INTERSTATE/SHELL GARVOC NO.1

WELL COMPLETION REPORT

45 Pages
4 ENCLOSURES

INTERSTATE/SHELL GARVOC NO.1 WELL

OTWAY BASIN, VICTORIA

WELL COMPLETION REPORT

by

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and

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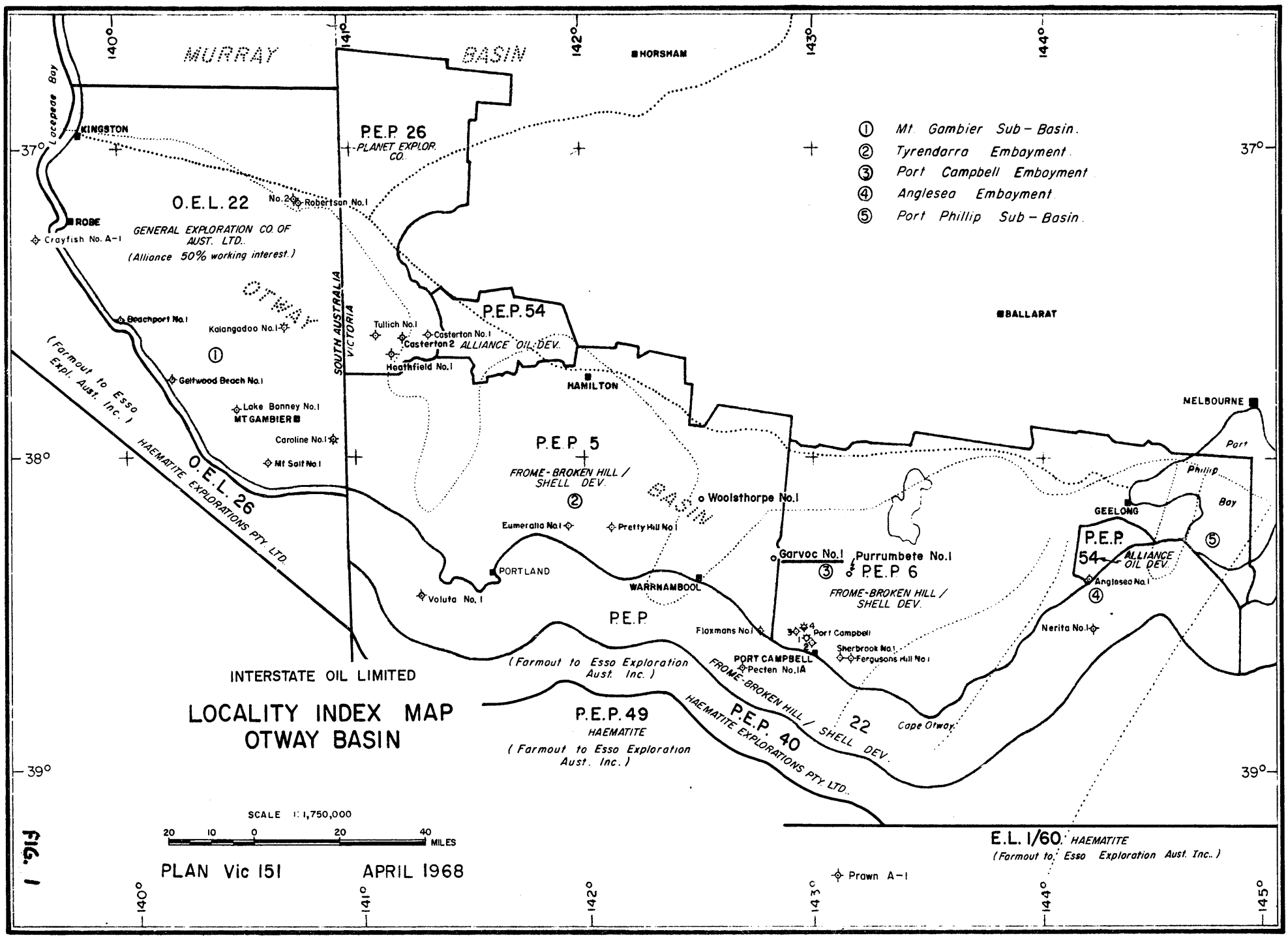
Melbourne
October, 1968

C O N T E N T S

A P P E N D I C E S



INTERSTATE OIL LIMITED

LOCALITY INDEX MAP OTWAY BASIN

PLAN Vic 151 APRIL 1968

FIG. 1

I SUMMARY

(1) Drilling

Interstate/Shell Garvoc No.1 situated approximately six miles south-southwest of Terang in southwestern Victoria, was drilled to a total depth of 5035 feet with a Brewster N4 rig by Richter Bawden Drilling Pty. Ltd. for the Operator, Interstate Oil Limited.

Drilling commenced on 21st June, 1968 and was completed on 6th July, 1968.

Two conventional cores were cut and thirty sidewall samples were taken. Induction Electric, Micro, Sonic Gamma Ray and Continuous Dipmeter logs were run at total depth and one Drill Stem Test was carried out.

The well was plugged back and abandoned as a dry hole on 8th July, 1968.

(2) Geological

Interstate/Shell Garvoc No.1 was located on a positive gravity nose within the northern hinge zone of the Otway Basin to the north of several earlier wells drilled in the Port Campbell area.

It was designed to test permeable sands in the Lower Cretaceous, Otway Group sequence in a position of suspected stratigraphic wedgeout based on seismic data.

The sequence penetrated consisted of 79 feet of Recent to Pleistocene basalt, 2085 feet of marine Tertiary sediments, 2795 feet of fluviatile Mesozoic sediments and 65 feet of metamorphic basement.

Palynological determinations and Dipmeter results suggest a significant unconformity is present within the Lower Cretaceous, Otway Group sequence at approximately 3440 feet well depth.

Permeable sandstones encountered between 4470 feet and 4970 feet depth are correlated with the "Pretty Hill Sandstone" of the Pretty Hill No.1 and Woolsthorpe No.1 wells. These sandstones contained rare speckled yellow fluorescence and traces of oil were extracted during core analysis. A drill stem test of the interval recovered saline water which was strongly gas cut with carbon dioxide.

The well achieved its objective by penetrating and testing good quality reservoir section in the lower portion of the Otway Group and further extended the known areal distribution of this potential reservoir.

II INTRODUCTION

Interstate/Shell Garvoc No.1 was the second of a series of three wells drilled along the northern margin of the Otway Basin in the general area to the north of the Port Campbell Embayment.

During late Upper Jurassic and Lower Cretaceous time a thick sequence of fluviatile sandstones, siltstones and shales was deposited in an East - West trending trough adjacent to the present coastline of southeastern Australia. In Upper Cretaceous and Tertiary time the original trough was subdivided into several embayments. (See Text Fig. 1)

Earlier drilling within the Port Campbell Embayment encountered significant but non-commercial flows of wet gas and minor oil showings within the Lower Cretaceous, Otway Group sequence but permeable reservoir horizons were lacking.

It was postulated that permeable sands would occur within the Otway Group along the northern hinge zone of the basin and that such sands would be sealed by overlying mudstones and siltstones. Seismic data indicated significant wedging out of the Otway Group toward the northern margin of the basin.

Interstate/Shell Garvoc No.1 was positioned on the hinge zone near the axis of a positive gravity nose which extends southwards into the Port Campbell Embayment in the vicinity of Terang.

The objective of the well was to investigate the development and test the formation fluid content of the postulated permeable Otway Group sandstones.

III. WELL HISTORY

(1) General data

(i)	Well name and number:	Interstate/Shell Garvoc No.1
(ii)	Name and address of operator:	Interstate Oil Limited, 95 Collins Street, Melbourne Vic. 3000
(iii)	Name and address of Joint Tenement Holders:	Frome-Broken Hill Company Pty. Ltd., 31 Queen Street, Melbourne Vic. 3000 and Shell Development (Australia) Pty. Ltd., 155 William Street, Melbourne Vic. 3000

Garvoc No.1 was drilled by Interstate Oil Ltd. (a partner in Frome-Broken Hill Company Pty. Ltd.) under the provisions of the relevant Joint Venture and Partnership Agreements. Shell Development (Australia) Pty. Ltd. contributed equally with Interstate Oil Ltd. toward the cost of the well.

(iv)	Petroleum tenement:	Petroleum Exploration Permit No.5.
(v)	District:	Colac (1:250,000)
(vi)	Location:	Latitude: 38°19'9" South Longitude: 142°52'33" East
(vii)	Elevation:	Ground 352' A.S.L. K.B. 363' A.S.L. (datum for depth measurement)
(viii)	Total Depth:	5030' Driller 5035' Schlumberger
(ix)	Date drilling commenced:	21.6.68
(x)	Date total depth reached:	6.7.68
(xi)	Date well abandoned:	8.7.68
(xii)	Date rig released:	8.7.68
(xiii)	Drilling time in days to T.D.:	16
(xiv)	Status:	Plugged and abandoned

Plugs -	4400' - 4550'	50 sax.
	2150' - 2300'	50 sax.
	1800' - 1950'	50 sax.
	985' - 1035'	40 sax.
	0' - 20'	10 sax.

Top plug was hand mixed. The first four plugs were set by conventional displacement.

(xv) Total cost: $

(2) Drilling Data

(i) Name and address of Drilling Contractor: Richter Bawden Drilling Pty. Ltd., Perry House, Elizabeth Street, Brisbane 4000

(ii) Drilling Plant:

Make:	Brewster
Type:	N-4
Rated Capacity:	6000 feet with $4\frac{1}{2}$" D.P. 7500 feet with $3\frac{1}{2}$" D.P.

Motors:

Make:	General Motors
Type:	Twin 6-71 Model 12103
B.H.P.	356

(iii) Mast:

Make:	Lee C. Moore
Type:	126 ft. Cantilever
Rated Capacity:	386,000 lbs.

(iv) Pumps:

Make:	Oilwell
Type:	214 P (2)
Size:	$7\frac{1}{4}$" x 14"

Pump Motors:

Make:	General Motors
Type:	Twin 6-71 Model 12103
B.H.P.	356

(v) Blowout Preventer Equipment:

Make:	(1) Regan ;	(1) Cameron
Size:	10" ;	12"
Type:	Type K ;	Type SS
Series (API)	900 ;	900
Operating Unit:	Payne accumulator Model NSSUA-80-3	

(vi) Hole Sizes: $12\frac{1}{4}$" Surface to 1051
$8\frac{3}{4}$" 1051 to T.D.

(vii) Casing and Cementing details:

Size: $9\frac{5}{8}$"
Weight: 36 lbs/ft.
Grade: J55
Range: 2
Setting depth: 1008 ft.

A Larkin guide shoe was run on the bottom of the first joint of casing, with a Larkin float collar between the first and second joints. No centralizers or scratchers were run. Top and bottom B.J. plugs were used.

(1) Quantity of Cement used: 400 sax. + 1100 lbs. $CaCl_2$
Cement to: 100 ft. (estimated)
Method used: Plug

(2) Quantity of Cement used: 152 sax. + 110 lbs. $CaCl_2$
Cement to: Surface
Method used: Gravity feed from surface

(viii) Drilling Fluid:

Type: Fresh water - bentonite
Average weight: 9.8 lbs/gal.

Treatment: The mud weight was kept at about the above figure by dumping and adding water. Fluid loss was controlled by adding C.M.C. and viscosity by treating with Q-Broxin and LoVis. pH was maintained at about 9.5 by addition of caustic soda.

