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ARCO . WOODSIDE

WELL COMPLETION REPORT

MERRIMAN No.1 .

COMPLETION REPORT

MERRIMAN No.1 .

W475

ARCO LIMITED / WOODSIDE (LAKES ENTRANCE)
OIL COMPANY N. L.

MERRIMAN NO. 1

FINAL WELL REPORT

by

Frank T. Ingram
ARCO LIMITED

Merriman 2/52

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S U M M A R Y

The Merriman No. 1 well was spudded on February 21, 1963, and reached the total depth of 6005 feet on March 17, 1963.

No shows of hydrocarbons were encountered and the well was plugged and abandoned on March 19, 1963. The gas sand, present in the North Seaspray No. 1, was absent in the Merriman No. 1.

The Tertiary - Mesozoic contact is a marked unconformity. The structural pattern in the Mesozoic sediments is very poorly reflected in the Tertiary section, and the structural "high" in the Tertiary is "off structure" in the Mesozoic.

Porosities and, more important, permeabilities in the Mesozoic sequence are much better in the Merriman No. 1 than in any well previously drilled in the Gippsland Basin. This is due mostly to an increase in grain size, and to a lesser amount of fine detritus. A source area to the south of the well site is postulated for the Mesozoic (Lower Cretaceous) sediments.

Merriman 6/52

INTRODUCTION

After the encouraging show of petroliferous gas in the North Seaspray No. 1 well, it was decided to drill two additional wells in the same area. The first of these, Merriman No. 1, was drilled on a structure similar to the North Seaspray structure, but entirely separate. The Merriman No. 1 was located 2 miles north of the coastal village of Seaspray, and 4 miles south-south-west of the North Seaspray No. 1 well.

The well was scheduled to a depth of 6,000 feet in order to test sands in the Latrobe Valley Coal Measures and the upper 2,000 feet of the Strzelecki Group. It was hoped to find sands with better permeability in the Strzelecki Group in the section where gas was found in the North Seaspray No. 1.

The structure was defined by the same reflection seismic survey conducted by Austral Geo Prospectors Pty. Ltd., which located the North Seaspray structure in the early part of 1962. The resulting structural maps reflected only the structure in the Tertiary sequence as no continuous reflections were obtained below the Tertiary. It was hoped that the structural high in the Mesozoic section would underlie the structural high mapped in the Tertiary section.

WELL HISTORY

GENERAL DATA

Well Name and Number	: MERRIMAN NO. 1
Location	: Longitude 147°10'43" East
	Latitude 38°20'52" South
	Warragul 4 mile sheet
Name and Address of Tenement Holder	: Lakes Oil Ltd. 792 Elizabeth St. Melbourne, Victoria
Details of Petroleum Tenement	: PPL. 160, Victoria
District	: Gippsland

Total Depth	:	Driller 6005 feet Schlumberger 6000 feet
Date Drilling Commenced	:	February 21, 1963
Date Drilling Completed	:	March 17, 1963
Date Well Abandoned	:	March 19, 1963
Date Rig Released	:	March 19, 1963
Drilling Time in Days to Total Depth	:	28
Elevation (above MSL)	:	Ground 67 feet Rotary? 78 " K.B.
Status	:	Dry, plugged and abandoned
Cost	:	Not available

DRILLING DATA

Name and Address of Drilling Contractor	:	Reading and Bates (Australia) Pty. Ltd. 2 City Road Melbourne, S.C.4. Victoria
Drilling Plant	:	Make: National Type: 50 Rated capacity: 7500 feet with 4-1/2 inch drill pipe Rated capacity: 10,000 feet with 3-1/2 inch drill pipe Motors: (2) General Motors 6-71 twin model diesel, 504 BHP each
Mast	:	Make: Lee C. Moore Type: 131 feet Cantilever Rated capacity: 550,000 pounds
Pumps	:	Make: National Type: 1 - C250 1 - C150-B Size: 7-1/4" x 12" Pump Motors Make: General Motors (1) Type: 6-71 twin diesel BHP: 312
Blowout Preventer Equipment	:	Make: Cameron (2) Size: 12" Series: 900 Make: Hydril Size: 12" Series: 900

Week ending	Viscosity sec/qt	Weight lbs/gal.	W.L. cc/30 min.	F.C.	pH
27/2/63	57	9.4	8.1	2/32"	9.1
6/3/63	60	10.3	7.9	2/32"	9.1
13/3/63	81	10.3	7.3	2/32"	9.2
18/3/63	94	10.3	6.3	2/32"	9.1

Water Supply :

A water bore was drilled to 120 feet with a percussion type water boring rig. A string of 6" pipe was driven to 93 feet, and a sand screen was set below the pipe. A Pomona pump assembly was installed in the bore and set at approximately 90 feet.

The capacity of the bore was in excess of 600 barrels (25,200 gal) per day.

Perforations and Shooting Record :

No perforations were made.

Plugging Back :

The only plugs set were during the abandonment of the well. A plug was set at 4650 - 4750 feet with 42 sacks of cement, another at 2200 - 2300 feet with 42 sacks of cement and a third at 450 - 550 feet with 65 sacks of cement. A plug of 25 sacks of cement was set from the surface to 25 feet in the surface casing. A steel plate was welded over the surface casing, and a 2" pipe was welded on to the casing projecting 3 feet above ground to serve as a permanent marker.

Fishing Operations :

Two fishing operations were performed, as described below :

1. Started in hole with bit at 5488 feet and dropped the bottom-hole drill collar with bit when the bit hit the side of the BOP and jarred open the elevators. Fish went all the way to bottom. Went in with overshot, but could not go over top of lift-sub. Went in again with overshot and went over fish after several attempts. Recovered fish, but left bale from top of lift-sub in hole. Went in with magnet and recovered bale. Resumed drilling. Time required for fishing job - 37 hours.

2. Started out of hole at 5814 feet for new bit and hit crown block with travelling block. Drilling line broke and dropped drilling string (5134 feet including 14 drill collars), travelling block, bales and elevators. Drilling string fell to bottom of hole. Went in with overshot and recovered 1-1/2 joints of drill pipe. Went in with overshot again and recovered 4" piece of drill pipe wrapped around overshot. Went in with overshot for the third time and recovered remainder of fish, except for two bit cones and fragments of drill pipe on bottom of hole. Reamed hole to bottom. Ran magnet 7 times and hard formation bits 4 times before hole cleaned out enough to drill ahead. Time required for complete fishing operation - 142 hours.

No junk or equipment was left in the hole.

Side-Tracked hole :

The hole was not side tracked.

LOGGING AND TESTING

Ditch Cuttings :

Cuttings were collected after passing over the shale shaker, then washed and placed in bags. The cuttings were collected every 10 feet while drilling and every 5 feet while coring. Complete sets of cuttings were sent to the Bureau of Mineral Resources and to the Department of Mines in Victoria.

Coring :

A total of 7 cores were planned, 4 in the Tertiary and 3 in the Mesozoic. This program was adhered to as closely as possible but because of lack of shows in the Tertiary only 2 cores were taken in this sequence. Because of lithological changes, 4 cores instead of 3 were taken in the Mesozoic section.

A Hughes type "J" barrel with Hughes soft or hard formation core heads was used for all coring. The total footage cored was 93 feet. The total recovery was 56.5 feet, or 61%. Recovery in the Tertiary sequence was only 43% because of the unconsolidated nature of the sediments. The recovery in the Mesozoic sequence was 86%.

See Appendix 5 for the detailed description of the cores.

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Side-Wall Sampling :

A total of 38 side-wall cores were attempted and 36 were recovered. Recovery was fair to good. A Schlumberger 30 shot side-wall coring gun was used.

Electrical and Other Logging :

The standard electrical log, microlog, sonic log and continuous dipmeter log were run by Schlumberger. The electrical, sonic and micrologs were run from the base of the surface casing at 504 feet to total depth. The continuous dipmeter was run from 1000 feet to total depth.

Drilling Time and Gas Log :

A geolograph drilling-rate recorder was located on the rig floor. A Core Lab logging unit was in use while drilling from 30 feet to total depth. This unit contained two drilling-rate recorders, a hot wire gas detector and various other equipment that was used by the well-site geologists during the drilling operation.

Formation Testing :

A total of 4 open hole drill stem tests were made using a Halliburton testing tool incorporating a dual closed-in pressure valve.

Listed below are brief descriptions of these tests:

D.S.T. No. 1, 504' - 784', 11-1/4" packer set in 13-3/8" casing, packer failed to set.

D.S.T. No. 2, 504' - 784', 11-1/4" packer failed to set.

D.S.T. No. 3, 540' - 784', 7-1/2" packer set in open hole at 540', packer failed.

D.S.T. No. 4, 5774' - 6000', recovered 900' drilling mud and 4600' of formation water.

See appendix 2 for detailed information on formation testing.

Deviation Surveys :

Hole deviation was measured by dropping the "Totco" device down the drill pipe before making a trip, or run down the drill pipe on a wire line. Surveys were made at intervals of 500 feet or less, depending on the frequency of trips.

The deviation increased from 1/4° to 1° in the interval

Hole Size and Depths	:	24"	0' - 30'
	:	17-1/2"	30' - 510'
	:	8-3/4"	510' - 6005'
Casing and Liner Details	:	Size	18-5/8"
		Weight	78 lbs/ft
		Range	2
		Setting Depth	30'
		Size	13-3/8"
		Weight	48 lbs/ft
		Grade	H-40
		Range	2
		Setting Depth	504'
Casing and Liner Cementing Details	:	Size	18-5/8"
	:	Setting Depth	30'
		Quantity cement used	35 sacks
		Cemented to	surface
		Method used	poured by hand
		Size	13-3/8"
		Setting Depth	504'
		Quantity cement used	400 sacks
		Cemented to	surface
		Method used	plug
Drilling Fluid	:	Type	Water base, bentonite, low pH
		Average weight	
		30' - 512'	8.6 lbs/gal
		512' - 1000'	8.9 " "
		1000' - 2000'	9.1 " "
		2000' - 3000'	10.3 " "
		3000' - 4000'	10.3 " "
		4000' - 5000'	10.3 " "
		5000' - 6000'	10.3 " "

The spud mud used to drill the surface hole was a low weight, low viscosity fresh water bentonite mud. After drilling out below the surface casing at 504 feet, the viscosity was gradually built up to about 60 seconds/quart, and the water loss was decreased to about 7 cc/30 minutes. The viscosity and water loss were controlled by the use of bentonite, Lo-Vis and C.M.C. (Tylose B77). The pH of the mud system was maintained by the use of caustic soda.

The slight amount of cement contamination when drilling out below the surface casing was controlled by soda ash. No lost circulation or unusual conditions were encountered.

