PE907135
CONTAINER_BARCODE	= PE902778
NAME	= Summary Sheet
BASIN	= OTWAY
PERMIT	= PEP/5
TYPE	= WELL
SUBTYPE	= MONTAGE
DESCRIPTION	= Summary Sheet (enclosure from W Rowans-1
REMARKS	=
DATE_CREATED	= 30/05/72
DATE_RECEIVED	=
W_NO	= W644
WELL_NAME	= ROWANS-1
CONTRACTOR	=
CLIENT_OP_CO	= SHELL DEVELOPMENT (AUSTRALIA)PTY

(Inserted by DNRE - Vic Govt Mines Dept)

PE907137

This is an enclosure indicator page.
The enclosure PE907137 is enclosed within the container PE902778 at this location in this document.

The enclosure PE907137 has the following character

ITEM_BARCODE	= PE907137
CONTAINER_BARCODE	= PE902778
NAME	= Stratigraphic Summary Log
BASIN	= OTWAY
PERMIT	= PEP/5
TYPE	= WELL
SUBTYPE	= STRAT_COLUMN
DESCRIPTION	= Stratigraphic Summary Log (encl from WCR) for Rowans-1
REMARKS	=
DATE_CREATED	= 5/05/72
DATE_RECEIVED	=
W_NO	= W644
WELL_NAME	= ROWANS-1
CONTRACTOR	=
CLIENT_OP_CO	= SHELL DEVELOPMENT (AUSTRALIA)PT

(Inserted by DNRE - Vic Govt Mines Dept)

PE907136

This is an enclosure indicator page.
The enclosure PE907136 is enclosed within the container PE902778 at this location in this document.

The enclosure PE907136 has the following character

ITEM_BARCODE	= PE907136
CONTAINER_BARCODE	= PE902778
NAME	= Regional Geology Map
BASIN	= OTWAY
PERMIT	= PEP/5
TYPE	= WELL
SUBTYPE	= WELL_CORRELATION
DESCRIPTION	= Relationship of Rowans to Regio Geology (enclosure from WCR) fo Rowans-1
REMARKS	=
DATE_CREATED	= 30/06/72
DATE_RECEIVED	=
W_NO	= W644
WELL_NAME	= ROWANS-1
CONTRACTOR	=
CLIENT_OP_CO	= SHELL DEVELOPMENT (AUSTRALIA)PT

(Inserted by DNRE - Vic Govt Mines Dept)

PE907138

This is an enclosure indicator page.
The enclosure PE907138 is enclosed within the container PE902778 at this location in this document.

The enclosure PE907138 has the following character

ITEM_BARCODE	= PE907138
CONTAINER_BARCODE	= PE902778
NAME	= Well Velocity Survey
BASIN	= OTWAY
PERMIT	= PEP/5
TYPE	= WELL
SUBTYPE	= VELOCITY_CHART
DESCRIPTION	= Well Velocity Survey (enclosure WCR) for Rowans-1
REMARKS	=
DATE_CREATED	= 30/06/72
DATE_RECEIVED	=
W_NO	= W644
WELL_NAME	= ROWANS-1
CONTRACTOR	=
CLIENT_OP_CO	= SHELL DEVELOPMENT (AUSTRALIA) PTY

(Inserted by DNRE - Vic Govt Mines Dept)

PE605027

This is an enclosure indicator page.
The enclosure PE605027 is enclosed within the container PE902778 at this location in this document.

The enclosure PE605027 has the following character

ITEM_BARCODE	= PE605027
CONTAINER_BARCODE	= PE902778
NAME	= Mud Log
BASIN	= OTWAY
PERMIT	= PEP/5
TYPE	= WELL
SUBTYPE	= MUD_LOG
DESCRIPTION	= EXLOG Mud Log (enclosure from W Rowans-1
REMARKS	=
DATE_CREATED	= 4/05/72
DATE_RECEIVED	=
W_NO	= W644
WELL_NAME	= ROWANS-1
CONTRACTOR	= EXPLORATION LOGGING INC
CLIENT_OP_CO	= SHELL DEVELOPMENT (AUSTRALIA)PTY

(Inserted by DNRE - Vic Govt Mines Dept)

PE605028

This is an enclosure indicator page.
The enclosure PE605028 is enclosed within the container PE902778 at this location in this document.

The enclosure PE605028 has the following character

ITEM_BARCODE	= PE605028
CONTAINER_BARCODE	= PE902778
NAME	= Composite Well log
BASIN	= OTWAY
PERMIT	= PEP/5
TYPE	= WELL
SUBTYPE	= COMPOSITE_LOG
DESCRIPTION	= Composite Well Log (enclosure f for Rowans-1
REMARKS	=
DATE_CREATED	= 31/07/72
DATE_RECEIVED	=
W_NO	= W644
WELL_NAME	= ROWANS-1
CONTRACTOR	=
CLIENT_OP_CO	= SHELL DEVELOPMENT (AUSTRALIA)PT

(Inserted by DNRE - Vic Govt Mines Dept)