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WOODSIDE (LAKES ENTRANCE) OIL COMPANY N.L.

ST. MARGARET ISLAND NO. 1

WELL COMPLETION REPORT

by

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of

MINES ADMINISTRATION PTY. LTD.

CONTENTS

		Page
I	ABSTRACT	2
II	INTRODUCTION	3
III	WELL HISTORY	4
	(i) General Data	4
	(ii) Drilling Data	4
	(iii) Logging and Testing	7
IV	GEOLOGY	10
	(i) Summary of Previous Work	10
	(ii) Summary of Regional Geology	11
	(iii) Stratigraphic Table	13
	(iv) Stratigraphy	13
	(a) Quaternary	13
	(b) Tertiary	13
	(c) Mesozoic	16
	(v) Structure	18
	(vi) Occurrence of hydrocarbon	18
	(vii) Contributions to geological knowledge	19
V	REFERENCES	20
VI	ENCLOSURES	
	(i) Locality map showing relation to regional geology	
	(ii) Stratigraphic column before drilling	
	(iii) Geological section through well before and after drilling	
	(iv) Composite well log (not enclosed)	
	(v) Copies of electrical logs	
	(vi) Continuous Dipmeter Log	
VII	APPENDICES	
	(1) Core description	21
	(2) Side Well Core description	25
	(3) Petrological Analysis	29
	(4) Drill stem test reports	
	(5) Schlumberger Interpretation	31
	(6) Dip Meter survey	35
	(7) Biostratigraphic Log	36

I ABSTRACT

Woodside St. Margaret Island No. 1 Well was drilled in P.E.P. 42 (Victoria) by Richter Bawden Drilling Pty. Ltd. using Woodside's Brewster N-4 rig. It was drilled to a total depth of 4,666 feet of which 90 feet were Quaternary, 2,949 feet were Tertiary sediments and 1,627 feet of Mesozoic sediments. The well was abandoned after penetrating 331 feet of green non-porous Strzelecki Formation. 4,339 feet of this was penetrated in Woodside's Sunday Island No. 1 Well without any indication of porosity or hydrocarbons.

The Tertiary penetrated compares closely to that found in all other wells (except Woodside's Sunday Island No. 1) drilled in the Gippsland Basin. It has been divided as follows:-

(i) The sands, clay, coal and shell bands of the Jemmy's Point Formation.

(ii) The limestone, calcarenite, and calcilutite of the Gippsland Limestone.

(iii) The marl of the Lakes Entrance Formation.

(iv) The brown coal, claystone and sandstone of the Latrobe Valley Coal Measures.

(v) The clay and volcanic rock (mainly Basalt) of the Narracan Group.

The Narracan Formation rests unconformably on the Mesozoic Strzelecki Group which is made up of white, grey and green felspathic greywacke and arkose and grey siltstone and shale.

The sands and gravels of the Latrobe Valley Coal Measures have high porosities and permeabilities similar to those found in this formation in other parts of the basin. Drill Stem Tests No. 1 and No. 2 covered sands in this formation. Both tests produced fresh water.

Porosities and permeabilities are much lower throughout the sandstones of the Strzelecki Group. Drill Stem Tests No. 3 and No. 4 covered sandstones in this formation. Minor amounts of salt water were recovered from both tests.

As no hydrocarbons were produced, the well was plugged and abandoned.

II INTRODUCTION

Woodside's St. Margaret Island No. 1 was located 9 miles east-north-east of Port Albert on the south-eastern coastline of Victoria and $5\frac{1}{2}$ miles southwest of Woodside South No. 1 Well, the nearest subsidized well. This area forms the southern part of the onshore section of the Gippsland Basin.

St. Margaret Island No. 1 Well was drilled to test a gravity anomaly which was thought to be the result of a closed structure in the Tertiary and possibly Mesozoic sediments. It was also hoped to establish the extent of thinning of the marine Tertiary which is present in Woodside South No. 1 to the north-east but absent in Sunday Island No. 1 situated southwest of St. Margaret Island No. 1 Well.

The principal targets were the sandstones of the Latrobe Valley Coal Measures from which gas has been produced offshore and the sandstones of the Strzelecki Group in which oil and gas shows have been encountered in Woodside No. 2 and Seaspray No. 1, both wells located onshore.

The well was abandoned after penetrating 30^{0} feet of non porous Strzelecki Formation similar to that penetrated in Sunday Island No. 1.

III WELL HISTORY

(i) General Data

(a)	Well Name & Number:	St. Margaret Island No. 1.
(b)	Location:	Latitude 38° 38'16" S. Longitude 146° 50'5" E. Victoria, on St. Margaret Island.
(c)	Name & address of tenement holder:	Woodside (Lakes Entrance) Oil Co. N.L., 792 Elizabeth St., Melbourne, C.1., Victoria.
(d)	Details of petroleum tenement:	Petroleum Exploration Permit No. 42 issued by the State of Victoria covering 9336 square miles.
(e)	District:	Alberton, Victoria.
(f)	Total Depth:	4664 feet, Driller. 4665 feet, Schlumberger.
(g)	Date drilling commenced:	29th January, 1966.
(h)	Date drilling completed:	18th February, 1966.
(i)	Date well abandoned:	19th February, 1966.
(j)	Date rig released:	21st February, 1966.
(k)	Drilling time in days:	20 days.
(l)	Elevation:	Ground - 15 ft. A.S.L. Kelly Bushing - 26 ft. A.S.L.
(m)	Status:	Dry, plugged, and abandoned.
(n)	Cost:	

(ii) Drilling Data

(a)	Contractor	Richter Bawden Drilling Pty. Ltd., Elizabeth Street, BRISBANE, Queensland.
(b)	Drilling plant -	
	Make	Brewster.
	Type	N-4.
	Capacity with $3\frac{1}{2}$" drill pipe	7,500 ft.
	Capacity with $4\frac{1}{2}$" drill pipe	5,500 ft.
	Motors	G.M. diesel 6-71 twin 6 rated 396 B.H.P.
(c)	Mast:	
	Make	Lee C. Moore.
	Type	Jacknife 126'.
	Capacity	368,000 lbs.
(d)	Pumps : two	
	Make	Oilwell.
	Type	214.P.
	Size	$7\frac{1}{4}$" x 14".
	Motors	G.M. diesels 6-71 twin 6 rated 396 B.H.P.

(ii) Drilling Data (cont'd)

(e) Blowout Preventor Equipment:

(i)	Make	Cameron.
	Size	12" Double Gate.
	Series	900.
(ii)	Make	Regan.
	Size	10".
	Series	900.

(f) Hole Sizes and Depths:

20" Conductor Pipe	0ft. - 89 ft.	R.K.B.
17½" Hole	89 ft. - 470 ft.	R.K.B.
12¼" Hole	470 ft. - 2619 ft.	R.K.B.
8¾" Hole	2619 ft. - 4664 ft.	R.K.B.

(g) Casing Details:

(i)	Size	20".
	Weight	60 lbs.
	Grade	Welded.
	Range	1.
	Setting Depth	77'.
(ii)	Size	13⅜".
	Weight	48 lb.
	Grade	H-40.
	Range	2.
	Setting Depth	450'.
(iii)	Size	9⅝".
	Weight	36 lb.
	Grade	J-55.
	Range	2.
	Setting Depth	2600'.

(h) Casing Cementing Details:

(i)	Size	20".
	Setting depth	77'.
	Qty. cement used	100 sacks.
	Cemented to	20'.
	Method used	Mixed in S/Tank, Top Cement Plug.
(ii)	Size	13⅜".
	Setting depth	450'.
	Qty. cement used	450 sacks.
	Cemented to	Surface.
	Method used	B.J. Cementing unit. Guide Shoe. Top Cement Plug.

(h) Casing Cementing Details:

(iii)	Size	$9\frac{5}{8}$".
	Setting Depth	2600'.
	Qty. cement used	370 sacks.
	Cemented to	1600'.
	Method used	B.J. Cementing unit.
		Guide Shoe.
		Float Collar.
		Top Cement Plug.
		Bottom Cement Plug.

(i) Drilling Fluid:

(i)	Type - To	Bentonite/water only.
	To T.D.	Ligno-sulphonate.
(ii)	Treatment -	With stock chemicals on location, on day to day basis as required.

(iii) Mud material and chemical consumption -

Supercol	(Viscosity)	11,650 lbs.
Volclay	(Viscosity)	55,388 lbs.
Unical	(Thinners and pH)	8,800 lbs.
Milcon		4,550 lbs.
Caustic	(Thinners and pH)	750 lbs.
Cellucol	(Water loss control)	396 lbs.
Cellophas	(Water loss control)	1,150 lbs.
Barytes	(Weight)	NIL -
Soda bicarb	(Cement contamination)	600 lbs.
Cal - Chloride	(Advance cmt. setting)	630 lbs.

(iv) Average weight analysis -

Week	Depth feet	Weight lbs/US Gal.	Viscosity secs. per 946 c.c.	W.L. c.c.	F.C. ins.	pH.
1.	1,570	9.9	66	7.0	2/32	11.2
2.	3,977	9.7	68	7.6	2/32	10.6
3.	4,664	9.9	55	5.3	2/32	9.2

(j) Water Supply -

Water well drilled to 196 feet with 8" casing set to 82 feet and 6" casing set to 177 feet. 10' screen. Engine - 6HP Southern Cross. Pump - 4 Stage Pomoma.

(k) Perforations and Shooting - Nil.

(ii) Drilling Data (cont'd)

(l) Plug Back and Cementation Jobs:

Plug backs -		On abandonment. Three plugs at following depths:
1.	3400' - 3200'	66 sacks Gippsland construction cement, Slurry weight 15 lbs. per gal. Pumped to hole.
2.	2700' - 2500'	66 sacks Gippsland construction cement, Slurry weight 15 lbs. per gal. Pumped to hole.
3.	20' - Ground Level	20 sacks Gippsland construction cement, Slurry weight 15 lbs. per gal. Poured to hole.

(m) Fishing Operations - Nil.

(n) Side-Tracked Hole - Nil.

(iii) Logging and Testing

(a) Ditch cuttings:

Samples were collected at 10-foot intervals while drilling, and at 5-foot intervals while coring. Three cuts were made from each sample; one for the Bureau of Mineral Resources, one for the Victorian Mines Department, and one for Woodside (L.E.) Oil Company N.L. No serious difficulties were experienced with sample collection, save for an 84 foot discrepancy owing to a bridge in the hole at 3296 feet after cutting Core. No. 7. This was subsequently found out during Drill Stem Test No. 3 and corrected.

(b) Coring:

The original programme called for a core to be cut at every change of formation, and if possible in the glauconitic zone at the base of the Lakes Entrance Formation and the top of the Latrobe Valley Coal Measures, and in addition cores were required to be taken in zones of economic interest (porosity, oil shows, gas shows).

The following cores were cut:-

Core No.	Interval	Cut	Recovery	% Recovery	Type of Core Barrel
1	850- 870'	20'	15'	75%	Hughes conventional S.F. $7\frac{7}{8}$".
2	1214-1234'	20'	1'6"	8%	" "
3	2010-2022'	12'	12'	100%	" "
4	2959-2969'	10'	8'	80%	Hughes conventioanl S.F. $8\frac{3}{4}$".
5	3240-3250'	10'	2'6"	25%	" "
6	3355-3370'	15'	13'	87%	" "

(b) Coring: (cont'd)

Core No.	Interval	Cut	Recovery	% Recovery	Type of Core Barrel
7	4251-4266'	15'	2'	13%	Hughes conventional H.F. $8\frac{3}{4}$".
8	4483-4493'	10'	Nil	Nil	" "
9	4493-4497'	4'	Nil	Nil	" "
10	4650-4664'	14'	13'	93%	Hughes conventional H.F. $7\frac{7}{8}$".
Totals 10	-	130'	67'	51.5%	

The lack of recovery in Cores Nos. 8 and 9 in Strzelecki Formation has been attributed to the inability of the cores to break off. As it was thought that the core barrel had worked over Core No. 8, a full 10 feet of core for Core No. 9 was considered unnecessary.

(c) Side-wall cores:

A total of 47 side-wall cores were cut to help evaluate zones of interest. Individual recovery was good. All cores were recovered.

The following cores were cut with a Schlumberger 30 shot side-wall core gun:-

Run 1

583'	1810'	1960'	1966'	2467'
591'	1813'	1961'	1968'	
769'	1939'	1962'	2397'	
788'	1940'	1964'	2466'	

Run 2

3050'	3415'	3918'	4214'	4370'
3060'	3425'	3922'	4218'	4375'
3110'	3467'	4021'	4245'	4408'
3120'	3490'	4029'	4291'	4412'
3348'	3790'	4042'	4336'	4571'
3410'	3795'	4048'	4340'	4572'

(d) Electrical and Other Logging:

Logging was carried out by Schlumberger Seaco. The following types of logs were run:-

Run 1

(i)	Electric Log	450' - 2616'
(ii)	Sonic - Gamma Ray Log	450' - 2610' (S) 20' - 2610' (GR)
(iii)	Microlog - Caliper	450' - 2615'
(iv)	Temperature Log	400' - 2523'

(d) Electrical and Other Logging: (cont'd)

Run 2

(i)	Electric Log	2603' - 4665'
(ii)	Sonic Log	2603' - 4658'
(iii)	Neutron - Gamma Ray Log	2603' - 4665'
(iv)	Microlog - Caliper	2603' - 4665'
(v)	Continuous Dipmeter Log	2600' - 4665'

(e) Drilling Rate Log:

A Geolograph was attached to the rig floor and drilling rate times were recorded continuously. A Drilling Time Log is included as part of the Composite Well Log.

(f) Gas Log:

A continuous hot wire mud gas detector was used while drilling below 470 feet. Daily carbide checks were carried out. No substantial gas kicks were recorded throughout the section, except for a general increase of about 5 units through the Latrobe Valley Coal Measures.

(g) Formation Testing:

Four conventional drill stem tests were run to test porosities and formation water salinities, in the sandstones of Latrobe Valley Coal Measures and the Strzelecki Group. All were conducted in open-hole during the drilling of the well.

D.S.T. No.	Interval	Formation	Method	Recovery
1	1950-2010'	Latrobe Valley Coal Measures	O/H	210' mud 360' sand and muddy water 360' sand (Salinity 990 ppm).
2	2350-2395'	Latrobe Valley Coal Measures	O/H	95' mud 532' water 8' sand (Salinity 500 ppm).
3	4090-4160'	Unknown Upper Cretaceous	O/H	1080' watery mud 1270' water (Salinity 16,500 ppm).
4	4320-4335'	Unknown Upper Cretaceous	O/H	10' mud 100' water (Salinity 15,015 ppm).
5	4320-4335'	ReRun of No. 4	O/H	

(h) Deviation Surveys:

Deviation surveys were taken with a Totco instrument at various intervals. They are plotted on the Composite Log (Enclosure 1V).

(h) Deviation Surveys: (cont'd)

They are as follows:-

Depth	Deviation
190'	$\frac{1}{4}^{o}$
325'	$\frac{3}{4}^{o}$
418'	$\frac{1}{2}^{o}$
470'	$\frac{1}{2}^{o}$
850'	$\frac{1}{2}^{o}$
1200'	$\frac{1}{4}^{o}$
2000'	$\frac{1}{4}^{o}$
2395'	1^{o}
2930'	$1\frac{1}{2}^{o}$
3240'	1^{o}
3870'	1^{o}
4155'	$1\frac{1}{2}^{o}$
4450'	$1\frac{1}{2}^{o}$
4650'	$1\frac{1}{2}^{o}$

(i) Temperature Survey;

A Temperature Survey was run in the interval 400' - 2523' in order to find the top of the cement bonding of the $9\frac{5}{8}$" casing. It showed a good cement bond; the top of which was at 1,600 feet.

(j) Other Well Surveys:

A Schlumberger Seaco Continuous Dipmeter Survey was run between 2,600 and 4,665 feet. (See appendix VI).