The average weekly analysis of the drilling mud is listed below :

from 100 to 3000 feet. In the interval 3000 to 4765, the deviation varied from 1° to 2-1/4°. From 4765 feet to total depth the deviation slowly increased to 4-3/4°.

No crooked hole problems were encountered.

Temperature Surveys :

No temperature surveys were made except for the recording of bottom hole temperatures while running electrical logs. The temperature at 4721 feet was 124°, and at 6000 feet it was 136°. This represents a normal temperature gradient of about 1° per 100'.

Other Well Surveys :

No other well surveys were made other than those listed above.

G E O L O G Y

SUMMARY OF PREVIOUS WORK

Geological and Drilling :

Before the drilling of the Merriman No. 1 well began logs, cores and cuttings of wells in the area were studied in order to anticipate the thickness and lithology of the sediments in the Seaspray area. The most significant of these wells are the North Seaspray No. 1, Wellington Park No. 1, Darriman No. 1, Holland's Landing and Lake Kakydra (fig. 1). All of these wells penetrated the Tertiary section and part of the thick Lower Cretaceous Strzelecki Group.

The deepest well (12,011 feet) in the area, the Arco - Woodside Wellington Park No. 1, penetrated a total of 8,226 feet of the Strzelecki Group, without reaching the base of this unit. This well, completed early in 1962, holds the record as the deepest well in the State of Victoria.

No field geological work was done in the Seaspray area and the surface is covered with late Pliocene and Quaternary sand, gravel and clay which do not sufficiently reflect the subsurface structural conditions to warrant surface mapping.

Various reports on the geology of the Tertiary sediments in the basin, and on the Strzelecki Group where exposed on the western side of the basin, were of great help in determining the regional geology.

Geophysical : Merriman 13/52

In 1962 a seismic reflection survey consisting of 191 miles of traverse was made from the Lake Wellington area south-west to the Woodside No. 2 well. This survey was conducted by Austral Geo Prospectors Pty. Ltd. and tied into a previous survey by the same company in the Lake Wellington area.

During this survey the North Seaspray and Merriman structures were located, and several lines were shot across the two structures to better define the amount and type of closure.

Seismic methods yield reliable results in the Tertiary section; but, because of the lack of good reflecting horizons in the thick homogenous Strzelecki Group, the pre-Tertiary structural framework in still not well known. The only source of positive information in this section is from well logs and outcrops.

See appendix 1 for the details on the velocity survey.

SUMMARY ON THE REGIONAL GEOLOGY

The Gippsland Basin is one of several small basins along the south coast of Australia. The basin is defined and delineated by the presence of Tertiary coal measures and marine sediments. The basin proper can be considered as that area west of the Lakes Entrance granite high, south of the Tertiary Paleozoic contact on the north side of the basin and east of a line between the Wilson's Promontory granite and the town of Warragul. The position of the south boundary of the basin is not known as it lies in the area of Bass Strait.

The Paleozoic subsurface is probably very much like the area of Paleozoic outcrops on the north side of the basin. Ordovician and Silurian sediments, altered by dynamic metamorphism and intruded by granite, probably underlie Mesozoic strata over most of the basin. Preserved, highly folded marine strata of Middle Devonian age occur as erosional remnants, or down-faulted blocks, north of the eastern half of the basin. Isolated occurrences of Middle Devonian rocks could be expected in the subsurface in the eastern half of the basin. Overlying these altered and highly folded older Paleozoic rocks on the northern side of the basin is a thick continental sequence of red shales, sandstones, conglomerates and volcanics of Upper Devonian - Lower Carboniferous age.

These beds are slightly to moderately folded and probably extend south at least as far as the Lake Wellington area.

No Permian sediments are known in the subsurface of the basin. However, conglomerate, exposed along a major fault on the south side of the Carrajung uplift, is thought to be glacial tillite of Permian age.

The major structural trend in the Tasman geosyncline is north-south, and as the Paleozoic rocks in the sub-surface of the Gippsland Basin are an extension of this geosyncline, then the same trend is thought to persist.

No sediments of Triassic age are known in the Gippsland Basin.

The Upper Jurassic and Lower Cretaceous times are represented by the Strzelecki Group, a thick sequence of non-marine sediments deposited in an east-west trending trough, or graben. The thickness of this sequence is not known, but the Wellington Park No. 1 well penetrated 8,226 feet with no indication of reaching the base. Estimates of the thickness in the outcrop area of the Strzelecki Ranges varies from 5,000 to 20,000 feet.

During Eocene time, when the Latrobe Valley Coal Measures was deposited, the Gippsland basin acquired, in general, its present size and shape. In the Latrobe Valley and coastal area, between Seaspray and Welshpool, swampy conditions resulted in very thick accumulations of brown coal. Towards the east coal becomes a minor constituent and clastic material predominates. East of Sale several bores have found thin fossiliferous lenses within the coal measures. In the Merriman No. 1 well brown coal accounts for about 21% of the total thickness of the coal measures.

In Oligocene time the first widespread marine invasion occurred in the Gippsland Basin resulting in the deposition of the Lakes Entrance Formation.

In Miocene time, as the sea gradually encroached over the basin, limestone and marl was deposited over a large area. This sequence of sediments consists of several members, but usually is referred to as the Gippsland Limestone.

A marine environment continued into Pliocene time, but then gradual retreat of the sea ended marine deposition in the Gippsland area of the Gippsland basin. From Upper Pliocene to recent time non-marine conditions prevailed, and a cover of sand, gravel and clay was deposited over most of the basin.

STRATIGRAPHIC TABLE :

The following is the stratigraphic sequence penetrated in the Merriman No. 1 :

TABLE I

Age		Name	Depth Ref. K.B.	Thickness	Lithology
TERTIARY	U. Pliocene	Lake Wellington Fm. and/or Haunted Hills Gravels	140'	129'	Sand, Gravel and Clay
	L. Pliocene	Jemmy's Point Formation	350'	210'	Sand, Shells and Marl
	U. Miocene	Tambo River Formation	490'	140'	Marl, and Limestone
	Miocene	Gippsland Limestone	2050'	1560'	Marl and Limestone
	Oligocene	Lakes Entrance Formation	2288'	238'	Calcareous Shale, Marl and minor Limestone
	L. Oligocene to U. Eocene	Latrobe Valley Coal Measures	4675'	2387'	Sand, Coal and Clay
					Unconformity
MESOZOIC	LOWER CRETACEOUS	Strzelecki Group	6005'	1330'	Graywacke, Subgraywacke, Shale, Siltstone, Sandstone, carbonaceous, non-marine

STRATIGRAPHY

0 - 140 feet

Haunted Hills Gravels and/or Wellington Park Formation

Upper Pliocene - Pleistocene

Sand, white to yellow, medium to coarse grained, mostly quartz with occasional gray and black rock fragments; and Clay, yellow and gray, non-marine.

140 - 350 feet

Jemmy's Point Formation

Lower Pliocene

Sand, light gray to yellow-green, fine to very coarse grained, abundant shell fragments in intervals 175 - 190 feet and 280 - 350 feet, marine.

The Haunted Hills Gravels thin from 240 feet in North Seaspray No. 1 to 140 feet in the Merriman No. 1. Conversely, the fossiliferous sands of the Jemmy's Point Formation thicken from 90 feet in the North Seaspray to 200 feet in the Merriman No. 1. This apparently means that the two rock units are in part the same age, and represent on-shore and off-shore facies. In general, it appears that the lithologic rock units of Upper Miocene - Pliocene age become younger toward the south, and were deposited during a slow regression of the sea from the basin during this time.

350 - 490 feet

Tambo River Formation

Upper Miocene

Marl, light gray, slightly arenaceous, soft, soluble, very fossiliferous, trace of glauconite.

This lithologic unit appears to have been deposited in moderate depth waters in the Seaspray area, but represents progressively shallower water deposition to the north. Thus, in the Southwest Bairnsdale No. 1, 36 miles north-northeast of the Merriman No. 1, sediments of the same age consist of near-shore shelly sands.

490 - 2050 feet

Gippsland Limestone

Miocene

Marl, light to medium gray, gray-green and light green, fine grained, friable to soft and sticky, very fossiliferous, glauconitic; and Limestone, light to medium gray and cream, fine grained, often coquinoidal, friable to slightly hard, often very porous.

The limestone is confined mostly to the upper 400 feet, and grades downward into marl, which in turn grades downward into calcareous shale.

The Gippsland Limestone is composed of three sub-stages which are, from top to bottom, the Bairnsdale, Batesford and Longford. But, since these substages cannot be recognized lithologically, and their boundaries can only be determined by microfossils in cuttings which are usually badly contaminated, the substage nomenclature has not been placed on the composite log.

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2050 - 2288 feet

Lakes Entrance Formation

Oligocene

Shale, green to gray green, slightly firm to soft and gummy, calcareous, fossiliferous, glauconitic throughout, very glauconitic at base.

The glauconitic sand at the base of the Lakes Entrance Formation in the Lakes Entrance area is not present in the Merriman No. 1 well. The lithological change at the base of this formation, where marine fossiliferous marl overlies brown coal, is very abrupt.

A minor unconformity, or hiatus, probably is present between the Lakes Entrance Formation and the underlying Latrobe Valley Coal Measures. In the Woodside No. 2 well (see locality map) a core was cut which exhibited desiccation cracks in the top of the coal measures filled with marl of the Lakes Entrance Formation.

2288 - 4675 feet

Latrobe Valley Coal Measures

Lower Oligocene t o Upper Eocene

Sand, white, quartz, fine to very coarse and pebbly, angular to sub-angular, poorly sorted, clean to very argillaceous and ligneous, poor to very good porosity; Coal, brown to black, often earthy and shaly, occasionally silty, soft to brittle, caves badly; Clay, brown, light gray, and white, slightly to very ligneous, soft and sticky; with minor Siltstone, brown, slightly firm, ligneous. Sandstone (3294' - 3298') light gray, fine grained, dolomitic, slightly hard.

The dolomitic sandstone at 3294 - 3298 feet can be correlated with the silty dolomite in the North Seaspray No. 1 at 2590 - 2595 feet, and in the Wellington Park No. 1 at 3162 - 3172 feet. The only other good correlation with other wells within the coal measures is the major coal seam in the interval 3479 - 3558 feet. This compares with the interval 2708 - 2780 feet in the North Seaspray No. 1 and with 3268 - 3370 feet in the Wellington Park No. 1.

The Latrobe Valley Coal Measures thicken rapidly from north-east to southwest. The thickness increases from 763 feet in

the Hollands Landing well (see locality map) to 1400 feet in the Wellington Park No. 1, then to 1701 feet in the North Seaspray No. 1 and finally to 2387 feet in the Merriman No. 1.

The thickening between North Seaspray No. 1 and Merriman No.1 appears to be due to individual beds increasing in thickness rather than the appearance of completely new section. For this reason the sands are all well flushed with fresh water, and the hoped-for pinch-outs of sands at the base, protected from flushing by impermeable clay beds, were not present.