Average weekly analysis:

Week Ending	Weight	Viscosity	Fluid Loss	Filter Cake	Sand	pH
29.6.68	10.1	98	9.0	2/32	1/2	11
6.7.68	9.8	55	6.5	2/32	$2\frac{1}{2}$	9.5

Total mud materials consumed:

Bentonite	418 x 100 lbs.
Fibertex	45 x 40 lbs.
Micatex	20 x 50 lbs.
Sawdust	4 tons
-	28 sacks
Caustic Soda	605 lbs.
LoVis/Myrtan	12 x 50 lbs.
Q-Broxin	33 x 50 lbs.
C.M.C.	21 x 56 lbs.

(ix) Water Supply: Water was pumped from a creek about 150 yards from the wellsite.

(x) Perforating and Shooting Record: No perforating was carried out.

(xi) Plugging back and squeeze cementation jobs:

Plug No.	Length of Plug	Sacks of Cement	Tested	Method
1.	4400-4550 (150 ft.)	50	No	Conv. Disp.
2.	2150-2300 (150 ft.)	50	No	" "
3.	1800-1950 (150 ft.)	50	No	" "
4.	985-1035 (50 ft.)	40	Yes Top at 980 ft.	" "
5.	0-20 (20 ft.)	10	-	Hand mixed

No squeeze cementation jobs were performed

(xii) Fishing operations: Although no fishing operations were needed, considerable trouble was experienced drilling the surface hole. Circulation was lost at 100' and never completely regained in the 12¼" hole. The hole was drilled to 1051 feet mostly with no or only partial circulation, but without any real troubles. One or more basalt boulders caved into the hole while a "dummy trip" was being made prior to running surface casing.

Two cement plugs and three days reaming were required to clean out the hole for the casing.

(xiii) Side tracked hole: Nil

(3) Formation Sampling

(i) Ditch cuttings: Cuttings were collected from the shale shaker, washed through a coarse sieve and retained and washed in a fine sieve. Samples were collected at 30 feet intervals from surface to 2190 feet, and thereafter at 10 feet intervals except while coring, when 5 feet samples were taken. The washed samples were dried, split 4 ways and placed in labelled polythene bags. The cuttings are stored at the following locations:

(A) Bureau of Mineral Resources,
Core and Cuttings Laboratory,
Collie Street,
Fyshwick, Canberra, A.C.T.

(B) Department of Mines,
Core Laboratories,
Cook Street,
Port Melbourne, Vic.

(C) Interstate Oil Limited,
95 Collins Street,
Melbourne, Vic.

(D) Shell Development (Aust.) Pty. Ltd.,
155 William Street,
Melbourne, Vic.

(ii) Coring

Core No.	Interval Cored	Feet Cored	Recovery Feet	%
1.	4526-4546	20	13	65
2.	4990-4999	9	7'9"	86

4 inches of every 2 feet of core were sent to (A) above, two 4 inch samples of Core No.1 were sent to Core Laboratories (Australia) Pty. Ltd., Brisbane, and the remainder of the Core is stored at (B) above.

(iii) Side-wall Sampling

30 cores were attempted using a Schlumberger gun with hard formation core heads.

30 cores were accepted as tabulated below.

Depth	Recovery	Depth	Recovery	Depth	Recovery
3076	2"	3940	1"	4599	1½"
3133	½"	4008	1"	4637	1½"
3262	2"	4078	¾"	4705	2"
3334	1½"	4184	1"	4756	1½"
3422	2"	4208	1"	4798	1½"
3549	1½"	4272	1"	4851	¾"
3588	1½"	4346	1"	4878	1"
3642	1"	4394	1½"	4914	1½"
3763	1"	4423	1¼"	4940	1¼"
3841	1"	4489	¾"	4964	½"

Following lithological description, the side-wall cores were used for petrographic and palynological determinations.

(4) Logging and Surveys

(i) Electrical and other logging - Schlumberger

Induction Electrical Log	1010 - 5034
Sonic-Gamma Ray	1010 - 5027
Microlog	1010 - 5034
Continuous Dipmeter	1010 - 5032

(ii) Penetration Rate and Gas Logs

Penetration Rate: Drilling times for each 10 feet were taken from the geolograph. The penetration rate was plotted as minutes per 5 feet on the composite log.

Gas Log: Casing shoe to T.D. A continuous record of mud gas was kept using a Core Laboratories Ltd. wire detector.

(iii) Deviation Surveys: A Totco 8° double recorder was used at intervals not greater than 500 feet. Results are tabulated below; see also continuous dipmeter results.

Depth	Deviation	Depth	Deviation
200 ft.	0°	2506 ft.	1°
400	½	3009	1½
611	½	3110	1¾
791	½	3637	1
1000	½	4110	3
1495	½	4526	3¼
2050	½	4980	2

(iv) Temperature surveys: None

(v) Other well surveys: None

(5) (i) Formation Testing: One drill stem test was run

Interval Tested	Type of Test	Results
4478-4548 feet	Dual Packer Straddle	Fair initial puff, increasing to strong air blow. Non-combustible gas to surface in 60 mins, at rate t.s.t.m. dying. Recovered 4270 feet salty water, muddy at top, and heavily gas cut throughout.

(ii) Production testing: None

IV GEOLOGY

(1) General

The target zones in Garvoc No.1 were sands within the lower portion of the Lower Cretaceous, Otway Group sequence.

The well encountered a sedimentary section essentially as predicted prior to drilling and from 4470 feet to 4970 feet depth intersected a dominantly sandstone interval containing medium to coarse grained quartz sandstones having porosities of 13 to 22% and measured permeabilities up to 661 m.d.

This sandstones interval is correlated with the "Pretty Hill Sandstone" of the Pretty Hill No.1 and Woolsthorpe No.1 wells.

In the Woolsthorpe No.1 well located 24 miles northwest of Garvoc No.1 the "Pretty Hill Sandstone" overlies a siltstone-shale interval with olivine basalt ("Casterton Beds") of Lower Cretaceous to ?Jurassic age. In Garvoc No.1 well the "Pretty Hill Sandstone" immediately overlies pre-Mesozoic metamorphic basement.

Palynological determinations and dipmeter results suggest an unconformity is present at approximately 3440 feet depth in Garvoc No.1 well within the Otway Group sequence. A similar situation has been encountered previously in the Woolsthorpe No.1 and Ferguson's Hill No.1 wells.

Enclosure No.1 shows the location of Garvoc No.1 in relation to structural contours of the basement surface as interpreted prior to drilling.

The correlation between Flaxmans No.1 and Garvoc No.1 is illustrated in the N-S cross section through the Port Campbell Embayment included as Enclosure No.2

(2) Stratigraphic Table - Garvoc No.1

Age	Rock Unit	Top (feet below) K.B.	Thickness (feet)
Recent to Pleistocene	Newer Volcanics	11	79
	Unconformity		
Upper Miocene to Oligocene	Heytesbury Group	90	1610
Upper Miocene	Port Campbell Limestone	90	560
Lower Miocene	Gellibrand Marl	650(approx.)	920
Upper Oligocene	Clifton Formation	1570	130
	?Disconformity		
Upper Eocene	Nirranda Group	1700	475
Upper Eocene	Narrawaturk Marl.	1700	225
Upper Eocene	Mepunga Formation	1925	250
	Unconformity		
Lower Cretaceous	Otway Group	2175 (662.1)	2765
Lower Cretaceous (Middle-Upper Albian)	Eumeralla Formation	2175	1265
	Unconformity		
Lower Cretaceous (Neocomian-Aptian)	Geltwood Beach Formation	3440 (1048.2)	1030
Lower Cretaceous (Neocomian-Aptian)	"Pretty Hill Sandstone"	4470 (1362 m)	500
	Unconformity		
?Ordovician	Basement Complex	4970 (1514	65 (+)

T.D. 5035

(3) Lithologic Description

Newer Volcanics	(Recent to Pleistocene)
Surface - 90 feet :	Basalt, black, weathering to yellow and orange
Heytesbury Group	(Upper Miocene - Oligocene)
90 - 650 feet (approx.) :	Port Campbell Limestone (Upper Miocene)
	Limestone, white to cream, soft vuggy, micro-crystalline to earthy with shell fragments
650 - 1570 feet :	Gellibrand Marl (Lower Miocene)
	Marl, medium grey to blue-grey and greenish grey, silty in parts, very fossiliferous.
1570 - 1700 feet :	Clifton Formation (Upper Oligocene)
	Calcareous Sandstone, white to greenish, fine to medium grained with green, black and brown lithic grains. Micaceous in part. Some coarse, well rounded individual quartz grains.
Nirranda Group	(Upper Eocene)
1700 - 1925 feet :	Narrawaturk Marl (Upper Eocene)
	Marl, grey and light to dark brownish, very fossiliferous.
	Sandstone, greenish, fine grained, very calcareous, also coarse well rounded individual quartz grains.
1925 - 2175 feet :	Mepunga Formation (Upper Eocene)
	Sandstone, clean, coarse very well rounded, colourless to yellowish quartz grains. In part strongly iron stained to yellowish-brown. Trace Pyrite and Glauconite
	Siltstone, dark brown, argillaceous, sandy, sideritic.

Otway Group	(Lower Cretaceous)
2175 - 3440 feet :	Eumeralla Formation (Middle - Upper Aptian)
2175 - 2385 feet :	Sandstone, white, fine grained, quartzose, argillaceous, multi-coloured lithic fragments Siltstone, Brownish to grey, quartzose, lithic, argillaceous, carbonaceous in part. Traces of Coal.
2385 - 2520 feet :	Sandstone, white to brown and brownish pink, fine to medium grained, sub-angular, quartz-ose, lithic, argillaceous, in part pyritic and carbonaceous. Siltstone, greenish grey brown, to brownish pink, quartzose, argillaceous, carbonaceous in part. Traces, Coal, and Pyrite.
2520 - 3115 feet :	Sandstone, white, fine to medium grained, subangular, well sorted, quartzose, multi-coloured grey, green and reddish lithic grains and chert, argillaceous, cal-careous in part. Some orange ?zeolite cement below 2850 feet. Siltstone, medium grey, quartz-ose, lithic, argillaceous, car-bonaceous, micaceous in part. Minor Shale, light grey, soft with trace of Coal.
3115 - 3440 feet :	Sandstone mostly medium to coarse grained, minor fine grained, angular to subangular, quartzose, lithic, tight, calcareous in part, some orange ?zeolite cement. Siltstone, grey to brownish, quartzose, lithic, very argill-aceous, carbonaceous in part. Trace of Shale brown-grey carbonaceous and Coal below 3400 feet.
3440 - 4470 feet :	Geltwood Beach Formation (Neocomian-Aptian)

3440 - 4090 feet :	Sandstone, white to grey, fine to medium grained, angular to subangular, poorly sorted to well sorted in part, quartzose, lithic, argillaceous, calcareous in part, micaceous and carbonaceous in part. Siltstone, medium grey to grey-white, quartzose, lithic, argillaceous, carbonaceous, micaceous. Shale, light grey to brownish silty, argillaceous, carbonaceous. Traces of Coal.
4090 - 4470 feet :	Siltstone, grey to grey-white, micaceous, argillaceous, carbonaceous, quartzose. Sandstone, grey-white, fine grained, tight, fairly well sorted, subangular, quartzose, lithic, argillaceous, micaceous, calcareous in part. Shale, grey to brownish, carbonaceous, micaceous. Traces of Coal.
4470 - 4970 feet :	"Pretty Hill Sandstone" (Neocomian-Aptian)
4470 - 4970 feet :	Sandstone, medium to coarse and very coarse, subangular to angular, well sorted in part, conglomeratic in part, individual clear quartz grains, rare pinkish quartz and garnets, some white clay matrix. Minor Siltstone, greyish-white, argillaceous, micaceous, carbonaceous, quartzose. Traces Shale grey-blue to black, carbonaceous, Pyrite and Coal.
Basement	(?Ordovician)
4970 - 5035 feet : (Total depth)	Quartz - Mica Schist, mottled medium grey to greenish grey, foliated, schistose mica and talc with pearly lustre with veins and patches of white milky quartz. Bedding irregular and highly contorted.