IV GEOLOGY

(i) SUMMARY OF PREVIOUS WORK

Exploration for oil in the Gippsland Basin commenced in earnest in 1924 after the discovery of oil at Lakes Entrance. Since then, Geological knowledge of the basin has increased considerably due to the large number of wells drilled, the surface geological surveys and the geophysical investigations carried out. These have been financed by private companies, the State Government and the Commonwealth Government.

Although a large number of wells have been drilled in the basin, the data obtained from wells drilled prior to 1961, is of limited value. More recent drilling, both onshore and offshore, has greatly increased the knowledge of the individual Tertiary and Mesozoic formations. Knowledge of the Palaeozoic sediments is confined mainly to that obtained from outcrop.

Very few wells have been drilled in the southern region of the Gippsland Basin.

IV GEOLOGY (cont'd)

The nearest one to Woodside St. Margaret Island No. 1 to have penetrated the entire Tertiary sequence is Woodside No. 2. In this well 3,253 feet of Tertiary sediments, and 2,563 feet of Mesozoic sediments were penetrated. Traces of oil or gas were present in both Teriary and Mesozoic sediments. Woodside No. 2 was abandoned in the Mesozoic Strzelecki Group.

Geophysical work is also limited in this part of the Gippsland Basin. Gravitational surveys were carried out by the Bureau of Mineral Resources as early as 1924. These extended to the larger islands off the coastline including St. Margaret Island. (Alberton Sheet No. 877 and 881A Map No. 739).

An Aeromagnetic survey of the Alberton sheet was flown by the Bureau of Mineral Resources in 1951.

(ii) SUMMARY OF REGIONAL GEOLOGY:

The Gippsland Tertiary Basin is a sequence of marine and continental Tertiary sediments overlying Mesozoic sediments in the central and southern part of the basin and Palaeozoic sediments in the northern section. The on-shore region of the basin covers most of the eastern coast of Victoria extending up to fifty miles inland. More than half of the basin however, lies off-shore. The southern-most boundary of the basin is unknown and it is possible that it is connected with the Bass Basin.

Basement in the Gippsland area is steeply dipping Ordovician and Silurian sediments and Metamorphics intruded by Granites (Webb 1961). Highly folded Middle Devonian marine and continental sandstones, siltstones, shales and limestones unconformably overlie basement.

Unconformably overlying the Middle Devonian is a moderately folded thick continental sequence of red and green shales, sandstones, conglomerates and volcanics of Upper Devonian to Lower Carboniferous age which were penetrated in South West Bairnsdale No. 1.

Permian sediments are almost completely absent but did occur in Woodside-Arco Duck Bay No. 1. A conglomerate exposed along a major fault on the southern side of the Carrajung uplift in the central part of the basin, is thought to be a glacial tillite of Permian age.

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

(ii) SUMMARY OF REGIONAL GEOLOGY: (cont'd)

Jurassic and lower Cretaceous sedimentation is represented by the Strzelecki Group, a non-marine sequence of arkose and felspathic greywacke. These were deposited in an east-west trending graben and have a maximum thickness thought to be as much as 20,000 feet. The only well - Duck Bay No. 1 - to penetrate this formation entirely is in the northern part of the basin where a pinchout occurs. Offshore and in the central part of the basin onshore, the Strzelecki or Lower Cretaceous-Jurassic passes into the Upper Cretaceous, a sequence of fine grained sandstone and mudstone. The relation between these two formations is unknown as both have not been penetrated in the one well and the Upper Cretaceous is not seen in outcrop.

Sedimentation during the Tertiary commenced in early Eocene times with the deposition of the Latrobe Valley Coal Measures. Almost entirely terrestial, it is composed of claystone, semi-consolidated sandstone and gravel, and brown coal. In the Woodside area, however, basalt and basaltic soils of the Narracan Group mark the base of the Tertiary.

A marine transgression began in Oligocene time with the deposition of the Lakes Entrance Formation, a sequence of marl, limestone, and glauconitic sandstone. Limestone and marl of the Gippsland Limestone and Tambo River Formationswere deposited as the transgressive sea gradually encrouched over the basin during the Miocene. Regression of the sea commenced in the Pliocene and the resultant sandstone, coquina, and limestone form the Jemmy's Point Formation.

With the withdrawal of the sea, continental conditions prevailed and the resultant Bushy Park Beds contain peats, clays and sands.

A generalised stratigraphic succession of the Tertiary and Mesozoic in the Gippsland Basin may be represented thus:-

Age		Formation	Rock Type
Pliocene	Continental Marine	Bushy Park Beds. Jemmy's Point Formation.	Clays, Peats, Fossiliferous Sands.
Upper Miocene Miocene Oligocene	Marine	Tambo River Formation. Gippsland Limestone. Lakes Entrance Format.	(Fossiliferous (Marls, Lime- (stones and (shales.
Unconformitively			
Eocene	Continental	Latrobe Valley Coal Measures.	Sandstones, Gravels and Coals
Palaeocene		Narracan Group	Basalt and Basaltic Soils.

(ii) SUMMARY OF REGIONAL GEOLOGY: (cont'd)

Age	Formation	Rock Type
Mesozoic	Undifferentiated Upper Cretaceous (?)	Sandstone and mudstones.
	Strzelecki Group Lower Cretaceous/ Jurassic	Arkose, felspathic, greywackie, siltstone, mudstone and shale.

(iii) STRATIGRAPHIC TABLE

Stratigraphic Table of formation encountered in St. Margaret Island No. 1 Well.

Age	Formation	Top	A.S.L.	Thickness
Recent	Alluvium	Surface	+15'	90'
Pliocene	Jemmy's Point Formation	90'	-75'	732'
Miocene	Gippsland Limestone	822'	-796'	978'
Oligocene	Lakes Entrance Formation	1800'	-1774'	182'
Eocene	Latrobe Valley Coal Measures	1982'	-1956'	968'
Palaeocene	Narracan Group	2950'	-2924'	89'
Upper Jurassic to Lower Cretaceous	Strzelecki Group	3039'	-3070'	1627'
		T.D. 4666'	-4640'	

(iv) STRATIGRAPHY

(1)(a) QUARTERNARY: (Surface to 90 ft.) 90 ft.

This is made up of unconsolidated sand composed of coarse, cloudy to slightly cloudy, angular to subangular quartz grains with rare light grey siliceous and lithic grains.

(b) TERTIARY

PLIOCENE

(i) JEMMY'S POINT FORMATION: (90 to 822 feet). 732 feet.

The formation is composed predominantly of sandstone and coquina beds with rare bands of marl, clay and brown coal. It can be divided into two units.

(A) Upper shelly unit. (90 to 385 feet).

(B) Lower sandy unit. (385 to 822 feet).

(A) UPPER SHELLY UNIT:

This unit is made up of Coquina beds composed predominantly of Lamellibranch valves and fragments but becoming richer in other fauna such as Gastropoda, Brysoa, Foraminifera, and Echinodermata towards the base. These beds contain varying amounts of fine grained sand and minor amounts of marl. The marl is dark grey in colour, clayey in appearance and richly calcareous.

(B) LOWER SANDY UNIT:

The top of this unit is marked by two thin seams of brown slightly fibrous coal. Below this is dominantly sandstone with minor coal and clay beds at 600 feet and becoming fossiliferous approximately 50 feet above the top of the Gippsland Limestone. The sandstone is dominantly quartzose made up of fine, medium and coarse quartz grains generally poorly sorted with grains sub-angular to sub-rounded and clear to slightly cloudy. Porosity is good throughout with very little clay matrix present. Rare beds are richer in lithic fragments or pyrite grains. A trace of mica is present throughout.

D.J. Taylor (See Biostratigraphic Log Appendix 7) includes the Upper Shelly Unit and part of the Lower Sandy Unit in the Bushy Park Beds basing his division on the molluscan and foraminiferal fauna present. As there appears to be some doubt as to the age of this fauna and that of the Bushy Park Beds, no greater subdivision has been carried out here.

MIOCENE

(ii) GIPPSLAND LIMESTONE: (822 to 1880 feet). 978 feet.

The Gippsland Limestone is a sequence of detrital and crystalline calcareous sediments. The basal sediments are mainly detrital with rare bands of crystalline limestone becoming more frequent towards the top of the formation. The upper 150 feet is a crystalline limestone.

The limestone throughout is brown to light brown, microcrystalline to cryptocrystalline, slightly carbonaceous, lithic, and quartzose, variably glauconitic, rarely fossiliferous. Towards the base of this formation, limestone bands become richer in fossil fragments particularly of foraminifera.

Detrital sediments are made up of calcarenites and calcilutites. The calcarenites are white to light brown, fine grained, rarely quartzose or lithic, variably glauconitic, made up almost entirely of calcareous fragments and containing lamellibranchs, coralline, bryzoan, and foraminiferal fragments. These are generally contained in a white microcrystalline cement.

The calcilutite is light grey, almost entirely calcareous though becoming more argillaceous towards the base. It contains varying amounts of fossil fragments as well as a diminishing number of limestone bands as the base is approached.

OLIGOCENE

(iii) LAKES ENTRANCE FORMATION: (1800 to 1982 feet) 182 feet. This formation is composed of mainly marl with minor calcarenite and calcilutite towards the base.

The marl is light grey to light green, variably calcareous and argillaceous and very clayey throughout. There is a gradual increase in glauconite from top to bottom.

The calcarenite and calcilutite are light brown, very fine grained, variably quartzose and pyritic, very glauconitic in part (up to 10%) and calcareous. Fossil fragments, dominantly bryzoan are present but not as common as in the Gippsland Limestone. The calcarenite grades into a very calcarious, glauconitic, very fine grained, well sorted sandstone. This sandstone forms very thin bands distinguished by a marked increase in resistivity on the Electrical Log. They are only present at the base of the formation.

EOCENE

(iv) LATROBE VALLEY COAL MEASURES: (1982 to 2950 ft.) 968 ft. The time range of the Latrobe Valley Coal Measures is in doubt. Although stated as Eocene, evidence from recent wells would suggest that deposition of this formation commenced in the Palaeocene. The upper age limit is also in doubt. It is possible that the Coal Measures may extend into the Oligocene. They are dominantly a fresh water sequence with thin bands of dolomite, probably marine, present in a number of wells (Hocking 1965). Offshore it is thought that part of the topmost sandstone of this formation is also marine. No dolomites are present in the Latrobe Valley Coal Measures penetrated in this well.

The main lithologies of this formation are sandstone, and coal with very minor claystone. The sandstone varies considerably from top to bottom. The top sandstone is fine to medium grained, very porous with little kaolinitic matrix, made up almost entirely of slightly cloudy to cloudy, sub-rounded quartz grains and rare, grey, sub-rounded, siliceous grains. Sorting is moderate. Lower sandstones tend to be made up of coarser grains with a large percentage of clear, angular quartz grains. Many gravels are present towards the base. These contain grains ranging from granular to pebble size. All sandstones and gravels are porous.

Two thick coal seams are present (a) 2004 to 2070 feet (b) 2214 to 2357 feet. Both are brown grading to a peat in part and faintly friable. The claystone is grey to brown, variably carbonaceous, slightly micaceous and quartzose and with rare laminations rich in carbonaceous material.

PALAEOCENE

(v) NARRACAN GROUP: (2950 to 3039 feet) 89 feet. This is composed of two layers of extruded unaltered volcanic rock, separated by a layer of deeply weathered volcanic material. A feature of this formation is the fresh unaltered nature of the volcanics. Both layers exhibit a high resistivity unlike the equivalent horizons found in other wells in the Woodside area.

The volcanic rock varies between an andesite and an olivine basalt. It is probable that the topmost layer (2960 to 2980 feet) contains slightly more quartz than the lower one and is therefore an andesite. The lower flow (3004 to 3039 feet) is more basic and is probably a basalt. (See petrological analysis of Core No. 4 - Appendix 3).

The colour of this group varies from light grey to dark green to black getting darker towards the base. The dark green or basaltic type has green crystals, probably Olivine, throughout. Also present is a yellow mineral, probably iron rich Olivine, surrounded by either a red or green reaction rim. The top layer is light grey in colour and probably contains more quartz and felspar than the basalt. This light grey material also fills a number of fractures present in the lower flow. A small amount of copper mineralization is present in isolated patches.

(c) MESOZOIC

UPPER JURASSIC TO LOWER CRETACEOUS

STRZELECKI GROUP: (3039 to 4666 feet). 1627 feet. Some doubt exists as to the exact top of this formation in the St. Margaret Island No. 1 Well. Although the upper boundary is taken at the base of the lower volcanic flow in the Narracan Group, Core No. 5 (3240 to 3250 feet) is composed entirely of clay with fragments of probable volcanics throughout. However, there is some doubt as to the authenticity of these fragments. It is possible that they may have formed part of a bridge that was encountered while tripping into the hole. Also dipmeter readings show an increase in dip as well as a change in direction of the

dip azimuth at approximately 304°. Therefore Core. No. 5 has been ignored and the top of the Strzelecki placed at the base of the basal volcanic flow in the Narracan Group.

There is also some doubt as to whether the entire section below 3039 feet is Strzelecki Formation. The lithology from 3039 to 4405 feet is not typically Strzelecki and was thought to be possible Upper Cretaceous as found in Woodside's Golden Beach West No. 1 Well. However, after a comparison of cores and cuttings from both wells, the sandstone making up approximately 80% of the lithology of St. Margaret Island No. 1 Well compares more closely to weathered Strzelecki rather than the Golden Beach Upper Cretaceous. As other wells in the Woodside-Yarram area i.e. Woodside No. 2 and Woodside South No. 1 have failed to penetrate Upper Cretaceous sediments, the entire sequence below the Narracan Group has been placed in the Strzelecki Formation.

LITHOLOGY:

The Strzelecki Group has been divided into two sections with the main difference between the two being that the upper section appears to be much more kaolinitic than the lower section.

(i) 3039 to 4335 feet.

The dominant lithology in this unit is a felspathic greywacke as classified by Pettijohn. It is white to light grey, fine grained, porous in part, with a variably calcareous, very kaolinitic matrix, slightly quartzose, variably felspathic, mainly lithic (grey and brown). The lithic grains - predominantly siltstone - are sub-rounded while the quartz is angular. Sorting is moderate. Although a number of porous intervals are present ((3395 to 3510 feet), (4016 to 4057 feet), (4162 to 4186 feet), and (4240 to 4332 feet)) there is little difference between these sands and the non porous ones. The main variation is in the amount of kaolinite.

Thin bands of siltstone and coal are present throughout. The siltstone is light grey with a clay matrix, very slightly carbonaceous, quartzose, felspathic, and lithic. It is probable that the siltstone grades into the felspathic greywacke.

(ii) 4335 to 4666 feet.

This unit varies and can be either a felspathic greywache or an arkose.

They are light green to light grey, fine, rarely medium grained, tight with a kaolinitic matrix or calcareous, partly chloritic cement. The detrital grains are variably carbonaceous and lithic, quartzose and felspathic with generally more quartz and felspar and less kaolinite than the upper section. Quartz is generally clear and sub-angular while lithics are rounded to sub-rounded. Sorting again is poor. The siltstone present is the same as that found in the upper section.

The carbonaceous material present in both upper and lower sections is in thin layers and probably follows the bedding planes.

(v) STRUCTURE:

St. Margaret Island No. 1 Well was drilled to test a gravity anomaly as defined by Quilty (1965). On drilling the well it was found that all formations were lower than anticipated.

The gravity anomaly can be explained by the presence of two layers of unaltered volcanic rock within the Narracan Group. In other wells drilled in the Woodside area, the Narracan Group is composed of strongly altered olivine basalt.

No marked difference is apparent in either the angle of dip or the direction of dip in the formation below the marine Tertiary. A Dipmeter Survey was run over the interval 2600 to 4665 feet.

Dips vary considerably throughout the interval of the Latrobe Valley Coal Measures logged. The overall dip of this formation is probably one to two degrees with the dip azimuth varying between North and North-west. A similar dip and dip azimuth applies for the Narracan Group.