The percentage of coal in the complete coal measures sequence amounts to about 21% in the Merriman No. 1. This compares with about 32% in the North Seaspray No. 1, 21% in the Wellington Park No. 1 and 9% in the Hollands Landing well.

4675 - 5208 feet

Strzelecki Group (?)

Lower Cretaceous

Sandstone, white to light gray, fine to coarse grained and occasionally pebbly, poorly sorted, slightly consolidated, clean to moderately kaolinitic, mostly angular to subangular quartz with occasional gray rock fragments, slightly to very feldspathic, often carbonaceous and argillaceous; Mudstone - Shale, light to dark gray and gray brown, partly silty and sandy, carbonized plant remains common, minor intra-formational conglomerate, usually laminated and interbedded with sandstone; Siltstone, medium to dark gray, argillaceous, carbonaceous, and minor Coal, black, brittle, in laminations or thin seams.

5208 - 5512 feet

Strzelecki Group (?)

Lower Cretaceous

Sandstone, white, fine to very coarse grained, often very pebbly, mostly white quartz with rare dark igneous rock fragments, extremely kaolinitic, friable, poorly sorted, slightly cross-bedded.

The above two units have not been recognized in other wells drilled in the Gippsland Basin. The sediments are closely associated with the typical Strzelecki Group sediments which occur below 5512 feet, but there are important differences. The sand-

stones lack the volcanic detrital material that imparts the characteristic gray-green color to the typical Strzelecki Group sandstones (graywackes). The sediments are less consolidated, more coarse grained, "cleaner" and more porous than sediments in the typical Strzelecki Group.

On the electric logs the shales in the upper unit, 4675 - 5208 feet, exhibit 2 to 5 times the resistivity of the shales below 5512 feet. The formation waters in the porous beds in both units are also much more resistive than in the porous beds below 5512 feet.

It is believed that these two lithologic units were deposited in a small, continental sub-basin after the deposition of the more extensive Strzelecki Group. A mild unconformity may exist at the base of the sandstone at 5512 feet. This is suggested by an increase in the average dip magnitude from about 30° to 40°, as shown by the continuous dipmeter log.

In this report the two units have been included in the Strzelecki Group, but future drilling may show that they are younger and distinct from the Strzelecki Group, and should be given formation names.

5512 - 6005 feet

Strzelecki Group

Lower Cretaceous

Shale, dark gray to brown, firm, carbonaceous, partly silty; Subgraywacke, light gray to gray green, very fine to medium grained, conglomeratic in core number 6, friable, composed of quartz, green and gray volcanic fragments, chlorite, feldspar, kaolin, biotite and carbonaceous material; and Siltstone, dark gray, argillaceous, firm to slightly hard, interbedded with shale.

This is the typical Strzelecki Group lithology, except that in the Merriman No. 1 the grain size is more coarse, and porosities better as a result. The subgraywacke encountered at 5940 feet extends to total depth and is tentatively correlated with the subgraywacke at 4400 - 4500 feet, in the North Seaspray No. 1 well. If this correlation is correct, then there is approximately 350 feet of section missing from the top of the Strzelecki Group in

the Merriman No. 1 at 5512 feet, as compared to the section in the North Seaspray No. 1.

The thin gas sand in the North Seaspray No. 1 (3768 - 3774 feet) was not found in the Merriman No. 1. It is believed that if the sand was present it has since been removed by the pre-Tertiary erosion that was responsible for the removal of the above-mentioned 350 feet.

The presence of pebbles in the subgraywacke at 5940 - 6005 feet indicates that the Merriman No. 1 well is closer to the source area for the Strzelecki Group sediments than the Wellington Park No. 1 or North Seaspray No. 1 wells. Because of the lesser amount of find detrital material, porosity and permeability in the Strzelecki Group are much better than in any well previously drilled.

The source area for the Strzelecki Group was mostly of a volcanic nature and yielded a complex suite of minerals and rock fragments. The volcanic rock detritus is mainly responsible for the persistent green coloration of the graywackes and subgraywackes.

Plant fossils and other carbonaceous materials were abundant in the Strzelecki Group sediments, but no marine fossils were found, and the sequence is regarded as a fresh water deposit.

S T R U C T U R E

The Merriman No. 1 was drilled about 1 mile west-southwest of a structural "high" developed in Tertiary sediments. This structure was located by a seismic reflection survey in 1962. The reflecting horizons used for mapping were the top of the Latrobe Valley Coal Measures and what was thought to be the base of the Tertiary section. This lower reflection was later proved to be coming from within the coal measures at approximately the base of the major coal seam.

No continuous reflecting horizons were found below the Tertiary strata. This condition is true throughout the Gippsland Basin where Tertiary sediments overlie the Strzelecki Group.

Closure on the south, east and west flanks of the structure is controlled by folding. Closure on the north flank is controlled

by a normal fault, down to the north, with a displacement of approximately 500 feet.

It was assumed before drilling that the Mesozoic section would have approximately the same structural character as the overlying Tertiary. After drilling the well, and making a continuous dipmeter survey, it was learned that the Mesozoic section had an average dip direction of due east, and an average dip magnitude of 20° to 40°.

Dips in the Tertiary section, as determined by the continuous dipmeter, are of low magnitude, but the directions of dip are too erratic to assign an average direction. There is, however, a persistent east component of dip direction which possibly is related to the underlying Mesozoic structure.

From the above directions of dip it is now believed that the well was drilled near the crest of a structural "high" developed in Tertiary beds. This "high" is believed to be the result of differential sedimentation and compaction of Tertiary sediments deposited over structurally complicated Mesozoic sediments. The topographical relief of the basin at the beginning of Tertiary deposition was probably substantial, judging from the moderate to strong folding in the Mesozoic beds. Deposition of the Latrobe Valley Coal Measures over topographic "highs" has resulted in draped structures due partly to the differential compaction of thick peat beds into brown coal. Differential subsidence during Oligocene and Miocene time has accounted for additional draping effects in the Lakes Entrance Formation and the Gippsland Limestone. Uplift, mild warping and faulting in Pliocene time have complicated these structures.

The structure in the Mesozoic strata is not well known. The average direction of dip is 79° different from the North Seaspray No. 1 ($N11^{\circ}E$). Thus, if the two wells are drilled on two different Mesozoic structures, then these structures have axis nearly at right angles to each other.

The predominant structural lineation in the Strzelecki Ranges where the Mesozoic sequence crops out is east-west, but there are many localized areas where dip directions vary 90°

within a distance of 1 or 2 miles. The east dip in the Merriman No. 1 may be only a minor deviation on a large east-west trending anticline, or it could represent a strongly folded eastward plunging anticline, separate from the North Seaspray structure. The direction of dip can also be explained by drag along a north-south fault, although there is little evidence for this.

RELEVANCE TO OCCURRENCE OF PETROLEUM

No significant oil or gas shows were found while drilling the Merriman No. 1. The gas sand present in the North Seaspray No. 1 was absent, either because of removal by erosion or because of "shaling" or "pinching out".

The sands of the Latrobe Valley Coal Measures all contain fresh water with no traces of hydrocarbons. Any oil which may have existed in these sands has now been flushed out by meteoric waters moving down the regional dip.

A formation test in the subgraywacke in the interval 5774 - 6005 feet recovered brackish waters (NaCl - 15,850 ppm) and indicated good porosity and permeability. The presence of brackish water may indicate the presence of marine or brackish water within the Strzelecki Group, and conceivably these deposits could be a source of hydrocarbons. The well was "off structure" in the Mesozoic sequence, and possibly up dip, on a closed structure, hydrocarbons may exist in this subgraywacke.

On drilling out below the surface casing set at 504 feet several gas shows were detected in the interval 504 - 720 feet. These shows originated in porous limestone beds in the upper part of the Gippsland Limestone. No fluorescence was seen in cuttings or in numerous side-wall cores in this interval. Three formation tests were attempted, but because of the shallow depth sufficient weight was not available to set the 11-1/4" packer in the surface casing, and the hole was too enlarged to permit testing in open hole.

The drilling mud weight while drilling through these limestones was 8.9 lbs/gal. The hydrostatic pressure of the drilling mud at 720 feet was 332 lbs/sq.in. and this was more than sufficient to contain the gas within the formation. Because of this low formation pressure, and the lack of any oil staining, the gas shows were considered insignificant.

POROSITY AND PERMEABILITY OF SEDIMENTS PENETRATED

Clean, porous sands are present from the surface down to 340 feet. A water bore drilled at the well site to a depth of 120 feet was produced at the rate of approximately 600 barrels per day. A bore drilled to 340 feet should produce several times this amount of water.

Porous, friable limestone was present from 490 feet to about 900 feet. Cuttings and side-wall samples of the limestone in the interval indicate porosities on the order of 20 to 30% with good permeability. Three formation tests were attemped in this limestone section, but because of mechanical reasons, all were unsuccessful.

Sands in the Latrobe Valley Coal Measures have fair to excellent porosity. No permeability measurements were made on any of these sands, but they appear to be highly permeable. The sands for the most part are clean, coarse, angular, unconsolidated and saturated with fresh water.

The Strzelecki Group can be considered as 3 separate units. The first of these, from 4675 to 5208 feet, consists of slightly consolidated sands, shales and sandstones. Porosities of the sands range from 17 to 30%. Because of the argillaceous (mostly kaolinite) nature of the sands they are not as permeable as the sands in the Latrobe Valley Coal Measures. No permeability measurements are available as yet for sands in this interval. The formation waters, as calculated from the SP curve, are fresh and average about 500 ppm NaCl.

The second unit is the sandstone in the interval 5208 - 5512 feet. This is an almost unbroken sequence of highly kaolinitic, friable sandstone. Porosities are fair, and average about 18-19%. Permeability, in core number 4 (5475-5488 feet), is mostly confined to laminations; but in a total thickness of 304 feet the net amount of permeable sandstone would be substantial. The permeability along the porous streaks, as determined by measurements on core number 4, vary from 21 to 26 millidarcies.

The third unit is the interval from 5512 feet to the total depth of 6005 feet. The graywackes and subgraywackes in this unit are more coarse grained than those in the North Seaspray No. 1 well.

and as a result porosities and permeabilities are much better in the Merriman No. 1 well. A formation test in the interval 5774 - 6005 feet produced formation water with an initial flowing pressure of 1610 psi, indicating good permeability. A formation test in the North Seaspray No. 1 in a subgraywacke thought to be equivalent to the subgraywacke at 5940 - 6005 feet in the Merriman No. 1, produced no formation fluid.

In the table below are porosities calculated from the microlog and sonic log, and porosities and permeabilities as determined by Core Laboratories, Inc.