V. REFERENCES

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APPENDIX 1:

APPENDIX I

TERTIARY FORAMINIFERAL SEQUENCE

INTERSTATE'S GARVOC-1

OTWAY BASIN - VICTORIA

by

David J. Taylor

Summary

	?	-	1080'	middle Miocene
Gellibrand Clays	1080'	-	1440'	lower Miocene
	1440'	-	1650'	Basal lower Miocene
Clifton Formation	1650'	-	1740'	upper Oligocene
	1740'	-	?	? Oligocene/Eocene

Introduction:-

Rotary cuttings were examined from 1080' - 2200'. Down hole contamination was extremely heavy in that the fauna represented at 1080' was still present at 2200'. Although the down hole biostratigraphic scheme of Taylor's (Esso Gippsland Shelf-1 report) was applied zonation proved difficult. It is also noted that the few samples available above 1080' yielded no fauna.

The sequence is summarised above. Upper-most Eocene would be expected to be present in the section but it was completely obscured by the down hole contamination.

MIDDLE MIOCENE ? - 1080'

The cutting sample at 1080' contains a few specimens of Orbulina suturalis suggesting middle Miocene, but the rest of the planktonic fauna is lower Miocene. As casing was set immediately above this level it is suggested that the sample represents the middle/lower Miocene boundary.

LOWER MIOCENE 1080' - 1650'

As well as O. suturalis, the sample at 1080' contains a rich planktonic fauna of Globigerinoides bisphericus, G. trilobus trilobus, G. trilobus altiaperturus, G. rubrus, Globoquadrina dehiscens, Globigerina ciperoensis. The benthonic fauna was dominated by Cibicides perforatus, Anomalinoides macraglabra, A. procolligera milliolids and arenaceous forms including Ammosphaeroidina, Gaudyrina, Clavulinoides, Pseudoclavulinoides and Textularia.

The planktonic fauna indicates Zonule F and the benthonic fauna is that common in lower rather than middle Miocene sediments. Samples from 1110' to 1440' contain a fauna identical to that listed above. There is a decline in numbers of Globigerinoides at 1440' and an increase in numbers of Globigerina woodi with the highest appearance of G. woodi connecta. This suggests the top of Zonule H = base of lower Miocene. Zonule G is probably present above 1440' but cannot be distinguished due to sample quality.

The benthonic constituents from 1080' to 1650' remain consistent with those listed for 1080' and indicate an inner continental shelf environment open to oceanic currents as planktonic proportions are high.

UPPER OLIGOCENE 1650' - 1740'

Cutting samples at 1650' contain calcareous sandstone fragments with pellets of brown iron oxide (after glauconite?). Iron stained tests of foraminifera include Globigerina euapertura, Cibicides perforatus, Elphidium sp., Notorotalia crassimurra and Lamarckina glencoensis. The lithology suggests the Clifton Formation and the iron staining proves that the fauna is in place. The presence of G. euapertura indicates Zonule 1 = Oligocene.

?OLIGOCENE - EOCENE 1740' - ?

Below 1740' the foraminiferal sequence is completely obscured by down-hole contamination. Only Oligocene and Miocene species were recorded, although Upper Eocene sediments would be expected in the vicinity.

October 18th, 1968

APPENDIX 2:

APPENDIX II

PALYNOLOGICAL REPORT ON INTERSTATE/SHELL GARVOC NO.1 WELL

3076 FEET - 4964 FEET

Eighteen sidewall cores taken from between 3076 feet and 4964 feet and a chip of core 1 at 4352½ feet in Interstate/Shell Garvoc No.1 well were submitted by Shell Development (Australia) Pty. Ltd. for palynological analyses. The samples studied include shales, siltstones, and sandstones and provide a representative coverage of all but the upper horizons of the Mesozoic sequence penetrated by the well.

Before palynological processing, the sidewall cores were cleaned as thoroughly as possible, and it was noted that some of the porous sandstone samples were impregnated with drilling mud. The samples were processed by a technique outlined by Dettmann (1968), and the resultant residues mounted in glycerine jelly on glass microscope slides. All but two of the samples yielded plant material in concentrations ranging from sparse to abundant (see Table 1). The quality of preservation of the plant material was determined and is documented in Table 1. From this table it is evident that the plant material from all samples is generally fairly to poorly preserved, although some of the siltstones provided perceptibly better preserved plant material than that extracted from the sandstones.

The plant material identified includes spores, pollen grains, and wood and cuticular fragments; occasional specimens that may be of aquatic (chlorophycean) origin were also observed but microplankton or other marine or brackish water indicators were not encountered.

Analyses of the individual spore-pollen assemblages indicates that the section examined is of Lower Cretaceous age and includes a Middle-Upper Albian sequence overlying (? disconformably) strata of Neocomian and Aptian age. These age determinations are based upon the presence of the Middle-Upper Albian Coptospora paradoxa Zone at 3334 feet (and ? 3076 - 3262 feet) and the older (Neocomian - Aptian), Cyclosporites hughesi, subzone of the Dictyotosporites speciosus Zone between 3549 feet and 4964 feet. The younger (Lower Albian), Crybelosporites striatus, subzone of the latter zone was not recognized in the sediments studied; if present it would be expected to occur somewhere in the interval 3334 - 3549 feet.

The microfloral assemblages recovered from the sediments are documented below with reference to their qualitative and quantitative content; the quantitative estimates are expressed in the following terms:- Ab (abundant) - numerical representation of a particular species totals at least 5% of total microflora, C (common) - numerical representation of a species forms 1-5% of total microflora, and R (rare) - numerical representation of a species is less than 1% of total microflora.

MICROFLORAL ASSEMBLAGES AND AGE DETERMINATIONS

A. 3076 feet - 3334 feet

3076 feet

A small residue composed almost entirely of wood fragments was extracted from the sample. Several spore specimens were observed and are referable to the following species :

Spores: Baculatisporites comaumensis (Cookson)
Cyathidites australis Couper
Stereisporites antiquasporites (Wilson & Webster)

3262 feet

The palynological residue is chiefly composed of wood fragments with infrequent cuticle and rare spores and pollen grains. The following types were identified :

Spores: Baculatisporites comaumensis (Cookson)
Cyathidites australis Couper
Lycopodiumsporites austroclavatidites (Cookson)
Neoraistrickia truncata (Cookson)
Stereisporites antiquasporites (Wilson & Webster)
Pollen: Araucariacites australis Cookson
Microcachryidites antarcticus Cookson
Podocarpidites cf. ellipticus Cookson

3334 feet

An abundant and diverse assemblage of spores and pollen grains was obtained from the sample. Species identified include :

Spores:	Aequitriradites spinulosus (Cookson & Dettmann)	R
	A. verrucosus (Cookson & Dettmann)	R
	Baculatisporites comaumensis (Cookson)	C
	Biretisporites cf. potoniaei Delcourt & Sprumont	R
	Cicatricosisporites australiensis (Cookson)	R
	Cingutriletes clavus (Balme)	R
	Coptospora paradoxa (Cookson & Dettmann)	R
	Crybelosporites striatus (Cookson & Dettmann)	R
	Cyathidites australis Couper	Ab
	C. Minor Couper	Ab
	C. punctatus (Delcourt & Sprumont)	R
	Dictyotosporites speciosus Cookson & Dettmann	R
	Foraminisporis asymmetricus (Cookson & Dettmann)	R
	F. dailyi (Cookson & Dettmann)	R
	Laevigatosporites ovatus Wilson & Webster	R
	Leptolepidites major Couper	R
	L. verrucatus Couper	R
	Lycopodiumsporites austroclavatidites (Cookson)	C
	L. nodosus Dettmann	R
	Neoraistrickia truncata (Cookson)	R
	Pilosisporites notensis Cookson & Dettmann	R
	Rouseisporites reticulatus Pocock	R
	R. simplex (Cookson & Dettmann)	R
	Stereisporites antiquasporites (Wilson & Webster)	Ab
	Trilites cf. tuberculiformis Cookson	R
	Velosporites triquetrus (Lantz)	R
Pollen:	Alisporites grandis (Cookson)	R
	A. similis (Balme)	R
	Araucariacites australis Cookson	C
	Classopollis cf. classoides Pflug	R
	Microcachryidites antarcticus Cookson	Ab
	Podocarpidites cf. ellipticus Cookson	C
Incertae Sedis:	Schizosporis spriggi Cookson & Dettmann	R

Remanie: Aratrisporites sp. - Triassic
Nuskoisporites sp. - Permian

Samples at 3076 feet and 3262 feet contain insufficient representation of stratigraphically significant species for precise age determination or zonal assignment. The horizon at 3334 feet, however, yielded an abundant microflora in which Coptospora paradoxa, Dictyotosporites speciousus, and Crybelosporites striatus are components. This association establishes the presence of the Middle-Upper Albian Coptospora paradoxa Zone (of Dettman and Playford 1968). Moreover, the concurrence of C. paradoxa and D. speciosus indicates that the horizon is near the base of the zone and is referable to Evans's (1966) Unit K2a.

B. 3549 feet - 4964 feet

3549 feet

The sample yielded abundant spores and pollen grains and infrequent wood and cuticular tissue. The diverse spore-pollen assemblage identified includes the following species:

Spores:	Aequitriradites verrucosus (Cookson & Dettmann)	R
	Baculatisporites comaumensis (Cookson)	C
	Ceratosporites equalis Cookson & Dettmann	R
	Cicatricosisporites australiensis (Cookson)	C
	C. ludbrooki Dettmann	R
	Couperisporites tabulatus Dettmann	R
	Cyclosporites hughesi (Cookson & Dettmann)	C
	Cyathidites australis Couper	Ab
	C. minor Couper	Ab
	C. punctatus (Delcourt & Sprumont)	R
	Dictyotophyllidites crenatus Dettmann	C
	Distyotosporites complex Cookson & Dettmann	R
	D. speciosus Cookson & Dettmann	C
	D. filosus Dettmann	R
	Foraminisporis asymmetricus (Cookson & Dettmann)	R
	F. dailyi (Cookson & Dettmann)	R
	F. wonthaggiensis (Cookson & Dettmann)	R
	Klukisporites scaberis (Cookson & Dettmann)	R
	Lycopodiacidites asperatus Dettmann	R
	Lycopodiumsporites austroclavatidites (Cookson)	C
	L. circolumenus Cookson & Dettmann	R
	L. eminulus Dettmann	R
	L. facetus Dettmann	R
	L. nodosus Dettmann	R
	Leptolepidites major Couper	R
	L. verrucatus Couper	C
	Neoraistrickia truncata (Cookson)	C
	Pilosisporites notensis Cookson & Dettmann	R
	Rouseisporites reticulatus Pocock	R
Pollen:	Alisporites grandis (Cookson)	C
	A. similis (Balme)	R
	Araucariacites australis Cookson	C
	Classopollis cf. classoides Pflug	C
	Microcachryidites antarcticus Cookson	Ab
	Podocarpidites cf. ellipticus Cookson	C
	P. cf. multesimus (Bolkhovitina)	R
Incertae Sedis:	Schizosporis reticulatus Cookson & Dettmann	R