Variation in dip and dip azimuth is present throughout the Strzelecki Group. Dips tend to be approximately one to two degrees to 4051 feet with small intervals, mainly sandstone bands having dips up to 20 degrees. From 4051 feet to total depth, the average dip is approximately 10 degrees.

The dip azimuths do not vary considerably. They range between north-east and north-west with the dominant direction of dip being approximately 30 degrees east of North.

(vi) OCCURRENCE OF HYDROCARBON

Although four drill stem tests were run during the drilling of this well, no traces of oil or gas were present in cuttings and no indication of gas occurred on the gas detector. All tests were run to determine the extent of porosity.

(vii) POROSITY AND PERMEABILITY:

Porosity and Permeability exists in most formations penetrated in this well. Positive separation on the Microlog is present throughout the Gippsland Limestone. Porosities, however, vary considerably with a maximum exceeding 30%.

The first porosity of interest, however, is found at the top of the Latrobe Valley Coal Measures. The upper sands of this formation i.e. 1960 to 1980 and 2070 to 2218 feet have porosity exceeding 30%* with the average approximately 32%*. Sands within the Latrobe Valley Coal Measures below 2218 feet have porosities below 30%* with an average of 28%*. Permeabilities of these sands are also very good. Drill Stem Tests No. 1 (1950 to 2010 feet) and No. 2 (2350 to 2395 feet) produced large quantities of fresh water before sand blocked the testing tool.

Porosity in the sandstones of the Strzelecki Group reaches a maximum of 23%*. The normal figure, however, is 18%* with some sandstones as low as 15%*. The low porosities are a result of a large amount of kaolinitic matrix. Sandstones within this group with porosities exceeding 20%* still have a large amount of matrix. Permeability is generally very low. Drill Stem Tests, covering this formation No. 3 (4090 to 4160 feet) and No. 4 (4236 to 4251 feet), produced small quantities of salt water. The Strzelecki sandstones over the basal 200 feet of the well have porosities as low as 10%*.

see testing report

(viii) CONTRIBUTIONS TO GEOLOGICAL CONCEPTS:

As there is little variation between the overall sequence of formations penetrated in this well and that found in other wells in the Gippsland Basin, the main points of interest resulting from the drilling of St. Margaret Island No. 1 can be found within individual formations.

(a) A relatively thick sandy Jemmy's Point Formation is present.

(b) Very little thinning of the marine Tertiary has occured between Woodside South No. 1 and St. Margaret Island No. 1. However, a complete pinch-out of this group of Formations does occur between this well and Sunday Island No. 1.

* All porosities are determined using the Sonic Log.

(c) The Latrobe Valley Coal Measures is similar in thickness and lithology to that found in all wells drilled in the southern onshore section of the basin.

(d) The Narracan Group is well developed and composed mainly of unaltered olivine basalt. Normally, the lithology of this formation is strongly altered basalt and volcanic soils.

(e) The lithology of the Strzelecki Group compares closely to that found in Woodside No. 2 and Woodside South No. 1, the nearest wells. This formation is marked by a mainly tight sandstone section, rich in felspar and with a number of bands with moderate porosity and moderate to low permeabilities.

V REFERENCES

Arco Woodside	1964	Duck Bay No. 1 well completion report.
Hocking, J.B.	1965	Characteristics of the Tertiary formation of southern and south-eastern Gippsland. Geological Survey of Victoria.
Pettijohn F.J.	1957	Sedimentary Rocks. Harper and Brothers, New York.
Quilty	1965	Gippsland Basin Airborne Magnetic Surveys, Victoria 1951-52 and 1956 Bureau of Mineral Resources Report No. 95.
Webb, E.A.	1961	Petroleum Prospects in the Gippsland Basin, Australia. Paper presented at 1961 Apea conference.
Woodside	1965	Woodside South No. 1 Well completion report.
Woodside	1966	Sunday Island No. 1 Well completion report.

APPENDIX NO. 1
CORE DESCRIPTIONS
ST.MARGARET ISLAND NO.1 WELL

Core No. 1 850' - 870' Cut 20', recovered 15'. (75% recovery)

Top 14'6" CALCARENITE; Very calcareous sandstone, light grey, fine grained, possibly containing some porosity. A light grey calcareous matrix, slightly carbonaceous, variably lithic and quartzose, calcareous (shell fragments). Sorting is moderate to good, and the grains are generally subrounded. Coarse and fine shell fragments are present throughout.
The lithics are green (? siliceous) and black.

Bottom 6" LIMESTONE; Brown, microcrystalline to cryptocrystalline, slightly carbonaceous; lithic, quartzose and rarely fossiliferous.
No structure indicated.
No indication of hydrocarbons.

Core No. 2 1214' - 1234' Cut 20', recovered 1'6" (8% recovery)
CALCILUTITE; Light grey to light green with numerous shell fragments set in a clayey-calcareous matrix. The matrix is slightly glauconitic and quartzose. The quartz grains are very fine-grained and rounded.
No structure indicated.
No indication of hydrocarbons.

Core No. 3 2010' - 2022' Cut 12', recovered 12' (100% recovery)
BROWN COAL; Dark brown to black with a dark brown streak, relatively soft, slightly friable, easily broken, generally breaking into chip form. Somewhat peaty in appearance and no plant impressions seen.
No structure indicated.
No indication of hydrocarbons.

Core No. 4 2959' - 2969' Cut 10', recovered 8' (80% recovery)
ANDESITE; Basic, relatively fresh and unweathered (though some minerals are altered), massive, varied somewhat in nature with some areas showing a greater concentration of mafics approaching micro-gabbro in character. Dark to light green-grey with numerous small veinlets up to 1 cm. in width criss-crossing the rock and presumably restricted to areas of late stage fracturing,

probably zeolitic in character (being soft, white to light brownish in colour). The major minerals appear to be mafics such as : dark brown amphibole showing good cleavage (? hornblende), dark green pyroxene and altered olivine with salic minerals such as; pale green? quartz and plagioclase (assumed to be andesine in composition). The rock could be olivine basalt with andesitic affinities. Some fracture areas show copper mineralization of dark green variety (malachite?). The surface is slightly pitted. There are no flow structures or any structures typical of an extrusive rock, no vugs or vesicles and the rock is generally medium to fine-grained and equigranular and appears to be hypabyssal.
No indication of hydrocarbons.

Core No. 5 3240' - 3250' Cut 10', recovered 2'6" (25% recovery)
CLAY; Light grey, slightly calcareous, mainly argillaceous with rare large fragments of green volcanic material and rare fragments of light grey, very fine-grained sandstone resembling the Strezlecki Formation. The volcanic material is the more common.
No structure indicated.
No indication of hydrocarbons.

Core No. 6 3355' - 3370' Cut 15', recovered 13' (87% recovery)
SANDSTONE; Light grey coloured, fine-grained, consisting of quartz, felspar and other lithic grains set in a calcareous-argillaceous matrix. In some areas the lithics predominate over the light grey to cloudy quartz grains. There are traces of white mica. In some areas of the core there are concentrations of streaky to laminated carbonaceous material which defines the bedding plane and the amount of dip. The rock therefore has a slight tendency to cleave along the bedding plane.
Fairly tight and non-friable, generally massive and equigranular with poor to moderate porosity.
Dip approximately 10^{o}.
No indication of hydrocarbons.

Core No. 7 — 4251'-4266' Cut 15', recovered 2' (13% recovery).

Top 1'6" — SANDSTONE; light grey to whitish, fine-grained, speckled in hand-specimen when wet, consisting predominantly of dark grey, and white (felspar) lithic grains set in a white dominantly kaolinitic matrix, which is non-calcareous. Quartz is very minor. Poor to moderate porosity.

Bottom 6" — SANDSTONE; slightly darker grey in colour than above, no longer of speckled appearance and generally lacking the dark grey lithics of above. Slightly finer in grain and with more quartz set in a more ?siliceous rather than kaolinitic matrix. It is laminated with black carbonaceous material in thin regular bands less than $\frac{1}{2}$ cm. in width which defines the amount of dip.
Dip approximately less than 5^{o}, no other sedimentary structures.
No indication of hydrocarbons.

Core No. 8 — 4483'-4493' Cut 10', recovered nil (0% recovery).

Core No. 9 — 4493'-4497' Cut 4', recovered nil (0% recovery).

Core No. 10 — 4650'-4664' Cut 14', recovered 13' (93% recovery).

Top 3' — SANDSTONE; with interbedded CARBONACEOUS SILTSTONE
The sandstone is white to light grey, fine-grained tight with a large percentage (approx. 20%) of white kaolinitic matrix; felspathic, lithic and quartzose. The lithic fragments are mainly grey siltstone. All the grains, both lithics and quartz, are sub-rounded with moderate sorting. Interbedded are thin beds and bands of siltstone of light grey colour, slightly felspathic, carbonaceous, lithic and quartzose. These appear to have been broken up by the sandstone dispersing media. Also present are thin carbonaceous streaks which show dip as well and exhibiting current bedding. No porosity present and the dips vary, but no greater than 10^{o}.

Top 7' — SANDSTONE; white to light grey as above though tending to be coarser grained. Lacking also are carbonaceous streaks or bands, though rare carbonaceous flecks are present. Tends to be more lithic with about twice as many lithics as quartz.

Bottom 3' SANDSTONE; White to light grey and coarser still. Also more felspathic and carbonaceous, with thin carbonaceous bands present throughout which exhibit very steep dips (approximately 30°). In places actual elongated coal fragments are present.
Dips varying from 0° - 30°.
No indication of hydrocarbons.

APPENDIX NO. 2
SIDEWALL CORES

Depth	LITHOLOGY
583'	SANDSTONE; white to light grey, generally medium-grained, extremely porous, entirely quartzose, containing no matrix, generally poor to moderate sorting and composed of subrounded to rounded clear and cloudy quartz. No fluorescence.
769'	SANDSTONE; fine-grained, rarely medium-grained, very porous, little to no matrix containing siliceous, calcareous and quartzose fragments. The siliceous fragments are red, brown, and green, calcareous fragments are fine-grained and rare.
788'	SANDSTONE; light grey, fine-grained, porous with possibly a very slightly calcareous matrix; slightly lithic (red and green), but dominantly quartzose, with the quartz grains well sorted and subrounded.
1810'	MARL grading to CALCILUTITE; brown, slightly quartzose, very slightly glauconitic (very fine, green, rounded fragments), calcareous and clayey.
1813'	CALCILUTITE; brown possibly grading to MARL, slightly carbonaceous, quartzose and calcareous.
1939'	SANDSTONE; light brown, very fine-grained, slightly porous, extremely calcareous matrix making up about 50% of the rock, glauconitic but not as much as at 1961', quartzose (with only detrital grains present). Recrystallization present and sorting very good.
1940'	SANDSTONE; grading to CALCARENITE; very fine-grained light brown similar to 1962' though very much more calcareous not as glauconitic as sandstones at 1960' etc. and lacking any fossils.
1960'	SANDSTONE; as for 1961' though generally fine-grained sandstone with numerous shell fragments and entire shells throughout.
1961'	SANDSTONE grading to SILTSTONE; light brown, very fine-grained, grading to silt size, tight with a calcareous matrix, which is in part slightly pyritic, very glauconitic and pyritic (combined approximately 15%), mainly quartzose, well sorted with rare fine to medium-grained sub-rounded quartz, though dominantly subangular the glauconite is much coarser than the quartz. Also present is a black mineral, not as common as glauconite. The pyrite is generally patchy.

1962' SANDSTONE; fine-grained, light brown, very well sorted as above though lacking shell fragments. Some areas are rich in calcareous matrix, while others are not very calcareous, but the percentage of quartz rises.

1964' CALCARENITE; fine-grained with about 50% calcareous matrix, brown and darker than 1961', glauconitic (sub-angular fragments), very slightly quartzose (generally medium-grained), very pyritic in part (associated with glauconite), calcareous with minor organisms present as well as shell fragments.

1966' CALCILUTITE; as for 1968', with shell fragments.

1968' CALCILUTITE; brown, quartzose with quartz grains generally fine to medium-grained and sub-rounded to rounded; glauconitic, rarely pyritic, calcareous. Shell fragments also present.

2397' SANDSTONE; brown, fine-grained, tight with a carbonaceous matrix, with detrital fragments almost entirely quartz, sub-angular, clear, good to moderate sorting: Rare coarse well rounded quartz grains are also present.

2466' CLAY; as for 2467'.

2467' CLAY; brown, slightly carbonaceous in part, slightly micaceous and quartzose with laminations rich in carbonaceous material rare.

3050' CLAY; light to medium grey in colour, soft and slightly carbonaceous.

3060' CLAY; as for 3050'.

3110' SILTSTONE; light to medium grey in colour, silty, calcareous, with few black carbonaceous flecks; white, very fine-grained lithic material (felspar), rare colourless very fine-grained quartz grains, soft and kaolinitic.

3120' SILTSTONE; as for 3110'.

3348' SILTSTONE; light grey, soft, silty, with minute black carbonaceous flecks, kaolinitic, lithic and rarely quartzose.

3410' SANDSTONE; light grey-brown, very fine-grained, soft, rarely quartzose, with black carbonaceous flecks, generally kaolinitic matrix, lithics are dark grey clayey and silty material, and white felspathic material.

3415' SANDSTONE; as for 3410'.

3425' SANDSTONE; light grey fine to medium-grained, consisting of dark grey lithic material (clayey and silty fragments), slightly more quartzose than above, rare carbonaceous flecks, and a white kaolinitic matrix.

3467' SANDSTONE; as for 3425'.

3490' SANDSTONE; as for 3425', but slightly finer in grain and more lithic.

3790' CLAY; medium to dark grey, calcareous soft.

3795' CLAY; as for 3790'.

3918' CLAY; as for 3790', but with carbonaceous flecks.

3922' CLAY; as for 3795'.

4021' SANDSTONE; light grey, fine-grained, white (felspathic) and dark grey lithic (clayey) material, with rare cloudy quartz grains set in a white kaolinitic matrix.

4029' SANDSTONE; as for 4021', but with black carbonaceous flecks.

4042' SANDSTONE; as for 4021', but with slightly less argillaceous matrix.

4048' SANDSTONE; as for 4042'.

4214' CLAY; light to medium grey, slightly carbonaceous, soft.

4218' CLAY; as for 4214'.

4245' SANDSTONE; light grey, fine to very fine-grained consisting mainly of dark grey (clay and silt) and white (felspathic) lithic material, with a kaolinitic-argillaceous matrix, slightly carbonaceous. Rare quartz grains.

4291' SANDSTONE; light grey, fine to medium-grained, carbonaceous, lithics (dark grey and white), with argillaceous matrix. Rare quartz grains.

4336' SANDSTONE; light grey to whitish grey, felspathic and carbonaceous with a kaolinitic matrix. Rare quartz grains.

4340' SANDSTONE; light grey to whitish grey, fine to medium-grained, consisting dominantly of dark grey lithic grains, white lithic grains, set in a white kaolinitic matrix, and minor cloudy quartz grains. Slightly carbonaceous.

4370' SANDSTONE; light grey, very fine-grained, dark-grey lithic material felspathic and kaolinitic, with minor quartz, slightly calcareous.

4375' SANDSTONE; as for 4370'.

4408' SANDSTONE; light grey very fine-grained, very silty, slightly quartzose and carbonaceous and not as kaolinitic as before, soft.

4412' SILTSTONE; light grey, silty and clayey, dark grey lithic material and slightly carbonaceous with minor quartz and kaolinitic material, soft.

4571' CLAY; medium to dark grey, soft, rare carbonaceous flecks.

4572' CLAY; as for 4571'.

APPENDIX NO. 3.
PETROLOGICAL REPORT

St. Margarets Island No. 1.
Core No. 4 2959' - 2969'.
Sample Depth 2960' and 2967'.
Rock Type - Basalt.

MACROSCOPIC EXAMINATION

2960' Medium grey to greenish grey fine grained rock containing numerous dark yellowish brown crystals. Rock is traversed by calcite veins up to 5 mm. in width.

2967' Greenish grey fine grained rock covered in places with numerous pale green spots.