T A B L E 2

Depth	Porosity			Permeability		Formation water ppm NaCl calculated from SP curve
	Microlog	Sonic	Cores	Cores	DST	
534'	38% (?)	Not reliable				
648'	40% (?)	" "				
2440'-2910'	34-40%	27 - 38%				200 ±
3010'-3054'	30-36%	29 - 38%				200
3958'-4000'	25-28%	18 - 33%				200 ±
4340'-4447'	24-33%	25 - 33%				200 ±
4637'-4675'	21-36%	21 - 30%				200 ±
4695'-4706'	17-20%	17 - 22%				500 ±
4744'-4749'	25-30%	19 - 22%				500 ±
4830'	30%	27%				500 ±
4880'-4904'	20-26%	19 - 27%				500 ±
5260'	21%	16%				3000 ±
5350'	24%	19%				3000 ±
5477'	22%	17%	18%	21 md.		
5484'	22%	19%	16%	26 md.		3000 ±
5777'	22%	25%				14000 ±
5952'	24%	22%				17000 ±
5940'-5990'	15-24%	16-26% (mostly 20-23%)				

NOTE : Salinity of drilling fluid recovered in DST No. 4, 5774' - 6005', 15,850 ppm NaCl.

CONTRIBUTION TO GEOLOGICAL CONCEPTS RESULTING FROM DRILLING

Although the Merriman No. 1 was completed as a dry hole considerable important information was obtained which will be useful in future exploration in the Gippsland Basin. Listed below are the most significant of these :

1. The Latrobe Valley Coal Measures thicken from 1701 feet in the North Seaspray No. 1 to 2387 feet in the Merriman No. 1. This is a regional trend of thickening to the southwest. In the Hollands Landing bore, 25 miles northeast of the Merriman No. 1, the thickness is only 763 feet.
2. Two lithological units, intervals 4675-5208 feet and 5208-5512 feet, are present in the Merriman No. 1 which are absent in other wells in the Gippsland Basin. These units have been identified as non-marine and Lower Cretaceous in age, indicating that they are closely associated with the Strzelecki Group sediments.
3. Porosities and permeabilities in the Mesozoic section are much better than in any of the wells previously drilled in the Gippsland Basin.
4. The sandstone that produced a small flow of petroliferous gas in the North Seaspray No. 1 was not present in the Merriman No. 1. This is thought to be due to an erosional unconformity at 5512 feet where several hundred feet of section appear to be missing.
5. Dips in the Mesozoic sediments are toward the east varying from 20° to 40° in magnitude, and the Tertiary-Mesozoic contact is a marked unconformity.
6. The east dip in the Mesozoic section suggests that the structural high in this sequence is west of the well site. The direction of dip is nearly at right angles to the direction of dip in the North Seaspray No. 1. The Merriman structure mapped in the Tertiary section by seismic methods does not reflect the underlying structural pattern in the Mesozoic section.

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INGRAM, Frank T. 1963 North Seaspray No. 1 well, final well report, unpublished report for Arco Limited and Woodside (Lakes Entrance) Oil Co. N. L.

Merriman 2/52

APPENDIX NO. 1

LIST AND INTERPRETATION OF ELECTRICAL AND OTHER LOGS

	Run No.	Interval
Electrical log	1	505' - 4721'
	2	4400' - 5998'
Microlog - Microcaliper	1	505' - 4721'
	2	4600' - 5998'
Sonic log	1	505' - 5994'
Continuous Dipmeter	1	505' - 5999'

For the most part the above logs are self-explanatory. The SP curve is reversed, from 2288 feet to about 5000 feet, because of fresh formation waters. The SP curve has little character in the sandstone between 5208 feet and 5512 feet because the formation water has approximately the same resistivity as the drilling fluids. Below 5512 feet the SP curve is normal.

A skid-mounted mud logging unit, supplied by Core Laboratories Inc., was in operation from 30 feet to total depth. This unit was equipped with a hot wire type gas detector, drilling rate recorder, pit level indicator, ultra-violet light and accessory equipment used by the geologists while logging the well.

The gas curve on the composite log indicates total gas in the drilling mud, and is the result of the logging by the hot wire gas detector.

Merriman 28/52

VELOCITY SURVEY

of the

ARCO LIMITED - WOODSIDE (LAKES ENTRANCE) OIL CO. N. L.

MERRIMAN NO. 1

VICTORIA

Prepared by

VICTOR BYCHOK
ARCO LIMITED.

A Schlumberger Sonic survey was conducted in the Arco - Woodside Merriman No. 1 to measure interval times for computing the sub-surface velocities. The survey was conducted on 17th March, 1963 for the measured interval from 5994' to 505'. Total elapsed logging time was 2½ hours.

As surface casing had been set to a depth of 504 ft. prior to the sonic survey, it was necessary to compute the sub-surface velocity for the interval from surface level to 508 ft. (-432) on the basis of the average velocity measured in this interval at the Arco-Woodside Wellington Park No. 1, located approximately 15 miles to the east. An asterisk is used to denote data obtained from the Arco-Woodside Wellington Park No. 1.

Location of Well

Latitude 38°20'52" South Longitude 147°10'43" East

K.B. Elevation = 76 feet Ground Level = 65 feet

Total depth surveyed = 5994 feet

Casing Record = 13-3/8" at 504 ft.

Merriman 29/52

VELOCITY DATA

Dgd	Tgd	/ Dgd	Tgd	Vi	Vav
0					
		432*	0.076*	5720*	
432*	0.076*				5720*
		324	0.044	7364	
756	0.120				6300
		458	0.059	7763	
1214	0.179				6726
		545	0.064	8516	
1759	0.243				7239
		455	0.067	6791	
2214	0.310				7142
		660	0.088	7500	
2874	0.398				7221
		610	0.084	7262	
3484	0.482				7234
		570	0.064	8906	
4054	0.546				7425
		544	0.055	9891	
4598	0.601				7650
		332	0.030	11067	
4930	0.631				7813
		504	0.044	11454	
5434	0.675				8050
		486	0.045	10800	
5920	0.720				8222

Explanation of Abbreviations

Dgd = measured depth of sonde from datum elevation
Tgd = measured vertical time from datum elevation
Dgd = difference in depth between interval depths
Tgd = difference in vertical time between interval times

Vi = interval velocity = ft/sec $\frac{Dgd}{Tgd}$

Vav = average velocity = ft/sec $\frac{Dgd}{Tgd}$

* = data from Arco-Woodside Wellington Park No. 1

DATUM PLANE = SEA LEVEL

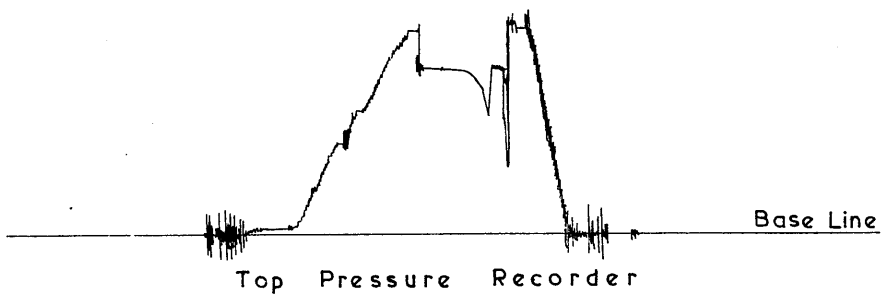
Logging time = 2½ hours

MERRIMAN Nº1

DRILL STEM TEST Nº1, 504'-784', 11 1/4" open hole packer set in 13 3/8" casing, packer failed to set because of insufficient weight, recovered 490' of drilling mud.

DRILL STEM TEST Nº2, 504'-784', 11 1/4" open hole packer set in 13 3/8" casing, packer failed to set because of insufficient weight, recovered 450' of drilling mud.

DRILL STEM TEST Nº3, 540'-784', 7 1/2" packer set in open hole, packer failed to hold because of enlarged hole.



DRILL STEM TEST Nº4, 5774'-6005' (schlumberger) 5/8" bottom choke, no water cushion, immediate strong blow decreasing to weak blow in 45 min., dead in 1hr., recovered 900' drilling mud and 4600' formation water (~~16,500~~ 15,850 ppm NaCl).

		IHP	3040 psi
IF	5min.	IFP	1610 psi
ISI	30min.	ISIP	2470 psi
IF	1 hr.	IFP	1785 psi
FSI	30 min.	FSIP	2470 psi
		FHP	3030 psi

Merriman 32/52

Flow Time	1st Min.	2nd Min.	Date February 22, 1963	Ticket Number T344001	
Closed In Press. Time	1st Min.	2nd Min.	Kind of Job Open Hole Test	Halliburton District Australia	
Pressure Readings	Field	Office Corrected	Tester B. Martin	Witness	
Depth Top Gauge	471 Ft.	No Blanked Off	Drilling Contractor Reading and Bates		
BT. P.R.D. No.		24 Hour Clock	Elevation 78 K.B.	Top Packer	
Initial Hydro Mud Pressure			Total Depth 784'	Bottom Packer 480	
Initial Closed in Pres.			Interval Tested 504 - 784	Formation Tested	
Initial Flow Pres.	1 / 2		Casing or ~~Hole~~ Size 13 3/8	Casing Perfs. Top / Bot.	
Final Flow Pres.	1 / 2		Surface Choke	Bottom Choke 5/8	
Final Closed in Pres.			Size & Kind Drill Pipe 4½ I.F.	Drill Collars Above Tester I.D. - LENGTH	
Final Hydro Mud Pressure			Mud Weight	Mud Viscosity	
Depth Cen. Gauge	Ft.	Blanked Off	Temperature 85 °F Est. / °F Actual	Anchor Size & Length ID / OD x 304'	
BT. P.R.D. No.		Hour Clock	Depths Mea. From K.B.	Depth of Tester Valve 468 Ft.	
Initial Hydro Mud Pres.			Cushion TYPE AMOUNT Ft.	Depth Back Pres. Valve Ft.	
Initial Closed in Pres.			Recovered 490 Feet of Mud .		Mea. From Tester Valve
Initial Flow Pres.	1 / 2		Recovered Feet of		
Final Flow Pres.	1 / 2		Recovered Feet of		
Final Closed in Pres.			Recovered Feet of		
Final Hydro Mud Pres.			Oil A.P.I. Gravity	Water Spec. Gravity	
Depth Bot. Gauge	784 Ft.	Blanked Off	Gas Gravity	Surface Pressure psi	
BT. P.R.D. No.		Hour Clock	Tool Opened A.M. P.M.	Tool Closed A.M. P.M.	
Initial Hydro Mud Pres.			Remarks Misrun - Insufficient Weight		
Initial Closed in Pres.					
Initial Flow Pres.	1 / 2				
Final Flow Pres.	1 / 2				
Final Closed in Pres.					
Final Hydro Mud Pres.					