3642 feet

Spores and pollen grains occur commonly in the residue which also contains abundant fragments of wood and cuticle. The following species were identified:

Spores:	Baculatisporites comaumensis (Cookson)	C
	Cicatricosisporites australiensis (Cookson)	R
	Ceratosporites equalis Cookson & Dettmann	R
	Cooksonites variabilis Pocock	R
	Cyclosporites hughesi (Cookson & Dettmann)	R
	Cyathidites australis Couper	Ab
	C. minor Couper	Ab
	C. punctatus (Delcourt & Sprumont)	R
	Dictyophyllidites crenatus Dettmann	C
	Dictyotosporites speciosus Cookson & Dettmann	R
	Foraminisporis dailyi (Cookson & Dettmann)	R
	F. wonthaggiensis (Cookson & Dettmann)	C
	Klukisporites scaberis (Cookson & Dettmann)	R
	Kuylisporites lunaris Cookson & Dettmann	R
	Leptolepidites major Couper	R
	L. verrucatus Couper	R
	Lycopodiumsporites austroclavatidites (Cookson)	C
	L. circolumenus (Cookson & Dettmann)	R
	L. eminulus Dettmann	R
	L. nodosus Dettmann	R
	Pilosisporites notensis Cookson & Dettmann	R
	Stereisporites antiquasporites (Wilson & Webster)	C
Pollen:	Classopollis cf. classoides Pflug	C
	Microcachryidites antarcticus Cookson	Ab
	Podocarpidites cf. ellipticus Cookson	Ab
	Tsugaepollenites dampieri (Balme)	R

3763 feet

The following diverse assemblage of spores and pollen grains was obtained from the sample. Other plant material identified includes fragments of wood and cuticle and rare examples of forms with possible chlorophycean affinities.

Spores:	Aequitriradites spinulosus (Cookson & Dettmann)	R
	Baculatisporites comaumensis (Cookson)	C
	Ceratosporites equalis Cookson & Dettmann	R
	Cicatricosisporites australiensis (Cookson)	R
	C. ludbrooki Dettmann	R
	Cooksonites variabilis Pocock	R
	Cyclosporites hughesi (Cookson & Dettmann)	C
	Cyathidites australis Couper	C
	C. minor Couper	Ab
	Dictyotophyllidites crenatus Dettmann	C
	Dictyotosporites complex Cookson & Dettmann	R
	D. speciosus Cookson & Dettmann	C
	Foraminisporis dailyi (Cookson & Dettmann)	R
	F. wonthaggiensis (Cookson & Dettmann)	R
	Klukisporites scaberis (Cookson & Dettmann)	R
	Leptolepidites major Couper	R
	L. verrucatus Couper	C
	Lycopodiumsporites austroclavatidites (Cookson)	C
	L. eminulus Dettmann	C
	L. facetus Dettmann	R
	L. nodosus Dettmann	R
	L. reticulumsporites (Rouse)	R
	Neoraistrickia truncata (Cookson)	R
	Osmundacidites wellmanii Couper	R
	Pilosisporites notensis Cookson & Dettmann	R
	P. parvispinosus Dettmann	R
	Rouseisporites reticulatus Pocock	R

	Stereisporites antiquasporites (Wilson & Webster)	C
Pollen:	Alisporites grandis (Cookson)	C
	A. similis (Balme)	R
	Araucariacites australis Cookson	C
	Cycadopites nitidus (Balme)	R
	Classopollis cf. classoides Pflug	C
	Microcachryidites antarcticus Cookson	Ab
	Podocarpidites cf. ellipticus Cookson	C
Incertae Sedis:	Schizosporis reticulatus Cookson & Dettmann	R

3940 feet

The small residue obtained from the sample contains rare spores and pollen grains. The following species are each represented by only one to several specimens:

Spores:
- Baculatisporites comaumensis (Cookson)
- Cicatricosisporites australiensis (Cookson)
- Cooksonites variabilis Pocock
- Cyathidites australis Couper
- Dictyotophyllidites crenatus Dettmann
- Klukisporites scaberis (Cookson & Dettmann)
- Leptolepidites major Couper
- L. verrucatus Couper
- Lycopodiumsporites austroclavatidites (Cookson)
- L. eminulus Dettmann
- Neoraistrickia truncata (Cookson)
- Rouseisporites reticulatus Pocock
- Stereisporites antiquasporites (Wilson & Webster)

Pollen:
- Classopollis cf. classoides Pflug
- Microcachryidites antarcticus Cookson
- Podocarpidites cf. ellipticus Cookson
- Tsugaepollenites dampieri (Balme)

Remanie:
- Striatites sp. - Permian

4078 feet

A small residue containing poorly preserved specimens of the following spore-pollen species was extracted from the sample:

Spores:
- Aequitriradites verrucosus (Cookson & Dettmann)
- Cicatricosisporites australiensis (Cookson)
- Ceratosporites equalis Cookson & Dettmann
- Cyathidites australis Couper
- C. minor Couper
- Dictyotosporites speciosus Cookson & Dettmann
- Klukisporites scaberis (Cookson & Dettmann)
- Lycopodiumsporites austroclavatidites (Cookson)
- L. eminulus Dettmann
- Neoraistrickia truncata (Cookson)
- Pilosisporites notensis Cookson & Dettmann
- Rouseisporites reticulatus Pocock
- Stereisporites antiquasporites (Wilson & Webster)

Pollen:
- Alisporites similis (Balme)
- Araucariacites australis Cookson
- Microcachryidites antarcticus Cookson
- Podocarpidites cf. ellipticus Cookson

In addition the following species are represented by one or two well preserved specimens which are considered to be contaminants from higher horizons. The sample (a quartzitic sandstone) was impregnated with drilling mud which could not be removed.

	Balmeisporites holodictyus Cookson & Dettmann (fragments only)	
	Crybelosporites striatus (Cookson & Dettmann)	
	Tricolpites sp.	
	Triorites harrisii Couper	

4184 feet

An assemblage composed of abundant spores and pollen grains and rare chlorophycean derivatives was extracted from the sample. The following species were identified:

Spores:	Aequitriradites spinulosus (Cookson & Dettmann)	R
	A. verrucosus (Cookson & Dettmann)	R
	Baculatisporites comaumensis (Cookson)	R
	Cicatricosisporites australiensis (Cookson)	C
	C. ludbrooki Dettmann	C
	Ceratosporites equalis Cookson & Dettmann	R
	Cooksonites variabilis Pocock	C
	Couperisporites tabulatus Dettmann	C
	Cyclosporites hughesi (Cookson & Dettmann)	R
	Cyathidites australis Couper	Ab
	C. minor Couper	Ab
	Dictyotophyllidites crenatus Dettmann	C
	Dictyotosporites speciosus Cookson & Dettmann	R
	Foraminisporis dailyi (Cookson & Dettmann)	R
	F. wonthaggiensis (Cookson & Dettmann)	C
	Klukisporites scaberis (Cookson & Dettmann)	R
	Kraeuselisporites linearis (Cookson & Dettmann)	R
	Kuylisporites lunaris Cookson & Dettmann)	R
	Laevigatosporites sp.	C
	Leptolepidites major Couper	R
	L. verrucatus Couper	R
	Lycopodiumsporites austroclavatidites (Cookson)	R
	L. eminulus Dettmann	R
	Pilosisporites notensis Cookson & Dettmann	C
	P. parvispinosus Dettmann	R
	Rouseisporites reticulatus Pocock	R
Pollen:	Alisporites grandis (Cookson)	R
	Classopollis cf. classoides Pflug	C
	Microcachryidites antarcticus Cookson	Ab
	Podocarpidites cf. ellipticus Cookson	C
	P. cf. multesimus (Bolkhovitina)	R
	Podosporites microsaccatus (Couper)	R
Incertae Sedis:	Schizosporis reticulatus Cookson & Dettmann	R

4272 feet

The residue extracted from the sample is chiefly composed of wood and cuticular material. In addition spores and pollen grains referable to the following species were observed:

Spores:	Baculatisporites comaumensis (Cookson)	C
	Ceratosporites equalis Cookson & Dettmann	R
	Cicatricosisporites australiensis (Cookson)	C
	C. ludbrooki Dettmann	R
	Cooksonites variabilis Pocock	R
	Cyathidites australis Couper	Ab
	C. minor Couper	C

	Foraminisporis dailyi (Cookson & Dettmann)	R
	F. wonthaggiensis (Cookson & Dettmann)	R
	Klukisporites scaberis (Cookson & Dettmann)	R
	Lycopodiumsporites austroclavatidites (Cookson)	R
	Pilosisporites notensis Cookson & Dettmann)	R
	Reticulatisporites pudens Balme	R
	Stereisporites antiquasporites (Wilson & Webster)	C
Pollen:	Alisporites grandis (Cookson)	Ab
	A. similis (Balme)	R
	Araucariacites australis Cookson	R
	Microcachryidites antarcticus Cookson	Ab
	Podocarpidites cf. ellipticus Cookson	C

4394 feet

Rarely occurring spores and pollen grains and abundant wood fragments were observed in the small residue extracted from the sample. The following species were identified :

Spores:	Aequitriradites sp.
	Cicatricosisporites australiensis (Cookson)
	Cyathidites australis Couper
	Laevigatosporites sp.
	Lycopodiumsporites austroclavatidites (Cookson)
	Stereisporites antiquasporites (Wilson & Webster)
Pollen:	Alisporites grandis (Cookson)
	Cycadopites sp.
	Podocarpidites cf. ellipticus Cookson

4489 feet

Abundant spores and pollen grains and minor quantities of wood and cuticle were extracted from the sample. The following species were observed :

Spores:	Aequitriradites spinulosus (Cookson & Dettmann)	R
	Baculatisporites comaumensis (Cookson)	R
	Ceratosporites equalis Cookson & Dettmann	R
	Cicatricosisporites australiensis (Cookson)	C
	Cooksonites variabilis Pocock	R
	Cyclosporites hughesi (Cookson & Dettmann)	R
	Cyathidites australis Couper	Ab
	C. minor Couper	Ab
	C. asper (Bolkhovitina)	C
	Contignisporites cooksonii (Balme)	R
	Dictyotophyllidites crenatus Dettmann	C
	Dictyotosporites speciosus Cookson & Dettmann	R
	Foraminisporis dailyi (Cookson & Dettmann)	R
	F. wonthaggiensis (Cookson & Dettmann)	R
	Ischyosporites punctatus Cookson & Dettmann	R
	Kuylisporites lunaris Cookson & Dettmann	R
	Klukisporites scaberis (Cookson & Dettmann)	C
	Leptolepidites major Couper	R
	L. verrucatus Couper	R
	Lycopodiacidites asperatus Dettmann	R
	Lycopodiumsporites austroclavatidites (Cookson)	C
	L. eminulus Dettmann	R
	Pilosisporites notensis Cookson & Dettmann	C

	P. parvispinosus Dettmann	R
	Reticulatisporites pudens Balme	R
	Rouseisporites reticulatus Pocock	R
	Stereisporites antiquasporites (Wilson & Webster)	C
Pollen:	Alisporites grandis (Cookson)	C
	Araucariacites australis Cookson	C
	Classopollis cf. classoides Pflug	C
	Microcachryidites antarcticus Cookson	Ab
	Podocarpidites cf. ellipticus Cookson	Ab

4532½ feet (core 1)

The sample failed to yield plant material of any description.