MICROSCOPIC EXAMINATION

2960' Consists of strongly pleochroic pale yellow brown phenocrysts set in a ground mass predominantly of ophitic labradorite and pyroxene which is now almost completely replaced by calcite.

Original vesicles in the rock have now been filled with a chloritic material. Skeletal iron ore is also present.

The phenocrysts which do not appear to have any characteristic crystal shape have a maximum length of approximately 1 mm. and comprise approximately 30% of the rock. They consist of a pleochroic biaxially negative mineral with a low 2V (less than 10^{o}) and having optical properties very similar to those of phlogopite. This mineral has been identified by C.S.I.R.O., Fishermens Bend, using X-rays as a saponite mineral probably formed from a mica under conditions of poor drainage.

2967' Consists of phenocrysts exhibiting typical olivine outlines in a groundmass of labradonite laths and chlorite which probably has replaced pyroxene.

The olivine has been completely altered to chlorite and a pale greenish "mica" like mineral not determinable under the microscope. Microscopic calcite veins and iron ore are also present.

COMMENTS

While the sections examined show some mineralogical difference they both represent the same rock type (basalt) which can be placed on stratigraphic grounds with the Older Volcanics. Petrologically however, the rocks show no definite characteristics that would place them for certainty within this series.

The alteration of the olivine is interesting and is probably a result of deuteric and or weathering phenomena. The microscopic evidence suggests the following sequence:-

Olivine-chlorite and "mica" (2967') - saponite (2960').

Apparently similar alteration products of olivine are referred to by Winchell (Elements of Optical Mineralogy Part 11, 1933, John Wiley and Son) as bowlingite and xylotile. The complete mineralogy and possible significance of this series cannot be worked out by optical means alone but would require x-ray diffraction techniques.

K. BOWEN.
Geologist - Department of Mines,
Victoria.

SERVICE (AUSTRALIA) PTY. LTD. TESTING REPORT

DRILL-STEM TEST DATA

Name ST. MARGARET ISLAND NO.1	Test No. 1
Well Number 1	Zone Tested Latrobe Valley Coal Measures
Company WOODSIDE (L.E.) OIL CO.	Date 3 - 2 - 66
Comp. Rep. D. Langton	Tester L.B. Thrupp

Recorder No.	2237	Recorder No.	2238
Clock Range	12 hr.	Clock Range	24 hr.
Depth	1963	Depth	1969'
Initial Hydro Mud Press.	1071	Initial Hydro Mud Press.	1097
Initial Shut-in Press.	886	Initial Shut-in Press.	876
Initial Flow Press.	(394)	Initial Flow Press.	800
Final Flow Press.	(733) 890	Final Flow Press.	855
Final Shut-in Press.	1067	Final Shut-in Press.	894
Final Hydro Mud Press.	1067	Final Hydro Mud Press.	1030

Temperature	104°	Tool Open Before I.S.I.	14 Mins.	5:45 A.M.
Mud Drop	8'	Initial Shut-in	45 Mins.	5:59 A.M.
Mud Weight	10.1	Viscosity 43	Flow Period	17 Mins.	6:44 A.M.
Fluid Loss	7.0	Final Shut-in	45 Mins.	7:02 A.M.

Interval Tested	1950 - 2010	Surface Choke Size	none
Net Pay Tested	-	Bottom Choke Size	½"
Top Packer Depth	1944	Main Hole Size	8¾"
Bottom Packer Depth	1950	Rat Hole Size	
Total Depth	2010	Feet of Rat Hole	
Drill Pipe Size	4½" F.H.	Wt. 16.6	Type of Test	Dual Bottom Hole
Drill Collar I.D.	2¼"	Ft. Run 357	Cushion Amount—Type	
Anchor Size	4¾"	Rubber size	8"

Recovery—Total Feet 930

Recovered 210 Feet Of Mud and very muddy water

Recovered 180 Feet Of Muddy water

Recovered 180 Feet Of Sand & muddy water

Recovered 360 Feet Of Sand

Remarks

Tool opened with good strong blow on initial flow. When opening for final flow, blow was practically nil and died in 1 minute. There was 360' of sand above the Tool preventing any blow on final flow, and also blocking off the complete tool.

SERVICE (AUSTRALIA) PTY. LTD.

RECEIVED
15 MAR 1966

TESTING REPORT

DRILL-STEM TEST DATA

Well Name ST. MARGARET ISLAND NO.1	Test No. 2
Well Number 1	Zone Tested Latrobe Valley Coal Measures
Company WOODSIDE (L.E.) OIL CO.	Date 4-2-66
Comp. Rep. D. Langton	Tester L.B. Thrupp

Recorder No.	2237	Recorder No.	2238
Clock Range	12 hr.	Clock Range	24 hr.
Depth	2381'	Depth	2387'
Initial Hydro Mud Press.	1272	Initial Hydro Mud Press.	1283
Initial Shut-in Press.		Initial Shut-in Press.	
Initial Flow Press.	300	Initial Flow Press.	1080
Final Flow Press.	339	Final Flow Press.	1080
Final Shut-in Press.		Final Shut-in Press.	
Final Hydro Mud Press.	1268	Final Hydro Mud Press.	1258

Temperature	110°	Tool Open Before I.S.I.	30 Mins.	7:41 A.M.
Mud Drop	8 feet	Initial Shut-in	30 Mins.	8:11
Mud Weight	9.7	Viscosity	Flow Period	15 Mins.	8:41
Fluid Loss	6.8	Final Shut-in	15 Mins.	8:56 A.M.

Interval Tested	2350 - 2395	Surface Choke Size	none
Net Pay Tested	-	Bottom Choke Size	1"
Top Packer Depth	2344	Main Hole Size	8¾"
Bottom Packer Depth	2350	Rat Hole Size	
Total Depth	2395	Feet of Rat Hole	
Drill Pipe Size	4½" F.H.	Wt. 16.6	Type of Test	Dual Bottom Hole
Drill Collar I.D.	2¼"	Ft. Run 357	Cushion Amount—Type	
Anchor Size	4¾"	Rubber size	8"

Recovery—Total Feet 635

Recovered 90 Feet Of Watery mud

Recovered 90 Feet Of Muddy water

Recovered 442 Feet Of Water

Recovered 8 Feet Of Sand

Remarks

Tool opened ~~xxx~~ with good strong blow, and decreased sharply in 5 minutes. Light to moderate blow on final flow. Tool completely plugged with sand

SERVICE (AUSTRALIA) PTY. LTD. TESTING REPORT

DRILL-STEM TEST DATA

Well Name ST. MARGARET ISLAND NO.1	Test No. 3
Well Number 1	Zone Tested STREZLECKI ?
Company WOODSIDE (L.E.) OIL CO.	Date 13-2-66
Comp. Rep. D. Langton	Tester L.B. Thrupp

Recorder No.	2237	Recorder No.	2238
Clock Range	12 hr.	Clock Range	24 hr.
Depth	4112'	Depth	4118'
Initial Hydro Mud Press.	2152	Initial Hydro Mud Press.	2128
Initial Shut-in Press.	1799	Initial Shut-in Press.	1773
Initial Flow Press.	(474) 356	Initial Flow Press.	(485) 351
Final Flow Press.	(483) 1134	Final Flow Press.	(485) 1097
Final Shut-in Press.	1761	Final Shut-in Press.	1733
Final Hydro Mud Press.	2194	Final Hydro Mud Press.	2157

Temperature	136°	Tool Open Before I.S.I.	3	Mins.	11:44 A
Mud Drop	6'	Initial Shut-in	45	Mins.	11:47
Mud Weight	9.7	Viscosity 42	Flow Period	60	Mins. 12:32
Fluid Loss	5.2	Final Shut-in	45	Mins.	1:32 P

Interval Tested	4090 - 4160	Surface Choke Size	-
Net Pay Tested		Bottom Choke Size	½"
Top Packer Depth	4084	Main Hole Size	8¾"
Bottom Packer Depth	4090	Rat Hole Size	
Total Depth	4160	Feet of Rat Hole	
Drill Pipe Size	4½F.H./3½I.W. 16.6	Type of Test	Dual Bottom Hole
Drill Collar I.D.	2¼" Ft. Run 357	Cushion Amount—Type	
Anchor Size	4¾"	Rubber size	8"

Recovery—Total Feet 2350

Recovered 1080 Feet Of Muddy water

Recovered 1270 Feet Of Fairly clean water

Recovered Feet Of

Recovered Feet Of

Remarks

Tool opened with moderate to strong blow on the initial flow, with a moderate blow on the final flow. Had to push tools through approx. 90' of sticky hole 7 stands off bottom. Pulling tool off bottom the first 120' was very tight which took 2 hours. Damaged 2 support rubbers

SERVICE (AUSTRALIA) PTY. LTD.

RECEIVED
21 MAR 1966
ANSD

TESTING REPORT

DRILL-STEM TEST DATA

Well Name ST. MARGARET ISLAND NO.1	Test No. 4
Well Number 1	Zone Tested STREZLECKI
Company WOODSIDE (L.E.) OIL CO.	Date 14-2-66
Comp. Rep. R.H. McCulloch	Tester L.B. Thrupp

Recorder No. 2237 Clock Range 12 hr. | Recorder No. 2238 Clock Range 24 hr.

Depth 4304' | Depth 4326'

Initial Hydro Mud Press. | Initial Hydro Mud Press.

Initial Shut-in Press. | Initial Shut-in Press.

Initial Flow Press. | Initial Flow Press.

Final Flow Press. | Final Flow Press.

Final Shut-in Press. | Final Shut-in Press.

Final Hydro Mud Press. | Final Hydro Mud Press.

Temperature | Tool Open Before I.S.I. Mins.

Mud Drop | Initial Shut-in Mins.

Mud Weight 9.8 Viscosity 52 | Flow Period Mins.

Fluid Loss 5.6 | Final Shut-in Mins.

Interval Tested 4320 - 4335 | Surface Choke Size

Net Pay Tested | Bottom Choke Size 1"

Top Packer Depth 4314 | Main Hole Size 8¾"

Bottom Packer Depth 4320 | Rat Hole Size

Total Depth 4335 | Feet of Rat Hole

Drill Pipe Size 4½ F.H./3½ I.F. Wt. 16.6 | Type of Test Dual Bottom Hole

Drill Collar I.D. 2¼" Ft. Run 357 | Cushion Amount—Type

Anchor Size 4¾" | Rubber size 7¾"

Recovery—Total Feet

Recovered Feet Of

Recovered Feet Of

Recovered Feet Of

Recovered Feet Of

Remarks

Could not get to bottom with tester. Ran into a ledge or cave 150' off bottom.

SERVICE (AUSTRALIA) PTY. LTD.

RECEIVED

TESTING REPORT

DRILL-STEM TEST DATA

Well Name ST. MARGARET ISLAND NO.1	Test No. 5
Well Number 1	Zone Tested STREZLECKI
Company WOODSIDE (L.E.) OIL CO.	Date 15-2-66
Comp. Rep. R.H. McCulloch	Tester L.B. Thrupp

Recorder No.	2237	Recorder No.	2238
Clock Range	12 hr.	Clock Range	24 hr.
Depth	4304'	Depth	4326'
Initial Hydro Mud Press.	2304	Initial Hydro Mud Press.	2300
Initial Shut-in Press.	1868	Initial Shut-in Press.	1864
Initial Flow Press.	(25) 34	Initial Flow Press.	(60) 55
Final Flow Press.	(27) 72	Final Flow Press.	(47) 81
Final Shut-in Press.	1866	Final Shut-in Press.	1855
Final Hydro Mud Press.	2291	Final Hydro Mud Press.	2283
Temperature	140°	Tool Open Before I.S.I.	4 Mins. 3:19 A.M.
Mud Drop	6'	Initial Shut-in	30 Mins. 3:23
Mud Weight	9.9	Viscosity 60 Flow Period	30 Mins. 3:53
Fluid Loss	6.2	Final Shut-in	30 Mins. 4:23 A.M.
Interval Tested	4320 - 4335	Surface Choke Size	-
Net Pay Tested		Bottom Choke Size	1/2"
Top Packer Depth	4314	Main Hole Size	8 3/4"
Bottom Packer Depth	4320	Rat Hole Size	
Total Depth	4335	Feet of Rat Hole	
Drill Pipe Size	4 1/2 F.H./3 1/2 I.F.	Wt. 16.6 - Type of Test	Dual Bottom Hole
Drill Collar I.D.	2 1/4" Ft. Run 357	Cushion Amount—Type	
Anchor Size	4 3/4"	Rubber size	7 3/4"

Recovery—Total Feet 110

Recovered 10 Feet Of Mud

Recovered 100 Feet Of Muddy water

Recovered ..... Feet Of .....

Recovered ..... Feet Of .....

Remarks

Tool opned with very weak blow, continued steady throughout test.

PE906334

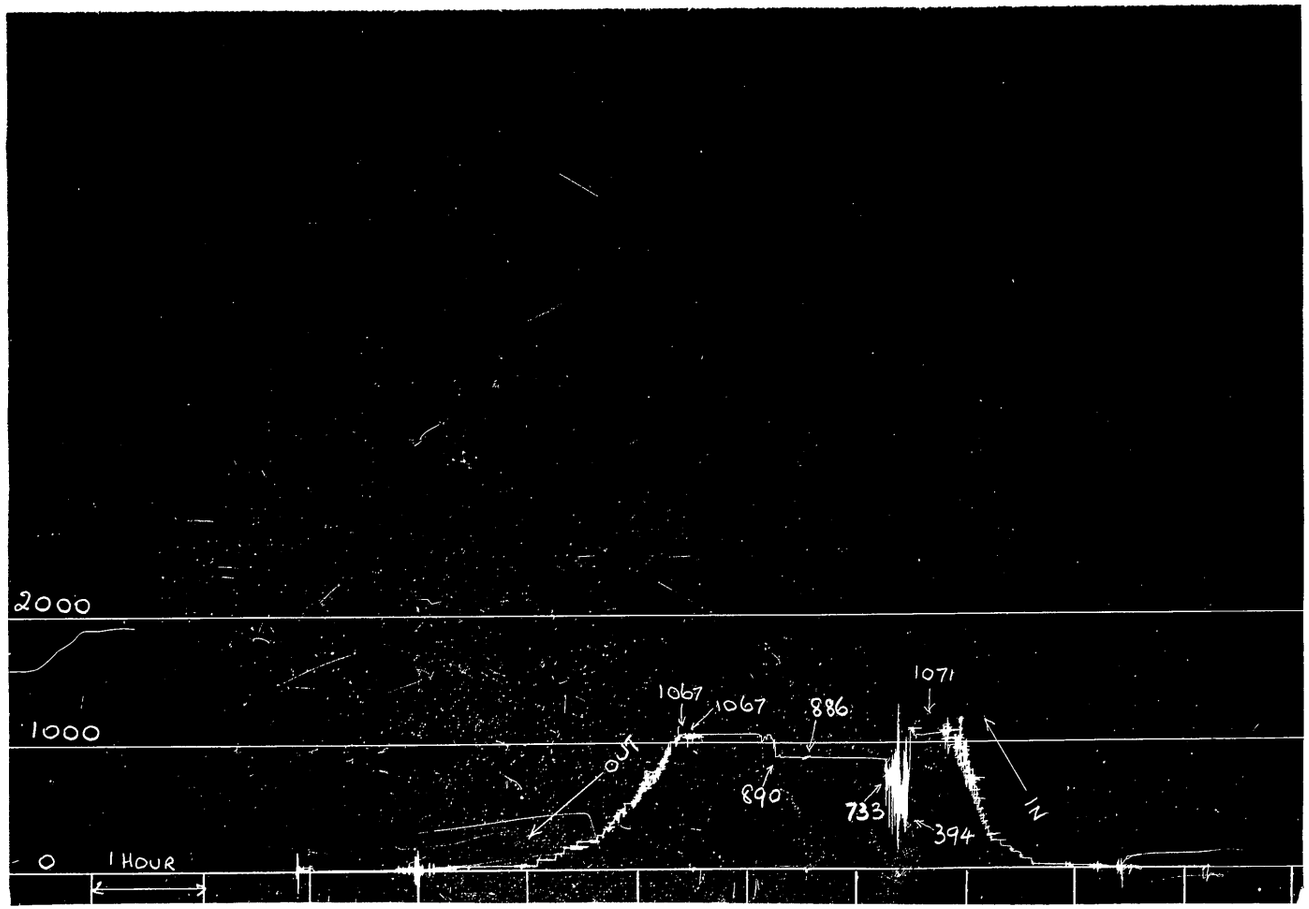
This is an enclosure indicator page.
The enclosure PE906334 is enclosed within the container PE902921 at this location in this document.