Legal Location Sec. - Twp. - Rng.

Lease Name: Merriman

Well No.: No. 1

Test No.: No. 1

Lease Owner/Company Name: Arco

Owner's District: Seaspray

Field Area: Wildcat

County

State: Victoria

FORM 1294-R2--SANDEFER

FORMATION TEST DATA

Merriman 33/52

Flow Time	1st Min.	2nd Min.	Date February 24, 1963	Ticket Number T 344003	
Closed In Press. Time	1st Min.	2nd Min.	Kind of Job Open Hole Test	Halliburton District Australia	
Pressure Readings	Field	Office Corrected	Tester B. Martin	Witness	
Depth Top Gauge	531 Ft.	No Blanked Off	Drilling Contractor Reading and Bates		
BT. P.R.D. No.		24 Hour Clock	Elevation 78' K.B.	Top Packer	
Initial Hydro Mud Pressure			Total Depth 784	Bottom Packer 540	
Initial Closed in Pres.			Interval Tested 540 - 784	Formation Tested	
Initial Flow Pres.	1 / 2		Casing or ~~Hole~~ Size $8\frac{3}{4}$	Casing Perfs. Top / Bot.	
Final Flow Pres.	1 / 2		Surface Choke 1"	Bottom Choke $\frac{5}{8}$	
Final Closed in Pres.			Size & Kind Drill Pipe $4\frac{1}{2}$ I.F.	Drill Collars Above Tester I.D. - LENGTH	
Final Hydro Mud Pressure			Mud Weight 9.1 lbs/gal.	Mud Viscosity 47 sec/qt.	
Depth Cen. Gauge	Ft.	Blanked Off	Temperature 85 °F Est. / °F Actual	Anchor Size & Length ID / OD X	
BT. P.R.D. No.		Hour Clock	Depths Mea. From K.B.	Depth of Tester Valve 528 Ft.	
Initial Hydro Mud Pres.			Cushion TYPE AMOUNT Ft.	Depth Back Pres. Valve Ft.	
Initial Closed in Pres.			Recovered Feet of		Mea. From Tester Valve
Initial Flow Pres.	1 / 2		Recovered Feet of		
Final Flow Pres.	1 / 2		Recovered Feet of		
Final Closed in Pres.			Recovered Feet of		
Final Hydro Mud Pres.			Oil A.P.I. Gravity	Water Spec. Gravity	
Depth Bot. Gauge	784 Ft.	Blanked Off	Gas Gravity	Surface Pressure psi	
BT. P.R.D. No.		Hour Clock	Tool Opened A.M. P.M.	Tool Closed A.M. P.M.	
Initial Hydro Mud Pres.			Remarks Mis-run Enlarged hole		
Initial Closed in Pres.					
Initial Flow Pres.	1 / 2				
Final Flow Pres.	1 / 2				
Final Closed in Pres.					
Final Hydro Mud Pres.					

Legal Location Sec. - Twp. - Rng.

Lease Name: Merriman

Well No.: No. 1

Test No.: No. 2

Lease Owner/Company Name: Arco

Owner's District: Seaspray

Field Area: Wildcat

County

State: Victoria

FORM 1294-R2--SANDEFER

FORMATION TEST DATA

Merriman 34/52

	1st	Min.	2nd	Min.
Flow Time				
Closed In Press. Time				

Pressure Readings	Field	Office Corrected
Depth Top Gauge	471 Ft.	No Blanked Off
BT. P.R.D. No.		24 Hour Clock
Initial Hydro Mud Pressure		
Initial Closed in Pres.		
Initial Flow Pres.	1	
	2	
Final Flow Pres.	1	
	2	
Final Closed in Pres.		
Final Hydro Mud Pressure		
Depth Cen. Gauge	Ft.	Blanked Off
BT. P.R.D. No.		Hour Clock
Initial Hydro Mud Pres.		
Initial Closed in Pres.		
Initial Flow Pres.	1	
	2	
Final Flow Pres.	1	
	2	
Final Closed in Pres.		
Final Hydro Mud Pres.		
Depth Bot. Gauge	784 Ft.	Blanked Off
BT. P.R.D. No.		Hour Clock
Initial Hydro Mud Pres.		
Initial Closed in Pres.		
Initial Flow Pres.	1	
	2	
Final Flow Pres.	1	
	2	
Final Closed in Pres.		
Final Hydro Mud Pres.		

Date February 24, 1963

Ticket Number T 344002

Kind of Job Open Hole Test

Halliburton District Australia

Tester B. Martin

Witness

Drilling Contractor Reading and Bates

Elevation 78' K.B.

Top Packer

Total Depth 784

Bottom Packer 480

Interval Tested 504 - 784

Formation Tested

Casing or Hole Size $13\frac{3}{8}$

Casing Perfs. Top / Bot.

Surface Choke

Bottom Choke $\frac{5}{8}$

Size & Kind Drill Pipe $4\frac{1}{2}$ I.F.

I.D. - LENGTH

Drill Collars Above Tester

Mud Weight 9.1 lbs/gal.

Mud Viscosity 45 sec/qt

Temperature 85 °F Est. / °F Actual

Anchor Size & Length ID / OD x304'

Depths Mea. From K.B.

Depth of Tester Valve 468 Ft.

Cushion TYPE AMOUNT Ft.

Depth Back Pres. Valve Ft.

Recovered 450 Feet of Mud .

Recovered Feet of

Recovered Feet of

Recovered Feet of

Mea. From Tester Valve

Oil A.P.I. Gravity

Water Spec. Gravity

Gas Gravity

Surface Pressure psi

Tool Opened A.M. P.M.

Tool Closed A.M. P.M.

Remarks Misrun - Insufficient Weight

Legal Location Sec. - Twp. - Rng.

Merriman Lease Name

No. 1 Well No.

No. 3 Test No.

Field Area Wildcat

Arco Lease Owner/Company Name

County

State Victoria

Seaspray Owner's District

FORM 1294-R2--SANDEFER

FORMATION TEST DATA

Merriman 35/52

Flow Time	1st Min. 5	2nd Min. 60	Date March 18, 1963	Ticket Number T 344004	
Closed In Press. Time	1st Min.	2nd Min. 30	Kind of Job Open Hole Test	Halliburton District Australia	
Pressure Readings	Field	Office Corrected	Tester B. Martin	Witness	
Depth Top Gauge	5765 Ft.	No Blanked Off	Drilling Contractor Reading and Bates		
BT. P.R.D. No.		24 Hour Clock	Elevation 78' K.B.	Top Packer	
Initial Hydro Mud Pressure	3040		Total Depth 6005	Bottom Packer	
Initial Closed in Pres.	2470		Interval Tested 5774 - 6005	Formation Tested	
Initial Flow Pres.	1610 1 1785 2		~~Casing~~ or Hole Size 8¾	Casing Perfs. Top / Bot.	
Final Flow Pres.	2470 1 2470 2		Surface Choke 1"	Bottom Choke 5/8	
Final Closed in Pres.	2470		Size & Kind Drill Pipe 4½ I.F.	Drill Collars Above Tester I.D. - LENGTH	
Final Hydro Mud Pressure	3030		Mud Weight 10.4	Mud Viscosity 80	
Depth Cen. Gauge	Ft.	Blanked Off	Temperature 136 °F Est. / °F Actual	Anchor Size & Length ID / OD X 226'	
BT. P.R.D. No.		Hour Clock	Depths Mea. From K.B.	Depth of Tester Valve 5762 Ft.	
Initial Hydro Mud Pres.			Cushion TYPE Nil AMOUNT Ft.	Depth Back Pres. Valve Ft.	
Initial Closed in Pres.			Recovered 900 Feet of Mud		
Initial Flow Pres.	1 2		Recovered 4600 Feet of 16600 Water ppm.NaCl.		
Final Flow Pres.	1 2		Recovered Feet of		
Final Closed in Pres.			Recovered Feet of		
Final Hydro Mud Pres.			Oil A.P.I. Gravity	Water Spec. Gravity	
Depth Bot. Gauge	6005 Ft.	Yes Blanked Off	Gas Gravity	Surface Pressure psi	
BT. P.R.D. No.		24 Hour Clock	Tool Opened A.M. P.M.	Tool Closed A.M. P.M.	
Initial Hydro Mud Pres.			Remarks Immediate strong blow decreasing		
Initial Closed in Pres.			to weak blow 45 min. dead 60 min.		
Initial Flow Pres.	1 2				
Final Flow Pres.	NIL 1 2				
Final Closed in Pres.		NIL			
Final Hydro Mud Pres.	NIL				

Legal Location Sec. - Twp. - Rng.

Lease Name: Merriman

Well No.: No.1

Test No.: No.4

Field Area: Wildcat

County

Lease Owner/Company Name: Arco

State: Victoria

Owner's District: Seaspray

Mea. From Tester Valve

FORM 1294-R2--SANDEFER

FORMATION TEST DATA

PALYNOLOGICAL EXAMINATION OF CORE SAMPLES FROM GOLDEN BEACH WEST No.1 AND MERRIMAN No.1 WELLS

BY MARY DETTMANN

Core samples from Golden Beach West No.1 and Merriman No.1 wells provided palynological evidence for the existence of Tertiary and Cretaceous sediments within the two wells. In Golden Beach West No.1 well, Tertiary microfloras were extracted from samples at 5076-91 feet and 5415-25 feet, whereas microfloras in samples from 6380-96 feet and 6840-60 feet demonstrate that horizons at these levels are Cretaceous in age. The lowest core (7100-12 feet) examined from the Golden Beach West No.1 well was found to be devoid of plant microfossils.

A well preserved Lower Tertiary microflora was extracted from Merriman No.1 well at 4705-22 feet. Samples lower in the sequence (between 5070 and 6005 feet) yielded meagre microfloras that indicate a Cretaceous age.

Details of the microfloras obtained from each of the samples investigated are presented below (see also Table 1).

Golden Beach West No.1 Well

The lowest sample examined (7100-112 feet) was found to be devoid of plant microfossils. The succeeding cores from 6340-60 feet and 6380-96 feet contain poorly preserved microfloras in which *Cicatricosisporites australiensis* (Cookson) is present. This species indicates a Cretaceous age. The sample from 6380-96 feet also yielded *Crybelosporites striatus* (Cookson & Dettmann) and triporate angiosperm grains; the former species confirms a Cretaceous age, and the angiosperm grains suggest an horizon within the Upper Cretaceous.

Fairly well preserved microfloras containing a high proportion of angiosperm grains were extracted from sediments at 5415-25 feet and at 5076-91 feet. The lower sample yielded *Triorites edwardsii* Cookson & Pike, the index of Harris's (1965) *Triorites edwardsii* and *Triorites edwardsii* - *Duplo-*

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pollis orthoteichus Assemblages. However, reference of the microflora at 5415-25 feet to one or other of the above-named assemblages is precluded by the absence of other diagnostic species. Nevertheless, the presence of T. edwardsii indicates a Tertiary (Paleocene) or, at the oldest, an uppermost Cretaceous age (see Harris 1965, Evans 1962) and suggest correlation with beds between 8336 and 9514 feet in Gippsland Shelf No.3 well and at 8695 feet in Gippsland Shelf No.1 well (Dettmann 1965).