4637 feet

No spores or pollen grains were extracted from the sample which yielded rare fragments of woody tissue.

4705 feet

Plant material extracted from the sample includes rare spores and a small amount of woody tissue. Spore types observed include :

Baculatisporites comaumensis (Cookson)
Ceratosporites equalis Cookson & Dettmann
Cicatricosisporites australiensis (Cookson)
Cyathidites australis Couper
C. minor Couper

4798 feet

The small residue obtained from the sample includes rare spores and pollen grains and infrequent woody tissue. The following types were identified:

Spores:	Baculatisporites comaumensis (Cookson)
	Cyathidites australis Couper
Pollen:	Araucariacites australis Cookson
	Cycadopites nitidus (Balme)
	Microcachryidites antarcticus Cookson
	Podocarpidites cf. ellipticus Cookson

4878 feet

Spores and pollen grains are of common occurrence in the residue which also contains abundant wood and cuticular material. Spore-pollen species identified include:

Spores:	Baculatisporites comaumensis (Cookson)	C
	Ceratosporites equalis Cookson & Dettmann	R
	Cicatricosisporites australiensis (Cookson)	R
	Cyathidites australis Couper	Ab
	C. minor Couper	Ab
	Foraminisporis dailyi (Cookson & Dettmann)	R

	Klukisporites scaberis (Cookson & Dettmann)	R
	Leptolepidites major Couper	R
	L. verrucatus Couper	C
	Lycopodiacidites asperatus Dettmann	R
	Lycopodiumsporites austroclavatidites (Cookson)	C
	L. circolumenus Cookson & Dettmann	R
	L. eminulus Dettmann	C
	L. facetus Dettmann	R
	L. nodosus Dettmann	R
	Matonisporites cooksoni Dettmann	R
	Murospora florida (Balme)	R
	Neoraistrickia truncata (Cookson)	R
	Sestrosporites pseudoalveolatus (Couper)	R
	Velosporites triquetrus (Lantz)	R
Pollen:	Alisporites grandis (Cookson)	C
	A. similis (Balme)	C
	Araucariacites australis Cookson	C
	Classopollis cf. classoides Pflug	C
	Microcachryidites antarcticus Cookson	Ab
	Podocarpidites cf. ellipticus Cookson	C
	Tsugaepollenites dampieri (Balme)	R

4940 feet

Plant material extracted from the sample consists chiefly of wood fragments. Spores and pollen grains are of rare occurrence and are referable to the following species:

Spores:	Baculatisporites comaumensis (Cookson)
	Cyathidites australis Couper
	C. minor Couper
	Foraminisporis dailyi (Cookson & Dettmann)
	Lycopodiumsporites austroclavatidites (Cookson)
	Neoraistrickai truncata (Cookson)
Pollen:	Araucariacites australis Cookson
	Classopollis cf. classoides Pflug
	Cycadopites nitidus (Balme)
	Microcachryidites antarcticus Cookson
	Podocarpidites cf. ellipticus Cookson
	Tsugaepollenites dampieri (Balme)

4964 feet

An abundant and diverse assemblage of spores and pollen grains was obtained from the sample. Species identified include :

Spores:	Baculatisporites comaumensis (Cookson)	Ab
	Contignisporites cooksonii (Balme)	R
	Cicatricosisporites australiensis (Cookson	C
	Cooksonites variabilis Pocock	R
	Couperisporites sp.	R
	Cyclosporites hughesi (Cookson & Dettmann)	R
	Cyathidites australis Couper	C
	C. minor Couper	Ab
	Dictyophyllidites crenatus Dettmann	R
	Dictyotosporites speciosus Cookson & Dettmann	R
	Foraminisporis dailyi (Cookson & Dettmann)	R

	Ischyosporites punctatus Cookson & Dettmann	R
	Januasporites spinulosus Dettmann	R
	Klukisporites scaberis (Cookson & Dettmann)	R
	Leptolepidites verrucatus Couper	C
	L. major Couper	R
	Lycopodiacidites asperatus Dettmann	R
	Lycopodiumsporites austroclavatidites (Cookson)	C
	L. circolumenus Cookson & Dettmann	C
	L. eminulus Dettmann	R
	Murospora florida (Balme)	R
	Neoraistrickia truncata (Cookson)	C
	Osmundacidites mollis (Cookson & Dettmann)	R
	Pilosisporites notensis Cookson & Dettmann	R
	Stereisporites antiquasporites (Wilson & Webster)	C
Pollen:	Araucariacites australis Cookson	C
	Cycadopites nitidus (Balme)	C
	Classopollis cf. classoides Pflug	R
	Microcachryidites antarcticus Cookson	Ab
	Podocarpidites cf. ellipticus Cookson	Ab
	Podosporites microsaccatus (Couper)	C
	Tsugaepollenites dampieri (Balme)	R
	T. trilobatus (Balme)	R

Samples between 3549 feet and 4964 feet yielded spore-pollen assemblages in which Dictyotosporites speciosus and Cyclosporites hughesi are components. This association indicates that the section belongs to the Neocomian-Aptian Cyclosporites hughesi Subzone of the Dictyotosporites speciosus Zone. The younger subzone of this zone, the Crybelosporites striatus Subzone (Lower Albian), was not recognized. Specimens of Crybelosporites striatus were recorded from the sample at 4078 feet, but these are almost certainly contaminants from higher in the well. As noted previously, the sample from which C. striatus was obtained, was impregnated with drilling mud. Furthermore, C. striatus and other probable contaminants (Balmeisporites holodictyus, Tricolpites sp. and Triorites harrisii) are distinctly better preserved and less compressed than all other spore-pollen types observed in the residue from the sample at 4078 feet.

The lower horizons of the Cyclosporites hughesi Subzone in the Garvoc well (between 4878 feet and 4964 feet) yielded Murospora florida. These horizons may thus be equated to Evans's (1966) Unit K1a, the upper part of which corresponds to the lower horizons of the C. hughesi Subzone (see Dettmann and Playford 1968). Criteria upon which the C. hughesi Subzone may be further subdivided are currently being investigated.

Microfloras obtained from the C. hughesi Subzone in the Garvoc No.1 well are composed almost entirely of spores and pollen grains. Occasional specimens of possible chlorophycean types (Schizosporis reticulatus) were observed at 3549 feet, 3763 feet, and 4184 feet.

CONCLUSIONS

Microfloras obtained from Garvoc No.1 well indicate that basal horizons of the Middle-Upper Albian Coptospora paradoxa Zone were encountered

at 3334 feet. The underlying section between 3549 feet and 4964 feet is entirely within the Neocomian-Aptian Cyclosporites hughesi Subzone of the Dictyotosporites speciosus Zone. Sediments referable to the Lower Albian Crybelosporites striatus Subzone (of the D. speciosus Zone) were not detected in the well.

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4th October, 1968

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St. Lucia, Queensland

EXPLANATION OF TABLE 1

Preservation and zonal attribution of plant microfossil assemblages in Interstate/Shell Garvoc No.1 well, 3076 feet - 4964 feet.

Abbreviations:

Yield expresses frequency of spores and pollen in the palynological residues as follows:-

Ab = abundant
C = common
Sp = sparse
B = barren

Colour and preservation. Spores, pollen, wood, and cuticle present in the residues are denoted by their colour (col.) and quality of preservation (pres.) thus:-

Y = yellow
Br = brown
Bl = black
good = well preserved
fair = fairly preserved
poor = poorly preserved

Spore-pollen zones are those defined by Dettmann and Playford (1968).

TABLE 1

Depth (feet)	Yield	Spore-Pollen		Wood		Cuticle		Spore-Pollen Zone	
		Col.	Pres.	Col.	Pres.	Col.	Pres.		
3076	Sp	Br	fair-poor	Br-Bl	Fair-poor	Br	Fair-poor	?	
3262	"	"	"	"	"	"	"		
3334	Ab	Y-Br	good-fair	"	fair	Y-Br	fair	Coptospora paradoxa Zone	
3549	"	"	fair	"	fair-poor	"	fair-poor	Dictyotosporites speciosus Zone	
3642	C	"	fair-poor	"	"	"	"		
3763	Ab	"	"	"	"	"	"		
3940	Sp	Br	"	"	"	"	"		
4078	"	"	poor	"	"	DY-Br	poor		Cyclosporites
4184	Ab	DY-Br	fair-poor	"	"	"	fair-poor		
4272	Sp	Br	"	"	"	"	"		hughesi
4394	"	"	"	"	"	"	"		
4489	Ab	"	"	"	"	"	"		
4532½	B	-	-	-	-	-	-		Subzone
4637	"	-	-	Br	poor	-	-		
4705	Sp	Br	fair-poor	Br-Bl	fair-poor	-	-		
4798	"	"	"	"	"	-	-		
4878	C	"	"	"	"	DY-Br	fair-poor		
4940	Sp	"	"	"	"	"	"		
4964	Ab	"	"	"	"	"	"		

APPENDIX 3:

CHEMICAL BRANCH
MINES DEPARTMENT
CHEMICAL LABORATORIES—
Departments of Agriculture, Health, and Mines, Victoria
GMG:MS
Phone: 63 0321
An. FF, 17/7

APPENDIX III

STATE LABORATORIES
MACARTHUR STREET
MELBOURNE, C.1

25th July, 1968

Report on Sample No.1025/68

U.W.R.S.5843

Sample : Water from oil bore

Locality : Parish : Laang

Sender : Interstate Oil Limited,
95 Collins Street,
MELBOURNE.

Particulars:

No.	1025
U.W.R.S.	5843
Well Name	Garvoc No.1
Location	38° 19'9" South 142° 52'33" East G.E. 352ft. A.S.L. Drilling Datum K.B. 363ft. A.S.L. Six miles south-south east of Terang. South east corner of Crown Section No.2
Test	D.S.T
Interval	4478 to 4548ft.
Date	7th July, 1968.

Results:		Parts per million
Total solids in solution by hypothetical combination		28,190
Chloride	(Cl)	7,290
Carbonate	(CO_3)	729
Bicarbonate	(HCO_3)	10,720
Sulphate	(SO_4)	511
Nitrate	(NO_3)	Nil
Calcium	(Ca)	7
Magnesium	(Mg)	19
Sodium	(Na)	9,250
Potassium	(K)	405
Iron-Total	(Fe)	100
Iron-Soluble	(Fe)	n.d.
Silicate	(SiO_3)	65
Total hardness (as $CaCO_3$)		98
pH		8.7
E.C. at 25°C.		31,800 micromhos/cm.
Specific Resistance at 17.5°C.		37 ohmcm.

A hypothetical combination is given as follows:-

		p.p.m
Calcium bicarbonate,	$Ca(HCO_3)_2$	28
Magnesium bicarbonate,	$Mg(HCO_3)_2$	114
Ferrous bicarbonate,	$Fe(HCO_3)_2$	318
Sodium bicarbonate,	$NaHCO_3$	13429
Potassium bicarbonate,	$KHCO_3$	1037
Sodium carbonate,	Na_2CO_3	1287
Sodium sulphate,	Na_2SO_4	756
Sodium nitrate	$NaNO_3$	Nil
Sodium chloride	NaCl	12018
Sodium silicate	Na_2SiO_3	104

John G. Kennedy
GIS

Senior Chemist,
Mines Department.