The enclosure PE906334 has the following characteristics:

ITEM_BARCODE	= PE906334
CONTAINER_BARCODE	= PE902921
NAME	= Drill Stem Test Photo, 1 of 10
BASIN	= GIPPSLAND
PERMIT	= PEP42
TYPE	= WELL
SUBTYPE	= DST
DESCRIPTION	= Drill Stem Test Photo, 1 of 10, for St Margaret Island-1
REMARKS	=
DATE_CREATED	= 3/02/66
DATE_RECEIVED	=
W_NO	= W497
WELL_NAME	= ST. MARGARET ISLAND-1
CONTRACTOR	= BJ SERVICE (AUSTRALIA)
CLIENT_OP_CO	= WOODSIDE OIL NL

(Inserted by DNRE - Vic Govt Mines Dept)

WOODSIDE (L.E.) OIL CO. FEBRUARY 3, 1966
ST.MARGARET ISLAND NO.1 TEST NO.1
RECORDER NO.2237 RECORDER DEPTH 1963'



DEPT. NAT. RES & ENV
PE906334

PE906335

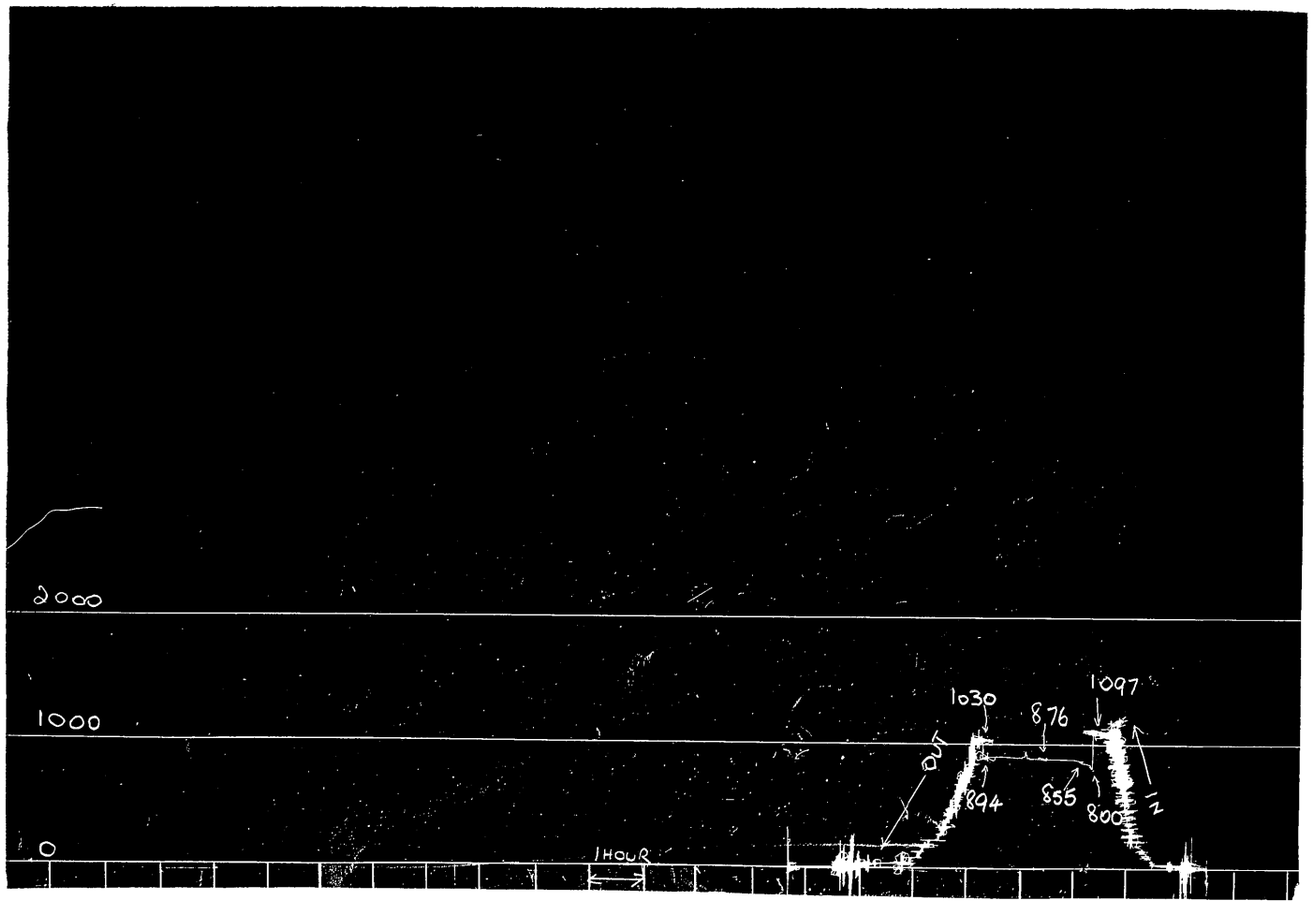
This is an enclosure indicator page.
The enclosure PE906335 is enclosed within the container PE902921 at this location in this document.

The enclosure PE906335 has the following characteristics:

ITEM_BARCODE	= PE906335
CONTAINER_BARCODE	= PE902921
NAME	= Drill Stem Test Photo, 2 of 10
BASIN	= GIPPSLAND
PERMIT	= PEP42
TYPE	= WELL
SUBTYPE	= DST
DESCRIPTION	= Drill Stem Test Photo, 2 of 10, for St Margaret Island-1
REMARKS	=
DATE_CREATED	= 3/02/66
DATE_RECEIVED	=
W_NO	= W497
WELL_NAME	= ST. MARGARET ISLAND-1
CONTRACTOR	= BJ SERVICE (AUSTRALIA)
CLIENT_OP_CO	= WOODSIDE OIL NL

(Inserted by DNRE - Vic Govt Mines Dept)

WOODSIDE (L.E.) OIL CO. FEBRUARY 3, 1966
ST.MARGARET ISLAND NO.1 TEST NO.1
RECORDER NO.2238 RECORDER DEPTH 1969'



DEPT. NAT. RES & ENV
PE906335

PE906336

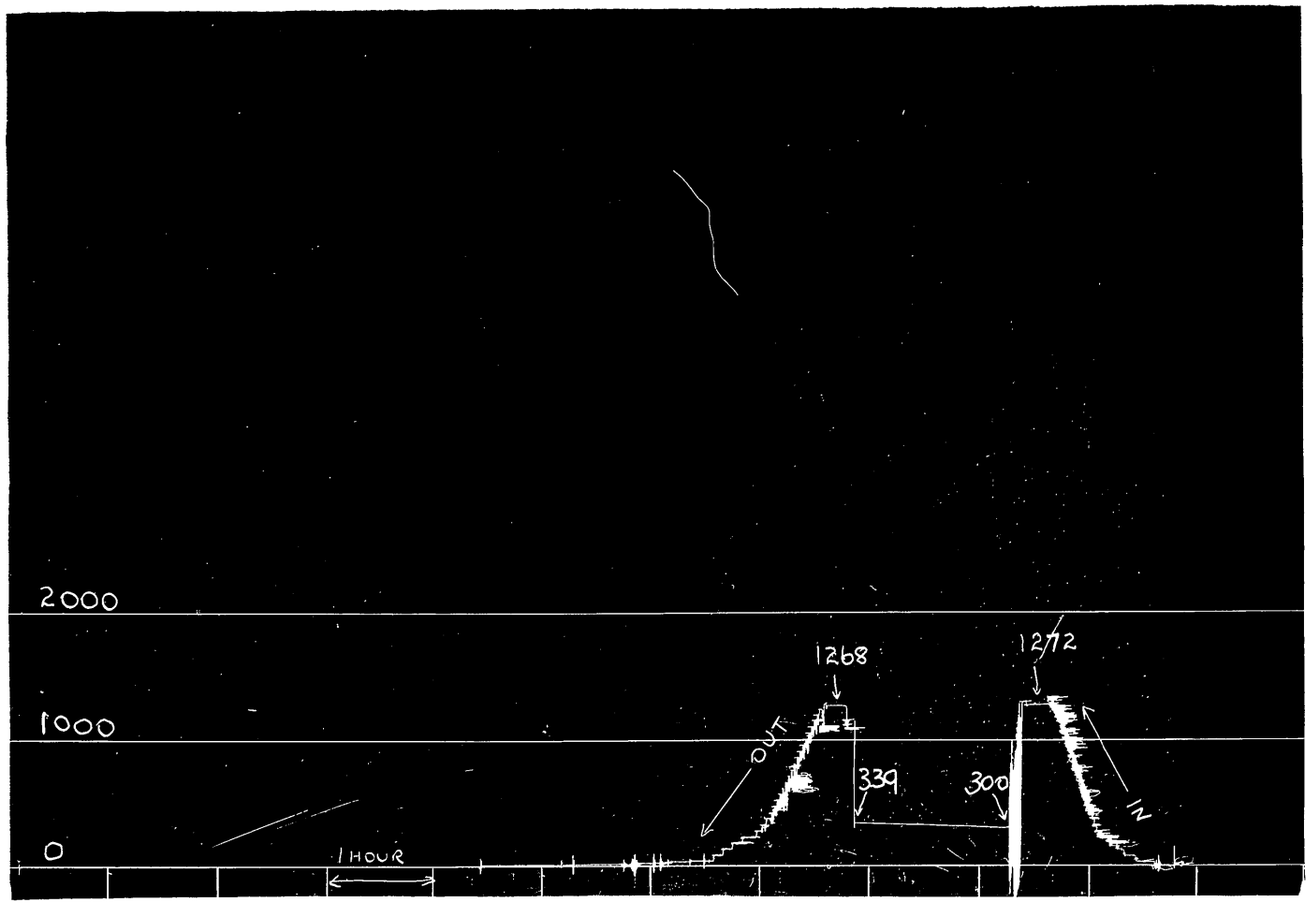
This is an enclosure indicator page.
The enclosure PE906336 is enclosed within the container PE902921 at this location in this document.

The enclosure PE906336 has the following characteristics:

ITEM_BARCODE	= PE906336
CONTAINER_BARCODE	= PE902921
NAME	= Drill Stem Test Photo, 3 of 10
BASIN	= GIPPSLAND
PERMIT	= PEP42
TYPE	= WELL
SUBTYPE	= DST
DESCRIPTION	= Drill Stem Test Photo, 3 of 10, for St Margaret Island-1
REMARKS	=
DATE_CREATED	= 4/02/66
DATE_RECEIVED	=
W_NO	= W497
WELL_NAME	= ST. MARGARET ISLAND-1
CONTRACTOR	= BJ SERVICE (AUSTRALIA)
CLIENT_OP_CO	= WOODSIDE OIL NL

(Inserted by DNRE - Vic Govt Mines Dept)

WOODSIDE (L.E.) OIL CO. FEBRUARY 4, 1966
ST.MARGARET ISLAND NO.1 TEST NO.2
RECORDER NO.2237 RECORDER DEPTH 2381'



DEPT. NAT. RES & ENV
PE906336

PE906337

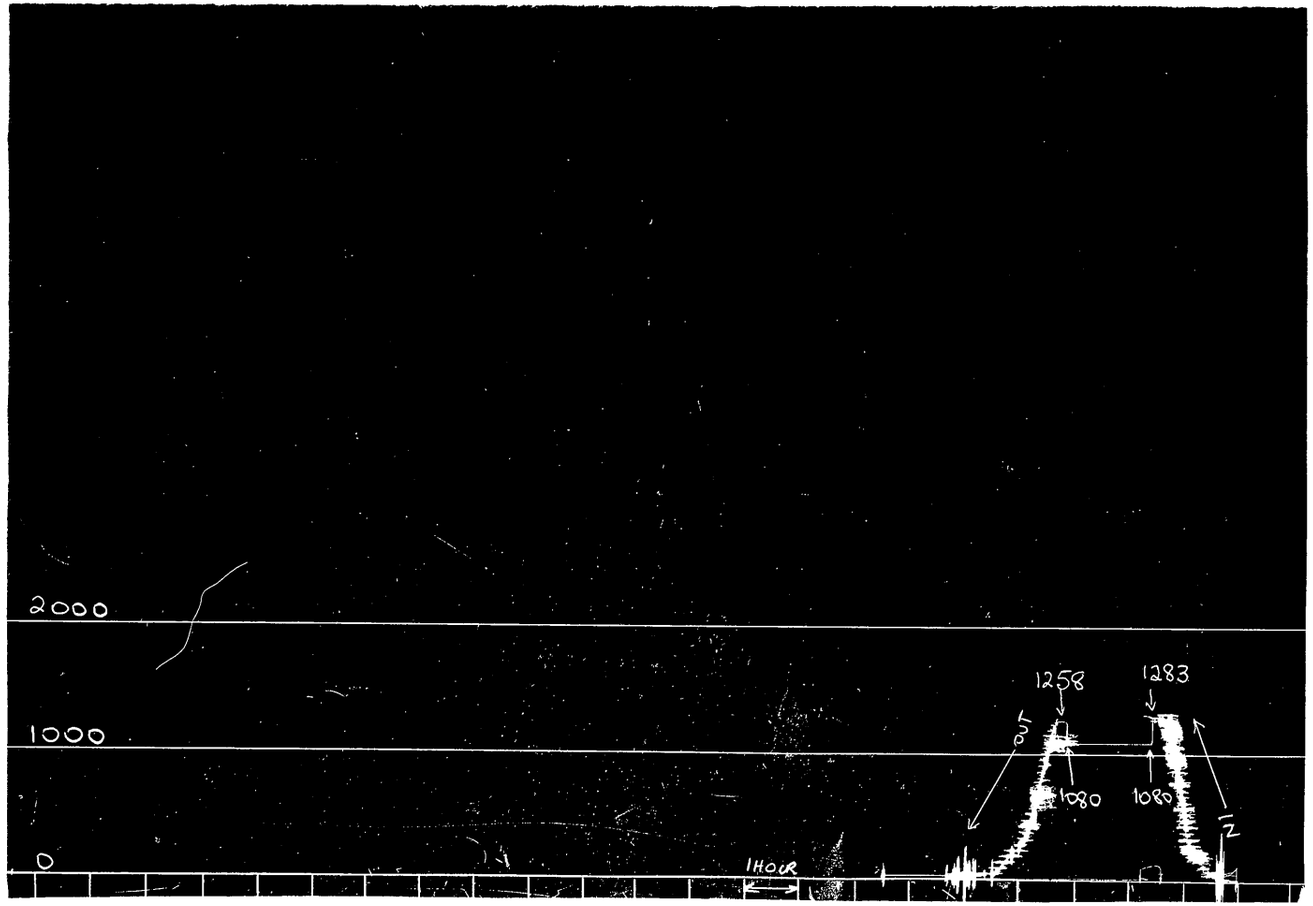
This is an enclosure indicator page.
The enclosure PE906337 is enclosed within the container PE902921 at this location in this document.