The sample from 5076-91 feet yielded a distinctly younger microflora containing Beaupreadities verrucosus Cookson, Nothofagidites falcata Cookson, and N. vansteenisi Cookson. B. verrucosus occurs in microfloras which Harris (1965, p.99) considers to be younger than his Duplopollis orthoteichus Assemblage of Upper Paleocene age. Cookson (1950, 1954) suggests an Eocene or younger age for B. verrucosus and indicates (1959) an Eocene - Lower Miocene age range for the two representatives of Nothofagidites. On this basis, the microflora can be regarded as Eocene to Lower Miocene in age.

Merriman No.1 well

Core 6 from 5990-6005 feet provided a sparse and poorly preserved microflora in which Alisporites grandis (Cookson) is the only stratigraphically significant species. This form is known only from the Cretaceous, being more common in Lower Cretaceous sediments. The succeeding sample from 5475-88 feet yielded a meagre microflora in which no stratigraphically significant species were observed.

Core 4 from 5070-81 feet also yielded a meagre microflora, but the presence of Balmeisporites glenelgensis Cookson & Dettmann indicates an Upper Cretaceous (Cenomanian to Turonian) age. Several examples of remanié fossils referable to the Permian spore genus Nuskoisporites were also observed.

Fair concentrations of well preserved spores and pollen grains were recovered from the sample at 4705-22 feet. Species present include Cyathidites splendens Harris, Triorites edwardsii, Tricolpites gillii Cookson, and Phyllocladidites mawso nii Cookson. These species indicate conformity of the microflora with either the T. edwardsii or T. edwardsii - D. orthoteichus assemblages. T. edwardsii suggests a Lower Tertiary (Paleocene) or uppermost Cretaceous age and demonstrates that the beds at 4705-22 feet in Merriman No.1 well are probable equivalents of those at 5415-25 feet in Golden Beach West No.1 well.

References

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18th February, 1966.

Mary E. Dettmann,
Department of Geology,
University of Queensland,
St. Lucia, Queensland.

	MERRIMAN No.1				GOLDEN BEACH WEST No.1					
	c.6 5990-6005'	c.5 5475-88'	c.4 5070-81'	c.3 4705-22'	c.8 7100-12'	c.7 6840-60'	c.6 6380-96'	c.5 5415-25'	c.4 5076-91'	
Spores						+	+			Cicatricosisporites australiensis
							+			Crybelosporites striatus
				+				+		Cyathidites splendens
				+				+		Laevigatosporites ovatus
			+							Balmeisporites glenelgensis
Pollen	+						+			Alisporites grandis
				+					+	Phyllocladidites mawsonii
									+	Dacrydiumites florinii
				+				+		Triorites edwardsii
									+	Triorites harrisii
				+						Tricolpites gillii
									+	Nothofagidites emarcida
									+	Nothofagidites falcata
									+	Nothofagidites vansteenisi
									+	Proteacidites annularis
									+	Proteacidites cf. rectomarginis
				+					+	Proteacidites subscabratus
								+		Proteacidites parvus
				+						Tricolporites prolata
									+	Myrteacidites mesonensis
									+	Beaupreadites verrucosus

Table 1. Distribution of selected spores and pollen grains in Golden Beach West No.1 and Merriman No.1 wells.

+ - species present

36/52

APPENDIX 3

PALEONTOLOGICAL REPORTS

REPORT ON TERTIARY STRATIGRAPHY IN MERRIMAN NO. 1 WELL

by

D. J. TAYLOR

Cores 1 to 5, side wall cores and rotary cuttings (to 3500 feet) have been examined from Arco-Woodside's Merriman No. 1 Well. Rotary cutting samples were heavily contaminated below the casing (set to 504 feet). Ten side wall cores were submitted from the interval 516 feet to 700 feet. No side wall cores were available between 700 feet and 2920 feet and rotary core No. 1 was not taken till 2364 feet. It is noted that many of the side wall cores were heavily contaminated; for example a side wall core from 4630 feet contained a middle Miocene fauna which included Orbulina universa which would not be found "in situ" below 800 feet in this section.

The stratigraphy, partially based on foraminiferal content, is outlined below in drilled order. All lithological units and stage names used are those used and defined by Carter (1963).

50 - 140 feet :

Medium-coarse orange sands which are unfossiliferous and probably represent the Haunted Hill Gravels.

140 - 350 feet:

Comprising mainly dirty sands with abundant shell fragments at some horizons. The fauna includes Elphidium imperatrix, E. pseudonodosum, Guttulina regina, Notorotalia clathrata, Pseudopolymorphina victoriensis and abundant milliolids. This is a typical Kalimnan Stage fauna (Pliocene age) and this lithological interval is an equivalent of the Jemmys Point.

350 - 510 feet :

The grey marls contain a fauna of small foraminifera

which include Orbulina universa, Nonion victoriensis and Notorotalia clathra. The presence of N. victoriensis suggests that this fauna represents the Mitchelian Stage and the lithology of this interval is typical of the Tambo River Formation.

510 - 1700 feet :

An interval of grey to brown marls with some brown and grey limestones. The first limestone occurs at the top of the interval. The first 200 feet probably represents the Bairnsdale Limestone as the faunas in the side wall cores (516 - 700 feet) contain a fauna typical of the Bairnsdalian Stage including Orbulina universa.

A sample at 800 feet contain Astrononion obseum which is restricted to the Wuk Wuk Marls of the Bairnsdale region. The first appearance of Operculina victoriensis at 900 feet also suggested of the Wuk Wuk Marls. It is not possible to identify the Glencoe Limestone within the section.

1700 - 2050 feet :

The samples within this interval were of marls which were mottled grey and white in appearance and were different from the preceding interval. The samples also contained limestone chips. The fauna was more abundant than that of the preceding interval. The top of the interval is marked by the first appearance of Astrononion centroplax, Hofkerina semiornata, Lamarckina glencoesis, and Gyroidina zealandica. Many arenaceous foraminifera, inclyding Cyclammina incisa, are present. The fauna is typical of the Longfordian Stage and the lithological interval represents the Longford Limestone.

2050 - 2300 feet :

There is a gradual lithological transition between 1950 and 2050 feet as the marls become more silty and definite limestones are absent. Mica and orange coloured coarse grained quartz are present at and below 2050 feet. Glauconite is present below 2150 but in no sample abundant (more than 5% in residue). At 2050 feet the fauna is similar, but more abundant than that in the preceding interval. However this fauna contains the Planktonic species Globigerina ampliapertura which does not

occur above Faunal Unit 5 in Victoria. Therefore in this section the top of the Janjukian Stage is at 2050 feet and the sediments below this level are similar to the Micaceous Marl Member of the Lakes Entrance Formation. This conclusion is supported by the appearance of Victoriella conoidea (= Victoriella "plecte") at 2100 feet. (V. conoidea seldom occurs at the top of the Lakes Entrance Formation). Other species, which first appear in this interval, include Lingulina carinata and Vaginulinopsis gippslandica.

2300 - feet :

A lithological change to carbonaceous clays and silts is apparent at 2300 feet. The first brown coal appears at 2305 feet.

No cores below this interval contained marine fauna. Although the cuttings were contaminated, they did not contain any pre-Janjukian species. As already mentioned some of the side wall cores were contaminated.

Comments on stratigraphy :

No stratigraphic comments can be made on the section below 2300 feet. The Greensand Member of the Lakes Entrance Formation is absent from this section as it is from other sections in the central and western portion of the Gippsland Basin. The development of the Lakes Entrance Formation is similar to that in the North Seaspray and Wellington Park Wells.

The Longford Limestone, the basal member of the Gippsland Limestone can be differentiated on both lithological and palaeontological grounds. But the other three members of the Gippsland Limestone cannot be separated with any certainty.

The marine Tertiary sequence in Merriman No. 1 Well is tabulated below. (Depths quoted are drilled depths).

Depth	Australian Tertiary Stages (Carter, 1959)	Rock Units (Carter 1963)	
		Formation	Member
50 - 140		Haunted Hills Gravels.	
140 - 350	Kalimnan	Jemmys Point	
350 - 510	Mitchellian	Tambo River	
510 - 1700	Bairnsdalian to Batesfordian	Gippsland Limestone	
1700 - 2050	Longfordian		Longford Limestone
2050 - 2300	Janjukian	Lakes Entrance Formation	

References :

Carter, A. N. 1959 - Guide Foraminifera of the Tertiary Stages in Victoria. Vic. Min. & Geol. J., 6 (3); 48-54.

Carter, A. N. 1963 - Tertiary Foraminifera from the Gippsland, Victoria and their stratigraphic significance. Geol. Surv. Vic., Memoir 22. (in press).

D J Taylor

Plant Remains from the Arco - Woodside Merriman No. 1 Bore

By JOHN DOUGLAS

Core from the Arco - Woodside Merriman No. 1 bore was examined, and the following plant remains recorded.

Core No. 3 - 4708 - 4720 feet

Black coalified root or rhizome compressions are present in some portions of this core, and undetermined leaf fragments showing prominent main veins are present in other portions. A large (28 mms) pyritized nodule of organic origin also occurs in this latter portion.

Core No. 4 - 5070 - 5081 feet

Numerous stem and leaf impressions are present including Pagiophyllum sp., a form with small thick leaves appressed along the stem and comparable in body form and cuticular anatomy with the present day Araucarian, Araucaria excelsa, Pagiophyllum sp. have also been recorded in Victoria from the Pretty Hill No. 1 bore (Frome Broken Hill Co.) at 2928 - 2940 feet (Douglas 1962), but it is possible that certain specimens at present regarded as Brachyphyllum gippslandicum McCoy should properly be placed in the genus Pagiophyllum.

Core No. 4 also contains poorly preserved impressions, of Sphenopteria sp. and another obscure form with pinnae which appears to bear sori along the main veins, and hence belong to some pteridophyte (fern) group.

All these forms are found in Mesozoic non marine beds now regarded, (Cookson and Dettman 1958), as Lower Cretaceous in age. The stratigraphic position of the Merriman beds yielding cores 4 and 5 is difficult to assess palaeontologically because of the lack of knowledge of Victorian Mesozoic floras. I regarded (Douglas 1962) the plant remains from Pretty Hill bore with Pagiophyllum as rather high in the Otway Group sequence, but correlation on this basis with the distant Merriman No. 1 beds under discussion is futile. Pagiophyllum however, is absent from any of the beds in the well sampled basal beds of the Tyers Group where well preserved floras are found just above Paleozoic

Merriman 41/52

beds lying unconformably beneath. An entirely different conifer assemblage is present in these basal Mesozoic beds. It would appear then that there is some justification for regarding the beds represented by cores 3 and 4 from Merriman's No. 1 bore as being well up in the Victorian non-marine Mesozoic sequence.