APPENDIX 4:

CHEMICAL BRANCH
MINES DEPARTMENT
CHEMICAL LABORATORIES—
Departments of Agriculture, Health, and Mines, Victoria
GMG:MS
Phone: 63 0321

An. FF, 11/7

APPENDIX IV

STATE LABORATORIES
MACARTHUR STREET
MELBOURNE, C.1

26th July, 1968

Report on Sample No.1029/68

Sample : Gas from Oil Bore

Locality : Garvoc No.1 Well

Sender : Interstate Oil Ltd.,
95 Collins Street,
MELBOURNE.

Attention Mr. Leslie

Details of Sample:

A sample of gas obtained from oil well Garvoc No.1, drilled by Interstate Oil Limited, was received for analysis.

This sample resulted from D.S.T. No.1, at an interval from 4478 to 4548 feet.

The location of this bore was 38° 19'19" South, 142° 52'33" East. G.E. 352ft. A.S.L. . Drilling Datum KB 363ft. A.S.L. Six miles south-south west of Terang. South east corner of Crown Section No.2. Parish of Laang.

The date of sampling was the 7th July 1968.

Results:

Analysis of Gas

D.S.T.1.	4478-4548 feet.
Carbon Dioxide	96.7%
Methane	0.4%
Air	2.0%
Hydrogen	0.2%
Helium	Trace

John G. Kennedy

Senior Chemist,
Mines Department.

APPENDIX 5:

APPENDIX V(a)

CORE DESCRIPTIONS

INTERSTATE/SHELL GARVOC NO.1

by

B.H. Sell and D.A. Short,
Mines Administration Pty. Limited

Equipment: Hughes "J" type 20 ft. barrel cutting a $3\frac{3}{8}$" diameter core.

Core No.1 Interval: 4526 - 4546
Rec.: 13 feet - 65%

4526'-4532'9" Sandstone white, mostly coarse grained, some medium and some pebbly to conglomeratic. It is composed dominantly of clear and white quartz, with minor coloured cherty lithic fragments and few shaley fragments and thin streaks. The matrix is soft white clay, slightly calcareous in a few patches. In spite of the clay matrix, porosity and probably permeability are very good. Grains are sub-angular to sub-rounded and sorting is only fair.

4532'9"-4539' Sandstone as above, but more even grained and without pebbles. It is medium grained at the top of this interval and grades to coarse. A bed containing some shaley clasts occurs at 4536'. Porosity and permeability are good from 4535'-4539'.
Dip: Bedding is irregular and most is current bedded at about 20°. True dip may be about 5° - 10°.
Signs of Oil/Gas: Some patches of blue-white to yellowish fluorescence, but most of the core has no shows.

Core No.2 Interval: 4990'-4999'
Rec.: 7'9" - 86%

4990-4997'9" Quartz mica schist medium grey with veins and aggregations of milky quartz. Bedding is irregular and highly contorted.
Dip -
Signs of Oil/Gas: Nil.

INTERSTATE/SHELL GARVOC NO.1 WELL

SIDEWALL SAMPLE DESCRIPTIONS

by

Shell Development (Australia) Pty. Ltd.

Depth below K.B.	Description
3076'	Shale, compact, dark grey, very silty; quartzitic, with very fine grains of white Feldspar, Coal specks; vague laminations. 2" size.
3133'	sub-lithic Sandstone, no visible porosity, salt and pepper colour, very fine to fine grained, well sorted, subangular and spherical grains, abundant white Clay and Carbonate cement, brittle; abundant dark grey lithics (Chert), very rare chloritic light greenish lithics, Coal flecks. $\frac{1}{2}$" size, broken.
3262'	Siltstone, compact, grey, very clayey (cement) quartzitic, with abundant fine grains of Quartz, white Feldspar and black lithics, slightly carbonaceous and micaceous. 2" size.
3334'	Siltstone, compact, salt and pepper colour, very clayey (cement), very fine Feldspar and lithic grains. $1\frac{1}{2}$" size.
3422'	Coal, black, slightly clayey, fissile. 2" size, broken.
3549'	Siltstone as 3334', regularly finely laminated. $1\frac{1}{2}$" size.
3588'	Siltstone, as 3334', more clayey, regular thin whitish laminae. $1\frac{1}{2}$" size.
3642'	Siltstone to very fine quartzitic Sandstone, slightly porous, whitish; clayey to calcareous cement, friable. 1" size.
3763'	Shale, grey, silty, slightly carbonaceous, brittle but consolidated. 1" size, broken.
3841'	Siltstone to very fine quartzitic Sandstone, as 3642' with rare very fine dark or greenish lithics. 1" size.
3940'	quartzitic Sandstone, slightly porous, whitish, very fine to fine grained, well sorted, angular; silty, clayey to calcareous cement, friable but compact, with a few dark grey lithics (Chert) and white Feldspar; 1 laminae (2mm) with Coal specks. 1" size.

4008' quartzitic Sandstone, whitish to light grey, somewhat light greenish, as 3940', grading into Siltstone, with carbonaceous specks and rare greenish lithics.
1" size, broken.

4078' quartzitic Sandstone, as 3940'
$\frac{3}{4}$" size.

4184' Shale, dark grey, silty, micaceous, carbonaceous; compact.
1" size, broken.

4208' Siltstone to quartzitic Sandstone, light grey, as 3642', with dark grey clayey to carbonaceous laminae rare orange grains (Zeolite ?).
1" size; broken.

4272' quartzitic Sandstone, as 3940'. Half the core is marked by very thin, regular, black carbonaceous laminae.
1" size.

4346' Siltstone to quartzitic Sandstone, as 3642'
1" size, broken.

4394' Shale, light grey, very silty, compact.
$1\frac{1}{2}$" size, broken

4423' Shale, as 4184', with irregular carbonaceous laminae.
$1\frac{1}{4}$" size, broken

4489' Shale, dark grey to black, very carbonaceous; compact.
$\frac{3}{4}$" size, broken.

4599' quartzitic Sand, porous, white, fine to medium grained, well sorted, subangular, fair sphericity; scarse white clayey cement, friable; very rare light brown lithics.
$1\frac{1}{2}$" size.

4637' quartzitic Sandstone, porous, white medium to coarse grained, well sorted, subangular to subrounded, high sphericity; a little white clayey cement, friable.
$1\frac{1}{2}$" size.

4705' quartzitic Sandstone, porous whitish, very fine to medium grained, poorly sorted, subangular, moderate sphericity; white clayey cement, friable, very rare dark grey and pale greenish lithics.
2" size.

4756' quartzitic Sandstone, as 4637', but medium grained, very well sorted.
$1\frac{1}{2}$" size.

4798' quartzitic Sandstone, as 4705'
$1\frac{1}{2}$" size, broken.

4851' quartzitic Sandstone, white, as 4705', but with a few dark grey and orange (Zeolite ?) lithics.
$\frac{3}{4}$" size, broken.

4878' quartzitic Sandstone, as 4851', but fine to medium grained, moderately sorted, abundant white clayey cement; with a carbonaceous streak (3 mm).
1" size, broken.

4914' quartzitic Sandstone, as 4705', but with rare dark grey and orange lithics
$1\frac{1}{2}$" size.

4940' quartzitic Sandstone, as 4705', rare dark grey lithics carbonaceous specks.
$1\frac{3}{4}$" size.

4964' Shale, as 4184', with small lensoid streak of whitish Siltstone.
$\frac{1}{2}$" size, broken.

CL-511-2

CORE LABORATORIES AUSTRALIA LTD.

Petroleum Reservoir Engineering

BRISBANE, AUSTRALIA

Company MINES ADMINISTRATION PTY. LTD. Formation _____ Page 1 of 1

Well GARVOC NO. 1 Cores CONVENTIONAL File AP-1-173

Field _____ Drilling Fluid _____ Date Report 17 JULY '68

~~County~~ VICTORIA ~~State~~ AUSTRALIA Elevation _____ Analysts N F

Location 5 MILES SW TERANG, OTWAY BASIN Remarks _____

CORE ANALYSIS RESULTS

(Figures in parentheses refer to footnote remarks)

SAMPLE NUMBER	DEPTH FEET	PERMEABILITY MILLIDARCYS		POROSITY PERCENT	RESIDUAL SATURATION		PROBABLE PRODUCTION	REMARKS
		HORIZONTAL	VERTICAL		OIL % VOLUME	TOTAL WATER % PORE		
1	4533'9" - 4534'	2.9		13.2	0.0	82.6		SD,WHITE, FN GRN,ARGIL.
2	4538'4" - 4538'8"	661		22.7	0.9	73.6		SD,WHITE, MED GRN, ARGIL.

NOTE:

(*) REFER TO ATTACHED LETTER.

(1) INCOMPLETE CORE RECOVERY—INTERPRETATION RESERVED.

(2) OFF LOCATION ANALYSES—NO INTERPRETATION OF RESULTS

Petroleum Technology Laboratory, Bureau of Mineral Resources, Geology and Geophysics, Canberra

CORE ANALYSIS RESULTS

NOTE: (i) Unless otherwise stated, porosities and permeabilities were determined on two plugs (V&H) cut vertically and horizontally to the axis of the core. Ruska porosimeter and permeameter were used with air and dry nitrogen as the saturating and flowing media respectively. (ii) Oil and water saturations were determined using Soxhlet type apparatus. (iii) Acetone test precipitates are recorded as Neg., Trace, Fair, Strong or Very Strong.

WELL NAME AND NO. GARVOC No. 1

DATE ANALYSIS COMPLETED 5th August, 1968.

Core No.	Sample Depth		Lithology	Average Effective Porosity two plugs (% Bulk Vol.	Absolute Permeability (Millidarcy)		Average Density (gm/cc.)		Fluid Saturation (% pore space)		Core Water Salinity (p.p.m. NaCl)	Acetone Test	Fluorescence of freshly broken core	
	From	To			V	H	Dry Bulk	Apparent Grain	Water	Oil				
1A	4528'1"	4528'5"	Sandstone	18	N.D	30	2.27	2.77	83	Nil	600	Neg.	Rare tiny, yellow speckles.	
1B	4530'	4530'4"	"	21	N.D.	372	2.10	2.66	72	Nil	600	Neg.	"	
1C	4532'2"	4532'6"	"	19	N.D.	203	2.17	2.68	88	Nil	700	Neg.	"	
1D	4534'2"	4534'6"	"	17	N.D.	3	2.21	2.67	74	Nil	600	Neg.	"	
1E	4536'	4536'4"	"	17	N.D.	24	2.21	2.67	91	Nil	700	Neg.	"	
1F	4538'	4538'4"	"	19	N.D.	553	2.16	2.67	96	Nil	700	Neg.	"	
2	4995'7"	4996'	Quartzite	1	Nil	Nil	2.68	2.72	N.D.	N.D.	N.D.	Neg.	Nil.	

Remarks: - Core 1 received in a sealed condition

General File No. 62/399
Well File No. 68/2020

APPENDIX V(d)

APPENDIX VI

INTERSTATE/SHELL GARVOC NO.1 WELL

List of Schlumberger Logs

Log	Run No.	Date	Interval Logged	Scale (ins/100 ft.)
Induction - Electric	1	6/7/68	1010'-5034'	1 & 5
Sonic/Gamma Ray/ Caliper	1	6/7/68	1010'-5027'	1 & 5
Microlog/Caliper	1	6/7/68	1010'-5034'	1 & 5
Continuous Dipmeter	1	6/7/68	1010'-5032'	2 & 5

APPENDIX 6:

LOG INTERPRETATION

by

SCHLUMBERGER SEACO INC.