The enclosure PE906337 has the following characteristics:

ITEM_BARCODE	= PE906337
CONTAINER_BARCODE	= PE902921
NAME	= Drill Stem Test Photo, 4 of 10
BASIN	= GIPPSLAND
PERMIT	= PEP42
TYPE	= WELL
SUBTYPE	= DST
DESCRIPTION	= Drill Stem Test Photo, 4 of 10, for St Margaret Island-1
REMARKS	=
DATE_CREATED	= 4/02/66
DATE_RECEIVED	=
W_NO	= W497
WELL_NAME	= ST. MARGARET ISLAND-1
CONTRACTOR	= BJ SERVICE (AUSTRALIA)
CLIENT_OP_CO	= WOODSIDE OIL NL

(Inserted by DNRE - Vic Govt Mines Dept)

WOODSIDE (L.E.) OIL CO. FEBRUARY 4, 1966
ST.MARGARET ISLAND NO.1 TEST NO.2
RECORDER NO.2238 RECORDER DEPTH 2387'



DEPT. NAT. RES & ENV
PE906337

PE906338

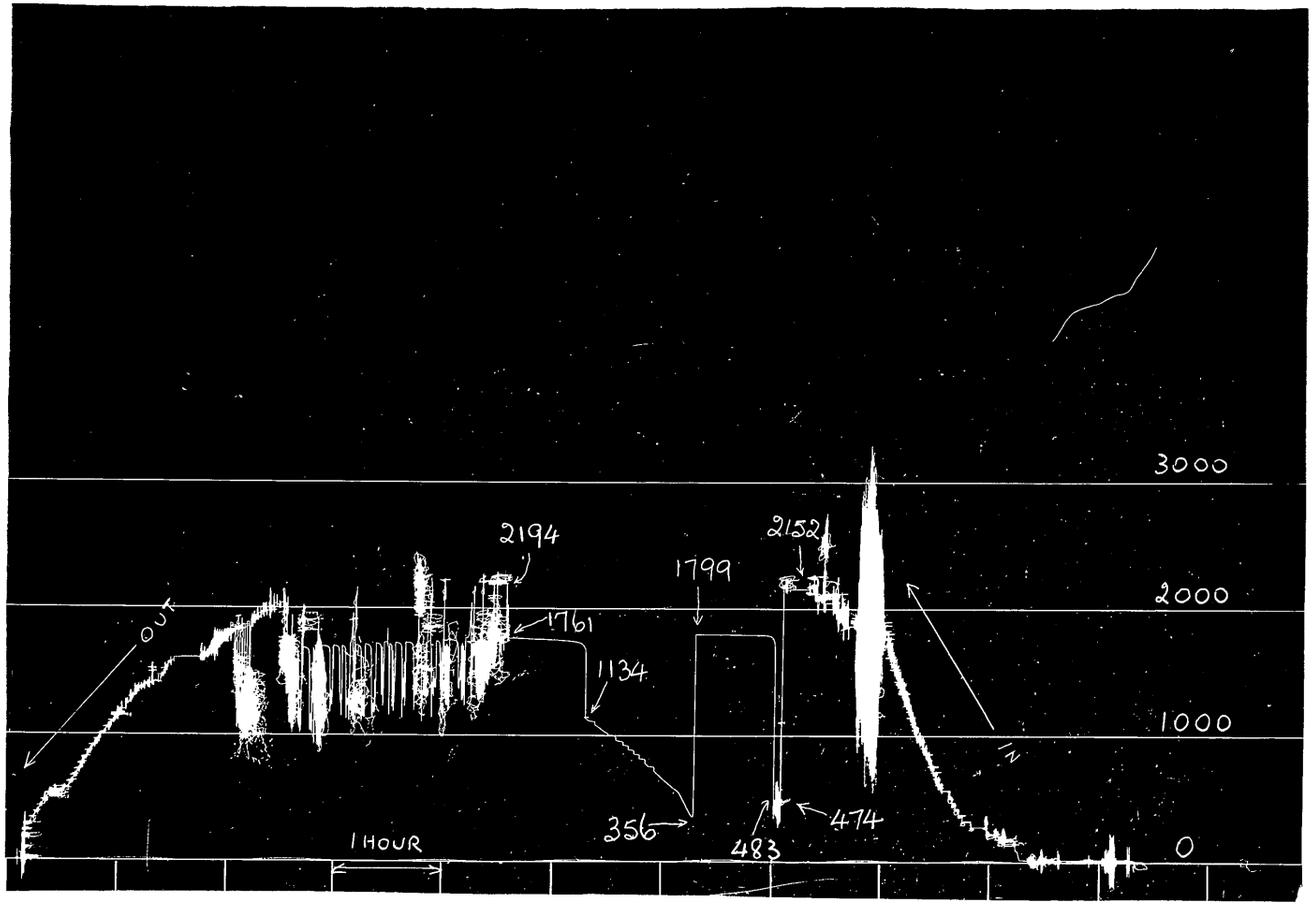
This is an enclosure indicator page.
The enclosure PE906338 is enclosed within the container PE902921 at this location in this document.

The enclosure PE906338 has the following characteristics:

ITEM_BARCODE	= PE906338
CONTAINER_BARCODE	= PE902921
NAME	= Drill Stem Test Photo, 5 of 10
BASIN	= GIPPSLAND
PERMIT	= PEP42
TYPE	= WELL
SUBTYPE	= DST
DESCRIPTION	= Drill Stem Test Photo, 5 of 10, for St Margaret Island-1
REMARKS	=
DATE_CREATED	= 13/02/66
DATE_RECEIVED	=
W_NO	= W497
WELL_NAME	= ST. MARGARET ISLAND-1
CONTRACTOR	= BJ SERVICE (AUSTRALIA)
CLIENT_OP_CO	= WOODSIDE OIL NL

(Inserted by DNRE - Vic Govt Mines Dept)

WOODSIDE (L.E.) OIL CO. FEBRUARY 13, 1966
ST.MARGARET ISLAND NO.1 TEST NO.3
RECORDER NO.2237 RECORDER DEPTH 4112'



DEPT. NAT. RES & ENV.
PE906338

PE906339

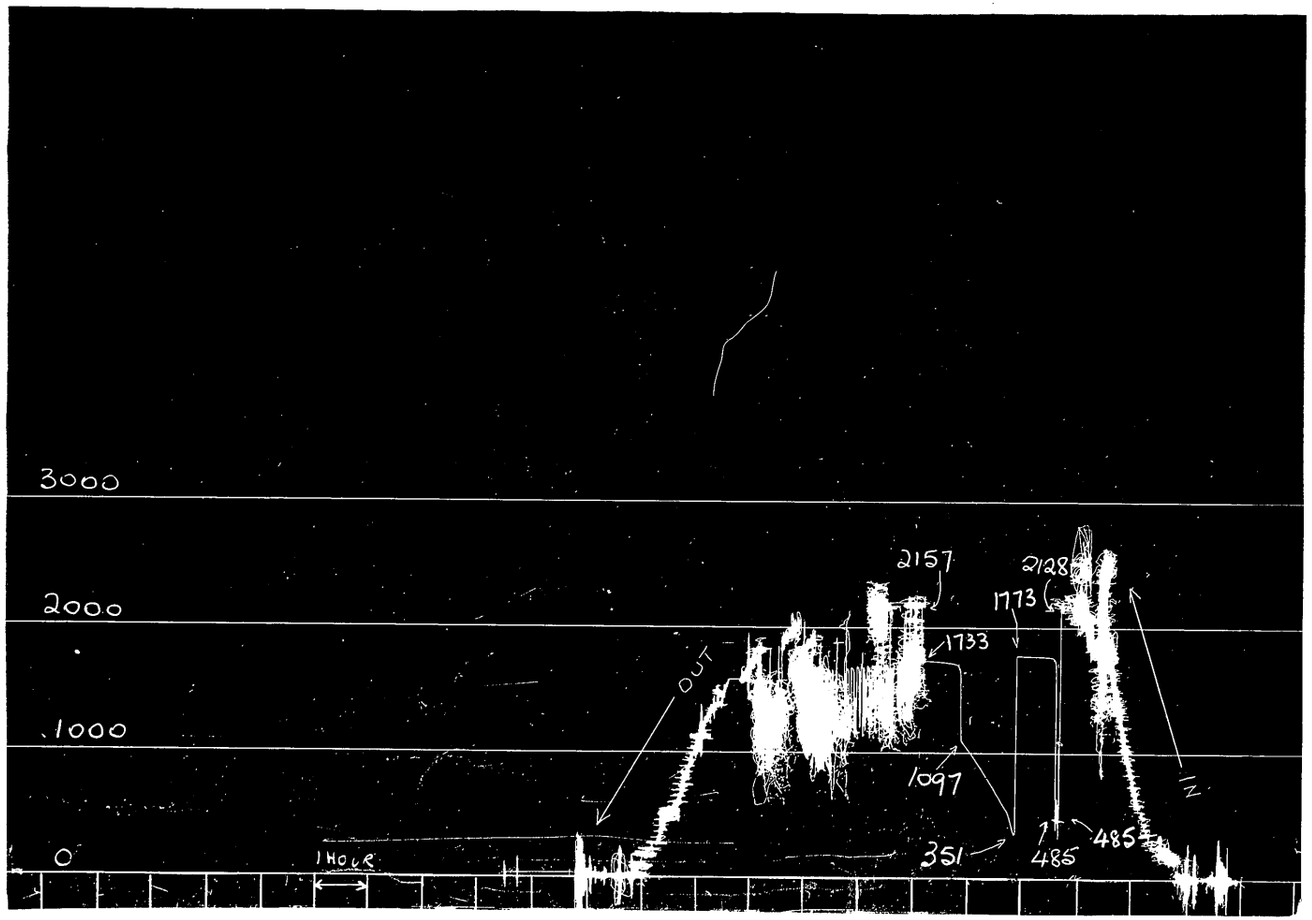
This is an enclosure indicator page.
The enclosure PE906339 is enclosed within the container PE902921 at this location in this document.

The enclosure PE906339 has the following characteristics:

ITEM_BARCODE	= PE906339
CONTAINER_BARCODE	= PE902921
NAME	= Drill Stem Test Photo, 6 of 10
BASIN	= GIPPSLAND
PERMIT	= PEP42
TYPE	= WELL
SUBTYPE	= DST
DESCRIPTION	= Drill Stem Test Photo, 6 of 10, for St Margaret Island-1
REMARKS	=
DATE_CREATED	= 13/02/66
DATE_RECEIVED	=
W_NO	= W497
WELL_NAME	= ST. MARGARET ISLAND-1
CONTRACTOR	= BJ SERVICE (AUSTRALIA)
CLIENT_OP_CO	= WOODSIDE OIL NL

(Inserted by DNRE - Vic Govt Mines Dept)

WOODSIDE (L.E.) OIL CO. FEBRUARY 13, 1966
ST.MARGARET ISLAND NO.1 TEST NO.3
RECORDER NO.2238 RECORDER DEPTH 4118'



DEPT. NAT. RES & ENV
PE906339

PE906340

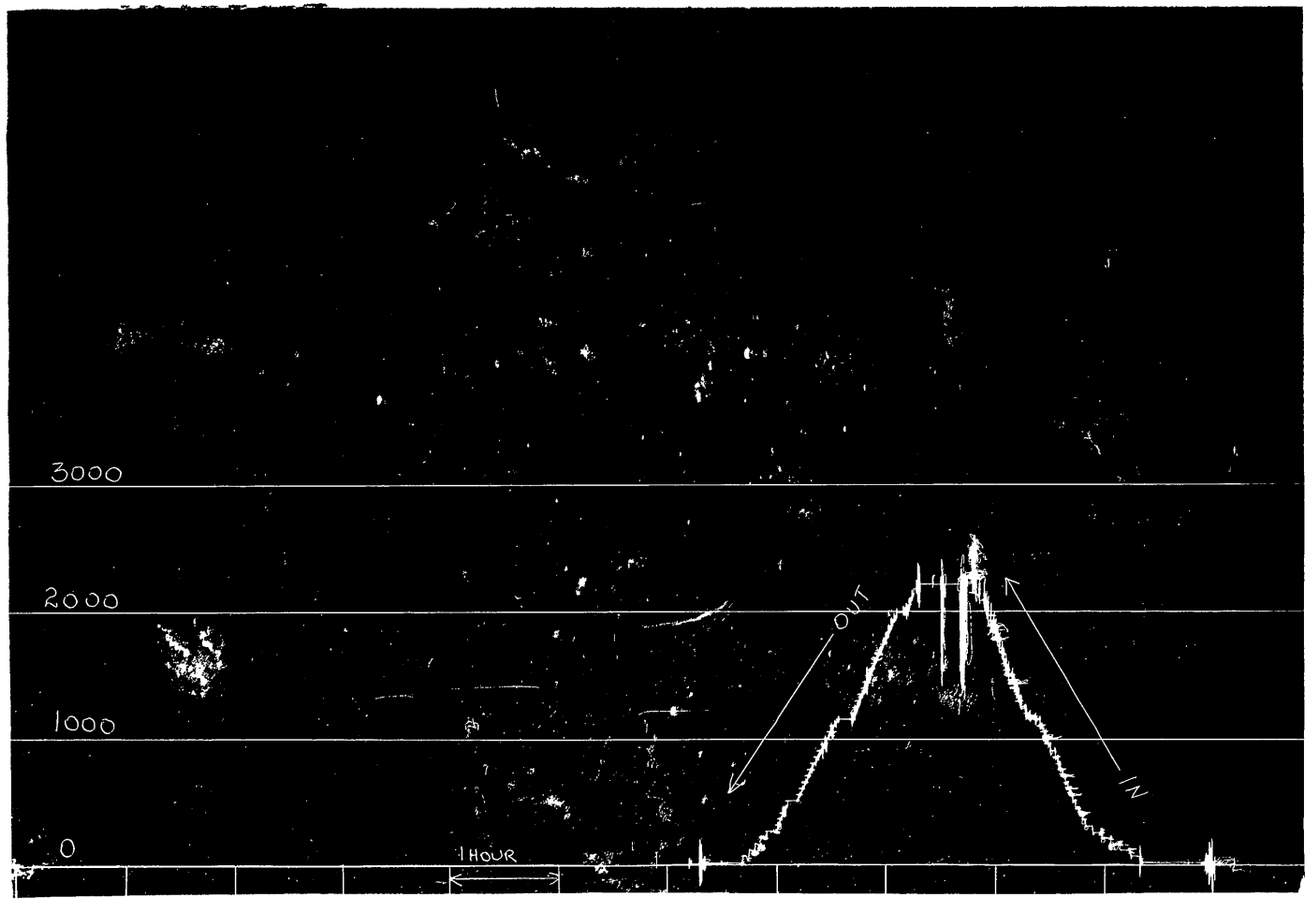
This is an enclosure indicator page.
The enclosure PE906340 is enclosed within the container PE902921 at this location in this document.