John G. Douglas per Jof Talent

JOHN DOUGLAS.
Geologist.

REFERENCES

Cookson, Isabel C. and Dettmann, Mary E. 1958 — Some trilete spores from Upper Mesozoic deposits in the eastern Australian region. Proc. Roy. Soc. Vic. 70, 2, P. 95-128.

Douglas, J. G. 1962 — Plant remains, Pretty Hill No. 1 bore Vic. Mines Dept. Unpubl. Rept. 1962/79

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APPENDIX NO. 4

CONVENTIONAL CORE DESCRIPTIONS

CORE NO. 1, 2364' - 2384' - recovered 4'

2380' - 81' Sand, dark brown, medium to very coarse grained, poorly sorted, sub-angular to angular quartz grains cemented with brown ligneous material, occasional specks of white clay, soft to very friable, poor porosity, odor of H_2S, no shows.

2381' - 83.8' Sand, dark brown, fine to coarse grained with some very coarse grains, poorly sorted, sub-angular to angular quartz grains, coated with brown ligneous material, occasional specks of white clay, trace of mica, very friable, poor to good porosity, strong odor of H_2S, no shows.

2383.8' - 2384' Sand, dark brown, very fine to fine grained, well sorted, ligneous, fair porosity; interbedded with Siltstone, light gray, argillaceous; and Brown Coal, soft to brittle, no shows.

CORE NO. 2, 2992' - 3012' - recovered 7'

2992' - 93' Brown Coal

2993' - 95' Laminated Siltstone, light gray, ligneous, soft, cross-bedded; and Brown Coal, silty

2995' - 98' Coal, black, silty, brittle, micaceous

2998' - 99' Sand, light to medium gray, fine to medium grained, micaceous, slightly consolidated, fair porosity, slightly ligneous, odor of H_2S, no show.

CORE NO. 3, 4708' - 4722' - recovered 12'

4708' - 20' Mudstone, light gray-brown to dark gray, partly silty, carbonaceous flakes and coal fragments common throughout, some vertical coal streaks up to 4" long, compact, carbonized twigs and leaves common, bottom 1' is very silty with floating coarse grained sand grains; one 2" band of Sandstone at 4710', light to medium gray, fine grained, dirty with abundant carbonaceous specks, tight. Bedding very irregular with abundant

slumping and wavy bedding, some light and dark laminations, slickensides common at 4712' - 13', dip appears flat.

CORE NO. 4, 5070' - 5081', recovered 11'

5070' - 71' Mudstone, dark gray to gray-brown, very silty and moderately sandy (fine to medium grained), carbonaceous fragments common, dense, very slightly hard, very slightly micaceous, poorly bedded.

5071' - 73' Laminated and thin-bedded Sandstone, medium brown gray, fine grained, composed of gray and pink feldspar, quartz and gray and green rock fragments with a kaolinitic matrix, tight, slightly hard; and Siltstone, medium to dark gray, argillaceous and carbonaceous, slightly hard, well bedded.

5073' - 74' Mudstone, dark gray, partly silty, dense with abundant carbonized plant fossils and coal fragments, occasional siltstone fragments.

5074' - 81' Laminated Shale, dark gray, dense, very carbonaceous; and Siltstone, light to medium gray, slightly hard, well bedded, laminations wavy and anastomosing. Reliable dips of 22^{o} to 28^{o}.

CORE NO. 5, 5475' - 5488', recovered 10'

5475' - 85' Sandstone, white, coarse to very coarse grained, becoming pebbly in bottom 5', angular, poor to fair sorting, white and clear quartz in a matrix of kaolinite, trace of black igneous rock fragments, porosity generally poor with fair porosity along laminations, slightly cross-bedded in top 2', very friable, no show, dips of 25^{o} in top 1', 40^{o} in remainder of core.

CORE NO. 6, 5990' - 6005', recovered 12.5'

5990' - 98' Subgraywacke, medium gray green, fine to medium grained with occasional pebbles, slightly friable, non-calcareous, approximate composition 60% quartz

grains, 20% green, gray and black igneous rock fragments, 15% weathered feldspar (white with traces of orange) and kaolin, 5% biotite and carbonaceous fragments, sub-rounded to sub-angular, occasional carbonaceous laminations, poorly bedded, fairly reliable dips of 35° to 45°.

5998' - 6002.5'

Subgraywacke, as above, conglomeratic; pebbles up to 1" in diameter, slightly friable, fair porosity, no visible dip.

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SIDE-WALL CORES

Number	Depth	Recovery	Description
1	516' ✓	1/2"	Limestone, medium gray, fine grained, friable, slightly glauconitic, fair porosity, wet, N.S.
2	520' ✓	2"	Marl, medium gray, soft, abundant fossil debris, slightly porous, N.S.
3	527' ✓	1"	Same as No. 2
4	531' ✓	1-1/2"	Limestone, light tan, fine grained, fragmental, friable, poor to fair porosity, N.S.
5	534' ✓	1"	Limestone, cream, fine grained, fragmental, friable, very fossiliferous, glauconitic, fair porosity, N.S.
6	561' ✓	2"	Same as No. 5
7	648' ✓	2"	Limestone, light gray, fine grained, friable, glauconitic, fair porosity, N.S.
8	687' ✓	2"	Limestone, light gray, fine grained, slightly silty, friable, fair porosity, N.S.
9	698' ✓	2"	Limestone, light gray, very fine to fine grained, fragmental, slightly argillaceous, poor porosity, N.S.
10	700' ✓	2"	Same as No. 9
11	2920' ✓	2"	Clay, brown, very ligneous, slightly consolidated, fetid odor.
12	3630 ✓	2"	Claystone, medium brown, slightly consolidated, waxy, occasional floating angular sand grains, rare carbonaceous laminations.
13	3736' ✓	1/4"	Sandstone, light gray, fine to coarse grained, kaolinitic, poorly consolidated, N.S.
14	3737' ✓	1/2"	Sandstone, light gray, fine to coarse grained, kaolinitic, unconsolidated, fair porosity, poorly sorted, N.S.
15	3740' ✓	---	Mixture of Sand and drilling mud, N.S.
16	3965' ✓	1"	Sand, white, medium to very coarse grained, poorly sorted, angular, clean, good porosity, N.S.
17	4010' ✓	1-1/2"	Claystone, laminated light gray and dark brown, soft, partly silty.

Number	Depth	Recovery	Description
18	4330' ✓	1"	Sandstone, medium brown, very fine grained, slightly consolidated, argillaceous, moderately carbonaceous, tight, N.S.
19	4345' ✓	3/4"	Sand, dirty white, fine to coarse grained, angular, poorly sorted, unconsolidated, moderately argillaceous (white clay), fair porosity, traces of dark gray minerals, N.S.
20	4520' ✓	1"	Clay, light gray-brown, soft, with stringers of brown coal, N.S.
21	4520' ✓	3/4"	Same as No. 20
22	4542' ✓	1"	Sand, white, with traces of brown clay, fine to coarse grained, angular, poorly sorted, unconsolidated, good porosity, N.S.
23	4630' ✓	1-1/2"	Clay, same as No. 20.
24	4638' ✓	1"	Sand, same as No. 22
25	4830' ✓	3/4"	Sandstone, white to light gray, fine to very coarse grained, angular quartz, mostly clean, trace of gray and black rock fragments, very friable, poorly sorted, good porosity, N.S.
26	4830'	1"	Sandstone, similar to No. 25, slightly argillaceous.
27	4923' ✓	1"	Sandstone, light gray, coarse grained angular quartz with traces of gray and black rock fragments, fair sorting, very friable, slightly kaolinitic, good porosity, N.S.
28	4944' ✓	1-1/4"	Sandstone, light gray, very fine to coarse grained, angular quartz, poorly sorted, kaolinitic, fair porosity, N.S.
29	5210' ✓	3/4"	Sandstone, white, medium grained, angular vitreous quartz grains in a matrix of white kaolinite, friable, poor porosity, N.S.
30	5288' ✓	1/2"	Sandstone, white, very fine to coarse grained, quartz grains in a matrix of white kaolinite, very poorly sorted, friable, poor porosity, N.S.
31	5525' ✓	1"	Laminated Sandstone, medium gray-green, very

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Number	Depth	Recovery	Description
31 (contd.)			fine grained, argillaceous, biotitic, friable, tight; and Shale, dark gray, sandy, carbonaceous, soft.
32	5628' ✓	1"	Subgraywacke, medium gray green, fine grained, composed of quartz, green volcanic rock fragments, light grey feldspar, biotite, and grey rock fragments, slightly calcareous, argillaceous, poor porosity, N.S.
33	5740' ✓	3/4"	Sandstone, medium brown-gray, fine grained, argillaceous, feldspathic, traces of green volcanic rock fragments, friable, poor porosity, N.S.
34	5777' ✓	1"	Subgraywacke, light gray, fine to medium grained, traces of orange feldspar, slightly kaolinitic, poor to fair porosity, N.S.
35	5992'? 5952' ✓	1"	Subgraywacke, medium gray green, fine grained, composed of quartz, feldspar, green and gray igneous rock fragments, biotitic, slightly kaolinitic, friable, poor porosity, N.S.
36	5952' ✓	1"	Samd as No. 35.

✓ = we have

9/3/27.

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APPENDIX 5

PETROLOGICAL REPORT

MERRIMAN NO. 1

by

Sylvia Whitehead.

MERRIMAN NO. 1

	Depth (Ft.)	Thin Section	
Core 4	5,070 - 5,081	M.589	Grey arkose
Core 5	5,475 - 5,488	M.590	White grit
Core 6	5,990 - 6,005	M.591	Grey grit

CORE 4

Core 4 contains fragments of carbonised wood and shows grey banding due to the presence of carbbnaceous material. The dip is between 30 and 40° (assuming the hole is vertical).

The arkose is similar to other specimens in that it is composed mainly of fragments of fine grained volcanic rock. Quartz is rather more abundant than in many other specimens, mainly as angular grains, some as fragments of quartz mosaic.

All fragments are closely packed and interstitial chlorite was not observed.

The main cementing material is a very pale yellowish-brown clay mineral (R.I. almost 1.56). This has also replaced some rock fragments and felspar grains.

Irregular patches of opaque carbonaceous material occur along some grain boundaries, and this appears to have been squeezed into some interstices.

Heavy Minerals : Very few are present.