G A R V O C #1

Logs available : Induction Electrical Survey
Microlog-Caliper
Sonic Gamma Ray

Depth	R IL	ΔT	Øs C ΔT SH = 140	Fs	SP	Rw @ BHT	Sw
2105	7	120	34	6.5	- 40	.50 to 1	68-97

2400-2500: This sand appears to be quite shaly as indicated by the reduced SP, high Gamma Ray count and Microlog separation. We can use the Gamma Ray to make an estimate of clay content: about 30%. The Sonic derived Ø is 30-35%. After correction for shale content the effective Ø drops to about 5%. This sand is obviously 100% water wet.

The sand from 3300 to 3800 appears to be quite shaly and water wet :

Depth	R IL	ΔT	Øs Good Compaction Vm=18,000	Fs	SP	Rw @ BHT	Sw
3945	3	85	22	16 -	45	.35	135
4075	3.8	85	22	16 -	45	.35	122

The sand section from 4470 to 4976 lends itself to a sonic resistivity plot as the SP indicates a fairly constant Rw and the Gamma Ray indicates some very clean sections. All the points chosen for the plot appear to have good permeability on the Microlog. The porosity values are tabulated on Chart #1 along with water saturation values derived from the sonic resistivity plot. It is apparent that the whole sand is water wet.

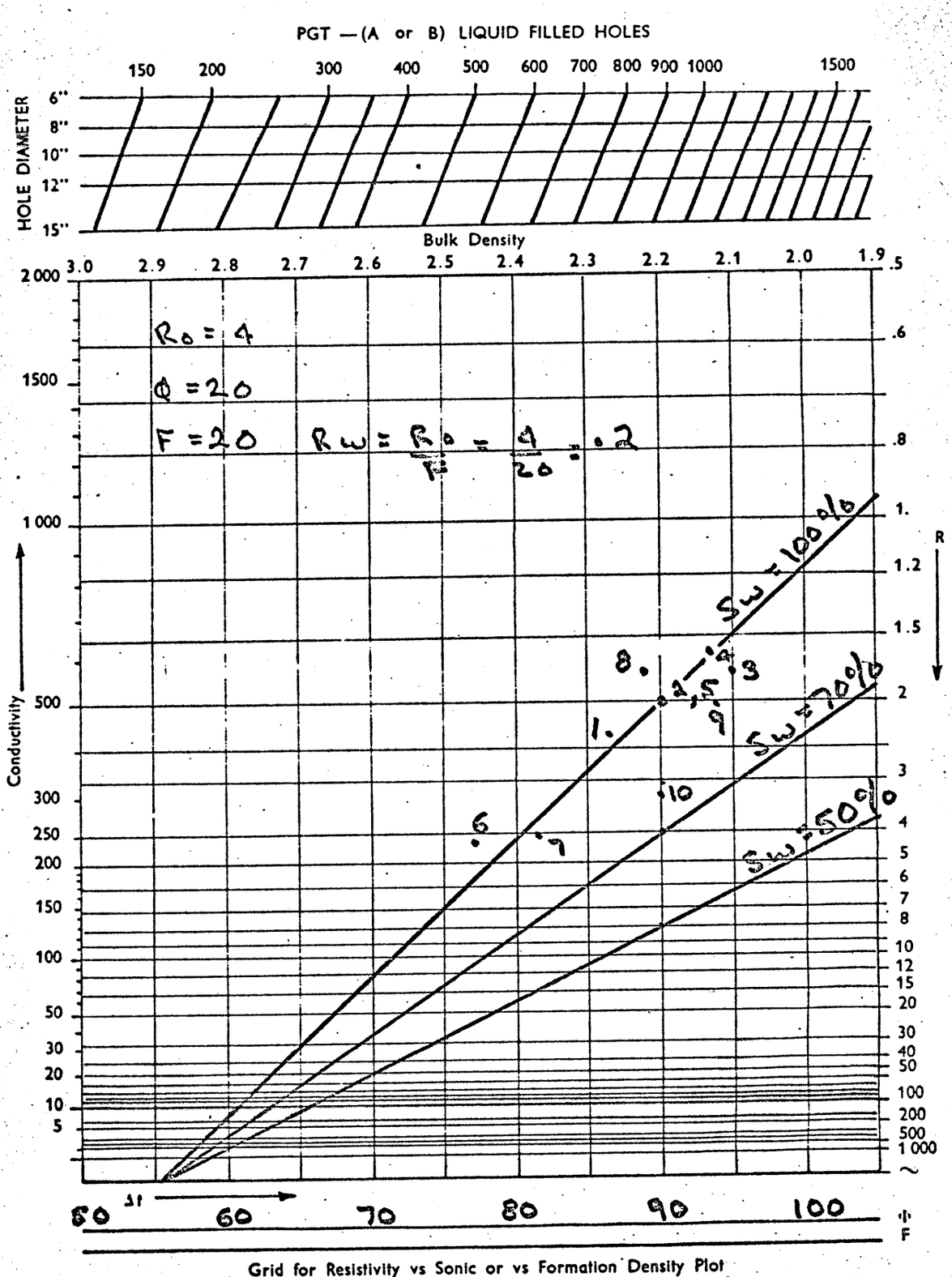
We can determine Rw = .2 from the plot. The furthermost NW points fall in a characteristic 100% water line which passes through ΔT = 55.5 for Vm = 18,000. We feel the compaction at this depth is sufficient to use C ΔT SH = 100 for porosity determination.

C H A R T #1

	Depth	R IL	Δ T	Ø	Sw
1	4474	2.4	87	23	100
2	4498	2.0	90	26	100
3	4555	1.8	95	29	90
4	4635	1.6	93	28	100
5	4685	2.0	90	26	90
6	4725	4.2	77	16	100
7	4806	4.0	82	20	100
8	4868	1.7	88	24	100
9	4915	2.0	93	28	87
10	4967	3.3	90	26	78

- - - - - - - - - - - - -

GRID FOR SONIC — RESISTIVITY OR [illegible] — RESISTIVITY PLOTS



Grid for Resistivity vs Sonic or vs Formation Density Plot

$F = \frac{.62}{\phi^{2.15}}$

CARVOC = 1

APPENDIX 7:

APPENDIX VII

INTERSTATE/SHELL GARVOC NO.1 WELL

DETAILS OF DRILL STEM TESTING

One open hole drill stem test was carried out during the drilling of the well.

Drill Stem Test No.1	Date: 7th July, 1968
Interval Tested:	4478 - 4548 ft.
Reason for Test:	To determine formation pressure, permeability and obtain samples of formation fluids from the "Pretty Hill Sandstone".
Well depth:	5035 ft.
Hole conditions:	Open hole $8\frac{3}{4}$"
Type of Test:	Dual packer straddle.
Drillpipe/Collar Size:	$4\frac{1}{2}$" D.P. $6\frac{1}{2}$" OD $2\frac{3}{4}$" I.D. Collars
Packers:	$7\frac{3}{4}$" set at 4472, 4478, 4548 and 4554 feet.
Choke Size:	$\frac{1}{2}$" Bottom, $\frac{3}{4}$" adjustable top.
Water cushion:	Nil.
Tail Pipe Data:	Details of the testing string are attached to the B.J. report (Enclosure 4).
Calculated Pressure of Mud Column:	2300 psi.
Duration of test:	Set packer at 1147 hrs. Tool opened at 1149 for 75 mins. Shut in at 1304 for 30 mins. Re-opened tool at 1334 - pulled packers at 1339.
Results:	Fair initial puff increasing to strong air blow. Non-combustible gas to surface in 60 minutes at a rate too small to measure and decreasing. No surface action when valve was opened for second flow period. Recovered 4270 salty water muddy for top 400 ft. Heavily gas cut throughout (see Appendices III and IV for water and gas analyses).

Pressure Readings:	Initial Hydrostatic	2357 psi	top
		2379 psi	bottom
	Final Hydrostatic	2330 psi	top
		2379 psi	bottom
	Initial Flow	1178 psi	top
		1874 psi	bottom
	Final Flow	1905 psi	top
		1920 psi	bottom
	Shut-in	1910 psi	top
		1921 psi	bottom

(See Enclosure 4 for copies of pressure charts)

Conclusions: The sandstone interval tested is permeable and contains salty water with dissolved CO_2

ENCLOSURE 1
LOCATION MAP

PE902877

This is an enclosure indicator page.
The enclosure PE902877 is enclosed within the container PE902876 at this location in this document.

The enclosure PE902877 has the following characteristics:

ITEM_BARCODE	= PE902877
CONTAINER_BARCODE	= PE902876
NAME	= Structural Map
BASIN	= OTWAY
PERMIT	= PEP/5
TYPE	= SEISMIC
SUBTYPE	= HRZN_CONTR_MAP
DESCRIPTION	= Structural Map showing approximate basement configuration prior to drilling (enclosure from WCR) for Garvoc-1
REMARKS	=
DATE_CREATED	= 31/10/68
DATE_RECEIVED	=
W_NO	= W521
WELL_NAME	= Garvoc-1
CONTRACTOR	= Interstate Oil Ltd
CLIENT_OP_CO	= Interstate Oil Ltd

(Inserted by DNRE - Vic Govt Mines Dept)

ENCLOSURE 2
X-SECTION

PE902878

This is an enclosure indicator page.
The enclosure PE902878 is enclosed within the container PE902876 at this location in this document.

The enclosure PE902878 has the following characteristics:

ITEM_BARCODE	= PE902878
CONTAINER_BARCODE	= PE902876
NAME	= Correlation Section
BASIN	= OTWAY
PERMIT	= PEP/5
TYPE	= WELL
SUBTYPE	= WELL_CORRELATION
DESCRIPTION	= Correlation Section, Flaxmans No 1 to Garvoc No 1(enclosure from WCR) for Garvoc-1
REMARKS	=
DATE_CREATED	= 31/10/68
DATE_RECEIVED	=
W_NO	= W521
WELL_NAME	= Garvoc-1
CONTRACTOR	= Geodrafting Services Pty Ltd
CLIENT_OP_CO	= Interstate Oil Ltd

(Inserted by DNRE - Vic Govt Mines Dept)

ENCLOSURE 3
COMPOSITE LOG

PE601502

This is an enclosure indicator page.
The enclosure PE601502 is enclosed within the container PE902876 at this location in this document.

The enclosure PE601502 has the following characteristics:

ITEM_BARCODE	= PE601502
CONTAINER_BARCODE	= PE902876
NAME	= Composite Well Log
BASIN	= OTWAY
PERMIT	= PEP/5
TYPE	= WELL
SUBTYPE	= COMPOSITE_LOG
DESCRIPTION	= Composite Well Log, Sheet 1 of 2, Interstate OIl Ltd Garvoc No 1
REMARKS	=
DATE_CREATED	= 8/07/68
DATE_RECEIVED	=
W_NO	= W521
WELL_NAME	= Garvoc-1
CONTRACTOR	=
CLIENT_OP_CO	= Interstate Oil Ltd

(Inserted by DNRE - Vic Govt Mines Dept)

PE601503

This is an enclosure indicator page.
The enclosure PE601503 is enclosed within the container PE902876 at this location in this document.