The enclosure PE906340 has the following characteristics:

ITEM_BARCODE	= PE906340
CONTAINER_BARCODE	= PE902921
NAME	= Drill Stem Test Photo, 7 of 10
BASIN	= GIPPSLAND
PERMIT	= PEP42
TYPE	= WELL
SUBTYPE	= DST
DESCRIPTION	= Drill Stem Test Photo, 7 of 10, for St Margaret Island-1
REMARKS	=
DATE_CREATED	= 14/02/66
DATE_RECEIVED	=
W_NO	= W497
WELL_NAME	= ST. MARGARET ISLAND-1
CONTRACTOR	= BJ SERVICE (AUSTRALIA)
CLIENT_OP_CO	= WOODSIDE OIL NL

(Inserted by DNRE - Vic Govt Mines Dept)

WOODSIDE (L.E.) OIL CO. FEBRUARY 14, 1966
ST.MARGARET ISLAND NO.1 TEST NO.4
RECORDER NO.2237 RECORDER DEPTH 4304'



DEPT. NAT. RES & ENV
PE906340

PE906341

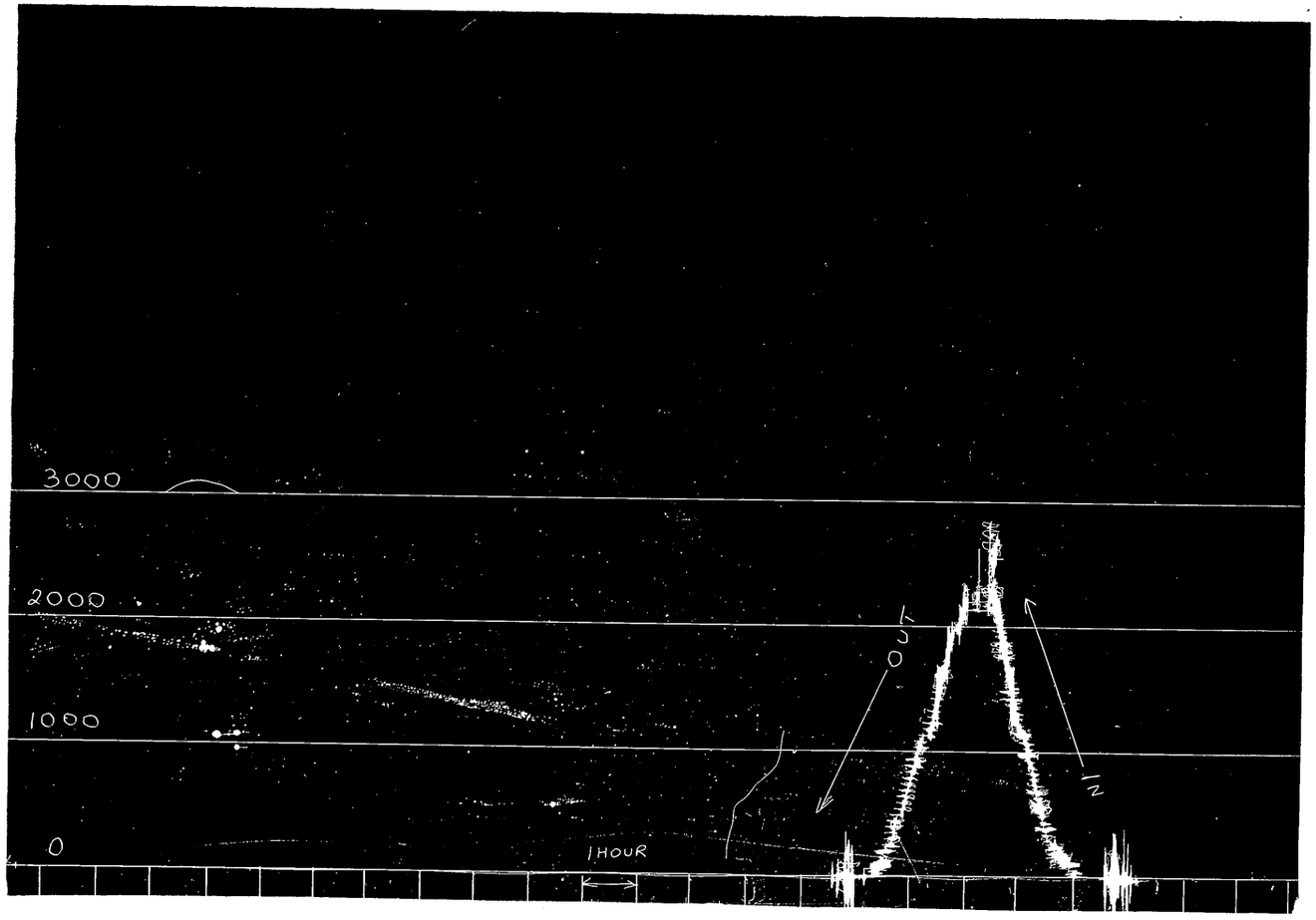
This is an enclosure indicator page.
The enclosure PE906341 is enclosed within the container PE902921 at this location in this document.

The enclosure PE906341 has the following characteristics:

ITEM_BARCODE	= PE906341
CONTAINER_BARCODE	= PE902921
NAME	= Drill Stem Test Photo, 8 of 10
BASIN	= GIPPSLAND
PERMIT	= PEP42
TYPE	= WELL
SUBTYPE	= DST
DESCRIPTION	= Drill Stem Test Photo, 8 of 10, for St Margaret Island-1
REMARKS	=
DATE_CREATED	= 14/02/66
DATE_RECEIVED	=
W_NO	= W497
WELL_NAME	= ST. MARGARET ISLAND-1
CONTRACTOR	= BJ SERVICE (AUSTRALIA)
CLIENT_OP_CO	= WOODSIDE OIL NL

(Inserted by DNRE - Vic Govt Mines Dept)

WOODSIDE (L.E.) OIL CO. FEBRUARY 14, 1966
ST.MARGARET ISLAND NO.1 TEST NO.4
RECORDER NO.2238 RECORDER DEPTH 4326'



DEPT. NAT. RES & ENV
PE906341

PE906342

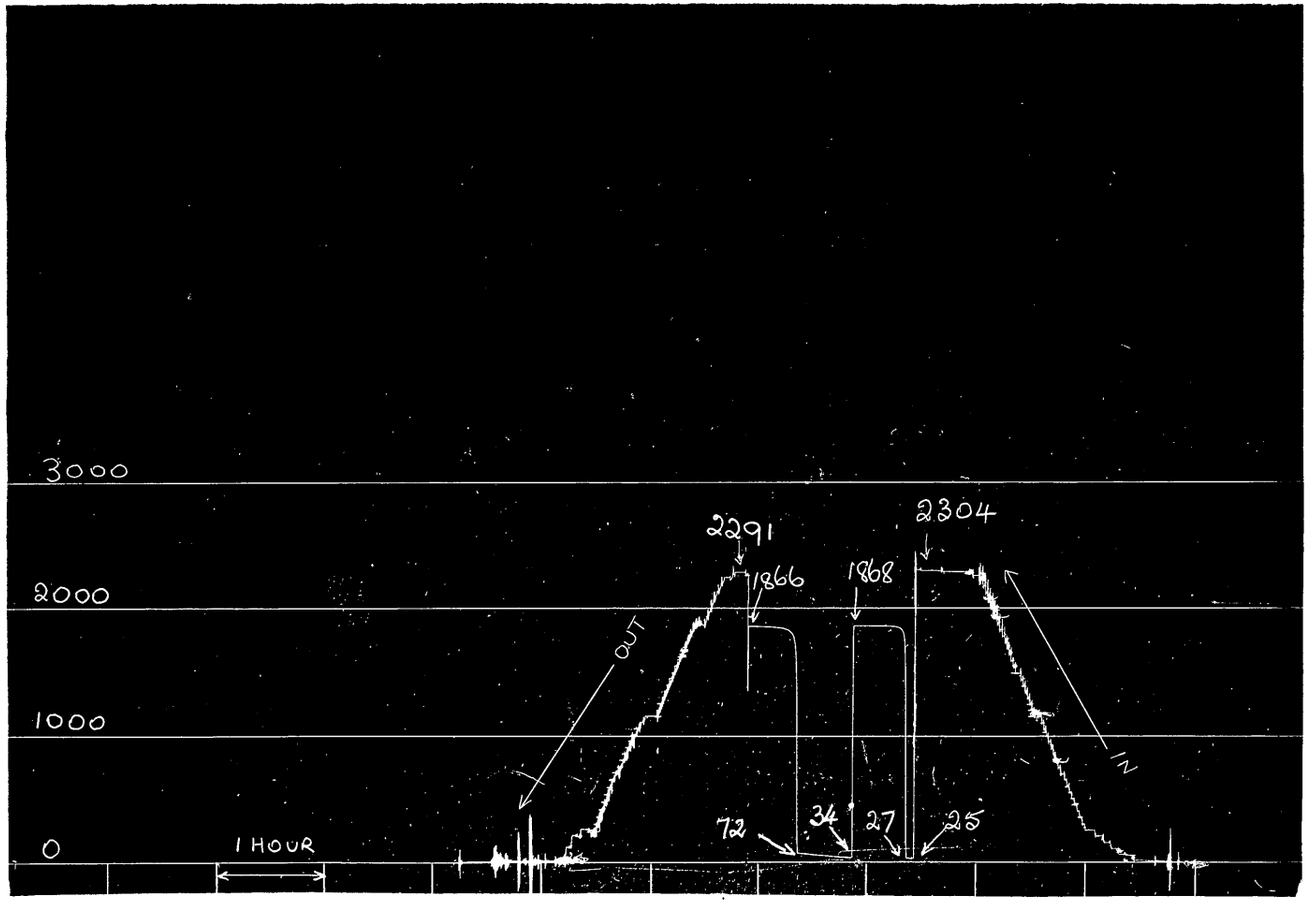
This is an enclosure indicator page.
The enclosure PE906342 is enclosed within the container PE902921 at this location in this document.

The enclosure PE906342 has the following characteristics:

ITEM_BARCODE	= PE906342
CONTAINER_BARCODE	= PE902921
NAME	= Drill Stem Test Photo, 9 of 10
BASIN	= GIPPSLAND
PERMIT	= PEP42
TYPE	= WELL
SUBTYPE	= DST
DESCRIPTION	= Drill Stem Test Photo, 9 of 10, for St Margaret Island-1
REMARKS	=
DATE_CREATED	= 15/02/66
DATE_RECEIVED	=
W_NO	= W497
WELL_NAME	= ST. MARGARET ISLAND-1
CONTRACTOR	= BJ SERVICE (AUSTRALIA)
CLIENT_OP_CO	= WOODSIDE OIL NL

(Inserted by DNRE - Vic Govt Mines Dept)

WOODSIDE (L.E.) OIL CO. FEBRUARY 15, 1966
ST. MARGARET ISLAND NO.1 TEST NO.5
RECORDER NO.2237 RECORDER DEPTH 4304'



DEPT. NAT. RES. & ENV.
PE906342

PE906343

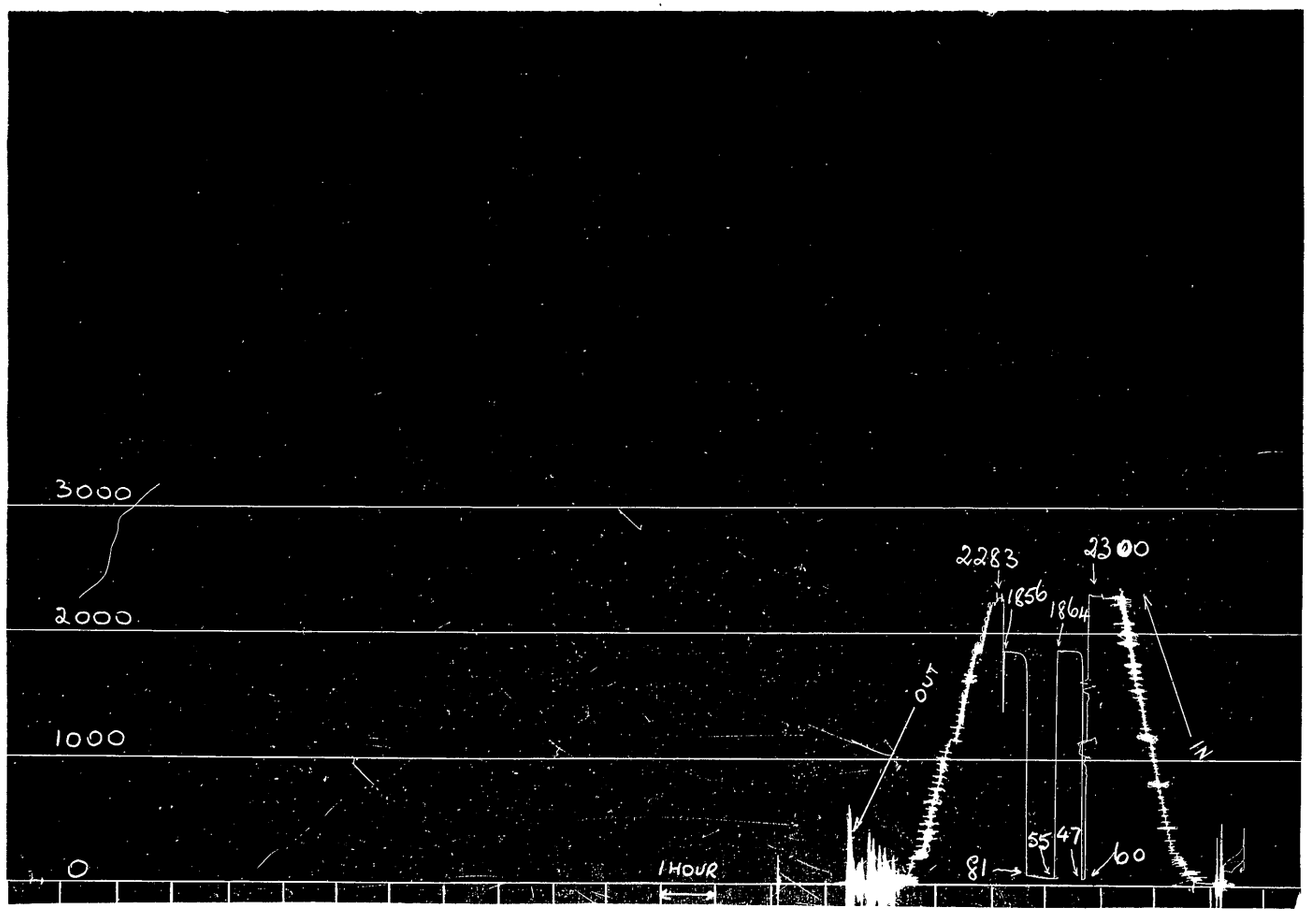
This is an enclosure indicator page.
The enclosure PE906343 is enclosed within the container PE902921 at this location in this document.

The enclosure PE906343 has the following characteristics:

ITEM_BARCODE	= PE906343
CONTAINER_BARCODE	= PE902921
NAME	= Drill Stem Test Photo, 10 of 10
BASIN	= GIPPSLAND
PERMIT	= PEP42
TYPE	= WELL
SUBTYPE	= DST
DESCRIPTION	= Drill Stem Test Photo, 10 of 10, for St Margaret Island-1
REMARKS	=
DATE_CREATED	= 15/02/66
DATE_RECEIVED	=
W_NO	= W497
WELL_NAME	= ST. MARGARET ISLAND-1
CONTRACTOR	= BJ SERVICE (AUSTRALIA)
CLIENT_OP_CO	= WOODSIDE OIL NL

(Inserted by DNRE - Vic Govt Mines Dept)

WOODSIDE (L.E.) OIL CO. FEBRUARY 15, 1966
ST.MARGARET ISLAND NO.1 TEST NO.5
RECORDER NO.2238 RECORDER DEPTH 4326'



DEPT. NAT. RES & ENV
PE906343

APPENDIX NO. 5

FIELD EVALUATION OF ST. MARGARET ISLAND NO. 1

By Dompier of Schlumberger SEACO

At bottom hole conditions: Rm=0.6 Rmf=0.38 Rmc=0.95

Rw Determination: Shally formation $\frac{PSP}{SSP}$ =0.6 α =0.6

From test Rw=0.11 ohms

Evaluation from ML: From log Rinv, Rn, tmc+chart 3-2 → Rxo

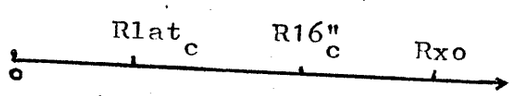
We assume dispersed shale in formation as Rw=0.11 all the ~~cament~~ current will flow through the formation water and effect of shale is small. (If shale were laminated, porosity derived from ML would be smaller).

If Sw 60-65% let us assume ROS=10 chart 3-4 → Ø col L.

If water bearing formation Ø ML will be smaller see column M.

Water saturation evaluation: Rlat, R16" corrected for hole effect (chart 2-1 + document No. 7) columns E-G.

We have:



$\frac{R16'c}{Rlat_c}$ $\frac{Rxo}{Rt}$

$\frac{Rmf}{Rw}$ = 0.35 + $\frac{R16"c}{Rlat\ c}$ + chart 4-2 → Sw limit (col.H)

Rt determination =Rlatc+R16"c+$\frac{Ri}{Rm}$ + document No. 7 → Rl (column H)

Saturation Sw = $\sqrt{\frac{FRw}{Rt}}$ → Sw (column J).

Evaluation from neutron: $Ø_i$ = Øt + Øsh $Ø_i$ = porosity index.