Opaque iron oxide		
biotite	-	brown flakes
chlorite	-	rare flakes
zircon	-	prismatic crystals, some angular, some partly rounded. Generally less than 0.1 mm.

tourmaline - rate as small (less than 0.1 mm) angular grains.

apatite - very rare as prismatic crystals

At present no suggestion can be made as to why so few heavy mineral grains were obtained from this specimen.

CORE 5 : (White grit)

The rock is too friable for sectioning. It is composed mainly of angular white quartz grains commonly 0.5 - 2 mm but some to 3 mm, minor small flakes of muscovite and rare grey grains (volcanic rocks ?) all partly cemented by white clay, probably kaolinite.

Heavy Minerals :

tourmaline - abundant as angular and prismatic grains, commonly in shades of yellow and brown, few blue.

zircon - common as prismatic crystals, many containing inclusions. Some grains are fractured but there is little evidence of rounding. Some very long crystals and rare stumpy crystals. Rare rounded grains, some pink to brownish.

biotite - rare brown flakes

pyrite - present as small crystals and crystalline aggregates, and as clusters of minute grains in clay (?) particles.

chlorite - very rare

rutile (?) - very rare (1 grain)

This heavy mineral assemblage differs from those obtained from many specimens of arkose in that tourmaline is abundant, zircon common and apatite is rare or absent.

Note : This assemblage is similar to that in grits overlying arkose in Wellington Park Well (3,725 ft.) in that it is composed predominantly of angular tourmaline and zircon (Petrological Report M.5/63), but as these minerals are common in many sedimentary rocks this fact is not very conclusive.

CORE 6 : (Grey grit) Merriman 50/52

This is also too friable for sectioning. It is composed mainly of angular quartz grains but the grain size is more variable. Much of it is finer grained than in Core 5, but larger, generally rounded grains up to 7 mm are present (i.e. the sediment is poorly sorted). Fragments of fine grained grey rock are more abundant than in Core 5, and there are a few pink feldspar grains. The cementing material is mainly white clay. A little carbonate is present which proved to be dolomite.

Heavy Minerals :

dolomite	-	angular fragments and crystals (R.I. - No = 1.7 dolomite probably with a little iron). This may be present as cementing material, or it may have replaced some mineral grains. It is not of detrital sedimentary origin.
biotite	-	common as brown flakes.
garnet	-	common, angular fragments to 0.3 mm. Colourless and pale pink.
zircon	-	common as semi-rounded grains. A few crystals are not rounded.
tourmaline	-	similar to that in Core 5, (angular) but not as abundant.
apatite	-	rare, some cloudy pleochroic grains semi-rounded.
chlorite	-	few flakes. Similar to but not as abundant as biotite. Some may be altered biotite.
pyrite	-	(authigenic) - similar to that in Core 5.
hornblende	-	very rare (1 grain)

This appears to be a mixed assemblage, containing minerals commonly found in the grits, and also containing some very similar to those occurring in specimens of arkose. In addition there is more garnet than has been noted in other specimens so far examined.

APPENDIX 6. Merriman 51/52

WATER ANALYSIS
by
VICTORIA STATE LABORATORY

Report on Sample No. 585/63

		U.W.R.S. 2990
Sample	:	Water from Oil Bore
Locality	:	Parish of Giffard
Sender	:	Dr. D. E. Thomas, Director of Geological Survey, Mines Department.

Particulars	
No.	585
U.W.R.S.	2990
Bore	Merriman's No. 1.
Sample	Drill Stem Test No. 4
Depth (feet)	5774-6000, open hole
Remarks	Recovery 5,530 feet of fluid
Date	18.3.63
Owner	ARCO-WOODSIDE (Lakes Entrance) Oil. Co. NL.

Results:		Parts per million
Total solids in solution		18,211
Chloride	(Cl)	9,620
Carbonate	(CO_3)	5
Bicarbonate	(HCO_3)	393
Sulphate	(SO_4)	1,296
Nitrate	(NO_3)	Nil
Calcium	(Ca)	325
Magnesium	(Mg)	76
Iron-Total	(Fe)	115
Iron-Soluble	(Fe)	0.7
Silica-Soluble	(SiO_2)	10
Total hardness	(as $CaCO_3$)	1,124

pH 8.0

A hypothetical combination is given as follows:

		p.p.m.
Calcium bicarbonate,	$Ca(HCO_3)_2$	520
Ferrous bicarbonate,	$Fe(HCO_3)_2$	2
Calcium sulphate	$CaSO_4$	670
Magnesium sulphate	$MgSO_4$	376
Sodium carbonate	Na_2CO_3	9
Sodium sulphate	Na_2SO_4	774
Sodium chloride	NaCl	15,850

PE903893

This is an enclosure indicator page.
The enclosure PE903893 is enclosed within the container PE903992 at this location in this document.

The enclosure PE903893 has the following characteristics:

ITEM_BARCODE	= PE903893
CONTAINER_BARCODE	= PE903992
NAME	= Merriman 1 locality and surface geology map (fig 1)
BASIN	= GIPPSLAND
ON_OFF	= ONSHORE
PERMIT	= PPL160
TYPE	= WELL
SUBTYPE	= MAP
DESCRIPTION	= Merriman 1 locality and surface geology map. Figure 1 from well completion report
REMARKS	=
DATE_CREATED	=
DATE_RECEIVED	=
W_NO	= W475
WELL_NAME	= Merriman 1
CONTRACTOR	=
CLIENT_OP_CO	= Arco Ltd / Woodside (Lakes Entrance) Oil Co. N.L

(Inserted by DNRE - Vic Govt Mines Dept)

PE903894

This is an enclosure indicator page.
The enclosure PE903894 is enclosed within the container PE903992 at this location in this document.

The enclosure PE903894 has the following characteristics:

ITEM_BARCODE	= PE903894
CONTAINER_BARCODE	= PE903992
NAME	= Merriman 1 Composite well log sheet 1 of 2
BASIN	= GIPPSLAND
PERMIT	= PPL160
TYPE	= WELL
SUBTYPE	= COMPOSITE_LOG
DESCRIPTION	= Merriman 1 Composite well log sheet 1 of 2. Plate 1 from well completion report
REMARKS	=
DATE_CREATED	= 31/07/63
DATE_RECEIVED	=
W_NO	= W475
WELL_NAME	= Merriman-1
CONTRACTOR	=
CLIENT_OP_CO	= Arco Ltd / Woodside (Lakes Entrance) Oil Co. N.L

PE903895

This is an enclosure indicator page.
The enclosure PE903895 is enclosed within the container PE903992 at this location in this document.

The enclosure PE903895 has the following characteristics:

ITEM_BARCODE	= PE903895
CONTAINER_BARCODE	= PE903992
NAME	= Merriman 1 Composite well log sheet 2 of 2
BASIN	= GIPPSLAND
PERMIT	= PPL160
TYPE	= WELL
SUBTYPE	= COMPOSITE_LOG
DESCRIPTION	= Merriman 1 Composite well log sheet 2 of 2. Plate 1 from well completion report
REMARKS	=
DATE_CREATED	= 31/07/63
DATE_RECEIVED	=
W_NO	= W475
WELL_NAME	= Merriman-1
CONTRACTOR	=
CLIENT_OP_CO	= Arco Ltd / Woodside (Lakes Entrance) Oil Co. N.L

PE903896

This is an enclosure indicator page.
The enclosure PE903896 is enclosed within the container PE903992 at this location in this document.

The enclosure PE903896 has the following characteristics:

ITEM_BARCODE	= PE903896
CONTAINER_BARCODE	= PE903992
NAME	= Merriman 1 Generalised stratigraphic column
BASIN	= GIPPSLAND
PERMIT	= PPL160
TYPE	= WELL
SUBTYPE	= STRAT_COLUMN
DESCRIPTION	= Merriman 1 Generalised stratigraphic column Gippsland Basin. Plate 2 from well completion report
REMARKS	=
DATE_CREATED	=
DATE_RECEIVED	=
W_NO	= W475
WELL_NAME	= Merriman-1
CONTRACTOR	=
CLIENT_OP_CO	= Arco Ltd / Woodside (Lakes Entrance) Oil Co. N.L

PE904797

This is an enclosure indicator page.
The enclosure PE904797 is enclosed within the container PE903992 at this location in this document.

The enclosure PE904797 has the following characteristics:

ITEM_BARCODE	= PE904797
CONTAINER_BARCODE	= PE903992
NAME	= Geologic Cross Section
BASIN	= GIPPSLAND
PERMIT	= PPL 160
TYPE	= WELL
SUBTYPE	= CROSS_SECTION
DESCRIPTION	= Carr's Creek 1 Geologic cross-section before and after drilling. Plate 3 of WCR
REMARKS	=
DATE_CREATED	= 25/07/63
DATE_RECEIVED	=
W_NO	= W476
WELL_NAME	= Carrs Creek-1
CONTRACTOR	= Geodrafting Services
CLIENT_OP_CO	= ARCO Ltd. / Woodside (Lake Entrance) Oil Co. N.L.

(Inserted by DNRE - Vic Govt Mines Dept)

PE903897

This is an enclosure indicator page.
The enclosure PE903897 is enclosed within the container PE903992 at this location in this document.

The enclosure PE903897 has the following characteristics:

ITEM_BARCODE	= PE903897
CONTAINER_BARCODE	= PE903992
NAME	= Merriman 1 geological xsection before/after drilling
BASIN	= GIPPSLAND
PERMIT	= PPL160
TYPE	= WELL
SUBTYPE	= CROSS_SECTION
DESCRIPTION	= Merriman 1 Geologic cross section before and afer drilling (enclosure from WCR) for Merriman-1
REMARKS	=
DATE_CREATED	= 10/07/63
DATE_RECEIVED	=
W_NO	= W475
WELL_NAME	= Merriman-1
CONTRACTOR	= Geodrafting Serviced
CLIENT_OP_CO	= Arco Ltd / Woodside (Lakes Entrance) Oil Co. N.L

(Inserted by DNRE - Vic Govt Mines Dept)

PE903898

This is an enclosure indicator page.
The enclosure PE903898 is enclosed within the container PE903992 at this location in this document.

The enclosure PE903898 has the following characteristics:

ITEM_BARCODE	= PE903898
CONTAINER_BARCODE	= PE903992
NAME	= Time Depth Curve
BASIN	= GIPPSLAND
PERMIT	= PPL160
TYPE	= WELL
SUBTYPE	= VELOCITY_CHART
DESCRIPTION	= Merriman 1 velocity survey curve (enclosure from WCR) for Merriman-1
REMARKS	=
DATE_CREATED	= 17/03/63
DATE_RECEIVED	=
W_NO	= W475
WELL_NAME	= Merriman-1
CONTRACTOR	=
CLIENT_OP_CO	= Arco Ltd / Woodside (Lakes Entrance) Oil Co. N.L

(Inserted by DNRE - Vic Govt Mines Dept)