The enclosure PE601503 has the following characteristics:

ITEM_BARCODE	= PE601503
CONTAINER_BARCODE	= PE902876
NAME	= Composite Well Log
BASIN	= OTWAY
PERMIT	= PEP/5
TYPE	= WELL
SUBTYPE	= COMPOSITE_LOG
DESCRIPTION	= Composite Well Log, Sheet 2 of 2, Interstate OIl Ltd Garvoc No 1
REMARKS	=
DATE_CREATED	= 8/07/68
DATE_RECEIVED	=
W_NO	= W521
WELL_NAME	= Garvoc-1
CONTRACTOR	= Interstate Oil Ltd
CLIENT_OP_CO	= Interstate Oil Ltd

(Inserted by DNRE - Vic Govt Mines Dept)

ENCLOSURE 4
TEST CHARTS

INTERSTATE OIL GARVOC NO 1 DST NO 1 7th JULY, 1968

2.50	B/N		
1.00	XO		
453.35	5 STUDS D/P		
1.00	XO		
20.00	PERF T/P		5035.00
9.00	P K R		486.85
486.85	BELOW BTM PACKER	BOTTOM OF TEST INT.	4548.15
3.00	PKR		
1.00	XO		
29.80	I D/C		
1.00	XO		
3.75	REC CASE - 2121 at 4510'		
1.00	LR BY PASS SUB		
30.00	PERF T/P		5035.00
1.00	PKR		557.40
557.40	TO BTM OF TOP PACKER	TOP OF TEST INT.	4477.60
11.00	PKR		
1.00	UP BY PASS SUB		
1.75	S/J		
4.75	REC CASE - 2014 at 4459'		
4.49	JARS	T.D.	
7.15	RETAINING VALVE	5030	DRILLER
5.23	D.A.P	5035	SCHLUMBERGER
1.00	DP XO		
593.77	TO TOP OF BJ TEST TOOL		
328.25	11 D/C		
1.00	P/O SUB		
4.47	STAB. BODY		
4087.87	46 STDS D/P		
29.81	SINGLE		
5045.17	TOTAL TOOLS		
5030.00	TOTAL DEPTH		
15.17	UP UNSET		

BJ SERVICE (AUSTRALIA) PTY. LTD. TESTING REPORT

DRILL-STEM TEST DATA

Well Name INTERSTATE GARVOC NO 1	Test No. 1
Well Number 1	Zone Tested PRETTY HILLS
Company INTERSTATE OIL LIMITED	Date 7.7.68
Comp. Rep. B.H. SELL	Tester STEPHENS.

Recorder No. 2014	Clock Range 12 Hr.	Recorder No. 2121	Clock Range 12 Hr.
Depth 4459		Depth 4510	
Initial Hydro Mud Press	2357	Initial Hydro Mud Press	2379
Initial Shut-in Press	----	Initial Shut-in Press	----
Initial Flow Press	1178	Initial Flow Press	1874
Final Flow Press	1905	Final Flow Press	1920
Final Shut-in Press	1910	Final Shut-in Press	1921
Final Hydro Mud Press	2330	Final Hydro Mud Press	2379
Temperature	168 °F	Tool Open Before I.S.I.	75 Mins.
Mud Drop	Nil	Initial Shut-in	30 Mins.
Mud Weight 9.9	Viscosity 50	Flow Period	-- Mins.
Fluid Loss 6.5		Final Shut-in	-- Mins.
Interval Tested	4478 - 4548	Surface Choke Size	None
Net Pay Tested	70'	Bottom Choke Size	$\frac{1}{2}$
Top Packer Depth	4472 - 4478	Main Hole Size	$8\frac{3}{4}$
Bottom Packer Depth	4548 - 4554	Rat Hole Size	---
Total Depth	5035 (Schlum)	Feet of Rat Hole	---
Drill Pipe Size	$4\frac{1}{2}$ FH Wt. 16.6	Type of Test	Dual Straddle
Drill Collar I.D.	$2\frac{3}{8}$ Ft. Run 358	Cushion Amount—Type	---
Anchor Size	$4\frac{3}{4}$ & $6\frac{1}{2}$	Rubber Size	$7\frac{3}{4}$

Recovery—Total Feet 4270

Recovered 200 Feet of Gas Cut Mud

Recovered 200 Feet of Muddy Water - Gas Cut

Recovered 3870 Feet of Fairly Clean Gas Cut Water.

Recovered ..... Feet of .....

REMARKS:

Tool opened with weak blow.
Increased to good strong blow. Almost dead at end of initial flow period.

PE905773

This is an enclosure indicator page.
The enclosure PE905773 is enclosed within the container PE902876 at this location in this document.

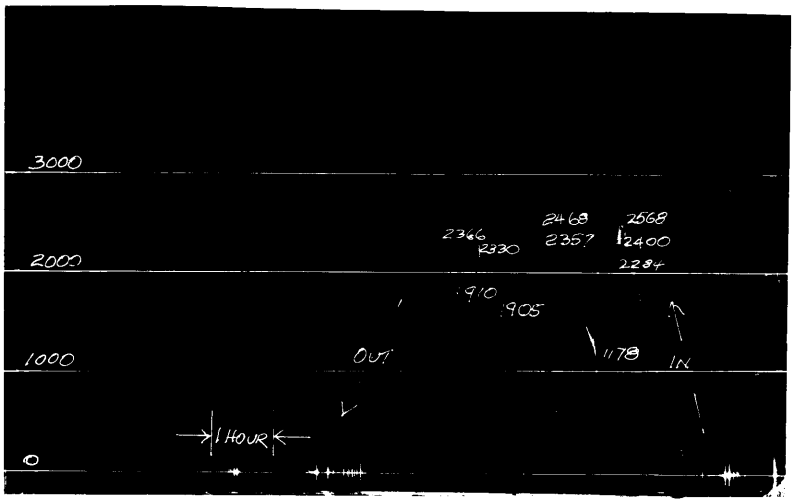
The enclosure PE905773 has the following characteristics:

ITEM_BARCODE	= PE905773
CONTAINER_BARCODE	= PE902876
NAME	= DST Photos
BASIN	= OTWAY BASIN
PERMIT	= PEP/5
TYPE	= WELL
SUBTYPE	= DST
DESCRIPTION	= Drill Stem Test Photos (from enclosure 4 of WCR, DST Test Charts), for Garvoc-1
REMARKS	=
DATE_CREATED	= 7/07/68
DATE_RECEIVED	=
W_NO	= W521
WELL_NAME	= GARVOC-1
CONTRACTOR	= RICHTER BAWDEN DRILLING PTY. LTD.
CLIENT_OP_CO	= INTERSTATE OIL LTD.

(Inserted by DNRE - Vic Govt Mines Dept)

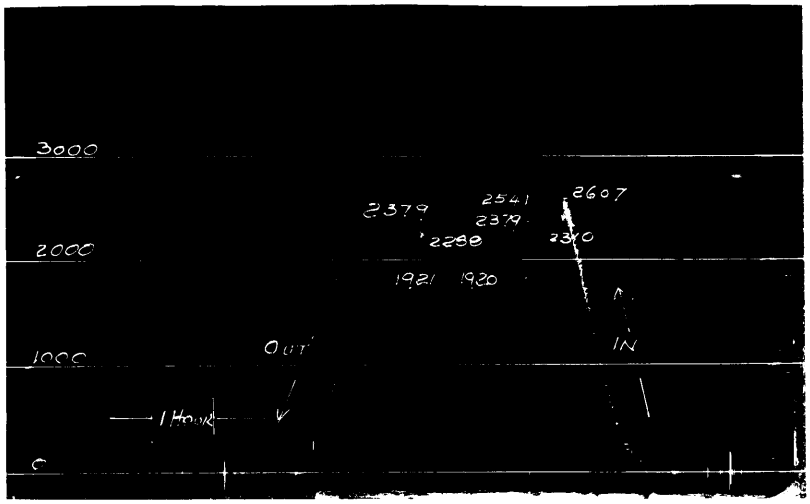
INTERSTATE OIL LIMITED
GARVOC NO 1
RECORDER NO 2014

JULY 7 1968
TEST NO 1
RECORDER DEPTH 4459'



INTERSTATE OIL LIMITED
GARVOC NO 1
RECORDER NO 2121

JULY 7 1968
TEST NO 1
RECORDER DEPTH 4510'



ENCLOSURE 5
WIRELINE LOGS

PE604417

This is an enclosure indicator page.
The enclosure PE604417 is enclosed within the container PE902876 at this location in this document.

The enclosure PE604417 has the following characteristics:

ITEM_BARCODE	= PE604417
CONTAINER_BARCODE	= PE902876
NAME	= Induction Electrical Log for Garvoc-1
BASIN	= OTWAY BASIN
PERMIT	= PEP/5
TYPE	= WELL
SUBTYPE	= WELL_LOG
DESCRIPTION	= Induction Electrical Log (enclosure 5 from WCR) for Garvoc-1
REMARKS	=
DATE_CREATED	= 6/07/68
DATE_RECEIVED	=
W_NO	= W521
WELL_NAME	= GARVOC-1
CONTRACTOR	= SCHLUMBERGER
CLIENT_OP_CO	= INTERSTATE OIL LTD.

(Inserted by DNRE - Vic Govt Mines Dept)

PE604415

This is an enclosure indicator page.
The enclosure PE604415 is enclosed within the container PE902876 at this location in this document.

The enclosure PE604415 has the following characteristics:

ITEM_BARCODE	= PE604415
CONTAINER_BARCODE	= PE902876
NAME	= Sonic-Gamma Ray Log for Garvoc-1
BASIN	= OTWAY BASIN
PERMIT	= PEP/5
TYPE	= WELL
SUBTYPE	= WELL_LOG
DESCRIPTION	= Sonic-Gamma Ray Log (enclosure 5 from WCR) for Garvoc-1
REMARKS	=
DATE_CREATED	= 6/07/68
DATE_RECEIVED	=
W_NO	= W521
WELL_NAME	= GARVOC-1
CONTRACTOR	= SCHLUMBERGER
CLIENT_OP_CO	= INTERSTATE OIL LTD.

(Inserted by DNRE - Vic Govt Mines Dept)

PE604416

This is an enclosure indicator page.
The enclosure PE604416 is enclosed within the container PE902876 at this location in this document.

The enclosure PE604416 has the following characteristics:

ITEM_BARCODE	= PE604416
CONTAINER_BARCODE	= PE902876
NAME	= Microlog for Garvoc-1
BASIN	= OTWAY BASIN
PERMIT	= PEP/5
TYPE	= WELL
SUBTYPE	= WELL_LOG
DESCRIPTION	= Microlog (enclosure 5 from WCR) for Garvoc-1
REMARKS	=
DATE_CREATED	= 6/07/68
DATE_RECEIVED	=
W_NO	= W521
WELL_NAME	= GARVOC-1
CONTRACTOR	= SCHLUMBERGER
CLIENT_OP_CO	= INTERSTATE OIL LTD.

(Inserted by DNRE - Vic Govt Mines Dept)

PE604418

This is an enclosure indicator page.
The enclosure PE604418 is enclosed within the container PE902876 at this location in this document.

The enclosure PE604418 has the following characteristics:

ITEM_BARCODE	= PE604418
CONTAINER_BARCODE	= PE902876
NAME	= Continuous Dipmeter for Garvoc-1
BASIN	= OTWAY
PERMIT	= PEP/5
TYPE	= WELL
SUBTYPE	= WELL_LOG
DESCRIPTION	= Continuous Dipmeter Log (enclosure 5 from WCR) for Garvoc-1
REMARKS	= shows 2 scales (1"" = 20' and 1"" = 50')
DATE_CREATED	= 7/07/68
DATE_RECEIVED	=
W_NO	= W521
WELL_NAME	= GARVOC-1
CONTRACTOR	= SCHLUMBERGER
CLIENT_OP_CO	= INTERSTATE OIL LTD.

(Inserted by DNRE - Vic Govt Mines Dept)