$Ø_i$ = Øt + Ø.5p

Percentage of shale p (column K) determined by gamma ray.

Neutron porosity corrected: ØN (col.P)

										SW			ØML			ØN
	Rnorm.	Rmv.	Rxo.	R16" a	cor.	RLAT e	cor.	SW Δ.2	Rt	Rxo./Rt Δ.2	p	ØML ROS=10	Water bearing	N cps.	Øi	
3400	4	3	11.4	8	8	7.5	7.2	>50	6.6	65	40	19	16	720	35	17
3404-20	3.6	2.9	8	7.5	7.5	7	7	>50	6.5	55	40	20	19	720	35	17
3420-30	4	3.2	3.5	8.2	8.2	8	7.8	>50	7.1	55	40	20	18	710	37	19
3430-38	4.6	3.7	11.4	11	11	9.8	8.5	>60	7.2	63	40	19	16	750	31	14
3440	3.5	2.8	8	8	8	8	7.8	>50	7.1	50	40	21	19	710	37	19
3466-70	4.5	4	8.5	7.5	7.5	7	7	>50	6.6	55	40	21	19	730	35	17
3485-91	4.8	4	10.5	10	10	9	8	>50	7.2	60	40	20	17	720	35	17
4020-4033	3.6	3	7.6	6	6	?	5/6	>50	5.5	55	35	21	20	700	37	22
4040-50	4	3.2	8.5	6	6	?		>55	5/6	60	35	20	19	720	35	20
4164-84	4	3	11.5	10	10	8	8	>50	7.2	60	25	19	16	720	35	24
4240-50	4.1	3.1	11.4	10	10	7	7	>60	6.5	65	25	19	16	820	26	16
4250-60	4.1	3.1	11.4	8	8	6	6	>55	5.5	70	25	19	16	760	30	20
4280-95	4.1	3.1	11.4	10	10	7	7	>60	6.5	65	25	19	16	720	35	24
	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P

Difficulty in interpreting these logs rises from the fact that:-

1) No real shale is present: as no shale line can be drawn a doubt is on evaluation of percentage of shale in porous formations (N-SL).
   On finding a reliable value of SP.
   On estimation of shale compaction (Sonic).
2) Porous formations are shally

HOW EACH CURVE IS AFFECTED BY PRESENCE OF SHALLY MATERIAL

1) Resistivity
   a) If p is the percentage of laminated shale of resistivity Rsh, we have the following relationship:-

$$\frac{1}{Ro} = \frac{p}{Rsh} + \frac{1-p}{Fsand}\ Rw \qquad \text{for virgin zone}$$

$$\frac{1}{R\ xo} = \frac{p}{Rsh} + \frac{1-p}{Fsand}\ Rmf \qquad \text{for flushed zone}$$

   Here p from 25 to 40% and Rsh 5 ohms (previous log)
   b) If dispersed shale with Rsh 5 ohms and Rw = 0.11, all current will flow through the formation water and effect of shale is small.
2) Neutron =
   The neutron response being proportional to the porosity index, shale affects the reading.
   Relation $\emptyset i = \emptyset 0 + \emptyset$ shale is independent of shale distribution and applicable to both the laminated and dispersed shale.
   If we assume $\emptyset$ sh 50%

$$\emptyset i = \emptyset t + 0.5p$$

3) Sonic
   a) If laminated shale, after correction for shale compaction we can assume the following relationship:

$$\emptyset s\ cor = \emptyset t + 0.33p$$

   b) If dispersed shale, the shally material is assumed dispersed in the fluid contained in the pores of formation.
   In this case the sound velocity of mixture (shale + fluid) is close to the velocity of clean fluid and we have the following relationship:-

$$\emptyset s\ cor = \emptyset t + p$$

4) P.S.

Presence of shale reduces SP of factor = $\frac{PSP}{SSP}$

Taking in account that Rw = 0.11 and PSP = - 25mv

α = 0.6

CONCLUSION: Due to the high percentage of shale in formations considered (up to 40%) correction on index porosity Øi must be done cautiously. Effect of shale on sonic depends greatly on distribution (laminated = 0.33p or dispersed = p).

Core porosities and core descriptions should help.

More accurate approach to determine Ø is the combination formation density - neutron: The effect of shale on these tools is known and independent of shale distribution.

APPENDIX NO. 6

THE CONTINUOUS DIPMETER SURVEY carried out in this well covers the basal Latrobe Valley Coal Measures and all formations below.

2600 to 2950 feet. (Latrobe Valley Coal Measures).
This interval included the basal sandstone of the Latrobe Valley Coal Measures. The dip azimuth is approximately 330 degrees while dips range from 1 degree to 14 degrees. This variation is probably due to sedimentary processes.

2950 to 3039 feet. (Narracan Group).
The values of dip and dip azimuth are extremely variable over this interval. Although the dip is probably slightly higher than that of the Latrobe Valley Coal Measures, dip azimuth is similar i.e. 330 degrees.

3039 to 3140 feet. (Strzelecki Formation).
This interval is composed of clay with persistent dips as high as 25 degrees. The dip azimuth is low and is approximately 30 degrees. Because of this change in azimuth, the top of the Strzelecki Group has been placed at 3039 feet. The dip azimuth of the Strzelecki throughout most of this well is approximately 30 degrees.

3140 to 3276 feet.
Dips again are low throughout this section and average approximately two degrees. Dip azimuth, however, is much greater i.e. 305 degrees.

3276 to 4666 feet.
This interval represents most of the Strzelecki Formation. Dip aximuth does not change significantly, and varies from slightly west of north i.e. 345 degrees to slightly east of north i.e. 30 degrees. Dips vary considerably, however, and range from one to 30 degrees. It is significant that high dips are very often present in the porous intervals while non porous intervals exhibit lower dips i.e. 1 to 2 degrees. This is particularly true across the interval 4050 to 4400 feet. This interval contains most of the porous Strzelecki Group as well as a majority of the high dips.

2nd Copy

PALYNOLOGICAL EXAMINATION OF CORES & SIDEWALL CORES FROM THE GOLDEN BEACH WEST NO.1, ST.MARGARETS ISLAND NO.1, SUNDAY ISLAND NO.1 AND DUTSON DOWNS NO.1 WELLS.

by J. G. Douglas, M.Sc.

Cores and sidewall cores examined from GoldenBeach West No.1 to 5022 feet (Sidewall Core 8), I regard as Lower Miocene - Eocene in age. Core 7 (6840-6860 feet) is probably from beds of Palaeocene - U.Cretaceous age.

Cores from 7320 and 7508 feet contained undiagnostic ~~ar~~ articular fragments with no indication of Lower Cretaceous (Stryelecki Group Age).

St.Margarets Island No.1, cores from the deepest beds sampled (3795 and 4408 feet) were barren.

Sunday Island No.1, cores from 4450 feet and 5795-5805 feet were also barren.

Dutson Downs No.1, core to 4800 feet was barren. Core from 5120-5130 feet was from beds of probable Palaeocene age. Core from 5673 feet was barren. Core at 6099 feet (deepest received), contained leaf cuticles, and some undiagnostic ~~fern~~ fern microspores. Again no characteristic L.Cretaceous taxa were present.

That is, no undoubtedly L.Cretaceous microfossils were isolated by me from any of these wells.

J. G. Douglas,
Geologist. 4/5/66.

APPENDIX No. 7.

GEOLOGICAL SURVEY OF VICTORIA

Unpublished Report 10/1966

By:- David J Taylor.

BIOSTRATIGRAPHIC LOG - ST. MARGARETS ISLAND NO. 1.

Drilled by: Woodside (Lakes Entrance) Oil Co., in the Gippsland Basin.

Casing program: 13⅜" set at 450: 95/8" set at 2603'.

Datum (K. B.) = +11' A. S. L.

Cores:- Core 1 (850-870') and Core 2 (1214-1234') contained fauna. Side wall core at 769', 788', 1810', 1939', 1960', 1964' & 1966' contained fauna.

Cutting: examined at 50' interval down to 4000'. Mud contamination was miminal.

140- 580' Quaternary mollusca and foraminiferal faunas of shallow water aspect, indispersed with brown coal lenses. The faunas and lithologies agree with those described by Hocking (1965) from the Bushy Park beds. Hocking (l. c. p. 2) gives a thickness of 770 feet for these beds in Woodside No. 2 Well.

580- 620' No faunas. Probably referable to Bushy Park Beds.

620- 830' "Jemmy's Point Fauna". KALIMNAN STAGE = LOWER PLIOCENE. Carbonaceous horizons are reported within this interval and have been noted by Hocking (l. c.) from the Jemmy's Point Formation in other wells.

J.P. 90 - 620

J.P. 620 - 822

830-1100' UPPER and MIDDLE MIOCENE shallow water fauna assignable to Taylor's (1965) Zonules A to D.

1100-1800' MIDDLE and LOWER MIOCENE shallow (shoal) water fauna, including Amphistegina lessonii and Operculina victoriensis. The nature of the fauna does not permit biostratigraphic differentiation.

1800-1960' OLIGOCENE - Taylor's Zonule L fauna, typical of the Lakes Entrance Formation.

1960-1990' LOWER OLIGOCENE - Taylor's Zonule J, including the diagnostic planktonic species Globorotalia tentaculosa. This fauna represents the initiation of the marine Tertiary transgression in the Woodside area. Hocking (1965, p. 11) reports it from Woodside No. 1 & 2 Wells, though he refers to it as "Faunal unit 4".

1990-T, D. No new foraminiferal faunas were found, suggesting that there was no marine influence in the section till mid-Tertiary times.

REFERENCES:

HOCKING, J. B., 1965. Characteristics of the Tertiary Formations of southern and south-eastern Gippsland. Geol. Surv. Vict., Unpubl. rep. 5/1965.

TAYLOR, D. J., 1965. The mid-Tertiary foraminiferal sequence - Esso Gippsland Shelf No. 1 Well. Appendix in Comm. Petrol. Search Subsidary Acts Publ. (in press).

PE902923

This is an enclosure indicator page.
The enclosure PE902923 is enclosed within the container PE902921 at this location in this document.

The enclosure PE902923 has the following characteristics:

ITEM_BARCODE	= PE902923
CONTAINER_BARCODE	= PE902921
NAME	= Stratigraphic Column
BASIN	= GIPPSLAND
PERMIT	=
TYPE	= WELL
SUBTYPE	= STRAT_COLUMN
DESCRIPTION	= Generalised Stratigraphic Column
REMARKS	=
DATE_CREATED	=
DATE_RECEIVED	= 1/01/66
W_NO	= W497
WELL_NAME	= St Margaret Island-1
CONTRACTOR	= WOODSIDE OIL CO
CLIENT_OP_CO	= WOODSIDE OIL CO

(Inserted by DNRE - Vic Govt Mines Dept)

PE902924

This is an enclosure indicator page.
The enclosure PE902924 is enclosed within the container PE902921 at this location in this document.

The enclosure PE902924 has the following characteristics:

ITEM_BARCODE	= PE902924
CONTAINER_BARCODE	= PE902921
NAME	= Regional Geology Map
BASIN	= GIPPSLAND
PERMIT	= PEP 42
TYPE	= WELL
SUBTYPE	= GEOL_MAP
DESCRIPTION	= Regional Geology Map Southwest Gippsland showing Margaret Island (enclosure from WCR) for St. Margaret Island-1
REMARKS	=
DATE_CREATED	=
DATE_RECEIVED	= 31/03/66
W_NO	= W497
WELL_NAME	= St Margaret Island-1
CONTRACTOR	= WOODSIDE (LAKES ENTRANCE) OIL CO NL.
CLIENT_OP_CO	= WOODSIDE (LAKES ENTRANCE) OIL CO NL.

(Inserted by DNRE - Vic Govt Mines Dept)

PE902925

This is an enclosure indicator page.
The enclosure PE902925 is enclosed within the container PE902921 at this location in this document.

The enclosure PE902925 has the following characteristics:

ITEM_BARCODE	= PE902925
CONTAINER_BARCODE	= PE902921
NAME	= Geological Section
BASIN	= GIPPSLAND
PERMIT	= PEP 42
TYPE	= WELL
SUBTYPE	= CROSS_SECTION
DESCRIPTION	= Geological Section From Wilson's Promontory to Woodside No 1 (enclosure from WCR) for St. Margaret Island-1
REMARKS	=
DATE_CREATED	=
DATE_RECEIVED	=
W_NO	= W497
WELL_NAME	= St Margaret Island-1
CONTRACTOR	= WOODSIDE (LAKES ENTRANCE) OIL CO NL.
CLIENT_OP_CO	= WOODSIDE (LAKES ENTRANCE) OIL CO NL.

(Inserted by DNRE - Vic Govt Mines Dept)

PE906333

This is an enclosure indicator page.
The enclosure PE906333 is enclosed within the container PE902921 at this location in this document.

The enclosure PE906333 has the following characteristics:

ITEM_BARCODE	= PE906333
CONTAINER_BARCODE	= PE902921
NAME	= Geological Section
BASIN	= GIPPSLAND
PERMIT	= PEP42
TYPE	= WELL
SUBTYPE	= CROSS_SECTION
DESCRIPTION	= Geological Section (Pre-Drill) of St.Margaret Island-1
REMARKS	=
DATE_CREATED	= 30/03/66
DATE_RECEIVED	=
W_NO	= W497
WELL_NAME	= ST. MARGARET ISLAND-1
CONTRACTOR	=
CLIENT_OP_CO	= WOODSIDE OIL NL

(Inserted by DNRE - Vic Govt Mines Dept)

PE601518

This is an enclosure indicator page.
The enclosure PE601518 is enclosed within the container PE902921 at this location in this document.

The enclosure PE601518 has the following characteristics:

ITEM_BARCODE	= PE601518
CONTAINER_BARCODE	= PE902921
NAME	= Composite Well Log
BASIN	= GIPPSLAND
PERMIT	=
TYPE	= WELL
SUBTYPE	= COMPOSITE_LOG
DESCRIPTION	= Composite Well Log Woodside Lakes Entrance Oil Co St Margaret Island No 1
REMARKS	=
DATE_CREATED	=
DATE_RECEIVED	=
W_NO	= W497
WELL_NAME	= St Margaret Island-1
CONTRACTOR	= WOODSIDE OIL CO
CLIENT_OP_CO	= WOODSIDE OIL CO

(Inserted by DNRE - Vic Govt Mines Dept)

PE601519

This is an enclosure indicator page.
The enclosure PE601519 is enclosed within the container PE902921 at this location in this document.

The enclosure PE601519 has the following characteristics:

ITEM_BARCODE	= PE601519
CONTAINER_BARCODE	= PE902921
NAME	= Composite Well Log
BASIN	= GIPPSLAND
PERMIT	=
TYPE	= WELL
SUBTYPE	= COMPOSITE_LOG
DESCRIPTION	= Composite Well Log St Margaret Island No 1
REMARKS	=
DATE_CREATED	=
DATE_RECEIVED	=
W_NO	= W497
WELL_NAME	= St Margaret Island-1
CONTRACTOR	= WOODSIDE OIL CO
CLIENT_OP_CO	= WOODSIDE OIL CO

(Inserted by DNRE - Vic Govt Mines Dept)

PE603661

This is an enclosure indicator page.
The enclosure PE603661 is enclosed within the container PE902921 at this location in this document.

The enclosure PE603661 has the following characteristics:

ITEM_BARCODE	= PE603661
CONTAINER_BARCODE	= PE902921
NAME	= Continuous Dipmeter Log
BASIN	= GIPPSLAND
PERMIT	= PEP42
TYPE	= WELL
SUBTYPE	= WELL_LOG
DESCRIPTION	= Continuous Dipmeter Log for St. Margaret Island-1
REMARKS	=
DATE_CREATED	= 19/02/66
DATE_RECEIVED	=
W_NO	= W497
WELL_NAME	= ST. MARGARET ISLAND-1
CONTRACTOR	= SCHLUMBERGER
CLIENT_OP_CO	= WOODSIDE OIL NL

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